

— *Revised Report* —

An Anthropological Study of the Significance of the Dugong in Okinawa Culture

Prepared for:

Commandant
US Marine Corps
Washington, D.C.

Under Contract N62742-04-D-1855, Task Order 0034
with
Department of the Navy
Naval Facilities Engineering Command, Pacific
Pearl Harbor, HI 96860-7300

March 2010

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Commandant, US Marine Corps, Washington D.C.

— *REVISED REPORT* —

**AN ANTHROPOLOGICAL STUDY OF THE SIGNIFICANCE OF
THE DUGONG IN OKINAWA CULTURE**

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I. INTRODUCTION

At the request of Headquarters, US Marine Corps (HQ USMC) and under contract to Naval Facilities Engineering Command, Pacific (NAVFAC Pacific), International Archaeological Research Institute, Inc. (IARII) has undertaken a study of the significance of the dugong, a marine mammal, in Okinawan culture. The research was conducted under Modifications 1, 2, 3, and 4 to Task Order 0034 under Contract N62742-04-D-1855 with NAVFAC Pacific. The four amendments to the task order modified a project to conduct archival research and informant interviews concerning past settlement and land use within Marine Corps Base Camp (MCB) Butler Central Training Area on Okinawa, Japan. The modifications to the Statement of Work (SOW) involved extending the archival research and informant interviews to include an anthropological and biological study of the dugong. Work for this project was coordinated with Ms. Valerie Curtis, Navy Technical Representative, and Dr. Sue Goodfellow, Cultural Resources Specialist, Headquarters, US Marine Corps.

Primary tasks include obtaining information on the nomination and designation of the dugong as a cultural property, reviewing the available literature and preparing anthropological and biological annotated bibliographies of articles, reports, and documents discussing the dugong in Okinawa and the other Ryukyu islands, conducting interviews with knowledgeable informants about the dugong and particularly its role in Okinawa culture, and preparing a report summarizing the results of the study.

OKINAWA PROJECT LOCATION

The area of concern for this project is the chain of islands that extend to the southwest from Kyushu, the southernmost of the main islands of Japan. This island chain, called the Ryukyu Islands, extends almost 1,300 kilometers (km) from Kyushu to the island of Yonaguni, about 150 km northeast of the island of Taiwan (Fig. 1). Today the entire archipelago is a part of the nation-state of Japan.

This archipelago can be divided into four main island clusters, the Amami Island group in the northeast, the Okinawa group in the center, and the Miyako and Yaeyama Island groups in the southwest (Fig. 2). The latter two together are sometimes called Sakishima (Southern Islands). Politically, the Amami Islands are a part of the Japanese prefecture of Kagoshima, most of which constitutes the southern portion of Kyushu Island. The remainder of the islands lie within the prefecture of Okinawa.

The island of Okinawa in the Okinawa Island group is the largest and most populous of the Ryukyu Islands. It is a narrow island, stretching approximately 104 kilometers (km) northeast-southwest, with an average width of only about 10 km (Fig. 3). It has a land area of 1,188 sq km and a population of 1.27 million people as of 2008; most of whom are concentrated in the south-central part of the island. Politically the island is divided into 41 municipalities (see Fig. 3). The proposed Futenma Replacement Facility is to be built along the east coast of Okinawa (Fig. 4).

For those readers unacquainted with Okinawa, it is important to realize that, while today a part of Japan, Okinawa has an ethnically distinct native population, a language that, although closely related to Japanese, is a separate language, and a prehistory and history different in many ways from that of the rest of Japan. It was only in 1879 that the Ryukyu Kingdom, which ruled the Ryukyu Islands from Shuri in central Okinawa, was abolished and Okinawa became fully integrated into the Japanese state. Since then,

the World War II Battle of Okinawa and the 27-year American occupation of the island have further maintained Okinawa's distinctiveness from the main Japanese islands.

THE DUGONG

The dugong is a marine mammal belonging to the Sirenian order. The order Sirenia also includes manatees, an Atlantic Ocean family whose four species are not only taxonomically close and anatomically similar to dugongs, but are also similar in terms of physiology, behavior, diet, and habitat. In the family Dugonidae itself, there is only a single extant species, *Dugong dugon*, which inhabits the tropical and subtropical waters of the Indian and western Pacific Oceans.

The dugong occurs throughout the Indo-Pacific region, from the coasts of East Africa east to the Pacific islands of Vanuatu and Palau, along some 140,000 km of coastline in over 40 countries. It seems to be restricted to subtropical and tropical waters, which are also where the seagrasses it feeds upon grow. Dugongs are most common in the waters off northern Australia, where perhaps 85 percent of dugongs are found. For the most part, elsewhere, including Okinawa, only relict populations remain.

Dugongs are the only living marine mammals that subsist wholly on plants and that live entirely in the ocean. They eat mainly seagrasses that flourish on shallow offshore reefs. These animals grow to about 3.3 m in length and 400 kg in weight, with little difference in size or form between the sexes. The dugong are slow-moving animals that, while usually living near shorelines, are capable of covering vast expanses of ocean. Sightings of the female dugong breast-feeding their young are said to have given rise to the legends of mermaids.

The Ryukyu Islands appear to be the northernmost extension of the normal range for dugong. The dugong are known historically to have lived throughout the Ryukyu archipelago from the Sakishima Islands in the southwest to the Amami Islands off the south coast of Kyushu. Recent sightings, however, have been limited to the waters off the island of Okinawa itself.

RESEARCH PERSONNEL AND SCHEDULE

The research team for this study consists of archaeologists, an anthropologist, a biologist, an archival researcher, and translators. Each individual is associated with one of four research organizations. Archaeologists, Dr. David Welch and Ms. Judith McNeill from International Archaeological Research Institute, Inc., Honolulu, coordinated the project, participated in the informant interviews, edited the annotated bibliographies, and prepared the introductory, archaeological, and summary chapters. The cultural anthropologist, Dr. Arne Røkkum, professor at the University of Oslo, was responsible for taking the lead role in the interviews, summarizing the significance of those interviews, and preparing the chapter addressing interpretation of the history and beliefs concerning the dugong and the cultural significance of the dugong in present Okinawan culture. The biologist, Dr. Thomas Jefferson, of Claymene Enterprises in San Diego, undertook the literature review, preparation of the biological annotated bibliography, and writing of the chapter on dugong biology. Researchers from ARCGEO, Inc. (ARCGEO) in Nishikawa, Okinawa, undertook the literature review of Japanese sources, prepared the anthropological annotated bibliography, arranged, participated in, and recorded the interviews, prepared summary translations of critical literature references and of the interviews, and prepared a brief summary of their archival research. The team was led by archaeologist Mr. Taku Mukai, with the primary research and interviews conducted by archival researcher and archaeologist Mr. Naoki Higa, and translations prepared by Mr. Takashi Miyagi and Ms. Nariko Yogi. Mr. Masayuki Yonaha, MCB Camp Butler

archaeologist, played a lead role in contacting relevant persons in Okinawa government agencies and participated in the interviews.

Research for the project was initiated in July 2009 and the literature reviews and informant interviews were completed in November 2009.

PROJECT BACKGROUND

The US Marine Corps has facilities on, and conducts operations around, the island of Okinawa. The Government of Japan (GOJ) plans to build a new airfield and heliport for the Marine Corps called the Futenma Replacement Facility (FRF) off the east coast of Okinawa. The FRF will replace the current facility used by the Marines at Marine Corps Air Station (MCAS) Futenma, which is located in the middle of a dense urban area in the heart of Ginowan City. MCAS Futenma is scheduled for closure and return to the Government of Japan.

The plan is for the FRF to be built primarily on reclaimed land within Henoko and Oura Bays off the east coast of Okinawa. The planned location (Fig. 4), in the municipality of Nago City, is at the northeast end of Marine Corps Camp Schwab and offshore of the camp in the shallow Henoko Bay along the Henoko coast and in the southwest corner of Oura Bay, a larger bay that cuts a deep indentation into the east Nago coast (Okinawa Defense Bureau 2009).

The planned location covers an area that contains seagrass beds, which include grass species that are the preferred food of the dugong. The dugong (*Dugong dugon*), which is listed as an endangered species, inhabits the area, and there is thus a need for the Marine Corps to fully understand the historical relevance and biological significance of this species in the area. Because most recent sightings of dugong in the Ryukyu Islands occur in the waters off the east coast of Okinawa in an area that includes the FRF and because the reef off Henoko Bay contains seagrass beds, there is a concern that construction of the new airfield might adversely affect this endangered species and critical elements of its habitat, primarily meaning the seagrass beds.

As well as being an endangered species, the dugong has been designated a natural monument under the Government of Japan (2004) Law for the Protection of Cultural Properties. Natural monuments are one of three types of monument, a category which also includes historic ruins (essentially archaeological sites) and places of scenic beauty, that are designated as cultural properties. Natural monuments are “animals, plants and minerals which hold outstanding significance in academic value, and represent the country of Japan” and “animals that have distinctive characteristics and habitat in Japan” (GOJ 2004). Thus, to be designated a natural monument, an animal species must have some special relationship to Japan (or a part of Japan) or the Japanese people. The dugong was selected for listing as a natural monument because it is an animal species which, while not endemic to Japan (that is, native and found exclusively in Japan), is considered a characteristic Japanese animal deserving of preservation.

Under US Department of Defense Japan Environmental Governing Standards (JEGS), 2008, and Section 402 of the National Historic Preservation Act (16 U.S.C. 470a-2), federal agencies must take into account the effects of their actions on properties listed on the World Heritage List or on the applicable country's equivalent of the National Register of Historic Places (for Japan, the Law for the Protection of Cultural Properties), for purposes of avoiding or mitigating any adverse effects on such properties. Because the US Marine Corps has installations in Okinawa and conducts operations in the waters around Okinawa, HQ USMC needs to obtain a better understanding of the cultural significance of the Okinawa dugong and what types of actions would constitute an adverse effect on this cultural property.

In addition, as a result of a lawsuit brought by a group of plaintiffs [the case of Okinawa Dugong (*Dugong dugon*), *et al.* v. Robert M. Gates, Secretary of Defense, *et al.*], the Marine Corps has been asked by American courts to conduct a study that will seek to reveal the significance of the dugong in Okinawan culture and how this significance relates to its designation as a natural monument and cultural property in Japan. This study is meant to supplement the GOJ Draft Environmental Impact Assessment (EIA) (Okinawa Defense Bureau 2009) prepared for the FRF project.

The purpose of this report is to present information which has been gathered concerning the cultural significance of the dugong and the reasons why it has been designated a cultural property.

II. GOALS AND METHODS OF THE RESEARCH

PROJECT GOALS

The Scope of Work (SOW) for this study called for the project team to:

Conduct background and documentary archival research for geographical, archaeological, folklore, historical, ethnographic and any other type of cultural resources information related to the dugong (*Dugong dugon*) in Okinawa culture. The contractor shall also analyze available and pertinent biological information on the dugong and seagrass beds and the information received from reference (i); and provide input as to dugong behavior, migratory movements, and feeding patterns, insofar as those topics are relevant to the dugong's status as a cultural and historic property of Japan.

The objective of this study is to answer the following questions:

1. What is the basis for the cultural significance of dugong in Okinawa?
2. Is the cultural significance ascribed to the Okinawa dugong tied to specific place names or settings?
3. How is the historical cultural significance of the dugong manifested in modern society? For example, is the cultural significance of the Okinawa dugong tied to any cultural practice(s), such as festivals or rituals? If so, are these practices conducted throughout Okinawa, or are they more local in occurrence? What is the nature and time depth of the practice(s)?

SCOPE OF WORK

The SOW sets out six sequential tasks, to be completed for this project:

- Task 1. Data Collection on Dugong Nomination: Obtain all available information documenting the designation of the Okinawa dugong as a cultural property, including its original designation as a cultural monument by the Ryukyu Prefecture, and its subsequent designation as a national monument in 1972. Of particular importance are documents detailing the rationale for the designations, and the characteristics of the Okinawa dugong considered to be integral to its cultural significance. Translation of obtained materials into English is necessary.
- Task 2. Literature Review: Review all literature and research referenced in the designation documents (if such documents exist), and any other relevant literature to validate and expand on the designation rationale. Literature review is also likely to require translation of documents prior to review. Review, assess, and interpret literature and research referenced in reference (i), as well as any additional materials provided by the Government, related to the proposed action, marine resources, seagrass, and dugong (*Dugong dugon*). Translated text from reference (i) will be provided to the Contractor.

Review additional relevant literature as required to complete Tasks 2, 5 and 6. Prepare a biological annotated bibliography of all materials reviewed in addition to those materials in reference (i). Prepare an annotated anthropological bibliography of all reviewed materials.

- Task 3. Ethnographic Study: Conduct interviews or communicate in writing, as appropriate and necessary, with other cultural experts to obtain information on the modern significance of the Okinawa dugong and any modern cultural practices relating to the Okinawa dugong. Transcripts of these interviews and communications should be translated into English for the report (Task 4). A list of individuals or organizations with whom such communication will occur must be submitted to Headquarters US Marine Corps in advance of the interim briefing and prior to initiation of such communication. Interviews will be recorded and transcribed, or a record of the conversation provided as a deliverable for the study. Any written communication will similarly be provided as a deliverable under the study. The contractor must consult, as requested, with designated Department of the Navy staff regarding whether any additional individuals or organizations should be communicated with regarding the cultural significance of the dugong.
- Task 4. Report Preparation: Prepare a peer-review quality report on the findings of the study. The report will include an executive summary that can be distributed to a non-technical (lay) audience, as well as a description of the study methodology, results, and any recommendations. The primary objectives of this report shall answer the research questions outlined in Section 1.b of this SOW. The report also will include the annotated bibliography noted in Task 2, and transcripts and written communications resulting from completion of Task 3.
- Task 5. Potential Impact Analysis: Consult, as requested, with designated Department of the Navy staff and with the main Contractor personnel staff [anthropologists, archaeologists, biologists] on the team regarding potential impacts to the dugong or dugong population in a physical [or biological] sense from proposed actions that are relevant to the dugong's status as a cultural and historic property of Japan.
- Task 6: Mitigation Analysis: Consult, as requested, with designated Department of the Navy staff and with the main Contractor personnel staff [anthropologists, archaeologists, biologists] on the team regarding measures to mitigate potential impacts to the dugong or dugong population in a physical [or biological] sense from proposed actions that are relevant to the dugong's status as a cultural and historic property of Japan.

LITERATURE REVIEW

The literature review, which primarily involved review of Japanese language documents that refer to the dugong in a cultural context or to the recovery of dugong bones and bone artifacts from archaeological sites, was for the most part conducted by researchers from ARCGEO. This included primary historical documents which discuss the hunting and consumption of the dugong during historical times and collections of traditional Okinawan folk stories, legends, and folk songs in which the dugong or a mermaid (often associated with the dugong) play a role. Naoki Higa took the lead role in visiting libraries and archives and in tracking down relevant literature on the internet.

The majority of the research took place at the Okinawa Prefectural Archives, Okinawa Prefectural Archaeology Center, and other libraries on the island of Okinawa. Mr. Higa made one research trip to Tokyo to conduct research at the National Diet Library and a trip to Ishigaki Island to conduct research at the Ishigaki City Board of Education (BOE) files and the Ishigaki City library. Based on this research, Mr. Higa compiled the bibliography and prepared many of the annotations in Japanese. Additional annotations and translations of the annotations into English were prepared by Takashi Miyagi and Nariko Yogi. They also prepared summary translations of relevant sections of many of the reports and assisted Arne Røkkum in his translations. Taku Mukai reviewed and edited the English language summaries.

A total of 410 individual bibliographical references were compiled. The collected articles are diverse and include those in which there are fragmentary references to the dugong as well as ones that have the dugong as their main topic of interest. Reports of archaeological sites containing dugong bone remains and bone artifacts and studies incorporating folk legends, particularly stories of the mermaid and the coming of a tsunami, were especially numerous. Historical documents were relatively rare, but recent research by Takeshi Izumi, published in his “Cultural History Essay of the Dugong” (2007), failed to uncover historic materials beyond what we examined. Descriptions and discussions of rituals associated with the dugong were also rather limited and this may, as several of the experts interviewed pointed out, be related to the secretive nature of some of these ceremonies, the restriction of participation to only community members, and a reluctance to disclose information about the rituals to outsiders, even local researchers.

Most of these references were examined and either the entire document or the pages with information about the dugong scanned or copied. Those that were not examined and collected are some of the archaeological reports that are cited by Mr. Isao Morimoto in his article summarizing the dugong remains from archaeological sites. For many of these we have used the summary prepared by Morimoto following years of extensive research of archaeological reports on his part without re-examining the original reports. Bibliographic information for each report was entered into an MS Access database with an annotation, and an annotated bibliography of the dugong in Okinawan culture was prepared (Appendix C). This is supplemented by an annotated bibliography of Okinawa dugong biology (Appendix D).

The government provided English translations of numerous sections of the EIA prepared by the GOJ Okinawa Defense Bureau (2009), declarant statements prepared for the court case, and background documents on the FRF project and on the dugong in Okinawa. Depending on primary topic, these were reviewed by various members of the team in order to extract information relevant to the cultural significance of the dugong. The majority focused on dugong biology, but declarant statements in the court case prepared by Mr. Isshu Maeda (later interviewed by the project team) and Mr. Sekine Takamichi contained valuable cultural information and references to documents for the project team to research further.

The translated EIA sections include a summary of project plans, biological studies of the dugong and seagrass areas in the FRF and adjacent areas along the east Okinawa coast, evaluation of project environmental effects, and recommended mitigation measures. The information was of most value to the project biologist and reviewed by him in preparing his sections of the report. The anthropologists perused the entire EIA, extracting information on the FRF plans, the potential impact of the project on the dugong and its habitat, and proposed mitigation measures. The translated portions of the EIA consider potential impacts that the construction and operation of the FRF will have on cultural properties such as archaeological sites and traditional prayer sites and on traditional festivals. However, the EIA does not address potential effects of the project to the dugong as a cultural property or to dugong-related rituals.

INTERVIEWS

Interviews were conducted in Japan during the month of October 2009 with knowledgeable informants who could be considered as cultural experts or dugong specialists.

An initial list of persons to be interviewed was developed from several sources. The project anthropologist, Arne Røkkum, had formerly worked in Okinawa; his background includes four years of *in situ* fieldwork spanning a period of three decades. Participant observation during that period was carried out on Yonaguni, Ishigaki, Iriomote, Hatoma, Kohama, Aragusuku, and Miyako Islands. Archival research was conducted in library institutions on Okinawa Island. Dr. Røkkum knew individuals who were likely to have information about the dugong in Okinawan culture, including those at the Okinawa Studies Institute in Tokyo, with which he had previously been affiliated.

The cultural and natural resource specialists at Camp Butler were consulted for names of individuals who might have expertise regarding the cultural role of the dugong. Naoki Higa, ARCGEO researcher formerly with the Okinawa Prefectural Archaeology Center, and Masayuki Yonaha, the MCB Camp Butler archaeologist, knew the archaeologists who had studied dugong remains and were likely to be knowledgeable in this area. These included [REDACTED]

[REDACTED] Also IARII had worked with [REDACTED] and [REDACTED] on previous projects and knew that they would be useful contacts for the archaeology and history of areas near the FRF. Mr. Senzo Uchida, a biologist at the Churaumi Aquarium, had done extensive work and written numerous articles on the dugong and was contacted at the suggestion of the project biologist as well as being included on the plaintiffs' list of biological contacts.

The plaintiffs in the court case had included their own list of individuals and organizations with expertise in regard to the cultural and historical role of the dugong. The research team made it a point to include a number of people from the plaintiff's list, but field time was not sufficient to allow us to contact and interview all the people on the list. We selected six cultural experts who seemed most likely from their publications or who were known to members of the project team to have knowledge of the role of the dugong in Okinawa culture.

Of the organizations on the plaintiffs' list, visits were made to most: Uruma City Cultural Sea Museum, University of the Ryukyus Museum, Higashi Village Museum, Ishigaki City Yaeyama Museum, Nakijin Village Museum of Culture and History (although it was closed for the week), Nago Museum, Okinawa Churaumi Aquarium, and the Okinawa Prefectural Archaeology Center. Among the Boards of Education, we visited the Okinawa Prefectural Board of Education and those municipal Boards of Education nearest the proposed project and those that were located along coasts where dugongs have been sighted: Chatan Township, Ginoza Village, Nakijin Village, and Nago City.

In the course of the interviews, some of the interviewees suggested the names of persons that they thought would be able to provide us with useful information. Thus [REDACTED] stressed the importance of talking with Mr. Isshu Maeda (one of the experts on the plaintiffs' list). Cultural practitioners were suggested by informants, but we could not arrange interviews with them during the time allotted for fieldwork. It also became clear from the interviews we conducted with [REDACTED] and others and the information gathered that it was essential that we conduct interviews with cultural experts

on Ishigaki Island. Thus, [REDACTED] and [REDACTED] were added to the interview list.

Interviews were not conducted with several people on the list for a variety of reasons. Mr. Masao Higa, an anthropologist at Okinawa Kкусai Daigaku specializing in Okinawa ritual life, had recently died. Mr. Shuzen Hokama, the leading scholar of Okinawan history of his generation, was too frail at his advanced age (85) to undergo an interview. Several people, including Mr. Tsurumi Higa, specialist in Okinawan folklore at the Higashi Museum, and Mr. Kazumasa Sunabe, cultural resource specialist at Miyakojima City BOE, were not available during the time set aside for the interviews. Our team was unable to contact directly either Professor Masanobu Akamine, specialist in Okinawan folklore and rituals at University of the Ryukyus, or Professor Eikichi Hateruma, specialist in Ryukyuan literature and folk songs at the Okinawa Prefectural University of Arts, and they failed to respond to messages our team left.

In general, all the archaeologists we contacted agreed to interviews, while a few folklorists and members of the academic community declined (or, most commonly, simply failed to respond to) our requests for an interview. This may reflect the lack of controversy about the archaeological material as compared with the more recent historical and cultural information, whose interpretation relates to the controversy over the development of the FRF. Any seeming over-emphasis that was given to archaeologists in the list of interviewees is a result of these differences in response to our interview requests.

Some planned interviews could not be conducted within the time allotted for fieldwork. Thus, it was especially difficult to set up conversations with cultural and ritual practitioners or members of local communities where it frequently took several initial interviews to even obtain the names of appropriate persons. Contact with the Kouri-jima *noro* (village priestess) needed to be made through the Nakijin Museum of Culture and History, which was closed during the second week of our visit.

While conducting interviews with these additional experts and practitioners would no doubt have furthered the depth of information on particular topics regarding the cultural significance of the dugong, it is the opinion of the authors that additional information would not substantially alter the conclusions reached in this study. We were unable to arrange interviews with several experts on folklore and ritual; however, Mr. Isshu Maeda, [REDACTED] provided suitable expertise in these areas. These and several other informants were able to provide information from their own experience of the myths and folk stories associated with the dugong and of rituals that honored or invoked the dugong. The cultural experts who were interviewed included [REDACTED]

[REDACTED] Mr. Isshu Maeda, who has conducted extensive research both in literature and in the field on the role of the dugong in folklore and ritual; [REDACTED]

The list of persons interviewed includes several specialists in all the areas in which one is likely to find that the dugong might have cultural significance: archaeology, history, folklore, ritual, and traditional cultural practices.

Interviews were conducted by a team that varied in membership from one to seven members depending on the person being interviewed and the location of the interview. The full interview team included Dr. Arne Røkkum, Dr. David Welch, Ms. Judith McNeill, Mr. Masayuki Yonaha, Mr. Naoki Higa, Mr. Taku Mukai, Mr. Takashi Miyagi, and Ms. Nariko Yogi.

Two interviews were conducted by Dr. Arne Røkkum at [REDACTED]
[REDACTED] The interviews at [REDACTED] were conducted with [REDACTED] of
the [REDACTED] and [REDACTED]
[REDACTED] an interpreter of the old syllabic script of the Ryukyu kingdom.

Interviews on Okinawa were conducted with six archaeologists, two biologists, an archivist, and two folklorists. The persons interviewed were:

[REDACTED] Archaeologist, [REDACTED]
[REDACTED] Archaeologist, [REDACTED]
[REDACTED] Archivist, [REDACTED]
[REDACTED] Archaeologist, [REDACTED]
[REDACTED] Archaeologist, [REDACTED]
Mr. Isshu Maeda, Researcher, Uruma City Cultural Sea Museum
Mr. Takeshi Sasaki, Curator and Biologist, Ryukyu University Museum
[REDACTED] Archaeologist, [REDACTED]
[REDACTED]
Mr. Senzo Uchida, Curator, Okinawa Churaumi Aquarium

Interviews with [REDACTED] archaeologist with the [REDACTED]
[REDACTED] were conducted [REDACTED] by Dr.
Røkkum and Mr. Higa.

The interviews were loosely structured, allowing the conversations to cover a range of topics related to the dugong. The interviewers had a small list of general questions that were put to each informant, but the specific questions asked varied from one interview to the next, focusing on the areas of expertise of the person being questioned. Common questions asked during the interviews included the following: what are the remains of the dugong from prehistory; what do historical documents tell us about the hunting, consumption, and distribution of the dugong; was the dugong designated a cultural property before World War II and what records support this; and how did Okinawans in the past think about the dugong and what is the attitude today? We asked each informant what he or she knows about folk stories concerning the dugong and what rituals involved the dugong.

For the archaeologists, we asked questions concerning which sites in the municipality in which he or she worked were known to have contained dugong bones, whether or not these appeared to have been the remains of food consumption or of other types of use, whether dugong artifacts were found, what kinds of artifacts these were and what their functions might be, and whether dugong use appeared to vary over time. We asked how these remains and artifacts relate to the rest of the archaeological record from that area.

From the historians and archivists, we would probe more deeply regarding documents about historical hunting, consumption, and distribution of the dugong. Questions were asked regarding the basis of our information about the special uses of the dugong during the period of the Ryukyu Kingdom.

The interviews are a critical part of the evaluation of the cultural significance of the dugong in that they provided us with access to information that is frequently unpublished. Most importantly, they allowed the team to get a feel for how knowledgeable Okinawans think about and relate to the dugong and to provide insights based on their wider acquaintance with the literature regarding Okinawan culture and history. A few of the informants had talked to cultural practitioners to whom the interview team could not get access and had information regarding rituals and other cultural practices that has never been

published and would thus be unavailable from other sources. In particular, as a result of his own research, Mr. Isshu Maeda possessed extensive knowledge of unpublished cultural practices related to the dugong.

Several new documents were discovered as a result of the interview process, although we were not permitted to copy one unpublished document, which reports recent studies of the dugong in Okinawa, because of its restricted distribution. Other new documents were found at Hosei University Institute of Okinawan Studies and in libraries on Ishigaki Island.

Takashi Miyagi and Nariko Yogi prepared summary translations of the Okinawa interviews (Appendix A), based on the tape recording made during each interview.

III. BIOLOGICAL AND ECOLOGICAL BACKGROUND ON THE OKINAWA DUGONG

An understanding of the dugong as a biological population, its behavior, and its habitat is essential to any understanding of its cultural significance. In addition, as will be discussed in the next chapter, its nomination as a natural monument is closely related to its status as an endangered animal species that is indigenous to Okinawan waters.

DESCRIPTION/TAXONOMY

There is a single species of dugong, *Dugong dugon*, which was originally described by Müller in 1776. Dugongs are the only living marine mammals that subsist on plants and are entirely marine (although manatees are also herbivorous, and some species occur in marine habitats). They are the only extant member of the Sirenian family Dugongidae – their closest recent relative was the Steller’s sea cow (*Hydrodamalis gigas*), which was exterminated by hunting in the late 1700s (Marsh et al. 2002).

These animals grow to about 3.3 meters (m) in length and 400 kilograms (kg) in weight, with little sexual dimorphism (Jefferson et al. 2008). They are brownish gray in color, with a very simple color pattern. The head has two dorsally-directed nostrils and a ventrally-placed mouth opening with a broad, flat muzzle. Tusks generally only erupt in mature males (occasionally also in females), but do not extend outside the mouth. The flippers are short, with no nails (as in some manatees), and the flukes are bi-lobed, very similar to those of cetaceans (Marsh et al. 2002; Jefferson et al. 2008).

There are many old legends about dugongs and mermaids in Okinawa and also along the Sea of Japan coastal area (Nishiwaki 1984; Uchida 2005). Hojo (1976) and Uchida (1994, 1996) discussed local names for dugongs used on the southwestern islands of Japan, where they are called “Zan” or “Zannoino” (or some variation of these, such as Zan-noiyo, Zan-noiyu, Zannoio, Zano, or Zanu).

DISTRIBUTION/ABUNDANCE

The dugong occurs throughout the Indo-Pacific region, from East Africa to Vanuatu, along some 140,000 km of coastline in over 40 countries. The historic range was much more extensive, and other than in northern Australia and the Persian Gulf/Red Sea region, dugongs are mostly represented by relict populations separated by areas of low abundance where they have been extirpated, or nearly so (Marsh et al. 2002).

The dugong is a tropical/subtropical species that ranges from 26-27° north and south of the equator. They occur often in wide, shallow, protected bays, mangrove channels and off the lee sides of large nearshore islands. They mostly occur in shallow, coastal waters less than ten m deep when feeding, and in fact spend up to 70 percent of their time within three m of the surface. However, dugong feeding trenches have been observed in waters up to 33 m deep. Shallow tidal sandbanks and estuaries are used for calving, possibly to minimize the chance of shark predation. They do move offshore into deeper waters where the continental shelf is wide, shallow, and protected. They do this especially when resting and traveling and they are capable of swimming long distances over deepwater trenches (Whiting 1999). Recent movements to locations such as Ashmole Reef (which is separated by 140 km and depths of

2,000 m from Indonesian islands with suitable habitat) and Aldabra Atoll (425 km from Madagascar) provide solid evidence of this ability to cross deep ocean areas over long distances (Marsh et al. 2002).

The population biology of the dugong is not well known (Marsh et al. 2002), and is especially poorly-known in Okinawa (see below). Abundance has been estimated rigorously in only a few areas of the range (in most areas there is only anecdotal or non-systematic information), and trends in abundance have not been systematically examined in any major portion of the range. Most rigorous information comes from northern Australia, where a series of surveys suggest that there are over 85,000 dugongs in aggregate. There is no doubt that this is the major center of abundance for dugongs in the world. There are estimated to be about 4,000 dugongs in the Red Sea, and another 7,300 in the Persian Gulf. In Thailand there are thought to be around 150 (Marsh et al. 2002). Outside of these areas, dugong populations occur mostly as small remnants numbering no more than a few hundred animals each. These small fragments probably sum to no more than 2,000 to 3,000 individuals, and taken together the above-summarized information suggests that there may be no more than 100,000 dugongs in the entire global population of the species.

Okinawa is apparently the northernmost dugong habitat in the world (Marsh et al. 2002). On 9 September 2002, an adult dugong was discovered dead on the coast of Ushibuka (32°N, 130°E) off the southwest coast of Kyushu, Japan (see Fig. 2), much further north (ca. 750 km) than the previously-known northern limit of the species (Yamamuro et al. 2004). Studies of carbon and nitrogen isotopes were conducted to determine if the dugong was a stray from the Okinawa area or had in fact been living further north. The studies were not conclusive, but were consistent with the idea that the animal may have moved from the Ryukyu Islands (presumably Okinawa) area further south. Ogura et al. (2005) reported another dugong that was caught in a set net in Kumamoto Prefecture farther north along the west coast of Kyushu and a dead dugong that was stranded on the shore nearby a few days later in October 2002. These are the current northernmost records of dugongs in Japan, and are considered extralimital.

Hirasaka (1933) stated that the dugong was previously ‘fairly abundant’ in the Ryukyu and Amami Islands of southern Japan. At the time of that writing, they were considered rare and near extinction in the area. In the latter half of the 20th century, Ryukyuan dugongs were often thought to be locally extinct; however, they are still present around Okinawa. Apparently, both a decrease in range and abundance has occurred. Uni (2003) stated that dugongs used to be found from at least Iriomote Island in the Yaeyama Island Group to Amami Island in the Amami Island Group (see Fig. 2). Japanese dugongs currently occur as a small, isolated population off Okinawa, primarily along the east coast of that island (Kasuya 1999; Shirakihara et al. 2007).

Dugongs previously used to be found north to at least Amami Island (28°30'N) (Kasuya and Brownell 2001). In the 1970s, the species was considered ‘scarce’ in the southern Ryukyu Islands of Japan, which were also shown to be the furthest north extent of the species (Nishiwaki et al. 1979). Nishiwaki and Marsh (1985) stated that dugongs do not appear to occur in Japan proper or Korea. They suggested that dugongs might occur in Okinawa and the Amami/Oshima Islands area further north, but indicated that the species was rare in Japanese waters. Uni (2003) clarified that dugong populations around Okinawa declined due to traditional hunting and were very low by about 1910-1915.

Despite the results presented above, no systematic surveys (i.e., using methods currently accepted by marine mammal biologists and incorporating an uncertainty factor, such as a coefficient of variation, for the point estimate) specifically designed for dugongs had been conducted in most of the areas considered part of the traditional range of dugongs in Japan. The first surveys for Japanese dugongs were carried out in the late 1970s (at Iriomote Island), but these produced no confirmed sightings (Kasuya and Brownell 2001; Marsh et al. 2002). In April to September 1998, 837 km of aerial surveys were flown and snorkeling surveys of seagrass beds were conducted off Okinawa. These surveys recorded ten

sightings of single individual dugongs in waters from less than 20 m to 100 m deep, all off the east coast of the main island of Okinawa, and confirmed that dugongs were still extant at Okinawa (Kasuya et al. 1999; Shirakihara et al. 2007).

In 1999, 970 km of aerial surveys were flown and underwater seagrass bed surveys conducted off the Sakishima/Yaeyama Islands (including the Iriomote, Kuroshima, and Ishigaki Islands) south of Okinawa, part of the southern Ryukyu Islands (Fig. 5). No dugong sightings or feeding tracks were observed (however, healthy seagrass beds were found, and many trap and gill nets were observed) (Kasuya et al. 2000; Kasuya and Brownell 2001; Shirakihara et al. 2007).

Japanese government groups additionally surveyed Okinawa in 2000-2003 and observed a total of 19 dugongs, including some specimens (as well as dugong feeding trails) off both the east and west coasts (Ministry of the Environment 2004; Yoshida and Trono 2004). Between 129 and 139 dugong feeding trails were observed in the different years, indicating that dugongs were still active in the area. Henoko Village (see Fig. 4) was a reported hotspot for dugongs in Okinawa (Shirakihara et al. 2007). During the EIA study for the FRF, 17 sightings of singles and one sighting of a pair were recorded, mostly off Kayo, from August 2007 to February 2008 (Okinawa Defense Bureau 2009). From March 2008 to February 2009, 57 sightings of single individuals, 27 sightings of pairs, and a single observation of a trio were recorded, mostly off Kayo and Kouri Islands (Okinawa Defense Bureau 2009). The quality of presentation of the information from these surveys in the English translation available to the authors (Okinawa Defense Bureau 2009) was inadequate, and it is unclear if this is a result of substandard-quality work done for the EIA, or whether it has more to do with the quality of the translation.

In the work described above, seagrass beds were found at all survey sites, but dugong feeding trails were only observed at Okinawa, not at the Yaeyama/Sakishima Islands. Dugong sightings were only made at Okinawa (Shirakihara et al. 2007). The conclusion was that dugongs were already extinct or existed in very low numbers in the Sakishima area, and that Okinawa (especially the middle and northern part of the east coast between Katsuren Peninsula and Ibu Beach; Figs. 6 and 7) was the last remaining area with dugongs in Japanese waters (Kasuya et al. 2000; Kasuya and Brownell 2001; Shirakihara et al. 2007). Uchida (2005) described some reasons why dugongs are apparently more abundant off the east coast of Okinawa than the west coast, mainly related to the difference in quality of habitat between the two coasts.

A scientifically-valid abundance estimate for the Okinawan dugong population is not available (i.e., one based on a systematic survey scheme using state-of-the-art methods and incorporating an uncertainty factor, such as a coefficient of variation, for the point estimate), but there were at least six dugongs (sighted simultaneously) in 1999 (Marsh et al. 2002). The Okinawan dugong population was roughly estimated at fewer than 50 by the Mammalogical Society of Japan in 1997. Despite the apparent low population, recovery was thought to be possible if threats were properly addressed (Kasuya et al. 2000; Kasuya and Brownell 2001).

LIFE HISTORY

Dugong life history and reproduction have been rather well-studied (at least in Australia); they are aged by counting the growth layer groups in their tusks. These are long-lived animals, with low reproductive rates and high investment in the offspring (K-selected). Life history parameter estimates are as follows: maximum known longevity is 73 years for females, age at first birth is 6-17 years, gestation period is 13-15 months, litter size is usually one (with infrequent twinning), weaning of the calf occurs at 14-18 months (calves begin to eat seagrasses soon after birth), interbirth interval is 3-7 years, and maximum population increase rate is 5 percent/year (Marsh et al. 2002; Marsh 2009).

There is virtually no regional information available on the life history of the Okinawan dugong population. However, during the EIA study for the FRF, a pair considered to be a cow and calf were observed in 2008/2009, suggesting that some reproduction is still occurring in this population. Other than these observations, which are qualitative and limited in scope, no information on the life history of the Okinawan dugong was collected in the EIA (Okinawa Defense Bureau 2009).

GENERAL ECOLOGY

The distribution of the dugong is largely coincident with the range of their tropical seagrass food, and dugongs are an integral part of seagrass bed ecosystems (Heinsohn et al. 1977; Marsh 2009). Within Okinawa, maps showing the distribution of seagrass beds in relation to dugong distribution can be found in Ministry of the Environment (2004). Dugongs can have a significant impact on both the species composition and nutritional content of the seagrass beds that they inhabit, as their feeding often results in the decline of some species, altering the pre-dugong equilibrium (Marsh 2009). Alternatively, damage to seagrass beds can have profound impacts on dugong populations, causing mass die-offs. Dugongs respond to such damage by either moving to another area, or postponing breeding (Marsh 2009). Dugongs may switch between different species of seagrasses as their availability changes. After dugongs have been removed from an area, the quality of the seagrass meadows decreases as dugong habitat.

Tropical cyclones/typhoons and flooding can damage seagrass beds. Two large floods and a tropical cyclone caused a dramatic decrease in the dugong population of Hervey Bay, Queensland, Australia, with a 6-8 month delay in when the impacts were detected (Preen and Marsh 1995). This population decline apparently resulted from mortality, starvation, and relocation, as other animals migrated to unaffected areas. Some recovery has been apparent in the intervening years, but full recovery may take up to 25 years (Preen and Marsh 1995).

Dugongs are opportunistic feeders, and eat mostly seagrasses, leaving long, sinuous furrows (often called tracks, trails, or scars) in seagrass beds (Preen 1995). These feeding trails have been observed at depths up to 33 m off northeastern Australia (Marsh et al. 2002). They prefer seagrasses that have low fiber, high nutrient content, and are easily chewed and digested – such as those of the genera *Halodule* and *Halophila* (Aketa 2003; Marsh 2009). Sometimes they eat only the leaves or rhizomes, but usually they uproot and consume the entire plant. Dugongs also sometimes eat invertebrates, especially at high latitudes in winter, and have been known to occasionally consume marine algae on rocky reefs (Whiting 2002; Aketa 2003; Yamamuro et al. 2004; Marsh 2009).

Little is known of the feeding habits of dugongs in Okinawa, and no feeding habits studies on the Okinawan population were conducted as part of the EIA (Okinawa Defense Bureau 2009). In 1965, one Okinawan male dugong (2.15 m, 350 kg), an incidental catch, was investigated by marine mammal researchers. They found a large quantity of seagrass (about five buckets full; species not identified in report) in its stomach (Hojo 1976). There are a wide variety of seagrass species available to Okinawan dugongs. Nine species of seagrasses, on which dugong feed, exist in the Southwestern Islands of Japan (Uchida 1996). The east coast has 21 seagrass beds covering 539 hectares (ha), and the west coast has nine seagrass beds covering only 89 ha (Uchida 1994; Yoshida and Trono 2004).

Aketa (2003) conducted the only study on the feeding habits and physiology of Okinawan dugongs. Analysis of the stomach contents of six dugongs stranded along Okinawa Island (one each in 1990, 1992, 1996, 1998, and two in 2000) indicated that a total of seven species of seagrasses were eaten: *Halophila ovalis*, *Thalassia hemprichii*, *Cymodocea rotundata*, *Cymodocea serrulata*, *Syringodium isoetifolium*, *Halodule uninervis*, and *Halodule pinifolia*. The total amount in a stomach was 200-500 grams (g) dry weight, which would cover 2.31–15.64 sq m of the seagrass floor. Seagrass species eaten

by dugongs were different between the east and west coasts of the island, and this presumably reflects the different availability of seagrass species between the two coasts. Most of the stomach contents were roots of seagrasses. Because root sections have the highest energy content, dugongs appear to prefer to eat these parts. The degree of grinding varied, depending on how fibrous the seagrass was. The daily energy intake was estimated at 1071.3–68937.3 kilocalories (kcal) and it was estimated that animals excreted 691.0–7307.3 kcal daily. Deep dives required for feeding deeper in the water column than where their typical shallow-water seagrass food occurs may be more energetically costly (Anderson 1994).

While the population discreteness of Okinawan dugongs is not well-studied, Yoshida and Trono (2004) conducted a preliminary genetic analysis, which showed that Okinawan and Philippine dugongs share part of their maternal genome, but that Australian dugongs are completely genetically distinct. Population discreteness was not an issue examined in the EIA (Okinawa Defense Bureau 2009).

Dugongs have been held in captivity in several places in the world, but dugongs from Okinawa have apparently only been held captive twice for short periods (Kataoka et al. 1995). On 18 January 1979, one female calf was obtained and held for 33 days at the Okinawa Marine Park (Kamiya et al. 1979a, b). In 1992-1993, another Okinawan dugong was kept captive for nine months at the Okinawa Expo Aquarium (Kataoka et al. 1995). Both animals died before much could be learned about them. Kataoka and Asano (1981) mentioned two female dugongs kept at the Okinawa Oceanarium (but captured from outside of Japan) for less than one month each.

Known natural predators of dugongs include large sharks and killer whales (*Orcinus orca*), and possibly saltwater crocodiles in some parts of the range (Marsh 2009).

BEHAVIOR/SOCIAL ORGANIZATION

Not much is known about dugong behavior and social organization – they have only been studied in detail in a few areas (mostly in Australia). They are difficult to observe and have very subtle sexual dimorphism. The only known long-term social bond is between a mother and calf; dugongs appear to have a fluid social structure. Solitary individuals or small groups are most common, although large herds of up to several hundred individuals are sometimes observed; the latter appear opportunistic, although not much is known of their structure or function (Lanyon 2003; Marsh 2009).

Dugong mating behavior varies with area. In some areas of Australia, male competitive herds are seen, with multiple males jostling for position to mate with a single female. In other Australian regions, males hold and defend mating territories and apparently use displays to attract females, a type of lek mating system (Marsh 2009).

Not much is known of dugong acoustic behavior and hearing capabilities, compared to the knowledge on other marine mammal species. We are not aware of any studies measuring the audiogram of the dugong, but the species probably has hearing capabilities similar to those of manatees. The West Indian manatee can hear sounds from 15 Hertz (Hz) to 46 kHz, with best sensitivity at 6-20 kHz (Bullock et al. 1982). Dugongs produce complex barks, trills, and chirp-squeaks ranging from 500 Hz to 18 kHz, with the center frequency for most of their sounds between 3 and 6 kHz (Anderson and Barclay 1995; Ichikawa et al. 2006). Chirp-squeaks are used primarily during feeding and patrolling territories, suggesting a ranging function. Barks appear to be used in aggressive interactions, as in territorial defense, and trills appear to be used in displays (Anderson and Barclay 1995).

The deepest dive recorded for a tagged dugong is 20.5 m, although deeper dives are inferred from the observation of feeding tracks at depths of up to 33 m (Chilvers et al. 2004). The average dive time for

shallow (< 3 m) dives is 2.7 min, but dives lasting as long as 12.3 min have been recorded (Chilvers et al. 2004).

Individual movements have only recently been studied. Most movements appear limited, short ‘commuting’ swims between feeding and resting areas, mostly determined by tide. However, some long-range movements up to 560 km have been documented, and often these involve return to the tagging site, indicating they represent ranging rather than dispersals. Single individuals or small groups are sometimes seen around isolated oceanic islands (e.g., Seychelles, Cocos-Keeling Islands) after many years of absence. This indicates that dugongs are capable of crossing deep oceanic stretches (Marsh 2009), as discussed above.

Very little is known about the behavior of dugongs at Okinawa, other than some general movement information. They apparently occur offshore in deep waters during the day and move over the reef to feed in shallow waters (1 to 4 m deep) at night, when human activities are less frequent (Kasuya 1999; Kasuya et al. 1999; Shirakihara et al. 2007). The FRF EIA did provide some useful information that is relevant here, although there was virtually no attempt at rigorous analysis of the data collected (Okinawa Defense Bureau 2009). Because of their habit of nighttime feeding, they were once thought to be nocturnal (S. Uchida, interview 2009). The average swimming speed of Okinawan dugongs has been reported to be about 3 km/hr (Uchida 1979). Some site fidelity is indicated by the repeated sightings of three individually-identifiable dugongs off Kayo and Abu Ohru Island between 2003 and 2008/2009 (Okinawa Defense Bureau 2009). This suggests that local, small-scale movements are probably the norm for Okinawan dugongs, but there are no quantitative data on home range size for these animals. However, in this study the individuals were identified from aircraft, and it is generally not possible to obtain high-resolution photos of marine mammals from aircraft, making the resightings reported in the EIA (Okinawa Defense Bureau 2009) somewhat questionable.

THREATS

Dugongs are highly vulnerable to human-caused threats, as a result of: 1) their K-selected life history (i.e., long lifespan, late reproduction, single offspring, extended parental care), 2) their dependence on seagrass beds, and 3) the coastal location of their main habitats, which are heavily influenced by humans. The species’ threats can be divided into six main categories:

(1) *Hunting* – Dugong meat reportedly tastes like pork or beef and is highly sought-after by peoples native to the regions where the dugong live. Traditionally, hunting has been the most important threat to dugongs and has probably been the main cause of the depleted status of most dugong populations around the range. Although it is illegal in most parts of the dugong’s range, hunting still occurs in at least 31 countries (Marsh et al. 2002). In the Torres Strait/Cape York area of northern Australia and Papua New Guinea, dugong hunting is considered an important part of the cultural identity of indigenous people. There, dugongs are still hunted legally, and the meat and oil are used for food and medicines, and other products used in ornaments and jewelry. In the 1990s, over 1,000 dugongs were killed annually in this area (Marsh et al. 2002). The fishery is managed, but recent modeling work has shown that the current catch levels are not sustainable (Marsh 2009). Thus, it is likely that the catch level is over five to six percent of the population size, which has been estimated to be the maximum sustainable annual removal (Marsh 1995).

Bones from archaeological sites suggest that dugongs in Okinawa were hunted for many millennia, because of their desirable meat and value of their bones and teeth (Uchida 1979). In historical times, dugongs have been hunted off southern Japan (Okinawa Islands, Miyako Islands, and Yaeyama Islands) for hundreds of years. Hunting methods involved primarily netting, but it is possible that

harpooning was also used (Uni 2003). The meat of the dugong apparently played a part in the historical relations between China and the Ryukyu peoples (Takeshi 2003).

Uni (2003) conducted a detailed analysis of old statistical references related to dugong hunting (Okinawa Prefecture 1894-1940: Investigative Reports of Fisheries 1888-1891, Report of Okinawa Fisheries 1912), and reported that a minimum total of 327 were killed between 1894 and 1916 alone, representing an average of 14.2/year during this period. In one year (1894), 31 dugongs were reported killed. Uni (2003) concluded that the dugong fisheries virtually disappeared by the mid-1910s in Okinawan waters, because of over-hunting. Continued killing of dugongs using dynamite occurred during the impoverished post-World War II years (Uni 2003; Uchida 2005; Shirakihara et al. 2007), and it is believed that dynamite fishing was the main reason for the continued decline in dugongs after the war. This suggests that dugongs became endangered earlier than previously thought (Uchida 1994). There can be little doubt that these kills resulted in a drastic reduction in the population size of the Okinawan dugong, and that hunting continued after the decline began (Uni 2003). With a maximum increase rate of 5 percent per year (Marsh 2009), the population would have had to number well over 300 individuals to sustain such kills. Although hunting is today illegal in Okinawa, the continued existence of some illegal hunting is possible.

(2) *Bycatch/Incidental Catch* – Dugongs are often caught in gillnets and other mesh entangling nets, as well as fish traps, in countries throughout their range. The numbers killed are largely unquantified, but significant. In some areas, like Queensland, Australia, dugongs also die in anti-shark nets set to protect bathers along populated swimming beaches. In Queensland between 1962 and 1995, 837 dugongs were caught in these nets and most died (Marsh et al. 2002; Marsh 2009).

A total of 11 dugongs were known to have been killed (seven) or stranded (four) in Okinawa between 1931 and 1993, and fishing bycatch is considered to be the greatest threat to the survival of the Okinawa population (Uchida 1994).¹ Of six dugongs stranded along Okinawa Island in the 1990s (one each in 1990, 1992, 1996, 1998, and two in 2000), four of the six were known to have been caught in either gillnets or setnets, the others having an unknown cause of death (Aketa 2003). Yoshida and Trono (2004) reported the number of dugongs documented bycaught in recent years to be: five in the 1980s, nine in the 1990s, and three in 2000 (note that these numbers presumably have partial overlap with those presented above). At least one dugong was rescued from a gillnet and sent to the Okinawa Aquarium (Uchida 1979, 1998).

Incidental catches are clearly a major conservation issue for Okinawan dugongs – of 16 known mortalities in the last 30 years, six were killed in trap nets, three in gillnets, one in an unknown fishery, and six were of undetermined cause (Marsh et al. 2002). The recent increase in number of records is probably due to an increase in interest in dugongs (Shirakihara et al. 2007). Of 19 dugong specimens collected or rescued in Okinawa between 1985 and 2000, 11 (58%) were considered to have been caught in gillnets, and this is another clear indication that bycatch in gillnets (and other fishing gear) is the major threat facing the current population (Okinawa Defense Bureau 2009).

(3) *Vessel Traffic* – Dugongs are occasionally struck and killed or injured by vessels, and although this threat is poorly understood, there is concern that it may represent a significant cause of mortality in some regions (Marsh et al. 2002). In Okinawa, there is little evidence that vessel collision is a significant cause of death. However, this may be easily underestimated. A vessel collision is an instantaneous event that is not likely to be observed, and depending on the injuries caused and the

¹ Kato (1979) related a detailed story of an Okinawan female dugong (which was bycaught on 17 January 1979 and presumably died on 19 February 1979).

condition of the carcass when discovered, it can be extremely difficult to pinpoint vessel collision as a specific cause of death.

There is qualitative evidence of dugongs decreasing their use of areas with heavy vessel traffic, swimming away from boats up to 1 km away (Richardson et al. 1995). There appear to be differences in the way dugongs respond to boats, depending on water depth. When in shallow water, they tend to swim towards deeper water, even if this brings them closer to the boat. In deeper waters, they tend to simply dive as the boat passes (Richardson et al. 1995). Heavy boat traffic can also affect feeding efficiency of dugongs through behavioral impacts. There has apparently only been a single detailed study of the impacts of boat traffic on dugongs. Hodgson and Marsh (2007) used a 'blimp-cam' system to examine dugong reactions to vessels, and found that overt behavioral reactions were not common. Reactions to boats were seen at ranges of 50-500 m. Dugongs were more likely to interrupt feeding activity when vessels passed within 50 m of their location, but generally the disruptions were short-term, only decreasing feeding budget time of the dugongs by less than six percent.

(4) *Acoustic Disturbance* – Dugong vocalizations cover a wide range of frequencies from about 500 Hz to 18 kHz (Anderson and Barclay 1995). Although not much is known about dugong communication, it is generally assumed that dugongs use vocalizations to communicate with each other, as do all other marine mammal species that have been studied in detail (see Anderson and Barclay 1995 for a description of different types of sounds and their functions). Impacts of noise on dugongs have been virtually unstudied, although it should be noted that the impacts from vessels discussed in the section above probably mostly work through acoustic impacts. There has been much speculation in the literature about how noise may affect dugongs, but so far no detailed study. Generally, there is no distinction made in the literature between noise and other types of vibrations. Marsh et al. (2002) identified the following potential effects of seismic surveys on dugongs:

1. Injury to hearing systems,
2. Interference with acoustic communication signals, and
3. Behavioral impacts, ranging from short-term disturbance reactions to long-term impacts on individuals or even populations.

At least some of these impacts can be generalized to all kinds of human-caused acoustic activities, and one might add the risk of death or serious bodily injury due to high-impact acoustic events such as underwater explosions or percussive piling used in marine construction activities. Such impulsive activities may cause serious hearing damage or rupture air spaces in the animal's body. Impacts of noise from military activities have also not been studied, although Marsh et al. (2002) noted that in an area of Australian military activity (involving underwater detonations, shelling, and amphibious landings), no dugong mortality had been reported. The USMC anticipates up to 71 aircraft (mostly helicopters) to be based at the FRF when completed (Czech 2008), and there is thus potential for a significant amount of aircraft noise to affect the surrounding waters. Clearly, this is an area of study that has been neglected and is ripe for research (in particular, specific studies on the impacts of helicopter noise on dugong movements, behavior, and physiology are required). Dugongs, which are shallow-divers, are not among the species of marine mammals most affected by naval sonars; these sounds appear to affect mostly deep-diving cetacean species such as beaked whales (family Ziphiidae) and some larger dolphins (see Tyack 2009).

(5) *Chemical Pollution* – Besides the detrimental effects of chemicals such as Persistent Organic Pollutants (POPs – e.g., DDT, PCB, HCH) and heavy metals on the animals themselves, herbicides used in some areas can also have negative effects on the seagrass beds that dugongs depend on for feeding

(Marsh 2009). Persistent Organic Pollutants are well-known for their detrimental impacts on wildlife, which include among other things causing reproductive abnormalities, altering hormone levels, and weakening of immune system functions. A variety of sources have been identified for POPs, which include both local point sources and more distant sources, especially those in industrialized areas and those with heavy agriculture (some POPs are pesticides or herbicides). Oil spills have not been found to cause problems so far, but dugongs do overlap with some oil production and transportation zones, so this is a concern (Marsh et al. 2002). There is no specific information on contaminant loads for the Okinawan population.

(6) *Habitat Loss/Degradation* – Seagrass beds can be destroyed by a number of human-caused activities, such as trawling, mining, dredging, land reclamation, coastal clearing, and boating (leading to propeller ‘scars’). They can also be damaged by sewage, detergents, heavy metals, herbicide runoff and other chemical wastes/contaminants. Anything that causes increased sedimentation and turbidity or decreased light penetration (e.g., dredge fill dispersion in the water column or soil run-off from land) can smother seagrass beds. Extreme weather, including large storms (such as cyclones or typhoons) and flooding, can damage or destroy beds by severe wave action, increased turbidity, shifting sands, or changes in salinity or light penetration. Recovery of seagrass beds after such damage may take up to 10 years or more (Marsh et al. 2002).

The primary factors that have been mentioned as having affected the Okinawan dugong population are bycatch and hunting (the latter mainly occurring in the past, although continued illegal hunting can not be discounted), as well as habitat destruction from coastal development and run-off. Other potential (but so far unproven) threats include ecotourism; acoustic pollution from seismic, military, or marine construction activities; disease outbreaks; and mortality from live-capture operations. Habitat destruction/alteration, especially from the planned US Marine Corps airport expansion at Camp Schwab (close to the main habitat) is an issue that has received much attention and interest (Kasuya and Brownell 2001; Yoshida and Trono 2004). Potential threats from military activities include: pollution (noise, chemical, sedimentation, and radioactivity from nuclear reactor leaks) and habitat destruction/alteration (Marsh et al. 2002). Vessel collisions may be added to this list. Mariculture activities (such as for seaweed) may represent an additional threat to the population (Shirakihara et al. 2007).

THE DUGONG’S STATUS AS AN ENDANGERED SPECIES

In the United States, the dugong is listed as Endangered under the Endangered Species Act (ESA), and is classified by the International Union for Conservation of Nature and Natural Resources (IUCN) as Vulnerable on a global scale. It is recognized that many populations of the species should be considered endangered or critically endangered. All known populations are listed on Appendix I of Convention on International Trade in Endangered Species of Flora and Fauna (CITES). The species enjoys legal protection in most countries, but often these laws are not enforced and have little impact in the real world (Marsh 2009).

There has been an increased interest in dugongs (especially in many developing countries) over the past decade or so, and this, along with the 2007 signing of an international Memorandum of Understanding on dugongs, have been encouraging signs that more will be done to protect dugongs in the future. It is also increasingly recognized that successful management of dugongs will need to be on biologically-meaningful scales large enough to encompass the areas covered by dugong movements (i.e., hundreds of kilometers and, in most cases, cross-border). Despite these facts, the depleted and highly endangered status of dugongs in most countries throughout the dugong range suggest that Australia may be the last great hope for the dugong’s long-term persistence.

Kasuya and Miyazaki (1997) summarized the status of dugongs in Japan, using the IUCN Red List criteria. They identified the population in Okinawa as Critically Endangered, which was also supported by the assessment of Shirakihara et al. (2007). The Okinawan dugong is considered under serious threat of local extinction (Uchida 1994; Kasuya and Brownell 2001). Current legislation and protection only restricts direct killing and does not regulate incidental kills, or habitat alteration. Any future development activities off Okinawa must be closely regulated to avoid disturbance of seagrass beds (Shirakihara et al. 2007).

IV. DESIGNATION OF THE DUGONG AS A CULTURAL PROPERTY

The answers to the questions of when and why the dugong was first nominated as a cultural property are perplexing and fraught with missing, incomplete, and contradictory evidence. It is certain from the extant documents that the dugong was nominated in Okinawa in January 1955 and before the end of the month designated as an Okinawa natural monument (*tennen-kinenbutsu*). It was recognized as a Japan national natural monument in 1972 following the reversion of Okinawa from US control to Japan. However, existing post-World War II records suggest that the dugong may have been nominated as a natural monument before World War II. This chapter reviews the information that has been found regarding nomination and designation of the dugong as a cultural property under Okinawan and Japanese law and how this may reflect the role of the dugong in Okinawan and Japanese culture.

PRE-WAR DESIGNATION

According to an anonymous posting on the internet, the dugong was initially designated a cultural property by the GOJ in Showa 5 (1930). However, no source for this claim is cited. The research team therefore undertook a search to find any documents relating to the designation of the dugong as a cultural property in 1930 (or in other years prior to World War II) that might confirm this claim. The primary objective was to determine why the dugong was initially designated a cultural property.

Nomination of the dugong in the 1930s would have been initiated under the then existing laws for protecting natural and cultural properties. These laws were the “Act of Preservation of Historic Sites, Places of Scenic Beauty and/or Natural Monuments” established in 1919 (Taisho 8), the “Conservation Law of National Treasures” established in 1929 (Showa 4), and the “Act of Preservation Regarding the Important National Art Properties” in 1933 (Showa 8). As seen in the title of the 1919 Act, cultural and natural resources of value fell under a single protective law. As under the current Law for the Protection of Cultural Properties, the 1919 Act joined places of scenic beauty and natural monuments with historic sites into one category of cultural property.

Our research in both the Okinawa Prefectural Archives and the National Diet Library in Tokyo failed to turn up any official government document from the early 1930s (1930-1936) concerning the nomination or designation of the dugong. After 1936 the transfer of Japan’s attention to preparations for war means that a later nomination is highly unlikely. Although no official government document concerning the nomination or designation of the dugong was found, the research did reveal one report, written in 1933 in Taiwan, then the Japanese colony of Formosa, by Kyosuke Hirasaka, which discusses the situation of the dugong at that time in some detail and concludes with an expression of the need to nominate the dugong as a natural monument.

██████████ researcher in the ██████████
██████████ has also conducted research on the dugong designation and has also been unable to find any pre-World War II document demonstrating its designation as a natural monument. According to ██████████ (interview, October 2009), in Taisho 8 (1919), when the preservation act was first implemented, there was an expression of opinion entered in the official gazette that the dugong should be designated as a natural monument, but the dugong was not designated as a result of this request. ██████████ confirmed this with the Agency for Cultural Affairs. According to ██████████ the appeal seems to have been prompted by concerns about the over-hunting of the dugong at the time. There was no rule to

control dugong hunting because the Ryukyu kingdom had been abolished in 1879 (removing its restrictions on dugong hunting). Okinawa and the southern Ryukyu Islands became a prefecture of Japan, whose national government had no laws to protect the dugong.

Based on his research, [REDACTED] has concluded that the dugong was not designated a natural monument prior to World War II. [REDACTED] has reviewed the 1933 report by Hirasaka and regards it as a preliminary survey to gather information on the dugong that could be used for its nomination. [REDACTED] (interview, October 2009), [REDACTED] with the [REDACTED] also noted that no pre-war official documents have been found regarding the designation of the dugong as a natural monument. The report by [REDACTED] is the only pre-war discussion of this topic of which he is aware.

Thus, though there clearly was some concern about the survival of the dugong as a species in the 1920s and 1930s, there exists no pre-World War II evidence that this led to its nomination as a natural monument.

PRE-WAR TAIWAN DUGONG REPORT

The dugong report by Hirasaka (1933) appears to be written to support the nomination of the dugong as a natural monument. It discusses the situation of the dugong at that time in some detail and concludes with an expression of the need to nominate the dugong as a natural monument. After providing evidence regarding its presence in the waters of Japan and of its scarcity and the effects of over-hunting, the paper reaches the following conclusions:

1. Dugong species must have thrived and been widely dispersed in the past; yet at present, the number of individuals and species are gradually decreasing, and the dugongs' range is also decreasing in size.
2. Because of the calm nature of the dugongs and their tendency to remain in fixed locations, they may be easily hunted to extinction.
3. There is the terrible example of the recent extinction of another marine mammal, the Steller's Sea Cow.
4. The only breeding district in our country, the Ryukyus, is facing the possibility of dugong extinction.
5. Its existence in Taiwan has been discovered and confirmed only recently (in 1931), and the area of distribution of the dugong might expand.
6. If this case is left unattended, it may lead to extinction in the near future, as is seen in other cases.
7. The distribution of the dugong is limited to the unexplored tropical areas, with a limited number of species. The evidence, as discussed in this paper, has extremely important value to the general and academic population.

For the reasons stated above, the paper concludes that it is abundantly clear that measures must be taken to insure the conservation of the dugong and that it should be nominated as a natural monument.

This document, thus, seems to lay out the reasoning behind a nomination of the dugong. It implies that any designation must have occurred after Showa 5 (1930), since it was written in Showa 8 (1933) and suggests that the dugong should be nominated as a natural monument (not that it has been nominated). While it provides no evidence of an actual nomination, it does show that proposals for the designation of the dugong as a natural monument were underway, at least in Taiwan, in the early 1930s.

POST-WAR STATEMENTS ABOUT PRE-WAR NOMINATION

Although no documents from the pre-World War II period have been located, several early post-war documents, as well as the documents that list the dugong as a natural monument, state or imply that it had been nominated as a natural monument before the war and afforded some kind of protection as a species. In 1951 the Biological Society of Okinawa released a statement that in pre-war times, six kinds of creatures had been preserved as protected species in Okinawa. The dugong was one of these. However, the statement does not note under which law this protection was extended to these animals.

The introductory section of the 1954 Okinawa Law for the Protection of Cultural Properties (Government of the Ryukyu Islands 1954) appears to assume that the dugong had been previously nominated as a natural monument. This section includes the following statement:

Natural Monuments within the Ryukyu (nominated by the Japanese Government before the War)

[...Discussion of other natural monuments...]

Dugong (Ju-gong)

Often seen in waters near the Red Sea and Indian coasts and in the oceans near the Ryukyus. The animal has an enlarged body and swims extremely slowly, causing it to be subjected to excessive hunting and massive decrease in numbers; as a result, it faces possible extinction. Therefore it is nominated as a Natural Monument. From its posture holding its upper body out of the water, grasping the calf with its ventral limbs while breast feeding and breathing, it is often mistaken for a human, this suggests that it may be the model for the mermaid (Okinawa Law for the Protection of Cultural Properties 1954: Introduction).

This belief that the dugong has a special protected status before World War II was repeated in the official Government of the Ryukyu Islands² Cultural Assets Protection Commission description of the dugong as a designated natural monument, where it is stated, “Growing awareness of gradual extinction has led to designation of the dugong as a protected species since the prewar days.” (Government of the Ryukyu Islands Cultural Assets Protection Commission 1978). Also, in the current list of Japan cultural properties, it is stated that the dugong was “put forward as a candidate for a natural monument before WWII.” (GOJ Agency for Cultural Affairs 2010). These documents suggest that the dugong was nominated before World War II, but not necessarily that it was designated a natural monument.

POST-WAR PRESERVATION EFFORTS

According to a Government of the Ryukyus report (Government of the Ryukyu Islands Investigation Division of the Board of Education 1958), pre-war Japanese legislation and regulations no longer applied to Okinawa. Thus, during the nine years following the war, cultural resource protection

² The Government of the Ryukyu Islands was the civil organization that administered Okinawa under United States military control between 1945 and 1972.

was ineffective because of the segregation of Okinawa from the Japanese government. No official legislation for cultural property preservation was in effect, leaving scattered artifacts and remains to be collected only by dedicated and thoughtful individuals, devoted to the preservation of cultural properties. Following World War II, Lieutenant Commander Hannah, a member of the US military government of Okinawa, along with a number of Okinawan administrators, undertook efforts to recover cultural properties and constructed museums at Shuri and Higashionna to protect culturally significant artifacts. However, without the force of protective laws, destruction of cultural properties continued to occur (Government of the Ryukyu Islands Investigation Division of the Board of Education 1958).

As a result of this situation, the Okinawa Historical Property Preservation Committee, consisting of both official and private entities, was assembled on October 31, 1949. The objective of this committee was the protection and preservation of historical and cultural properties along with landscapes and cultural and natural monuments. One of its major tasks was to formulate a law to protect cultural and natural properties.

On June 29, 1954 a Government of the Ryukyu Islands Law for the Protection of Cultural Properties was enacted. It was explicitly modeled after the GOJ Law for the Protection of Cultural Properties passed into law in 1950 and used nearly identical language as that law. The Okinawa law enumerated three classes of cultural properties: (1) tangible cultural properties, (2) intangible cultural properties, and (3) monuments, consisting of historic sites, places of scenic beauty, and natural monuments. In January 1955 the following criteria were established by the National Commission for Protection of Cultural Properties (1955) in Public Notice Item No. 4 for selecting which animals and plants were eligible for designation as natural monuments (translations were prepared by the current research team and are not official translations).

The Selection Criteria of Special Historic Sites, Places of Scenic Beauty and/or Natural Monuments and Historic Sites, Places of Scenic Beauty and/or Natural Monuments

[...]

Natural Monuments

Any Animal, Plant or Geological Mineral of which holds academic value and represents the natural resources in our country.

1. Animals

- a. A unique and distinctive animal of the Ryukyus and its habitat.
- b. Animals and their habitats, which may not be unique to the Ryukyus, but which are distinctive and require preservation in the Ryukyus.
- c. Those classified as distinctive animals or herds living in their natural environment.
- d. Domestic animals distinctive to the Ryukyus.
- e. Animals and the habitat of non-domestic animals which were transplanted from overseas to the Ryukyus and which currently inhabit the Ryukyus as wild species.
- f. Specimens of animals considered highly valuable.

2. Plants

- a. Time-honored trees, colossal trees, ancient trees, trees exhibiting unusual shapes, original cultivated plants, trees planted in rows, and groups of trees that are part of a shrine or prayer site.
- b. Original primary natural forests and vegetation.
- c. Unusual terrestrial landscapes and the vegetation they contain.
- d. Landscapes and the vegetation around important or representative *utaki*.
- e. Mangroves and other vegetation which inhabit coastlines or sandy beaches.
- f. Plants living in caves.
- g. Ponds, thermal springs, lakes, rivers and oceans which are inhabited by special water weeds, algae, moss, and microorganisms.
- h. Trees or rocks inhabited by dense vegetation.
- i. Lines of distinctive vegetation along forest margins.
- j. Areas vegetated by special or unusual cultivated plants.
- k. Vegetated areas with rare or endangered plants.

[...]

Special Natural Monuments

Selected from the natural monuments, which hold global or national value.

During the post-war period the Biological Society of Okinawa also expressed its willingness to create a plan and make an appeal to the authorities for legislation in terms of conservation of protected species. It noted that, in pre-war times, six kinds of creatures had been preserved as protected species. These included the dugong, which was discussed as follows:

Dugong dugon

The dugong (*Dugong dugon*) is a rare animal that inhabits around the Red Sea, the Indian Ocean, and in the adjacent waters of the Ryukyu Islands. Being a slow swimmer with the enlarged body, it was a victim of indiscriminate fishing practices, which caused its extreme decrease in population in recent years. Growing awareness of gradual extinction has led to designation of the dugong as a protected species. The dugong delivers one calf a year. The common name “mermaid” is considered to be derived from the appearance of female dugong and her calf held with the forelimbs breaking the water surface to breathe, since it is quite similar to human beings letting their heads emerge from underwater (Shiroma 1951).

1955 DESIGNATION

Under the new 1954 Okinawa Law for the Protection of Cultural Properties, it was decided to designate the dugong as a natural monument (*tennen-kinenbutsu*), recognizing formally the status it may have had under pre-World War II Japan government law. According to its listing in the inventory of cultural properties, the dugong was nominated on January 7 and the Committee of Cultural Property Protection in the Ryukyu Government, which was under the US administration at the time, designated it as a natural monument on the January 25 in 1955.

The following Cultural Assets Protection Commission commentary on cultural resources designated by the Government of the Ryukyu Islands between 1956 and 1962 was published in 1978 by

the Okinawa Prefectural BOE. As noted in the document, the source of some of the information is a chronicle by Higashion'na (1950), who quotes a report by researchers from the fisheries agency compiled by Matsubara in 1888 and included in an 1889 fishery report (Ministry of Agriculture and Commerce 1889). The commentary provides the following information about the dugong as a natural monument:

Dugong Protected Area: Adjacent Water Areas of the Ryukyu Islands

The dugong (*Dugong dugon*), one of the rarest animals in the world, inhabits the Red Sea, the Indian Ocean, and the waters adjacent to the Ryukyu Islands. Body size is approximately 2.7 meters long with an enlarged trunk that gradually tapers toward the horizontal caudal fin. The hind limbs and dorsal fin are absent. The body is barely covered with short hair, and the skin is bluish-gray in color while the lower abdomen is faint white. Being a slow swimmer, it once was a victim of indiscriminate fishing practices, which caused its decrease in number. Growing awareness of gradual extinction has led to designation of the dugong as a protected species since the prewar days. The dugong delivers one calf a year, and raises the infant in the sea holding it with the forelimbs.

The dugong is also known as “海馬”, which stands for “seahorse” in Chinese characters. According to *Denshinroku* (a Chinese historic document written in 1719), the dugong is described as “a horse faced mammal on a fish-like body form without scales. Meat is similar to pork. Since it is seldom captured, it was offered to the King of Ryukyu once it was hunted.” In addition to this, a record of its former appearance off the coast of Kudaka Island is written in *Omoro Soshi*. Furthermore, according to the *Nanto Fudoki Chronicles* written by Mr. Kanjun Higashion'na, there is a report as follows in the fishery researchers' log of Central Seinankai (Southwest Sea) written in 1888 (Meiji 21) by Mr. Shin'nosuke Matsubara, an engineer of the Ministry of Agriculture and Commerce:

“The dugong is also called *Kaiba/Umiuuma* (standing for “seahorse” in Chinese characters), being scientifically classified in the same order of the whale and the dolphin. The dugong can rarely be seen in Okinawa Prefecture. Prior to Haihan Chiken [the Abolition of the Han System and Establishment of the Prefecture System], Han-O [the Ryukyu King] ordered his fishermen to hunt dugongs so that he could offer it to the Edo-Bakufu (the Japanese government) and the Chinese government. Considering Aragusuku Island, one of the Yaeyama Islands, as the most favorable hunting place in Okinawa, the king required the people in the island to pay *kaiba* (dugong or dugong meat) as a tax annually. Dugong hunting is conducted exclusively around Aragusuku Island. ...The largest dugong recorded is more than 3.03 meters long (one *jo*). Female dugongs usually conceive in winter, and, reportedly, their swimming with newborn infants around February or March is frequently witnessed.”(Government of the Ryukyu Islands Cultural Assets Protection Commission 1978).

Except for the statement about the dugong in the introduction to the 1954 Law for the Protection of Cultural Properties, this is the only government document that the research team could find from the period of the Government of the Ryukyu Islands. This commentary provides extensive information about the role of the dugong in Okinawan history, but makes no explicit statement about why it was designated a natural monument. In the first sentence, it suggests that it is so designated because it is “one of the rarest animals in the world” or, in an alternative translation “a rare creature in the world.” Similarly the statement about the dugong in the introduction to the 1954 law notes its connection with the mermaid. However, it states that the motivation behind the nomination and designation of the dugong as a protected species was a result of a growing awareness of the fact that it was in danger of gradual extinction as a result of over-hunting that had led to a severe decline in the population.

GOVERNMENT OF JAPAN 1972 DESIGNATION

The GOJ Law for the Protection of Cultural Properties was established in Showa 25 (1950) as Law Number 214 under Japanese Statutes. In 1951 the criteria for selecting an animal as a designated cultural property were listed in the Bulletin of the Association for the Rehabilitation of Cultural Properties (National Commission for Protection of Cultural Properties 1951). These criteria are nearly identical to those enacted in Okinawa in 1955 (English translations are official translations). Because the meaning of the English translations is not always as clear as one might want, the original Japanese text is included here. The Japanese word translated as “peculiar” can also be translated as “unique” and, in a scientific sense, is probably intended to mean “endemic”; that is, a species that is exclusively native to Japan.

1. Animals (動物)

1. Well-known animals peculiar to Japan and their habitat
(日本特有の動物で著名なもの及びその棲息地)
2. Animals which are not peculiar to Japan, but need to be preserved as well-known characteristic Japanese animals, and their habitat
(特有の産ではないが、日本著名の動物としてその保存を必要とするもの及びその棲息地)
3. Animals or animal groups peculiar to Japan within their natural environment
(自然環境における特有の動物又は動物群聚)
4. Domestic animals peculiar to Japan
(日本に特有な畜養動物)
5. Well-known imported animals presently in a wild state, with the exception of domestic animals; their habitat
(家畜以外の動物で海外よりわが国に移殖され現時野生の状態にある著名なもの及びその棲息地)
6. Particularly valuable animal specimen
(特に貴重な動物の標本)

Criterion 2 appears to refer to animals that are indigenous to Japan but that are also found elsewhere but that can still be regarded as characteristic or distinctive of Japan. It should also be noted that for all non-domesticated animals, the selection criteria specify not only the animal, but also its habitat or natural environment.

With the reversion of Okinawa to Japan in 1972, the GOJ (1950) Law for the Protection of Cultural Properties superseded the Okinawa law. In Showa 47 (1972), the significance of Okinawa cultural properties under the Japanese Law for Protection of Cultural Properties was acknowledged, as Okinawa was returned to Japan and an official request was issued (Showa 47, Consultation Number 8) to include the Okinawan Cultural Properties in the Japanese Law. All the cultural and natural assets designated as cultural properties under the Okinawa law thus became cultural properties under GOJ law, including natural monuments such as the dugong. Uchida (1994) states the dugong was listed as a Japanese National Treasure in 1972, but no documents have been found to support this statement.

The initial explanation of its reason for listing as a cultural property was not particularly clear and did not state under which of the six criteria it was designated. It does note its academic value, that it is sometimes referred to as a mermaid, and that it is in danger of extinction.

As to the reason for its nomination as a cultural property, the dugong was selected as a candidate under the selection criteria of Special Historic Sites, Places of Scenic Beauty or Natural Monuments and Historic Sites, Places of Scenic Beauty or Natural Monuments, before the war, and was again included in the list of requests for designation on the 10th of May in Showa 26 (1951). It is referred to as a mermaid or *kaiba* and holds academic value to the international world. It once lived from the Red Sea to the Indo Pacific to the near seas of the Okinawa islands. However its slow swimming behavior is causing the animal to face a high possibility of extinction from being over hunted (Cultural Property Department of the Agency for Cultural Affairs 2001).

In 1975, the Okinawa Prefectural Education Committee prepared a summary inventory of GOJ designated natural monuments relevant to the prefecture. Its discussion of the dugong obviously draws in large part on the earlier listing of the dugong under Okinawa law. Again the danger of extinction of the species is prominent in the statement about the dugong. In this case the cultural role of the dugong is not mentioned.

Dugong dugon (P.L.S. Müller)

The dugong (*Dugong dugon*), one of the rarest animals in the world, is also called *kaiba/umiuma* (stands for “seahorse” in Chinese characters). Body size is approximately 150 centimeters long with the enlarged trunk that gradually tapers toward the caudal fin. Coarse hairs sparsely distributed over the body, and the skin is bluish-gray in color while the lower abdominal is faint white. Being a slow swimmer, it once was a victim of indiscriminate fishing practices, which caused its decrease in number. Growing awareness of gradual extinction has led designation of the dugong as a protected species since the prewar days. Although, stories of having witnessed a dugong in the adjacent waters of the Ryukyu Islands are less heard in these years. The dugong delivers one calf a year, and raises the infant in the sea holding it with the forelimbs.

The dugong range from East Africa to Andaman Islands, Philippines, Taiwan, and the adjacent waters of the Ryukyu Islands, and they reach Minamidaito Island on the north. (Okinawa Prefectural Education Committee 1975:140).

The first listing of Japanese natural monuments after the reversion of Okinawa to Japan was compiled in 1976 (GOJ Agency for Cultural Affairs 1976). It included the dugong, but provided only a short description, similar to the one in the current list presented below.

According a Wikipedia website that presents current information from the GOJ Agency for Culutral Affairs (2010), as of December 2009 there are 905 Natural Monuments, of which 128 are individual animal species or populations, six are groups of animals, and 11 are animal habitats, and 75 are Special Natural Monuments. The natural monuments include individual trees, particular forests, plant communities, groups of animals in a particular habitat, and particular animal species. The dugong is one of more than 14 animal species listed as natural monuments. Those found in the Ryukyu Islands include a rat, a woodpecker, a wild cat, a turtle, an eagle, a deer, and a bat; some are rare and endangered, others are not (Okinawa Prefectural Education Committee 1975). The dugong does not appear on the list of Special Natural Monuments and is simply listed as a Natural Monument.

The current listing of natural monuments found on that this Wikipedia website states that the dugong was designated as a natural monument under Criterion 2 of the six criteria for designating animals as natural monuments. This is the only explicit statement found of why the dugong was designated a natural monument.

Although the criterion of significance includes the habitat as well as the animal, there is no statement that the dugong habitat is included in the designation (unlike some species where this is made explicit).

While the list of Special Natural Monuments has been translated into English, the list of ordinary Natural Monuments was not translated. The following translation of the dugong listing has been prepared by ARCGEO:

Name	<i>Dugong dugon</i>
Category	Natural monument
Category 2	–
Prefecture	Not fixed
Cities, towns, and villages	Okinawa Prefecture
Managing groups	–
Date of designation	1972.05.15 (Showa 47. 05.15)
Standards for designation	Animal Criterion 2: Animals which are not peculiar to Japan, but need to be preserved as well-known characteristic Japanese animals, and their habitat
Date of special designation	–
Date of additional designation	–
Comment / Note	S47-5-189 : Put forward as a candidate of natural monument before WWII. Called as “Mermaid” or “Kaiba,” the dugong is a rare creature in the world. It used to inhabit from the Red Sea, Indian Ocean through adjacent waters of the Ryukyu islands. Since they swim slowly, they were over hunted and are considered as an endangered species.

The commentary on the designation of the dugong follows closely previous statements, indicating that it is rare and endangered and referring only briefly to its association with the mermaid legends.

ANALYSIS AND SUMMARY

The results of the research regarding the nomination of the dugong are not as satisfactory as one might hope because of the loss or destruction of critical documents during and after World War II. The research does not provide a definite answer to the question of whether the dugong was nominated as a natural monument before World War II. Some post-war documents indicate that it was nominated and others that it was given special protection, but no pre-war nomination or designation form has been found. After the war, for the first nine years under American control, there was no legal framework for the protection of cultural properties in Okinawa. Official documents show that the dugong was designated (or possibly redesignated) in Okinawa in January 1955 under the new 1954 Okinawa Law for the Protection of Cultural Properties. This meant that it was clearly protected and removed any ambiguity over its status (as to whether it was or was not protected before World War II and as to whether pre-war cultural laws applied following Okinawa’s separation from Japan and its control by the American government). Following Okinawa’s reversion to Japan in 1972, the dugong was placed on the GOJ list of natural monuments along with other Okinawa cultural properties.

The listing of the dugong on the inventory of natural monuments states that the designation of the dugong is based on its status as an animal species that, while not endemic to Japan, is a well-known characteristic Japanese animal that needs to be preserved. From what is referred to in the government documents, it can be inferred that its designation is primarily based on the value of the dugong as a biological species: on the fact that it is a native species in Okinawa waters, that it is rare and in danger of extinction, and that it can contribute to scientific research. While no document states this explicitly, this is the most plausible inference that can be drawn from the materials that have been located. The cultural

significance of the dugong is generally underplayed, with only references made to its historical role during the period of the Ryukyu Kingdom and its association with the mermaid in Okinawan folk tales.

The purpose of the Law for the Protection of Cultural Properties, as stated in the English translation of Article 1, is to preserve and utilize cultural properties, so that the culture of the Japanese people may be furthered and a contribution be made to the evolution of world culture. Alterations to the existing state of a cultural property or activities affecting its preservation may require permission from the Commissioner for Cultural Affairs. While there is less emphasis found in the materials published on the internet on guidelines for preservation of natural monuments than other types of cultural properties, it is clear that the dugong was nominated as a Japanese animal species and therefore preservation of the species in Japan would seem to be the legally mandated outcome of its designation.

Whatever may be the role of the dugong in Okinawan culture (a topic that will be explored in depth in the remainder of this report), its cultural role remained largely implicit rather than being made explicit in its nomination and designation as a natural monument. One of our informants, [REDACTED] suggested that, because the nomination forms were written by biologists, the cultural significance was simply overlooked and not stated. While the explicit reasons for the nomination may be biological, [REDACTED] feels that underlying these reasons were the cultural values attached to the dugong. Several informants suggested that, without the cultural value Okinawans attributed to the animal, it might not have been nominated. The criterion under which it was designated, that of a characteristic Japanese animal implies some kind of cultural valuation that makes this animal characteristic of Japan as opposed to other animals. Thus, the absence of any reference to the cultural role of the dugong in the nomination and designation documents does not mean that the dugong is not of cultural value to the people of Okinawa. Nor does it mean that the cultural significance was not crucial in the nomination of the dugong as a natural monument.

The following three chapters discuss what is known of the cultural role of the dugong in the Ryukyu Islands through archaeological studies, historical documentation, and Okinawan folklore.

V. ARCHAEOLOGICAL EVIDENCE: THE DUGONG IN THE PREHISTORIC PAST

Archaeological investigations have revealed that for up to 6,000 years the inhabitants of Okinawa and other Ryukyu Islands have hunted the dugong, eaten its meat, and for at least 3,000 years used its bones for making artifacts. While the bones and bone artifacts found in archaeological sites generally do not reveal the significance of the dugong to the prehistoric inhabitants of the islands, the context of the finds or the style of an artifact may allow the archaeologist to speculate about the meaning and importance of the dugong to the people utilizing it. It is even possible (though not verifiable) that significance imputed to the dugong continued into and influenced historical and contemporary attitudes toward the dugong. Most importantly for this paper, the archaeological evidence provides a background for understanding the dugong's known significance during historical times.

Archaeological excavations have revealed the presence of dugong bones in over 100 sites in the Ryukyu Islands. These demonstrate use of the dugong by the inhabitants of Okinawa from as early as the Early Shellmound Period II (Early Jomon Period) more than 5,500 years ago (see Table 1 for dating and correlation of Okinawa and Japan prehistoric and historical periods), including remains from some of the earliest Holocene Age sites on the island, through the Gusuku Period (ca. 1200-1609 Common Era [CE]) and on into the historical Kinsei Period (1609-1867 CE). The types of bones, their modifications, and the contexts in which they are found reveal change in the patterns of the use to which the dugong was put over the course of these millennia.

According to a compilation of data prepared by Isao Morimoto in 2004 and supplemented in 2005, at least 113 archaeological sites in the Japanese archipelago are known to contain dugong bones, including dugong bone artifacts and bone remains as the residue of consumption. These sites are distributed across the archipelago: five sites in the Amami Islands Group, 86 sites in the Okinawa Islands Group, eight sites in the Miyako Islands Group, and 12 sites in the Yaeyama Islands Group. In addition, in the main Japanese islands one site on Honshu and one on Kyushu contain dugong bones. Morimoto (2004) notes that the list of sites in the Amami Islands Group, which is part of Kagoshima rather than Okinawa prefecture, may not be complete. Morimoto also comments that frequently reports only list bone remains as being those of sea mammal rather than specifically those of dugong. However, since there is no separate indication in the archaeological or historical record that other sea mammals in the surrounding waters, whales and dolphins, were systematically hunted, it is most likely that the bones are those of dugong.

Our background research and interviews have revealed that several more recently excavated sites on Okinawa also contain dugong remains. New notable discoveries are reported in research reports published after the year 2004, such as those of the Anchinoue Shellmound in Motobu Township (Motobu Township Board of Education 2005) and Gushikawa Gusuku of Uruma City (Uruma City Board of Education 2006). At Shurijo Castle site in Naha City, dugong bones have been found at the Shoin and Satsuma areas (Okinawa Prefectural Archaeology Center 2006a), including the Uchibaru area site (Okinawa Prefectural Archaeology Center 2006b), Kugani-Udun Site (Okinawa Prefectural Archaeology Center 2007a), Uchibaru Area West Region Site (Okinawa Prefectural Archaeology Center 2007b), and Shichanu-Unaa Sumui-utaki Area Site (Okinawa Prefectural Archaeology Center 2008). The most recent reports are those for Watanji Village Site of Naha City (Okinawa Prefectural Archaeology Center 2007c), Ireibaru B Site of Chatan Township (Chatan Township Board of Education 2007, 2008a),

Hanzanbaru B Site of Chatan Township (Chatan Township Board of Education, 2008b), and Higashionna-Mikawabaru Site of Uruma City (Uruma City Board of Education 2009).

Figures 8 and 9 show the locations of archaeological sites on Okinawa Island discussed in the text.

EARLY SHELLMOUND (JOMON) PERIOD SITES ON OKINAWA ISLAND

While there are several Late Paleolithic sites on Okinawa dating to the last part of the Pleistocene (ca. 32,000-14,000 before present [BP]), no archaeological sites that date to the end of the Pleistocene or early Holocene have yet been found. Hiroto Takamiya (1997) suggests that the island was unable to support a hunting and gathering way of life over a long period of time. Deer and boar were hunted by the late Paleolithic peoples, but, while bones of both are common in the earliest sites, in later sites the percentage of deer bone falls and boar becomes a far more important food source. By the end of the Pleistocene, the Ryukyu deer had become extinct, whether as a result of over-hunting or of other causes is not known.

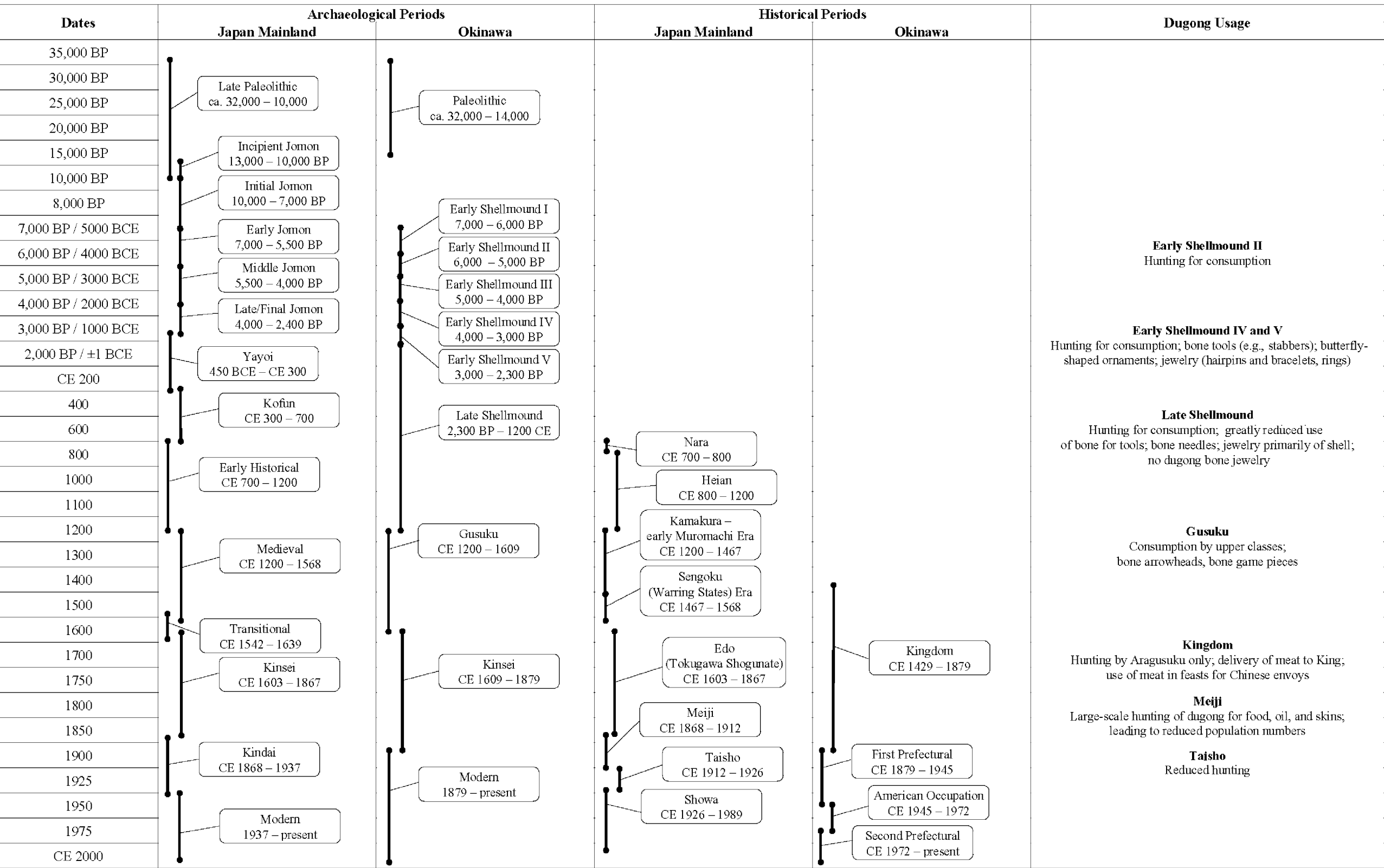
Archaeological evidence indicates that Okinawa was settled again by around 7000 years BP (uncalibrated³). The following nearly 5000 year long period of settlement is termed the Early Shellmound Period in Okinawan archaeology, although frequently the Japanese periodization is used, reflecting the fact that much of the pottery found in these early Okinawan sites is similar to that found on the main Japanese islands.

The use of dugong as a food resource is first confirmed from a few Early Jomon (Okinawan Early Shellmound Period II; ca. 6000-5000 years BP uncalibrated) sites on the island of Okinawa. Such sites are less common than later sites and only a few contain dugong bones. Along the west coast of the main Okinawa island, these include the Ireibaru B site in Chatan Township, the Noguni Shellmound Point B in Kadena Town, and the Komesu Shellmound in Itoman City. At Noguni a scapula and an unknown number of finger (*digitorum manus*) fragments were recovered. At Ireibaru, a bone artifact from a sea mammal was reported very early (in 1919) by Matsumura (1920), but recent excavations have uncovered much more material. At Komesu, rib fragments (number unspecified) were found; for this site, it is not clear whether the bones come from the Early Jomon or from later deposits (Morimoto 2004).

Recent excavations at the Ireibaru B site by the Chatan Township BOE (the results of which have been only partially published) have indicated that it is among the earliest sites in Okinawa (Chatan Township Board of Education 2007, 2008a). Here dugong bones have been recovered in association with Sobata style pottery (dating to about 5500 years ago). In an interview with [REDACTED] (interview, October 2009), [REDACTED] archaeologist [REDACTED] she disclosed additional information about this site. The Early Jomon Period deposits contain only dugong bones, mostly rib bones, that are remains of food consumption; no dugong bone artifacts are found in these early deposits.

³ Because of fluctuations in the amount of Carbon¹⁴ in the atmosphere (and thus the proportion of Carbon¹⁴ to Carbon¹² in organic remains) the age in radiocarbon years obtained by measuring past organic materials must be calibrated in order to more accurately reflect the actual date in calendrical years. Until very recently Japanese archaeologists have not calibrated the radiocarbon dates they have obtained. Thus the date ranges used for sites and periods are generally hundreds to thousands of years more recent than the more probably correct calendrical date.

Table 1. Chronology of Archaeological and Historical Periods in Okinawa and Mainland Japan and Summary of Dugong Use in Major Periods.



BP = Before Present (1950); BCE = Before Common Era; CE = Common Era

Most of the dugong remains on Okinawa come from Late Jomon to Final Jomon (Okinawan Early Shellmound Periods IV to V) deposits (4000-2300 BP), periods when prehistoric sites are much more common on Okinawa than earlier. Bones are found in sites all along the west and east coasts of Okinawa, extending from Nakijin Village in the north to Itoman City in the south. In addition, dugong bones are found in sites of this age on the islands of Ie Shima and Kumejima.

The northern coast of the Motobu Peninsula is the location of seagrass beds and is an area (particularly around Kouri-jima) closely associated with dugong. Dugong bones have been recovered from three prehistoric sites in Nakijin: Kouribaru (on Kouri-jima) (Uehara et al. 1983), Nishinagahamabaru, and Tokijinhamabaru (Nitta et al. 1977). Three sites are also known in Motobu: Gushiken Shellmound (Kishimoto et al. 1986) and the Chibazukabaru site (Kishimoto et al. 1988) contain dugong remains, while the Yabikubaru site contained a dugong bone butterfly-shaped ornament (Morimoto 2004). All are coastal sites and date from the Late to Final Jomon Periods. Mostly remains of rib fragments are found at these sites. A sea mammal tooth is reported from Kouribaru. Tokijinhamabaru contained over 30 bones and bone fragments. From Nishinagahamabaru artifacts include hair pins, and pieces of rib with holes drilled in them (interview, October 2009).

Dugong remains are not reported from any sites along the east coast of Nago City, but to the south in Ginoza at the Meebaru coastal site (interview, October 2009) found 39 dugong bones in the Late Jomon Period layer. At the Kogachibaru Shellmound near Ishigaki in Uruma City, 40 dugong bones and 11 dugong bone artifacts, consisting of a hair pin, 5 rings, and 5 stick-shaped artifacts, were recovered from Late to Final Jomon Period layers (Shimabukuro et al. 1997).

Heshikiya-toubaru Site, located at the tip of Katsuren Peninsula in Uruma City, which extends into the Pacific Ocean on the east side of central Okinawa, is a site of the Late to Final Jomon Periods on Nakagusuku Bay. The survey unearthed a vast quantity of shells, fish bones, and bones of land and sea mammals. Among the mammal remains, the most common are wild boar and dugong bones. This is by far the richest site in terms of dugong remains; two complete crania, over a thousand rib fragments, and several hundred other bones were found. Dugong artifacts consist of a bone stabber, two unfinished perforated artifacts, and five bones with scars of unidentified purpose. Based on analysis of the bones, Archaeologist Hiromasa Kaneko found an indication of change in focus from hunting dugong in the early occupation to wild boar later on, as it was found that the number of dugong bones decreased over time. He also found that the excavated dugong bones were concentrated near the coast, while those of wild boar were discovered in inland areas of the sites (Department of Culture of the Okinawa Prefectural Education Committee 1996).

In addition to bone remains that probably indicate use of the dugong as a source of meat, a large repertoire of dugong bone artifacts has been excavated dating from the Late and Final Jomon Periods from the Ireibaru B site (interview, October 2009). These include both tools and other artifacts that were more likely made as ornaments for body adornment, charms or amulets, or for use in rituals. Dugong bone artifacts that were probably used for personal adornment include hairpins, rings, and bracelets. The most spectacular pieces of dugong jewelry are the butterfly-shaped bone ornaments, which were usually made from dugong mandibles (unlike most tools, which were made from rib bone).

The first dugong bone butterfly-shaped ornament (although not originally recognized as dugong bone) was excavated at the Sachihija Shellmound in 1919 (Shimada 1920). While not widespread, the butterfly-shaped ornaments made of dugong bone are found at a few other sites, most commonly at sites on the Katsuren Peninsula in Uruma City at the southern end of Kin Bay and along the west coast of Okinawa from Kadena to Naha (Morimoto 2004). These ornaments were sometimes painted red, suggesting to some researchers ritual use or use in magic. However, none have been recovered from a context that would confirm their function, nor are we even sure that they were meant to represent a butterfly. [REDACTED] (interview, October 2009) suggested that they might be meant to resemble a moth, rather than a butterfly, an insect that is important in recent rituals in the Amami Islands and that appears on the ritual robes of priestesses.

SAKISHIMA PREHISTORIC ARCHAEOLOGY

Because the islands of the Sakishima area, the southwestern Ryukyu islands composed of the Yaeyama Island Group, the Miyako Island Group, and Yonaguni, are crucial in the investigation of the historical significance of the dugong in the Ryukyus, the archaeological background for these islands, which is quite different from that of Okinawa and the other northern Ryukyu islands, is discussed in some detail here. Figure 10 shows the locations of archaeological sites in Sakishima mentioned in the text.

In the Sakishima area, there is no evidence of Jomon pottery or of any Jomon influence on the cultures of these islands. Here the early sites seem to be the result of settlement from Taiwan beginning in the late fifth millennium BP; the calibrated radiocarbon dates suggest settlement sometime between 4500 and 3900 BP. The presence of Shimotabaru pottery, named after a site of this period on Hateruma, and the clustering of radiocarbon dates place all these sites into a brief phase called the Shimotabaru Phase at the beginning of the settlement sequence for these islands. The Shimotabaru pottery is a red, usually undecorated, earthenware in the form of dishes with flat bases. Associated with the pottery are semi-polished stone adzes in a variety of forms made from local sources and one *Tridacna* (giant clam) shell adze. The pottery and the adzes both suggest connections with Taiwan; red pottery of similar form is found in sites of this age (Middle Neolithic) on the east coast of Taiwan (Summerhayes and Anderson 2009). Adzes similar to Shimotabaru forms are also known on Taiwan. However, the adzes in the Yaeyama Islands are made from local stone and the pottery is also made locally, probably using clay from the Nagura Basin on Ishigaki island. In contrast, the early pottery of Okinawa is clearly connected to the Jomon pottery of Japan and adzes of these types are not found north of Okinawa.

Bone is poorly preserved in the acidic soils found in the interiors of the islands, thus dugong remains are found only at coastal sites. Dugong bones are found at Nagura Shellmound and Otabaru on Ishigaki, Nakama 2 on Iriomote, Shimotabaru Shellmound on Hateruma in the Yaeyama Island Group and from Arafu Shellmound in the Miyako Island Group. At Nagura, three rib fragments were found and at Shimotabaru 16 rib fragments, two vertebrae, and four unidentified bones were recovered (Morimoto 2004).

The islands may have been abandoned and resettled again later, between 3000 and 2500 years ago (Summerhayes and Anderson 2009). Sites from the Late Neolithic Period (3000-1000 BP) are characterized by *Tridacna* shell adzes, artifacts that were common in the Philippines but not found on Okinawa. Dugong hunting was also practiced by these Late Neolithic settlers; several Late Neolithic sites have yielded dugong bones. Rib bone fragments were recovered from Nagura and Kanda Shellmounds (along with a canine tooth at the latter site) on Ishigaki. On Miyako, the number and type of bones from Urasoko are unknown, but a rib and a vertebra were found at Nagamazuku. At the Toguruhama site on Yonaguni, a dugong humerus, phalanx, and vertebra were excavated. A bone stabber found at the

Urasoko site is the only dugong artifact reported to have been found at a prehistoric site in Sakishima (Morimoto 2004).

It is only in the sixteenth century with the expansion of the Ryukyu Kingdom from Okinawa into Sakishima that a close connection developed between these islands and Okinawa. As will be discussed in the next chapter, the dugong was to play a critical role in the subsequent relationship between Sakishima and Okinawa.

LATE SHELLMOUND (POST-JOMON) PERIOD SITES

Around 400 Before Common Era (BCE) major changes on the main Japanese islands mark the beginning of the Yayoi Period (ca. 400 BCE-300 CE). The rapid expansion of intensive wet rice agriculture transformed the mixed Jomon economy to one primarily dependent on agriculture. By the early centuries CE growing social complexity, social and political stratification, and exchange with China and Korea characterize societies on the Japanese islands; by the seventh century a unified Japanese state had emerged. On Okinawa, however, wet rice agriculture was not adopted until more than a millennium later, and the course of development was much different from that on the main Japanese islands. The years from 300 BCE to 1200 CE are known as the Late Shellmound Period, and the use of Okinawan terminology for these periods reflects the dissimilarity between Okinawa and Japan.

Dugong remains continue to be found in Late Shellmound Period sites, but primarily as food remains. Artifacts are occasionally found, but the use of dugong bone for ornaments or as possible ritual objects is much reduced. Two bone needles from Ara Shellmound on Ie Shima are among the very few dugong bone artifacts from this period (Asato et al. 1993). Shell becomes the material of choice for bracelets and other items of decoration. Bracelets or bracelet preforms made of shell from Okinawa are frequently found at sites on Kyushu where they seem to have served as prestige goods for the emerging elite.

GUSUKU PERIOD SITES

By 1200 CE wet rice was being cultivated in Okinawa and the archaeological record reveals indications of increasing social stratification, accumulation of wealth by the elite class, and the rise of territories with political power. The next 400 years are known as the Gusuku Period, named for the *gusuku* (castles or citadels) built by the rulers of the small domains that developed on the island. It was a period of gradual political consolidation as multiple independent domains, each protected by its own castle, waged war with one another. By late in the 14th century, three main centers of power had emerged: Hokuzan in the north with its main castle at Nakijin, Chuzan in the center with its main castle at Urasoe, and Nanzan in the south. In 1429 the Chuzan lords unified the entire island under their control and began to build a new castle at Shuri, high on a naturally well-defended hill overlooking Naha Harbor.

This choice of location was of significance in that the wealth of this new Ryukyu Kingdom was largely dependent on the trade connections that Okinawa had with China, Japan, Korea, and Southeast Asia. Sho Hashi was acknowledged as the ruler of the Ryukyu islands by the Chinese emperor and the kings of the Sho Dynasty continued to send tribute to China for the next 450 years. In return Okinawa came to play a central role in the trade of both Japanese and Southeast Asian products to China and the distribution of Chinese silks, porcelains, and other goods to these places.

For the early part of this period the archaeological record is the main source of information, but by the 15th century first Chinese written records and then later local Okinawan accounts maintained by

the Ryukyu Kingdom become increasingly important in informing us about Okinawa. This section looks at the archaeological evidence of the dugong in Okinawan culture of the Gusuku Period; the next chapter will discuss the historical materials.

Dugong bones appear to have been used differently during the Gusuku Period than during the earlier prehistoric phases. The change in use is related to the changes in the patterns of social hierarchy that emerged during this period. There are at least 24 Gusuku Period sites, mostly on Okinawa but also in the Miyako and Yaeyama Island Groups, from which dugong bone has been recovered. These include both remains of food consumption and bone artifacts. The artifacts are tools or game pieces only; no ornamental or ceremonial artifacts date to this period. Arrowheads are the most commonly found artifacts; bone points and prong-end-shaped artifacts are also found. These pointed tools appear to be imitations of iron artifacts. While iron had been introduced to the island, it was still scarce and expensive. Dugong bone may have been the next best material for Gusuku Period tools, selected for making arrowheads and other tools because of its strength (Morimoto 2004).

A particularly rich collection of dugong bone arrowheads was recovered in excavations at Katsuren Castle on Katsuren Peninsula in Uruma City. Six were definitely made from rib bones; the remaining six were probably made from the ribs. In the nearby Katsuren Shellmound, a dugong bone mahjong tile piece was recovered; it may date from Late Shellmound or very early Gusuku Period. There is also a bone arrowhead from the Inafuku site in Ozato, a spatula-shaped artifact from Itokazu Gusuku, and rib artifacts from Agari-nu Utaki and Wakuta Old Kiln in Naha.

██████████ (interview, October 2009) has carried out a study of the distribution of bone remains during the Gusuku Period in Nakijin Village. ██████████ divides the region into four habitation zones and suggests that each zone is primarily inhabited by a particular social class. The royal family lived in the three highest, central courtyards at Nakijin Castle. The remaining six courtyards in the castle were inhabited by the aristocrats and warriors. The villages immediately around the castle would have been inhabited by artisans, craftsmen, and others associated with serving the castle. Finally, the outlying areas between the castle and the coast were inhabited by the commoner farmers.

██████████ has calculated that nearly half the wild boar bones found in Gusuku Period deposits in Nakijin come from the area inhabited by the ruling elite. Another quarter comes from the lower castle courtyards. Thus, the hunting (or at least the consumption) of the wild boar seems to have been an activity restricted to the upper classes and was one of the signs of high status. The evidence for the dugong is more limited and less clear, but again it seems to be largely recovered from the castle precincts and thus, its use and consumption may also, like the wild boar, have been related to social class. The largest number of dugong bones is found in the royal courtyards. In particular, the more unusual artifacts made from dugong bone, such as the dugong bone dice, have been recovered only from the castle itself (██████████ interview October 2009).

RYUKYU KINGDOM ARCHAEOLOGICAL EVIDENCE

In addition to the evidence from the prehistoric period, there is also archaeological evidence of dugong bones excavated from Ryukyu Kingdom (1429-1879) sites, which assist in augmenting information from the historical accounts of the kingdom. In particular, the remains from the Shuri-jo Castle site are noteworthy. The castle was built over the course of the period from the 15th century to the first half of 16th century as a capital for the Ryukyu Kingdom's government. In conjunction with the reconstruction and maintenance of the castle, archaeological surveys have been conducted, covering a wide area including that of the main hall inside the castle and the area surrounding the castle.

The reports of these surveys and test excavations indicate that no bones were found in the middle central ward (*bailey*), which consisted of the main hall, south hall, and a north hall. In the absence of trash pits, it can be concluded that this location was never used for waste disposal (Department of Culture of the Okinawa Prefectural Education Committee 1988a, 1988b, 1998a, 1998b; Okinawa Prefectural Archaeology Center 2001a, 2001b, 2002, 2003a, 2004a, 2004b, 2004c, 2006a, 2006b, 2007a, 2007b and 2008). The only findings of animal bone distribution in the middle central ward were those unearthed from the artifact-bearing layer located at the kings' study and the *Sasunoma* (guest house) area which included a large quantity of animal bone remains (including dugong bone) and fish bones (Okinawa Prefectural Archaeology Center 2006a). According to the historical records, the dugong meat was highly valued and was brought to the Ryukyu Kingdom as prepared meat or dried skin from the remote islands. However, the excavated material suggests that it was not only dugong that had been butchered elsewhere that was assembled in the Kingdom's kitchen, but also considerable amounts of dugong for butchering. In the Ueki-mon Gate area, marks of decapitation are found among the unearthed bone artifacts of adult and calf dugong bones (Okinawa Prefectural Archaeology Center 2003b).

Analyzing the excavated dugong bones, there are skulls, shoulder blades, rib bones, vertebral centrum bones, and metacarpal bones, with some showing damage or marks probably inflicted by butchering. In other words, the catch was brought directly to the palace and was dissected in the palace. A cookhouse called "*Yuinchi*," located at the southeast of the back of the main hall, is said to be the kitchen of the Ryukyu Kingdom. However, from an archaeological point of view, it is presumed that the dugong was butchered at many places in the castle and the bones were dumped as residues.

According to the historical materials and geographical descriptions, the settlement on Aragusuku in the Yaeyama Island Group is considered as the only village that was permitted to hunt the dugong. However, the archaeological recovery of bones from many parts of the dugong indicate that whole dugongs were brought to the castle before butchering. This suggests that dugong were being hunted by islanders nearer the castle, perhaps along the west coast near the capital of the Ryukyu Kingdom. As Morimoto's Figure 4 titled "Distribution of Excavated Dugong Bones No.3 (Okinawa Islands)" shows, dugong bones are excavated from both shellmounds and Gusuku castle ruin sites located along the beaches of Naha City, Urasoe City, and Ginowan City (Morimoto 2004). It is easy to imagine the existence of hunting grounds near the capital of the Ryukyu Kingdom, even though no written records supporting their presence has been found.

In one of the excavations of old tombs of the Kinsei (Pre-Modern) Period, which followed the Gusuku Period, those of Shuri-Sakiyama Old Tombs in Naha City (Shima et al. 2001), a dugong bone was discovered in the No. 1 urn of the 7th tomb, a finding that raises questions about the use of dugong in burial rituals within the last 100-400 years.

PATTERNS OF DUGONG USE FROM THE ARCHAEOLOGICAL RECORD

The last column in Table 1 summarizes the changing patterns in Okinawan use of the dugong over time. During the Pleistocene, both the Ryukyu wild boar and the Ryukyu deer were hunted by Late Paleolithic hunter-gatherers on Okinawa. By the end of the Pleistocene the deer was extinct. The island itself may have been abandoned by people until 7000 or so years ago. With only the wild boar left as a major terrestrial protein source, there was an emphasis placed on marine resources in these new Jomon period sites. While fish and shellfish were particularly important, remains of sea mammals are also found in these early prehistoric sites. As [REDACTED] (interview, October 2009) has suggested, the dugong may, to some degree, have served as a replacement for the extinct deer, which remained an important Jomon Period food source on the main islands of Japan and also as a source material for bone artifacts.

At the Early Jomon Period sites, there is evidence only that dugong were hunted for their meat; only at Late and Final Jomon Period sites do archaeologists find artifacts made of dugong bone. Dugong may have been favored for making artifacts because of the high density of its bones. Even after the introduction of iron into the islands, dugong bone continued to be used for several artifacts, including arrowheads (imitating the form of iron points), dice, and mahjong tiles.

Although the number of dugong artifacts recovered is not huge, the artifacts made from dugong bones are found from the Late Jomon through the Gusuku Period. Morimoto (2004) notes an increase in the number and variety of artifacts in the Final Jomon Period compared with the earlier Late Jomon Period. However, following the Final Jomon, dugong bone artifacts are rather rare in Late Shellmound Period sites. According to [REDACTED] (interview, October 2009), [REDACTED] archaeologist [REDACTED] marine shell seems to have replaced dugong bone as a favored material for making jewelry.

In addition to the practical tools and jewelry, a particular artifact, produced by utilizing dugong bones and known as the butterfly-shaped ornament, has been recovered from deposits dating to the Late and Final Jomon Periods. This raises questions of whether the dugong bone was deliberately selected to manufacture this artifact and whether it was selected for reasons other than the simple availability of the bone or because of its hardness and strength. Some researchers have speculated that there might be cultural factors behind the use of dugong bones. H. Shimabukuro, the excavator of some of these artifacts, argues that, “the predominant component utilized as the material for butterfly-shaped ornaments are sea mammal bones, such as dugong and whale bones. The reason why it was important to maintain such integrity of raw material holds great interest” (Shimabukuro 1991).

Other researchers such as Hiromasa Kaneko, who conducted research regarding the utilization of dugong bones for artifacts, states that “a common concern regarding the dugong can be noticed in the regions around the world where the habitat of the animal is located. This suggests, the dugong had a significant adherence to peoples lives from an early period of time, and must have, at some level, affected their psychology” (Kaneko 2000).

Despite these intriguing suggestions, the archaeological remains of the dugong in prehistoric sites have not been found in contexts that readily allow archaeologists to discern whether the dugong was selected for reasons of special cultural value or simply because its meat was edible and the bone was good for making artifacts.

SUMMARY

In summary, the hunting of the dugong seems to have been practiced in Okinawa and the entire Ryukyu archipelago in prehistoric times, as dugong bones are found at coastal sites throughout the islands. The dugong may have been hunted solely to provide meat to be consumed, perhaps its fat for fuel, and its bones to be made into artifacts. On the other hand, such an unusual animal may have taken on a larger cultural significance. A possible indication of such wider significance is the manufacture of butterfly-shaped ornaments that were sometimes covered in ocher, suggesting possible ritual or magical use of these artifacts, but this cannot be confirmed from the current archaeological evidence. As the dugong is a large mammal with a significant quantity of meat obtainable from a single animal, there may well have been ritual distribution of its meat after one was captured, following common practice among hunter-gatherer peoples throughout the world.

The archaeological record informs us that Okinawans have had a relationship with the dugong since nearly the earliest known Holocene settlement on the island. While the ways in which dugong was

used changed over time, this relationship continued into the historical period with the establishment of the Ryukyu Kingdom and the special role the dugong came to play in relationships within the kingdom and between the Kingdom and China.

VI. HISTORICAL DOCUMENTATION: THE ROLE OF THE DUGONG UNDER THE RYUKYU KINGDOM AND IN THE MODERN ERA

While it is difficult to be certain of the cultural meaning that the dugong may have possessed in the prehistoric period, written records dating to the period of the Ryukyu Kingdom (1429-1879) contain information of how the dugong was perceived and used and of its role in Okinawan political culture. Contemporary perceptions and the traditional values placed on the dugong may well derive from this period of traditional Okinawan culture. This chapter focuses on the contents of the historical records; what these mean in terms of the cultural significance will be discussed more thoroughly in Chapter VII.

The Ryukyu Kingdom was founded in 1429 CE during the middle part of the Gusuku Period when Sho Hashi of the central kingdom of Chuzan on Okinawa completed his conquest of the other two kingdoms on the island. In later years the Ryukyu kings would extend their dominion over other Ryukyu islands (Kerr 1958).

All three kingdoms had already established trade and tributary relationships with China, and in 1430 the Ming Chinese emperor confirmed Hashi's position as ruler or *sho* of Okinawa. For four and a half centuries the rulers of Okinawa would pay tribute to the emperor, and the Emperor of China would send emissaries to Okinawa to collect this tribute. This tributary relationship gave Okinawa a favored position in conducting trade with China. For several centuries, the kingdom was engaged in extensive trade contacts throughout east and southeast Asia.

In 1609 the lord of Satsuma in southern Kyushu, a feudal domain under the Tokugawa Shogunate which ruled Japan at the time, conquered Okinawa. Thereafter the Ryukyu kings owed tribute to Satsuma, as well as China, but maintained their role as rulers of the islands for over two and a half more centuries. Only in 1879, a decade after the Meiji Restoration in Japan, with the reorganization of the government administration, was Okinawa truly integrated into the Japanese state, with the northern islands becoming a part of Kagoshima Prefecture and Okinawa and the southern islands becoming Okinawa Prefecture. The institution of kingship was abolished.

An important effect of the integration of Okinawa as a fief within the Satsuma domain was that it allowed Satsuma to take advantage of Okinawa's favored position with China to trade with China despite the closing of Japan to the outside world by the Tokugawa Shogunate. Through Okinawa, Chinese silks and porcelains were obtained in exchange for Japanese silver.

As a result of the close relationship between China and Okinawa, many of the earliest historical documents about Okinawa are Chinese records. It is only after 1590 that the Ryukyu kings compiled earlier records and began to keep written records and not until much later that the dugong is mentioned in any official documents. This chapter reviews the existing documents, Chinese, Okinawan, and Japanese, that refer to the dugong during the period of the Ryukyu Kingdom. This is followed by a brief review of government documents relating to the hunting of the dugong after the abolition of the kingdom.

In the historical texts, the word used for dugong is *kaiba* written using the *kanji* characters 海馬 meaning Sea “海” Horse “馬”). While these characters are also used to refer to a Chinese mythological sea creature, they clearly refer to the dugong in the most of the texts concerning Okinawa. The common Okinawan term for the dugong, *zan*, does not appear in the written accounts. *Kaiba* refers both to the dugong as a living creature and to the meat of the dugong after it has been killed and butchered.

The earliest Okinawa historical record referring to the dugong goes back only as far as 1768 and all other Okinawan documents date to the nineteenth century. Most of the documentation comes not from the central archives at Shuri, but from administrative records kept in Ishigaki City in the Yaeyama Islands. The Chinese records of the diplomatic missions sent to the Ryukyu Kingdom supplement the meager local documentation. These are generally slightly older documents dating between 1721 and 1800 and describe the use of the dugong during the tribute missions. These two sets of official documents are supplemented by accounts of travels kept by adventurers, traders, and scientists.

Shirakihara et al. (2007) state that the dugong was hunted by the inhabitants of Aragusuku from as early as 1637, citing Ohama (1971) as the source of this date. Our review of Ohama failed to find any statement concerning this date, nor have we found any primary sources that talk of dugong hunting in 1637. Thus, while it is assumed that some of the practices referred to in the later documents found during our research reflect earlier practices, there is scant historical evidence of the relationship between the dugong and the Ryukyans before 1700. The only exception is a folk song recorded between 1521 and 1623 with mentions hundreds of catches of dugong and which will be discussed in the next chapter.

What is generally assumed by authors who refer to the historical use of the dugong during the period of the Ryukyu Kingdom is that the hunting and use of the dugong was restricted by the Ryukyu kings, who ruled the Ryukyu Islands from Shuri castle. Only the inhabitants of the small island of Aragusuku were allowed to hunt the dugong; the dugong was then dried and prepared for transport to Shuri Castle. The dugong meat was the “tax” that these people of Aragusuku were required to pay to the king. The meat was then prepared by the royal chefs as one of the courses at feasts given to emissaries of the Chinese emperor, who came to collect tribute from the Ryukyu king. As our discussion of the historical documents below will show, this general scenario has been developed only by putting together pieces from a number of disparate historical documents. As pointed out also by several of the informants we spoke with, these documents are not quite as fully supportive of this “known history” than one would be led to believe from many authors. Most of the references date to the last years of the Ryukyu kingdom (which was abolished by the Meiji Emperor in 1879) with no mention of the dugong prior to the 18th century.

The historical materials translated and summarized in this chapter were collected by Mr. Naoki Higa during the course of this project. His research incorporates materials previously collected by Izumi (2007) for his “Cultural History Essay on the Dugong”. This chapter and the next are based upon Mr. Takeshi Izumi’s essay, with the inclusion of additional material derived from the research conducted for this report and for preparation of the annotated bibliography. Appendix B contains the original text and English translations of the materials discussed below.

THE KAIBA IN THE DIPLOMATIC PAPERS OF RYUKYU – CHINA RELATIONS

The *Rekidai Hoan*, the *Precious Documents of Successive Generations* (Editorial Office of the Okinawa Prefectural Library for Historic Materials 1992; Wada 1994), is a compilation of documents of both Chinese and Okinawan origin compiled during the period of the Ryukyu Kingdom. The first compilation was undertaken beginning in 1697 and included documents going back to 1372 when the kingdom of Chuzan on Okinawa first sent envoys to China at the invitation of the Ming Emperor. The two originals of the compilation have both been destroyed, but copies of significant portions going back to 1424 are still available in various libraries and archives.

In 1428, a record was made that was included in the *Rekidai Hoan*, documenting the bestowal of a gift of royal vestments from the Chinese Emperor to the Ryukyu king, Sho Hashi. The wardrobe set included a *Ra*-woven silk robe with a seahorse (*kaiba*) embroidered on the back, the wearing of which

was authorized for officials of the ninth rank. From the illustration accompanying the record, the *kaiba* appears to be pictured as a mythical seahorse, galloping over the waves, and not a dugong (see Appendix B). All the animals depicted on these official robes were animals of speed and strength, so the dugong would appear not to be a suitable animal for representation on these robes. Thus, it is unlikely that this first reference in the Chinese-Ryukyuan diplomatic record to a *kaiba* refers to the dugong.

THE DUGONG IN THE CHINESE RECORDS OF ITS DIPLOMATIC RELATIONS WITH THE RYUKYU KINGDOM

As both earlier and generally more informative, the Chinese documents in which the term *kaiba* clearly refers to the dugong are discussed first. These relate how the dugong meat was supposed to be sent exclusively to the Ryukyu king and how it was then prepared in feasts for the Chinese emissaries who came to collect tribute. There are three documents which refer to the use of the dugong. These are from journals or official reports by the Chinese investiture envoys of their stay in the Ryukyus.

The earliest is a report of a Chinese mission to Chuzan (Shuri) in 1721 written by one of the emissaries, Hsu Pao-Kuang (Harada 1999). Hsu writes that the *kaiba*, with the head of a horse and the body of a fish and no scales, was a rare catch. When captured, it was immediately delivered to the king. Its meat was like pork.

In the record of the 1759 mission to Okinawa, the envoy Chou Huang (2003; Harada 1999) wrote a briefer description of the dugong, repeating part of Hsu's description and adding nothing new.

The most complete discussion comes from Li Dingyuan's journal of the mission in 1800 (Li 2007; Harada 1999). He states:

There were thin slices of *Kaiba* meat. Its shape is curled and twined, looking like wood shavings. The color is similar to chopped *bukuryo* (a type of fungus used for medicinal purposes: a blackish Polypore). Its high-grade meat is difficult to obtain. If the meat is acquired, it is immediately delivered as an offering to the king. Its shape, a body of a fish, head of a horse, no hair and has legs with skin of a *jiangzhu* (finless Porpoise). My regrets are that I have seen the processed meat, but have not seen a living one yet.

Furthermore, the journal describes how the meat was served as *Osuimono* (a Japanese style clear broth soup) (Li 2007).

The first two Chinese journal entries are simple notes, yet still hold valid information regarding the difficulties in obtaining dugong meat, and how it was immediately submitted to the king. The third reference is from a journal written on June 15, 1800, providing details of the day dugong meat was served at dinner.

Sumiko Kinjo discovered dugong meat was used as one of the ingredients in the *Okansen Ryori* (hospitality dishes) for the banquet in welcoming the Chinese investiture emissaries (Kinjo 2003). Although daily foods were also served to the emissaries, among the dishes presented was salted and dried dugong meat (Kinjo 1993), in which, where one *kin* is the equivalent of 600 g, the total serving exceeded 18 kg of salted meat and 111 kg of dried dugong meat. Kinjo surmises that the chef must have been relatively familiar with cooking dugong meat, and as for the emissaries, they must have eaten the dugong meat with no hesitation, and regarded it as of high value, and deliberately ordered the dugong from the government of the kingdom.

REPORTS OF THE DUGONG IN THE RYUKYU KINGDOM RECORDS

The records of the Ryukyu government regarding the dugong are few and only one (a 1768 document) dates earlier than the 19th century. These documents are important in that they cover the rules and procedures governing the procurement of the dugong by the people of Aragusuku in the Yaeyama Islands to be given as tribute and used as part of the feasts prepared for the Chinese envoys.

The first three documents are status reports made by administrative inspectors of the Ryukyu Kingdom temporarily stationed in the Miyako and Yaeyama Islands, addressing specific details of local issues and current conditions, which are later put into effect in public notifications to reform the administration of the remote islands. These types of report are known as the *Kimochō* (Records of Political Actions), *Kujichō* (Records of Administrated Guidelines), and *Noomuchō* (Records of Agricultural Development Plans). Of these, the oldest existing *Kimochō* is the *Yoseyama Oyakata Kimochōi* (Ishigaki City Board of Education 1977).

The earliest of these dates to 1768 and relates to Aragusuku, commenting that the administrators frequently ask for dugongs and turtles. It notes that any acquisitions of the dugongs and turtles, beside those offered to the King, shall be prohibited (City History Compilation Office, General Affairs Department of Ishigaki City 1993).

The second, from 1858, is an Administrative Manual for the Yaeyama Islands prepared by Oyakata Onaga. He seeks to reinforce the rule that the dugongs that are caught must be sent to the king, a law that is clearly being ignored. Onaga's journal log states:

It is ordered that the dugong, be handled as a royal offering to his majesty. It is also a limited privilege to be hunted only by the certified residents of Aragusuku. The people are prohibited to sell dugongs to others who may want it, yet this rule seems to be ignored. Although it is said that it is hard to control, because when there is excessive meat, it is handed to those who are interested. Year by year the Chinese missions are coming to last longer, requiring more labor in a difficult hunt. From here on, the rule must be obeyed as promulgated. Selling the dugong will be strictly prohibited. And additional catches will be officially noted by the regional officer, subsequently offered to the royal palace as the order of his majesty (City History Compilation Office, General Affairs Department of Ishigaki City, 1994).

A third entry from the Administrative Regulations for the Yaeyama Islands by Oyakata Tomikawa prepared in 1875 repeats the paragraphs above but also notes the difficulties the people of Aragusuku are having in obtaining a sufficient supply to meet the needs of the court. Tomikawa states:

The acquisition of seahorses [dugongs] for the offering to the king is a duty assigned to the people of Aragusuku. Unfortunately the acquisition is becoming gradually less successful over the years, causing a strain on the people of Aragusuku as increasing numbers of men are put to work in this task. The people of Aragusuku have requested that other communities be permitted to share this heavy burden. But, as the re-assignment of annual quotas for the hunting community has just taken place, no sudden changes can be put into effect.

During this time, as a temporary solution, the assigned amount will be set at one *kin* (600g) to four people, and this matter will be reported to the Shokenfu (City History Compilation Office, General Affairs Department of Ishigaki City, 1994).

In the Administrative Regulations for the Yaeyama Islands in 1874, an account recorded in 1857 is quoted. This indicates the price for salted and dried dugong and dugong skin. Although difficult to interpret, the value of 600 grams of dugong seems to equal the tax due from one person (Kuroshima 1999).

On the cover of a book entitled *Miscellaneous Records of Yaeyama-jima* (Yaeyama Culture Study Group 1980) is an illustration with a transcription by Shoen (1798-1864) that says “Product One. Kaiba. Rarely caught.”

The final Ryukyu Kingdom reference to the dugong is found in the *Miscellaneous Records of the Ryukyu-Han* dating to 1873 (Government of the Ryukyu Islands 1965). This states that 600 grams of *kaiba*, a product of the Yaeyama Islands, were sent from Ryukyu to Kagoshima, suggesting that this was payment of tribute to Satsuma or that the king was selling dugong meat as well as using it for feasts prepared for the Chinese emissaries.

The topics covered in these official reports include the following:

1. The first document discussed above is the first royal order found, with the word 海馬 (*kaiba*; dugong). The assigned *kanji* means Sea “海” Horse “馬” used as a name, and it is the oldest official paper referencing the dugong, dating back to 1768.
2. These documents include orders to assign exclusive dugong hunting rights to Aragusuku Village.
3. The dugong was delivered to the king as an offering. Its usage in internal relations and shipments to Satsuma can be found recorded in column 6. (The column is written in the notation of the Kagoshima system.)
4. Frequent requests for the dugong meat were made by the stationed government officials, and difficult conditions in the acquisition of dugongs are causing problems for the villagers.
5. For these reasons, any private trading of dugong meat is prohibited by order of the king. Any excess meat is to be stored for later offerings or succeeding tax payments.

The growing difficulties in the annual hunt, and increasing requests made by the stationed government officials might have been the root cause of these public notices.

These documents raise the question concerning why this kind of tax payment is expressed as an “offering” at a time when a poll tax (that is, a tax per individual head) was normally imposed. In the *Records of Administrative Guidelines in the Yaeyama Islands* written by Oyakata Tomikawa and partially translated above is the expression “諸御用物并上木物雜物” (City History Compilation Office, General Affairs Department of Ishigaki City 1991). This is interpreted by Kiyoshi Makino to mean: “The special taxes are imposed as supplementary payment to the *Futokudemai* (a type of additional tax payment to insufficient payments of subsidies), and requested from Miyako, Yaeyama and Kerama only”. The name *kaiba* can be found within the list of 48 types of special taxes (Makino 1971).

On the other hand, Tetsuo Sunagawa (2002) notes the absence of any mention of *kaiba* in any of the tax ledgers kept by the central government of the Ryukyu Kingdom. The lack of any primary source about the collection of the dugong as an offering or tax is clearly problematic. However, the fact that the dugong was once used as a tax payment by the residents of Aragusuku is upheld by the documentation kept by officials in the Yaeyama Islands. Documents that indicate the exact period of when the king ordered the dugong delivery, and how Aragusuku-Son was nominated with exclusive hunting rights for the royal offering have not been found.

It is impossible to confirm how the dugong meat was processed and in what form it was delivered as tax payment to the king. However, the Administrative Regulations for the Yaeyama Islands recorded in 1874, includes material that may trace back to between 1748 and 1750, and this may possibly define the price of the dugong as an offering (Kuroshima 1999). It also indicates that dugong offerings consisted of both salted and dried meat.

ARTICLES ON THE DUGONG FOUND IN GEOGRAPHICAL DOCUMENTS

References to dugong are also found in the journals of travellers and scientists. Like other historical records discussed herein, these texts also revolve around the consumption of dugongs.

The oldest of these, found in a *Journal of Oshima Island*, recorded in Horeki 12 (1762), is by far historically the most important. It describes the shipwreck of a vessel that departed from the Ryukyus to Satsuma, was caught in a typhoon, and left stranded in Tosakoku. The journal is written by a Confucianism scholar named Tobe Nagahiro, who interviewed Shibirabaikin (one of the crew members) in various matters such as the shipwreck, administration system of the Ryukyu government, people, customs, geographic names and local products in a very detailed manner (Iwasaki 1974).

The following is recorded regarding the dugong:

Kaiba, a peculiar thing. Its girth, 5 *shaku* (1.515 m) and 2 *kan* (3.363 m) in length. No scales or large fins can be found on this beast with a horse-like head and a swine-like mouth. Captured in a place called *Itoman*, and recently seen by Shibirashi. The skin (blubber) is dried and offered to the king of Ryukyus. Known by the name *Kaiba*, or *Tatsuno'otoshigo*, and is commonly used as a charm for safe delivery in childbirth. Considerably different with male [exact meaning uncertain] (Iwasaki 1974).

In regard to the dugong, Shibirashi comments on it as a rare catch in *Itoman*. Shibirashi is the third son of the previously noted Shibirabaikin. It is stated, when the dugong is caught, the meat is dried with the skin (blubber) still attached, and offered to the king. On rare occasions, when demanded, it is sent to Satsuma. This is the oldest document which clearly states the method of processing the meat, and is of great value, as the testimony is from a person close to the Ryukyu government.

Three scholars who conducted research in the Yaeyama Islands in the first half of the 20th century make reference to the dugong in their publications. The authors did not eat the dugong, but relate the stories told to them as folk tales. It is possible to conclude that by this time the dugong hunt had become an absolute rarity.

Takuji Iwasaki worked as a meteorologist in Ishigaki for 40 years and studied the biology, history, and culture of the island while there. Regarding the method of preparing dugong meat, Iwasaki (1974) uses the term “差シ身,” which may be read as “sa shi mi” and he is most likely pointing to the raw fish dish “sashimi.” However, this strikes one as a very peculiar statement, since this method of preparing dugong is mentioned nowhere else. Eijun Kishaba was a local teacher who was recruited to participate in a project to collect folk songs. He says that in the Yaeyama Islands the mermaid is believed to be a true living spiritual fish with supernatural powers and that the dugong is not considered a mermaid. Kishaba (1977) refers to the dugong as *Zan* and to its meat as *Kaiba* (海馬). Fumi Miyagi (1972) was a local historian who recorded the use of dugong meat as a nutritious feast favored by the princess as an after birth meal.

DUGONGS IN THE MEIJI PERIOD FISHERY REPORTS

While the preceding historical references either date from the late years of the Ryukyu Kingdom or seem firmly based on lost reports from that era, the following set of reports date from the Meiji Period. These provide information about the status of the dugong following the abolition of the Ryukyu Kingdom, how hunting methods improved, and how the lifting of hunting restrictions, and the promotion of the dugong as a marine product may have led to a severe depletion in its numbers.

The *Research Report of Preliminary Investigation of Fisheries* announced by the Ministry of Agriculture, Forestry and Industrial Business in Meiji 22 (Ministry of Agriculture and Commerce 1889) is the first scientific research report of marine resources in Japan. In this report, prefectures located in the southwest region of Japan, such as Okinawa, Kagoshima, and Miyazaki, were selected as the initial investigative area. There is an article within this report, which concerns the dugong, revealing how dugongs were perceived at the time. A large portion of the Research Report of Fisheries is compiled through interviews of the local residents and contains a wide variety of information regarding the characteristics, feeding behavior, and utilization of the dugong. The report states that the northern limit of its habitat is located along the coasts of the Okinawa Islands north to the island of Oshima (in the Amami Island Group) (Fig. 11). The dugong feeds on the roots of eel grass (*Zostera marina*) and Koamamo (*Zostera japonica*) causing the dugong to gather in bays and gulfs with the highest amount of vegetation during the summer (Editorial Board of Administrative History of Agriculture, Forestry, and Fisheries of Okinawa Prefecture 1983).

Similar topics are also found in the Ishigaki Island section in this report. No visual confirmation of the dugong is reported for Yonaguni Island, and dugongs in Nago are said to enter the bay, but are not hunted. The dugong was hunted by the residents of Aragusuku Island, captured with a net in shallow waters, dragged to shore, and subsequently beaten to death. The dugong was often hunted as a rare yet valid food resource, but more importantly served its purpose as a tax payment to the king of Ryukyu Islands [apparently referring to its use in earlier times]. In the report of fisheries, many statements are found regarding the dried blubber, followed by its meat usage, describing its preservation process, as it was either salted or dried.

Several issues of *The Fisheries Bulletin of Dai-Nippon* (Japan) (1882-1895) contain articles on the dugong. Its first appearance, in 1886 in issue No. 55, is in an illustration introducing the dugong as a distinctive commodity from Okinawa. In issue No. 66 (1887) there is an article describing dugong hunting in Queensland Australia, which suggests the dugong hunters in Okinawa should learn this hunting method. In issue No.134, an article reports that dugong blubber was being sold in 100 *kin* (6000 gram) bulk units at market on a trial basis in Yokohama. However, just as the market was set to expand, substitutes for the blubber began to appear (Fisheries Committee of Dai-Nippon 1886, 1888, 1893, 1895).

In the Meiji Period, the dugong is introduced in a number of expositions held to support and promote industrial development. At the *Dainikai-Naikokukangyo-Hakurankai* (The 2nd Domestic Industrial Exhibition) held in Ueno, Tokyo in 1881 (Meiji 14), *Kaiba-Kawa* (*kaiba* skin) is exhibited by Aragusuku Village (Domestic Industrial Exhibition Bureau 1881). At the *Daigokai-Naikokukangyo-Hakurankai* (The 5th Domestic Industrial Exhibition) (held in 1903, Meiji 36), *Jugon-Kawa-Hoshiniku* (dugong blubber with dried meat) and *Jugon-Kawa-Kansei* (dried dugong blubber) was exhibited from Iriomote Village and Hatoma Village in Yaeyama County (The 5th Domestic Industrial Exhibition Bureau, 1903). At the *Dainikai-Suisan-Hakurankai* (the 2nd Fisheries Exposition) (1897, Meiji 30), *Jugon-Niku* (dugong meat) from Ishigaki Village and Uehara Village was exhibited (The 2nd Fishing Exhibition Bureau 1897). And at the *Dainikai-Kansai-Kyushufukenrengo-Suisan-Kyoshinkai* (The 2nd Exposition of the United Department of Fisheries Industries of Kansai and Kyushu) (held in 1907), a product named *Kaiba-Kawa* (*kaiba* skin), is exhibited from an unknown supplier (Matsu'ura 1908).

These documents indicate that, during and after the Meiji Period, attempts were being made to utilize the dugong more fully and to promote its use as a viable marine resource.

The figures available from the Meiji and Taisho Periods indicate that the result of this policy of promotion seems to have been the capture of far more dugongs than during the years of the Ryukyu Kingdom (Okinawa Prefecture 1894-1940; Uni 2003). The restrictions limiting hunting to the Aragusuku Islands were lifted and fishermen from Itoman City and perhaps other coastal villages became dugong hunters. While it cannot be proven, the logical inference from the data is that over-hunting led to a severe decline in the dugong population. This is first visible in the records of the Taisho Period after 1912, as the dugong catch declines steeply from what was taken during the Meiji Period. Even with the later recognition of the Ryukyu dugong as an endangered animal, accidental capture in nets continued to result in the premature death of many dugongs. The final blow to the population, according to many of our informants, was the use of dynamite in fishing at the end of World War II. While dugongs were not specifically targeted, they sometimes were killed or injured and floated to the surface.

These reports bring us to the situation that the dugong is in today. At some point after 1926 (the date of the last reported sighting), dugongs disappeared from the Sakishima Islands and none have been sighted there for years. The population off the coasts of Okinawa is now estimated at less than 80 and, by some observers, as less than 50.

VII. THE DUGONG IN OKINAWA TRADITION: PLACE NAMES, FOLKLORE, AND RITUAL

This chapter looks at the dugong as it has been viewed traditionally in Ryukyu culture. The chief sources of information examined are place names that relate to the dugong or seagrass beds, folk stories and songs, and known rituals involving the dugong. Information in the background literature has been expanded upon and interpreted by many of our informants.

For the songs, legends, and folk tales, the age of origin is generally not known. One exception are the songs found in the *Omoro Soshi*, a compilation of ancient poems and songs dating from 1531 to 1623. The songs about the dugong are the earliest Okinawan references to the dugong.

THE DUGONG IN LOCATION NAMES

Traditional place names are one of the best indications of which aspects of the natural environment particular societies have selected as culturally significant. There are several locations in Okinawa that are believed to have acquired their names from their association with the dugong. Some Okinawan municipalities have undertaken research into traditional place names within their boundaries. These are the primary sources used in this study. Research has focused on coastal municipalities, especially those where dugongs are reported to have been sighted or hunted or where seagrass beds are known to be present. It is possible that there are other locations in Okinawa associated with the dugong.

The authors of the document, *History of Henoko* (Editorial Board of Henoko District 1998) write concerning the coast offshore from the village of Henoko (see Fig. 6):

...the area in the ocean divided by the reef during low tide is called *Inoo*, and the area from the *Pishi* (the reef division) to the beach is known as *Inoo-Uchi* (Inner *Inoo*). Few of these *Inoo-Uchi* will dry up to the point where the white sand of the ocean floor is exposed during low tide. In these *Inoos*, the seagrass vegetated areas are referred to as *Jangusanumii*. The reason for this is the seagrasses are the *Jan*'s ("dugong" in local dialect) favorite food.

In the *Records of Ginoza Village* (Editorial Board of Records of Ginoza Village 1991), a similar description can be found where the same type of area on the inner reef along the coast of Ginoza (see Fig. 7) is called *Jangusamii*. It is unknown whether similar kinds of names exist in other locations comparable to these two places where the seagrass known as *Amamo* (Eel Grass: *Zostera marina*) grows and where it is confirmed the dugong has certainly once inhabited the area.

In Itoman City (see Fig. 7) and Kumejima Town (Fig. 12), locations named *Zangumui* or *Jangumui* can be found. (Editorial Board of History of Naagusuku-mura [Nashiro] 1988; Editorial Board of History of Nakazato Village 2000). It can be inferred that in these named locations the dugong was frequently spotted and the name of the location is derived from the common sightings of dugongs.

Along the coast of Kouri Island in Nakijin Village (see Fig. 7), there is a location named *Janja-Iwa* (Dugong Rock) (Editorial Board of Journal of Kouri 2006). Any relationship of the name with the folk tale of Kouri-jima Island origins (discussed below) could not be confirmed.

This set of names covers many, but not all, of the coastal reef sections off Okinawa Island where seagrass beds are known to be present and indicates traditional knowledge of where dugongs feed and might be found and thus an awareness of the dugong and its feeding habits in these coastal communities. In other places with known seagrass beds, including the Yaeyama Islands, the research team was not able to confirm whether traditional place names existed for these areas. This is an area in which additional primary research to identify coastal place names by the local municipalities would be needed.

LEGENDS AND FOLK TALES ASSOCIATED WITH THE DUGONG

Folk tales and legends that are associated with the dugong are told in many communities throughout the Ryukyu archipelago. These can be divided into two major types of stories: origin stories of the island people and stories of a mermaid and the coming of a tsunami. In the first type of story the Okinawans use the word *kaiba* to refer to the dugong. This, as noted in the preceding chapter, when written in Chinese characters combines the character for sea and the character for horse. In the mermaid and tsunami stories, the mermaid is referred to by various words but not *zan*. A tale told only on Hateruma Island is also included below.

THE LEGEND OF ISLAND ORIGIN

The general plot of the island origins story is as follows:

Long ago in Kouri-jima Island, there lived a couple, who lived naked. They lived by eating the rice cakes that fell from the sky every day and never grew hungry. Until one day, as the couple began to store the rice cakes, suddenly they stopped falling from the sky. The two were shocked and began to pray to the heavens, but no rice cakes came. From then, the couple had to gather and collect their own food and learned the meaning of labor. One day, the couple saw the *kaiba* mating and grew ashamed and hid their groins with *kuba* leaves. The residents of Kouri-jima are the decedents of the couple.

A variant of the story suggests that the couple first learned about sex by watching the dugongs copulating.

The details of the story tend to vary in other documents. In the *Legend of Japan (Period I) 2 of 12, Legends of Okinawa* (Oshiro et al. 1976), the imitated animal is referred to as a seahorse (*Tatsuno Otoshigo*) rather than a dugong. In the *Old Stories of the Ryukyu Islands, Sequel* (Fukushima 1982), the animal is a seabird. Other variations of the imitated animal are found in multiple documents (Yoshinari 2003; Yamashita et al. 1989; Ozawa 1989).

THE MERMAID AND TSUNAMI (THE SPEAKING FISH)

The most common story presented in collections of folk stories that is probably related to the dugong is the tale of the mermaid (or speaking fish) and the approach of a tsunami. The common belief in the Ryukyu Islands, discussed in scores of articles by various authors (see Appendix B, Annotated Bibliography) is that the legends of the mermaid are based upon the dugong. While a few authors dispute this and say the mermaid is modeled on a type of fish (and this does seem likely to be the case for mermaid stories on the main Japanese islands where sightings of dugongs would have been extremely rare), they are certainly in the minority.

There are many variations, yet the most common plot of the story is that a mermaid, caught by a fisherman and brought ashore, weeps and begs to be released. In gratitude for releasing her, the mermaid warns the fisherman of an approaching tsunami. Thus, the fisherman and his family escape to the mountains and avoid the tsunami.

In the most common alternative version, there is no warning and the mermaid simply brings a tsunami. In a version from Gushikawa in Uruma City, Mr. Azama, born in 1911, tells the story of a mermaid and a tsunami in Takaesu.

When Mr. Azama's grandmother was a child, there was a tsunami near Takaesu. Shortly before the tsunami struck, a mermaid was captured and hung behind the kitchen stove. The moment that the mermaid said "Shall I bring one wave or two waves?", the tsunami hit the island (Editorial Board of History of Gushikawa City 1997).

In a story from Irabu Island of Miyako, a similar type of a mermaid called *Yonaitama* appears. Numerous documents describe this story (Nakasone 1988; Yaeyama Old Tales Seminar 2002; Executive Operating Committee of Okinawa Folklore Institute 1981; Fukuda et al. 2000; Yamashita et al. 1989). An example of the tale as told on Miyako Island is the following:

Once a man from Irabu caught a *yonaitama*. He ate half of it and then salted the other half. One night, the Sea God called out "Yonaitama, Yonaitama, come home!" The Yonaitama replied "I am half salted and cannot return." The Sea God responded, "Then I shall make a tsunami, which you can ride to return to the sea." As the Sea God spoke, he caused a tsunami to occur. Meanwhile, a mother and child living near what is now the location of the Touri-Ike [a natural monument on Shimoji-jima in the Miyako Islands] left their house to visit the child's grandmother, for she would not stop crying. By taking this journey, they avoided the tsunami disaster. When they returned home the next morning, they found two giant pits in the ground, which came to be known as the Touri-Ike.

One version of this story uses the word *jyan* meaning dugong. According to this version of the story:

Long, long ago, a man caught a fish that turned into a beautiful woman. He brought her back home and made her his bride. Later, after they had a child, they had a quarrel. The man was angry and told his wife "You're a fish! Go back to the sea!" Immediately she took her child and they both turned into *jyan* (dugong) and returned to the sea.

The stories about the mermaid and the tsunami can be divided into those with the mermaid/dugong benefiting humans and those in which the mermaid/dugong is eaten and without warning all are destroyed. In all these stories the dugong speaks. Categorized as the *Monoii* (Talking) type in folkloric studies, most share common themes with the Yonaitama stories from Miyako (Inada and Ozawa 1983).

Isshu Maeda (interview, October 2009) comments on this matter, "To the southern island people, the stories are passed down in two aspects as the dugong was a sacred animal associated with the 'Creation of World' and a 'Speaking Fish.' To the southern island people, the dugong was a not only a Sea deity, but also a creature to be feared." Maeda suggests that there are two aspects of the dugong revealed in these stories. The dugong is an intermediary of or an interlocutor for the sea deity. As such, the dugong may be the bringer of good fortune to people. But the dugong may also be the bearer of evil, as when she brings a tsunami without warning.

BUATTEIYE, THE DUGONG, AND THE COW

A story which connects the dugong with the *Kaigu* (the palace of the ocean deities), is one told in Hateruma Island in the Yaeyama Island Group, recorded by Cornelius Ouwehand (2004). This is the *Bua E muzangara* legend of the house of *Buatteiye*.

One night, a dugong rose in the *Shisanchiipama* of *Budumarii* beach and was sleeping on a coral shelf. A man of the *Buatteiyes* spotted the dugong and decided to drag it onshore. He brought a large cow (*Buguttsuee*) that was feeding in a nearby field. Carefully he tied the dugong and the cow together with a sturdy rope, not to awake the sleeping dugong. The cow pulled as hard as it could, but the dugong woke up and pulled back in fearsome force, and dragged the cow and *Buatteiye* in to the ocean. The cow drowned, and ten days later the man of the *Buatteiyes* came back with a drastic change. He had changed so much he could be easily mistaken for a different man. Till this day, the descendants of the man, especially the first sons, were called *Zangara*, and believed to possess special powers. And after this the *Buatteiye* house grew wealthy.

Ouwehand describes the motif of this legend as follows:

1. The cow dragged into the ocean functioned as a offering to the gods.
2. For the man retuning ten days later, he has seen another world. In this case he confirms a motif of living in the underwater world of Ryugu (dragon place).

These are common motifs found in the myths and legends of the dugong that are associated with the northern part of the Okinawa Island Group.

THE DUGONG IN OLD FOLK SONGS AND RITUALS

The dugong not only appears in folk stories and legends passed down in Okinawa, but also in folk songs. Most of these traditional songs have been recorded only in recent years, but one of these is recorded in the *Omoro Soshi*. This is a compilation of ancient poems and songs dating from 1531 to 1623 in the early years of the Ryukyu Kingdom. As such, it is the earliest written reference to the dugong in Okinawa.

In these old folk songs, the dugong is not the main focus of the song. However, the notable aspect is its appearance in songs whose theme is the celebration of a catch of a large number of fishes. Most of these songs are performed at festivals and rituals and thus these ceremonies are also discussed in this section. The text of the songs can be found in Appendix B.

In Chapter 11, number 95 of the *Omoro Soshi* there is a song with a dugong mentioned (Hokama 2000). This song tells about Komaka Island and the capture of dugongs and turtles and speaks of the catch of hundreds of dugongs. In the song, the name of an uninhibited island called “Komaka-jima” appears; it is located near Kudaka Island. The song says men prepare nets and go out fishing to catch plenty of sea turtles and dugongs. The song used to be sung on Kudaka Island, but is not heard any more (Hokama 2000).

This first song of dugong hunting relates the dugong to the turtle (as did several of our informants), going as far back as the 16th century. It is the earliest non-archaeological evidence for dugong hunting in the Ryukyu Islands. It talks about the preparation of nets, suggesting that nets were used in catching the dugong.

As is frequently the case with songs, the meanings can be a bit ambiguous and there is much information which is not conveyed within the simple lyrics, but is probably more apparent when the songs are performed within the ritual contexts for which they were created. The songs demonstrate the long relationship of the dugong with the sea deity in Okinawan traditions. In places they seem to sing of the abundance that the dugong brings.

Many of the rituals in which the dugong figures are those honoring the sea deity or spirit, the sacred entity called *Nirai Kanai* in standard Okinawan. This sacred figure is not in the strict sense a deity of the sea, but a spirit who stays in hollows on the bottom of the sea, along the coastlines, or even in the coral or limestone fissures reached by seawater inside the island itself. As this spirit is connected with undersea hollows, cracks and fissures, *Nirai Kanai* can sometimes also refer to the place where the spirit resides. On Aragusuku Island where that deity is worshiped, the spatial reference goes to deep ground of the island, to the *niirasuku*. Rituals in honor of the sea deity *Nirai Kanai* were held in the past in coastal communities on Okinawa and other Ryukyu Islands and a few are still held today.

With the exception of Aragusuku, the role of the dugong in Okinawan ritual does not seem to be prominent in the literature. Its role may, though, be more pervasive than is known, since many rituals include secret ceremonies about which we could uncover little information. Mr. Isshu Maeda (interview, October 2009), however, mentioned several rituals conducted on Okinawa and especially on several smaller islands that involve the dugong. The oldest record is in a document written by Shinobu Orikuchi (1956) in 1921. In addition to this, a book written by Yashu Nakamatsu (1978) also has some descriptions of the dugong, especially about a festival in honor of the sea deity.

Many of these rituals took place on the small islands offshore from the main island of Okinawa, especially on the islands off the Katsuren Peninsula that form the east side of Kin Bay (see Fig. 12), one of the areas where the dugongs are most commonly found. Information about these rituals comes mostly from the interview with Mr. Maeda, but where information is from other informants, that is noted below.

In Tsuken Island, men were allowed to hunt the dugong only during a particular festival. They butchered it to offer the meat at the sacred grove of the village god, and then they distributed the meat to each member of the village. This custom lasted until the end of World War II when it became impossible to continue dugong hunting. However, the festival continues to be held each year, commemorating the former ritual. Those who experienced the festival have information about the dugong, but they won't talk about it easily.

In Hamahiga Island, on the third day of the third month of the lunar calendar, people celebrate the sea deity who is believed to dwell below the sea in *Nirai Kanai*. At the festival, people sing a song that asks the dugong to come to the island. The festival is still held as a matter of form, and a part of the dugong-related song is included in *A Record of My Travels in Yokatsu* (与勝旅行記), a survey note written by Mr. Shinji Miyagi and edited by City History Compilation Office of Nago City (1993). On the same date, people on Henza Island still celebrate a festival of the dugong, which is called "Sanguwachaa," and you can listen to a dugong-related song directly.

There may be dugong-related songs in nearby Miyagi Island and Ikei Island, but these do not appear in the known documents or festivals.

Three recently recorded songs in which the dugong is mentioned are all associated with festivals and rituals held in various coastal villages in Nago City municipality. One of these festivals takes place in Henoko. These songs also include one sung during the rice festival on Iheya Island, the sacred song of *Unjami* (Celebration of the Sea Deity) in Nago Township, and a sacred song sung during the ritual for

Umachii (Praying for Prosperity Gathering) in June in Henoko Village (City History Compilation Office of Nago City 1997).

Two of the more important songs in terms of our understanding of the dugong's significance in Okinawan culture are performed during the festival of the sea deity held in Ogimi Village, a village on Okinawa Island north of Nago City. The first song tells of the priestess of the village putting the stirrup on the dugong, which is then ridden by the *Nirai Kanai* sea deity (City History Compilation Office of Nago City 1997):

In a second song, an old feeding song for a ceremony of the ocean deity in Ogimi, Kenichi Tanikawa draws attention to the lines which are very similar to those in the song above:

“It is a fine thing. The villages’ priestess. Places her feet upon the stirrup and plays. As a god who remains in the eternal world, I shall ride the *Zan* and bid farewell” (Kishaba 1977). From this translation, we can understand the song noted in Genshichi Shimabukuro’s *Yanbaru No Dozoku*. The song sings of the time during the ceremony, when the dugong takes part as the gods mount and arrive from *Nirai* (a mythical place in which all life originates), and at the end, return. The dugong here is believed to have a supernatural existence, relating to the ceremony of the ocean deity, and belongs to the *Nirai* (Tanikawa 1986).

The interpretation of the song is difficult (and will be discussed in the next chapter), but what is unmistakable is the relationship between the dugong and the ocean deity. The song says the sea deity comes to the island riding on the back of the dugong and brings happiness and plenty of catches. The dugong comes to the island as a familiar spirit or emissary of the sea god.

During the sea deity festival held on Kouri-jima off the Motobu Peninsula, where the dugong appears in the legends regarding the island’s original people, a song about the dugong is sung (interview, October 2009).

The dugong also appears in other songs that were probably part of rituals which are no longer performed. One is a song that was sung on Kume Island west of Okinawa. Although the song is not heard these days, there is a description of it in *Old Chronicle of Nakazato* (仲里旧記), a record of prewar time (Editorial Board of History of Nakazato Village 2000). The song is similar to the song performed on Kudaka-jima that is found in the *Omoro Soshi* (Hokama 2000).

On the two Aragusuku Islands, Uechi and Shimoji, there is a song that says villagers watched the dugong when it was hunted and beached. The dugong also appears in a song in Taketomi Island. On other islands in the Yaeyamas, Sunagawa (2002) reports that there are some lines in a song suggesting that the dugong is a master of the seas. However, if caught and brought into a boat, it can cast a curse on the fisherman and his descendants, from grandchildren until the next seven generations onwards.

On one of the Aragusuku Islands, which were the islands required to supply dugong meat to the Ryukyu king, there is a shrine (*utaki*) which contains dugong skulls. A folk song about dugong hunting tells of the well-expressed islander’s joy at successfully paying the dugong tax to the government. The dugong hunt was a difficult task, and it took many days for the hunters to catch one. Before departing, the hunters visited the Isho Utaki (*isho* means sea in Okinawan dialect) and prayed for a successful hunt. As they returned to the island with a catch, they offered its skull to the Isho Utaki to show their gratitude for divine aid (Arakawa 1978). The shrine may thus be related to the hunting of the dugongs conducted by the inhabitants of Aragusuku in the days of the Ryukyu Kingdom.

An annual ritual is still conducted at the *utaki*, but the components of the ritual are secret and outsiders are not allowed to participate in or observe the ritual. It seems likely that the shrine is dedicated

to the sea deity and that the dugong skulls may be the remains of offerings that were once made to the sea deity, but this could not be confirmed.

From the information that has been gathered, it seems most probable that the dugong played a role in rituals in those communities that at one time hunted the dugong or in those in which the dugong was important in the folk beliefs of the islanders. Such communities are more common on the small islands off Okinawa than on Okinawa itself. The dugong was probably not worshipped but played a role as an emissary of the sea god. Dugong meat may have been offered to the gods and then distributed to the participants in the ritual. It should be noted, however, that the dugong does not seem to figure prominently in myth and ritual in the Ryukyu Islands. Røkkum notes that in four years of investigating myth and ritual, mostly in Sakishima, the dugong was only mentioned one time by the cultural practitioners he interviewed.

The next chapter attempts to develop in more detail an understanding of the relationship between Ryukyu Island communities and the dugong and how the dugong became significant in these communities.

VIII. EVALUATING THE CULTURAL ROLE AND SIGNIFICANCE OF THE DUGONG IN OKINAWA

This chapter investigates the role of the dugong in Okinawan culture and the cultural implications of the information that was collected during the project research and presented in the preceding chapters. The discussion attempts to integrate the materials from the interviews with the archival literature to arrive at an anthropological understanding of how the dugong fits in traditional Okinawan culture and how this relates to attitudes to the dugong in contemporary Okinawan culture. The focus of much of the discussion is on the historical use of the dugong under the Ryukyu Kingdom and what that implies for the cultural significance of the dugong in Okinawan culture.

DUGONG AS A CREATURE OF NATURE AND CULTURE

The aim of this study is to document the significance of a marine mammal, the dugong, in the lives of people in the Ryukyus, in the recent past and in the present. An anthropological approach typically involves some degree of participant observation to justify a question as follows: In what manner can we say that ideas about the dugong are endemic to local traditions of knowledge and interest? The issue of the dugong being designated a natural monument and a cultural “property” of the Japanese nation calls for a retrospect on reasons: What were the criteria for the declaration of the species as special in a cultural sense rather than just endangered in a biological sense? But even if the arguments in favor of protection may be hard to retrieve, one might well expect that the attitude supporting favored status for the dugong still exists. The real issue is this: How do the people in the Ryukyus *value* the dugong?

The Act of Preservation of Historic Sites, Places of Scenic Beauty and/or Natural Monuments of 1919 was an early step bracketing items of nature under the cultural item of a “monument.” The 1950 GOJ Law for the Protection of Cultural Properties maintained this inclusion of natural monuments and places of scenic beauty with historic sites, as “monuments,” one category of cultural property. The GOJ law mandates preservation of listed cultural properties. By giving the dugong protected status as a Natural Monument in 1972, the Japanese statute makes the dugong an inalienable asset – one that cannot be lost – not only to Ryukyans but to the Japanese nation as a whole. The designation under the Law for the Protection of Cultural Properties appropriates a species as part of *Japanese* heritage. Additionally, in 1997 the Japanese Mammalogical Society, finding the dugong population in Okinawa critically endangered, put it on its red list. The basis for protecting the species in the name of culture preceded the basis for protection in the name of nature. This, however, should not be regarded as something exceptional. Just as we speak of “inalienable human rights” as inseparable rights in regard to society, modern legal thinking – Japanese in the present instance – does not restrict this emphasis on indispensable values to human society itself: it includes its natural environment as well.

But why should there be such an appropriation of a species of nature under the aegis of culture? As Berque (1992) so lucidly demonstrates in his essay “Identification of the Self to the Environment,” the linkage of person to environment is fundamental in Japan, and above all in the intellectual genre of cultural introspection called *nihonjinron* (discourse by the Japanese on the Japanese). This “environment” is not nature in its unbroken and rugged expanse, but rather what Berque (1992) prefers to call a *milieu*, which has been populated by a select number of species. Such selection is fundamental to the issue at hand: the designation of some species as indispensable to a Japanese cultural being. The designation, then, serves as a conduit for molding a common identity. The included species are important

in an evocative, sometimes poetic, sense. Their role in discourse is to populate an environmental (or *milieu*) artifice which is *uniquely* Japanese. The most well known contribution to such theorizing about Japanese nature-culture uniqueness is Tetsuro Watsuji's study (1965), first published in 1935, *Ningengakuteki-kosatsu* [*Climate: An Essay in the Study of People*]. Watsuji (1889-1960) was a philosopher and author who held the view that sharing the same territorial space, including its climate, is crucial for understanding the way people relate to each other in a society. The belief that the Japanese have a higher degree of sensitivity toward nature than many other peoples due to their country's distinctive four seasons is a "folk" version of that philosophy. Any species designated as a cultural monument for being "a rare creature in the world" – to quote the terms from the dugong listing (Okinawa Prefectural Education Committee 1975:140) – would serve as an example of that uniqueness. Such thoughts have been influential in Japan since the Meiji Period (1868-1912), but it would take another, much closer look, to see how they might have motivated the natural monuments legislation.

Legislation about "natural monuments" was institutionalized a long time before Japan (belatedly in the view of many) began responding to international environmental concerns. The nomination may not necessarily build upon any *reasoning*, but rather on what Berque portrays as a collective *sensibility*. Material from an interview reconstructed below may shed some light on the topic of legislation and sensibility.

AN ISSUE OF APPROACH

While the standard Japanese term for dugong – *jugon* – differs only slightly from the scientific name, the most common Ryukyuan term known from spoken dialect, ritual songs, and place names is *zan*. Sunagawa (2002) stresses that this term is used both on Okinawa Island and in the Yaeyama Islands. Taking account of a uniquely Ryukyuan term for the sea mammal is a simple, but necessary, first step toward grasping the local Ryukyuan views on the role of the animal in their traditions.

In his "Essay on the Cultural History the Dugong", Izumi (2007; crediting Uni 2003) provides some figures on dugong around the Ryukyu Islands. As translated from Japanese:

...the estimated number of dugongs caught between 1894 and 1916 (in the years of Meiji 27 to Taisho 5) was 327, and it is believed the rapid decrease of dugong hunting began as we enter the Taisho Period (1912 to 1926). In terms of food resources, the dugong carried 100 to 150 kg of meat and 20 to 30 liters of oil, about which it is said that only a small amount of grease was obtainable from one dugong.

Izumi assumes that at present there are fewer than 50 dugongs left. They inhabit the waters off the eastern seaboard of Okinawa Island. In a paper titled "Are Ancient Dugong Bones Useful for Analysis?," Hoson et al. (2009) point to the uncertainty of estimates about dugong populations in the waters around the Ryukyu Islands. The sources for the estimates they mention are (a) historical books from the Ryukyu Kingdom and from the Meiji Period, and (b) harvest records 1894-1916 issued by the Okinawa Prefectural Government.

The more the dugong (or any other animal) is threatened with extinction, the more explicit and easily accessible one would expect cultural values relevant to a natural species to be. "Cultural significance" is not simply what can be summed up *post hoc* in the terms of a study of *cultural practices* such as hunting and ceremony. Rather, from a cultural anthropological point of view, the issue of the role of the dugong in Ryukyuan culture(s) is more appropriately addressed by asking what are the *cultural perceptions* involved, and how are these refocused due to changes taking place both in society and the natural environment. To briefly sketch this context of how the issue of what the dugong means to the

Ryukyuans is mediated by interest, we paraphrase two contrasting points of view received during the round of interviews on Okinawa Island and on Ishigaki Island in the southern Yaeyama group.

1. The man/woman in the street: Until the status of the dugong became linked to the issue of the US military presence in Okinawa you might ask whomever in the street about the dugong, and there would be a real possibility that the answer would be: “What animal is that?”
2. The academic and ritual specialist: It is really difficult to work on the issue:
 - a. Samples of dugong bone that might be good for research are not released, with the consequence that communication between academics at times is difficult;
 - b. papers on the topic are not easily disseminated, and
 - c. local people are unwilling to cooperate (with the researcher). Obstacles such as those quoted in the preceding lines were not encountered during the work for the present project, although some reserve was necessary in asking for unpublished material and also when carrying out an interview about protected cultural material.

People along the seaboard have their own reasons for being reticent about the topic of dugong, including secrecy about ritual and covert hunting practices. This suggests a profile of knowledge about the dugong that is “high” among a very few specialists and “low” among the general population. Insights held by researchers, hunters, and ritualists may not easily find their way to the general population. That, however, causes little methodological concern for the present analysis. One might be mistaken in thinking of “culture” as a *shared* heritage. The angle of approach being suggested here might even be said to fit well with the way contemporary anthropologists approach the subject, assuming as a matter of fact that knowledge about the dugong is unevenly distributed and motivated by interest. There can be no general answer to the question of a cultural significance of the dugong in the Ryukyu Islands unless one realizes that cultural truths are inevitably relativistic, mediated by history and society in the particular instance. What makes the anthropological endeavor worthwhile, however, is that a *finite* field of interest in society might more easily be delineated. Even if the sample for this inference is limited, there is a good reason to say that familiarity with the dugong, apart from the familiarity that emerges from the debate about the air facility re-location, is not very prominent in Okinawa Prefecture.

The discourse on protection has until recently been based on (hard) scientific data about the dugong’s status as a species. An article in the Okinawa Encyclopedia on the topic “dugong” does not mention anything about cultural value nor does the statement in the Cultural Preservation listing issued in 1973 by the Okinawa Prefectural Government BOE. A brief glance at the texts is informative. First there is the entry in the Encyclopedia of Okinawa (Publication Office of Okinawan Encyclopedia 1983:382-383). Although it says that the species was designated as a National Natural Monument in May 1972, the encyclopedia article does not quote the rationale behind the designation. The preface of the publication *Cultural Assets of Okinawa* states, however, that the law includes *monuments* in addition to tangible cultural assets, intangible cultural assets, and folklore materials. The dugong is listed on page 140 in the English language version as a national monument, in terms of its biological characteristics and as “a rare creature in the world.” Among zoological species, it shares this designation with a rat, a woodpecker, a wild cat, a turtle, an eagle, a deer, and a bat. There is no discussion as to how a species links up with cultural values. Rarity is mentioned in the cases of the dugong, turtle, rat, and woodpecker, but surprisingly not in the case of the wild cat known as almost extinct and unique to the ecology of the rain forest covered Iriomote Island. Rarity, hence, seems to be neither a sufficient nor necessary criteria for

the designation. The word “rare,” moreover, is not qualified by more precise terms about the local population and its viability. The wild cat meets another criteria – it is found to be important for science. A “scientific point of view” is also referred to in the case of the deer.

The overall mandate for designating natural species is found in the Law for the Protection of Cultural Properties of 1950. From Chapter One, Article 4, regarding the items falling under the purpose of the law: “...animals (including their habitats, breeding places and summer and winter resorts), plants (including their habitats)...” Only if we look at Article 3, which deals with “folk-cultural properties,” can we make an assumption about how the dugong was categorized. That article mentions “manners and customs” and elements of material culture which are “indispensable for the understanding of changes in our people’s modes of life.” If it can be demonstrated that the dugong is not only a rare creature but one which takes on “folk-cultural properties,” we have at least a hypothesis about how it was nominated for special status under Japanese legislation.

Why is the situation like this, that we do not know very much about how the dugong came to be considered worthy of a protected status for cultural reasons? This was a question asked of [REDACTED] during the round of interviews (October 2009). The real motives for declaring the dugong a treasured cultural object, he said, are probably cultural. But, as these motives were embedded in common knowledge, more or less taken for granted, they did not find their way into the texts. It follows that cultural reasons more than scientific reasons may lie behind the appointment of the dugong to the status of an inalienable cultural object. Early on in the conversation, [REDACTED] mentioned the role of the dugong in the taxation system of the Ryukyu Kingdom as possibly a major factor behind the designation. Later, he specified other aspects, such as the role it plays as a sacred animal in oral tradition. Authors giving the reasons for the legal designation of the animal, however, might find such folk tales of little scientific value, not worthy of entering their list of references. [REDACTED] himself sees a much larger role for cultural anthropology in the issue of the dugong. As of now, there is too little dialogue between the disciplines, he added.

What [REDACTED] refers to is the absence of a voice of the Ryukyuan themselves in the designation of the dugong as an inalienable cultural property. He deduces a stance in favor of its listing as a monument, and in going back to the criteria quoted in Cultural Assets of Okinawa, there is no doubt that the issue he is raising is the dissonance between the scientific and the ethnographic. Both make criteria, but they are not weighted equally. The scientific reasons for protection alone may not be sufficient to justify the declaration of a “monument,” not in Japan, and not in other countries either. In one of his lines of reasoning, [REDACTED] suggests that the cultural inspiration behind the designation of the dugong, as well as of other animals, is the pride of having these species preserved within the nation’s fauna. He mentions that this was the case also before the war. A rare fowl, for example, was then added to a list of monuments. Cultural reasons, although they do not enter the formal documents, form a strong motive for the legal move. But, unfortunately, in the view of [REDACTED] they might just have been taken for granted or even purposely omitted as being too fuzzy.

A CULTURAL TRAJECTORY

During Ryukyuan prehistory, the dugong may have been the only easy catch of the larger sea animals. Its presence along the seagrass meadows of the coral reef was constant enough to secure a supply for food and the production of tools and ornaments. In fact, according to one view, the Ryukyu Islands may have been populated by migratory dugong hunters. (A contrary view, however, states that the dugong is not sufficiently migratory to support any claim that the islands have been populated by dugong hunters following the dugong from elsewhere.)

Some intricately shaped dugong bone artifacts dating back to the Late and Final Jomon Periods (Early Shellmound Periods IV and V), approximately 4,000- 2,300 years ago, have been excavated on Okinawa Island. They are named in accordance with their shape, which is reminiscent of a butterfly, and are thus named “butterfly-shaped ornaments” ([REDACTED] interview, October 2009). They cannot have been tools. But were they ornaments or magical objects? Their intricacy and the occasional presence of red ocher on the artifact’s surface has led some archaeologists to see them as magical or ritual objects.

During the Late Shellmound Period (ca. 300 BCE-1200 CE), the use of dugong appears to have decreased. A few tools are still made from dugong bone, but items of jewelry, such as bracelets and rings, that were formerly made from dugong bone are now made from marine shell. The archaeological evidence suggests that a shift in emphasis took place, from hunting dugong in shallow seawater to inland hunting of wild pigs. By the beginning of the Gusuku Period (ca. 1200-1609) iron became available but was probably in scarce supply. Arrowheads and other pointed artifacts were made from dugong bone, but their manufacture and form suggests some knowledge of iron. Iron was precious; dugong bone was the more available suitable raw material. Other dugong artifacts from the Gusuku Period were made for a dice game popular at the castles. [REDACTED] archaeologist who was [REDACTED] offers some detail on this: such objects have been obtained from the castle sites of Katsuren and Nakijin. But the usage might have been haphazard, as judged from the incorrect design of the one die found at Katsuren.

It is, however, only through the interactions with Chinese emissaries visiting Okinawa to tend the tributary relationship that developed during the Chinese Ming Dynasty (1368-1644) that we learn something about the fuller context of society itself. The *Rekidai Hoan* (歴代宝案), probably compiled in 1697, containing the *Precious Documents of Successive Generations* (Editorial Office of the Rekidai Hoan 1992; Wada 1994), suggests an interest at the Chuzan court about the availability of dugong. The key note to this interest may have been struck by the Chinese themselves. During the investiture mission in 1492, gowns with embroidered depictions of what in the written characters of the record are “seahorses” were brought as presents. This is an animal filling a rank in Chinese officialdom. Ordinary people, by contrast, were differentiated in accordance with an inventory of birds. It might have been the rareness of the dugong – mostly seen around the waters of Hainan Island in the south – that qualified it for entry into the animal ranking system. In the opinion of one expert interviewed ([REDACTED] interview October 2009), the characters that make the word which in Japanese is pronounced *kaiba* lump the dugong and the seahorse into a single semantic category. According to [REDACTED] interview to [REDACTED] (interview October 2009), it is improbable that the animal depicted was a realistic representation of the dugong. In a comment written in 1721 by a Chinese diplomat and included in the *Chuzan Denshinroku* (中山傳信録物) [*Record of Transmitted Fact of Chuzan*] the seahorse is a long-necked animal galloping along the waves. Its body is described as fish-like, but without scales. In Chinese lore, then, this might have been a mythical beast attributed to the islands of the Ryukyus. But the comment brings us also a noteworthy historical clue – the meat of the seahorse carried a special quality. On that account it was reserved for the king. The description of the *kaiba* as galloping along the waves sounds like the mythical seahorse, but the part that talks about the meat being reserved for the king would seem to refer to the dugong.

The *Rekidai Hoan* gives the following information on the gifts received from the Chinese:

To the King:

[...] One *ra* woven wardrobe, One red wardrobe with golden embroidery of *quilin*, One blue wardrobe with golden embroidery of *kaiba*, One roll of blue mercery, One roll of green mercery, One roll of indigo mercery.

“Mercery” refers to measured bundles of silk, linen, or other luxurious fabric to be used in trade and the Okinawan word here might simply be translated as fabric. The red wardrobe is embroidered in a *quilin* design, a mythical horned animal. The blue wardrobe is embroidered with a design of a seahorse, the dugong or, otherwise, a depiction of another auspicious, yet chimerical animal.

Moreover, there may be good reason to assume that the dugong – rare enough to occupy a slot in a scheme of imagined zoological life (a mythical *quilin* and a mythical *kaiba*) – also caught the interests of specialists in Chinese medicine. There are no written sources favoring this possibility, yet it is noteworthy that some interviewees alluded to the possibility that the Chuzan interest in obtaining dugong was inspired by the contact with China. What we know has been extracted from the *Rekidai Hoan*, the Ryukyuan diplomatic documents. According to [REDACTED] however, there is a surprising absence of detail:

The emissaries coming with the investiture missions numbered around 400 persons. For a stay that might last as long as 6 months they were the guests of the Shuri Castle. Dance performances and banquets were given in their honor. The culinary treats included dugong meat. Members of the Okinawan nobility were recipients, as well, of these treats (Okinawa Prefectural Education Committee 1975). But there is no indication that the Chinese actually asked to be served this fare. Other hints about the hospitality come from local sources in Okinawa. But why is there no detail on this in the records of the Kingdom? Since some discourse on the dugong is obtainable from written sources in the Yaeyamas, then it is quite inexplicable that there is nothing to quote from written sources on Okinawa Island. Could it be that history itself has two layers: one authored by the rulers and the other by those who are ruled?

It seems that dugong meat was served to the Chinese emissaries during banquets as a broth dish. This manner of preparation is prevalent in ordinary Ryukyuan cooking, which includes cuts of meat served in a soup. What probably made the dish worthy of a meal for a diplomatic banquet was the inclusion of the rare meat of the dugong. Although it seems likely that the king shared meat also with Okinawan nobility (in the view of [REDACTED] there are no written records giving the Okinawan version of the social and culinary value of the dugong. Archaeological excavations on the site of the Shuri Castle (Izumi 2007), as discussed in Chapter V of this report, nonetheless, buttress the extant written record by documenting that dugong bones were among the bones of animals found on the site. There were also signs of dugong carcasses being handled at the castle kitchen. The animals may have been obtained from fishermen inhabiting the western coastline of central Okinawa. This indicates that the menu applicable to formal events at the castle included fresh dugong meat in addition to the soup containing cured meat. Consumption of dugong was a royal privilege; hence there is scant record of its role in culinary practice or the manufacture of artifacts among ordinary villagers.

The records that indicate that dugong meat was reserved for royal cuisine leave no clues as to whether the dugong assumed a mythical or zoological importance on that account. So far we can only conclude that dugong meat was a rare treat in very much the same way as Russian caviar today is a rare treat and thus suitable as a menu ingredient for diplomatic banquets. In the Ryukyus as in other societies of East Asia we may speak of an *haute cuisine* tradition with roots in the past. In the Ryukyus just as in China, Korea, and mainland Japanese tradition, cooking traditions are part of traditional arts, and so – as in France, for example – they fall under the general category of “cultural importance.”

DUGONG AND SUBSISTENCE ACTIVITY

It is only far back in prehistory that the dugong may have been the subject of core subsistence activity for people living in the Ryukyu Islands. Depletion of the stock may have been caused by low numbers and their low reproduction rate, but relatively easy availability – the dugong dwells in shallow

waters, its feeding behavior leaves tell-tale tracks along the sea floor, and it has no fear of humans. Its diurnal resting behavior makes it an easy prey. With such a large amount of animal protein obtainable from a single catch it would be no wonder that the stocks of dugong were depleted, even in an age with low level hunting technology. In contrast, the Inuit (Eskimo) have successfully hunted seals with simple technology all through their past. Seasonal restriction, along with a more time consuming localization resulting from seal breathing patterns, have served to maintain the ecological balance. The archaeological evidence from late prehistoric sites suggests that the Ryukyu Islanders placed increasing emphasis on inland hunting of wild pigs as sightings of the dugong became less common.

The Gusuku Period (ca. 1200-1609) saw advancement in seagoing capability allowing trade relationships to be built across large parts of East Asia and Southeast Asia. It is a paradox of a sort that, except for inhabitants or descendants of the fishing community of Itoman in the southern part of Okinawa Island, present-day Ryukyuan villagers identify themselves as farmers. Harvesting the reef is a natural adjunct to tilling the fields, but not deep sea fishing and long distance voyaging. However, the ancestors of today's farmers, were sailors and traders who transported goods over long stretches of ocean ranging from Malacca in present-day Malaysia to the Chinese ports of Kwantung and Fukien and on to Korea and the main islands of Japan. A portion of the wealth of the Ryukyu Kingdom (1429-1879) rested on involvement in this trade.

During the present project to define the significance of the dugong in the cultural consciousness of the Ryukyuan, a number of books covering the seasonal cycle of rituals have been examined. It is telling that the overwhelming majority of these publications deal with agricultural ritual. It was only as recently as the Meiji (1868-1912) and Taisho (1912-1926) Periods that Ryukyuan turned to deep water fishing. Itoman fishermen began migrating to the waters of the Miyako and the Yaeyama Island Groups for seasonal catches. Some preferred to take up residence on the outlying islands. In this way fishing villages were formed as a recent adaptive choice. The Ryukyuan in general turned *away* from the sea. They were taught to fear it. The deity of the coral reef hollows and limestone cavities of the coastlines, the *Nirai Kanai*, may draw the living present on the shore toward a realm of the dead (Rokkum, research notes). And the dugong may cause the waves to be choppy (according to the interview account of [REDACTED]). [REDACTED] The Ryukyu Dynasty wanted the islanders to be farmers so that they might be able to pay taxes from produce obtained from working on the land, such as rice, sugarcane, fabrics, and corvée labor. Allowing the islanders to fish for self-consumption would have undermined the emphasis on farming.

For the villagers, the attention paid to the dugong differed little from the attention toward whales, dolphins, and turtles. These species shared the same marine habitat, so they carried the same interest. There was no systematic hunting of large sea mammals, but as displays at the Nago Museum suggest – whale bones, when available, were put to practical usage. Information obtained both at the Nago Museum on the western side of Okinawa and the Uruma City Marine Museum on the eastern side, indicate two contrasting practices for catching dugong.

1. A collective drive-in catching act, with seine nets stretched out between two boats. Swimmers equipped with goggles try to steer the animal towards the net. The method was fraught with the danger that the otherwise docile sea animal might embrace the swimmer with its fore-fins.
2. A more limited undertaking with harpoons performed from individual boats by fishermen knowledgeable of the dugong's resting places (*zan nu kumui* = dugong pools). Charging at the animal from a small boat could be dangerous, so typically individual fishermen mobilized the rest of the villagers for a collective hunt after observing the presence of the dugong.

Safety for the fishermen was assured, however, when blast fishing became the favored choice soon after the end of World War II. Dynamite was easy to obtain, and a period of indiscriminate killing of marine life followed. The dugong was too rare to be targeted as a favored catch, however. According to one interviewee, a dugong among the catch was a cause of great surprise. [REDACTED] (interview, October 2009).

[REDACTED] discusses the implications of the use of dynamite.

[REDACTED] In his words:

After the end of the war it became quite common to catch fish by throwing dynamite into the sea. It was practiced not only by Itoman fishermen. The method of blast fishing was called *happa*. It was not targeted at any species, it was not a way of specifically hunting dugong, although there were instances of individuals of this species floating to the surface as well. But the risk was high. Some fishermen lost their arms. Think of the difference this makes in terms of attitude when you compare this with the practices during the Pre-Modern Period [late Ryukyu Kingdom Period]. As you already may know, the meat was submitted to the king. It was also thought to have medicinal effect. This shows how it was treated as important.

Even with sufficient knowledge about its feeding and resting behavior, appearances of the dugong were too haphazard and perhaps even too frightening for local cultures of dugong hunters to come into existence. To compare, whales were plentiful in the waters surrounding Okinawa Island, but not hunted on a large scale. Exhibits at the Nago Museum showed some tools for catching whales, but there is not much information available to suggest that the presence of a bit of technology changed the balance from sporadic to systematic hunting. [REDACTED] noted the disappearance of dugong in the Yaeyama group of islands, where previously it was more numerous than along the coasts of Okinawa Island. Could it be that a cultural disposition, such as a belief that the dugong is sacred, put a brake on hunting activity? The more prevalent opinion among the interviewees was that hunting the dugong was not different from hunting whales or dolphins. So far, neither in the literature nor in the responses obtained through interview is there any substantial indication of a religiously motivated prohibition against catching or eating dugong meat in the Ryukyu Islands. Although one interviewee placed a positive emphasis on the word *shinsei* (sacred), one must remember that the only pronounced demand for dugong meat was from the politico-religious center at Shuri. Female priests and bureaucrats of various ranks upheld the rules about proper ritual, at court on Okinawa Island, and through a system of appointments and hereditary assignments, even on the most remote islands in the Yaeyamas. A taboo on killing dugong pronounced by priestesses would have run counter to the privileged place of the meat of that animal under the following themes: culinary preferences, hospitality rules, medicinal prescriptions, and – as will be expanded upon below – taxation requirements. A limited ban on consumption, however, can take effect when epidemic disease threatens (cf. [REDACTED] below).

An extraordinary method of tax payment during the Ryukyu Kingdom Period takes us to the role of the dugong in historical times. Processed dugong meat would fulfill the requirements of a tax payment on the part of the Aragusuku villagers of the Yaeyama Island Group (see Fig. 5). The case of Aragusuku is the only case in the Ryukyu Islands in the historical period of a linkage of the hunting of dugong to politico-religious practices. [REDACTED] suggests that this might be the only known exception to the general case, that in historic times the dugong has not been targeted as a catch, but merely caught by chance when seen. We will therefore expand upon an extended case.

HOW DUGONG BECOMES A VALUED SPECIES

This section takes a look at textual sources that might shed some light on why and how the dugong became a valued animal during the period of the Ryukyu Dynasty (1429-1879).

The first textual source in which it might be expected that the dugong would be mentioned (Annals of King Seiso 1493, 1497) makes no mention of the dugong. A description dated 1477 remains from a stay in the Yaeyama Islands by shipwrecked Koreans. They note an absence of turtle (probably land turtle) on Aragusuku, but they leave a blank when it comes to dugong (Tokuno 2002).

The annals of the Ryukyu Court shed no light on the historical issue of how the dugong became a important catch and a precious culinary treat. The *Omoro Soshi* (おもろそうし) ballads compiled by the court in the period 1531-1623 contain stanzas alluding to a much valued catch of dugong. A couplet in Volume 1 repeats the numbers of one hundred dugongs, one hundred turtles. These verses, as they might have been sung on Kudaka Island (Tokuno 2002) extolled the virtues of the hunt. According to Sunagawa (2002), there are far more songs about dugong in the Yaeyama Island Group than around Okinawa Island. The song motifs of Miyako Island resemble those known on Iriomote Island in the Yaeyamas. Sunagawa holds the view that, despite the distribution of these songs across a wide geographical area, the motifs are very similar. A central theme is the catching of the dugong and relishing its meat. On Aragusuku, there is a song of the *jiraba* genre recreating the joys of making the fishing nets for the hunt. A recurrent motif is that of the deity of the sea riding on the back of the dugong (Sunagawa 2002). According to Kato et al. (1995), such vocal addresses toward the animal world are typical of song culture in the Yaeyamas. The islanders entrusted their lives and the island's future to these animals. "A Frog by a Well" tells of a relationship between dugong and humans at Iriomote. Other animals appearing in songs are the yellow-margined box turtle (*Cuora flavomarginata evelynae*) and a blue-tailed skink (*Plestiodon kishinouyei*).

Sunagawa (2002) writes about the tax exacted from the Aragusuku Islanders by the Ryukyu Court as a special tax and as a product tax, although its design cannot be recreated from available sources. Nor is there any record available for shedding light on why the Aragusuku islanders were the chosen ones for paying this tax. Did they excel as dugong hunters by possessing a special hunting technique? The dugong hunt was a seasonal activity, starting in March. Ohama (1971) recreates the scene, one of total coordination between the male islanders for equipping the boat crews. They gathered at the shrine. Obeisance paid there was seen as a prelude to a good catch. It might happen that the weight of the dugong ripped apart the fishing nets stretched out in the sea. It was hazardous to try to solve the problem with the nets. The dugong might kill the swimmer by embracing him or capsize the boat with its caudal fin. But as soon as the fin had been cut or the lower part of the back bone broken, the dugong lost its sense of orientation, turning upside down in the water. While the hunt was going on, the rest of the islanders kept vigil at the shrine. The return of the hunters was celebrated with another act of paying obeisance. A victory song was chanted at the shrine. One stanza narrates the tying up of the seahorse (dugong). The next stanza narrates the tying up of the turtle. Many hunting trips may have ended in failure, however. The Aragusuku islanders did not deserve this burden, according to Ohama. The entire exploit was unproductive. At the end of these expeditions Aragusukuans were left with only heads and bones. They were not allowed to take away even a slice of dugong meat to feed themselves.

The monopoly enjoyed by the Aragusukuans and the limited size of their expeditions, two or three small vessels, might have served as a brake on the reduction of dugong stock in the waters of the Ryukyu Islands. The hunting season seems to have been around March-April. During the Meiji Period (1868-1912) the roughly estimated number of dugong was 200. The estimated number today is 50. This probably explains a paradox observed by [REDACTED] (interview, October 2009) – why is the dugong extinct in the southern group of islands (where it was more abundant) and not in the area around Okinawa Island? Did the people of Okinawa Island restrain themselves from hunting it due to its sacred character? A more empirical interpretation would be that people around the archipelago were taught that the sea is a dangerous zone. A cultural rule put a brake on marine exploitation, although it might well have been inspired by the pragmatics of self-sufficiency. Whatever the case, as observed by one of the authors of this report (Rokkum 1998, Rokkum 2006), there is still a restraint in effect regarding the sea, as

noticed through parental warnings for children – do not play on the beach where you can be reached by the pulling force of the sea.

The extant ledgers on produce in the Ryukyu Kingdom show entries for “turtle,” but not for “zan” or “kaiba.” Why is the entry for dugong missing while all the others are present? Is it possible, Sunagawa asks with some sense of irony, that both the locals and the researchers may be wrong? From the latter part of the 18th century, however, we encounter some written documentation.

As detailed in Chapter VI, status reports about local conditions and issues were written by administrative inspectors of the Ryukyu Kingdom on temporary duty in the Miyako and Yaeyama Island Groups. Administrative reforms in the remote islands were carried out on the basis of such reports, known as the *kimocho* (Records of Political Actions), *kujicho* (Records of Administred Guidelines), and *nomucho* (Records of Agricultural Development Plans). Of these, the oldest existing *kimocho* is the *Yoseyama Oyakata*⁴ *Kimocho* (Ishigaki City Board of Education 1977) dating back to 1768. It contains the first royal order with the word 海馬 (*kaiba*) – seahorse, dugong. The documents do not provide any information, however, on why and when the islanders of Aragusuku in the Yaeyamas were allotted exclusive rights to hunt dugong for an annual presentation to the king. The choice of words by the officials tells us, however, that this was not just a fiscal arrangement but a presentation or even an offering. In other words, dugong is a gift only worthy of a king. According to *Oyakata Yoseyama in Yoseyama Oyakata Yeayama-jima Kimocho [Administrative Regulations for the Yaeyama Islands by Oyakata Yoseyama]* written in 1768 (City History Compilation Office, General Affairs Department of Ishigaki City 1993):

Administrative inspectors are frequently asking the locals of Aragusuku to provide seahorse and turtle. This should not go on any more. Procurement of seahorse and turtle in excess of what is designated as an offering to the king shall no longer be tolerated.

Oyakata Onaga, too, defends the royal monopoly in his journal log called *Onaga Oyakata Yaeyama-jima Kimocho [Administrative Regulations for the Yaeyama Islands by Onaga Oyakata]* written in 1858 (City History Compilation Office, General Affairs Department of Ishigaki City 1994):

By royal order, seahorse shall be treated as an offering to the king himself. Only certified residents of Aragusuku are allowed to hunt the animal. They are not allowed to sell seahorse to others who may want it. It seems, however, that this rule is ignored. Occasional excess of meat is said to be the cause of this. But this is precisely the reason why, year by year, the difficult hunts demanding so much manpower tend to last longer and longer. From now on the law must be obeyed according to the letter. Selling seahorse will be strictly prohibited. Any additional catches will be registered by the regional officer before being submitted to the Castle, for the king, in compliance with his request.

Oyakata Tomikawa, as well, has a version of the policy review regarding the special tax defined as processed dugong meat. He, also, formulates the stance in his journal log entitled *Tomikawa Oyakata Yaeyama-jima Shoshimari-cho [Administrative Regulations for the Yaeyama Islands by Oyakata Tomikawa]* written in 1875 (City History Compilation Office, General Affairs Department of Ishigaki City 1991):

Procuring seahorse for offering to the king is a duty assigned to the people of Aragusuku. Unfortunately, as the years go by, this acquisition is becoming gradually less successful. A situation of more and more men needed to carry out the task causes a strain upon the people of Aragusuku. They have now made a request that other communities share this heavy burden. But as

⁴ “Oyakata” is the title of an administrative official.

the re-assignment of annual quotas for the hunting community has just taken place, no sudden changes can be put into effect.

The administrative chiefs find a solution to the *extra* burden resulting from unauthorized requests but not to the one caused by the initial responsibility of collectively upholding a royal monopoly. In Tokuno's reading (Tokuno 2002), the hunting of sea turtle also was covered by the revised edict.

Sunagawa (2002) addresses the issue of "seahorse" (*kaiba*) not being found in the ledgers of taxation revenue. Makino (1971) is content with slightly more indirect evidence. Makino reasons that in *Tomikawa Oyakata Yaeyama-jima Shoson Kujicho 43 [Records of Administrative Guidelines in the Yaeyama Islands written by Oyakata Tomikawa 43]* "...the special taxes are imposed as supplementary payment of the *futokudemai* kind (a type of additional tax to make up for negligence in paying regular taxes) and charged to Miyako, Yaeyama and Kerama only."

(interview, October 2009).

She recapitulates the historical case – islanders of Aragusuku were exhorted to cultivate rice, millet, and barnyard millet. But the territory of that island is too limited for large scale farming and the depth of soil is not more than 10 cm. The Ryukyu Court authorities, therefore, could not expect the stipulated tax quotas to be filled by rice cultivation. An alternative duty of corvée labor was therefore put in force. Others were offered the alternative of filling their workday quota in public fields. Another solution would be to harvest the sea. Accordingly, and by royal decree, Aragusuku islanders were licensed to hunt dugong. This regulation came into effect during the Kinsei (Pre-Modern) Period (1609-1879). According to [redacted] Aragusukuans may not have been chosen by the authorities of the Ryukyu Kingdom to submit a meat tax because they were proven dugong hunters, rather, they were simply appointed in accordance with administrative logic to fulfill a duty.

It was important for the authorities of the Kingdom to keep the islands populated. So they designated a natural resource for exploitation exclusively by Aragusukuans. Other islands, for example nearby Kuroshima, had other resources such as turtle and fish. On the latter island an actual increase of population took place due to an abundance of natural resources. As a result, emigration to Ishigaki Island began to take place. The authorities kept a record of the produce on each island. But although the taxation system was a per capita regime it may not have been very strict. [This is a view which might not be shared among all historians working on the subject.]

Hunting dugong was not an easy assignment. There are no dugong grazing grounds near the island. Consequently, in order to fill their quotas, the islanders would have to sail into the vicinity of other islands: Iriomote, Kuroshima, and Ishigaki (see Fig. 5). One trip would take two to three days, with a departure of two to three boats. Spotting the dugong might have been difficult as it foraged as solitary individuals, never in schools. But the capture itself was not difficult. For the people in the Yaeyamas, the occasional appearance of dugong was always a fortunate happenstance.

It seems that the Aragusukuans felt this duty of paying a meat tax on a per capita basis as a heavy burden although they had no competition in the hunt. It was not a free-for-all kill, and moreover, the authorities of the Kingdom did not want people in general to orient themselves toward the sea. They were exhorted to concentrate upon farming in order to fulfill per capita tax quotas.

According to [redacted] the skeletal remains of dugong on Aragusuku are only of the part above the trunk – only skulls, no rib cages and no tusks have been found. No large animals were available for food and tool-making other than dugong and wild pigs. The large bones might have been

used for making tools, although no artifacts made from dugong bone have actually been collected on Aragusuku. It is certain, however, that tusks were used to make name seals (*inkan*). Dugong ivory seals still exist in the islands. Tusks and bones were transported to the capital at Shuri, Okinawa Island, and onward to the Satsuma fief on Kyushu Island and probably also to China. That is probably the main reason why no one has seen any remaining tusks in the area of the Aragusuku shrines. [REDACTED]

[REDACTED] view on the use of dugong bone for name seals is confirmed by [REDACTED] in [REDACTED] (interview, October 2009), who is a [REDACTED]

A review of a historical case of the dugong in the southern archipelago of the Yaeyama Island Group suggests a politico-religious context. A chunk of cured dugong meat was a gift worthy of a king. A dugong skull was a gift worthy of a deity. Since there is no enshrinement of dugong skulls on neighboring islands, it is likely that the role of the dugong for worship at the Aragusuku shrines was a function of its role in the taxation regime of the Kingdom. Records indicating this cultural importance are found at the point of delivery of the meat tax, that is, in Ishigaki City. It is noteworthy, however, that during the historical period of the Ryukyu Dynasty (1429-1879), no records were kept about dugong in the official notes at Shuri Castle. There are no details on the culinary rules, and even more unexpectedly, no entry of either *zan* or *kaiba* in the taxation ledgers.

At present, just a few dugong remains can be seen at the sacred groves (*wan*, *ugan*) on Aragusuku. A sacred grove has a clump of trees, sometimes enclosed by an oval stone-wall. The innermost area beneath the trees is perpendicular to the entrance, which is sometimes arched. Standing stones in this protected zone beneath the trees mark the locus of a deity. A shrine building is often seen outside this enclosure. The built structure is not required for the sanctity of the place. In an English translation these are “shrines” even without the presence of a structure. The innermost recess of these sacred groves are places off-limits to outsiders. In most areas of the Ryukyus, there would be a restriction on entry by men. In an anthropological portrayal sensitive to signs in culture, the circumspection regarding sacred sites would, however, suggest an important observation. *Cultural* deployment of the dugong in the Ryukyus is not general purpose but special purpose – the more restricted, the more important. According to [REDACTED]

Dugong skulls could previously be spotted upon stone walls surrounding the Aragusuku sacred groves. The so-called Dugong Shrine is located on Kamiiji Island. The correct name, however, is Aaru Ugan (East Shrine). Few bone remains can be seen today. Nowadays merely bone fragments are left within the shrine enclosures. The tusks had already been cut off before the presentation at the shrine. The shrine precinct has been violated by bone collectors. But when accident and death hit their families, the plunderers brought what was left of the skulls back to the site of the shrine. Bone fragments littering the precinct could be observed in 1972. Remaining skulls and bones have been removed by researchers and collectors. The Affiliated Museum of Ryukyu University has a collection. After the research work has been done – DNA samples extracted – the skulls will be returned to Aragusuku. Noriyuki Ohtaishi of Hokkaido University is a chief researcher. The scientists made a formal request to borrow bone samples for research purposes. They paid obeisance to the resident deity before starting the task. People of Aragusuku really dislike the visits by researchers. But this is actually what is felt by most people in Okinawa – a negative attitude toward taking anything from a sacred grove.

[REDACTED] thinks it is particularly bad to go to Kamiiji for bone hunting, even if the dugong itself is not a deity. [REDACTED]

[redacted] (interview, October 2009), a [redacted] affirms this wish by the islanders for outsiders not to have entry into their sacred sites: “This [the annual harvest rituals of the secret initiation society] is actually what we dedicate our lives to.” The interviewer, Rokkum, during earlier research, was present at some of the rituals. [redacted]

[redacted] Any act of reproduction of the particulars by graphical or audio-visual means is prohibited. Field research, either by Japanese (including Okinawan) researchers or foreigners, is difficult.

DUGONG AND DEITY

In the preceding sections the significance of dugong has been outlined against the historical background of Ryukyuan society: how an impetus to produce a dugong yield originated at the court and how the inhabitants of one island in the Yaeyamas became tax paying subjects by submitting catches of dugong meat. It is evident from the close-up view of Aragusuku that what was left for the Aragusukuans themselves to retain from the catches – the skulls – were exhibited on stone-walls lining the shrine perimeters. The relationship between dugong and deity will now receive additional attention by including motifs, not from physical activity such as hunting but from story-telling. As discussed in the previous chapter, oral knowledge focused on the dugong is of two principal kinds – origin stories and stories about the talking fish. The narrative drift of both types is one of anthropomorphizing a hybrid creature, one which is half-human half-fish. From other parts of the world we learn that it is not unusual for deities of creation or origin to have hybrid qualities. The first example from Aragusuku elaborates the affinity between humans and dugong.

Ohama (1971) points out what the elderly among the Aragusuku islanders find noteworthy about the animals: the visible genitals and breasts, the strong forelimbs, the hairs on the back of the head. Although Ohama himself does not focus upon it, it is illuminating for the present study of cultural significance that the islanders’ primary observation is one about the similarities and differences between dugong and *humans*. Along with a view quoted below about the sentiments the dead dugong might harbor against its hunters, what we encounter is perhaps an urge to anthropomorphize a part of animal life. Or, if not a fully developed icon of a familiar creature in the animal world, at least the dugong served as a useful index for humans on conditions in nature. For, according to Ohama (1971), the Aragusuku islanders took notice of the dugong’s movement. If it jumps against the wind, weather will be fine. But if it jumps with the wind, weather will be bad. Ohama recounts folk stories about dugong encounters. He mentions three subjects:

1. One day a fisherman found a dugong at the beach. Thinking it was dead, he had his ox pull it up to his house. But the dugong woke up, and turned around; dragging the ox back again down toward the sea.
2. Fishermen who mistook the dugong for a stone drowned when their boats capsized.
3. Sexual arousal may cause female dugongs to embrace male humans with their forelimbs. No one has survived such an embrace.

Let us now take a look at the details, first from Kouri, a small island immediately off the coast of Motobu Peninsula in Nakijin, Okinawa Island. This is a slightly elaborated version of the island origins story presented in the previous chapter.

STORY OF ISLAND ORIGIN:

Long ago, a naked couple inhabited Kouri Island. They survived by eating the rice cakes that every day kept falling down from the sky. They never grew hungry until one day, as the couple began to store the rice cakes, this state suddenly came to an end. The two humans were startled, and began to pray to the sky. But no more cakes fell. From then on the couple had to start gathering their own food and thus acquire an understanding of the meaning of work. One day, the couple observed *kaiba* (sea horse/dugong) mating. That made them feel ashamed, so they hid their groins with leaves of the *kuba* palm (*Livistona chinensis* var. *subglosa*). The residents of Kouri Island are the descendents of this couple. (City History Compilation Office of Nago City 1993; Minamoto 1974.)

For variations on the motif, e.g. of the included species being a seabird rather than a dugong, see Oshiro et al. (1976), Fukushima (1982), Yoshinari (2003), Yamashita et al. (1989), and Ozawa (1989). The encounter with the dugong teaches the couple how to set limits; the copulating animals remind them about the difference between un-cultured and cultured living.

STORY OF MERMAID AND TSUNAMI (THE SPEAKING FISH):

A mermaid caught by a fisherman implores to be released back into the sea. The fisherman grants the wish. As a token of appreciation, the mermaid tells him about an impending disaster, a tsunami. This enables the fisherman and his family to save their lives by taking refuge high up in the hills (Inada and Ozawa 1983).

In a story from Irabu Island in the Miyako Island Group, a similar type of mermaid named Yonaitama appears. As noted in the last chapter, there are several variants on this story.

During the interview (October 2009), Mr. Isshu Maeda of the Uruma City Cultural Marine Museum revealed a thought on the subject of creation stories:

Stories which have been passed down from the past retain two aspects: one, the dugong as a sacred animal associated with the creation of the world and, two, the speaking fish. To people in the southern islands [the Ryukyus], the dugong was a not only a deity of the sea but also a creature to be feared.

Kishaba (1977), who was an Ishigaki resident, writes in his *Yaeyama Minzokushi [Records of Yaeyama Folklore]* about a “spirit fish” or “man-faced fish.” This is the *ningyo nu izu*, a creature half-fish half-human. Its name on the island of Hateruma is *niejii iu*. It possesses the ability to warn about tsunamis and it can speak, as if possessed by a deity, to the listener about the details of ancestry unnoted by the person himself/herself. To this Kishaba adds a factual note – in the Yaeyamas, the dugong is named *zan* and its dried meat *kaiba*. During the poll tax era, an annual offering was delivered to the king by the Yaeyama governmental office. Aragusuku islanders were granted exclusive hunting rights. As both the *zan* and the *ningyo* (mermaid) are recognized in the Yaeyamas, it can be concluded that in those islands they are not the same.

According to [REDACTED] (interview, October 2009), a tsunami struck the Yaeyamas in 1771. In the area of Shiraho on Ishigaki Island, the loss of population was 90 percent. The only survivors, according to legend, were those who heeded the warning given by the dugong. The story goes like this:

A dugong had been caught by fishermen some days before the catastrophe. It talked to them in a human voice while shedding tears, promising to bring them a word about something about to happen if only they would spare its life. In this way, those who heeded the advice given by the

dugong moved away from the low-lying area along the beach just in time before the area was hit. They were the survivors. From then on, the dugong has been revered in Ishigaki.

Rokkum (1998 and 2006) sees a parallel here between this account and what he was told on Yonaguni Island about animals, such as horses and cows, begging for their lives and shedding tears. This is a narrative device for assigning the role of an animal as a familiar or intermediary, or – as would be the term in Japanese language – a *monoshiri* (a knower). To recapitulate from above; Kishaba leaves no doubt that this is the way the dugong has been conceived.

Alternatively, dependent on the version of the narrative, the tsunami was a punishment on the part of the dugong for people not heeding its cries for mercy. The dugong, thus, has a *janus* face – it yields both blessings and punishments (cf. interview with Isshu Maeda 2009 referenced above). In a story from Okinawa Island, where the dugong is a mermaid, the following instance of being hit by a tsunami takes place:

According to Mr. Azama (born in 1911), there is a story about a tsunami in Takaesu and a mermaid (Editorial Board of History of Gushikawa City 1997). When Mr. Azama's grandmother was a child, a tsunami swell inundated the coastal area of Takaesu. Just before the wave arrived, a captured mermaid was hung behind a kitchen stove. The tsunami hit at the very moment the mermaid said, "Shall I bring one wave or two waves?" This double-sided effect of the dugong is also noted by people in the Yaeyamas. According to Sunagawa (2002) there are some lines in a song suggesting that the dugong is a master of the seas. But if caught and brought into a boat, it can cast a curse on the fisherman and his descendants, from grandchildren on to the next seven generations. [REDACTED] while taking note of the auspiciousness of a dugong catch in one location of the Yaeyamas, adds a case from Hateruma Island, where fishermen believe it forebodes something untoward. Also, according to Ouwehand (1985), a story from Hateruma (the *zangara* story) tells of a man who wanted to capture a dugong resting on the beach. He tried to make his bull pull the animal off the beach, but achieved only the opposite effect; he and the bull being drawn into the sea. The bull drowned, but the man reappeared after ten days. He appeared to have become a different person.

What Sunagawa writes of as an enshrinement of dugong bones in Aragusuku might well be one method of forestalling the animal's vengeance for being cruelly killed. But according to [REDACTED]

By amassing bones of dugong along the shrine stone walls, the islanders of Aragusuku showed their gratitude to the deity of the sea for its bounty. It was a thanksgiving for what the sea had bestowed upon them and a token of their wishes for coming seasons.

In our view, the worship directed toward the sea enhances plenty – as a catch from the sea, but also as a harvest from the fields. The translated word "bounty" carries this double semantic implication. [REDACTED]

The remains of slaughtered dugong play a part in the way the islanders sacrifice to the deity of the sea, *but it is itself not a deity (kamisama de wa nai)*. This view is valid for both islands of Aragusuku: Kamiji and Shimoji. The name of the shrine on the island of Shimoji – Nanazo – means Seven Gates. The islanders speak of the layout as made in imitation of a fish net, with the consequence that once inside there can be no way out. There is archaeological evidence, that Nanazo is a former site of a village. A raised stone at the Aaru Shrine of Kamiji Island is a node in the interrelationship to a deity of the sea. The shrine area has a characteristic layout: stone walls on each side of the compound leading up toward the innermost enclosure (*ibi*); then, from the left side of the sacred interior, a third extension reaching toward the sea. The entrance is from the outer area – a gathering place of the shrine compound. Dugong skull remains could be seen on top of these stone walls.

Ohama (1971) reviews his field trip to Aragusuku. The main ritual event of the year is a harvest festival, but different from other places in the Yaeyamas, no banners are paraded and there are no tug-of-war matches. The ritual at the Aaru shrine, also called the Dugong Shrine, is very secret. There is absolutely no admission for outsiders. Violation of what in his words is a “taboo” is certain to cause trouble. In his opinion, the nature of worship suggests past existence of a network of trade and smuggling, involving – in the Yaeyamas – Komi Village on Iriomote, the two islands of Aragusuku, Kohama Island, and Miyara Village on Ishigaki Island.

Internet pages run by tourist agencies warn visitors against crossing the line between the outside and the inside of the shrines of Aragusuku. Camping is prohibited on the islands. The shrine areas are domains of the two secret societies of Aragusuku. Entry by non-members is not allowed. From this we can also deduce that there may be layers of knowledge and belief about the relationship between dugong and deity which are not available for publication. The local wish to avoid trespassing and publication of secret society matters is generally respected, by researchers and the mass media. From an anthropological point of view it seems quite obvious that when knowledge is guarded it also carries some sort of cultural significance.

Even if the dugong is not a deity, and no worship of it can take place, it still plays a role in ritual, as in the case of Sonai Village on Iriomote Island. A story known by people above the age of 60 says that the dugong originally lived in the mountains while the wild boar lived in the sea. [REDACTED] says:

Once they decided to swap habitat. As a consequence, the dugong became an animal of the sea. During the August Moon Festival [15th day of the 8th lunar month], a reenactment of the action of habitat reversal takes place. Skulls of wild boar are thrown into the sea. The bones are *returned* to the sea. Skulls of dugong go to dry land. It is reported that skulls of boar could be seen in Sonai as late as 1946.

[REDACTED] (interviews, October 2009) state:

Jaws of dugong [unclear: or bones of wild boar?] were also put on display, beneath the roof overhang of people’s houses. This is known to have taken place at Sonai on Iriomote Island.

This raises the question of whether it is possible today to grasp the sentiments behind the presentation of dugong skulls at the Aragusuku shrines? Is it possible that this was not an easy sacrifice to perform, that there was some regret at having killed the dugong? As background for the question, note that the method of getting a dugong catch involved trapping the animal in a seine net, cutting its caudal fin and breaking its lower back bone, then hoisting it up on to the shore. Here it was clubbed to death. [REDACTED] (interview, October 2009), an Aragusukan renowned for his knowledge of the local history, answered the questions:

In the 11th [lunar] month an annual event takes place at Aragusuku. The event includes an address to the dugong with words about gratitude: “We caught a lot. We also caught you. Please forgive us. The killing was so terrible. We may have wanted you to escape from us. We feel pity with you for having killed you. We hope you will be at ease. But we had to do it because it was the order given by the Kingdom.”

According to [REDACTED]

Fish were used for offerings at the shrine. The meat of dugong went to the king. What was left of the carcass was divided among the islanders. The tusks and other osseous parts were sold for money.

The two islands of Aragusuku – Kamiji and Shimoji – had their own shrines and cult groups. The name of the Kamiji shrine is Aaru. The name of the Shimoji shrine is Nanazo. The per capita taxation regime treated the islands as one district (Aragusuku-mura), but in reality the actions requiring the fulfillment of taxation quotas took place independently. The relationship between the two islands was strained. People of Kamiji still feel closeness to Komi on Iriomote. People of Shimoji feel closeness to Kuroshima Island. The word for shrine is *ugan* at Kamiji while it is *wan* at Shimoji. Dugong bones could previously be seen scattered around the compound of Nanazo.

██████████ mentions that *kuyo* (memorials) may have been performed for hunted wild pigs. After the interview had taken place, the interviewer (Rōkkum) asked ██████████ if the question that he (Rōkkum) had posed about a posthumous existence for the dugong might have been a leading question. She responded that she was somewhat surprised about the answer we received. She had been interviewing ██████████ for a long time about dugong and Aragusuku, but this is the first time she heard something about sentiments of guilt. Her doubt coincides with a point of view recorded during the interview (October 2009) with Mr. Takeshi Sasaki at the Affiliated Museum of the University of the Ryukyus. Mr. Sasaki bridges the religious attitude with interest in society:

It is a cost-benefit calculus which underlies the reported dugong hunting practice of Aragusuku. It is not motivated by spiritual reasons per se. The Aragusukians were dependent on the dugong catch for paying their taxes. That is why they found a place for its remains inside the sacred grove. On other islands it was just an occasional gift from the sea, so they did not need to pay that much attention to it.

Nonetheless, there can be no definite answer to the question, did the dugong hunters of Aragusuku, who apparently spoke about the duty they fulfilled as a heavy toll, in fact experience this as violating a shared sentience, human and animal? Did they honor the dugong posthumously by carefully putting its skull on display inside the shrine grounds? Rōkkum has recorded a posthumous rite for a house cat on Yonaguni Island. The rationale given was that this is an animal needing special treatment due to its closeness to humans. Unless the posthumous consolation rite is duly executed, it might curse the life of the owner. A hunter and his prey, likewise, are agents who affect each other. A mere physical interactivity may give rise to sentimental value. The widely known myth of a captured dugong begging for its life and shedding tears is suggestive of the possibility of the dugong being elevated to a status deserving of posthumous rites. As for the unexpected answer to the question posed to ██████████ (i.e., the posthumous existence for the dugong), it is the experience of Rōkkum from doing fieldwork in the Yaeyamas that it can be difficult to obtain good answers unless you appear totally familiar with the subject. That may be the basis of dialog in the local culture. So it might well be the case that what was told by ██████████ was not previously known, simply because the question had not been asked.

DUGONG AND SOCIETY

The present section deals with the value placed on the dugong in Ryukyuan society; at the Ryukyu Court and around the scattered islands.

According to ██████████ (interview, October 2009), the value of the dugong in the past may have derived from its scarcity and rarity. Perhaps the appreciation of the animal during the Ryukyu Kingdom was a continuation of that value from prehistoric times. He emphasized, however, the scarcity of bone tool or ornament specimens, which would argue against regular access to or preference for dugong bone as a tool-making material. A few butterfly-shaped dugong bone objects have been found on Okinawa Island, but none in the Yaeyama Island Group. Ordinary people could not freely reserve for themselves a catch of dugong; the right of having it cured belonged to the king himself. The dugong was

a highly valued animal in the eyes of royal officialdom. Despite this, for unknown reasons, no official records from the time tell us about the amounts of dugong meat offered as tax.

Let it be re-emphasized that the royal archives give no indication about the status of hunting before this appropriation of the dugong by the king through a taxation regime. After the Ryukyu Kingdom finally collapsed in 1879, there was no regulation in force to limit the hunting of dugong. [REDACTED] (interview, October 2009) maintained that after the establishment of Okinawa as a prefecture (in 1879), there were no rules preventing over-hunting. Several dozen animals may have been hunted annually. This view is shared by Mr. Isshu Maeda of the Uruma City Cultural Marine Museum. More extensive hunting in the southern part of the archipelago due to a high degree of knowledge about dugong behavior might well be the cause of an earlier depletion of stock there than in the central maritime area of Okinawa Island. The Yaeyama fishermen might simply been better hunters than the fishermen of Okinawa Island. The hypothesis matches a statement given by Mr. Maeda (interview, October 2009; see quotation below) about the danger which seems to have been involved when confronting the dugong individually.

Data from official statistics quoted by Sunagawa (2002) provide additional insight. In 1894 the weight of registered dugong meat was merely 153 kilograms and increased to only 180 kilograms by the end of the Taisho Period (1925). (The Okinawa Prefectural Government maintained records of produce. Dugong was included in the fisheries record.) The personal notes made by Asato (1976) in his Aragusuku book support the view that the dugong had become very scarce around the beginning of the Showa Period (1926). The dynamite fishing after the Second World War did the rest. In his view:

The knowledge accumulated by the Aragusukuans of how to successfully trace and trap the animal became public domain knowledge after the fall of the Kingdom. Another factor would be the arrival in the southern islands of the Itomans, dedicated fisherfolk from Okinawa Island. Only the Itomans of Okinawa Island took up fishing as a specialized endeavor.

[REDACTED] (interview, October 2009), [REDACTED] is specific on that point:

Marine resources were exploited only up to the edge of the coral reef. There were seaweeds, crabs, seashells and fish that could be speared in shallow pools during low tide. But it was only when the Itomans arrived in the late Meiji Period that an awareness arose about the possibility of hunting larger sea animals off the edge of the reef. Itoman fishermen practiced seasonal fishing, forming semipermanent colonies. Gradually these became settled colonies.

This adaptation of harvesting the reef is still practiced in some places within the Ryukyus, e.g. on Yonaguni Island. Local knowledge of reef-based marine resources is extensive, but that knowledge is quite limited when it comes to larger marine animals such as whales, dolphins, and blue marlins that do not regularly inhabit the reef. The professionalization of fishing in the Yaevamas depleted the stocks of dugong, the one large sea animal found on the reef. According to [REDACTED] (interview, October 2009):

People around the archipelago were taught that the sea is a dangerous zone. But the dugong can be such an easy catch – even if arriving into the nearby waters not as a school but as a limited number of individuals – that they could not neglect it. Only the Itomans of Okinawa Island took up fishing as a specialized endeavor. But, after the Ryukyu Kingdom collapsed and Ryukyu became incorporated in the Japanese nation as a prefecture, there were no more regulations in force to limit the hunting of dugong. In the years after the end of the Second World War the stock of dugong has been further reduced by blast fishing. As the dugong has the ability of passing memory on to at least two subsequent generations [the interviewee suggests that the dugong can

pass on acquired avoidance behavior to the subsequent generation], there is little hope of a replenishment of the stock. The dugong is very sensitive to sounds.

Question: “What would be the general idea about the dugong among people in the Yaeyamas?”
[redacted] answered by recapitulating the known usages from the Shellmound Age to the age of per capita taxation [summarizing the scholar’s stance]. But to people in general:

The dugong is just a large edible mammal like the wild pig.

[redacted] (interview, October 2009) [redacted] sheds some additional light on modern hunting methods around the Yaeyamas. He credited [redacted] for this:

A net was used to catch the dugong. Fishermen on a motorboat chased the dugong, knowing there was a particular way that the dugong runs away. The fishermen spread a net along the dugong’s escape route, forcing it to swim towards shallow waters on the reef. Here they subdued the animal by cutting off its tail fin. Its force is strong enough to capsize a boat.

...In the sea off Ginoza there may not have been much hunting of dugong and there are no folktale events related to the sea. The stories he has heard tell about absolutely unsuccessful chases with harpoon along the seagrass meadows. It might have been easier for them, however, when the dugong swam toward the mouth of the Fukuchi River.

And furthermore:

The *Omoro Soshi* texts of the Ryukyu Kingdom suggest a connection of the dugong to annual events, but the stories recited through these texts are not known to people in our age. Not even informants in their 90s can tell much about these tales. This might not be surprising since the dugong seldom appears in statistical data after around 1915-16.

DUGONG CUISINE

The present section addresses why and how the dugong became a valued species in Ryukyuan society. It was caught systematically during the age of the Ryukyu Kingdom for taxation purposes. But the motivation was not simply a fiscal one – procurement of dugong marked a royal privilege relating to court cuisine and the treatment of guests.

Cured meat of dugong was first and foremost targeted for consumption at the Ryukyu Court, but some quantities obviously went to the Satsuma fiefdom of Kyushu Island. No public distribution of meat took place among the islanders, and there is no record that any quantity entered the marketplace or trade networks. This exclusive disposition of dugong produce contrasts with the case of whales and dolphins. The meat from the catch of the latter species was shared by the islanders in general. There seems to have been a taste for dugong – a culinary value – coupled with social rules of etiquette and hospitality behind a royal monopoly established on catch and distribution. There is no record that might give us an inside view of how this culinary refinement originated. We know that the Ryukyu Court emulated styles practiced at the Chinese capital, the center of the tribute trade that underpinned the kingdom’s economy, but there is no evidence that the taste for dugong meat was passed on to the Ryukyuan by the Chinese. In comparison, whale meat, according to Mr. Maeda (interview, October 2009), was more easily obtainable than dugong. It was consumed by the general population, and had no prestige value. Dugong meat was reserved for members of the *sattoshi* official class at Shuri, the Ryukyuan capital. It was prepared as a soup. But Mr. Maeda adds: “Even if there was a prohibition against eating dugong meat in the southern islands of the Yaeyamas, oral records tell that people found ways to obtain some meat for themselves, cooking it by roasting (*himono*).” Archeological records, as well, suggest a practice of

roasting. According to [REDACTED] in an interview (October 2009), dugong meat may not only have been consumed, as medicine, by childbearing women at the Shuri Castle, but also by women at the administrative residences in the southern provinces. [REDACTED] finds it likely that the demand for dugong meat originated among royal officials in search for the key to longevity.

Notes kept at the *dunchi* (administrative houses) of Ishigaki and Miyara Villages on Ishigaki Island in the Yaeyama Island Group, inform us that dugong meat was an ingredient of a broth dish (*suimono*). According to Miyagi (1972), a *zan* treat is said to be truly nutritious. A piece of dugong meat was a coveted possession, the treasure of a princess. But there are more extensive records on dugong consumption in the Yaeyamas. The archives left by the governmental administrators of the Yaeyama Island Group, which were quoted previously and generally belong to the period from the middle to the end of the 18th century, reveal a demand for dugong meat among members of the administrative class. Coupled with the notes from local nobility houses on meal compositions during the subsequent early Meiji Period (1868-1912), we have firm evidence that dugong meat was actually consumed in the Yaeyamas.

Texts of historic songs tell about the urge to secure a dugong catch; “we want to eat it soon,” as the line goes. But what can lie behind this craving for dugong meat on the part of the Yaeyama nobility. Sunagawa (2002) asks: Was it the taste itself which was exquisite, was it as a treat for guests that it was so special, or was it a miracle cure good for childbirth and for longevity? As for the meat presented at Shuri, according to one saying, the one who samples it can expect a life span of 800 years. But there is no indication that products of the dugong entered the tributary trade in which the king of Shuri had a partnership.

Tokuno (2002), as well, ponders the possibility of dugong meat having a high medicinal value. He refers to the Sino-Japanese motif of the miraculous effects of the sea horse and the occurrence of this motif in legends of the Yaeyama Islands. [REDACTED] (interview, October 2009) gave the following account of the usage of dugong meat in the past:

Records indicate that meat of dugong was included in the banquets given at court for guests from China. Only the heads remained on Aragusuku. The way of thinking about the effects of eating dugong meat is reminiscent of Chinese medical lore: a remedy that brings about longevity. Officials from the Ryukyu Court may have brought with them stocks of cured dugong for private sale on their missions to China. In the Yaeyamas, dugong meat is believed to be good for child delivery [used at the court of Shuri, but also on Aragusuku.] It is ingested as a soup, with the broth made from shavings of dried meat.

[REDACTED] b
[REDACTED] fish catch records from the Yaeyama Branch of the Okinawa Bureau of Statistics [*Yaeyama Okinawa-ken Tokeisho*] show no entries for dugong caught from the year 1929 on. She also brought forth a 70 year old sample of dried dugong meat and explained:

Only a few people above the age of 70 can recollect having eaten dugong meat. Those of around 60 years of age can only refer to recollections by their parents. In their way of cooking, the fresh meat of dugong was treated no different from pork, as for example, for the typical *chanpuru* stir fry dish, which requires additional ingredients such as bean curd, bitter gourd, and egg.

This matches the statement by [REDACTED] and recalls eating dugong meat in his childhood. The dish was served in the way of a steak. It had been obtained by his grandmother from Itoman fishermen, who caught it with a fishing net. He was about the age of 13-15 at the time, and recalls being somewhat shocked at what was being served. But dugong meat does not seem to have found its way into the menu at the shrines of Aragusuku. According to [REDACTED]

At Aragusuku, dugong meat played no role in ceremonial ostentation. Fish was used, first of all, for the important Harvest Festival (*puru*). Meal preparations took place on the beach below the shrine. Young men of the village prepared the catch. Other ingredients were fish paste (*kamaboko*) along with other typical festival food.

_____ emphasized that salting was not enough to preserve the meat and that it would decompose after some days. Taking into account that the blubber could also be included, the curing process would not differ very much from the making of bacon. The chunk of meat was first left simmering in boiling water for a short while. Then it was put on a plate for salting, and finally, hung above the fireplace for smoking. The dried meat of the dugong is very tough and could be added to a broth only as shavings removed with a carpenter's plane. She credits the following insight to Sumiko Kinjo's publications:

Diaries with records about dugong meat inclusion in ceremonial meals, as a soup (*suimono*), were kept at the administrative chief (*dunchi*) houses of Ishigaki and Miyara. Dugong dishes were restricted to formal events, such as mortuary rites. People of lesser ranks, such as the islanders of Aragusuku, were not permitted to prepare a recipe normally reserved for the royal court. Dugong meat was welcome as an extra treat when available, but it called for no special preparation for cooking or meal presentation. However, if _____

_____ here is one extraordinary situation which calls for a ban on eating dugong meat – if there is an outbreak of contagious disease. The grandmother's explanation was that the dugong is too close to humans to allow eating it indiscriminately. Dolphin meat, however, is not subject to such restraint.

In contrast, according to the view held by Mr. Maeda (interview, October 2009), dugong meat may actually have entered the menu of festival meals in some parts of Okinawa Island. While referring to the cluster of islands comprising Hamahiga, Henza, Miyagi, and Ikei, Mr. Maeda said:

Before the war, dugong was hunted only periodically, in preparation for festivals. It was not hunted throughout the year. There was no prohibition against killing dugong at other times, but it was a difficult catch. Dugong sightings were rare occurrences, and it was both dangerous and difficult for a single fisherman to try to catch it. So people did not devote much time to dugong hunting. This contrasts with the hunting of whales and dolphins which were truly collective undertakings, carried out on a more regular basis by the men of one whole village.

... It was a specific feature of one festival that meat of dugong was presented as an offering. During the ritual itself it was also treated as a festival dish. After the event, the rest of it was shared among the islanders in general. But starting about 80 years ago, the catch of dugong became meager and difficult to obtain for the festival.

... A dugong motif is present in the ritual life of Hamahiga Island, specifically, on the 3rd day of the 3rd Moon ritual of descending to the beach (*umihiraki*). The prayers say about the dugong: "Please come here!"

DISCUSSION

From the age of the Ryukyu Kingdom up to the present, dugong meat has had a scarcity value. But during the age of the Ryukyu Kingdom, it was not marketed according to such value. A question which cannot be satisfactorily answered from the sources available is whether processed dugong meat, as well as dugong products such as dugong ivory, were distributed along barter networks. We simply do not know. What we do know, however, was that the authorities of the Ryukyu Kingdom did their utmost to uphold the royal privilege – procurement of dugong is for an offering to the king. Under this royal privilege, however, dugong meat might well have been redistributed for consumption by royal guests and

by members of the nobility. We also have reason to think that during the same period there was also some unlicensed hunting of dugong

For the Ryukyu nobility the supply of dugong enabled culinary refinement. For ordinary people it was a welcome extra treat and in periods of food scarcity an important protein supplement. For those living on Aragusuku Island availability of dugong around the Yaeyama Island Group was a fiscal necessity. Only Aragusuku had something which we might call a “dugong culture” in the same sense as we speak of a local “whaling culture.” Expression of gratitude to the dugong was manifest as an array of skulls along the shrine perimeters. Had the dugong been sacred in the first place, it is more likely that it would have been an object of worship rather than a medium for sacrifice. The seasonal hunt was opened and closed at a sanctuary decorated with trophy skulls from previous hunts. The skulls of the animal were offered to the shrine deity just as the meat was offered to the king. Such a parallel between the act of paying obeisance to the king and to a deity has been more fully topicalized by Røkkum (1998, 2006). What we thus can conclude from the near past is not a worship of the dugong itself, but rather of a spirit object (such as the *Nirai Kanai*) evoked during the annual harvest festival. If the dugong had itself been the enshrined deity, it is not really thinkable that it would have had its backbone broken or its caudal fin cut before being beaten to death. One might raise the objection that the Aragusukuans were forced by the royal authorities to do just that. This is correct, but the method for killing the dugong seems to have been prevalent all over the archipelago.

Even the *Omoro Soshi* literature (different from administrative records) surviving from the Ryukyu Kingdom period tell about the hunt – its joys in fact – but, admittedly, also about some ambivalence caused by the dugong’s human-like features.

It was only with the downfall of the Kingdom at the end of the 1870s that the dugong hunt became a free-for-all. The population numbers suffered as a consequence. Blast fishing in the aftermath of the Second World War caused another reduction of the dugong population; perhaps the final blow to a sustainable stock. The dugong was already too rare a species to be specifically targeted, but on the occasions that the dynamite burst brought a dugong up to the surface, there was hardly any regret. If the dugong had been a sacred animal, we would probably have had narratives about the doubts people had about killing it.

So the dugong became an object of cultural value because it was killed for paying taxes and for food and for obtaining material for the carving of ivory objects. A description of its significance for the people of the Ryukyus would be skewed by simply listing its possible mystical attributes. If put into writing by western scholars, such focus on esoteric folkloristics to create an association between a people and an animal would probably be tagged negatively as “orientalism” or “ethnic exotification.” The dugong was not held in awe by people of the Ryukyus in general. It has not been venerated as a deity, although some Ryukyuans may have thought about it as having supernatural qualities. The possibility of divinity has been raised, however in view of the following facts: (a) the role of the dugong in a creation story, (b) oral tradition carrying motifs of dugong supernatural qualities (a rewarding or punishing entity, an entity with access to the deity of a subaquatic terrain, the *Nirai Kanai*), and (c) the association of the dugong with places of worship, specifically, worship of the *Nirai Kanai*. In all three instances there is a positive correlation; the dugong is associated with stories of origin, with stories about otherworldly appearances. All the same, the dugong is not a deity or totemic animal to the Okinawans. It would be entirely wrong to infer that the dugong has a status for Ryukyuans similar to the status the sacred cow has for people in India. It would be nonsensical and even appear offensive to write an introduction to Okinawa with these words: “The ancestors of the people in these islands prayed to the sea-cow.” It even takes some effort of investigation to draw the conclusion that it might have been thought of as having supernatural qualities by *some* people inside the island chain of Ryukyu. It can be added that other animals, as well, figure in myth and in ritual as sacrifices – for example, chickens, cats, pigs, snakes,

crows, cattle (Røkkum 1998 and 2006). But even in the case of people claiming that they “worship” a slab of sacrificial pork, is there any fair reason to assume that the pig is an animal with mystical attributes?

In accordance with what has just been said, a material culture associated with the dugong – as exhibited in the visited museums – is a culture of hunting. Hence, if the dugong had not been threatened with extinction, there might have been good reasons to *allow* hunting in order to preserve the folkloric memories, the knowledge of its behavior, and the technology needed for a successful catch. The cultural argument about the preservation of a “way of life” is deployed by both Japan and Norway precisely for countering the demand for a total ban on whale hunting.

For example, in the main islands of Japan, only a very few coastal villages have a tradition of whaling. The number of Japanese who have tasted whale meat is dwindling. Yet several Japanese have noted that they are thankful for the whale meat they had for school lunches during the early post-war years. People in these marginal villages still have a sense of gratitude for the bounty received from whaling, so they practice memorials and sacrifices for the repose of whale souls. The parallel to Okinawa is striking: (a) whaling is not a central activity of Japanese society, but when it becomes an issue of Japan (joined by Iceland and Norway) against the rest, it takes on importance for the entire nation, and (b) Buddhist values endorse hunting the animal; it is permissible given the performance of memorials for the repose of its soul. The view that the killing of the whale should be prohibited due to the role it plays in ritual has not been encountered.

Despite the alleged scientific underpinnings, the Japanese and the Okinawans, in particular, may have nominated the dugong as a species worthy of preservation more from the point of view of its cultural significance than from the point of view of a global assessment of the viability of the species. It is typical for choices that involve values and sentiments that they are difficult to retrace from, for example, the following vantage point : Why did the Japanese nominate the dugong and not, for example, the whale? The easy answer would go as follows: Given an international dispute on whaling, it would be contrary to the official Japanese stance that the minke whale is not a threatened species to designate it as “a rare creature of the world.” Only with the minke stock on the brink of dramatic reduction would we expect that the cultural argument, which is persistently used by the Japanese side in this controversy, to have an effect on legislation. The cultural argument is as follows.

The linking of culture with environment is quite articulate in Japan; it is an intellectualist undertaking, a way of reflecting on how it is to be Japanese. However, the general idea of one or a few, select, natural species appointed to serve as emblems of broader identities is well-known, and not limited to societies with strong links to their past. These are choices, which – unlike pure choices of preservation based on biological assessment – are motivated by not so crisp values and sentiments. Designation of one or the other species as worthy of nomination under a legal scheme is, unlike the case of red listing according to criteria of relative extinction, not a matter of scientific assessment. That is probably why there is a lacunae in motives for the special status accorded to the dugong. For the present purpose – not being able to trace and recapitulate the discussions which preceded the nomination of the dugong for status as a “monument” – we simply have to accept the dugong was designated along with other zoological species in the Ryukyu Islands *without* the underlying cultural criteria being specified. But for the sake of de-exoticizing the issue and for the purpose of illustration of the generality of the Japanese case, one may consider the following element taken from US environmental legislation:

(a) From the Bald Eagle Protection Act of 1940: “This law provides for the protection of the bald eagle (the national emblem) and the golden eagle by prohibiting, except under certain specified conditions, the taking, possession and commerce of such birds.” The sentence encloses a cultural justification for protection, that is, the national emblem of the United States of America. A

memorandum (1994) from President William J. Clinton appends an additional cultural consideration: the collection and distribution of eagle feathers for Native American religious purposes. (<http://www.fws.gov/laws/lawsdigest/baldegl.html> accessed on February 19, 2010).

(b) The Grand Staircase-Escalante National Monument in Utah, USA, a 1.7 million acre area designated a “monument” in 1996. According to the Bureau of Land Management it “embraces a spectacular array of scientific and historic resources” (http://www.blm.gov/ut/st/en/fo/grand_staircase-escalante.html accessed on February 20, 2010.)

The first comparative example demonstrates the importance of cultural considerations or preservation legislation, for a nation and for an ethnic community. The second example demonstrates the similarity between Japanese and US legal thinking as far as the concept of a “monument” is concerned. In both instances we can see that the category carries a wider range of association than that of an artifact under a scheme of cultural heritage.

CONCLUSION

It is a special challenge for this study to pursue a lead given by one of the interviewees, [REDACTED] that the nomination of the dugong as a national monument was couched in scientific vocabulary although the motivation behind it might have been cultural.

The designation of the dugong as a natural monument was made in Okinawa during the postwar period of US administration. Nonetheless, it is not unrealistic to assume that legal thinking among the Okinawan elite at the time might have been inspired by Japanese prewar standards for reserving a “monument” status for natural species found important for the collective identity, phrased in accordance with the theoretical view espoused by Berque (1992), as a collective *sensibility* (see section “Dugong as a Creature of Nature and Culture”). That, however, does not mean that the nomination necessarily mirrors popular opinion, but rather the other way around: that a perception of the significance of the species is shaped as a *consequence* of the nomination. The idea of a protected status is not just a scientific concern but also a concern about cultivating a collective perception about self and nature, as topicalized under the early heading in this report: “Dugong: A Creature of Nature and Culture.” The issue raised through this attention is that a Japanese intellectualist tradition, which also might be considered a wave of cultural nationalism, is concerned with what elements in nature mean to the Japanese. Protected status from the point of view of culture is communicated to the public as the importance to the nation of some species found within the boundaries of Japan. The declaration of special status makes long-term preservation a priority, but it does not necessarily result in a call for conservation measures. This priority on communicative value, that is, the declaration of status, might still be the case in Japan. As exemplified by a view quoted in an article in *Stars and Stripes*, August 15, 2009, reproduced by National Geographic News: (http://news.nationalgeographic.com/news/2007/08/070823-dugongs_2.html [accessed November 15, 2009]): “The newspaper ... quoted Ministry of the Environment spokesperson Harumi Nakajima as saying the listing is meant simply to inform the public that dugongs are at risk.” Here we see the protected status is helpful in *saying* something about a species even if it might not be very helpful in *doing* something about it.

Communicative content is also an issue to consider when it comes to the case itself of building a replacement facility off the shore of Henoko Bay. A great number of Okinawans are probably *seeing* this as a threat against the viability of what little is left of a dugong stock. Scientific evaluation of the risk to remaining dugong individuals may go one or the other. Yet from an anthropological point of view focused on communication, it is likely that the dugong has already become a symbolic rallying point that summarizes a sentiment of resistance against threats to environment and cultural values. In the current

situation of debate about the construction of the Henoko offshore military facility – a sea mammal, the dugong, is threatened with extinction and so, as the argument goes, is also the cultural identity and knowledge associated with it. For the Japanese in general (including those who may never have tasted whale meat or visited a whaling village) another sea mammal, the whale, also takes on the role of a marker of cultural identity. This happens when an international situation, conservation measures for example, imparts the notion to the Japanese that it is we the Japanese against the world.

This report concludes that the dugong carried cultural significance for people in the Ryukyu Islands prior to its legal designation as a monument. It would have been a moot point to list each item included in this report according to a “yes” or “no” as to the issue of cultural significance. Cultural significance exists in a case where the following provision can be documented: (a) oral traditions containing religious motifs such as creation stories and narratives about supernatural qualities or events, and (b) material and natural matter associated with subsistence activity, such as hunting and worship. An important task in this report has been to try to recreate the way this significance was actually achieved.

IX. SUMMARY AND EVALUATION

The last chapter sought to draw together the various strands of evidence our research uncovered regarding the dugong and to derive from them an anthropological understanding of how the dugong became significant in Okinawan culture and the extent to which the dugong has significance in recent Okinawan culture. In this chapter we summarize the results of the research and discuss how they answer the questions posed in the original scope of work. This is followed by a summary of potential cultural impacts of the FRF project and potential mitigation measures.

The dugong was designated a natural monument by the Okinawans in 1955 and by the Japanese in 1972 because, while not endemic to Japan, it is a well-known characteristic Japanese animal that was increasingly rare in the waters around Okinawa. The documents related to its designation as a natural monument provide some indication of why the dugong was considered biologically distinctive to Japan, particularly to the Ryukyu Islands. The dugong is an animal with a limited range in the tropical and subtropical waters of the Indo-Pacific with the Ryukyu Islands forming the northern boundary of its range. Except in the seas around Australia, and to a lesser extent the Red Sea, it has become very rare. In some of the waters around the Ryukyu Islands where it was previously hunted, it is no longer seen, and the remaining population off the east coast of Okinawa probably numbers fewer than 50 individuals. It is this aspect of the dugong as one of the rarest animals in the world and in danger of extinction that prompted its nomination to be designated a natural monument first in the Ryukyus and then in Japan.

While the biological aspects are clearly prominent in these documents, some of the cultural experts we interviewed, especially [REDACTED] have suggested that there were also underlying cultural reasons why the dugong was designated a natural monument, even if these were not stated explicitly. The only cultural basis stated for its designation is found in the inventory of cultural properties where it is noted that the dugong is often considered the model for the legendary mermaid, an imaginary creature that is the focus of many Okinawan folk tales. Its association with the mermaid was probably one of the factors helping to make knowledge of the seldom-seen dugong more widespread in the past than it might otherwise have been. But, as an animal whose justification for being designated a cultural property is that it is a characteristic Japanese animal, one would expect that there must surely be deeper and more extensive cultural reasons underlying its nomination.

This study has examined the archaeological evidence, historical documents, and traditional folk tales, songs, and rituals to delineate the role of the dugong in Okinawan culture and what factors, beyond its biological distinctiveness, might be the basis of its designation as a cultural property. Through a thorough review of the background literature – Okinawan, Japanese and English – and a series of interviews with cultural experts and dugong specialists, the research team sought to define the significance of this animal species in Okinawan culture in the past and at present. As discussed in Chapter II, the interview process was initiated with a list of informants known through various sources to have knowledge about topics relevant to the project. Over the course of the interviews, the list was expanded as the persons interviewed suggested additional experts who might be able to augment the information about the dugong in their areas of expertise. Based on these two avenues of research, the study has uncovered information on the ways in which the dugong was used in the prehistoric past, its significance as a species reserved for the king in the historical period of the Ryukyu Kingdom, and its place in traditional Okinawan folklore.

The dugong's role in Okinawan rituals is less well-defined, given the limited information in the published literature and the reticence of ritual specialists and participants to divulge information about these rituals. It would almost certainly have been difficult to obtain additional detailed information about these rituals directly from cultural practitioners without a long period of research on Okinawa and even then the information obtained may have been limited because of the secretive nature of such rituals. Even local researchers specializing in folklore and ritual, such as Mr. Maeda (interview, October 2009), have noted the difficulty of obtaining such information. Nevertheless, based on the information from some of the cultural experts interviewed (who had seen or participated in these rituals or obtained some information from participants) and previous research conducted by the project cultural anthropologist Dr. Røkkum, this study accepts the importance of the dugong in rituals that are still held in coastal locations on Okinawa and the smaller Ryukyu Islands. Additional information would have deepened our understanding of the dugong's ritual role, but, in the opinion of the authors, would not have substantially altered the conclusions of this study.

The results of our research are summarized below and then discussed as answers to the three primary research questions stated in the SOW (Chapter II).

CULTURAL SIGNIFICANCE OF THE DUGONG

The results of the research indicate that the dugong, since at least the period of the Ryukyu Kingdom and perhaps earlier, has had a traditional role in Okinawan culture as something more than just meat to be eaten and a source of bone material for making artifacts. Exactly what this role has been and how significant it has been is not always clear and, as is frequently the case with cultural beliefs, incorporates a fair degree of ambiguity. In Chapter VIII we have tried to extract from the various written sources and our interviews an idea of how the dugong has been viewed by the people of the Ryukyu Islands through history and into the present. The opinions expressed by the cultural experts that were interviewed ranged from the view, at one end of the spectrum, that the only value that the dugong has had for Okinawans is that of being something good to eat to the view that the dugong is a sacred animal, even a deity. Our assessment, based on the folklore literature and on the views of our informants who specialized in folklore and ritual, is that the dugong, whether seen as an animal with some human traits, as a mermaid, or as a kind of "seahorse" on which the sea deity rides, is best viewed as an intermediary between the world of humans and the world of the supernatural, from which it brings messages, warnings, good fortune, and sometimes disaster. Because of this role, it is a somewhat special and significant animal in Okinawan traditional culture, not solely an ordinary animal to be hunted and eaten.

The dugong, although it is now recognized as a *national* monument, has always been much more closely connected to Okinawa than to the rest of Japan, where it is rarely seen. Thus the beliefs, folk tales, and rituals associated with it are distinctly a part of Okinawan identity and not of an overall Japanese identity. The dugong has played a special part in folklore and ritual for many coastal peoples in the Ryukyu Islands, especially on the small islands around Okinawa and in the Miyako and Yaeyama Island Groups. The special role of the dugong in ritual in Aragusuku was probably related to its being hunted only by Aragusukuan until the end of the Ryukyu Dynasty. As we have suggested in the last chapter, the more restricted the community in which a belief is held or a tradition followed, the more culturally important it is likely to be.

As we have also emphasized in the preceding chapter, the dugong's significance is not the same for all segments of society; the knowledge and practices that give significance to the dugong are not necessarily shared by all members of Okinawan society, but only by particular communities within that society. The understanding of scholars and ritual practitioners is different from that of the man-in-the-street. Its historical importance is probably best known only to scholars, researchers, or those with a keen

interest in the past history of the islands. To priestesses, shamans, other ritual specialists, and those who maintain past traditions in Okinawan villages and towns, knowledge of the dugong's role in traditional myth and belief is greater than that of Okinawans raised in modern cities and towns. Its importance to the descendants of people who lived on Aragusuku and to people who live in coastal communities near where dugongs once flourished, which formerly hunted dugongs, or which actively honor the sea deity is much greater than to the ordinary Okinawan living in Naha or Okinawa City. Finally, concern over the possible impacts of the construction and operation of the FRF has in recent years raised awareness of the role of the dugong in segments of the local population that may formerly had little interest in such a rare and unusual animal.

Part of the current research has focused on the evolution of the beliefs about the dugong in Ryukyuan culture. For prehistoric times the archaeologist is limited in the extent to which he or she can detect the cultural thinking, beliefs, and patterns that underlay the use of the dugong from the Early through the Late Shellmound Periods. The context of the finds, especially from early excavations, is not always clear. Most of the dugong remains found suggest the use of the dugong as meat to be eaten with the bones simply discarded after the meat was consumed. Occasionally, but usually not in great numbers, artifacts made from sea mammal bone (generally assumed to be dugong, since there is no evidence that other large sea mammals, such as whales and dolphins, were being systematically hunted) are found, usually made using rib bone. From the Early Shellmound Periods IV and V (ca. 4000-2300 BCE) ornaments as well as tools are found; most notable are the butterfly-shaped ornaments, usually made from dugong mandible. However, whether these are simply ornamental or created for magical or ritual purposes is not known. To some researchers these may be manifestations of cultural values attached to the dugong from prehistoric times, values that may have influenced attitudes toward the dugong throughout Okinawan history.

It is only during the Gusuku Period in historical times that archaeologists are able to see distinct contexts in which dugong bone is found. [REDACTED] (interview, October 2009)

[REDACTED] Rib bones were carved into arrowheads for the warriors of the castle lord or into dice or mahjong tiles for games played by the nobles. At Katsuren Castle dugong bone remains and artifacts were also commonly found within the castle precincts, but not elsewhere. At Shuri Castle, the bone remains suggest that dugong were butchered and prepared for meals on the castle grounds.

This distribution of dugong remains found during the Gusuku Period suggests that its use was largely restricted to the upper classes and may herald the special restrictions that came into force under the Ryukyu kings. Unfortunately, the lack of early documentation means that we know little of the origins of this special political use of the dugong. What is clear from documents dating to the later years of the Ryukyu Kingdom is that dugong meat, perhaps because it was rare, was special in that it was only to be eaten by the king or those to whom the king distributed the meat (emissaries of the Chinese emperor, the Satsuma lords, and the high-ranking Ryukyuan nobles).

The special nature of the dugong is also shown in the rules designating the inhabitants of the two Aragusuku islands as the only ones permitted to hunt the dugong. In this role, the dugong was both an offering to the king and the official tax the people of these islands had to pay. The special relationship was demonstrated in the annual harvest festival held each year at one of the shrines on Aragusuku in the expressions of gratitude to the dugong in song and ritual, and in the placement of dugong skulls in the shrine. Although no new skulls were placed on these shrines after dugong hunting ceased, the ritual celebrating the annual harvest continues today.

Thus, even as an animal to be hunted and eaten, the dugong was special, because its meat was scarce and came to be used as an offering or tax that could be given only to the king, binding the people

of the Yaeyama Islands to the Shuri court of the king of the Ryukyu Islands in a special way. In turn, the king's inclusion of dugong meat in feasts prepared for the emissaries of the Chinese investiture missions made these dishes special, even though not prepared differently from other typical Okinawan dishes. Dugong meat or skins may also have figured in tribute to the Satsuma lord. Thus, the dugong played a special role in tying far-flung parts of the kingdom to the central court, of connecting the Ryukyu king to those to whom he owed tribute, and thus of promoting the international trade and exchange on which the Shuri court relied for support.

The dugong's importance in Okinawan culture stems not only from its historical role as an animal whose meat was reserved for use by the king, but also its traditional role in folklore and ritual. As Isshu Maeda (interview, October 2009) has concluded, both in the tales of the mermaid and in the songs connecting the dugong with the sea deity, the dugong appears as an intermediary or interlocutor between the world of the gods, especially that of the sea deity, and the world of man. The dugong could bring good things, good fortune, warnings about a tsunami, and productiveness (including assistance in childbirth), but the dugong could also be the carrier of bad fortune, contagious disease, and punishment, often in the form of a tsunami, and was, therefore, feared.

Research suggests that the dugong was not worshipped as a god, but was revered and held in awe as more than simply natural. However, this reverence clearly did not prove great enough to prevent widespread killing of dugongs during the Meiji and Taisho Periods nor did it prevent incidental killings through blast fishing and the capture of dugongs in fishing nets after World War II.

BASIS OF THE CULTURAL SIGNIFICANCE OF THE DUGONG

The first question that the research team sought to investigate is: What is the basis for the cultural significance of the dugong in Okinawa?

The results of the research indicate that the dugong, since at least the period of the Ryukyu Kingdom to the present, has been perceived as holding a special significance in Okinawan culture and has a meaning, at least in some Ryukyuan communities, beyond that of a good meal. Its cultural significance is based on several aspects of Okinawan (or Ryukyuan) culture.

1. The dugong's importance in Okinawan culture stems first from its historical role as a special animal whose meat was reserved for use by the king and was served to the envoys from China when they arrived in Okinawa to collect tribute for the Chinese emperor. Chapter VIII included a detailed investigation of what was involved in the use of the dugong during the period of the Ryukyu Kingdom and what meaning the dugong had in this context. During at least the latter portion of the Ryukyu Kingdom Period (18th and 19th centuries) and probably earlier, only the inhabitants of Aragusuku were allowed to hunt the dugong. They in turn sent the dried and salted dugong meat to the Ryukyuan king in Shuri Castle for his use as their sole form of tax payment. The dugong, thus, played an important role both in cementing relations between the central government on Okinawa and some of the farthest outlying portions of the kingdom and in the conduct of the tributary relationship between the Ryukyuan kings and the Chinese emperor. It may also have played a role in the feudal relationship between the Ryukyuan king and his overlord, the ruler of Satsuma in Kagoshima, but this is less well documented in the historical accounts.
2. The dugong is an important element in the legends concerning the origins of the Okinawan people. In all reported versions of the tale about the man and woman who

were the progenitors of the Okinawa people, the couple see dugong (*kaiba*) swimming and mating offshore. In one version this is how they first learn about sex and thus become able to produce offspring. In another version the sight gives them a sense of shame and causes them to put on clothes to hide their private parts. Whatever its role, the dugong is closely connected with the legendary origins of the Okinawan people.

3. The dugong is frequently associated with the mermaid in folk tales related throughout the Ryukyu Islands. These vary in particulars from island to island or even place to place on Okinawa Island, but in general they contain basic elements in common. In these tales, the mermaid either brings good fortune by warning of an approaching tsunami or else simply brings the tsunami without warning causing the destruction of all. In the beneficial tales, a dugong/mermaid is caught by a fisherman, weeps and begs for its life, is released, and in gratitude thanks the fisherman by warning him of the approaching tsunami, allowing him and his family to escape. In the tales of destruction the mermaid/dugong may be hung up to dry, salted, boiled, and eaten and then the coastal village is inundated by a tsunami. The identification of the dugong with the mermaid is not universally recognized by all researchers or Ryukyuan villagers, but is accepted by most scholars in this area.
4. The dugong played a part in rituals conducted by coastal communities, primarily on the smaller islands off Okinawa, on other small islands in the Ryukyus, and particularly on Aragusuku. Rituals that are still performed or that were held until at least recent times on several islands invoke the dugong in song during the festivities. Many of these ceremonies are held in honor of the sea deity *Nirai Kanai*. Some songs tell of how the sea deity leaves her home amid the cracks and fissures of the reef and rides the dugong to shore and then back out to sea again. On Aragusuku, rituals were held in the past in which dugong were offered and their skulls then left at the sacred ritual place. Although dugong (now extinct or extremely rare in the surrounding waters) is no longer used in these rituals, the harvest festival is still conducted annually at the shrines on the two Aragusuku islands. Outsiders are barred from observing these secret ceremonies, so it is uncertain how significant the dugong is to these rituals.

THE RELATIONSHIP OF THE DUGONG TO SPECIFIC PLACES

The second question investigated asks: Is the cultural significance ascribed to the Okinawa dugong tied to specific place names or settings?

As discussed above, the dugong is of more importance in some Okinawan communities than in others. These are those communities that are located along the coast and particularly those where the dugong is (or formerly was) seen offshore and in which fishing is conducted.

Many of these communities have place names referring to the dugong or to the seagrass beds on which the dugong feed. These communities in northern Okinawa include, Ogimi in Ogimi Village, Henoko in Nago City and Kouri-jima in Nakijin Village. In all these communities there are rituals in honor of the sea deity, and songs performed during the festival refer to the dugong. In Ginoza Village there are place names associated with the dugong, but, despite intensive investigations of traditional folk stories and songs by village researchers, no local folk tales associated with the dugong have been identified. Other locations with place names relating to the dugong and seagrass beds are Itoman City on

Okinawa and Kouri-jima. While it is not known if there are rituals and songs relating to the dugong in Itoman, this was a major fishing community in early modern times, one from which large-scale hunting of the dugong was conducted in the southern Ryukyu Islands. Like the areas in northern Okinawa, there are rituals and songs performed on Kouri-jima that involve the dugong.

In Uruma City along the Katsuren Peninsula in Kin Bay, there are also place names that reflect feeding grounds for the dugong. On the islands off the Katsuren Peninsula, rituals honor the sea deity and the dugong. Inhabitants of all these islands would have had direct access to dugongs living in Kin Bay. On Tsuken-jima the ritual took place annually until World War II. Traditionally, the hunting of a dugong could take place only prior to the festival and dugong meat was offered to the village spirit in the sacred grove and then distributed among the members of the community. The form of the ritual is still observed, but sea turtle has replaced the dugong. On Hamahiga-jima a ritual in honor of the sea deity continues to be held each year and includes a dugong song. On Henza-jima there is an ongoing festival of the dugong, during which a song to the dugong is sung.

For the Yaeyama and Miyako Island Groups, there are no known place names in the literature related to dugong feeding grounds, although this may be the result of a lack of place name research rather than the absence of such names. Mr. Maeda says that his research in the Yaeyama Islands has discovered oral traditions of such names. While specific places relating to the dugong are not known, these islands are known historically to include areas where dugong lived and where they were hunted. On these islands it is primarily in rituals and songs, one going back to the 16th century, that the cultural value of the dugong is expressed. The prevalence of mermaid tales in these islands may also be a sign of the importance of the dugong, although some islanders considered the dugong and the mermaid to be separate creatures.

Perhaps the closest connection with the dugong is seen in Aragusuku, in the Yaeyama Island Group. The role of the inhabitants of the two small Aragusuku islands in procuring dugong for the king in the past and the continuation of the annual harvest ritual that formerly celebrated the completion of the hunt make this a place of great importance in the relationship between the peoples of the Ryukyu Islands and the dugong.

THE DUGONG AND MODERN SOCIETY

The final area of investigation focused on how the historical cultural significance of the dugong is manifested in modern society. Topics to be considered included whether the cultural significance of the Okinawa dugong is tied to any cultural practices, such as festivals or rituals, whether these practices are conducted throughout Okinawa or whether they are more local in occurrence, and what the nature and time depth of these practices might be.

The knowledge of the role of the dugong in Okinawan history is probably confined to a small segment of the Okinawan community (historians, folklorists, and others who are concerned with the details of Okinawan history) and is probably not widespread among most Okinawans. These specialists - through their knowledge, research, and writings - help keep alive the traditions and folk beliefs about the dugong that might otherwise be lost in contemporary times. It is to these folk beliefs and stories that contemporary Okinawans who are not specialists but who are concerned about the preservation of the dugong turn in seeking confirmation of its significant role in Okinawan culture.

As discussed above, the dugong is tied to festivals and rituals that are still held in at least a few coastal communities on Okinawa, including Henoko, in several communities on small islands off the coast of Okinawa, on other islands in the Ryukyu chain, and on many of the islands in Sakishima. In

modern society, the dugong is probably still culturally most important to the islanders of the Yaeyama Island Group, where the dugongs were obtained for the Ryukyu king on Okinawa. On these islands there is a society, including former residents of the now nearly abandoned Aragusuku village, who participate in an annual ritual harvest ceremony still held in Aragusuku today. Here the islanders maintain a continuing tradition that probably goes back to the days of the Ryukyu Kingdom. While fresh skulls of dugong are no longer available as offerings, songs and prayers still recount the importance of the dugong.

The time depth of these songs, rituals, and practices is uncertain, but it seems likely that they date back to the period of the Ryukyu Kingdom. At least one song in the *Omoro Soshi* dating from 1531-1623 sings about preparing nets for hunting the dugong and catching hundreds of turtles and hundreds of dugongs. A mermaid story told in Gushikawa in Uruma City links the tale of the dugong and the tsunami with an actual tsunami that occurred in 1771.

In concluding this review of the dugong's cultural significance, it is clear that the dugong has had significance in Okinawan culture beyond simply being an animal that is hunted for food or other products.

CULTURAL IMPACTS OF THE FUTENMA REPLACEMENT FACILITY ON THE DUGONG

As shown in Figure 4, the proposed area to be covered by the FRF will include both the land in the northeast corner of Camp Schwab and portions of the reef extending south and east from the current coastline. Extensive fill will be placed on the reef to raise the surface above the water level and allow the construction and use of two runways. Seawalls with berthing facilities will be constructed to protect the airfield (Okinawa Defense Bureau 2009).

Based on the results of this study, the construction and operation of the FRF should have little direct adverse impact on the cultural significance of the dugong or on traditional cultural practices associated with the dugong. Since the area in which the FRF will be built, on Camp Schwab and on the reef immediately offshore from the camp, is already off-limits to the general Okinawan population, no cultural events or social/religious ritual ceremonies involving the dugong take place in these areas. Because of the dugong's rareness, its status as a GOJ endangered biological species, and its designation as a protected cultural property, hunting has not taken place, except perhaps surreptitiously and only occasionally, since the immediate post-war years. Because hunting is now illegal, the FRF will not directly affect hunting.

Rituals in honor of the sea deity are still held annually in Henoko Village adjacent to the south boundary of Camp Schwab and these may involve the dugong in some form. The dugong is at least mentioned in songs performed during the rituals. It is possible that temporary construction activities and later operational activities could disturb the performance of these rituals; for example, if nearby flight paths are used and/or excessive noise occurs during the periods when the rituals are being performed.

The FRF construction will directly impact a traditionally named place. Seagrass beds in the vicinity of Henoko are called *Jangusanumii* (the dugong's bed). The reason for this is that the seagrasses are the *Jan's* ("dugong" in local dialect) favorite food and that depressions in these areas are places in which the dugong rests. These seagrass beds extend into the area to be impacted by the FRF project. Feeding trenches created by dugongs were observed within these seagrass beds in December 2000 (Okinawa Defense Bureau 2009; Fig. 3.3 and 3.4). Although the beds have been named by the people who lived in these coastal communities, the project research found no indication that any culturally important activities are conducted in or associated with this area.

In one sense, the planned construction of the FRF has had the indirect effect of creating a much greater awareness of the cultural value of the dugong in at least segments of the Okinawan population as well as in its endangered condition and thus might indirectly benefit preservation efforts to protect this cultural property.

The most likely cultural impacts of the FRF will be indirect rather than direct and will stem from the biological harm that might be done to the dugong population as a result of the construction and use of the airfield in an area where dugongs feed (or at least fed in the past). The dugong has for long been so scarce in the waters around Okinawa and totally absent from the waters around the Sakishima Islands that as an animal it no longer plays any physical role in Okinawan ritual or in Okinawan cuisine. But the dugong does appear in Okinawan folk legends, songs, and rituals that are recited and performed at present. If the dugong population is lost, then it is likely that those traditions that help create Okinawan identity will become increasingly meaningless to future generations. Even though the dugong as a scarce and endangered species no longer plays an active role in any rituals (that is, it is no longer hunted, offered as a sacrifice to the village gods and sea deity, and its meat distributed afterwards), it is still referred to frequently in the performance of annual rituals.

Thus, our conclusion, based on this study, is that the disappearance of the dugong population from Okinawa would have an adverse cultural impact. Thus, biological conservation and management to help preserve and protect the species, as discussed below, are related directly to cultural protection of the dugong.

For centuries the Okinawan dugong population has been decimated by human activities, and is currently highly endangered. There can be little doubt that the direct killing of about 300 dugongs between 1894 and 1916, incidental kills of unknown numbers from blast fishing after World War II, and the deaths of at least 17 dugongs in fishing nets between 1980 and 2000 have had catastrophic impacts on the population. Although no reliable abundance estimates exist, the population is generally believed to number fewer than 50 individuals.

The implication of the biological information reviewed in Chapter III is that the FRF has the potential to impact the dugong population and could affect its recovery to sustainable numbers. It is possible that the construction of the FRF will limit further the range and number of an already rare and endangered species and perhaps hinder attempts to bring some recovery in the existing numbers. Recovery is important since it is not certain that the current population is sufficient for the long term viability of the population. Since the dugong has become extinct in the ocean waters around the Sakishima islands, the dugong population around Okinawa Island is the last remaining population in Japan. These potential effects have also been reviewed and summarized in the draft EIA.

In Henoko Bay, the FRF will directly impact seagrass beds, a natural habitat and food source for the dugong. While the studies done for the FRF (Okinawa Defense Bureau 2009) failed to reveal any dugongs living in Henoko Bay and its immediate vicinity, it is possible that these exist but were not present or seen when the counts were made. Feeding trails were observed within these seagrass beds in 2000. Other researchers, such as Shirakihara et al. (2007), have pointed to Henoko as a locus of dugong activity. Regardless of whether they are currently being used by dugongs, destruction of seagrass beds along Henoko Bay will limit areas that could provide habitat in the event of recovery and increase in the current dugong populations. While this study has argued that other factors, such as accidental catches in fishing nets, may be a more important cause of the decline of the species and its possible extinction, it is also clear that the FRF has the potential to contribute to this decline.

The feeding areas of the dugongs that live across Oura Bay to the east will not be directly impacted by the construction, but noise from the construction and operation of the FRF could still affect

the dugongs in that area. The presence of several dugongs in the northeast part of the bay has been documented in the EIA studies. Although there are few detailed studies of impacts of noise on dugongs, based on what is known of other species of marine mammals (including the closely-related manatees), there is reason to be concerned about the effects of noise (especially in the lower frequency range, to which dugongs appear more sensitive). Marine construction activities are generally very noisy, and some types of noise that are commonly produced (e.g., impulsive sounds from percussive piling or underwater detonations) can be particularly harmful, and must therefore be managed and mitigated carefully. In the longer term, the operation of the airfield will also result in continuing increased noise levels from aircraft taking off and landing.

Evaluating the actual overall effects of the FRF at this point is not possible, as the detailed studies that could provide baseline information that we need have not been conducted. Previous surveys have not used consistent methods; observer experience and competence can not be assured (especially in the GOJ's EIA study - Okinawa Defense Bureau 2009); and sightings and survey effort have not always been used to provide repeatable, quantitative measures of density or abundance of dugongs that can measure trends. In addition, potential seasonal differences have not generally been accounted for. Because of a lack of these scientific state-of-the-art studies (i.e., recognized as among the best available and using methods that are currently accepted by marine mammal biologists) that would inform us about the overall size and status of the dugong population in Okinawa, the viability of a population of this size, and the numbers of dugong using the FRF area, it is impossible to determine accurately the extent of the adverse impacts that might be anticipated. However, it is possible, from the review of literature conducted, to establish that impacts on the dugong population can be expected.

Finally, it is necessary to consider a final point. In the previous chapter we talked of the dugong as an inalienable animal (one that cannot be lost) to Japanese culture. What we were getting at in that discussion is the fact that by designating the dugong a cultural property, the GOJ placed it in a category requiring preservation and protection. Regardless of its cultural significance (which will only be minimally affected by the construction and use of the FRF), the dugong as a biological species has been designated a natural monument, placing it in a category where the ultimate aim is the preservation of the species. Thus, however much weight is put on the arguments about its cultural significance (and, as we have pointed out in the last chapter, such significance cannot be measured and evaluated against an absolute standard but only as an element of the perceptions and values of the society concerned), the English translation of Article 1 of the Law for the Protection of Cultural Properties (GOJ 2004) seems to mandate the preservation of the species. Before undertaking any projects that might potentially harm the species or otherwise work against its preservation, an agency, organization, or individual undertaking the action should consult with the Agency for Cultural Affairs and take into consideration the potential effects of its actions.

RECOMMENDATIONS

MITIGATING CULTURAL IMPACTS

Based on this study, which has looked at the cultural importance of the dugong in Okinawan culture, the following are suggested as possible cultural mitigation measures related to the construction of the FRF.

The Marine Corps should be sensitive to the schedule of festivals and rituals that may occur in the village of Henoko or in other villages along the east coast of Nago City that might be affected by noise or other disturbances from planes flying in the usual flight path approaches for the reef runways.

Restrictions on operations during the periods for performance of such rituals would lessen impacts of the operation of the FRF on such rituals and increase good-will by demonstrating the concern of the Marine Corps for the culture of the island on which it is a guest.

On a more general level, the Marines could support local initiatives, particularly in Nago City, for preserving the memories and technologies associated with the dugong in museums and other facilities for research, publication, and exhibition. The Marine Corps could also help promote studies (without necessarily playing a lead role) that will result in more information about the dugong's cultural role. Such studies could include local studies of traditional place names, the preparation of informative exhibits on the dugong in local museums, and further collections of traditional folklore in municipalities where this has not yet been done. Exactly what the role of the Marine Corps might be would have to be determined as the projects develop: it might involve financial support, participation by Marine Corps employees or contractors, or simply permitting access to Marine Corps lands where this is needed for completion of the project.

This study has synthesized a significant amount of information about the cultural role of the dugong, but contains little information from ritual practitioners and healers, which might reveal additional cultural roles for the dugong or practices that involve the dugong. As Mr. Maeda points out, even for him as a local researcher, it can take extensive efforts and a considerable amount of time to obtain this information, which people are frequently reluctant to share. Research to obtain this information would probably need to be planned and implemented by skilled local scholars, but there might be ways for the Marine Corps to promote the completion of these studies and the preservation of this information.

To at least have a complete record of the dugong in Okinawan culture would be one important measure that could assist researchers and educators and would mitigate any adverse cultural impacts. The publication at a later date of the results of the research undertaken for this report, in which much information about the cultural role of the dugong has been compiled and synthesized, would be one step toward assembling such a record.

BIOLOGICAL CONSERVATION AND MANAGEMENT

The review of biological information conducted above makes it apparent that the main factors that have led to the catastrophic decline of dugongs in Okinawa are hunting (in the past) and by-catch in fishing gear. These factors have caused the loss of a large proportion of the population, but now that the population is apparently so small, habitat loss and degradation issues have also become a concern in its ability to recover to sustainable numbers. If it is accepted that preservation of the dugong as a viable species in Japanese waters is essential to avoid adverse impacts to its cultural significance, as indicated above, then any adverse effects of the FRF on the dugong's viability must be taken into account in the mitigation of cultural effects. While it is not the purpose of this document to engage in a detailed discussion of the mitigation of biological impacts, a few critical points will be raised.

It is primarily the responsibility of the Japanese and/or Okinawan governments to take appropriate steps to conserve the population. While a detailed assessment of the utility of specific biological mitigation measures for construction of the FRF is beyond the scope of this review, clearly an integrated management plan that examines each of the potential threats with objective scientific data, and deals with them accordingly, is the only way to preserve this dugong population. As a steward of areas that are used by the dugong, the Marine Corps should be a participant in such conservation programs. In the declarations by Ellen Hines and Adam Frankel [in the case of *Okinawa Dugong (Dugong dugon)*, *et al. v. Robert M. Gates, Secretary of Defense, et al.*], there was disagreement about whether aircraft noise from the operation of the FRF, once completed, would be a significant factor for the local dugong

population. While we agree with Dr. Frankel's general assessment that dugongs appear to adapt to acoustic stressors, we must remember the uncertainties in our knowledge, and the endangered status of the Okinawa population, and, accordingly, precautionary actions should be adopted.

Foremost is the need for a program of baseline biological and ecological studies of the dugong. The studies conducted for the EIA (Okinawa Defense Bureau 2009) provide little of value here, as there are questions about the experience of observers and the suitability of specific survey methods, and the surveys were not used to provide quantitative measures of the population's status. Without such a program, it will be difficult to impossible to assess the potential adverse effects of the FRF, develop appropriate mitigation measures, and evaluate the success of mitigation measures. A better understanding of the current status of the dugong population is needed in order to understand what impacts might be expected from construction of the FRF, and to determine if mitigation measures can reduce the impacts to acceptable levels. Therefore, a comprehensive evaluation of what mitigation measures are appropriate and needed, based on the best available scientific information, should be conducted before the project begins. The Marine Corps should initiate such studies before undertaking any actions that might impact the dugong population or its habitat. Most importantly these should be systematic studies employing state-of-the-art scientific methodologies.

Secondly, there should be a program of active conservation and management established for the waters offshore from Marine Corps bases. By active conservation, we mean a type of adaptive management in which ongoing monitoring results are used to adjust conservation measures to ensure that they are effective in protecting the population from undue impacts. In order for management to be successful, it is recognized that there needs to be active participation between governments and the people who are actually affected by the management policies. For example, the Australian Government has formally accepted this fact, and their dugong management policy involves the following components (Marsh 2009):

- ♦ The banning of commercial hunting,
- ♦ The replacement of shark nets with other forms of bather protection that do not harm dugongs,
- ♦ The establishment of a series of marine protected areas, such as the Great Barrier Reef MPA,
- ♦ Restrictions on vessel speeds and routes in important dugong areas,
- ♦ Limitations on the use of certain herbicides that are harmful to dugongs,
- ♦ A carcass salvage and examination program that provides feedback on mortality and biological samples,
- ♦ A long-term monitoring program involving the use of aerial surveys, and
- ♦ The formalization of a co-management scheme between government and the tribes of native peoples.

This strategy appears to have been successful, and overall dugong population numbers have been relatively stable in Queensland for the past 20 years (Marsh 2009).

For Okinawa, Uchida (2005; interview, November 2009) stated the importance of science-based research and a management program for Okinawan dugongs, and emphasized the need for different agencies to work together to understand the actual status of the dugong population. Kasuya (1999), through the Sirenian Specialist Group (an advisory group of marine mammal experts organized under the International Union for the Conservation of Nature and Natural Resources, IUCN), made a series of recommendations for management of Okinawan dugongs (fishing/mariculture restrictions, public awareness programs, etc.) and research (surveys, photo-identification studies, study of scientific specimens). There is a need to address threats and conserve deepwater areas used for daytime resting, shallow reef areas used for nighttime feeding, as well as the corridors between them.

Specifically for the Okinawan dugong, Marsh et al. (2002) suggested research including: aerial surveys and recording incidental sightings, detailed studies of seagrass beds, and socio-economic evaluations of closing the trap and gillnet fisheries. Management recommendations include:

- ♦ Establishment of a dugong ‘sanctuary’ to protect important habitat,
- ♦ The use of a rigorous EIA process for any future planned development in dugong habitat,
- ♦ Restriction or banning of harmful fisheries,
- ♦ Improvement of public awareness programs,
- ♦ Listing of the species on all appropriate endangered species lists, and
- ♦ The development of a long-term conservation plan for the population.

The EIA for the FRF mentions a number of mitigation measures being considered for reducing impacts on the Okinawan dugong (Okinawa Defense Bureau 2009). We feel it is premature to make a definitive list of the mitigation measures that would be appropriate, considering the uncertainties in our current knowledge. However, based on experiences in Hong Kong and elsewhere (see Jefferson et al. 2009), a list of potential mitigation measures that might be effective (i.e., a ‘laundry list’) is helpful, and we provide some start to that in this report. For instance, it is unclear whether night-time restrictions on marine construction activities would be important to protecting the dugongs of Okinawa from harm. Providing such a list of potential mitigation measures is an important first step for dugong management and conservation in Okinawa. The discussion of potential impacts and mitigation measures provided in the EIA study (Okinawa Defense Bureau 2009) was found to be only minimally useful, as the document did not cite appropriate literature, and did not place their recommendations into the context of our current state of knowledge (no matter how limited) on marine construction impacts and airfield operational impacts on marine mammals. Therefore, evaluations made therein regarding fill materials, red soil deposition, and vessel traffic impacts are of little value, and would need to be reassessed with a more stringent level of scientific vigor.

There, unfortunately, are no examples of similar construction projects affecting dugong or manatee populations that can be used as models for the development of a mitigation program. However, mitigation measures used for dolphins and porpoises in similar marine construction projects in Hong Kong should be examined (Jefferson et al. 2009). For instance, the use of a bubble curtain around noisy construction activities, such as percussive piling, can dramatically reduce construction noise and help to protect dugongs (see Würsig et al. 2000). Because the dugong seems to be sensitive to noise and to avoid nearshore areas during the noisier daytimes, there should be measures such as this to restrict noise and the spread of noise into the ocean waters during construction. In addition, once the airfield is operational, and, if further study indicates that airport operations cause significant disturbance to dugong feeding, then there might need to be restrictions on night use of the runways, so that the dugong can continue to feed at night. Even if there are no dugongs along Henoko Bay, the population across Oura Bay is still likely to be affected by the increased noise levels that operation of Marine Corps aircraft would bring. Monitoring of the dugong population off the east coast of Okinawa must continue after the airfield is in operation in order to record what effects there might be on those dugongs.

Because the FRF will destroy a portion of the seagrass beds that may currently be (and potentially could be) feeding and resting grounds of the dugong, it is recommended that mitigation be undertaken to replace these seagrass beds elsewhere on the Okinawa reef. Some discussion of this idea was previously made in the declaration of Michael D. Noah (in the case of Okinawa Dugong (*Dugong dugon*), *et al. v. Robert M. Gates*, Secretary of Defense, *et al.*), and we agree with his general assessment of the effectiveness of methods to control effluent from reclamation/dredging, and to transplant seagrasses as a mitigation measure. Mitigation strategies that involve increased protection of a species or biological community in other areas or to promote new habitat to compensate for measures that might harm a biological population in an area affected by a particular project have been developed in the US. For

example, in Hawai'i, to mitigate the effects of the rerouting of a road on Mauna Kea through habitat used by the endangered *palila* bird, a fenced-in sanctuary has been created in an area upslope to promote habitat for the *palila* by keeping out grazing animals. Something similar is being suggested here. There are areas along the reef that were formerly seagrass areas that have been damaged as a result of erosion run-off and other factors connected with modern development. The Marine Corps could, with the assistance of the local authorities, undertake the creation of new beds in such locations, covering an area at least as large as the area that will be impacted in Henoko Bay. This might also include establishing a dugong sanctuary in the areas of these newly planted seagrass beds. This may seem to be beyond the usual sphere of Marine activities, but there seems to be no reason why the Marine Corps could not either provide financial assistance and the expertise of their environmental and cultural specialists in planning and promoting these tasks. While this seems to be a promising avenue, clearly more study is needed of the applicability and feasibility of this approach.

To summarize, further directed work, both on the cultural and the biological sides, will be needed as the project to build the FRF goes forward. Most importantly, pre-construction-, construction-, and post-construction-phase dugong and seagrass monitoring programs should be undertaken to evaluate actual impacts, the effectiveness of mitigation measures, and to provide information for use in adaptive management of the dugong population. Further studies will be needed both to clarify the current biological status of the Okinawan dugong population and to develop and refine an appropriate set of mitigation measures to ensure the construction and operation of the FRF will not have a significant negative impact on the population. A detailed biological assessment, which would include a specific plan for biological monitoring of the population throughout the different phases on construction and operation, is a necessary next step. There is reason to believe that the construction of the Futenma Replacement Facility can proceed without having an overall adverse impact on the endangered population of dugongs in Okinawa, but this will require a well-planned approach that involves cultural sensitivity, adaptive management and state-of-the-art biological monitoring, and cooperation with the Japanese and Okinawan governments.

FIGURES

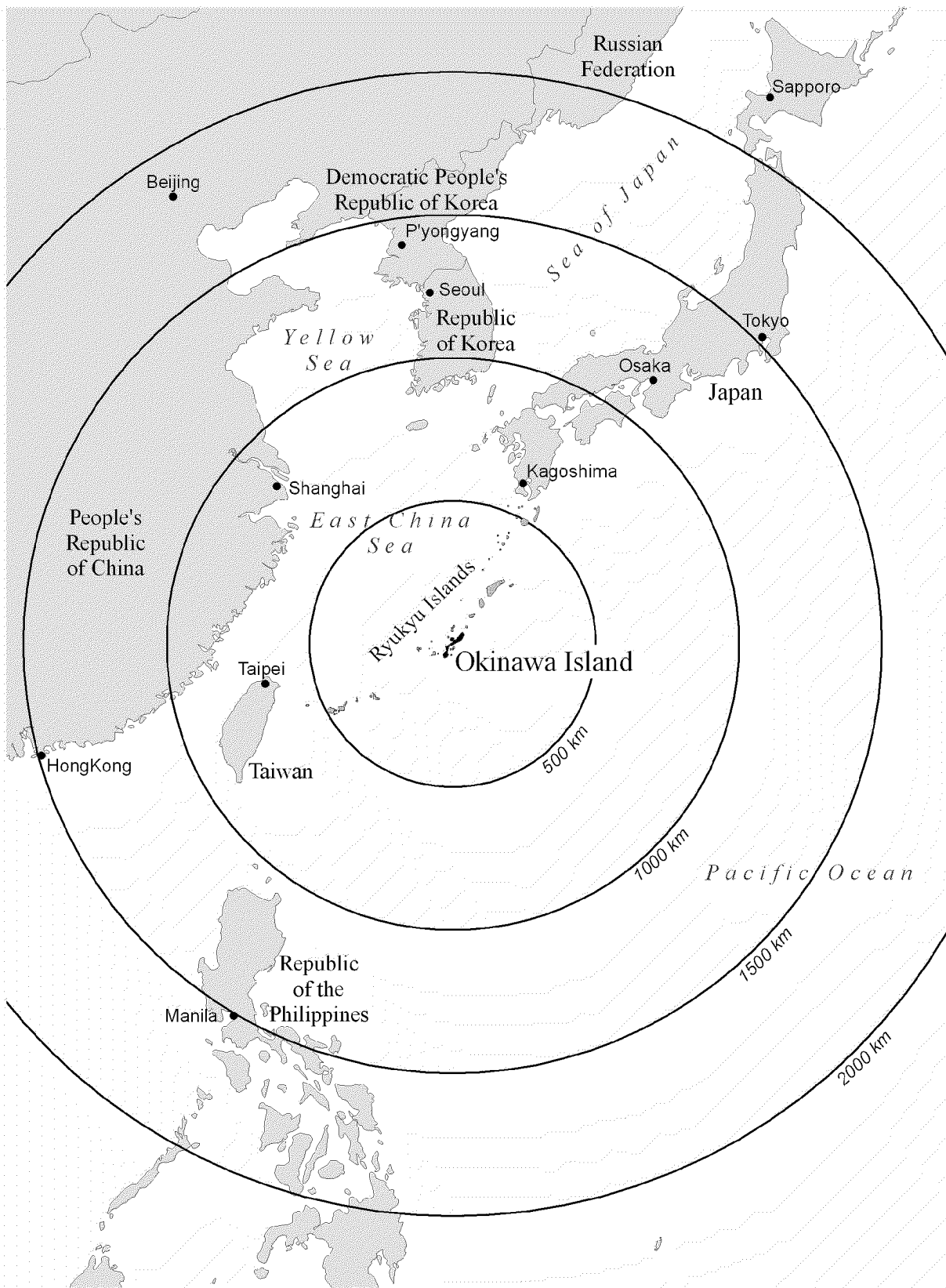


Figure 1. Location of Okinawa and the Ryukyu Islands in the Western Pacific.

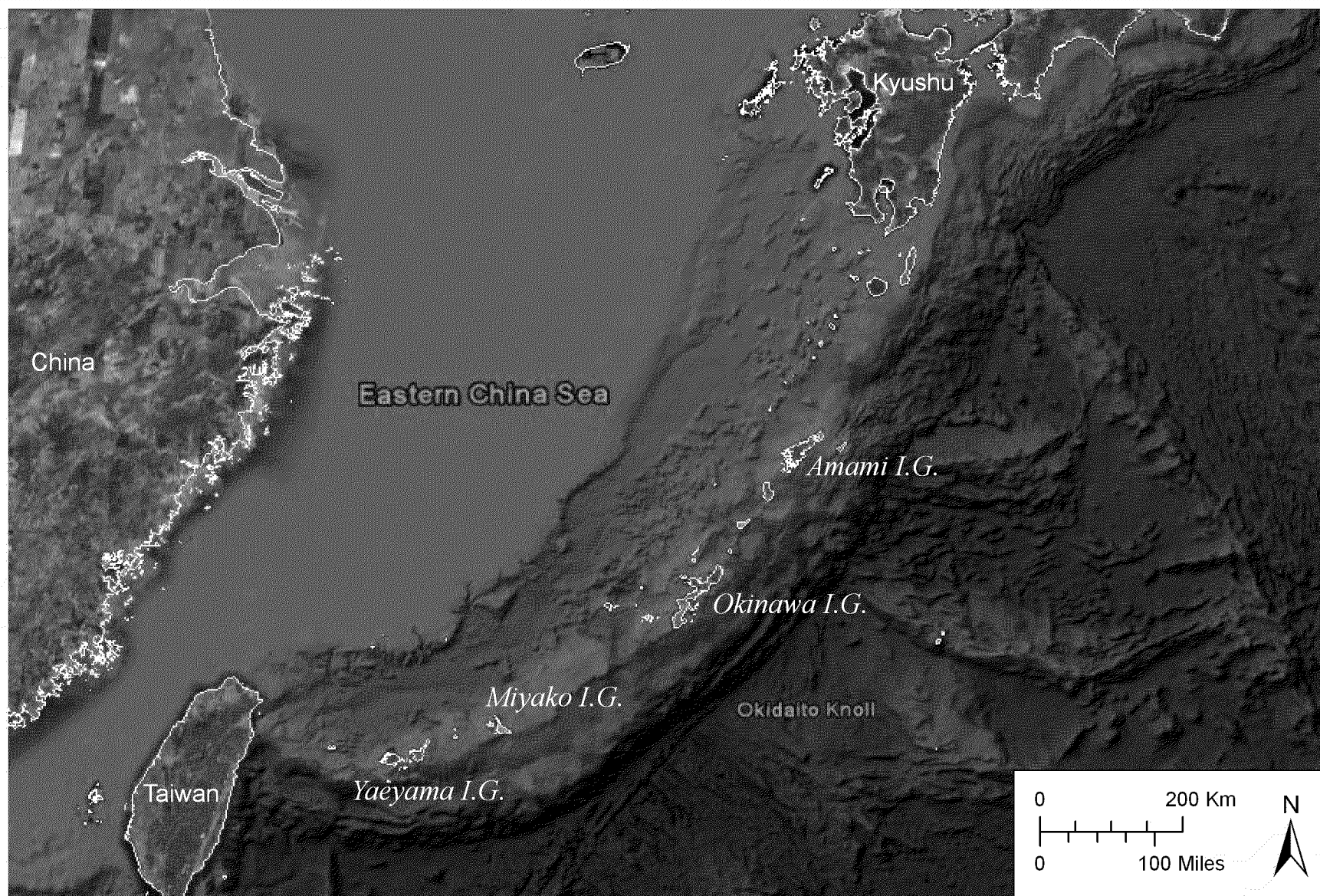


Figure 2. Location of Major Ryukyu Island Groups in Relation to Kyushu and Taiwan.

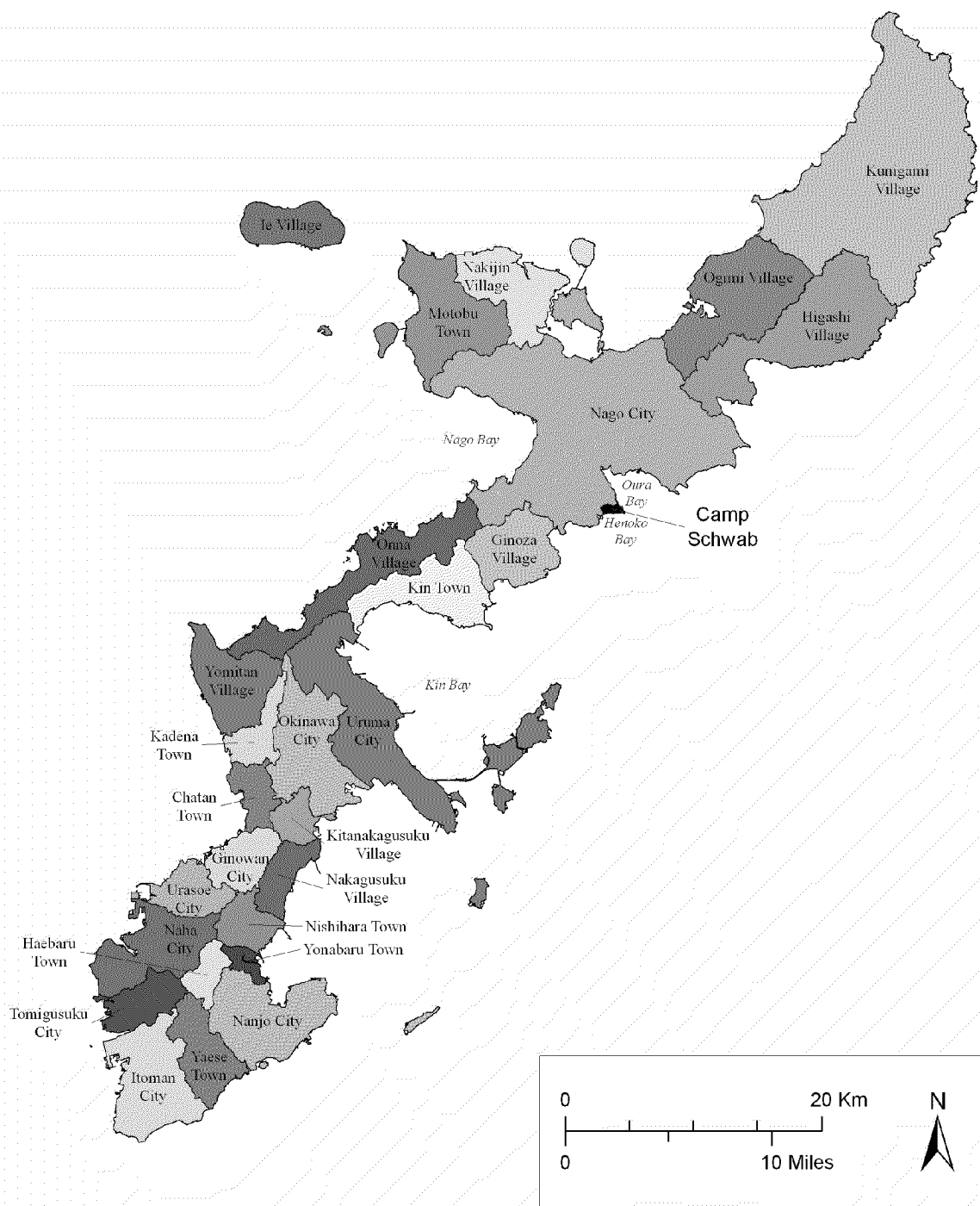


Figure 3. Map of Okinawa Island and Location of Okinawa Municipalities.

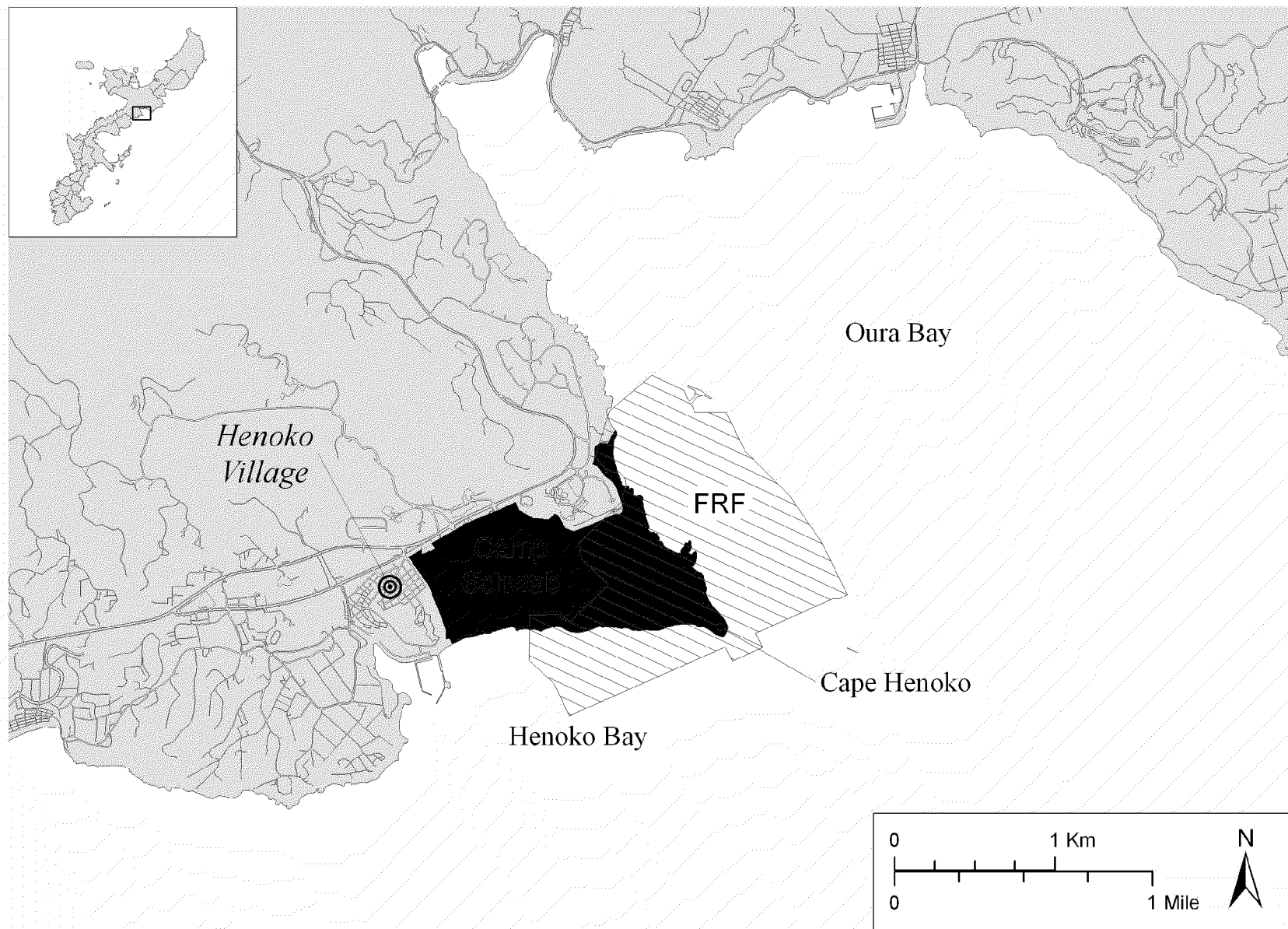


Figure 4. Location of Camp Schwab and the Proposed Futenma Replacement Facility.

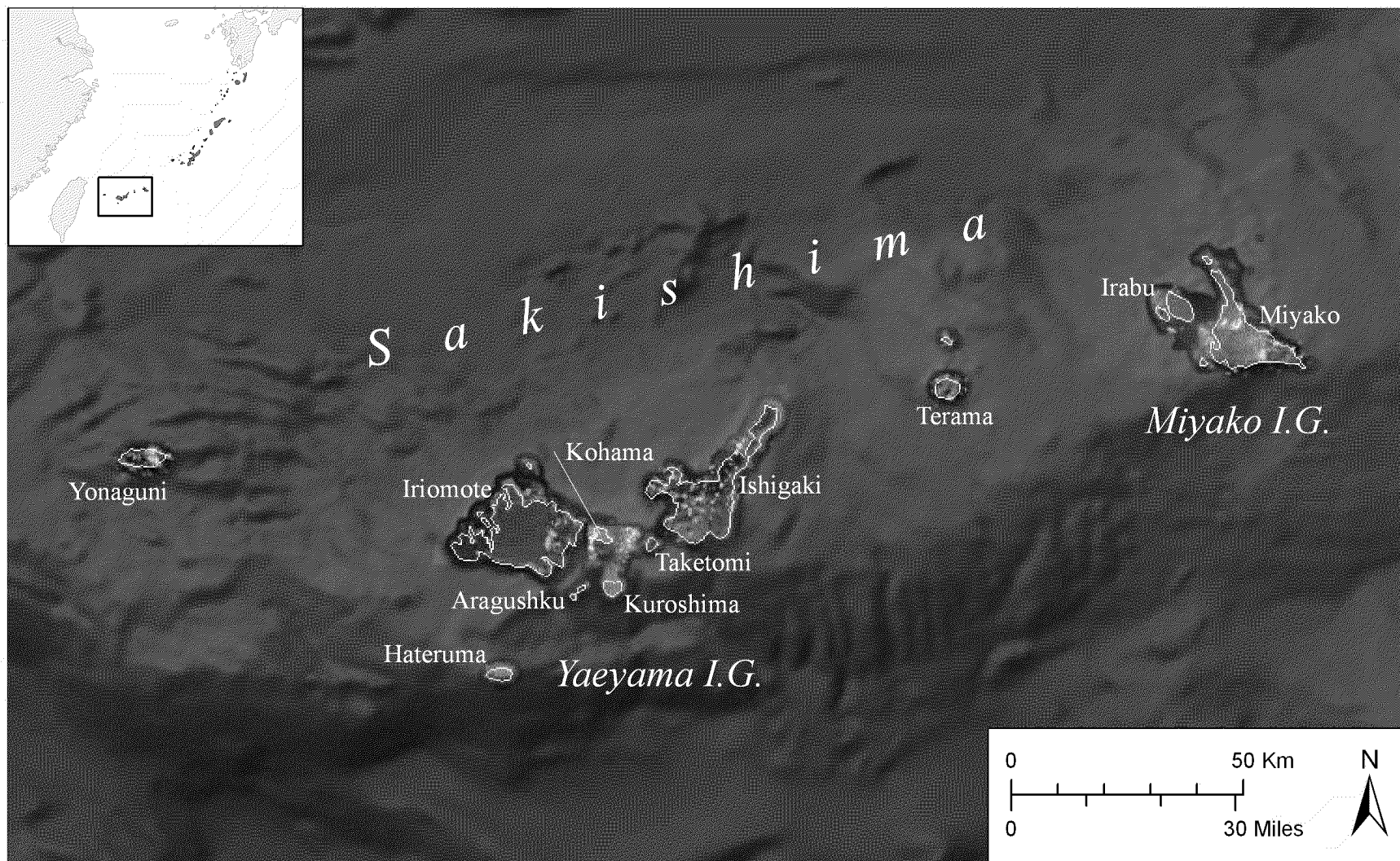


Figure 5. Map of Sakishima Islands.

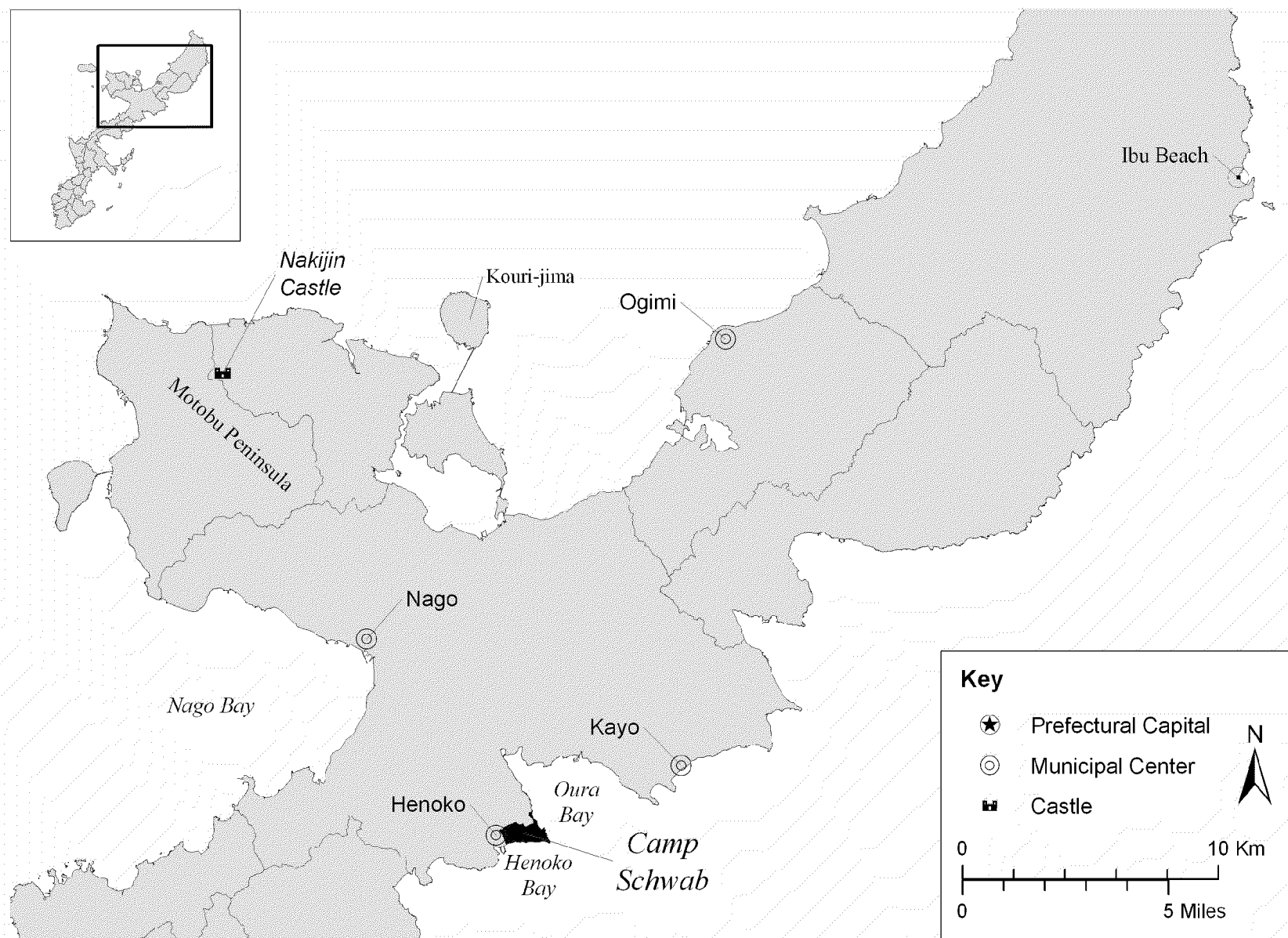


Figure 6. Northern Okinawa with Islands, Towns, and Other Locations Discussed in the Text.

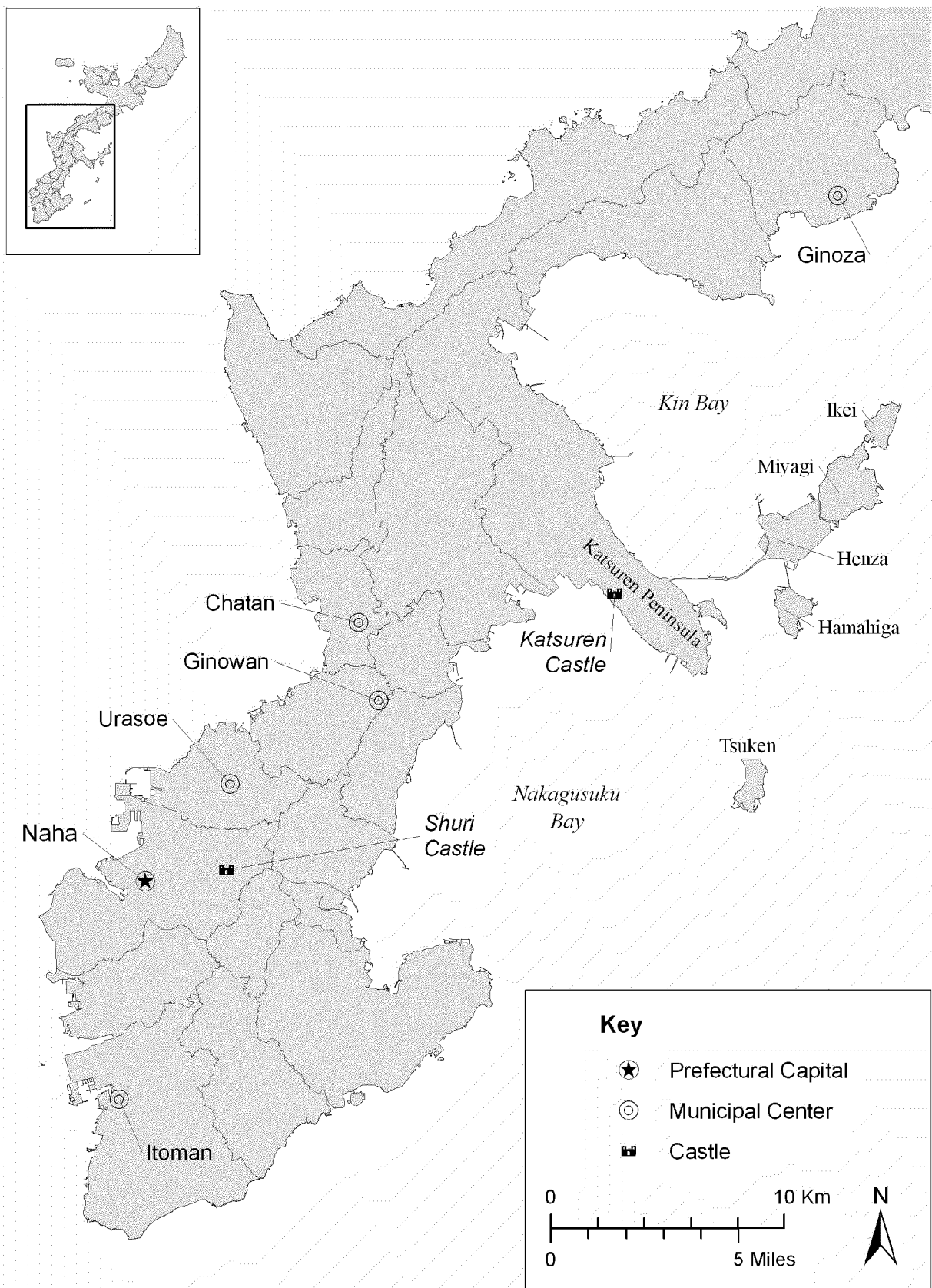


Figure 7. Southern Okinawa with Islands, Towns, and Other Locations Discussed in the Text.

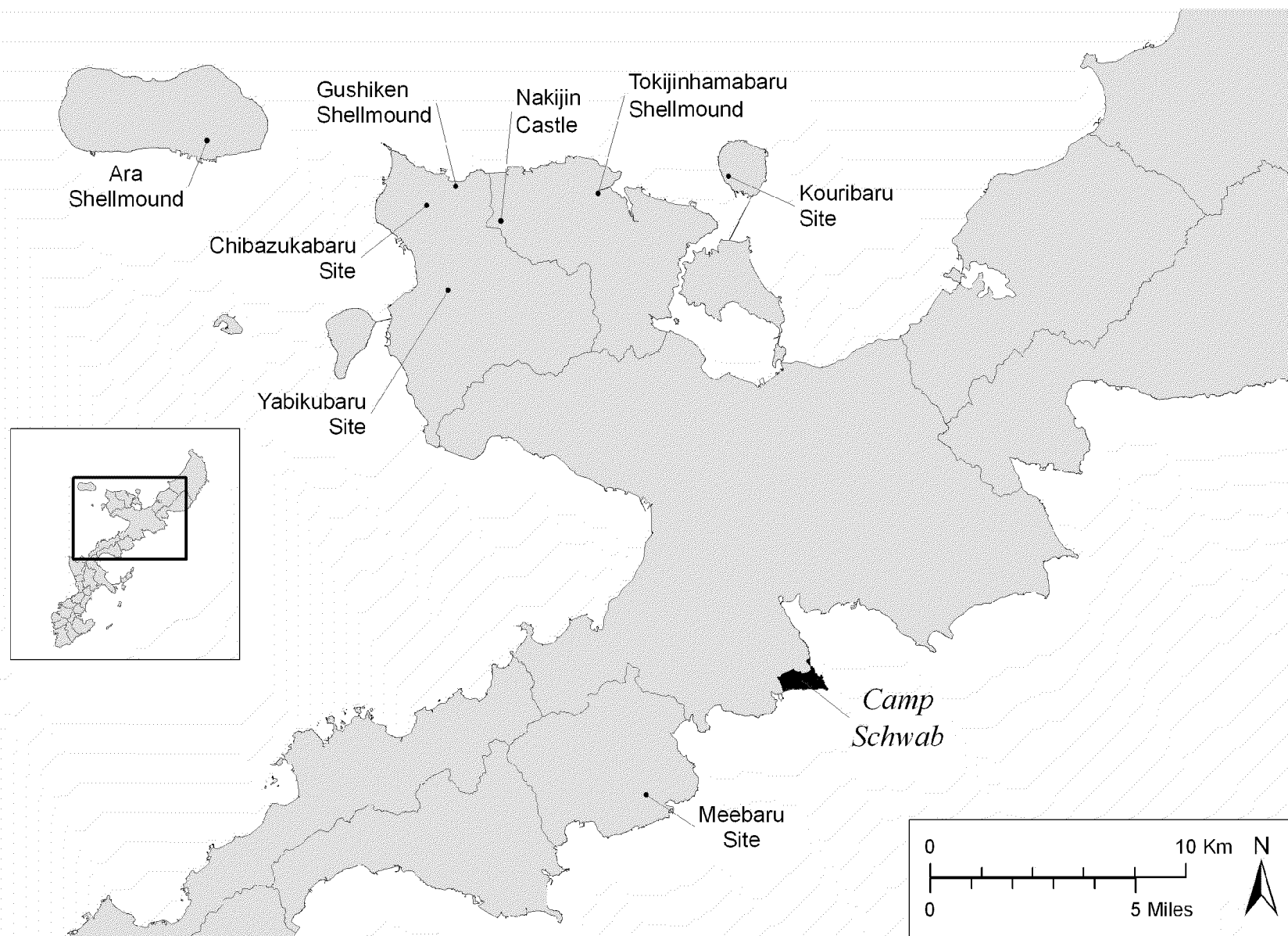


Figure 8. Archaeological Sites in Northern Okinawa Discussed in the Text.



Figure 9. Archaeological Sites in Southern Okinawa Discussed in the Text.

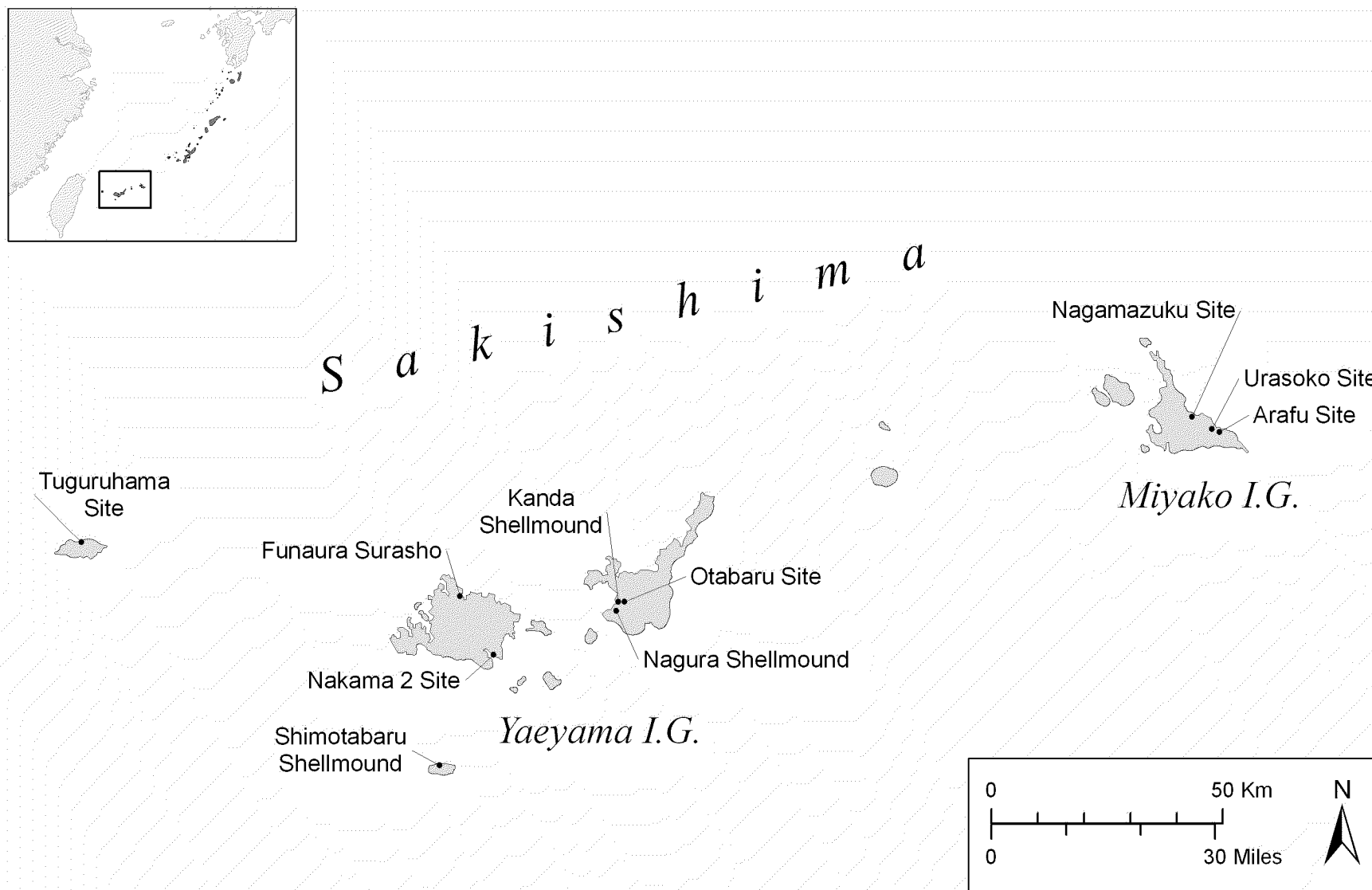


Figure 10. Archaeological Sites in Sakishima.

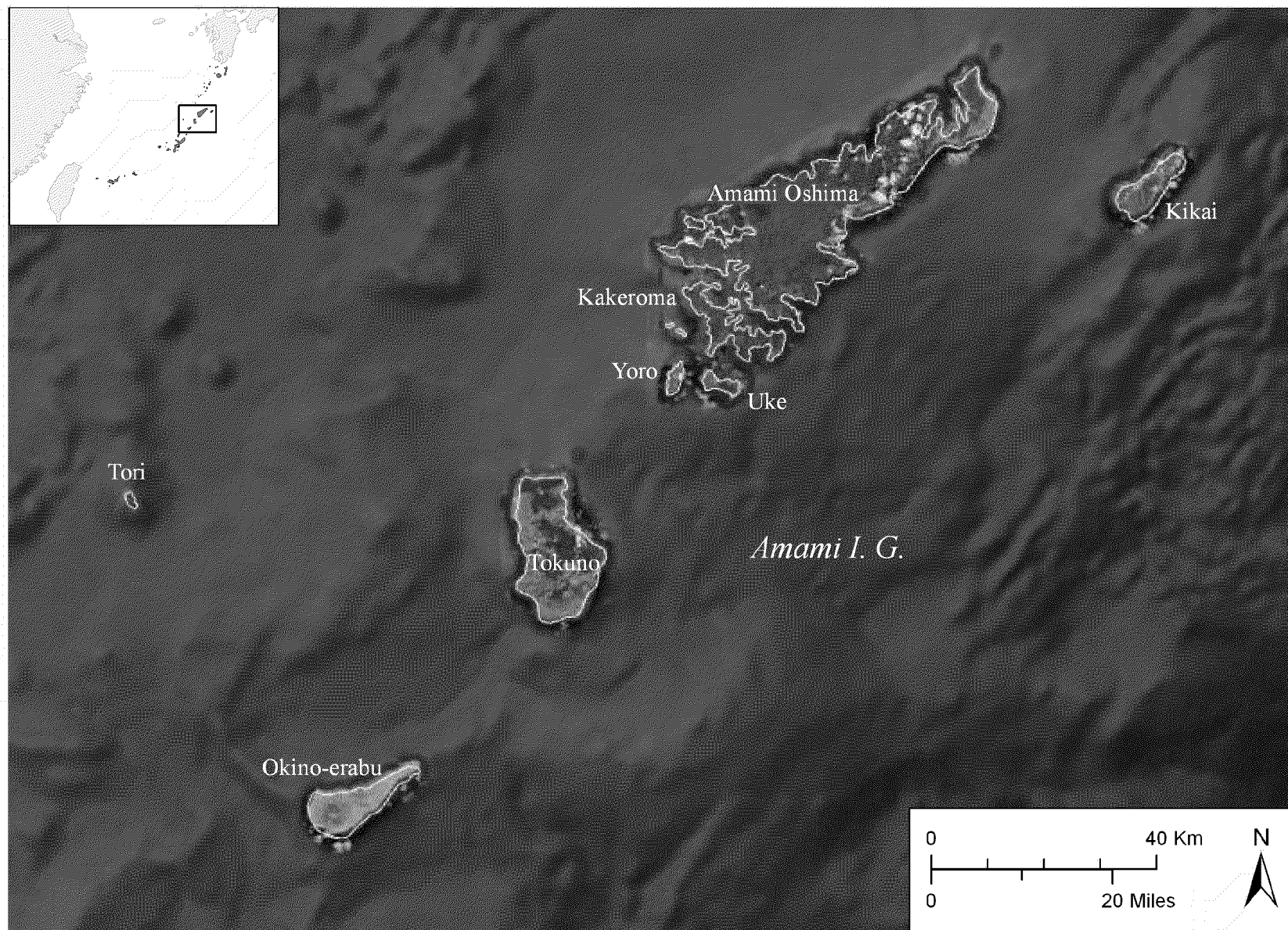


Figure 11. Map of Northern Ryukyu Islands.

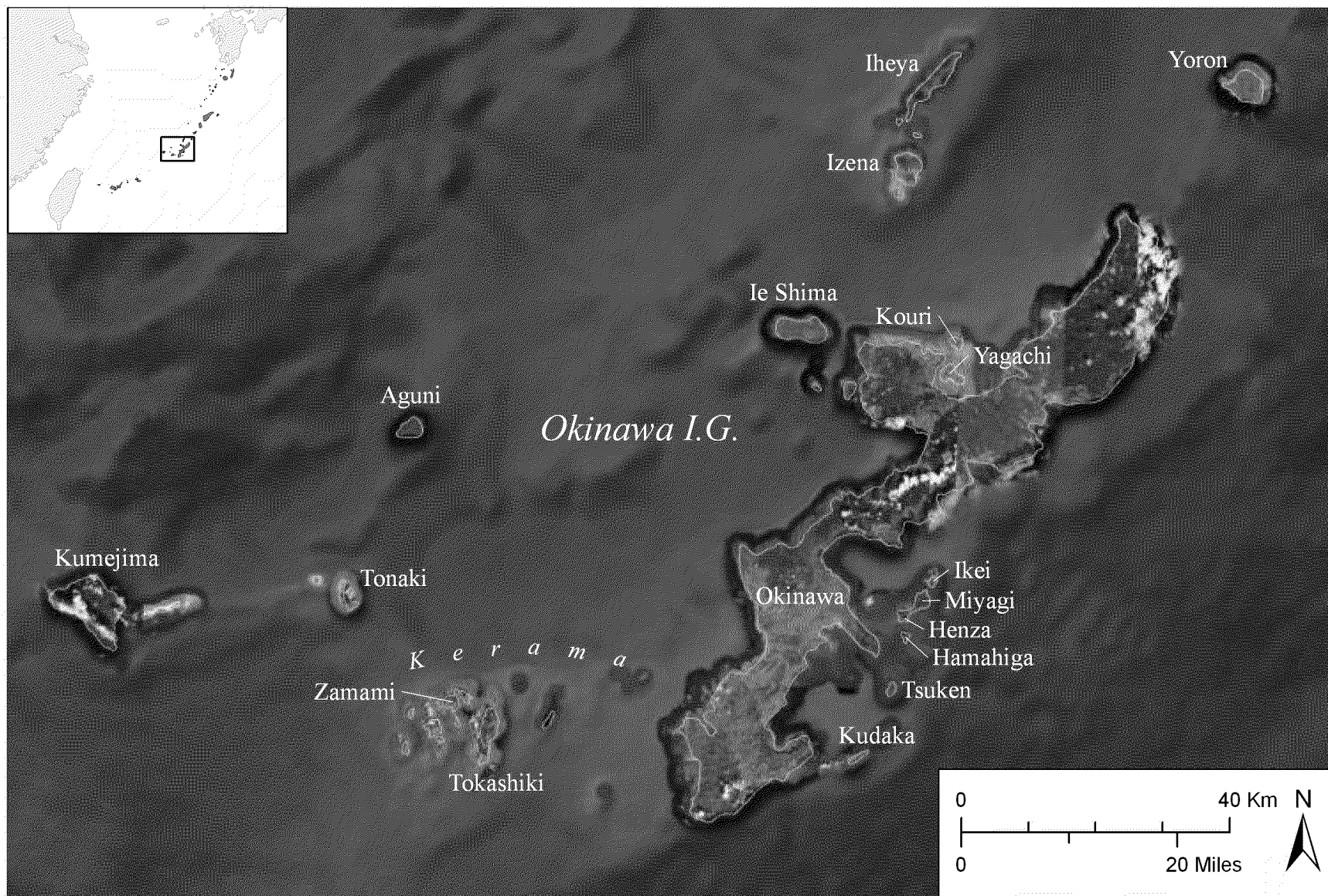


Figure 12. Map of Central Ryukyu Islands.

GLOSSARY

Age of first birth – the age at which females bear their first calf. Because the gestation period of a dugong is 13-15 months, this generally occurs a little over a year after the attainment of sexual maturity.

Bycatch – the non-targeted catch of a fishing operation, which is usually discarded.

Cetacean – the technical term for a whale, dolphin, or porpoise, members of the mammalian order Cetacea.

Coefficient of variation (CV) – a measure of uncertainty for an abundance estimate or other estimated parameter. The CV is used as a standard measure of confidence in the precision of the point estimate,

Contaminant load – the concentrations of contaminants (pollutants) in an animal's body.

Daily energy intake – the total amount of energy consumed by an animal, usually measured in calories.

Flukes – the horizontal tail appendages of a marine mammal, such as a whale or dugong, which extend as blades from the animal's body.

Gusuku – castle or citadel. One of the large fortified sites built, usually on ridge or hilltops, by the kings, lords, and chiefs of Okinawa between the 13th and 16th centuries. As well as walled courtyards, these might also incorporate administrative buildings, sacred sites, and residences of the ruler, his family, and warriors.

Incidental kill - the non-targeted catch of a fishing operation, which may not be discarded, and may actually be used or marketed.

Jomon Pottery – pottery with cord-marked motifs. Pottery of this type in a great variety of styles and forms dominated Japan ceramics from the earliest pottery (about 13000BP) until 2400 BP, the Jomon Period in Japanese prehistory

Kanji – ideographic characters, each of which usually represents one word, used in the Japanese system of writing. The *kanji* characters are generally derived from characters used in the Chinese writing system.

K-selected – a life history strategy in which an animal species is relatively long-lived, produces few offspring, and invests substantial resources in the upbringing of the offspring. As opposed to r-selected, which refers to animals that are short-lived, produce many offspring, and do not invest substantial resources in the offspring.

Lee side – the side of an island that is protected from the prevailing winds.

Lek mating system – a mating system in which males gather in a common area and defend small territories for the purposes of competitive mating with females. The males do not defend resources, but display to females.

Wholly Marine – in a biological sense, referring to a species that occurs entirely in salt waters of oceans or seas, and not in fresh water

Nirai Kanai – the Okinawan name for a sacred entity, usually called a sea deity or god, but more strictly the entity is a spirit who stays in hollows on the bottom of the sea, along the coastlines, or in coral or limestone fissures. *Nirai Kanai* can also refer to the undersea place where the spirit resides. In some myths it seems also to refer to a “heavenly land” where life originates or souls go after death. In Okinawan myth the sea deity sometimes sends the dugong or comes riding across the sea on the dugong.

Natural monument – under the GOJ Law for the Protection of Cultural Properties, natural features such as animals (including their habitats, breeding places and summer and winter resorts), plants (including their habitats), and geological features and minerals (including the grounds where peculiar natural phenomena are seen), which possess a high scientific value in and for this country [Japan]. In Japanese termed *tennen kinenbutsu*. Natural monuments are one type of monument, which in turn is one of several categories of cultural property.

Noro – in Okinawan religion, a priestess who conducts rituals at the household, village, and municipal levels, and, in the past, conducted royal court rituals. Female priests play a dominant role in Okinawan religious practices.

Percussive piling – the installation of support piles in marine construction activities by use of a piling hammer, which creates an impact that drives the pile into the seabed. This is a type of pile-driving, which also includes bored piling.

Poll Tax – a tax levied per individual head, so each person in the taxed population pays the same amount of tax.

Relict population – a reproductively-isolated stock of an organism that at an earlier time was abundant in a large area, but now occurs at only one or a few small areas.

Rhizome - the horizontal stem of a plant that sends out roots and shoots, generally embedded in the sediment.

Ryukyu Kingdom – the term for the unified Okinawan state which was established by Sho Hashi in 1429 on the island of Okinawa. It later expanded to include the other Ryukyu Islands. Independent from 1429-1609, it then became a part of the Satsuma fief, but the Sho Dynasty continued to rule the Ryukyus as Satsuma vassals until the Japanese federal government under Emperor Meiji abolished the monarchy in 1879.

Sakishima – literally, the Southern Islands. Refers to the islands in the Ryukyu chain which lie to the southwest of the Okinawa Island Group between Okinawa and Taiwan. The Miyako and Yaeyama Island Groups and Yonaguni make up Sakishima.

Satsuma – a feudal domain under the Tokugawa Shogunate located in Kagoshima (southwestern Kyushu) whose lord conquered Okinawa in 1609 and made the Ryukyu king his vassal and the Ryukyu Islands part of his fief.

Sexual dimorphism – the situation in which males and females differ from each other in morphological characteristics.

Sirenian – the technical term for a dugong, manatee, or sea cow, members of the mammalian order Sirenia.

Stranding – Stranding is a naturally-occurring event in marine mammals. It happens when a marine mammal (alive or dead) washes up on shore. The term has been generalized to also include situations in which a carcass of a marine mammal is found floating in the water near shore. Anthropogenic causes of marine mammal strandings are also known.

Tokugawa Shogunate – the government that ruled Japan from Edo (Tokyo) from 1603-1868. The successive lords of the Tokugawa Dynasty descended from Ieyasu Tokugawa, founder of the dynasty, and ruled all Japan as *shoguns* in a semi-feudal system nominally under the Emperor in Kyoto.

REFERENCES

- Aketa, K.
2003 *The study of food and digestive characteristics in sirenians*. Ph.D. thesis, Mie University, Mie, Japan, 110 pp. (in Japanese).
- Anderson, P. K.
1994 Dugong distribution, the seagrass *Halophila spinulosa*, and thermal environment in winter in deeper waters of eastern Shark Bay, western Australia. *Wildlife Research* 21:381-388.
- Anderson, P. K., and R. M. R. Barclay
1995 Acoustic signals of solitary dugongs: physical characteristics and behavioral correlates. *Journal of Mammalogy* 76:1226-1237.
- Arakawa, Akira
1978 Ningyo to Hitobito no Roman. [Romance with a Mermaid and People]. In *Shin Nanto Fudoki*. [New Southern Islands Chronicles]. In Japanese. Daiwa Shobo Publishing, Co., Ltd., Tokyo, Japan.
- Asato, Bushin
1976 *Aragusuku-jima (Panari)*. [Aragusuku-jima Island: Panari]. In Japanese. Private Publication, Okinawa, Japan.
- Asato, Shinjun, et al.
1993 *Ie-jima Ara Kaizuka Hakkutsu Chosa Hokokusho* [Excavation Survey Report of Ara Shellmound, Ie-jima Island]. Okinawa-ken Bunkazai Chosa Hokokusho Dai 48 Shu [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 48]. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.
- Berque, Augustin
1992 Identification of the Self in Relation to the Environment. In *Japanese Sense of Self*, edited by Nancy R. Rosenberger. Cambridge University Press, Cambridge.
- Bullock, T. H., T. J. O'shea and M. C. McClune
1982 Auditory Evoked Potentials in the West Indian Manatee (Sirenia: *Trichechus manatus*). *Journal of Comparative Physiology* 148:547-554.
- Chatan Township Board of Education
2007 *Chatan Cho Bunkazai Chosa Hokokusho Dai 26 Shu: Ireibaru Iseki - Ireibaru B Iseki Hoka Hakkutsu Chosa*. [Survey Report of the Cultural Resources of Chatan Town, No. 26: Ireibaru Site - Excavation Survey of Ireibaru B Site, et al]. In Japanese. Chatan Town Board of Education, Okinawa, Japan.
- 2008a *Chatan Cho Bunkazai Chosa Hokokusho Dai 27 Shu: Ireibaru B Iseki, Ireibaru E Iseki - Camp Kuwae Kitagawa Henkan ni Tomonau Hakkutsu Chosa Jigyo (Heisei 10~14 Nendo)*. [Survey Report of the Cultural Resources of Chatan Town, No. 27: Ireibaru B Site, Ireibaru E Site - Excavation Survey Project Associated with the Recession of the North Side of Camp Kuwae (1998-2002)]. In Japanese. Chatan Town Board of Education, Okinawa, Japan.

- 2008b *Chatan Cho Bunkazai Chosa Hokokusho Dai 28 Shu: Ireibaru D Iseki - Camp Kuwae Kitagawa Henkan ni Tomonau Hakkutsu Chosa Jigyo (Heisei 10~14 Nendo). [Survey Report of the Cultural Resources of Chatan Town, No. 28: Ireibaru D Site - Excavation Survey Project Associated with the Recession of the North Side of Camp Kuwae (1998-2002)]*. In Japanese. Chatan Town Board of Education, Okinawa, Japan.
- Chilvers, B. L., S. Delean, N. J. Gales, D. K. Holley, I. R. Lawler, H. Marsh and A. R. Preen.
2004 Diving behaviour of dugongs, *Dugong dugon*. *Journal of Experimental Marine Biology and Ecology* 304:203-224.
- China, Teijun
1999 *Meebaru Iseki [Meebaru Site]*. In Japanese. Ginoza Village Board of Education, Okinawa, Japan.
- Chou Huang
2003 *Shuko Ryukyu Koku Shi Ryaku. [Shuko: History of Ryukyu - China - Japan in Edo Period]*. Translated by Harada, Nobuo. In Japanese. Yoju Shorin, Inc., Okinawa, Japan.
- City History Compilation Office of Nago City (ed.)
1997 *Nago-shi Shi Soshō 15: Yambaru no Matsuri to Kamiuta. [Series of the History of Nago City, No. 15: Festivals and Religious Songs of Yambaru]*. In Japanese. Nago City Board of Education, Okinawa, Japan.
- City History Compilation Office, General Affairs Department of Ishigaki City (ed.)
1991 *Ishigaki-shi Shi Soshō 1. [Series of History of Ishigaki City, No. 1]*. In Japanese. Ishigaki City Office, Okinawa, Japan.

1993 *Ishigaki-shi Shi Soshō 2. [Series of the History of Ishigaki City, No. 2]*. In Japanese. Ishigaki City Office, Okinawa, Japan.

1994 *Ishigaki-shi Shi Soshō 7. [Series of the History of Ishigaki City, No. 7]*. In Japanese. Ishigaki City Office, Okinawa, Japan.
- City History Compilation Office of Nago City, ed.
1993 *Nago-shi Shi Soshō 14: Haneji no Minwa. [Series of the History of Nago City, No. 14: Folktales of Haneji]*. In Japanese. Nago City Board of Education, Okinawa, Japan.
- Cultural Property Department of the Agency for Cultural Affairs
2001 *Bukazai Hogokankei Horeishu [Compilation of the Act of Congress Regarding Cultural Property Protection]*. In Japanese. Government of Japan Agency for Cultural Affairs, Tokyo.
- Czech, J. J.
2008 Aircraft Noise Study for Camp Schwab, Okinawa, Japan. Final Report. Unpublished contract report prepared by Wyle for the Environmental Company. Charlottesville, Virginia.
- Department of Culture of the Okinawa Prefectural Education Committee
1996 *Okinawa-ken Bunkazai Chosa Hokokusho Dai 125 Shu: Heshikiya Tobaru Iseki, White Beach Chiku Nai Soko-kensetsu Koji ni Tomonau Kinkyu Hakkutsu Chosa Hokokusho. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 125: Heshikiya Tobaru Site - Report of the Urgent Excavation Survey Associated with the Warehouse Construction in White Beach Region]*. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

- 1988a *Shuri-jo Ato - Kankai Mon, Kyukei Mon Uchigawa Chiiki no Fukugen Seibi ni Kakaru Iko Chosa*. [*Shuri-jo Castle Ruin Site: Archaeological Feature Survey Related to the Restoration and Maintenance of Kankai-mon Gate and Kyukei-mon Gate Areas*]. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.
- 1988b *Shuri-jo Ato: Kankai Mon/Kyukei Mon Uchigawa Chiiki no Fukugen Seibi Jigyo ni Kakaru Iko Chosa* [*Shuri-jo Castle Ruin Site: Archaeological Feature Survey Related to the Restoration and Improvement Project of the Inside Area of the Kankai-mon Gate and Kyukei-mon Gate*]. In Japanese. Ryokurindo Shuppan, Okinawa, Japan.
- 1998a *Okinawa-ken Bunkazai Chosa Hokokusho Dai 133 Shu: Shuri-jo Ato—Unaa Ato and Hoshin Mon Ato no Iko Chosa Hokoku* [*Survey Report of the Cultural Resources of Okinawa Prefecture, No. 133: Shuri-jo Castle Ruin Site—Report of Archaeological Feature Survey of the Unaa Site and Hoshin-mon Gate Site*]. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.
- 1998b *Okinawa-ken Bunkazai Chosa Hokokusho Dai 133 Shu: Shuri-jo Ato - Unaa Ato and Hoshin Mon Ato no Iko Chosa Hokoku*. [*Survey Report of the Cultural Resources of Okinawa Prefecture, No. 133: Shuri-jo Castle Ruin Site - Report of Archaeological Feature Survey of the Unaa Site and Hoshin-mon Gate Site*]. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

Domestic Industrial Exhibition Bureau (ed.)

- 1881 *Dai 2 Kai Naikoku Kangyo Hakurankai Shuppin Mokuroku, Dai 5 Ku 2 Hen, 5*. [*Exhibition Catalogue of the Second Domestic Industrial Exhibition, Fifth Area, Volume 2, No. 5*]. In Japanese.

Editorial Board of Administrative History of Agriculture, Forestry, and Fisheries of Okinawa Prefecture (ed.)

- 1983 *Okinawa Ken Suisan Ippan*. [Okinawa Prefectural Fisheries Team 1]. In *Okinawa-ken Norin Suisan Gyosei Shi Dai 17 Kan: Suisangyo Shiryo Hen I*. [*Administrative History of Agriculture, Forestry, and Fisheries of Okinawa Prefecture, Volume 17 (Supplementary Information of Fisheries, I)*]. In Japanese. Association of Agriculture and Forestry Statistics, Okinawa, Japan.

Editorial Board of Henoko District (ed.)

- 1998 *Henoko Shi*. [*Records of Henoko*]. In Japanese. Henoko District Office, Okinawa, Japan.

Editorial Board of History of Gushikawa City (ed.)

- 1997 *Gushikawa-shi Shi, Dai 3 Kan, Minwa Hen, Jo, Densetsu*. [*History of Gushikawa City, Volume 3, Folklore Volume, Volume 1, Traditions*]. In Japanese. Gushikawa City Board of Education, Okinawa, Japan.

Editorial Board of History of Naagusuku-mura (Nashiro) (ed.)

- 1988 *Naagusuku-mura Shi (Itoman-shi Aza Nashiro Shi)*. [*Records of Naagusuku Village (Records of Nashiro District, Itoman City)*]. In Japanese. Arakaki, Seiji, Okinawa, Japan.

Editorial Board of History of Nakazato Village (ed.)

- 2000 *Nakazato-son Shi, Dai 6 Kan, Shiryo Hen 5, Minzoku*. [*History of Nakazato Village, Volume 6, Supplementary Information No. 5: Folklore*]. In Japanese. Nakazato Village Office, Okinawa, Japan.

Editorial Board of Journal of Kouri (ed.)

- 2006 *Kouri Shi. [Records of Kouri]*. In Japanese. Kouri, Nakijin Village, Okinawa, Okinawa, Japan.

Editorial Board of Records of Ginoza Village (ed.)

- 1991 *Ginoza-son Shi, Dai 1 Kan, Tsushi Hen. [Records of Ginoza Village, Volume 1, Complete History]*. In Japanese. Ginoza Village Office, Okinawa, Japan.

Editorial Office of the Okinawa Prefectural Library for Historic Materials

- 1992 *Rekidai Hoan [Precious Documents of Successive Generations]*. Translated into Japanese. Okinawa Prefectural Library, Board of Education, Naha, Okinawa, Japan.

Executive Operating Committee of Okinawa Folklore Institute

- 1981 *Yaeyama Minwa no Tabi. [Journey of Yaeyama Folklore]*. In Japanese. Okinawa Folklore Association, Okinawa, Japan.

Fisheries Committee of Dai-Nippon 1886, 1888, 1893, 1895

- 1882-1895 *The Fisheries Bulletin of Dai-Nippon (Japan) 1886, 1888, 1893, 1895*.

Fukuda, Akira, Jun'ichi Yamazato, and Mitosi Murakami

- 2000 *Yaeyama/Ishigaki-jima no Densetsu/Mukashi Banashi (1): Ryukyu no Densho Bunka wo Aruku 1. [Traditions and Old Tales of Yaeyama and Ishigaki-jima Island: Inquiries of Ryukyuan Oral Culture, No. 1]*. In Japanese. Miyai Shoten, Co., Ltd., Tokyo, Japan.

Fukushima, Hoichi

- 1982 *Zoku/Ryukyu no Mukashi Monogatari. [Old Stories of the Ryukyu Islands, Sequel]*. In Japanese. Kaiho Shuppansha, Okinawa, Japan.

Government of Japan

- 1950 *Law for the Protection of Cultural Properties*. Original statute.
- 2004 *Law for the Protection of Cultural Properties*. Currently effective revision of 1950 law. Provisional English translation produced by the Agency for Cultural Affairs, Cultural Properties Protection Department.

Government of Japan Agency for Cultural Affairs

- 1976 *Ten'nen Kinenbutsu Kinkyu Chosa Shokusei Zu/Shuyo Doshokubutsu Chizu, No. 47, Okinawa-ken. [Urgent Survey on National-Monument Vegetation: Vegetation Map of the Main Flora and Fauna, No. 47, Okinawa Prefecture]*. In Japanese. Agency for Cultural Affairs, Tokyo, Japan.
- 2010 Information on monuments posted on Wikipedia website:
http://en.wikipedia.org/wiki/List_of_Special_Places_of_Scenic_Beauty,_Special_Historic_Sites_and_Special_Natural_Monuments). Accessed February 25, 2010.

Government of the Ryukyu Islands

- 1954 *Law for the Protection of Cultural Properties*. Okinawan Prefectural Agency for Cultural Affairs, Naha, Okinawa.

- 1965 *Okinawa-ken Shi, Dai 14 Kan, Shiryō Hen 4, Zassan. [History of Okinawa Prefecture, Volume 14, Supplementary Information No. 4, Miscellaneous Volume 1].* In Japanese. Government of the Ryukyus, Okinawa, Japan.
- Government of the Ryukyu Islands Cultural Assets Protection Commission
- 1978 1956 Nen - Shitei Bunkazai Kaisetsu. [Description of designated cultural property, 1956]. In *Okinawa Bunkazai Chosa Hokoku (1956-1962). [Survey Report of the Okinawan Culture, 1956-1962].* In Japanese. Naha Shuppansha, Okinawa, Japan.
- Government of the Ryukyu Islands Investigation Division of the Board of Education
- 1958 *Ryukyu Shiryō (Dai 3 Shu). [Historical Materials of the Ryukyus, No. 3].* In Japanese. Board of Education of the Government of the Ryukyu Islands, Okinawa, Japan.
- Harada, Nobuo
- 1999 *Jo Hoko Chuzan Denshinroku Shin Yakukchu Ban. [Jo Hoko - Records of Chuzan, New Translation with Notes].* In Japanese. Yōju Shorin, Inc., Okinawa, Japan.
- Heinsohn, G. E., J. Wake, H. Marsh and A. V. Spain
- 1977 The dugong (*Dugong dugon* (Muller)) in the seagrass system. *Aquaculture* 12:235-248.
- Higashion'na, Kanjun
- 1950 *Nanto Fudoki. [Southern Islands Chronicles].* In Japanese. Okinawan Local Cultural Society, Okinawa, Japan.
- Hirasaka, Kyosuke
- 1933 *Tennen Kinenbutsu Chosa Hokoku, Dai 1 Shu. [Survey Report of National Monument, No. 1].* In Japanese. Department of Interior, Governor-General of Formosa, Taiwan.
- Hodgson, A. J., and H. Marsh
- 2007 Response of dugongs to boat traffic: The risk of disturbance and displacement. *Journal of Experimental Marine Biology and Ecology* 340:50-61.
- Hojo, Teruyuki
- 1976 Anatomical identification and anthropological consideration of a humerus of the dugong (*Dugong dugon*) from Urasoe shellmound in Okinawa Island. *Journal of the Anthropological Society of Nippon* 84:139-146 (in Japanese).
- Hokama, Shuzen
- 2000 *Omoro Saushi (Jo). [Omoro Sōshi, Volume I].* In Japanese. Iwanami Shoten Publishers, Co., Ltd., Tokyo, Japan.
- Hoson, Osamu, Go Ogura, Noriyuki Ohtaishi, and Sen-ichi Oda
- 2009 Are ancient dugong bones useful for analyses? *Proceedings of the 4th International Symposium on SEASTAR2000 and Asian Bio-logging Science (The 8th SEASTAR2000 Workshop)*: 35-40.
- Ichikawa, K., C. Tsutsumi, N. Arai, T. Akamatsu, T. Shinke, T. Hara and K. Adulyanukosol
- 2006 Dugong (*Dugong dugon*) vocalization patterns recorded by automatic underwater sound monitoring systems. *Journal of the Acoustical Society of America* 119:3726-3733.
- Inada, Koji, and Toshio Ozawa
- 1983 *Nihon Mukashi Banashi Tukan Dai 26 Kan: Okinawa. [Observation of Japanese Old Tales, Volume 26: Okinawa].* In Japanese. Dohosha Printing, Co., Ltd., Kyoto, Japan.

Ishigaki City Board of Education

- 1977 *Ishigaki-shi Bunkazai Chosa Hokokusho Dai 1 Shu: Furusutobaru Iseki. [Survey Report of the Cultural Resource of Ishigaki City, No. 1: Furusutobaru Site].* In Japanese. Ishigaki City Board of Education, Okinawa, Japan.

Iwasaki, Takuji

- 1974 *Hirugi no Ichiyo. [A Leaf of the Mangrove].* In *Iwasaki Takuji, 1 Kan, Zenshu. [Complete Works of Takuji Iwasaki, Volume 1].* In Japanese. Dento to Gendaisha, Tokyo, Japan.

Izumi, Takeshi

- 2007 *Dugong ni Tsuiteno Bunkashiteki Shiron. [Cultural History Essay on the Dugong].* In *Nicchu Koryu no Kouko Gaku. [Archaeology in the Exchange Between Japan and China].* In Japanese. Doseisha, Tokyo, Japan.

Jefferson, T. A., M. A. Webber, and R. L. Pitman

- 2008 *Marine Mammals of the World: A Comprehensive Guide to Their Identification.* Academic Press/Elsevier, 573 pp.

Jefferson, T. A., S. K. Hung, and B. Würsig

- 2009 Protecting small cetaceans from coastal development: Impact assessment and mitigation experience in Hong Kong. *Marine Policy* 33:305-311.

Kamiya, T., S. Uchida, T. Tobayama, and Y. Yoshida

- 1979a Anatomical sketches of visceral organs of *Dugong dugon* (1). *Geiken Tsushin [Whales Research Institute News]* 325:25-34.

- 1979b Anatomical sketches of visceral organs of *Dugong dugon* (2). *Geiken Tsushin [Whales Research Institute News]* 326:35-42.

Kaneko, Hiromasa

- 2000 “Chokei Kokki” no Sozai ni Tsuite. [About the Materials of “Butterfly-shaped Bone Products”]. In *Takamiya Hiroe Sensei Koki Kinen Ronshu Ryukyu/Higashi Asia no Hito to Bunka (Jokan).. [Memorial Collection of Papers for the Celebration of Prof Hiroe Takamiya's 70th Birthday: People and Culture of the Ryukyus and East Asia, Volume 1].* In Japanese. Memorial Collection of Papers for the Celebration of Prof. Hiroe Takamiya's 70th Birthday Publication, Okinawa, Japan.

Kasuya, T.

- 1999 Dugongs in Okinawa. *Sirennews* 31:10-11.

Kasuya, T., M. Shirakihara, H. Yoshida, H. Ogawa, H. Yokochi, S. Uchida, and K. Shirakihara

- 1999 Japanese dugongs, their current status and conservation measures required: Report of 1998 dugong survey. In *8th Report of Pro-Natura Foundation*, pp. 55-63. In Japanese, with English summary. Japanese Association for Protection of Nature, Tokyo.

- 2000 Japanese dugongs, their current status and conservation measures required: Report of 1999 dugong survey. In *9th Report of Pro-Natura Foundation*, pp. 29-36. In Japanese, with English summary. Japanese Association for Protection of Nature, Tokyo (Unpublished report).

Kasuya, T., and R. L. Brownell

- 2001 Conservation status and future prospects of dugongs in Japanese water. Unpublished report, 8 pp.

Kasuya, Toshio, and Nobuyuki Miyazaki

- 1997 Kaigyū Moku Dugong. In *Red Data Book Nihon no Honyurui*. [*Red Data Book - Mammals in Japan*]. In Japanese. Bun'ichi Co., Ltd., Tokyo, Japan.

Kataoka, T., and S. Asano

- 1981 On the keeping of dugong (*Dugong dugon*) in Toba Aquarium. In *The Dugong: Proceedings of a Seminar/Workshop Held at James Cook University, 8-13 May 1979* (H. Marsh, ed.), pp. 199-204. James Cook University.

Kataoka, T., T. Mori, Y. Wakai, J. Palma, A. A. Yaptinchay, R. T. R. de Veyra, and R. B. Trono

- 1995 *Dugongs of the Philippines: A Report of the Joint Dugong Research and Conservation Program*. Toba Aquarium, Japan.

Kato, M.

- 1979 A tale of dugongs. *Gakashi Kaiho* [Bachelor's Journal] 745:26-30.

Kato, Mutsuo, Makoto Numata, Kagetaka Watanabe, and Masanori Hata

- 1995 *Nihon no Tennen Kinenbutsu*. [*Natural Monuments of Japan*]. In Japanese. Kodansha, Co., Ltd., Tokyo, Japan.

Kerr, George H.

- 1958 *Okinawa: The History of an Island People*. Charles E. Tuttle Company, Inc., Rutland, Vermont and Tokyo, Japan. Revised 2001, Tuttle Publishing, North Clarendon, Vermont.

Kinjo, Sumiko

- 1993 Okinawa no Shoku Bunka - Ryori Bunka no Tokuchō to Keifu. [Okinawan Food Culture - Characteristics and Ties of Cuisine Culture]. In *Kan Chugoku Kai no Minzoku to Bunka Dai 1kan: Kaiyō Bunka Ron*. [*Folklore and Culture of the Circum-China Sea, Volume 1: Ocean Cultural Theory*]. In Japanese. Gaifusha, Tokyo, Japan.
- 2003 Ryūkyū no Shoku Seikatsu to Bunka. [Diet and Culture of the Ryūkyū Islands]. In *Bessatsu Kan 6: Ryūkyū Bunka-ken toha Nanika?* [*Additional Volume, Kan, No. 6: What is the Culture of the Ryūkyūs?*]. In Japanese. Fujiwara Shoten, Co., Ltd., Tokyo, Japan.

Kishaba, Eijun

- 1977 *Yaeyama Minzoku Shi, Ge Kan*. [*Ethnography of Yaeyama, Second Volume*]. In Japanese. The Okinawa Times, Okinawa, Japan.

Kishimoto, Yoshihiko, et al.

- 1986 *Excavation Survey Report of Gushiken Shellmound* [*Gushiken Kaizuka Hakkutsu Chosa Hokoku*]. Survey Report of the Cultural Resources of Motobu Township, No. 3 [Motobu-cho Bunkazai Chosa Hokokusho Dai 3 Shu]. In Japanese. Motobu Township Board of Education, Okinawa, Japan.

Kishimoto, Yoshihiko, et al.

- 1988 *Excavation Survey Report of Chibazukabaru Site [Chibazukabaru Iseki - Hakkutsu Chosa Hokoku]*. Survey Report of the Cultural Resources of Motobu Township, No. 5 [Motobu-cho Bunkazai Chosa Hokokusho Dai 5 Shu]. In Japanese. Motobu Township Board of Education, Okinawa, Japan.

Kuroshima, Tameichi

- 1999 (Shiryo Shokai) Yaeyama-jima Shomonodai Tsukecho. [(Description of the Historical Material) Account Book of Yaeyama-jima islands]. In *Ishigaki Shiritsu Yaeyama Hakubutsukan Kiyo, Dai 16/17 Go Gappei Go*. [Bulletin of Yaeyama Museum, No. 16/17 Issue]. In Japanese. Ishigaki City Yaeyama Museum, Okinawa, Japan.

Lanyon, J. M.

- 2003 Distribution and abundance of dugongs in Moreton Bay, Queensland Australia. *Wildlife Research* 30:397-409.

Li, Ting-yuan

- 2007 *Li, Ting-yuan Shi Ryukyu Ki*. [Li Ting-yuan Journal of a Mission to the Ryukyus]. Translated by Harada, Nobuo. In Japanese. Yoju Shorin, Inc., Okinawa, Japan.

Makino, Kiyoshi

- 1971 Jinto Zei to Uwagi Zei [Utaki of Yaeyama]. In *Okinawa Bunka, Dai 9 Kan, 1-2 Go, Tsukan 36-37 Gappei Go*. [Okinawan Culture, Volume 9, No. 1 and 2, Consecutive Number of Volume 36 and 37, Double Issue]. In Japanese. Institute for Okinawan Studies, Okinawa, Japan.

Marsh, H.

- 1995 The life history pattern of breeding, and population dynamics of the dugong. In *Population Biology of the Florida Manatee* by T. J. O'Shea, B. B. Ackerman and H. F. Percival, pp. 75-83. U.S. Department of the Interior, NBS.
- 2009 Dugong *Dugong dugon*. In *Encyclopedia of Marine Mammals*, edited by W. F. Perrin, B. Würsig and J. G. M. Thewissen, pp. 332-335. Second Edition. Academic Press.

Marsh, H., H. Penrose, C. Eros, and J. Hugues

- 2002 *Dugong: Status report and action plans for countries and territories*. UNEP Early Warning and Assessment Report Series, 155 pp.

Matsumura, Ryo

- 1920 *Ryukyu Ogido Kaizuka*. [Ryukyu Ogido Shellmound]. In Japanese. University of Tokyo, Tokyo, Japan.

Matsu'ura, Atsushi

- 1908 *Nissei Kaichin, Dai 2 Kai Kansai Kyushu Fuken Sogo Suisan Kyoshinkai no Shiken*. [Nissei Kaichin, the Second Exposition of the United Department of Fisheries Industries of Kansai and Kyushu]. In Japanese. Suisan Shoin, Tokyo, Japan.

Minamoto, Takeo

- 1974 *Zoku, Ryukyu Rekishi Monogatari*. [Historical Stories of the Ryukyus, Second Series]. In Japanese. Okinawa Bunkyo Publishing, Okinawa, Japan.

Ministry of Agriculture and Commerce

- 1889 *Reconnaissance Investigation Report of Marine Products, Volume 1, No. 1.* In Japanese. National Diet Library, Tokyo.

Ministry of the Environment

- 2004 *Dugong to Moba no Kouikiteki Chosa, Heisei 13-15 Nendo, Kekka Gaiyo.* [Wide-Ranging Survey of the Dugong and Seaweed Beds]. In Japanese. The Ministry of the Environment, Tokyo, Japan.

Miyagi, Fumi

- 1972 *Yaeyama Seikatsu Shi.* [Records of Yaeyama Life]. In Japanese. Jono Printing, Co., Ltd., Kumamoto, Japan.

Morimoto, Isao

- 2004 Jugon Bone ni Kansuru Shutsudo Siryo no Shusei (Zantei). [Collection of Excavated Materials in Regard to the Dugong's Bones (Interim)]. In *Kiyo Okinawa Maibun-kenkyu 2.* [Bulletin of Research on Buried Cultural Resources of Okinawa, No. 2]. In Japanese. Okinawa Prefectural Archaeology Center, Okinawa, Japan.
- 2005 Jugon Hone ni Kansuru Shutsudo Shiryo no Shusei (Hoi 1). [Collection of Excavated Materials in Regard to the Dugong's Bones (Supplement 1)]. In *Kiyo Okinawa Maibun-kenkyu 3.* [Bulletin of Research on Buried Cultural Resources of Okinawa, No. 3]. In Japanese. Okinawa Prefectural Archaeology Center, Okinawa, Japan.

Motobu Township Board of Education

- 2005 *Motobu Bunkazai Chosa Hokokusho Dai 8 Shu: Okinawa-ken Kunigami Gun Motoabu Cho Anchi no Ue Kaizuka Hakkutsu Chosa Hokokusho.* [Survey Report of the Cultural Resources of Motobu Township, No. 8: Excavation Survey Report of Anchinoue Shellmound, Motobu Township, Kunigami Gun, Okinawa]. In Japanese. Motobu Township Board of Education, Okinawa, Japan.

Nakamatsu, Yashu

- 1978 *Times Sensho 4, Koso no Mura-Okinawa Minzoku Bunka Ron.* [Okinawa Times Selection, No. 4: Villages in Layers of History - Okinawan Folkloric Culture -]. In Japanese. Okinawa Times, Okinawa, Japan.

Nakasone, Koichi

- 1988 *Ryukyu no Mukashi Banashi (Dai 1 Shu).* [Old Stories of the Ryukyus (No. 1)]. In Japanese. Akatsuki Shobo Publishing, Okinawa, Japan.

National Commission for Protection of Cultural Properties

- 1951 *Bulletin of the Association for the Rehabilitation of Cultural Properties.* Government of Japan, Tokyo.
- 1955 The Selection Criteria of Special Historic Sites, Places of Scenic Beauty and/or Natural Monuments and Historic Sites, Places of Scenic Beauty and/or Natural Monuments. Public Notice Item No. 4. Government of the Ryukyu Islands, Okinawa.

Nishiwaki, Masaharu

- 1984 Jugon no Hanashi. [Stories of the Dugong]. In *Zenshu Nihon Dobutsu Shi 30.* [Complete Works of the Japanese Animal Records, No. 30]. In Japanese. Kodansha, Co., Ltd., Tokyo, Japan.

- Nishiwaki, M., T. Kasuya, N. Miyazaki, T. Tobayama, and T. Kataoka
 1979 Present distribution of the dugong in the world. *Scientific Reports of the Whales Research Institute* 31:133-141.
- Nishiwaki, M., and H. Marsh
 1985 Dugong *Dugong dugon* (Muller, 1776). In *Handbook of Marine Mammals*, Volume 3: The sirenians and baleen whales, edited by S. H. Ridgway and R. Harrison, pp. 1-31. Academic Press.
- Nitta, Jusei, et al.
 1977 *Tokijin Hamabaru Kaizuka Chosa Hokokusho (I) [Survey Report of Tokijin-hamabaru Shellmound (I)]*. Nakijin-son Bunkazai Chosa Hokoku Dai 1 Shu [Survey Report of the Cultural Resources of Nakijin Village, No. 1]. In Japanese. Nakijin Village Board of Education, Okinawa, Japan.
- Ogura, G., T. Hirayama, K. Sudo, N. Otaishi, H. Mukai, and Y. Kawashima
 2005 Investigation of the northern limit of dugong habitat in the Tokara Islands and Amami-Oshima in the Ryukyu Archipelago, Japan. *Wildlife Conservation Japan* 9:49-58.
- Ohama, Shinken
 1971 *Yaeyama no Jinto Zei. [Capitation Tax of Yaeyama]*. In Japanese. San'ichi Publishing, Co., Ltd., Tokyo, Japan.
- Okinawa Defense Bureau
 2009 *Draft Environmental Impact Statement for the Futenma Replacement Facility Construction Project, April 2009*. In Japanese, translated by TetraTech, Inc.
- Okinawa Prefectural Archaeology Center
 2001a *Okinawa-kenritsu Maizo Bunkazai Center Chosa Hokokusho Dai 2 Shu: Tenkaiji Ato (I) - Suimuikan Chika Chushajo Iriguchi Shinsetsu Koji ni Tomonau Kinkyu Hakkutsu Chosa. [Survey Report of the Okinawa Prefectural Archaeology Center, No. 2: Tenkaiji Temple Site (I) - Urgent Excavation Survey Associated with New Construction of Underground Parking Entrance of Suimuikan Restaurant]*. In Japanese. Okinawa Prefectural Archaeology Center, Okinawa, Japan.
- 2001b *Okinawa-kenritsu Maizo Bunkazai Center Chosa Hokokusho Dai 4 Shu: Isa Meebaru Dai Ichi Iseki - Ginowan Shi Kitanakagusuku Sen (Isa-Futenma) Doro Kaichiku Jigyo ni Tomonau Kinkyu Hakkutsu Chosa Hokokusho (III). [Survey Report of the Okinawa Prefectural Archaeology Center, No. 4: Isa-meebaru No. 1 Site - Report of the Urgent Excavation Survey Associated with the Road Improvements of Ginowan-Kitanakagusuku Line (Isa-Futenma) (III)]*. In Japanese. Okinawa Prefectural Archaeology Center, Okinawa, Japan.

- 2002 *Okinawa-kenritsu Maizo Bunkazai Center Chosa Hokokusho Dai 8 Shu: Tenkaiji Ato (II) - Shuri-jo Koen Kanrito Shinsetsu Koji ni Tomonau Kinkyu Hakkutsu Chosa. [Survey Report of the Okinawa Prefectural Archaeology Center, No. 8: Tenkai-ji Temple Ruin Site (II) - Urgent Excavation Survey Associated with New Construction of the Administration Building of Shurijo Castle Park -J]. In Japanese. Okinawa Prefectural Archaeology Center, Okinawa, Japan.*
- 2003a *Okinawa-kenritsu Maizo Bunkazai Center Chosa Hokokusho Dai 15 Shu: Shirinami Iseki - Naha Chiho Saibansho Hirara Shibu Tatekae ni Tomonau Hakkutsu Chosa. [Survey Report of the Okinawa Prefectural Archaeology Center, No. 15: Shirinami Site - Excavation Survey Associated with the Reconstruction of Hirara Branch Office of the Naha District Court]. In Japanese. Okinawa Prefectural Archaeology Center, Okinawa, Japan.*
- 2003b *Okinawa-kenritsu Maizo Bunkazai Center Chosa Hokokusho Dai 14 Shu: Shuri-jo Ato - Ueki Mon Oyobi Shuhen Chiku Hakkutsu Chosa Hokokusho. [Survey Report of the Okinawa Prefectural Archaeology Center, No. 14: Shuri-jo Castle Ruin Site - Excavation Survey Report of the Ueki-mon Gate and the Adjacent Area]. In Japanese. Okinawa Prefectural Archaeology Center, Okinawa, Japan.*
- 2004a *Okinawa-kenritsu Maizo Bunkazai Center Chosa Hokokusho Dai 18 Shu: Shuri-jo Ato - Gusuku no Shimojiku Hakkutsu Chosa Hokokusho. [Survey Report of the Okinawa Prefectural Archaeology Center, No. 18: Shuri-jo Castle Ruin Site - Excavation Survey Report of Shimoji (Lower) Area of the Castle]. In Japanese. Okinawa Prefectural Archaeology Center, Okinawa, Japan.*
- 2004b *Okinawa-kenritsu Maizo Bunkazai Center Chosa Hokokusho Dai 20 Shu: Shuri-jo Ato - Higashi no Azana Chiku Hakkutsu Chosa Hokokusho. [Survey Report of the Okinawa Prefectural Archaeology Center, No. 20: Shuri-jo Castle Ruin Site - Excavation Survey Report of the Eastern Azana Area]. In Japanese. Okinawa Prefectural Archaeology Center, Okinawa, Japan.*
- 2004c *Okinawa-kenritsu Maizo Bunkazai Center Chosa Hokokusho Dai 19 Shu: Shuri-jo Ato - Jokaku Minami Gawa Shimojiku Hakkutsu Chosa Hokokusho. [Survey Report of the Okinawa Prefectural Archaeology Center, No. 19: Shuri-jo Castle Ruin Site - Excavation Survey Report of the Southern Shimoji (Lower) Area of the Castle]. In Japanese. Okinawa Prefectural Archaeology Center, Okinawa, Japan.*
- 2006a *Okinawa-kenritsu Maizo Bunkazai Center Chosa Hokokusho Dai 28 Shu: Shuri-jo Ato - Shoin, Sasunoma Chiku Hakkutsu Chosa Hokokusho. [Survey Report of the Okinawa Prefectural Archaeology Center, No. 28: Shuri-jo Castle Ruin Site - Excavation Survey Report of the Shoin and Sasunoma Area]. In Japanese. Okinawa Prefectural Archaeology Center, Okinawa, Japan.*
- 2006b *Okinawa-kenritsu Maizo Bunkazai Center Chosa Hokokusho Dai 34 Shu: Shuri-jo Ato - Ouchibaru Chiku Hakkutsu Chosa Hokokusho. [Survey Report of the Okinawa Prefectural Archaeology Center, No. 34: Shuri-jo Castle Ruin Site - Excavation Survey Report of the Ouchibaru Area]. In Japanese. Okinawa Prefectural Archaeology Center, Okinawa, Japan.*

- 2007a *Okinawa Kenritsu Maizo Bunkazai Center Chosa Hokokusho, Dai 45 Shu: Shuri-jo Ato - Kugani Udun Chiku Hakkutsu Chosa Hokokusho. [Survey Report of the Okinawa Prefectural Archaeology Center, No. 45: Shuri-jo Castle Ruin Site - Excavation Survey Report of the Kugani Udun Area].* In Japanese. Okinawa Prefectural Archaeology Center, Okinawa, Japan.
- 2007b *Okinawa Kenritsu Maizo Bunkazai Center Chosa Hokokusho, Dai 44 Shu: Shuri-jo Ato - Ouchibaru Nishi Chiku Hakkutsu Chosa Hokokusho. [Survey Report of the Okinawa Prefectural Archaeology Center, No. 44: Shuri-jo Castle Ruin Site - Excavation Survey Report of the Western Area of the Ouchibaru].* In Japanese. Okinawa Prefectural Archaeology Center, Okinawa, Japan.
- 2007c *Okinawa-kenritsu Maizo Bunkazai Center Chosa Hokokusho Dai 46 Shu: Watanji Mura Ato - Rinko Doro Naha 1 Gosen Seibi ni Tomonau Kinkyu Hakkutsu Chosa Hokoku. [Survey Report of the Okinawa Prefectural Archaeology Center, No. 46: Watanji-mura Village Ruin Site - Report of the Urgent Excavation Survey Associated with the Improvement of the Naha Route 1, Harbour Road].* In Japanese. Okinawa Prefectural Archaeology Center, Okinawa, Japan.
- 2008 *Okinawa Kenritsu Maizo Bunkazai Center Chosa Hokokusho, Dai 47 Shu: Shuri-jo Ato - Shicha Unaa Suimui Utaki Chiku Hakkutsu Chosa Hokokusho. [Survey Report of the Okinawa Prefectural Archaeology Center, No. 47: Shuri-jo Castle Ruin Site - Excavation Survey Report of Shicha Unaa Suimui Utaki Area].* In Japanese. Okinawa Prefectural Archaeology Center, Okinawa, Japan.

Okinawa Prefecture

- 1894-1940 Investigative Reports of Fisheries. *Okinawa-ken Tokeisho [Okinawa Prefecture Statistical Reports].* In Japanese. Okinawa Prefecture, Okinawa, Japan.

Okinawa Prefectural Education Committee

- 1975 *Okinawa no Bunkazai 1975. [Cultural Resources of Okinawa, 1975].* In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

Orikuchi, Shinobu

- 1956 *Minzokushikan ni Okeru Takai Kannen. [Notion of Death in the Historical View of Ethnology].* In *Orikuchi Shinobu Zenshu 16 [Complete Works of Shinobu Orikuchi, No. 16].* In Japanese. Chuo Koronsha, Co., Ltd., Tokyo, Japan.

Oshiro, Tatsuhiro, Masahiko Hoshi, and Tadashi Ibaragi

- 1976 *Nihon no Densetsu (Dai I Ki) Zen 12 Kan 2: Okinawa no Densetsu. [Japanese Traditions (First Period), Total 12 Volumes, Volume 2: Okinawan Traditions].* In Japanese. Kadokawa Group Publishing, Co., Ltd., Tokyo, Japan.

Ouwehand, Cornelius

- 1985 *Hateruma: Socio-Religious Aspects of a South-Ryukyuan Island Culture.* Leiden: E.J. Brill.
- 2004 *Hateruma: Minami Ryukyu no Tosho Bunka ni Okeru Shakai - Shukyo Teki Shoso. [Hateruma: Socio-Religious Aspects of South Ryukyu Islands Culture].* Translated by Nakahachi, Yoshimori. In Japanese. Yoju Shorin, Inc., Okinawa, Japan.

- Ozawa, Toshio
 1989 Shiso Densho to Mukashi Banashi. [Ancestors Lore and Old Tales]. In *Higashi Asia no Sosei Shinwa. [Genesis Myths of East Asia]*. In Japanese. Koubundou, Co., Ltd., Tokyo, Japan.
- Preen, A.
 1995 Diet of dugongs: are they omnivores? *Journal of Mammalogy* 76:163-171
- Preen, A., and H. Marsh
 1995 Response of dugongs to large-scale loss of seagrass from Hervey Bay, Queensland, Australia. *Wildlife Research* 22:507-519.
- Publication Office of Okinawan Encyclopaedia
 1983 *Okinawa no Dai Hyakka Jiten Chukan. [Okinawan Encyclopedia, Volume II]*. In Japanese. Okinawa Times, Okinawa, Japan.
- Richardson, W. J., C. R. Greene, C. I. Malme and D. H. Thomson
 1995 *Marine Mammals and Noise*. Academic Press, San Diego, 576 pp.
- Røkkum, Arne
 1998 *Goddesses, Priestesses, and Sisters: Mind, Gender And Power in the Monarchic Tradition of The Ryukyus*. Scandinavian University Press, Oslo.
 2006 *Nature, Ritual, and Society in Japan's Ryukyu Islands*. Routledge, London.
- Shimabukuro, Harumi
 1991 Iwayuru "Chokei Kokki" ni Tsuite. [About So-Called "Butterfly-shaped Bone Products"]. In *Nanto Kouko Dai 11 Go. [Southern Islands Archaeology, No. 11]*. In Japanese. Okinawa Archaeological Society, Okinawa, Japan.
- Shimabukuro, Hiroshi, et al.
 1997 *Ishikawa shi Kogachibaru Kaizuka - Okinawa Jidosha Do (Ishikawa-Naha Kan) Kensetsu Koji ni Tomonau Kinkyu Hakkutsu Chosa Hokokusho (6) [Kogachibaru Shellmound, Ishikawa City - Report of the Urgent Excavation Survey Associated with the Construction Works of Okinawa Expressway (Ishikawa - Naha) (6)]*. Okinawa-ken Bunkazai Chosa Hokokusho Dai 84 Shu [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 84]. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.
- Shimada, Sadahiko
 1920 *Okinawa-ken Sachi Hiijaa Kaizuka, Rekishi to Chiri, Dai 30 Kan Dai 5 Go [History and Geography of Sachi Hiijaa Shellmound, Okinawa Prefecture, Volume 30, No. 5]*. In Japanese. Kyoto University, Kyoto, Japan.
- Shirakihara, M., H. Yoshida, H. Yokochi, H. Ogawa, T. Hosokawa, N. Higashi, and T. Kashuya
 2007 Current status and conservation needs of dugongs in southern Japan. *Marine Mammal Science* 23:694-706.
- Shiroma, Chokyo
 1951 Ten'nen Kinenbutsu. [Natural Monument]. *Okinawa Times*, 30 September. In Japanese.

Summerhayes, Glenn R., and Atholl Anderson

- 2009 An Austronesian Presence in Southern Japan: Early Occupation of the Yaeyama Islands. *Bulletin of the Indo-Pacific Prehistory Association*, Vol. 29.

Sunagawa, Tetsuo

- 2002 Aragusuku-jima to Jugon (Zan), Sono Seisui no Rekishi. [Aragusuku Island and Dugong (Zan) - Its History of Ebb and Flow]. In *JohoYaima - Volume 108. [Information of Yaima, No. 108]*. In Japanese. Nanzansha, Co., Ltd., Okinawa, Japan.

Takamiya, Hiroto

- 1997 *Subsistence Adaptation Processes in the Prehistory of Okinawa*. Unpublished Ph.D. dissertation, University of California at Los Angeles.

Takeshi, T.

- 2003 Sekitsui dobutsu itai kara mita Amami • Okinawa no kankyo to Seigyō [Environment and Occupation through Vertebrate Animal Remains of Amami and Okinawa]. *Senshi Ryukyu no Seigyō to Koeki - Amami/Okinawa no Hakkutsu Chosa kara - Kaitei Ban* [Occupation and Trade of Prehistoric Ryukyu - From the Excavations of Amami and Okinawa - New Edition]. In Japanese. Kinoshita Laboratory, Faculty of Letters, Kumamoto University, Kumamoto, Japan.

The 2nd Fishing Exhibition Bureau (ed.)

- 1897 *Dai 2 Kai Suisan Hakurankai Shuppin Mokuroku, Dai 2 Satsu, Dai 2 Bu, Seizo*. [Exhibition Catalogue of the Second Fishery Exhibition, Volume 2, No. 2. Manufacturing]. In Japanese. Ryu'unkaku, Unknown.

Tokuno, Toshimi

- 2002 Shiryō ni Miru Jugon. [Dugong in the Historical Materials]. In *JohoYaima -Volume 108. [Information of Yaima, No. 108]*. In Japanese. Nanzansha, Co., Ltd., Okinawa, Japan.

Tyack, P. L.

- 2009 Human-generated sound and marine mammals. *Physics Today* 62:39-44.

Uchida, S.

- 1979 Animals waiting for salvation (43) dugong. *Doubutu To Doubutu-en* [Animals and Zoos] 12:16.
- 1994 The dugong. In *Base Data of Japanese Rare Wild Aquatic Organisms*, edited by S. Odate, pp. 569-583. Fisheries Agency and Japanese Association for Conservation of Aquatic Resources, Tokyo.
- 1996 Dugong. In *The Encyclopaedia of Animals in Japan*, Volume 2: Mammals II, edited by K. Izawa, T. Kasuya and T. Kawamichi, pp. 102-103. Heibonsha Ltd.
- 1998 Giant fishes and whales. *Iwo-Machi [Fish Town]* 21:1-16. In Japanese.
- 2005 Dugongs, humans and aquaria. *Kokuritu-kouen* [National Parks] 635:8-11 (in Japanese).

Uehara, Shizuka, et al.

- 1983 *Kouribaru Iseki Hakkutsu Chosa Hokokusho* [Excavation Survey Report of Kouribaru Site]. Nakijin-son Bunkazai Chosa Hokokusho Dai 8 Shu [Survey Report of the Cultural Resources of Nakijin Village, No. 8]. In Japanese. Nakijin Village Board of Education, Okinawa, Japan.

Uni, Yoshikazu

- 2003 Okinawaken no Jugon, Dugong dugon Hokaku Tokei. [Okinawan Dugong: Statistics of Captured Dugong dugon]. In *Nago Hakubutsukan Kiyo 11 - Ajimaa*. [Bulletin of Nago Museum, No. 11: Ajimaa]. In Japanese. Nago Museum, Okinawa, Japan.

Uruma City Board of Education

- 2006 *Uruma Shi Bunkazai Chosa Hokokusho Dai 4 Shu: Gushikawa Gusuku I, Hakkutsu Chosa Hokoku Gaiho*. [Survey Report of the Cultural Resources of Uruma City, No. 4: Gushikawa Gusuku I - Summary Excavation Survey Report]. In Japanese. Uruma City Board of Education, Okinawa, Japan.
- 2009 *Uruma Shi Bunkazai Chosa Hokokusho Dai 7 Shu: Higashionna Mikawabaru Iseki/Heshikiya Furujima Iseki/Tobaru Kaizuka, Shinai Iseki Hakkutsu Chosa ni Tomonau Maizo Bunkazai Hakkutsu Chosa Hokokusho*. [Survey Report of the Cultural Resources of Uruma City, No. 7: Higashionna-mikawabaru Site, Heshikiya-furujima Site, and Tobaru Shellmound - Excavation Survey Report of the Buried Cultural Resource Associated with the Excavation Survey of Sites in the City]. In Japanese. Uruma City Board of Education, Okinawa, Japan.

US Department of Defense

- 2008 Chapter 12: Historic and Cultural Resources. In *Japan Environmental Governing Standards*. Headquarters, U.S. Forces Japan, Tokyo.

Wada, Hisanori

- 1994 *Rekidai Hoan* [Rekidaihoan] Translation into Japanese with notes. Historiographical Institute of Okinawa Prefectural Library, Okinawa Board of Education, Okinawa, Japan.

Watsuji, Tetsuro

- 1965 *Fudo: Ningengakuteki-kosatsu*. [Climate: An Essay in the Study of People]. Original 1935, in Japanese. Iwanami shoten, Tokyo.

Whiting, S. D.

- 1999 Use of the remote Sahul Banks, northwestern Australia, by dugongs, including breeding females. *Marine Mammal Science* 15:609-615.
- 2002 Rocky reefs provide foraging habitat for dugongs in the Darwin region of northern Australia. *Australian Mammalogy* 24:147-150.

Yaeyama Culture Study Group

- 1980 *Yaeyama Bunkaron Shu (Dai 2 Go), Soritsu 10 Shunen Kinen Go*. [Collection of Yaeyama Cultural Theory, No. 2: Commemoration Issue of the 10th Anniversary of the Publication]. In Japanese. Yaeyama Culture Study Group, Okinawa, Japan.

Yaeyama Old Tales Seminar

- 2002 “*Yaeyama Mukashi Banashi*” *Yaeyama Mukashi Banashi Seminar Saiwa Sakuhinshu*. [*Old Tales of Yaeyama: Rewritten Collected Works of Yaeyama Old Tales Seminar*]. In Japanese. Yaeyama Old Tales Seminar, Okinawa, Japan.

Yamamuro, M., K. Aketa, and S. Uchida

- 2004 Carbon and nitrogen stable isotopic ratios of the tissues and gut contents of a dugong from the temperate coast of Japan. *Mammal Study* 29:179-183.

Yamashita, Kin'ichi, Shoji Endo, and Akira Fukuda

- 1989 *Nihon Densetsu Taikai (Dai 15 Kan, Nanto Hen)*. [*Anthology of Japanese Legends, Volume 15: Southern Islands*]. In Japanese. Mizu'umi Shobo, Co., Ltd., Tokyo, Japan.

Yokoyama, Mikiko

- 1980 *Keimango Iseki [Keimango Site]*. Nagasaki Prefectural Board of Education, Nagasaki.

Yoshida, M., and R. B. Trono

- 2004 Dugong conservation network in Asia and Pacific. In *Knowledgeable Marketplace Reports: The 3rd IUCN World Conservation Congress*, Pp. 1-9.

Yoshinari, Naoki

- 2003 *Ryukyu Minzoku no Teiryu: Ko Kayo ha Nani wo Kataruka*. [*Undercurrent of the Ryukyuan Folklore*]. In Japanese. Kokon Shoin, Co., Ltd., Tokyo, Japan.

APPENDIX A.

INTERVIEWS

SUMMARY OF THE INTERVIEWS AT [REDACTED] [REDACTED]

INTERVIEW WITH [REDACTED]

OCTOBER 6, 2009

[REDACTED]
[REDACTED]
[REDACTED] Through his upbringing, [REDACTED] is thus familiar with fishermen's way of thinking about the link between the sea and the spirit world.

[REDACTED] makes an example of a sighting of a single dugong four to five years ago off the beach near the Onna Village Museum of Okinawa Island. Even if the dugong thrives in shallow waters, and thus can be easily spotted and killed for food, he does not think that its hunting has anything to do with the culture of Okinawa Island. He adds that there is no more a tradition of hunting whales, even if they are spotted in far larger numbers, than the dugong. Okinawans in general (here he does not include specialized fishermen [REDACTED]) just keep a watch on the marine life thriving on the coral reefs. They relish meat of turtle, dolphins and possibly also the dugong, but only as occasional treats along with rice which has been rinsed in seawater before cooking. Cooking is simple, only with salt as condiment. Historically, their main concern was to get just enough from the sea to stave off hunger.

Gathering edibles on the coral reef is subsistence activity; it is not practiced for the sake of wealth accumulation. But even so, there will still be a worry for the days ahead. Now, what they observe in this respect is that places along the coastline teeming with maritime life are precisely the places which have been sacred since a long time ago. Where the spirits (deities) reside, there is always something to eat. Even with a pragmatic attitude towards harvesting the reef, there is a belief that the yield comes from the spirits. And so, for the sake of showing gratitude, a return is due – whether or not the catch was due to collaborative planning or merely good luck. His string of thought goes as follows: Sustenance can be upheld only if people keep in mind that the catch is delivered by the spirits and that part of it must go back to the spirits. The return should include the whole thing, an unblemished exemplar of the catch. The whole is beautiful (*kirei*). But this summarizes just a disposition or attitude on the part of Okinawans about the correct way of accepting and returning edibles obtained from the sea. [REDACTED] is not insisting on a religious motif here, but on the primacy of a social etiquette which sees no boundary between humans and spirits. The dugong is not a privileged species in this makeup of humans, spirits, and the sea. It is not an object of worship (*shinko no taisho de wa nai*).

INTERVIEW WITH [REDACTED]
OCTOBER 7, 2009

[REDACTED] The interview is carried out as a dialogue between [REDACTED] and Arne Røkkum, with occasional participation by another research associate seated at the table. [REDACTED] brought copied materials, writings on the dugong done in collaboration with other researchers. He read from the House Annals of the Miyara royal appointee of the Miyara district (*magiri*) in what is now Ishigaki City.

Røkkum: There is a “dugong shrine” in the Yaeyamas, on the island of Aragusuku. Would that entitle us to say that the dugong is worshiped as a deity?

[REDACTED] Well....

Røkkum: People in Aragusuku have a notion of the *nirasuku*, a ravine that might lead to the world of the Nirai Kanai [a female deity of the hollows of coral formations].

[REDACTED] Perhaps the dugong plays the role of an intermediary here.

[REDACTED] A tsunami hit the Yaeyamas in 1771. In the area of Shiraho on Ishigaki Island, the loss of population was 90 percent. The only survivors were those who heeded the warning given by the dugong. The story goes like this: A dugong had been caught by fishermen some days before the catastrophe. It talked to them in a human voice while shedding tears, promising to bring them a word about something about to happen if only they would spare its life. In this way, those who heeded the advice given by the dugong moved away from the low-lying area along the beach just in time before the area was hit. They were the survivors. From then on, the dugong has been revered in Ishigaki.

Røkkum: I see a parallel here between this account and what I heard on Yonaguni Island about animals, such as horses and cows, begging for their lives and shedding tears. This is a narrative device for assigning the role of an animal as a familiar or intermediary, or – as would be the term in Japanese language: a *monoshiri* -- a knower.

[REDACTED] Catching the dugong was a specialized skill. It was usual to catch sea turtles for food during the dugong hunting trips. Skulls of dugong are buried in the topsoil of a sanctuary of Kamiji Island of Aragusuku. A sample of these bones has been excavated and taken away for study by members of the Taketomi Educational Board. The shrine itself is dedicated to the dugong.

Røkkum: Were the findings of dugong bones made inside the innermost enclosure, the *ibi*? This is normally an off-limits perimeter for outsiders. Entry is only for priestesses [*tsukasa*] and members of an initiation society [*yamaninzu*] still active despite the virtual depopulation of the island. (Røkkum has studied the annual initiation society festival from a position outside the *ibi* perimeter).

[REDACTED] The bones were found inside the *ibi*. Dried and salted meat of the dugong fulfilled the needs for tax payment to the Ryukyu Government. This was a per capita tax payable either as rice from the male population and fabrics from the female population or, alternatively, as corvée labor. An absence of rivulets and subterranean freshwater pools on the island makes irrigated rice cultivation an impossible task. Instead, the islanders were granted a concession to hunt dugong for the sake of paying taxes. This was promulgated as an exclusive right for residents of Aragusuku. Normally in

the Yaeyamas, there would be much disagreement about fishing rights. But in the case of the dugong catch, the Aragusukuans enjoyed a monopoly by royal decree. So they were free to hunt wherever they liked. No one would object. One of the hunting places known for its long stretches of seagrass has now become the reclaimed land of Ishigaki Harbor. Dugongs were an easy catch due to their lack of fear of humans and due to their habit of having fixed resting places, as in this coastal area of Ishigaki as well as in some places along the coast of Iriomote.

Rokkum: This seems to be the only instance from the near-present of dugong hunting as a specialized and approved skill. It is important to note that it does not have its roots in local culture. South Ryukyuan are not averse to consuming the meat of sea mammals, but only as a haphazard treat as I noted in the case of a dolphin catch on Yonaguni Island. In the case subject to scrutiny here, islanders are granted the right to hunt a species but not to consume it.

██████████ Salted or dried meat of the dugong was brought to the Shuri Castle. Evidence of the use of dugong meat can be found in the House Annals of the Miyara House in Ishigaki, where the administrative chief of the Yaeyamas resided. It was probably the main ingredient of the ubiquitous broth dish, named *suimono* (a dictionary word used for a dish which differs from the mainland Japanese alternative). These banquets took place even with a royal decree that all dugong meat obtained from the Yaeyamas is for the exclusive consumption at the Shuri court.

Rokkum: There is nothing exceptional about the preparation of the ingredient dugong meat. The rules of cooking and meal presentation seem not to differ from the standard arrangement for banquets. But meat of the dugong being a rare treat, it probably added an exclusive flavor to the banquet itself. Meat normally reserved for the king can be appropriated by the host of the banquet to show off his royal connection.

██████████ Dugong meat was a treat offered to ambassadors from China.

Rokkum: Did they demand this culinary treat?

██████████ Perhaps. There are records showing that the Chinese had a preference for rare culinary treats, such as sea cucumber and certain seaweeds.

Rokkum: Compare the references in written materials relevant to the following items: first, dugong imagery was reproduced in embroideries on the emissaries' garb; second, a dugong population is associated with the waters of Hainan Island; third, there was a cooking place at the Shuri Castle, where dugong meat was prepared.

██████████ In the annals of the Miyara Dunchi "dugong" is written *zan*. Preparing the meat for cooking was a man's job. Strict rules obtained for the arrangement of dishes, although there is not much information about the recipes.

██████████ Even with the strict rule of taxation, the economy as a whole was founded on informal networks of barter. While the islanders of Ishigaki and Iriomote could deliver produce from agriculture and rice farming, people on more arid islands such as Aragusuku had to develop their own specializations. In addition to dugong hunting, they were expected by the authorities to produce ceramics. This privilege enabled them to define a niche for themselves within the barter networks. But the geographical closeness to a large and sparsely inhabited island, Iriomote, also offered an opportunity to practice agriculture. Such inter-island interdependency was typical of the Yaeyamas during the

period of the Ryukyu Dynasty. The only exception was the remote Yonaguni Island, where the inhabitants enjoyed self-sufficiency within their own territory.

SUMMARY OF THE INTERVIEW AT THE [REDACTED]

INTERVIEW WITH [REDACTED]
OCTOBER 9, 2009

In [REDACTED] dugong bone artifacts such as hairpins and bracelets, the excavated artifacts, were ceremonial accessories rather than tools. Since the butterfly shaped bone artifacts excavated from archaeological sites in Okinawa were painted in red, they seem to be charms rather than tools. In the early stage of these artifacts, people used stones as a base material, and then they changed the material to whale bones and jawbones of wild boars. In a later period, during the time when Okinawan original earthenware develops, the material tends to be dugong jawbones and rib cage bones. It could be said that the foundation of Okinawan spiritual culture hit its peak during Late to Final Jomon Periods.

On the contrary, in Katsuren-jo castle ruin site in Uruma city, the excavated dugong bone artifacts were tools rather than charms. Other sites located in Katsuren such as the Shinugudo Site and Chiharabaru Site follow the same pattern with one another, as they bear a common aspect of having a shallow beach near by, which the dugong prefer to inhabit. In these sites, drills made by dugong bones were excavated.

The point is the distinction between artifacts that are ornaments (or charms) and tools can be made clearly. However, it is very difficult to tell jewelry from charms, so I only can say "there's a strong possibility that the artifact is an ornament/charm."

It is also unknown whether the bone artifacts were introduced from China during a certain period of time, because we don't have such records from the Late Jomon Period. The point is, considering the concept of "dressing up" and that it takes a lot of time to produce such artifacts, the artifacts were not just accessories for ordinary people but for those of higher social status.

The presence of these (non-tool) bone artifacts comes to an end during the Final Jomon Period and cannot be found in Gusuku Period. Excavated dugong bones of the Gusuku Period were food residues or tools. The bones were used as a material to replace iron. Iron was imported from China, and was relatively rare in that time. In places where the dugong don't appear, people substitute bones of cows and horses, which were also imported from China. Since the dugongs inhabit shallow waters with abundant seagrasses much like those found in Awase (in Okinawa City) or Chatan, such replacement of material can be noticed in the excavated artifacts.

In the Yayoi (Late Shellmound) Period, people made bracelets with dugong rib bones. The rib bones are narrow, so people combined some to make one bracelet. Only two jawbones can be obtained from one dugong, but when it comes to rib bones, one dugong can provide a lot. Rib bones were used as parts of butterfly shaped artifacts or tools such as drills or string stoppers (of a bag), and they were excavated from Kogachi Shellmound in Uruma City. Rib bones of the dugong are often used as accessories, charms, and tools in Late Jomon Period. Probably, this is related to the shallow water area where the coral reef grows. The shallow water is limited to ten meters in depth, and these kinds of shallow waters do not exist in Amami. The farther we go up north, the narrower the reef gets, and dugong tend to approach wide shallow waters. Regarding the Yaeyama and Miyako Islands, there is another earthenware culture that is much different from that of mainland Okinawa due to the long distance between them. Since Yaeyama and Miyako culture has been not studied thoroughly at this point, much is not clear.

About ten dugong skulls were excavated from the Heshikiya-Tobaru Site in the White Beach area. Since the site belongs to the Yayoi Period, the excavated bones are not tools. Rib bones are the most commonly excavated artifacts from archaeological sites, so it is very rare to have so many skulls from one site. Therefore, concepts or ideas of the dugong could differ from region to region, whether they are regarded as food or a source of material.

Bones of the Ryukyu wild boar, smaller than those that lived in mainland Japan, were excavated from the Ireibaru Site (in Chatan), Noguni Site (in Kadena), Aragusuku Site, and the Aragusuku Shichabaru No. 2 Site. I don't know the reason why, but these remains tend to be from the Early Jomon Period to the Gusuku Period. Pig bones were also excavated from the Gusuku Period, which is when the trade with China flourished and cows and horses were introduced to the Ryukyus. In Katsuren, artifacts made of dugong bone, used as iron substitute, were found. In Sashiki Gusuku, the person who had iron must have had some kind of authority. This could suggest that iron was difficult to obtain for the general population, and that is the reason why people used dugong bone as a substitute material.

I've heard a story that a dugong was caught in a net set in shallow waters. I've also heard a story that dolphins got lost seasonally somewhere under Nago, but I forgot the exact place name. In the Jomon and Yayoi Periods, the proportion of dugong bones as food residue is much less than that of wild boars and shellfish. Ten dugong skulls were excavated from the Heshikiya-Tobaru Site, which can suggest the dugong was hunted by people just as they hunted whales. Since Yayoi style earthenware was excavated from the East coast, there is a possibility that the Okinawans made contact with mainland Japanese, who might have different attitudes against the dugong hunting. In other words, people of the Yayoi period might have had techniques to catch the dugong. If the dugong was consumed throughout Okinawa, dugong bones should be found at excavations all over the island. However, the skulls were only excavated from Heshikiya-Tobaru Site at this point. There is a possibility that the dugong was hunted and consumed in these areas of shallow waters during the Yayoi Period. From this site, other bone parts were also excavated, and the skulls were not concentrated in one spot, but they were scattered within the site. Probably, the butchering was held at the site. Possibly, the dugong hunting was held consciously in the White Beach area, and at other sites this custom cannot be found.

Dugong bones that were excavated from the Ireibaru Site are tools and accessories from the Jomon Period. Bones are mainly excavated from sites that belong to the Jomon Period, while seashells are mainly found from the sites related to the Yayoi Period. Regarding butterfly shaped bone artifacts, which consist of several bone pieces of wild boar, fish, sea turtle, and dugong, these are excavated from about 30 places around Yomitan, Katsuren Peninsula, and Kouri-jima. Since these butterfly shaped bone artifacts were found as single items in the cultural deposits, and not used for burials, the specific use of these artifacts are still unclear. The butterfly shaped bone artifacts and dugong bones are distinctive characteristics only found in Okinawan spiritual culture. The meaning of the butterfly shaped bone artifacts is not yet clear, but it is a unique or very unusual aspect of Okinawan culture since they are not found in Amami, and the theory of a route of origin from China lacks credibility. In the Jomon Period, there was no direct connection found between Okinawa and China. Therefore, researchers are looking into a relationship with Kyushu, and especially to the custom of coloring the artifact in red.

SUMMARY OF THE INTERVIEW AT THE [REDACTED]

INTERVIEW WITH [REDACTED]

OCTOBER 13, 2009

[REDACTED] that he has had a personal interest [REDACTED] since when he was in college. Among these personal researches, the dugong was one of the topics.

As you might already know, during the time from Pleistocene to Early Jomon, the Ryukyu Sika deer became extinct, leaving the wild boars as the largest land mammals. This is one of the questions that surround the archaeological studies in Okinawa. The time when earthenware is first discovered is after the time the Ryukyu Sika appears to have become extinct. The Minatogawa man is dated to be 18000 years old. The oldest earthenware culture begins 6000 years ago. The 12000-year length of time between these periods remains a time about which little or nothing is known.

[REDACTED]

Within the Yayoi period on the mainland, artifacts such as arrowheads made from deer antlers are found. In the Ryukyus the same situation can be found with the dugong bones, which, in contrast to those of many other animals, are highly dense. During the Yayoi period, iron and bronze were relatively rare in the Ryukyus. Therefore the bones might have been utilized as a substitute material. Even in the Gusuku period, many dugong bone tools and arrowheads are found.

Later, during the time of the Ryukyu Kingdom, the island of Aragusuku was ordered to submit the dugong as offerings.

The dugongs that inhabit the seas around Okinawa share a similarity in their DNA structure with those that live in Manila Bay. A scientific report suggests the dugongs in Australia have a more different type of DNA. [REDACTED]

[REDACTED] According to a report made prior to World War II, in a cave found in Cape Irago of Aichi prefecture, there is a site dating to the Middle to Late Jomon Period where dugong bones were found.

Other than this, dugong remains are found at the Nabatake site of Saga prefecture, which dates to the Final Jomon period, and is famous for the earliest evidence of rice cultivation in Japan. He suspects the dugong made its way this far north by getting lost in the Kuroshio Current. Their main distribution, however, remains in the southern seas. No artifacts were discovered at this site, only the unmodified bones of the dugong.

Two reports are also found in Taiwan. On the east coast of Taiwan, there is an island called *Ryoku-to* (Green Island), where Taiwan University reports the finding of dugong remains at an

archaeological site. A fair amount of seagrass favored by dugongs can be found within the coral reef on this island. This might be why they gathered around this area.

But he strongly suggests the primary distribution is located in the areas around the Ryukyu Islands and to the south of Tokara Island.

He says a similar situation can be accounted for with the sea mammals such as sea lions and seals, which inhabit the cold current in the Tohoku and Hokkaido area of Japan, where they were also hunted as a source of protein during the Jomon period.

In the northern area of mainland Japan, the wild boar and deer were hunted as the primary source of protein; the same behavior can be found in the islands of Ryukyu during Pleistocene times. Yet approximately 10,000 years ago, after the time of the Minatogawa man, the deer became extinct. As an additional explanation for this matter, the remains of Minatogawa man discovered at the Minatogawa-jin site, can be categorized into two groups by their stratified location. The two are known as the Jobu-Minatogawa-jin (Upper Minatogawa Man) and Kabu-Minatogawa-jin (Lower Minatogawa Man). A vast number of deer and boar remains were also found at this site. As we ascend in the stratigraphy, you find that the number of deer remains in the site tends to decrease, and, in turn, the findings of boar remains increase. This was reported by Tokyo University and published in English. The reason for this changing pattern is still unknown. Professor Hiroyuki Otsuka from Kagoshima University has conducted research on this topic, but he has not found the cause yet.

The wild boar in Okinawa, known as the Ryukyu Inoshishi, is a subspecies smaller than that of the Japanese boar. It is a common understanding [REDACTED], that when a species is isolated in a remote island, its physical size begins to decrease over the generations. He believes in this matter that the Ryukyu Inoshishi (wild boar) was the predominant source of protein and the dugong was a supplementary source along with fish and shells during the hunting and gathering period on Okinawa.

In regard to the dugong research, it may play a great role in solving archaeological questions, as it brings two significant factors into play. One in regard to the food supply during the Holocene, and the other concerns utilization of the bone material. Since the deer was extinct, considering the dugong's high bone density, it is possible dugong bones were used as a substitute for deer antlers, mainly used for fishhook production.

For these reasons he believes dugong research is significant in archaeological studies in Okinawa. And to cover all the bases, [REDACTED] research regarding the remains, artifacts and feeding residues found in archaeological sites, folklore and pre-war documents regarding hunting method and size of the net it was hunted with, and many other matters concerning the dugong. According to folklore and old records, the size of the nets was normally 200 *hiro*, where one *hiro* is approximately 130 cm, the length will easily exceed 200 meters. They would surround the dugong with this net by using two to three boats. Such methods have gradually come to light through research of these records.

There are research papers written in 1889 by the Tokyo Zoology Association. However, there are no historical documents that address the matter of how the dugong was hunted.

Regarding the use of the dugong as tax payment during the Ryukyu Kingdom, there are very few documents. One of the few things that is known is the fact it was either dried or salted and then delivered to Shuri Castle.

For the Shellmound era, the utilization of dugong can be found as an optional food source, and now [REDACTED] the possibilities of whether there was a site or specific area or people specialized in dugong hunting, and that may have provided portions of their quarry to surrounding neighbors.

Another matter [REDACTED] is if the brains were consumed or not. This suspicion derives from a few skull bones found cracked and opened at the crown of the head.

Regarding the mermaid legends and other myths associated with the dugong, there is the Yonatama story in Irabu Island in Miyako.

He also mentioned the fishing by dynamite frenzy caused by starvation after the war. He suspects this might have played a part in causing the decrease of the dugong population.

If you take a good look at the shape of Okinawa Island on a map, it is easy to determine the areas where the dugong might have been seen in the prehistoric time by considering their feeding behaviors and distinctive characteristics and by locating shallow sandy beaches.

For matters of its nomination as a Natural Monument, there is the report made by Hirasaka of the Department of Interior of the Governor-General of Formosa. Although, for Japan itself, there are no lawful designations that clearly indicate that it had been designated a national monument before World War II.

As for the butterfly-shaped ornament, it is made by using the cheekbone/jaw bone, and carved out to the shape of a butterfly. Other scholars have made the suggestion that the shape is more like the moth, which, in Okinawa, is believed to be a sacred creature that holds mythical powers, and, if seen during the night, many believe it will cause bad luck if you intentionally kill it. The moth is believed to be the carrier of the soul from *Niraikanai* (an Okinawan imaginary place which is believed to be where all living things come from). The butterfly-shaped ornaments date back to as early as 3500 years ago.

He believes that the ornament was made for religious ceremonies. The reason he agrees with this theory is that the similar pattern of the butterfly shape embroidery can be seen on the wardrobes of the *noro* (priestess) in Amami Oshima Island, which are handed down from the previous *noro*. These robes were worn by 17th century *noro* and there are costumes that are 150 to 200 years old. Recently, the possibility that this embroidery is that of a moth rather than a butterfly has gained support. Much controversy has occurred regarding the definition of the motif of the butterfly-shaped ornament over the past years. Although there has been no historical research made of its background, the existence of the mythical moth tale holds out the strong possibility for it to be a moth rather than a butterfly. This artifact might have been associated with burial customs. But this theory is also unsupported, for none of these ornaments are found in tombs or burial sites. [REDACTED] hopes that someday he will find one of these ornaments excavated from a burial site to prove his hypothesis.

SUMMARY OF THE INTERVIEW AT THE [REDACTED]

INTERVIEW WITH [REDACTED]

OCTOBER 14, 2009

In Japan, there was no "Natural Environment Protection Act" before the war; the law was made after the Ministry of the Environment was established in 2001. Until then, the "Wildlife Conservation Act" covered the protection of the natural environment. Since the wildlife conservation act mainly controls hunters, it had less impact on deforestation. In some ways, natural monuments took over the task of natural environment protection. Rare animals were the objects of natural monument designation; even a domesticated animal was designated if it was rare. A long-tailed fowl is one of the examples of this kind of designation at that time.

After the war, destruction of the natural environment became noticeable and people expected that the designation of natural monuments would work as protection for the natural environment. However, the natural monuments failed to protect the natural environment. Basically, these two, natural monuments and protection of the natural environment, are different matters. These designated natural monuments such as animals and plants were appointed as our cultural pride. I mean these designated natural monuments are the reflection of our cultural pride. This is the cultural background of natural monuments' designation. I believe it's better to consider the dugong, cut off from these two concepts of natural monument and natural environment protection.

Regarding the dugong, it was designated as a natural monument after the war; it was not designated before the war. Mr. [REDACTED]'s Taiwan report was more like a preliminary survey to grasp the actual condition of the dugong at that time, rather than a designation as a natural monument. The conducting of a preliminary survey does not always mean that the objective animal would be designated as natural monument. In Taisho 8 (1919), there was an expression of opinion to the official gazette on designation of the dugong as a natural monument, but it ended up being just a request and the dugong was not designated. [REDACTED] What was behind the appeal? Around then, the dugong was over-hunted. There was no rule to control the dugong hunting because the Ryukyu Kingdom was abolished and was replaced by the Haihan-Chiken federal system. It seems that several dozens of dugong was captured annually. By the beginning of the Taisho Period, it was impossible to catch the dugong because of the over hunting. Probably, the condition of the dugong had disappointed people and they came to insist on the designation of the dugong as a natural monument. This over-hunting took place in Yaeyama Islands, and the dugong is extinct or nearly so now. Fortunately, there are some dugongs left in adjacent waters of mainland Okinawa, and this is very interesting to me; in Okinawa, there should be some folklore aspects that functioned as a protection from extinction for the dugongs.

I think, the dugong was regarded as a sacred animal in Okinawa and this is the reason why they were not over-hunted in Okinawa. However, a lot of catch was reported in Itoman according to the prefectural statistical data. Even though, the dugong could have been treated as a sacred animal in central and northern Okinawa, and this could have prevented the dugong from being over-hunted in Okinawa. If I study old folksongs, there would be some supportive ideas that the Okinawan people were in awe of the dugong. By the way, there is folklore in Ogimi that the sea god returns to the sea riding on a back of the dugong; they appear as a pair in the story. Besides, in Kouri Island, there is an Adam and Eve (a human origins) story in which the dugong appears.

Strange to say, nothing is described about the Okinawan dugong in the old historical documents of the Ryukyu Kingdom. There are some writings regarding the dugong in the Yaeyama islands, but no descriptions of Okinawan dugong. So, the only way left for us is to look over private records or private memories because I think history has two layers; one is that of the kingdom which controls the society, and the other is that of ordinary people who are under the kingdom's control.

For Okinawan people, the dugong was regarded as a God as I mentioned before, and I think this was the biggest reason for its designation as a natural monument. I think the cultural aspect of the dugong played the main role in its designation. It could be that the existence of the dugong was far too common for the Okinawan people to acknowledge as a noteworthy monument. They took the dugong for granted. Since the natural scientists and the folklorists see the dugong only from their own perspectives, I mean because the researchers from the two studies did not synchronize their points of view well, the dugong study failed to make progress.

I'm offering an opinion that the designated natural monuments are missing cultural value these days. The value, I mean the connection with people is what we need to mostly consider in the phase of judging designations. Unfortunately, cultural anthropological aspects of the objects are left behind because those who study animals and plants are mostly specialized in natural science. Since I'm not a folklore specialist, I'm not quite sure about these aspects, but Mr. Maeda is an expert in the field.

There are some documents about the dugong in Yaeyama. For example, the dugong dish is described in Ms. Sumiko Kinjo's report that is about the banquet menu served to the emissaries from China. However, of the approximately 400 emissaries in Okinawa for half a year, it was only the upper class who were invited and more likely to have had the dugong dish served. So, this will give us some information about why the Ryukyu Kingdom needed the dugong meat, and that it was used as a part of the banquet. There's less possibility that the Chinese emissaries officially requested the Ryukyu Kingdom to serve the dugong dish; no such thing is reported in "Rekidai Hoan (歴代宝案)", the Ryukyuan diplomatic documents.

People in Aragusuku Island might eat the dugong meat, since the island is the only place that was allowed to hunt the dugong. The dugong meat was said to be good for the health of a pregnant woman, and I think the story was well known to the descendants of samurai in Shuri, Okinawa Island. Since the dugong meat was paid as a tax, the rulers might have shared the meat with their subordinates.

In China, the dugong is described by the Chinese character “海馬” meaning “seahorse,” which is actually a mythical creature believed to live in Okinawa. The record of the mission says that the seahorse has a long neck, and runs over the sea. Such an animal does not exist in the real world. I think the emissaries might have known that they were wrong. This could be the beginning of calling the dugong a “seahorse.”

You should look over a book or a report called “Collection of Old Folksongs in the Southern Islands (南島歌謡集成),” I don't remember the exact title. There should be some descriptions of the dugong.

SUMMARY OF THE INTERVIEW AT [REDACTED]

INTERVIEW WITH [REDACTED]
OCTOBER 16, 2009

The word “jan” or “zan” frequently appears in the sea land names, such as “Jankusa” or “Jangumui / Jankumui.” I guess there is such a sea place name in Itoman region; a dugong entered the area where the seagrass grows, which the dugongs prefer to eat, and he wasn’t able to get out of there and ended up being caught. People called the area “Jangumui.”

In Ginoza, there is no traditional folk event that relates to the sea. I heard a story that the fisherman had tried to catch the dugong. When the fishermen found a dugong eating the sea grass in shallow water, they rowed a boat to catch him. Yet the dugong swam too fast to catch up with, they always failed to catch the dugong. I never heard that they made it. I think they tried to hunt the dugong with a harpoon instead of using a net. There’s a story that a dugong came to the mouth of the Fukuchi River. The dugong came into the reef once in several years; it seems people tried to catch it. If the dugongs approach the mouth of a river, I think it would have been easy to catch them.

According to an interview included in a journal of Ishigaki Island, right after the war, when a man threw dynamite to the sea, it accidentally killed a dugong and the surfaced carcass surprised people. In the island’s museum, a stuffed specimen and dried or smoked meat of the dugong is displayed. In Ishigaki, the dugong meat was sold at a market until right after the war, so the displayed dugong meat might be a part of the product.

A few years ago, there was a presentation about the dugong hunting method conducted in the Yaeyama Islands. There were two presenters: one is from the Yaeyama Islands, and another was Mr. Masanao Toyama. According to him, a net was used to catch the dugong. Fishermen on a motorboat chased the dugong knowing there was a particular way that the dugong runs away. The fishermen spread a net in advance within the dugong’s escape route (which leads to the reef) and await the dugong being caught. Then, the fishermen cut off the dugong’s tail because it’s the potentially fatal part for them. The tail is said to be powerful enough to destroy a boat.

I know the dugong appears in the *Omoro Soshi*, but the story of the annual events that relate to the dugong is not heard of any more. The informants, who are in their 90s, don’t even have much information, or dugong-related folktales to share with us. These informants were elementary school students before the war. In addition to this, the dugong seldom appears in the statistical data after around 1915 to 1916.

Regarding the dolphin, it was rarely the case that they lose their way and enter the coral reef in Ginoza. As for the method of capture, the fishermen seemed to use a harpoon but they seldom succeeded in hunting; a success rate was once in several years. In Nago, the fishermen got into a motorboat and set out to the sea and drove them into a net.

Speaking of archaeological aspects of the dugong, in Ginoza, the dugong bones were excavated from an old tomb [REDACTED] [didn’t mentioned its exact name] and from layers dating to the Late Jomon Period at the Meebaru Shellmound and the Meebaru Site (a deep one that has acorns in the pits). Both the shellmound and the site are located near the sea. Since the tomb is also an archaeological site called the Ueenuatai, the unearthed dugong bones might be related to the site. [REDACTED] to survey the Ginoza-Furujima Site because it has a possibility of holding dugong bones. Although the Ueenuatai Site is

located inland, there is a probability of finding the dugong bone because there might have been a barter system back then. These excavated dugong bones were found as food remains; they are not bone artifacts or processed goods because they bear traces of being cut by sharp-edged tools. The dugong bones belong to the Late Jomon to Early Yayoi Period; there is time duration, but the main period is the Late Jomon Period. On the contrary, the number of excavated dugong bones in Kin is much less; I'm not quite sure about this because excavation survey has not been conducted to a sufficient degree to conclude about the situation in Kin.

I know folklore about dugong hunting. In Yaeyama, people cut off the dugong's tail. This is the only one that I heard. When I was a child, my parents also told me that when the sea gets stormy, it's because of the dugong. In Ishigaki Island, people had hunted the dugong right after the war and sold its meat at the market. I never heard that the Okinawan people ate the dugong meat. The thing that comes from the sea is all for the kings, so people could have eaten them not openly but secretly, I guess.

SUMMARY OF THE INTERVIEW AT THE MARINE HISTORY MUSEUM, URUMA CITY

INTERVIEW WITH MR. ISSHU MAEDA OCTOBER 16, 2009

From a folklore point of view, it is important to first have a good grasp of when and where the dugong appears in documents and religious festivals. For example, in Tsuken Island, men are allowed to hunt the dugong only during a certain festival. They dissected it to offer the meat at the sacred grove of the village god, and then they allotted each member of the village the meat. This custom lasted until the end of the war; people stopped distributing the meat when it became impossible to conduct dugong hunting. However, the festival is still taking place merely for form's sake. As the oldest record of such festivals, there is a document written by Mr. Shinobu Oriuchi in Taisho 10 (1921), about 80 years ago. In addition to this, a book written by Mr. Yashu Nakamatsu also has some descriptions of the dugong, especially about the sea god festival.

Those who had experienced the festival have information about the dugong, but they wouldn't talk about it easily. In Hamahiga Island, on the third month of the lunar calendar, people celebrate the sea god who is believed to dwell in Niraikanai (literally, "heavenly land"), a legendary island utopia beyond the sea. At the festival, people sing a song that asks the dugong to come to the island. The festival is still held as a matter of form, and a part of the dugong-related song is included in "A Record of My Travels in Yokatsu (与勝旅行記)," a survey note written by Mr. Shinji Miyagi and edited by City History Compilation Office of Nago City. On the same date, people in Henza Island still celebrate a festival of the dugong, which is called "Sanguwachaa," and you can listen to a dugong-related song directly.

In Ogimi-son, people sing a dugong-related song during the sea god festival; the song says the sea god comes to the island riding on the back of the dugong, and he brings happiness and plenty of catches. The dugong comes to the island as a familiar spirit of the sea god. The dugong also appears in a song in Kume Island; although the song is not heard these days, there is a description of it in "Old Chronicle of Nakazato (仲里旧記)," a record of prewar time. There is a similar song in Kudaka Island. The song is included in the *Omoro Soshi*, a collection of old Okinawan folksongs. In the song, the name of an uninhabited island called "Komaka Island" appears; it is located near Kudaka Island. The song says men go out for fishing to catch lots of sea turtles and dugongs; unfortunately, the song is not heard any more. In Aragusuku Island, there's a song that says villagers watched the dugong when it was hunted and beached. The dugong also appears in a song in Taketomi Island. I would guess that there might be dugong-related songs in Miyagi Island and Ikei Island. However, I did a survey and I don't think there are any documents or festivals relating to the dugong. There may be some hunting of the dugong and religious beliefs about the dugong beyond that in the songs.

The dugong inspires awe in Okinawan people. There are three aspects regarding the recognition and view of the dugong. Firstly, the dugong is regarded as the familiar spirit that brings productiveness. Secondly, the dugong is considered to be a troublesome creature that brings contagious disease or a tsunami. Thirdly, the dugong is treated as a curse to the people. As an example of contagious disease, there's a newspaper article written in the Meiji Period. When people hunted the dugong, they hung it from a tree. Then, a disease had broken out among the pigs throughout Okinawa Island and it became a big problem. When it comes to tsunami, there are related stories in Irabu Island, and descriptions are included in "Old Chronicle of Miyako (宮古旧記)" written by Mr. Koei Sakima. There is a collection of folktales, for which I don't remember the exact book title; the book includes past examples. A story of the dugong that causes tsunami also appears in a folktale passed down in Izena Island. In terms of the curse, there is a story that the dugong spoke to a person who was about to hunt it; the dugong told him,

“I’ll curse you over three generations.” So, apparently there is two-sidedness to the dugong: good and evil.

In terms of the difference between the dugong and the sea animals called “hiitu” (such as the dolphin and the whale), people’s attitude toward them differs. The sea animals are easy to hunt for food. However, when it comes to the dugong, it was not considered as a general food resource because it was paid as a tax to the Ryukyu Kingdom. The dugong dishes were a part of the banquet that was served to the emissaries from China. Pregnant women who belonged to the royal family were served broth of the dugong during the Kinsei Period. The broth was seen around a part of Naha until the Meiji Period. The dugong meat was hard to obtain; only a few people were able to enjoy the dugong meat.

According to the record, Aragusuku Island was the center of the dugong hunting. However, other islands also conducted hunting; there was consumption of the dugong by people outside of the Ryukyu Dynasty. The fact was just left out of the record since it had to be kept as a secret. We know this through the oral history. Especially, right after the war, the dugong was hunted in considerable numbers because of a food shortage; the over-hunting caused a significant decrease of the dugong population. After this period, the dugong was unable to increase in number because of the unsuitable environment surrounding it.

People processed the dugong into dry meat so that the meat keeps well for a long time during the transportation from Aragusuku Island to the Kingdom; the meat had to be preserved well enough. The dry meat is displayed at the Ishigaki Museum. People who hunted the dugong around here might have had the dugong raw or grilled because the dugong bone excavated from the archaeological sites are black in color and have charcoal on them. I forgot to mention, but the dugong meat was also salted and brought to the Ryukyu kingdom. There is such a description in “History of the Ryukyus (琉球国由来記).”

On the islands near here, there is a possibility that people hunted the dugong not frequently or freely but periodically in accordance with the festival. However, especially right after the war when people had a hard time finding food, the dugong was hunted regardless of the festival. Nevertheless, the fishermen would have had little chance to meet a dugong. Therefore, the hunting was more likely to have taken place seasonally. Alternatively, there might be a particular place where the dugong appears; they have to have suitable sea grass vegetation. When it comes to the hunting style, it differed place to place; all the villagers went out to help the hunting at some villages, but only dozens of people joined it at the other villages. The hunting when held at the places where all the villagers joined in always went along with a festival.

The dugong was not supposed to be a target of ordinary fishing because they were a part of the tax payments. Actually, it was a quite hard task for a man to catch the dugong since they grow to about four meters long and the power of their fin is incredible; I believe people had to figure out a good way to catch it. As I said, people over-hunted the dugong right after the war, but the catch was because of the use of dynamite, left over ammunition from the war. In order to kill the dugong, people only need to throw the dynamite into the sea. At that time, the dugong was hunted both by accident, and also by being targeted, and the dugong always surprised the people at the beach.

Today, the population size of the dugong has severely declined. The over-hunting conducted after the war could be one reason for the present situation, but the environment was not appropriate for the dugong to increase their numbers after their population dropped sharply. Bearing one calf takes about 13 months and the mother can have only one calf at a time. It is very difficult to increase the population when the numbers fall off rapidly, and I think this is calculated ecologically. In the past 50 years, the number of sunny feeding grounds decreased dramatically because of the landfill and the effluent of the liquid waste and sediments. Plentiful amounts of the seagrass are seen along the east coast of the

Okinawa, and I think it's enough for the dugong to live on; however, we still cannot confirm the dugong's presence. This leads to the conclusion that the population of the dugong is very low. The dugong is observed near Taiwan, and they might visit Okinawa. They transit quite a long distance, more than we might think. Although Amami Island is known to be the northern limit of the dugong, it is Okinawa that has the preferable environment for them to live in. Even so, I think only fewer than 20 dugongs live in the waters adjacent to Okinawa. About 30 years ago, Okinawa prefecture conducted a survey with the Ministry of the Environment and found out that Henoko and Uruma City have the largest shallow water areas where the seagrass grow.

Personally, I would speculate that the time of day in which the dugong can be observed differs at present from in the past. The dugong tends not to approach the shallow waters that are adjacent to the road since it's very noisy for them. So, those who observed the dugong these days reported that it was early in the morning or midnight. On the contrary, in pre-war time, people saw the dugong during the day, which is before 1970 when the road was not in a good condition. I learned this from an interview. So, the time of observation (of the dugong) seems to have shifted. The dugong is very good at hearing; in other words, they are sensitive to sounds. They avoid the sound of engines. All the fishermen who witnessed the dugong said it was when the engine was turned off. However, since the ecology of the dugong is not researched concretely, we cannot conclude the shift of the observation time unless their life style is investigated. I know that the dugongs tend to approach humans because they are very curious animals, but they don't come near us. Therefore, having had interviews with the informants, I think it's because of the noise.

The sea place names such as *jankusa* (this means "dugong's sea grass") are allotted to the area where the seagrass grows. The name is found in Uruma City. It doesn't mean that the dugong always live in a place with the seagrass. If we could find the traces of the dugong's leftover food, we can conclude that the dugong was there. The sea turtle is a sign that tells of the dugong's presence. If you find a sea turtle in the shallow waters, you'll also find the dugong since they eat the same sea grass. Of course, there are places that were named after the presence of the dugong. The area where the dugong takes a rest has the form of a depression, and they are called "zangumui." It means "dugong's bed." I can't remember the exact place with the name on it, but you'll find it in Yaeyama. The area where the seagrass grows is where you'll always find sea turtles. I said that in Tsuken Island, people celebrate a festival with the dugong meat. When they failed to catch the dugong, they caught the sea turtle and used it instead of the dugong.

People from mainland Japan wrote most of the fishery documents. Generally speaking, there are not many documents written by Okinawa people. Among them, there is a book called "Fishery in Yaeyama" by Mr. Eijun Kishaba, written before the war. In addition to this, there is a report written by Mr. Bushin Asato regarding his interviews conducted in Aragusuku-jima. I recommend these two books for your project. For other important references, please find my newspaper article that I wrote to the Okinawa Times about ten years ago. I listed all the useful bibliographic entries in that article.

The dugong doesn't appear much in documents, but there are some archaeological reports that treat the dugong. Therefore, when it comes to the folklore, I need to keep interviewing to get the information. However, it's fairly difficult since the informants hesitate to talk about the dugong. What I wrote in the newspaper article were the memories and experiences that the informants had when they were children. I have to be very close to the informant to get the information.

I recommend that you read a document written by Mr. Forrest R. Pitts, rather than one by Ms. Susan Sered. Mr. Forrest R. Pitts visited Henza Island about 50 years ago to conduct a survey of GHQ. He was one of the members of Mr. William P. Lebra's survey group, the Scientific Investigations in the Ryukyu Islands (SIRI). There's a picture taken by Mr. Forrest R. Pitts. He surveyed how *noru* become

kaminchu, one of the two principal types of practitioners of Okinawan shamanism that deals with good and evil spirits.

I remember seeing an interesting ceremony relating to dugong hunting in Hateruma Island. I think there's a detailed description in "Records of Henoko (辺野古字誌)." There's a dugong-related song in the section of "Harvest Festival in June."

As I said, the dugong appears in the archaeological documents, and these excavated remains are partial remains of the whole body. Based on the analysis of the excavated examples, they seem to have been dissected at the beach and brought to the area where the remains were found. One of the excavation locations is five kilometers distance from the sea, and it is nothing but nonsense to carry the dugong without dissecting it. People might have had a portion of the dugong at the beach, and then took the leftovers to their residential area. In folklore, it became clear that the butchering of the dugong was taking place at the beach. Even though, I'm skeptical of the frequency of dugong hunting in those [prehistoric] times. The amount of excavated dugong remains is few. People might have hunted the dugong seasonally, or they just found a dead body thrown up on the shore. The fishing net became available about 2000 years ago, but people had a relationship with the dugong about 3500 years ago. So, their primitive way of the hunting might have involved intense physical labor.

SUMMARY OF THE INTERVIEW AT THE UNIVERSITY MUSEUM, UNIVERSITY OF THE RYUKYUS

INTERVIEW WITH MR. TAKESHI SASAKI OCTOBER 19, 2009

Basically, the dugong itself is designated as an internationally protected animal (or endangered species). So, I think the biological importance was one of the critical factors or background of the dugong's designation as a Japanese natural monument. A few years ago, samples of the Okinawan dugong have been taken for analytical studies of DNA. Researchers have been conducting surveys from a genetics point of view. Since DNA extraction is potentially available from rather old samples including the one we display at the museum here, the DNA study of dugongs that were hunted around the Ryukyu Islands is making progress. Hokkaido University is the institution which is playing a leading role in the study, and the results of the study are becoming known little by little. The dugongs in the Ryukyu Islands, especially those in the adjacent waters of Okinawa, are known as the dugongs that live in the northern limit of their distribution. The study of dugong DNA has been primarily conducted by scientists at Hokkaido University. The DNA study reveals that different populations are differentiated in terms of their patterns of genes from place to place. Their results suggest that dugongs in the Ryukyu archipelago and especially the ocean near Okinawa main island, the northern limit of the dugongs' distribution, have genetic characteristics distinct from those found in other areas.

From the era of the Ryukyu Dynasty, the dugong had been utilized in various kinds of ways, but its historical progression was not researched thoroughly. Some of the historical documents tell the amount of the dugong catch, but they don't say how the people utilized the dugong and where the hunting mainly taken places. The numbers of individual dugong dropped sharply, and that caused the people to have very little to do with them. Perhaps there were only a few people who knew there were dugongs in adjacent waters of Okinawa when Henoko started drawing people's attention in the 1990s. Because of the time span, the Okinawan people have a different image of the dugong from the past, and clarifying the difference seems very important to me. Speaking of the present situation of the dugong, there isn't a sufficient amount of scientific data. Basically, some protecting groups are taking a main role to investigate dugongs' distributions and behaviors. I think we need to conduct more systematic surveys for this; we have to clarify the biology of the dugong.

When it comes to the individual numbers of dugong, the Ministry of the Environment conducted the most detailed survey. The dugong network (a protection group) has also conducted a survey, inviting researchers from overseas sometimes. So, we need to take a look at them one by one. Since the stranded dugongs were freeze-stocked at the Okinawa Churaumi Aquarium, you might want to ask them about the dugong. Because of a difference between the researchers' perceptions, studying the dugong is a little difficult; the communication between the researchers is not going well. So, we need to approach the sample in various ways. I believe repeatedly making a lot of approaches makes the scientific data profitable enough for estimating the number of dugongs. Unfortunately, we haven't reached that phase yet. In terms of the sea mammals, the dugong is under survey in Australia, and the manatee is in the Americas. So, it might be easier for the U.S. military to ask the information from them. Since I'm not a dugong specialist, I'm not quite sure about the dugong's migration area.

From the biological point of view, the area where the dugong can dwell is limited to the east coast of mainland Okinawa. The shallow waters, where the seagrass grows as a basic and critical factor for the dugong to live, are limited to the areas where the dugong was observed. So, these are where the dugong migrates. They fairly coincide in terms of the natural environment. However, the displayed skull (in the

museum) is the one that was stranded at Sashiki, southeast of the island. So, in 1980 at the latest, there should have been dugongs in Nakagusuku Bay. The environmental change at that time might have influenced the dugong's living area. I only can assume the decrease of the living area from the present situation, because there's no accumulated scientific data to conclude this. I believe the land reclamation was one of the reasons for the reduction of the habitat and it ended up dropping the remaining numbers of the dugong.

It's pure supposition, but I think the number of dugongs in the prewar time might have showed a tendency to decline. Then, the war damaged them. After the war, over-hunting caused the dugong population to drop sharply.

As for their present condition, the dugong is sometimes netted in the adjacent waters of Okinawa. The museum specimen is one that was trapped in a net at Miyako Island in 1945. According to my confidential interview with the local fishermen, the dugong is netted often in the adjacent waters of Okinawa. But, if they officially report the fact, they would end up being unable to go fishing. This tells how important the dugong is considered. So, even if the dugong is trapped in a net, the fishermen just wash the carcass out to sea. What we could know from this is that the dugong was not perfectly protected after the war. The fact is, there were no significant protection plans for the dugong after the war, and situations which affected its numbers were secretly occurring. The lack of enforcement of legal protections may have severely affected the population.

When I conducted an interview at Higashi-son in the northern part of Okinawa, there was plenty of seagrass in shallow waters called "zan'noyui," where the dugong tends to visit and take its rest. It's not the name of a specific place, but it's just a place where the dugong rests. A fisherman told me that he went there for fishing. So, the place might have been well known among the local fishermen. Actually, I wrote about it, or I just told this to Mr. Toyama and he wrote it down. Anyway, there should be a document on this.

[REDACTED] According to Mr. Sasaki, the document is a kind of survey report of the dugong-related utaki in Aragusuku Island, written four years ago (around 2005). The document provides witnessing and distribution information in detail. The document would be the best one for those who want to talk about the dugong bone archaeologically or from a folklore points of view, because researchers in those fields had participated in writing the paper.]

Probably, there was no difference between the dugong hunting and other sea animal hunting. Since the dugong is useful as an abundant protein source, there's no reason to distinguish the dugong from other sea animals. If people had conducted dugong hunting under the circumstance of only small numbers being left, that would have been a critical reason for rapid dropping of its population. Since I'm not a dugong specialist, I'm not quite sure whether the dugong is a curious sea animal or not. But I believe it's much easier for people to hunt the dugong than any other sea mammals such as dolphins.

In the Miyako and Yaeyama islands, especially in Aragusuku Island, dugong hunting was permitted, since crop harvests provided insufficient yields for them to pay tribute. Hunting was prohibited in other regions. Even though the people in Aragusuku were allowed to conduct the hunting, I heard it was a burdensome task for them. The fishermen went out to sea for many days to search for the dugong, and the fishermen are said to bring some handy food with them. Since finding the dugong took so many days even then, I think the number of the dugong was already limited back then. Most of the interviews end up saying the dugong catch was nothing but an accidental result. They just found a dugong approaching the reef and ended up catching it by chance. Dugong hunting is a matter of cost and benefit; it doesn't have to do with spiritual manners, I think.

Whether the dugong was regarded as an important animal or not must be decided on the basis of how it had been essential to people's life back then. In Aragusuku Island, the dugong had a special meaning as a tax, and was considered as an important animal. This is the reason why we find the dugong-related utaki there; it is regarded as a sacred place. In other areas people might have the idea that the dugong is merely a present from the sea that people occasionally receive, and I think they didn't pay much attention to it. The excavated ornaments made of dugong bones might suggest that the dugong used to have an important meaning as food at that time. Compared to other sea animals, such as dolphins and whales, the dugong was easy to catch for ancient people even with the primitive way of hunting. It is likely that the importance of the dugong as food is a key to understanding how the dugong was considered at that time. Or, whether the Ryukyu Dynasty set a sacred value on the dugong could be another possible key to figure out the status.

Even now, various kinds of people are conducting surveys in various ways, and there should be quite a lot of data that has not been made public yet. The researchers tend to be cautious in releasing the data, because the dugong itself is a delicate problem to deal with. The dugong network has the dugong's stranding data, so it might be useful to take a look at it.

SUMMARY OF THE INTERVIEW AT [REDACTED]

INTERVIEW WITH [REDACTED]
OCTOBER 20, 2009

On first meeting with [REDACTED]

He notes that they have documentation of the local names and location names and that the residents of Kouri Island identify some locations in the water by names, which might help the research in finding the places related to the dugong in Nakijin.

As for archaeological sites in Nakijin which have discoveries of dugong bones, there are prehistoric sites and Gusuku Period sites.

Prehistoric Sites:

The Nakijin prehistoric sites are the:

- Kouribaru site
- Nishinagahamabaru site
- Tokijinhamabaru site

These three prehistoric sites have been archaeologically investigated in the Nakijin Village boundary.

The Motobu prehistoric sites are:

- Gushiken Shellmound
- Bise Shellmound
- Chibazukabaru site

[REDACTED] says that he has to reconfirm this information, since he has not thoroughly read all of the reports.

[REDACTED] also says, throughout all of the sites [REDACTED], fragmentary or partial pieces of dugong bone have been unearthed. But he also confessed, "this might be just coincidental, and it might have to be reconfirmed before I can surely say this."

Another common aspect is that the sites are all near the coast.

At one of these sites noted above, the Kouribaru site, they found a possible dugong artifact; dugong remains with artificial marks. (Yonaha-san says, "forget about this one" in the audio; that is, these are probably not artifacts but bones with butchering marks.)

At Nishinagahamabaru site, they found a *kanzashi* (a Japanese style hair pin) made from a dugong ribcage bone.

To illustrate another example, [REDACTED] brings out the research report on the Kogachibaru site of Uruma City, where archaeologists also unearthed a *kanzashi* made from dugong bone. [REDACTED] claims that these type of findings are common around the Okinawa main island.

The Nishinagahamabaru site dates back to the end of Late Jomon Period (possibly the early stage of Final Jomon period).

[REDACTED] shows a map of Kouri Island and the north coast of Nakijin and explains that the most populated area is on the southern part of the island. The northern coast is a marine terrace, which is where they found the archaeological sites previously mentioned. There is also a site called Naganebaru site located on a 30 meter upper terrace. The site was a relatively small excavation site and dates to the Late Jomon period. The unearthed artifacts are Uzahama type earthenware, which date back to the Late to Final Jomon Period. The archaeological sites are all located near a sandy beach.

The elevation at the Naganebaru and other sites is not a significant matter, but how close it is to the ocean holds more importance. There is also a spring in this site, caused by the geographical layers.

The Ryukyu natural soil layers tend to have spring water too.

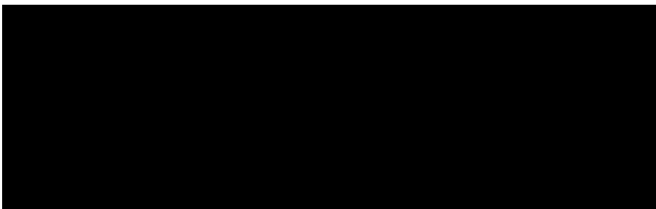
Later [REDACTED] shows an aerial photograph and explains, “During low tide, there is an area where the reef dries up and you can walk along on the reef. Here you can do that (pointing at a possible fishing area), but it’s about a kilometer away from the land. Here (possibly pointing near the archaeological site) there is easier pathway to access the emerged reef. And until this day, there are traditions where farmers/non-professional fishers will climb down to the ocean and catch their own fish. We call this fishing tradition *Umi-atchaa* (Sea Walker or Sea Walking). When we conduct research, we not only pay attention to water resources or rich forests, but also take into consideration the distance between the reef and the species which inhabits the nearby area. The prehistoric sites in Nakijin tend to be located in the areas where all of these aspects meet up.”

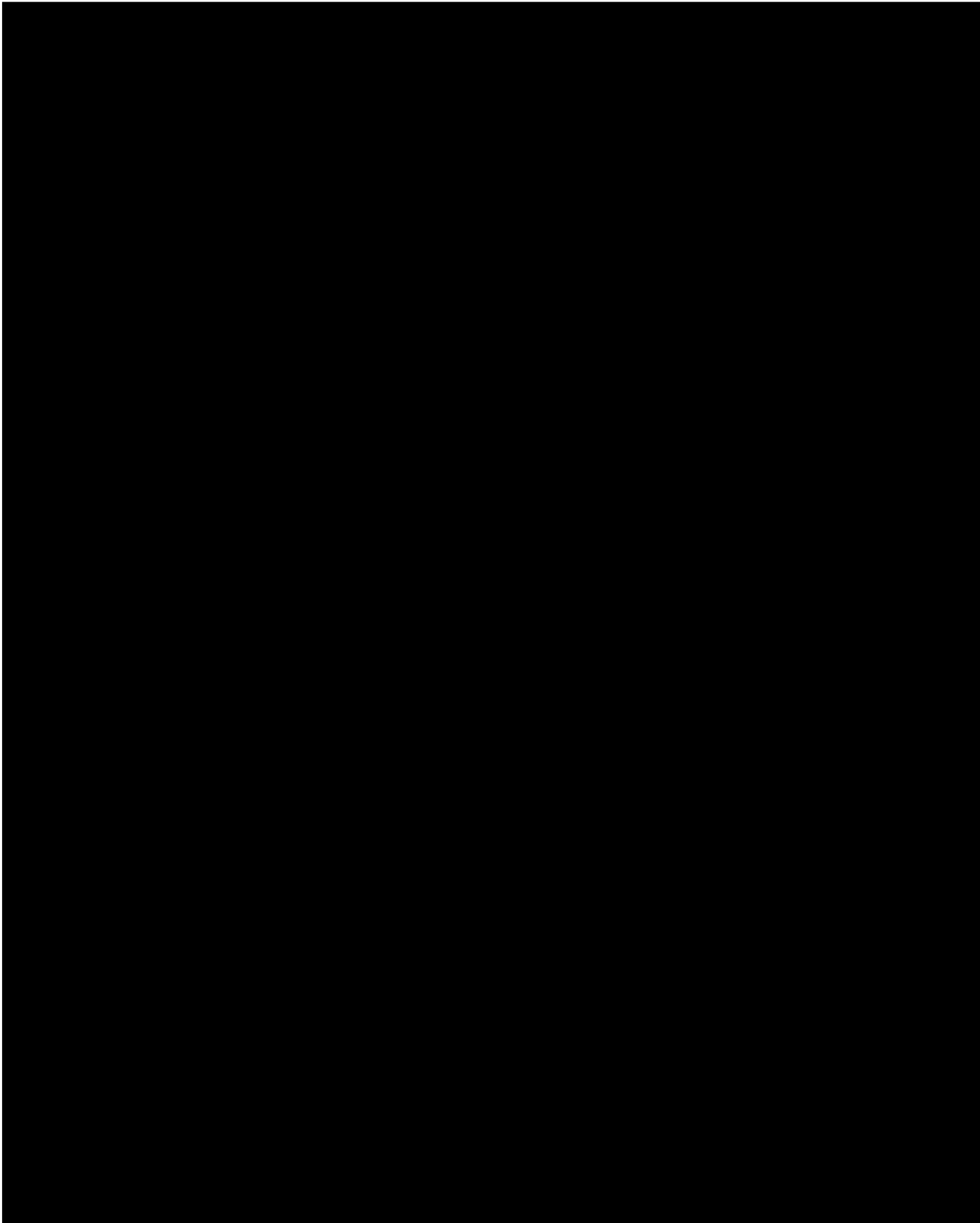
Gusuku Period Sites:

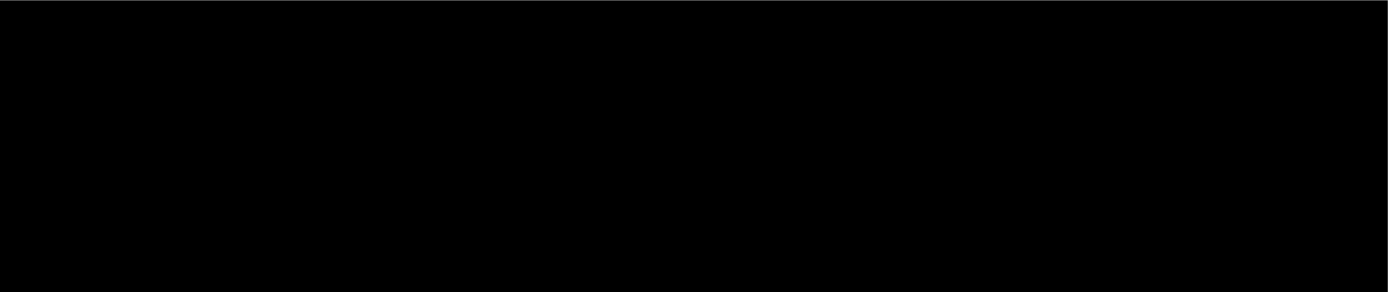
The acidic natural soil found in the Nakijin area tends to decompose the buried animal remains and shells, therefore making them hard to find. This matter must be taken into consideration in the approach to understanding the Gusuku Period archaeological features.

A distinctive difference between Jomon and Gusuku Periods is the introduction of domesticated animals. During the Jomon Period, the largest land mammal in the Ryukyus was the wild boar. And, as we enter the Gusuku Period, the remains of livestock such as horses and cattle begin to appear. These animals are believed to have been introduced to the Ryukyus by the Chinese near the beginning of the Gusuku Period.

A significant aspect revealed in the Gusuku Period sites is the development of social stratification. In Nakijin’s case, [REDACTED] suggests a hierarchical system divided into four major classes. [REDACTED]







The discoveries at the Nakijin Gusuku site included a large number of wild boar remains. The majority of these remains were unearthed from the highest point of the *gusuku* site. As we descend, domesticated animal remains gradually take the place of the wild boar remains.

Similar shifts in the composition of the unearthed artifacts can be seen in other findings such as the large amount of shellfish remains that were discovered in the site. The unearthed shells suggest that the first (highest) rank seem to have eaten the shellfish species that were rare and considered as delicacies at the time. Yet there are no indications suggesting that members of the first rank might have gathered the shellfish on their own. For the second highest rank, the diversity of the collected shellfish tends to vary. [REDACTED] suggests they might have gathered the shellfish on their own from time to time. Research also reveals the species of collected shellfish are those which can be found in the nearby reefs. The second and the third rank seem to share a similar composition of shellfish. And, as we climb down to the lowest rank, the composition of the shellfish remains grow difficult. This does not mean they did not eat the shellfish, but on the account of decomposition caused by the acidic soil, it is difficult to interpret the role of shellfish in their diet. [REDACTED] states, "Still, the vast majority the shellfish remains found in the area are the most common species found in the nearby ocean, which means they were the bottom feeders."

Regarding the dugong, the remains are found mostly in areas where the top three ranks are suggested to have lived. And, as we go higher on the *gusuku* site; the more dugong remains are found. This may indicate the dugong was acknowledged as a delicacy and food for the higher ranks only.

During this time, it is not common for people to make tools with dugong bones. Of the few bone artifacts, there are the dice (possibly made out of dugong bone), arrowheads, and a ribcage bone with a carved and flattened surface that appears to be in the production stage of a die. Bone artifacts made during the prehistoric period are more likely to be tools, which can be essential necessities to the everyday life. Opposed to this, Gusuku Period bone artifacts are more along the line of items used for leisure purposes.

For the bone arrowheads, there are two theories to account for the reasons for their manufacture. Iron production had been introduced to the Ryukyus during the Gusuku Period. Therefore, some suggest there were no reasons to have arrowheads made of bone. One of the theories suggests they were made for ceremonial purposes. Other theories suggest they were made for tactical purposes. [REDACTED] cannot recall the actual source of information, but he remembers that there was an experiment to test the penetrating capabilities of both iron and bone arrowheads. The result was that, while the iron arrowheads tend to bounce off the leather armor worn by the warriors, the bone arrowheads performed with a higher penetrating capability.

Regarding the study of social stratification at *gusuku*, there are other variations of this structure where the lines between social ranks are relatively vague, and a few strong leader-like individuals (no kings) administer the region. These types can be found at places such as Ishigaki Island. On the contrary, Nakijin (the major castle in the northern part of Okinawa) had a distinctively strict hierarchic stratification much like to those that can be seen at major *gusuku* such as Shuri. There might be some slight variations according to chronological differences, but according to [REDACTED] the *gusuku* that imposed the strict

hierarchic stratification tend to be the most decorated and well known (powerful) *gusuku*. The number of *gusuku* located in the northern portion of the island is small in comparison to those in the southern portion. There is a theory that suggests that Nanzan could have been considered as a country on its own. But, the clear distinction of its borderline is still unknown. There are a few theories in determining the actual location of Nanzan. This could suggest a much different social structure took place in the Nanzan area than the one we see in Nakijin.

The three dice that we are shown were found at the Nakijin Gusuku site.

Dugong bones were not only used for making dice, but also for game pieces. These types of artifacts were mostly for the wealthy.

SUMMARY OF THE INTERVIEW AT [REDACTED]

INTERVIEW WITH [REDACTED]
OCTOBER 21, 2009

In Okinawa, from prehistoric times to recent years, the dugong has been basically regarded as something that approaches the bay or human territories (on their own initiative), and they haven't been aggressively targeted for fishery. [REDACTED] and haven't even researched it, I'm not quite sure about the dugong, but they were not actively hunted, but accidentally caught. I know that the dugong-bone-made ornaments were excavated from archaeological sites that belong to the prehistoric times. I guess the butterfly-shaped bone artifacts were also found to be made from dugong bone. In the era of the Ryukyu Dynasty, even if people accidentally caught the dugong, they were not allowed to consume it without reporting to the Dynasty. Then, people were ordered to offer the dugong as salted or dried meat. That's what I've heard so far; again, I'm not a specialist and I've never actually read those kinds of records.

Speaking archaeologically, the dugong bone was utilized as a material for the ceremonial ornaments, items which are, I think, not very practical for everyday life. Or, they were used as a material for the luxuries such as dice. The dugong as food was seldom obtained; even if people accidentally caught the dugong, only those who belonged to the upper class were able to enjoy the meat. Here's my question: how had the dugong bone been treated? I think people decided to utilize the dugong bone since they were left behind after the dugong was eaten, and there were no other bones of such high density except for dugong. I guess the quality of the bone attracted people's attention and consequently it ended up being chosen as a material for the artifacts. The bone hairpins, for example, had to be made to a precise shape and many have bone of high density, such as dugong. I think the ancient people decided to use the bone not because the dugong had a special mystique or sacredness, but because the bone was suitable for making artifacts in terms of its qualities being denser than the bones of most animals.

Speaking of dice, the one excavated from Katsuren-jo Castle ruin site shows randomly arranged numbers; the sum of the numbers written on opposite sides aren't seven. So, I think the die was not well known among the people at that time. [REDACTED]

In the Yaeyama Islands, there's no dugong bone-made butterfly-shaped artifacts; the artifact is found in few numbers even in the main island of Okinawa; they were excavated from the archaeological sites that belong to the Late Jomon period only. In addition to this, cultural remains of bone are so simple and there's less cultural variety in the surrounding islands of Okinawa; in prehistoric times, we can only find a few kinds of bone artifacts such as needles and drills made from wild boar bone.

Again, as I mentioned before, I have a question regarding the dugong bone's status: whether the material of the bone artifact had to be the dugong bone because of its mystique and its power originating from its unfamiliarity, or it's just an accidental result of its material properties. If there was a definite notion of the dugong, the Ryukyu Dynasty should have prohibited dealing with the dugong freely and ordered people to submit it to the Dynasty. Or, if there's a tendency of exclusive possession of the dugong by the upper class people, there should be some movements that had originated the sense of value in the prehistoric times. I guess there was a notion that the dugong had a scarcity value even back in the prehistoric era. As the society becomes a hierarchical one, the upper class likely attempted to monopolize the things with scarcity value, including wild boar. Then, we could discuss the dugong's scarcity value as

the one that had been carried on from the prehistoric era to the Gusuku period, and then to the Dynasty era.

Wild boar hunting in Okinawa was conducted not by bow and arrow, but mostly by trapping. I guess, in a hierarchical society, those who had power over others tended to monopolize the area where the wild boar appeared frequently.

SUMMARY OF THE INTERVIEWS CONDUCTED [REDACTED]

INTERVIEWS WITH [REDACTED]

[REDACTED] OCTOBER 22-23, 2009

NB: Square parentheses = comment added.

Dugong Remains

[REDACTED] Dugong skulls could previously be spotted upon stone walls surrounding the Aragusuku sacred groves. The so-called Dugong Shrine is located on Kamiji Island. The correct name, however, is Aaru Ugan (East Shrine). Few skulls can be seen today. Nowadays there are mostly bone fragments scattered around the shrine enclosure. The tusks had already been cut off before the presentation at the shrine. The sacred site is still intact even though the larger part of the island now has become a cattle ranch. The shrine precinct has been violated by bone collectors. But when accident and death hit their families, the plunderers brought what was left of the skulls back to the site of the shrine. As recently as 1972 there were lots of fragments littering the ground. Remaining skulls and bones have been removed by researchers and collectors. The Affiliated Museum of Ryukyu University has a collection. After the research work has been done – DNA samples extracted – the skulls will be returned to Aragusuku. Noriyuki Ohtaishi of Hokkaido University is a chief researcher. The scientists made a formal request to borrow bone sample for research purposes. They paid obeisance to the resident deity before starting the task. People of Aragusuku really dislike the appearance of researchers on the island. But this is actually what is felt by most people in Okinawa: a negative attitude toward taking anything out from a sacred grove.

[REDACTED] affirms this wish by the islanders not to have an entry by outsiders into their sacred sites: “This [the annual harvest rituals of the secret initiation society] is actually what we dedicate our lives to.”

[REDACTED]

Dugong and Deity

[REDACTED] By amassing bones of dugong along the shrine stone walls, the islanders of Aragusuku showed their gratitude to the deity of the sea for its bounty. It was a thanksgiving for what the sea had bestowed upon them and a token of their wishes for coming seasons. [The worship directed toward the sea enhances plenty: as a catch from the sea, but also as a harvest from the fields. The translated word “bounty” carries this double semantic implication.] The remains of slaughtered dugong play a part in the way the islanders sacrifice to the deity of the sea, *but it is itself not a deity (kamisama de wa nai)*. This view is valid for both islands of Aragusuku: Kamiji and Shimoji. The name of the shrine on the island of Shimoji – Nanazou – means Seven Gates. The islanders speak of the layout as made in imitation of a fish net, with the consequence that once inside there can be no way out. [Internet pages run by tourist agencies warn visitors against crossing the line between the outside and the inside of the shrine of Aragusuku. Camping is prohibited on the islands.] There is archaeological evidence, however, that this

is the former site of a village. A raised stone at the Aaru Shrine of Kamiiji Island is a node in the interrelationship with a deity of the sea. The shrine area has a characteristic layout: stone walls on each side of the compound leading up toward the innermost enclosure (*ibi*); then, from the left side of the sacred interior, a third extension reaching toward the sea. The entrance is from the outer area – a gathering place of the shrine compound. Dugong skull remains can be seen on top of these stone walls.

Even if the dugong is not a deity, and no worship of it can take place, it plays a role in ritual, as in the case of Sonai Village on Iriomote Island. A story known by people above the age of 60 says that the dugong originally lived in the mountains while the wild boar lived in the sea. Once they decided to swap habitat. As a consequence, the dugong became an animal of the sea. During the August Moon Festival [15th day of the 8th lunar month], a reenactment of the action of habitat reversal takes place. Skulls of wild boar are thrown into the sea. [REDACTED] “The bones were *returned* to the sea.” Skulls of dugong go to dry land. It is reported that skulls of boar could be seen in Sonai as late as 1946. [REDACTED] Jaws of dugong [unclear: or bones of wild boar?] were also put on display, beneath the roof overhang of people’s houses. This is known to have taken place at Sonai on Iriomote Island.

Dugong Products

[REDACTED] Records indicate that meat of the dugong was included in the banquets given at court for guests from China. Only the heads of the dugong were left on the islands of Aragusuku. The way of thinking about the effects of eating dugong meat is reminiscent of Chinese medical lore: a remedy for longevity. Officials from the Ryukyu Court may have brought with them stocks of cured dugong for private sale on their missions to China. In the Yaeyamas, dugong meat is believed to be good for child delivery [used at the court of Shuri, but also on Aragusuku.] It is ingested as a soup, with the broth made from shavings of dried meat.

Other quantities of dugong meat went to the Satsuma fiefdom of Kyushu Island. Tusks were also shipped there. No public distribution of meat took place among the islanders. This contrasts with the case of whales and dolphins. The meat from the catch was shared by the Aragusukuans. The large bones were used for making tools. No large animals were available for food and tool-making other than dugong and wild pigs. The dugong was not something they would not live without, but instead – for Yaeyama coastal people in general – it was always a fortunate appearance. The skeletal remains of dugong on Aragusuku is only of the part above the trunk. No rib cages are found, and no tusks. The latter were used to make name seals (*inkan*). That is probably the main reason why no one has seen any remaining tusks in the area of the Aragusuku shrines. This observation is confirmed by [REDACTED] [In the Ryukyus, as in Japan proper, a person’s legal identification is affirmed by a seal, printed with an engraved stamp. The carved maxillary incisors are marketed, mostly on Java, Sumatra, and the Philippines, as dugong ivory]. Dugong ivory seals still exist in the islands, but no tools made from dugong bone have been collected. There was no local production of artifacts made from dugong material. Not only the dried meat, but also the tusks and bones were transported to the capital at Shuri, Okinawa Main Island, and onward to the Satsuma fief on Kyushu Island and probably also to China.

Dugong and Society

[REDACTED] By royal decree, the Aragusuku Islanders were licensed to hunt dugong. It was not a free-for-all kill, and moreover, the authorities of the Kingdom did not want people in general to orient themselves toward the sea. They were exhorted to concentrate upon farming in order to fulfill per capita tax quotas. People around the archipelago were taught that the sea is a dangerous zone. It was

easy for the fishermen to catch the animal even if it did not come to the nearby waters in a school, but just one by one. Only the Itoman city dwellers of Okinawa Island took up fishing as a specialized endeavor. But after the Ryukyu Kingdom collapsed in 1879 and Ryukyu became incorporated in the Japanese nation as a prefecture, there was not any regulation in force to limit the hunting of dugong. In the years after the end of the Second World War the stock of dugong has been further reduced by blast fishing. As the dugong has the ability of passing memory on to at least two subsequent generations, there is little hope of a replenishment of the stock. The dugong is very sensitive to sounds. [redacted] fetches a newspaper clip from a file: Records of fish catch from the Yaeyama Branch of the Okinawa Bureau of Statistics (*Yaeyama Okinawa-ken Tokeisho*) show no entry of a dugong catch from the year 1929 on. [redacted] also brings forth a 70 year old sample of dried dugong meat. The method of curing was effective. The slab of meat had been salted, smoked, and dried. Only a few people above the age of 70 can recollect having eaten dugong meat. Those of more or less 60 years of age can only refer to recollections by their parents. [redacted]

[redacted] In their way of cooking, the fresh meat of dugong was treated no differently from pork, as, for example, for the typical *chamuru* stir fry dish, which requires additional ingredients such as bean curd, bitter melon, and egg.

Question: "What could be the general idea about dugong among people in the Yaeyamas?" [redacted] answers by recapitulating the known usages from the shellmound age to the age of per capita taxation [summarizing the scholar's stance]. "But to people in general, the dugong is just a large edible mammal like the wild pig."

Methods of Catching Dugong

[redacted] A duty of corvée labor was in force for those who had no fields. They were offered the alternative of filling their workday quota in public fields. This regulation came into effect during the Near Present Era (*Kinsei*), from 1609. Islanders were exhorted to cultivate rice, millet, and barnyard millet. The Aragusuku Island territory is too limited for large scale farming and the depth of soil is not more than 10 cm. The authorities therefore demanded that the islanders submit catches of dugong as tax. But there are no dugong grazing grounds near the island. Consequently, in order to fill their quotas, the islanders would have to sail into the vicinity of other islands: Iriomote, Kuroshima, and Ishigaki (the areas of Shiraho and Miyara). One trip would take 2-3 days, with a departure of 2-3 boats. It seems that the Aragusukuans felt this duty as a heavy burden. Why Aragusuku? It was important for the authorities of the Kingdom to keep the islands populated. So they designated a resource, an ecological niche to exploit, exclusively for Aragusukuans. Other islands had other resources, such as turtle and fish, as for example, on nearby Kuroshima. On the latter island an actual increase of population took place due to an amplitude of natural resources. As a result, there began an emigration to Ishigaki Island. The authorities kept a record of the produce on each island. But although the taxation system was a per capita regime, it may not have been very strict.

Dugong Cooking

[redacted] At Aragusuku, dugong meat played no role in ceremonial ostentation. Fish was used, first of all, for the important Harvest Festival [*puru*]. Meal preparations took place on the beach below the shrine. Young men of the village prepared the catch. Other ingredients were fish paste (*kamaboko*) along with other typical festival food. The dugong meat used for tax payment was salted, smoked, and then left for drying. [redacted] emphasizes that salting was not enough to preserve the meat: it would decompose after some days. Taking into account that the blubber could also be included, the curing process would not differ very much from the making of bacon. The chunk of meat

was first left simmering in boiling water for a short while. Then it was put on a plate for salting, and finally, hung above the fireplace for smoking. Foods were prepared for offering (*kumotsu*) and for meal consumption. The dried meat of the dugong is very hard and could be added to a broth dish only as shavings obtained by the use of a carpenter's plane. As written in the book published by Sumiko Kinjo, diaries with records about dugong meat inclusion in ceremonial meals, as a broth dish (*suimono*), were kept at the administrative chief (*dunchi*) houses of Ishigaki and Miyara. Dugong dishes were restricted to formal events, such as mortuary rites. People of lesser ranks, such as the islanders of Aragusuku, had no opportunity of flaunting the ability to serve a recipe normally reserved for the royal court. Dugong meat was welcome as an extra treat when available, but it called for no special preparation for cooking or meal presentation. However, if [REDACTED] follows the advice of [REDACTED] [REDACTED] there is one extraordinary situation which calls for a ban on eating dugong meat: if there is an outbreak of contagious disease. [REDACTED] explanation: the dugong is too close to humans to allow eating it indiscriminately. Dolphin meat, however, is not subject to such restraint.

SUMMARY OF THE INTERVIEW AT [REDACTED]

INTERVIEW WITH [REDACTED] OCTOBER 23, 2009

The interview begins with Yonaha-san's question asking, "On your account, do you believe it would be difficult to directly get in contact with those associated with utakis or certain ceremonies and conduct a interview?" [REDACTED] replies, "I don't think it should be difficult. [REDACTED] so I can't say much on that account." Regarding the utaki associated with the dugong, [REDACTED] has once visited Aragusuku Island [REDACTED] before, and had a chance to see the well-known enshrined dugong skeletal bones.

During the time of the Ryukyu Kingdom, he was told that the dugongs could be seen in this area (Sashiki township) too. There are records stating there was a feeding bed of the dugong here, and it also can be found noted in the *Omoro Soshi*. The vegetated area of the dugong seagrass spreads from the east coast of Okinawa to here in Sashiki area. And he believes the habitation area of the dugong could have been found all over Okinawa Island.

[REDACTED] claims he has eaten the dugong once, [REDACTED] At first he didn't know it was dugong meat, and was told it was the meat of a mermaid. He was shocked at first. [REDACTED] The dugong meat was cooked like a steak. It was a relatively rare dish to come across back then. [REDACTED] had apparently brought it home and they ate at home. [REDACTED] says, it was not a dugong accidentally caught in a fishing net, and from what he remembers, it was given to [REDACTED] This is all he can remember about it. He says, "They were still around at that time." He knows but can not recall the individual's name, who compiled research at the time regarding the dugongs in the Okinawan seas. He claims, in the report, an estimated 300 dugongs inhabited Okinawa waters. He is not sure of the source of the information, but says the report covers the statistical data of how many were present in what year at what location. (Yonaha-san suggests, it might be a report compiled by [REDACTED]) The reason why he knows this is because [REDACTED]

[REDACTED] in Henoko Bay before. (Personally he thinks it's a ridiculous idea to bury such a beautiful area.) He recalls the abundant vegetation of seagrass growing in the area. And claims a similar site can be found on the east side of Kouri Island. [REDACTED] states, "I guess they could be spotted from there and along the east cost side of the island."

Regarding the dynamite hunting that took place after the war, [REDACTED] recalls, "They called the dynamite and the method itself, *Happa*, and it was a common thing to do at the time". He continues, "It wasn't necessarily for catching dugongs, but more to catch fish. You could easily catch any small or large fish with it, but it was also a very dangerous thing to do. I heard a lot of stories about those who lost their arms as they tried to throw the dynamite in the water." This was not a thing done only by the fishermen of Itoman, but all over the island. Of course, during the Kinsei (Pre-modern Period), the dugong was hunted in a much different way. And, as you may already know, its meat was submitted to

the King. Which might explain how importantly it was regarded. During the time of the Ryukyu Kingdom, it was even considered a medicine.

In Kinsei period of Yaeyama, the fishing method was primarily to just walk along the dried reef and to catch the fish. Fishing was not done by specialist fishermen, but most likely the farmers. The concept of fishing at the time was this: the ocean (or fishing points) existed as a continuation of their field. Farmers would consider the elongated boundary line was the boundary line of their fishing spots. [REDACTED] believes the ocean and land were considered as one unit (set) at the time. So when it was low tide, the farmers would go down to the reef and capture the fish trapped in the inner reef. So the idea was more like “a farm field in the seas.”

The modernization of the Yaeyama fishing industry takes place when Itoman fishermen came to the Yaeyama Islands. This was around year 10 of Meiji. Most of the non-local residents begin to settle in Yaeyama around the Meiji 20s. Originally the fishermen from Itoman came as seasonal workers (seasonal fishers), who would build a hut on the beach. Right around where the city office is now. During the time, there were no refrigerators, so the Itoman fishermen would come to fish depending on the season, and sell the fish at the market place and save their money. This was called *Kuyaa* (it means “hut” in Japanese); in Ishigaki Islands the areas composed of these huts began to develop into villages known as *Agari-Guyaa* (East Kuyaa), *Naka-Guyaa* (Middle Kuyaa) and *Iri-Guyaa* (West Kuyaa). Needless to say, the temporary visitors (seasonal fishermen) begin to settle in Ishigaki Island. Huts began to disappear, and in their place houses began to emerge in the area. The traditional fishing method of the Itoman fishermen, called *Agiyaa*, was to row the *Sabani* (traditional Okinawan fishing boat) out to the sea with a fishing net, and wear a *Mikagan* (Okinawan diving goggles) and dive into the ocean. The actual labor of this type of fishing was done by the *Itoman Uyaai* (orphans bought and brought from Itoman as workers). This was considered as a traditional way of fishing at the time, but soon was prohibited for human rights concerns after the war. The children who had been sold were called *Koinguwaa*. [REDACTED]

In the Meiji 30s, bonito fishing was introduced to the islands of Yaeyama by the fishers from Miyazaki in mainland Japan, and large vessels began to dock in the port. Fishermen from mainland Okinawa, also arrive in Ishigaki at this time. This bonito fishing hits its peak in the Taisho Period. During this time, associations of fishermen begin to emerge and boat manufacturing factories and blacksmiths opened their businesses in the area. So it could be said, the modernization of the fishing industry in Yaeyama began from the introduction of bonito fishing. A few *Katsuobushi* (bonito shaving) factories opened in the island at this time, and the economy began to grow. Still, most of the boat owners were from either mainland Japan or Okinawa. So most of the money didn’t end up in the hands of Yaeyama people. After the war, the bonito industry takes a rapid decline and ends around the 1950s. [REDACTED]

The Itoman fishermen still fished in their own traditional ways throughout that time. After modernization hit the island, sailing masts were replaced with motor engines, and the *Sabanis* began to grow bigger. The *Agiyaa* fishing industry was ordered by the court to stop using children as labor, and the fishermen were forced to depend on motorized boats.

Regarding the dugongs, [REDACTED] rarely heard about their being caught. [REDACTED]

SUMMARY OF THE INTERVIEW AT OKINAWA CHURAUMI AQUARIUM

INTERVIEW WITH MR. SENZO UCHIDA, NOVEMBER 11, 2009

Mr. Uchida thinks that the official research that is conducted by each of two ministries, the Ministry of Fisheries and the Ministry of Environment, has not produced substantial results given the amount of money spent. If the project was a conjoined mission by these two departments, the results might differ and share some value.

He also explains his difficulty in understanding the reason why Cultural Affairs would nominate any natural animal as a cultural monument.

As for the reason why the dugong might have been considered important, Mr. Uchida simply states "It's for its meat value. It was a tasty animal. If there were enough now, there are no doubts we would be eating it." Its meat also has a relatively slow decomposition rate. It went bad slowly. Another distinctive feature of the dugong, unlike other sea mammals, is that whereas dolphins and whales have their nursing breasts located near their reproductive organs, the dugong, opposite to this, has them near its upper body, much like humans. And it was often spotted feeding its calf by holding it like a human mother would do. Maybe this is why it was considered "close" to humans and was much related to in our culture. But the theory of the dugong as the model for the mermaid legend does not convince him. In the legend of the mermaid in mainland Japan, the mermaid is said to have red hair. The model could possibly be a deep-sea fish. There is this one fish that has a long red back fin, with a side profile very similar to a human face.

Mr. Uchida was not aware of the Kouri Island Origin Legend, and seemed interested in the folk legend. Related to this topic, he claims, "That should mean that the dugongs still live there in the seas of Kouri Island. I am fully aware of the seagrass vegetation in that area. In general, the west coast of this island has been too modified for the dugongs. The whole development might have only destroyed the seagrass and this is why the vast majority of reports of dugongs spotted come from the east side of the island. To the dugongs, it is not a major task to swim around the island and feed on the seagrass beds located in Kouri-jima."

"I'll tell you this. There is a report of a dugong caught at Miyako Islands, and researched by Professor Takara and Nishiwaki in the 1960s. Now, from there we take a leap to 1979, when a dugong was found swimming off shore. From that point, all of the dugongs that have been reported between then and now have been researched by our institution. Now, all of the information, which we provided as the basis of the research conducted by the Ministry of Environment, is directly from our research. This is hardly ever mentioned, and I wish they did so, but that is the fact. There are problems with the visual confirmation records or spotting records they compiled. There are a number of cases where the dugong was over-counted because they could not make an adequate identification of the individual dugongs. The visual confirmation research by airplane can't really be trusted either, for that manner. The dugong lives near relatively isolated quiet beaches. It was once considered to be nocturnal because it was known to feed at night. After a fair amount of research, it was discovered the dugong had a keen sense of hearing, and was only avoiding humans during the day. In Iriomote Island, there are a number of beaches that match the requirements for a dugong habitat. I am sure some might be there. I was once informed by the residents of Kumejima Island, there secretly have been a few cases where the dugong has been spotted, but kept unreported to avoid any unwanted attention being focused on the dugong. And, if an airplane is hovering on the top of their heads, they will surely swim away. On the quiet east coast is where most of the dugongs are spotted. This is because of the still existing undeveloped beaches with the seagrass

vegetation. There are fewer ships, cars, lights and noise around those areas. They avoid the areas where human activity is present. ”

Mr. Uchida also commented on the dynamite fishing after the war. He states, “A lot of them were killed back then. A lot. That’s why they don’t come back. That’s why you can see a large decline in the number of dugongs spotted after the war.”

He further commented of the inconsistency in documents related to the dugongs by mentioning some misinformation in town history documents. “There was a research team recently in Iriomote. The team consisted of poorly trained college students who were conducting research of the ecology at the beach. One of them found the remains of an animal washed up and thought it was a dugong. My team and I went to research it and it turned out to be a Komakko (Pygmy Sperm Whale). It is easy to understand why it was mistaken. The Komakko has a round, curved face just like the dugong. Similar to this, there are a few cases where we researched the dugong remains washed up in towns and villages, where an elder told the people it was a *Zan*, and it turned out to be a decomposed seal or a small whale. There are many cases like this.”

In general, Mr. Uchida believes that there simply have not been enough studies of the dugong. And if we want to keep Okinawa as the “Northern limit of Dugong Distribution,” we should assemble a research team with every department or ministry or country associated with the dugong to find fully what is needed to be said about them. But he says, “I am sure this will not happen. For 30 years, since I came to Okinawa, I have been telling officials that we need to protect and research the dugongs. I also have been saying either the Chinese River Dolphin or the dugong will become extinct soon. The match was won by the Chinese River Dolphins to first become extinct. The dugong will be next. ”

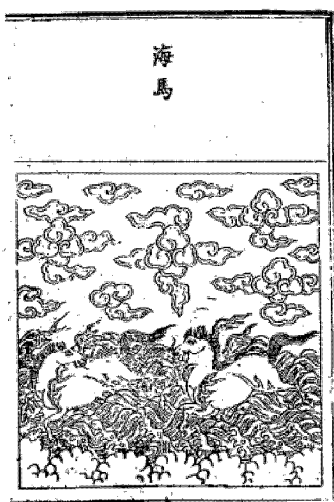
APPENDIX B.

TEXTS AND TRANSLATIONS OF HISTORICAL DOCUMENTS AND FOLK SONGS

Prepared by Naoki Higa

THE *KAIBA* IN THE HISTORICAL RECORDS OF RYUKYU DIPLOMATIC RELATIONS WITH CHINA

1. *Rekidai Hoa* [*Precious Documents of Successive Generations*], translated by Hisanori Wada (1994)



The *Kaiba*

『歴代宝案』 1-01-09
皇帝より琉球国王尚巴志へ

頒賜の勅諭と目録 宣徳3年 (1428)

(勅諭略)

国王

(以下頒賜品の一部略)

羅

織金胸背麒麟紅一匹

織金胸背海馬青一匹

素紅一匹 素青一匹

素緑一匹 素藍一匹

王妃

(以下略)

宣徳三年十月十三日

“*Rekidai Hoan*” 1-01-09

From the Emperor to King Sho Hashi of the Ryukyu

Listed here is the record of a gift presented to the king and queen. Recorded in Sentoku 3 (1428)

[...]

To the King

[...]

A *Ra* woven Wardrobe

One red wardrobe with golden embroidery of *Qilin*.

One blue wardrobe with golden embroidery of *Kaiba*.

One roll of red mercery, One roll of blue mercery.

One roll of green mercery, One roll of indigo mercery.

To the Queen

[...]

Sentoku 3, October 13th

THE DUGONG IN CHINESE RECORDS

1. Hsu Pao-Kuang / *Jo Hoko*
“Chung-shan ch`uan-hsin lu” / *Chuzan Denshinroku* [Report of a Mission to Chuzan] Koki 60 (1721)
(Translated by Nobuo Harada 1999)

...*Kaiba* [dugong], head of horse, body of fish, no scales. Its meat is like pork, and rare to obtain. When captured, it is immediately delivered to the king.
2. Chao Huang / *Shu Ko* • •
“Liuqui guo zhi” / *RyukyuKoku Shiryaku* [Record of Missions to the Ryukyu] Kenryu 24 (1759)
(Huang Chou, 2003; translated by Nobuo Harada 1999)

Kaiba, head of horse, body of fish. When captured, it is immediately delivered to the king.
3. Li Dingyuan / *Li Teigen*
“Shi Liuqiu ji” / *Shi Ryukyu Ki* [Missionary Journal of the Ryukyus] Kakei 5 (1800)
(Teigen Li, 2007; translated by Nobuo Harada 1999)

(June) 15th, ... There is a thin slice of *Kaiba* meat. Its shape is curled and twined as a wood shaving. The color is similar to chopped *bukuryo* [a type of fungus used for medicinal purposes: a blackish Polypore]. Its high-grade meat is difficult to obtain. If the meat is acquired, it is immediately delivered as an offering to the king. Its shape, a body of a fish, head of a horse, no hair and has legs with skin of a *jiangzhu* [finless porpoise]. My regrets are that I have seen the processed meat, but have not seen a living one yet.

REPORTS OF THE DUGONG IN THE RYUKYU KINGDOM RECORDS

1. *Yoseyama Oyakata Yeayama-jima Kimocho*, Kanryu year 33 (1768)
(City History Compilation Office, General Affairs Department of Ishigaki City, 1993)

187. Notice: Aragusuku issues. The administrating inspectors frequently ask the locals for dugongs and turtles. It is becoming a situation that cannot be overlooked by the locals of Aragusuku. Any acquisitions of the dugongs and turtles, beside the offering to the King, shall be prohibited.
2. *Onaga Oyakata Yaeyama-Kimocho*, Kanpo Year 8 (1858)
[Administrative Manual for the Yaeyama Islands] by Oyakata Onaga
(City History Compilation Office, General Affairs Department of Ishigaki City, 1994)

Journal Log: It is ordered that the dugong, be handled as a royal offering to his majesty. It is also a limited privilege to be hunted only by the certified residents of Aragusuku. The people are prohibited from selling dugongs to others who may want them, yet this rule seems to be ignored. Although it is said that it is hard to control, because when there is excessive meat, it is handed to those who are interested. Year by year the Chinese missions are coming to last longer, requiring more labor in a difficult hunt. From here on, the rule must be obeyed as promulgated. Selling the dugong will be strictly prohibited. And additional catches will be officially noted by the regional officer, subsequently offered to the royal palace as the order of his majesty.
3. *Tomikawa Oyakata Yaeyama-jima Shoshimari-cho*, First Year of Kosho (1875)
[Administrative Regulations for the Yaeyama Islands] by Oyakata Tomikawa
(City History Compilation Office, General Affairs Department of Ishigaki City, 1991)

Journal Log: It is ordered that the dugong, be handled as a royal offering to his majesty. It is also a limited privilege to be hunted only by the certified residents of Aragusuku. The people are prohibited from selling dugongs to others who may want them, yet this rule seems to be ignored. Although it is said that it is hard to control, because when there is excessive meat, it is handed to those who are interested. Year by year the Chinese missions are coming to last longer, requiring more labor in a difficult hunt. From here on, the rule must be obeyed as promulgated. Selling the dugong will be strictly prohibited. And additional catches will be officially noted by the regional officer, subsequently offered to the royal palace as the order of his majesty.

Journal Log: The acquisition of sea horses [dugongs] for the offering to the king is a duty assigned to the people of Aragusuku. Unfortunately, the acquisition is becoming gradually less successful over the years, causing a strain on the people of Aragusuku as increasing numbers of men are put to work in this task. The people of Aragusuku have requested that other communities be permitted to share this heavy burden. But, as the re-assignment of annual quotas for the hunting community has just taken place, no sudden changes can be put into effect.

During this time, as a temporary solution, the assigned amount will be set as one *kin* (600g) to four people, and this matter will be reported to the Shokenfu.

4. *Yaeyama-jima Shomotsu Daifucho*, Dochi Year 13 (1874); Recorded in 1857
[Administrative Regulations for the Yaeyama Islands] by OyakataTomikawa
(Tameichi Kuroshima, 1999)

[...]

Same as right, one *kin* [600 grams] of salted *kaiba* meat. The price is the equivalent to *Daifu* [measurement by amount of labor] 0.0333 labor.

Same as right, one *kin* of dried *kaiba* meat. The price is the equivalent to *Daifu*, one person. The price of the skin is the same as the meat.

5. *Yaeyama-jima Kyuki* [Miscellaneous Records of Yaeyama-jima]
(Yaeyama Culture Study Group, 1980)

On the book cover, is an illustration described as Iriomote Shuri Ooyako, and it is believed to be a transcription by Shoen (1798-1864), the tenth generation of the Itosu House. This says: "Product One. *Kaiba*. Rarely caught."

6. *Ryukyuhan Zakki* [Miscellaneous Records of the Ryukyu-Han]
(Government of the Ryukyu Islands, 1965)
Meiji Year 6 (1873), Research by the Ministry of Finance

One *kaiba* one *kin* / Sent from Ryukyu to the Shimakata / Price in rice 1 *sho* [1.8039 liters] 5 *go* [901.95 milliliters] / Shipped to Kagoshima Prefecture / Price 4 *kan* Mon to Ryukyu

[...]

A product from Yaeyama Island

OTHER REFERENCES

1. *Ooshima Hikki* [A Journal of Oshima Island] by Nagahiro Tobe, recorded in Horeki 12 (1762)
(Takuji Iwasaki 1974)

General Records of Various Subjects:

Kaiba, a peculiar thing. Its girth, 5 *shaku* [1.515 m] and 2 *kan* [3.363 m] in length. No scales or large fins can be found on this beast with a horse-like head and a swine-like mouth. Captured in a place called *Itoman*, and recently seen by Shibirashi. The skin (blubber) is dried and offered to the king of Ryukyus. On rare occasions, it is sent to the Satsuma on demand. Known by the name *Kaiba*, or *Tatsuno'otoshigo*, and is commonly used as a charm for safe delivery in childbirth. Considerably different with male [exact meaning uncertain].

2. *Hirugi No Ichiyo* [One Hirugi Leaf] (Takuji Iwasaki, 1974)

A luxury in the island. ... if a simple taste is favored, try the dugong sashimi, also known as *Zan* (the *kanji* is written “mermaid”) in the local dialect, seasoned with ginger and vinegar with papaya on the side.

3. *Yeayama Minzokushi* [Records of Yaeyama Folklore] (Eijun Kishaba, 1977)

In Ishigaki Island, the mermaid is referred to as the “*Ningyou Nu Izu*”; in Hateruma Islands it known as the “*Nieji Iu*”. ... According to the local folklore, its physique can be described as a human-faced fish, although its existence is not a myth but a true living creature believed to be a “*Reigyo*”[spiritual fish] possessing supernatural powers which often predicts tsunami, or would speak of a distant family line unknown to the listener, as if it were possessed by a god. ... In Yaeyama, the dugong is named “*Zan*” and its dried meat “*kaiba*.” During the time of poll taxes, an annual offering was delivered to the king by the Yaeyama government office. In Yaeyama, only Aragusuku Island was granted exclusive hunting rights. ... In Yaeyama the dugong and mermaid are both seen and are considered to be two completely different things.

4. *Yeayama Seikatsu Shi* [Journal of Life in Yaeyama] (Fumi Miyagi 1972)

(Ta) *Panariakamataa* [Aragusuku *Akamata*] or *Kunakamataa* is not a familiar name to me. But I have heard of the *Pnarizan* [Aragusuku *Ningyo* ~ the *kanji* is written the “mermaid of Aragusuku”] before. ... *Zans* are said to be a highly nutritious feast, favored as an post-birth meal for the princesses and were considered as treasured possessions.

THE DUGONG IN OLD FOLK SONGS

The *Omoro Soshi*, is a compilation of ancient poems and songs dating from 1531 to 1623. In Chapter 11, number 95 of the *Omoro Soshi* there is a song with a dugong mentioned.

1. *Omoro Soshi* Chapter 11 Number 95 (Shuzen Hokama 2000)

こまかの濤に おれ見物
久高の濤に
儒艮網 結び降ろち
亀網 結び降ろちへ
儒艮 百 込めて
亀 百 込めて

Komaka (Island) in its stone marvelous
Komaka (Island) in its dew
Tie and drop the dugong net
Tie and drop the turtle net
Dugong hundreds of wishes
Turtle hundreds of wishes

儒艮 百 捕りやり
[...]

Dugong hundreds of catches
[...]

2. Rice Cultivating Ceremony of Iheya Island / Rice Festival [年浴のミセゼル]
(City History Compilation Office of Nago City 1997)

やへの八つ あうやてや
さんの魚の をらまわやも
げにたばうれ だにたばうれ
[...]

The Octopus
Even when the dugong fish is there
Indeed give me certainly give me
[...]

3. The Sacred Song for *Umachii* [Prosperity Praying Gathering]
in June in Henoko, Kushi Village
(City History Compilation Office of Nago City, 1997)

[...]
あわすくふ あなまやーど
じゅなぬゆーや うふいさくとう
ぬすまらんどー
[...]

[...]
The blowfish circles its hole
The dugong is too big
You cannot steal it
[...]

4. The sacred song of *Ungami* [Celebration of the Sea God] in Janagusuku of Ogimi
(City History Compilation Office of Nago City, 1997)

ゆかてさみ 間切ぬる
あぐしち あしぶ
わんぬ にれがみや
じやんぬくちどう とうゆる
いすぢ いとうみ はやみり

Splendid they are, the priestess of the village
Which pulls the stirrup
I the *Nree* God
Will ride the Dugong
Come swift, and return quick

5. The Sacred Song of *Unjami* [Celebration of the Sea God] in Nago Township
(City History Compilation Office of Nago City 1997)

[...]
うらみぐい みぐて
うらまわい まわて
ざんぬくち くむくむ
てるていだに てらさもう
[...]

[...]
Wonder and wonder on the beach
Circle and circle the beach
The dugong mouth, *Kumukumu* [unknown meaning]
Let the sun shine on me
[...]

6. *Yanbaru No Dozoku* by Genshichi Shimabukuro
(Eijun Kishaba, 1977)

The *Omoro* (sacred old song) of Jyanagusuku, Ogimi Village

ねらや潮や、さすい —
港潮や、満ちゆい、いそぢ早めり —
サンラー、サンラー、ヨセテクー —
御鞍形や、太陽形／おふい形や、お月形 —

鑑形や、むかじ形／手綱形や、購蛤形	—
よかて、さめ、間切祝女、あぐるしち	—
遊ぶ吾身の	—
海神や	—
じゃんの口ど取ゆる	take the <i>Kaiba</i> by its mouth [ride the dugong]
イトミハヤメリ	—

7. Feeding song for a ceremony of the ocean god in Ogimi (source unspecified)
(Kenichi Tanikawa, 1986)

ゆかちやみ 間切祝女や	It is a fine thing
鑑引ち遊ぶ	The village's priestess
吾るニレー神や	Places her feet upon the stirrup and plays
ザンぬ口取やい 暇乞い	As a god whom remains in the eternal world, I shall ride the <i>Zan</i> [dugong] and bid farewell

From the translation of Song 7, we can understand Song 6 noted in Genshichi Shimabukuro's *Yanbaru No Dozoku*. The song tells of the time during the ceremony, when the dugong takes part as the gods mount and arrive from *Nirai* (a mythical place from which all life is originates), and at the end, returns. The dugong here is believed to have a supernatural existence, relating to the ceremony of the ocean god, and belongs to the *Nirai*.

APPENDIX C.

ANTHROPOLOGICAL ANNOTATED BIBLIOGRAPHY

This annotated bibliography lists books, reports, government documents, and articles that provide information about the role of the dugong in Okinawan culture.

The bibliography is broken into eight sections by the major subject matter area that is covered in the bibliographic entry. These are:

- Biology and Ecology
- Cultural Property Designation
- Ethnography
- Folklore
- General
- History
- Hunting and Consumption
- Language
- Prehistoric Archaeology

Asano, Nagao (浅野長雄)

- 1938a パラオの儒艮に就て〔Ⅰ〕. Palau no Dugong ni Tsuite, I. [About the Dugong in Palau]. In 植物及動物 第6巻第6号. *Shokubutsu Oyobi Dobutsu, Dai 6 Kan, Dai 6 Go. [Plants and Animals, Volume 6, No. 6]*. In Japanese. Yokendo, Co., Ltd., Tokyo, Japan.

Remarks about the biology of the dugong in Palau.

Asano, Nagao (浅野長雄)

- 1938b パラオの儒艮に就て〔Ⅱ〕. Palau no Dugong ni Tsuite, II. [About the Dugong in Palau, II]. In 植物及動物 第6巻第7号. *Shokubutsu Oyobi Dobutsu, Dai 6 Kan, Dai 7 Go. [Plants and Animals, Volume 6, No. 7]*. In Japanese. Yokendo, Co., Ltd., Tokyo, Japan.

Remarks about the biology of the dugong in Palau.

Editorial Board of History of Higashi Village (東村史編集委員会), ed.

- 1987 東村史 第1巻 通史編. *Higashi-son Shi, Dai 1 Kan, Tushi Hen. [History of Higashi Village, Volume 1, Complete History]*. In Japanese. Higashi Village Office, Okinawa, Japan.

A description of the dugong as one of the animals living in the Higashi Village seas.

Ezaki, Teizo (江崎悌三)

- 1935 八重山遊記4. Yaeyama Yuki 4. [Outline of Yaeyama]. In 月刊 ドルメン 4月號. *Gekkan Dorumen 4 Gatsu Go. [Monthly Magazine - Dolmen, April]*. In Japanese. Oka Shoin, Tokyo, Japan.

Refers to the dugong and its biology in the Yaeyama region.

Hirasaka, Kyosuke (平坂恭介)

- 1933 台湾に儒艮 (Halicore dugong (Erxleben)) の産する事に就いて. Taiwan ni Dugong (Halicore dugong [Erxleben]) no Sansuru koton ni Tsuite. [About the Existence of the Dugong (Halicore dugong (Erxleben)) in Taiwan]. In 動物学雑誌 第四十五巻第五百三十二・五百三十三号. *Dobutsu Gaku Zasshi, Dai 45 Kan, Dai 532-533 Go. [Zoological Magazine, Volume 45, No. 532-533]*. In Japanese. The Zoological Society of Japan, Tokyo, Japan.

A description about the biology of the dugong in Taiwan.

Hirasaka, Kyosuke (平坂恭介)

- 1934a 儒艮、即「人魚」に就いて (上). Dugong, Sunawachi "Ningyo" ni Tsuite, Jo. [About the Dugong, which is also well known as a "Mermaid," Volume 1]. In 台湾水産雑誌 第二三四号. *Taiwan Suisan Zasshi, Dai 234 Go. [Taiwan Fisheries, No. 234]*. In Japanese. Taiwan Fisheries Association, (Taiwan).

Remarks about the biology of the dugong in Taiwan.

Hirasaka, Kyosuke (平坂恭介)

- 1934b 儒艮、即「人魚」に就いて (下). Dugong, Sunawachi "Ningyo" ni Tsuite, Ge. [The Dugong, which is well known as a "Mermaid," Volume 2]. In 台湾水産雑誌 第二三五号. *Taiwan Suisan Zasshi, Dai 235 Go. [Taiwan Fisheries, No. 235]*. In Japanese. 台湾水産会, (Taiwan).

Remarks about the biology of the dugong in Taiwan.

Hirasaka, Kyosuke (平坂恭介)

- 1938 パ泳ぐ人魚. Oyogu Ningyo. [Swimming Mermaids]. In 台湾水産雑誌 第二八六号. *Taiwan Suisan Zasshi, Dai 286 Go. [Taiwan Fisheries, No. 234].* In Japanese. Taiwan Fisheries Association, (Taiwan).

Introductory materials about the dugong in Taiwan.

Hirasaka, Kyosuke (平坂恭介)

- 1939 パラオの儒艮. Palau no Dugong. [The Dugong in Palau]. In 科学南洋 第二卷第二号. *Kagaku Nan'yo, Dai 2 Kan, Dai 2 Go. [Science - Southeast, Volume 2, No. 2].* In Japanese. Palao Tropical Biological Station, Japan Society for the Promotion of Science, Tokyo, Japan.

A scientific summary of the dugong in Palau. The book includes an extracted Japanese translation of the drift records at Peleliu Island.

Honma, Yoshiharu (本間義治)

- 1966 平坂恭介先生業績目録. Kyosuke Sensei Gyoseki Mokuroku. [A Catalogue of Dr. Kyosuke's Accomplishments]. In 新潟県生物教育研究会誌 第3号. *Niigata-ken Seibutsu Kyoiku Kenkyukai Shi, Dai 3 Go. [Records of the Niigata Prefectural Biology Educational Foundation, No. 3].* In Japanese. Niigata Prefectural Biology Educational Foundation, Niigata, Japan.

A research bibliography of Dr. Kyosuke, a leading expert in the study of dugongs.

Honma, Yoshiharu (本間義治)

- 1996 故平坂恭介先生の海生哺乳類に関する業績をめぐって. Ko Kyosuke Sensei no Kaisei Honyurui ni Kansuru Jisseki wo Megutte. [Accomplishments of Dr. Kyosuke on Marine Mammals]. In 新潟県生物教育研究会誌 第31号. *Niigata-ken Seibutsu Kyoiku Kenkyukai Shi, Dai 31 Go. [Records of the Niigata Prefectural Biology Educational Foundation, No. 31].* In Japanese. Niigata Prefectural Biology Educational Foundation, Niigata, Japan.

A research bibliography of Dr. Kyosuke, a leading expert in the study of dugongs.

Kamiya, Toshiro (神谷敏郎)

- 1979 人魚学ことはじめ. Ningyo Gaku Koto Hajime. [Introduction to Mermaid Studies]. In 海洋と生物 No.4 (第1巻第4号). *Kaiyo to Seibutsu, No.4 (Dai 1Kan, Dai 4 Go).* [Aquabiology, Volume 1, No. 4]. In Japanese. Biology Study Association, Tokyo, Japan.

An introduction of the biology and characteristics of the dugong.

Kishaba, Eikin (喜舎場永均)

- 1977 八重山民俗誌 下巻. Yaeyama Minzoku Shi, Ge Kan. [Ethnography of Yaeyama, Second Volume]. In Japanese. The Okinawa Times, Okinawa, Japan.

A description of the dugong in Yaeyama is included.

Matsui, Takeshi (松井健)

- 2001 マイナー・サブシステンスと琉球の特殊動物. Minor Subsistence to Ryukyu no Tokushu Dobutsu. [Minor Subsistence and Particular Animals in Ryukyu]. In 国立歴史民俗博物館研究報告 第87集. *Kokuritsu Rekishi Minzoku Hakubutsukan*

Kenkyu Hokoku, Dai 87 Shu. [Survey Report of the National Museum of Japanese History, No. 87]. In Japanese. National Museum of Japanese History, Chiba, Japan.

An essay on the relationship between the dugong of Okinawa and its scarcity.

Miyazaki, Nobuyuki (宮崎信之)

1980 ジュゴンとクジラ. *Jugon to Kujira. [Dugong and Whale].* In 琉球の自然史. *Ryukyu no Shizen Shi. [Natural History of the Ryukyus].* In Japanese. Tsukiji Shokan, Co., Ltd., Tokyo, Japan.

Description of the dugong habitat and history.

Nature Conservation Division of the Department of cultural and environmental affairs, Okinawa Prefectural Government. (沖縄県文化環境部自然保護課)

2003 ジュゴンのはなし - 沖縄のジュゴン -. *Jugon no Hanashi - Okinawa no Jugon. [Tales of Dugong - Dugong in Okinawa].* In Japanese. Nature Conservation Division, Department of Cultural and Environmental Affairs, Okinawa Prefecture, Okinawa, Japan.

A brief description of the biology and cultural background of the dugong.

Publication Office of Okinawan Encyclopaedia (沖縄大百科事典刊行事務局)

1983 沖縄大百科事典 中巻. *Okinawa no Dai Hyakka Jiten Chukan. [Okinawan Encyclopedia, Volume II].* In Japanese. Okinawa Times, Okinawa, Japan.

An encyclopedia of Okinawa, containing two articles on the dugong. One of them states the following:

Dugong dugon: A large herbivorous marine mammal, which belongs to the order Sirenia, family Dugongidae, has a fusiform body that reaches 3 meters long. A crescent-shaped fluke is similar to those of Cetaceas, and one set of teats is located under each root of the forelimbs that function as pectoral flippers. A female dugong was considered to hold her calf with her forelimbs when suckling the calf, which feeds by taking the mother's teat from one side of her body. The structure of its mouth is quite unusual: the fleshy upper lip stretches upward showing a disk-like form covered with a few scattered thick bristles. A pair of nostrils lies above the upper lip. Its eye is small and a tiny ear hole is located behind the eye. The external ear is absent. The body is bluish gray in color and sparsely covered with short hair. They inhabit the coral reef around the Indo-Pacific region, and the Nansei Islands (literally Southwest islands) is the northern limit of their distribution. The staple diet of the dugong is marine Embryophyta siphonogama that includes families of Hydrocharitaceae and Potamogetonaceae. National Natural Monument (1972.5).

Takara, Tetsuo (高良鉄夫)

1969 6 海の珍獣・ジュゴン (人魚) . No 6, *Umi no Chinju • Jugon (Ningyo). [Rarest Animal in the Sea: Dugong (Mermaid), No. 6].* In 琉球の自然と風物 (特殊動物を探る) . *Ryukyu no Shizen to Fubutsu (Tokushu Dobutsu wo Saguru). [Nature and Scenery of the Ryukyus: Exploration of Rare Animals].* In Japanese. Ryukyu Bunkyo Tosho, Co., Ltd., Okinawa, Japan.

An description of dugong habitat and history.

Takara, Tetsuo (高良鉄夫)

- 1991 沖縄の資源探訪. *Okinawa no Shigen Tanbo. [Inquiry of Okinawan Resources]*. In Japanese. Ryukyu Shimpo, Okinawa, Japan.

Reporting biological and historical aspects of the dugong.

Takara, Tetsuo, and Tetsuo Amano (高良鉄夫 天野鉄夫)

- 1977 沖縄動植物研究史. *Okinawa Doshokukbutsu Kenkyu Shi. [Research History of Okinawan Animals and Plants]*. In Japanese. Publication Association of Animals and Plants Study, Okinawa, Japan.

A book on a history of faunal and floral studies of the Ryukyu Islands, indicating the name of the dugong appears in “Nihon Sekitsui Doubutsu Mokuroku” (Inventory of Vertebrate Animals in Japan) published in 1891.

The Ministry of the Environment (環境省)

- 2004 シ “ ユ コ ・ シ ” と藻場の広域的調査 平成13年～15年度 結果概要. *Dugong to Moba no Kouikiteki Chosa, Heisei 13-15 Nendo, Kekka Gaiyo. [Wide-Ranging Survey of the Dugong and seaweed Bed]*. In Japanese. The Ministry of the Environment, Tokyo, Japan.

A brief summary of the survey of the dugong’s seaweed beds and information on studies of its DNA is included.

Uchida, Senzo (内田詮三)

- 1994 4、ジュゴン 海牛目 ジュゴン科. 4. Dugong, Kaigyū Moku, Dugong Ka. [4. Dugong, Sirenia, Dugongidae]. In 日本の希少な野生水生生物に関する基礎資料 (I). *Nihon no Kisho na Yasei Suisei Seibutsu ni Kansuru Kiso Shiryo, I. [Fundamental Data of the Scarce Wild Aquatic Life in Japan, I]*. In Japanese. Japan Fisheries Resource Conservation Association, Tokyo, Japan.

General remarks on the biology of the dugong.

Uchida, Senzo (内田詮三)

- 1998 日本の希少な野生水生生物に関するデータブック (水産庁編). *Nihon no Kisho na Yasei Suisei Seibutsu ni Kansuru Data Book (Suisan Cho Hen). [Data Book of the Scarce Wild Aquatic Life in Japan, the Fisheries Agency Edition]*. In Japanese. Japan Fisheries Resource Conservation Association, Tokyo, Japan.

An outline of the biology of the dugong.

Uchida, Senzo, Teruo Tobayama, and Yukinori Yoshida (内田詮三・鳥羽山照夫・吉田征紀)

- 1979 ジュゴンの飼育例. *Dugong no Shiiku Rei. [Breeding Precedent of the Dugong]*. In 動物園水族館雑誌 第20巻 (1978) 第1号. *Dobutsuen Suizokukan Zasshi, Dai 20 Kan (1978), Dai 1 Go. [Journal of Japanese Association of Zoological Gardens and Aquariums, Volume 20, 1978, No. 1]*. In Japanese. Japanese Association of Zoos and Aquariums, Tokyo, Japan.

A report of the breeding methods of the dugong.

Uchida, Senzo, Teruo Tobayama, and Yukinori Yoshida (内田詮三・鳥羽山照夫・吉田征紀)

- 1980a ジュゴンの生理値. *Dugong no Seirine. [Physiological Properties of the Dugong]*. In 動物園水族館雑誌 第21巻 (1979) 第3号. *Dobutsuen Suizokukan Zasshi, Dai 21*

Kan (1979) Dai 3 Go. [Journal of Japanese Association of Zoological Gardens and Aquariums, Volume 21, 1979, No. 3]. In Japanese. Japanese Association of Zoos and Aquariums, Tokyo, Japan.

Remarks on the biology of the dugong. Discusses dugong body length, average respiration rate, heart rate, body temperature, blood tests, and behavior based on five dugongs in captivity at the Okinawa aquarium

Uchida, Senzo, Teruo Tobayama, and Yukinori Yoshida (内田詮三・鳥羽山照夫・吉田征紀)

1980b ジュゴンの外型計測値と剖検所見. Dugong no Sotogata Keisokuchi to Boken Shoken. [The Dugong's Outer Measurements and Findings of the Autopsy]. In 動物園水族館雑誌 第21巻 (1979) 第3号. *Dobutsuen Suizokukan Zasshi, Dai 21 Kan (1979) Dai 3 Go. [Journal of Japanese Association of Zoological Gardens and Aquariums, Volume 21, 1979, No. 3]. In Japanese. Japanese Association of Zoos and Aquariums, Tokyo, Japan.*

Remarks on the biology of the dugong.

Yamamoto, Hideyasu (山本英康)

2002 沖縄近海鯨類の人との関わりと変遷. Okinawa Kinkai Geirui no Hito tonon Kakawari to Henkan. [Connection of Cetacea in the Adjacent Waters of Okinawa with People and Its Changes]. In 名護市博物館紀要・10 あじまあ. *Nago Shi Hakubutsukan Kiyo 10: Ajimaa. [Bulletin of Nago Museum No. 10: Ajimaa]. In Japanese. Nago Museum, Okinawa, Japan.*

An essay on Cetacea habitation in the adjacent waters of the Okinawan coast, including a reference to the dugong.

Yatsu, Naohide (谷津直秀)

1914 動物分類表. *Dobutsu Bunrui Hyo. [Animal Classification Table]. In Japanese. Maruzen, Co., Ltd., Tokyo, Japan.*

A zoological classification table prepared in 1914.

Agency for Cultural Affairs (文化庁)

- 1976 天然記念物緊急調査 植生図・主要動植物地図 47沖縄県. *Ten'nen Kinenbutsu Kinkyu Chosa Shokusei Zu/Shuyo Doshokubutsu Chizu, No. 47, Okinawa-ken. [Urgent Survey on National-Monument Vegetation: Vegetation Map of the Main Flora and Fauna, No. 47, Okinawa Prefecture]*. In Japanese. Agency for Cultural Affairs, Tokyo, Japan.

A description of the national monuments for the first time after Okinawa's reversion to Japanese administration in 1972, including the dugong.

Cultural Assets Protection Commission of the Government of the Ryukyu Islands

(琉球政府文化財保護委員会)

- 1962 指定文化財写真集. *Shitei Bunkazai Shashin Shu. [Photo Collections of the Designated Cultural Property]*. In Japanese. Cultural Assets Protection Commission of the Government of the Ryukyu Islands, Okinawa, Japan.

A description of the national monuments in Okinawa, including an article on the dugong.

Cultural Assets Protection Commission of the Government of the Ryukyu Islands

(琉球政府文化財保護委員会)

- 1964 沖縄の文化財. *Okinawa no Bunkazai. [Cultural Resources of Okinawa]*. In Japanese. Cultural Assets Protection Commission of the Government of the Ryukyu Islands, Okinawa, Japan.

An explanation of national monuments in Okinawa, including an article on the dugong.

Cultural Assets Protection Commission of the Government of the Ryukyu Islands

(琉球政府文化財保護委員会)

- 1978 「一九五六年—指定文化財解説」. 1956 Nen - Shitei Bunkazai Kaisetsu. [Description of designated cultural property, 1956]. In 沖縄文化財調査報告 (一九五六年—一九六二年). *Okinawa Bunkazai Chosa Hokoku (1956-1962). [Survey Report of the Okinawan Culture, 1956 - 1962]*. In Japanese. Naha Shuppansha, Okinawa, Japan.

Commentary on cultural resources appointed by the Government of the Ryukyu Islands in 1956. Includes a section on the dugong.

Hamaguchi, Hisao (濱口寿夫)

- 2004 「地域を定めず指定されている天然記念物に関する教育普及活動の例」. Chiiki wo Sadamezu Shitei Sareteiru Tennen Kinenbutsu ni Kansuru Kyoiku Fukyu Katsudo no Rei. [An Attempt to Conduct Public Recognition to the Value of Okinawan Natural Monuments]. In 沖縄県教育庁文化課紀要 第20号. *Okinawa-ken Kyouiku Cho Bunka Ka Kiyo Dai 20 Go. [Bulletin of Culture Division, Education Department, Okinawa Prefectural Government No. 20]*. In Japanese. Department of Culture of the Okinawa Prefectural Education Committee, Okinawa, Japan.

Case examples of the administrative dissemination activities for popularizing the national monuments.

Hanai, Masamitsu (花井正光)

- 1980 南西諸島に生きる天然記念物の動物たち. Nansei Shoto ni Ikiru Ten`nen Kinembutsu no Dobutsu Tachi. [Natural Monument Animals in the Southwest Islands]. In 月刊 文化財 第198号. *Gekkan Bunkazai, Dai 198 Go. [Monthly Cultural Property, No. 198]*. In Japanese. Dai`ich Hoki, Co., Ltd., Tokyo, Japan.

A description of the dugong in a list of the natural monuments.

Higashionna, Takuma (東恩納琢磨)

- 2000 ジュゴンと共に生きる地域を. Jugon to Tomoni Ikiru Chiiki wo. [For a Coexisting Community with Dugongs]. In 隔月刊 ひょうご部落解放 第96号. *Kakugetsu Kan Hyogo Buraku Kaiho Dai 96 Go. [Bimonthly Magazine - Liberation of the Hyogo Buraku, No. 96]*. In Japanese. Hyogo Buraku Liberation Research Center, Hyogo, Japan.

Notes about connections between the military base relocation and the Okinawa natural resources, including a small article on the dugong's habitat and relationship with the local culture.

Ikehara, Sadao (池原貞雄)

- 1988 沖縄文化財百科〈第4巻〉. *Okinawa Bunkazai Hyakka (Dai 4 Kan). [Encyclopedia of Okinawan Culture, Volume 4]*. In Japanese. Naha Shuppansha, Okinawa, Japan.

A description of Okinawan cultural resources, including an article on the dugong.

Investigation Division of Board of Education, the Government of the Ryukyu Islands

(文教局研究調査課)

- 1958 琉球史料 (第三集) . *Ryukyu Shiryo (Dai 3 Shu). [Historical Materials of the Ryukyus, No. 3]*. In Japanese. Board of Education of the Government of the Ryukyu Islands, Okinawa, Japan.

The law establishing cultural property protection during the Government of the Ryukyus.

Ito, Kenshi (伊藤研之)

- 1973 1973 九州沖縄文化年鑑. *1973 Kyushu Okinawa Bunka Nenkan. [1973 Annual of Kyushu Okinawa Culture]*. In Japanese. Kyushu-Okinawa Cultural Association, Fukuoka, Japan.

A list of designated national monuments dated 1973, including the dugong as a cultural property.

Iwamoto, Satoshi (岩本敏)

- 2002 週刊 日本の天然記念物 動物編 第4回配本. *Shukan Nihon no Tennen Kinenbutsu: Dobutsu Hen, Dai 4 Haihon. [Weekly Magazine - Natural-monuments of Japan, Animal, Distribution Book #4]*. In Japanese. Shogakukan, Inc., Tokyo, Japan.

A description of Japanese national monuments. Dugong edition.

Kameyama, Norikazu, Yasuhide Oshiro, Tsutomu Sashida, and Yoshihiro Miyagi (亀山統一 大城保英 佐次田勉 宮城義弘)

- 2003 ジュゴンが危ない -米軍基地建設と沖縄の自然-. *Dugong ga Abunai - Beigun Kichi-kensetsu to Okinawa no Shizen -*. [*Dugong in Danger - Construction of US Military Bases and Nature of Okinawa -*]. In Japanese. Shin Nihon Shuppansha, Co., Ltd., Tokyo, Japan.

A book on the relocation of US military facilities in relation to the Okinawan natural environment. Briefly touching on the dugong in the text.

Kasuya, Toshio, and Nobuyuki Miyazaki (粕谷俊雄・宮崎信之)

- 1997 海牛目ジュゴン. *Kaigyu Moku Dugong*. In レッドデータブック日本の哺乳類. *Red Data Book Nihon no Honyurui*. [*Red Data Book - Mammals in Japan*]. In Japanese. Bun'ichi Co., Ltd., Tokyo, Japan.

A list of endangered species of mammal. The dugong is included.

Kikugawa, Hiroshi (喜久川宏)

- 1980 季刊 沖縄アルマナック 1980年 03 特集 文化財 若夏号. *Kikan Okinawa Almanac 1980 Nen, 03, Tokushu, Bunkazai, Wakanatsu Go*. [*Quarterly, Okinawa Almanac 1980, 03, Special Feature, Cultural Resources, Summer Issue*]. In Japanese. Socio-Economic Research Center, Co., Ltd.

A description of national monuments in Okinawa, including an article on the dugong.

Legal Affairs Department of the Government of the Ryukyu Islands (琉球政府法務局)

- 1971 琉球現行法規総覧. *Ryukyu Genko Hoki Soran*. [*Overview of Current Legislation of the Ryukyus*]. In Japanese. Dai'ichi Hoki, Co., Ltd., Tokyo, Japan.

The law establishing cultural property protection during the Government of the Ryukyus.

Manabe, Kazuko (真鍋和子)

- 2002 ノンフィクション 知られざる世界
ジュゴンはなぜ死ななければならなかったのか. *Non Fiction Shirarezaru Sekai: Dugong ha Naze Shinanakereba Naranakattanoka*. [*Non Fiction: Unknown World - Why Must Dugongs Have to Die?*]. In Japanese. Kin'no Hoshisha, Co., Ltd., Tokyo, Japan.

An article on the base relocation and how this involves the dugong.

Save The Dugong Campaign Center (ジュゴン保護キャンペーンセンター編), ed.

- 2002 ジュゴンの海と沖縄 —基地の島が問い続けるもの. *Dugong no Umi to Okinawa - Kichi no Shima ga Toi Tsudukeru Mono*. [*Dugong's Sea and Okinawa - What the Island of Military Bases Has Been Raising Questions About*]. In Japanese. Koubunken, Co., Ltd., Tokyo, Japan.

A book on the relocation of U.S. military facilities in relation to the Okinawan natural environment. Briefly touching on the dugong in the text.

Save The Dugong Fund (ジュゴン保護基金編), ed.

- 2001 ジュゴンの海は渡さない いのちをつなぐ美ら海を子どもたちに. *Dugong no Umi ha Watasanai: Inochi wo Tsunagu Chura Umi wo Kodomotachi ni. [Never Give Away the Sea of the Dugong: Handing down the Beautiful Sea as a Life Source for Children]*. In Japanese. Fukinoto Shobo Publishing, Inc., Hokkaido, Japan.

A book on the relocation of U.S. military facilities in relation to the Okinawan natural environment. Briefly touching on the dugong in the text.

Shiroma, Chokyo (城間朝教)

- 1951 天然記念物. Ten'nen Kinenbutsu. [Natural Monument]. 沖縄タイムス. *Okinawa Taimusu. [Okinawa Times]*. 30 September 1951. In Japanese.

The Biological Society of Okinawa is willing to create a definite plan and make an appeal to the authorities for legislation in terms of conservation of protected species. In pre-war time, six kinds of creatures including the dugong have been preserved as protected species.

Tateishi, Akira (館石昭)

- 1973 沖縄の海と自然. *Okinawa no Umi to Shizen. [Sea and Nature of Okinawa]*. In Japanese. Shogakukan, Inc., Tokyo, Japan.

A photo collection of Okinawa's natural resources, including a list of national monuments in Okinawa.

The Okinawa Prefectural Education Committee (沖縄県教育委員会)

- 1975 沖縄の文化財 1975. *Okinawa no Bunkazai 1975. [Cultural Resources of Okinawa, 1975]*. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An explanation of national monuments in Okinawa, including an article on the dugong. The article states the following about the dugong as a natural monument:

The dugong (Dugong dugon), one of the rarest animals in the world, inhabits around the Red Sea, the Indian Ocean, and in the adjacent waters of the Ryukyu Islands. Body size is approximately 2.7 meters long with the enlarged trunk that gradually tapers toward the horizontal caudal fin. The hind limbs and dorsal fin are absent. The body is sparsely covered with short hair, and the skin is bluish-gray in color while the lower abdominal is faint white. Being a slow swimmer, the dugong was indiscriminately hunted, causing its excessive declination in numbers. The growing awareness of its gradual extinction has led to the designation of the dugongs as a natural monument even before the previous war. Referred to as “mermaid” or “kaiba/umiuma,” the dugong in Okinawa is also called “zan'nuiyu” or “zan”.

Unknown (著者不明)

- 1988 沖縄文化財百科〈第4巻〉. *Okinawa Bunkazai Hyakka, Dai 4 Kan. [Encyclopedia of Okinawan Culture, Volume 4]*. In Japanese. Naha Shuppansha, Okinawa, Japan.

An introduction of Okinawan Cultural Properties. A description of the dugong is included.

Urashima, Etsuko (浦島悦子)

2008 島の未来へ：沖縄・名護からのたより. *Shima no Mirai e: Okinawa, Nago kara no tayori. [For the Future of the Island: A Message from Nago]*. In Japanese. Inpakuto Shuppansha, Tokyo, Japan.

A report from the east coast of Nago about the struggle to save the habitat of the dugong in view of the targeted date for construction of a military base.

Higa, Matsukichi (比嘉松吉)

- 1979 「古代の魚法」. *Kodai no Gyoho*. [Ancient Fishing Method]. In 渡名喜島の遺跡 I. *Tonaki-jima no Iseki I*. [Sites in Tonakishi-jima Island, I]. In Japanese. Tonaki Village Board of Education, Okinawa, Japan.

A discussion by local citizens, suggesting the origin of dugong consumption dates back to prehistoric time, however its source is unidentified. According to the source, during the time when our ancestors lived in a society based on kinship, they maintained their living by gathering collectable necessities from the natural world using wooden or stone tools. In other words, they hunted wild boars or deer from the mountains; dugongs from the ocean. What they procured was shared within the group. Excavated artifacts found in recent surveys verify these facts.

Makino, Kiyoshi (牧野清)

- 1990 八重山のお嶽. *Yaeyamano Otake*. [Utaki of Yaeyama]. In Japanese. Aaman Kikaku, Okinawa, Japan.

Among the utaki, it describes the utaki related to the dugong in Aragusuku-jima Island (Panari).

Miyagi, Fumi (宮城文)

- 1972 八重山生活誌. *Yaeyama Seikatsu Shi*. [Records of Yaeyama Life]. In Japanese. Jono Printing, Co., Ltd., Kumamoto, Japan.

A magazine on life in Yaeyama written by a local elder, including notes about the dugong in the food and place name section.

Ohama, Shinken (大浜信賢)

- 1971 八重山の人頭税. *Yaeyama no Jinto Zei*. [Capitation Tax of Yaeyama]. In Japanese. San'ichi Publishing, Co., Ltd., Tokyo, Japan.

Descriptions of ceremonies for the dugong hunting in Aragusuku-jima Island. Based on the fact that the dugong was once a type of tax payment (offering) within the Yaeyama Islands, the author introduces the subject with a discussion of dugong hunting, its habitat area within Yaeyama, songs of Kaiba hunting, and the Kaiba utaki.

Oyamori, Chomei (親盛長明)

- 2005 昔がたり私がつたり 親盛長明さんの巻 最終回
ザン (ジュゴン) を葛の網で捕る話など. *Mukashi Gatari Watashi Gatari, Oyadomari Chomei San no Maki, Saishu Kai, Zan (Jugon) wo Kuzu no Ami de Toru Hanashi Nado*. [Telling Old Stories, Telling about Me, by Chomei Oyamori, Last Edition, Story of Hunting Zan (Dugong) by Arrow Root Net, etc]. In 情報やいま 2005年1/2月合併号. *JohoYaima 2005 Nen 1/2 Gatsu Gappei Go*. [Information of Yaima, January/February 2005 Issue]. In Japanese. Nanzansha, Co., Ltd., Okinawa, Japan.

Interviews with the local elders in Yaeyama, including statements about the dugong.

Tanigawa, Ken'ichi (谷川健一)

- 1981 海の群星. *Umi no Gunsei*. [The Stars of the Sea]. In . Shueisha, Inc., Tokyo, Japan.

An article about experiences in Yaeyama post-war, describing dugong hunting with dynamite.

Yamashiro, Zenzo, Takeo Minamoto, and Tokuyu Arashiro (山城善三・源武雄・新城徳祐)

- 1978 「古宇利島の海神祭」. Kouri-jima no Unjami. [Sea God Festival at the Kouri-jima Island]. In 沖縄文化財調査報告 (一九五六年—一九六二年). *Okinawa Bunkazai Chosa Hokoku (1956-1963)*. [Survey Report of Okinawan Cultural Resources, 1956 - 1962]. In Japanese. Naha Shuppansha, Okinawa, Japan.

A discussion of the Unjami (Sea God Festival) on Kouri-jima Island (with a section concerning the dugong). Zenzo Yamashiro, Takeo Minamoto, and Tokuyu Arashiro report the agenda, customs, and rituals associated with the sea festival held at Kouri-jima Island. Based on this report, the prayers that symbolize a good catch at the sea that people offer at sea festivals in other regions were not seen in the festival held at Kouri-jima Island. Instead of prayers, a ritual called “falling rice cakes” derived from the legend of Kouri-jima Island origin is held. In another ritual, a man and woman, embracing each other, disappear into a main house during the festival at Kouri-jima Island. The latter ritual could be considered as a symbolical representation of the story of the male-female relationship being taught by the dugong to the original couple. The authors conclude that these two rituals are the main part of the sea festival held at Kouri-jima Island.

Agarie, Chotaro (東江長太郎)

- 1989 古琉球 三山由来記集. *Ko Ryukyu Sanzan Yuraiiki Shu. [Old Ryukyus: Provenance of Three Kingdoms]*. In Japanese. Naha Shuppansha, Okinawa, Japan.

Contains legends concerning the establishment of the island, including a story of the dugong. The author discusses the legend of Kouri-jima's origin. Usually, a dugong appears in this Kouri-jima legend. However, in the version told by the author, the dugong is replaced by a Sea-Bird (Kai-Cho). The source of this version and why the story is told this way are not stated.

Akamine, Masanobu (赤嶺政信)

- 2008 沖縄における津波と「油雨」に関する伝承. *Okinawa ni Okeru Tsunami to "Abura Ame" ni Kansuru Densho. [Traditions Related to the Tsunami and Greasy Rain in Okinawa]*. In 沖縄の災害情報に関する歴史文献を主体とした総合的研究. *Okinawa no Saigai Joho ni Kansuru Rekishi Bunken wo Shutai to Shita Sogoteki Kenkyu. [Comprehensive Research Based on Historical Documents on Disaster Information of Okinawa]*. In Japanese. Unpublished Research Report for the Grants-in-Aid for Scientific Research B (Base Technologies), 2005-2007 Fiscal Year, N/A.

An essay of Okinawan folk tales, including a dugong story. The story is about a man in Koja Village, Misato Magiri, who found a strange fish and took it home in a bucket. Later he hears a voice from the bucket saying, "Should it be one or two waves?" The man is frightened and heads to the beach to release the fish, but along the way he meets another man and gives the fish away. As the other man cooked it and was about to eat the fish, a tsunami came and destroyed the village. The Yonatama Legend about the mother and child avoiding the tsunami is also mentioned here.

Arakawa, Akira (新川明)

- 1978 人魚と人々のロマン. *Ningyo to Hitobito no Roman. [Romance with a Mermaid and People]*. In 新南島風土記. *Shin Nanto Fudoki. [New Southern Islands Chronicles]*. In Japanese. Daiwa Shobo Publishing, Co., Ltd., Tokyo, Japan.

A description of the folk songs related to dugongs on Aragusuku-jima Island of the Yaeyama Islands.

In Aragusuku-jima Island, consisting of both Uechi and Shimoji Islands, there is an utaki for dugong worship and a folk song about dugong hunting. The song sings of the well-expressed islander's joy for successfully paying the dugong tax to the government. The dugong hunt was a difficult task, and it took many days for the hunters to catch one. Therefore, before leaving the island for hunting, the hunters visited the Isho Utaki (isho means sea in Okinawan dialect) and prayed for a successful hunt. As they returned to the island with a catch, they offered its skull to the Isho Utaki to show their gratefulness for divine aid. There used to be many dugong skulls, which are about the same size as a dog's skull. However, since some researchers and curio looters took them away in recent years, only five to six skulls are left on the stone wall located at the inner part of the Utaki.

Arima, Hideko, and Shoji Endo (有馬英子 遠藤庄治)

- 1979 日本の民話〈12〉九州(二)・沖縄. *Nihon no Minwa (12): Kyushu (2)/Okinawa. [Japanese Folk tales (12): Kyushu (2), Okinawa]*. In Japanese. Gyosei, Co., Ltd., Tokyo, Japan.

An old song related to the dugongs is included. The song goes as follows: A Zan (dugong) caught at Sakieda beach, and from four places, the ears didn't go, but the legs did, but the legs didn't take it, the hand did. The hand didn't eat it but the mouth did. So it got mad and hit the back. But the back didn't cry and the mouth did.

Asato, Bushin (安里武信)

- 1976 新城島(パナリ). *Aragusuku-jima (Panari). [Aragusuku-jima Island: Panari]*. In Japanese. Private Publication, Okinawa, Japan.

A book on Aragusuku-jima Island (Panari), describing old songs about the dugong, utaki, and dugong hunting.

This contains a description of utaki in Aragusuku-jima Island, a folk song related to dugong hunting, and details of the dugong hunting during the time the king of Ryukyu ordered the submission of the zanu (dugong). Among the several utaki, the "Isho Utaki" was the focal point of prayers associated with dugong hunting. The hunters sailed the coast of Iriomote-jima Island, Kohama-jima Island, and Ishigaki-jima Island, and did not return for about ten days. The hunting ground was generally a shallow beach with abundant sea grasses. They looked for feeding marks at low tide, and put up a net during high tide. The hunters then waited for the tide to ebb and dugong to appear. As for its capture, the hunters hacked the dugong's caudal fin with a sharp blade. As the dugong shook its fin furiously, unable to bear the pain, the caudal fin broke and the hunters waited until the dugong became exhausted and then loaded it on board. They paid the dugong's skin and meat to the king after boiling and drying them in the sun. Its skull was offered to Isho Utaki and nothing was ever wasted.

City History Compilation Office of Nago City (名護市史編さん室), ed.

- 1992 名護市史叢書・13 屋我地の民話. *Nago-shi Shi Soshō 13: Yagachi no Minwa. [Series of the History of Nago City, No. 13: Folktales of Yagachi]*. In Japanese. Nago City Board of Education, Okinawa, Japan.

A compilation of folk tales in Yagachi, Nago City, containing three dugong related folk tales. These are similar to the tales in other Nago City compilations.

City History Compilation Office of Nago City (名護市史編さん室), ed.

- 1993 名護市史叢書・14 羽地の民話. *Nago-shi Shi Soshō 14: Haneji no Minwa. [Series of the History of Nago City, No. 14: Folktales of Haneji]*. In Japanese. Nago City Board of Education, Okinawa, Japan.

A compilation of folk tales collected in Haneji, Nago City, containing three dugong related folk tales. One story concerns Kouri-jima, which is said to be the original cradle of the human race. A man and a woman fell from heaven and lived on rice cakes that came down from the sky. On earth they watched the sea mammals mating and learned the male-female relationship from them. The two imitated the actions of the sea mammals and the woman conceived and gave birth to a human baby. After that, no more rice cakes fell from the sky (because they were considered to be persons of prudence and discretion?) With the exercise of prudence and discretion, they were able to survive by

fishing and farming. This story tells how this man and woman became the ancestors of all the people on Kouri-jima and that their offspring spread all over Okinawa Island. A similar story is told in Nago City; this version of the story suggests that the two are still worshipped as gods at the top of the mountain.

City History Compilation Office of Nago City (名護市史編さん室), ed.

- 1997 名護市史叢書・15 やんばるの祭りと神歌. *Nago-shi Shi Sosho 15: Yambaru no Matsuri to Kamiuta. [Series of the History of Nago City, No. 15: Festivals and Religious Songs of Yambaru]*. In Japanese. Nago City Board of Education, Okinawa, Japan.

Includes old folk songs related to the dugong in Haneji, Nago City.

Cornelius, Ouwehand (アクエハント・コルネリウス)

- 2004 HATERUMA : ー南琉球の島嶼文化における社会-宗教的諸相ー. *HATERUMA: Minami Ryukyu no Toshō Bunka ni Okeru Shakai - Shukyo Teki Shoso. [Hateruma: Socio-Religious Aspects of South Ryukyu Islands Culture]*. Translated by Nakahachi, Yoshimori (中鉢良護). In Japanese. Yoku Shorin, Inc., Okinawa, Japan.

Contains a story of traditional dugong legends of Hateruma-jima Island. The story is related below.

It is believed that a dugong landed at a beach currently called Budumarii (this means “large anchorage” in the local dialect) located on the northern coast of Hateruma-jima Island. There are legends relating to the island families’ social status and position; one of the families known as the House of Buatteiye has its origins in a dugong legend. This is a story about a man who attempted to pull a washed up dugong sleeping on a coral rock tied with a rope to a cow. The man and the cow were dragged into the sea by the dugong: the cow was drowned and the man returned ten days later with a wretched look causing people to mistake him for another. The descendants of the man, especially the eldest son was called “Zangara,” were believed to have been blessed with extraordinary powers. Since then, the House of Buatteiye has become rich. Although this story sounds quite simple, the cow dragged into the sea could be considered as an offering or a sacrifice to the water god.

Dai, Mataro (大 真太郎)

- 1974 竹富島の土俗. *Taketomi-jima no Dozoku. [Local Customs of Taketomi-jima Island]*. In Japanese. Japan Journalism Publishing, Unknown.

An old folk song in which the dugong appears is included.

Ebara, Yoshimori (恵原義盛)

- 1986 奄美の動物と俗信. *Amamino Dobutsu to Zokushin. [Animals in Amami and Folk Beliefs]*. In 南島研究 第二六号. *Nanto Kenkyu, Dai 26 Go. [Study on Southern Islands, Volume 26]*. In Japanese. Southern Islands Study Group, Tokyo, Japan.

Inherited folk tale of the dugong on Amami Island. In the olden days, the dugong was often spotted in the Uino (inner shores) playing while carrying its sibling under its arm.

Editorial Board of Collection of the Old Traditional Songs of Taketomi Township
(竹富古謡編集委員会), ed.

- 2005 竹富町古謡集 (第五集) . *Taketomi Cho Koyo Shu (Dai 5 Shu)*. [Collection of the Old Traditional Songs of Taketomi Town, No. 5]. In Japanese. Taketomi Town Board of Education, Okinawa, Japan.

One ancient folk song related to the dugong is included. The song is about a Panama (dugong) caught on the east beach. It was washed up. And a comic relay of whimsical words describes the joy beginning. It is similar to other dugong songs.

Editorial Board of History of Gushikawa City (具志川市史編さん委員会), ed.

- 1997 具志川市史 第三卷 民話編 上 伝説. *Gushikawa-shi Shi, Dai 3 Kan, Minwa Hen, Jo, Densetsu*. [History of Gushikawa City, Volume 3, Folklore Volume, Volume 1, Traditions]. In Japanese. Gushikawa City Board of Education, Okinawa, Japan.

Reference material for folk tales of Gushikawa City (currently Uruma City), including a story concerned with a mermaid (dugong) and tsunami. This story is told by Mr. Azama, who was born in 1911. He tells the story of a mermaid and a tsunami in Takaesu. When Mr. Azama's grandmother was a child, there was a tsunami near Takaesu. Shortly before the tsunami struck, a mermaid was captured and hung behind kitchen stove. The moment that the mermaid said "Shall I bring one wave or two waves?", the tsunami hit the island.

Editorial Board of History of Nago City (名護市史編さん室), ed.

- 2003 名護市史・本編9 民俗Ⅲ 民俗地図. *Nago-shi Shi, Hompen 9, Minzoku III, Minzoku Chizu*. [History of Nago City, Main Volume 9, Folklore III, Folklore Map]. In Japanese. Nago City Office, Okinawa, Japan.

Includes a description of a superstition which recommends that one should not look at the dugong, since a glimpse of the dugong can bring one bad fortune.

Editorial Board of Journal of Kouri (古宇利誌編集委員会), ed.

- 2006 古宇利誌. *Kouri Shi*. [Records of Kouri]. In Japanese. Kouri, Nakijin Village, Okinawa, Japan.

A book regarding history, culture, and folkways of Kouri Island. Place names and legends related to the dugong, such as the story of the original ancestors and the rice cakes, are documented.

Editorial Board of Records of Nishime, Kume-jima Island (久米島西銘誌編集委員会), ed.

- 2003 久米島 西銘誌. *Kume-jima Nishime Shi*. [Records of Nishime, Kume-jima Island]. In Japanese. Editorial Board of Records of Nishime, Kume-jima Island, Okinawa, Japan.

Dialect Dictionary of Nishime, Kumejima Township, including an article on the dugong.

Ehman, Kenny

- 1998 *Weekly Japan Update* <http://japanupdate.com/?id=3766>. In English. Japan Update, Internet.

Report of an interview with Professor Eikichi Hateruma concerning the role of the dugong in Okinawan folklore, religion, and history. The dugong appears in 12th to 17th century songs called omoro from the island of Okinawa. It is sung about in more recent songs from the Yaeyama Islands. A prayer area on Aragusuku is also mentioned. Mr. Hateruma concludes that these songs, stories, and rituals show that the dugong has been revered as a sacred, spiritual animal in Ryukyu Island culture.

Endo, Shoji (遠藤庄治)

- 1989 いらぶの民話. *Irabu no Minwa. [Folklore of the Irabu]*. In Japanese. Irabu Town, Okinawa, Japan.

Five traditions relevant to the dugong handed down in Irabu-jima Island. The first is the tale of the Mermaid Wife (Ningyo-Nyo-bou), which was told by Mr. Seicho Nakasone, who says that he saw a dugong during his childhood.. According to this story, long, long ago, a man caught a fish that turned into a beautiful woman. He brought her back home and made her his bride. Later, after they had a child, they had a quarrel. The man was angry and told his wife “You're a fish! Go back to the sea!” Immediately she took her child and they both turned into jyan (dugong) and returned to the sea. The second tale is the story of the Yonaitana (dugong) and the Touri-Ike (a natural monument on Shimoji-jima in the Miyako Islands). Once a man from Irabu caught a yonaitama. He ate half of it and then salted the other half. One night, the Sea God called out “Yonaitama, Yonaitama, come home!” The Yonaitana replied “I am half salted and cannot return.” The Sea God responded, “Then I shall make a tsunami, which you can ride to return to the sea.” As the Sea God spoke, he caused a tsunami to occur. Meanwhile, a mother and child living near what is now the location of the Touri-Ike left their house to visit the child's grandmother, for she would not stop crying. By taking this journey, they avoided the tsunami disaster. When they returned home the next morning, they found two giant pits in the ground, which came to be known as the Touri-Ike.

Endo, Shoji (遠藤庄司)

- 1992 粟国島の民話. *Aguni-jima no Minwa. [Folklore of Aguni-jima Island]*. In Japanese. Aguni Village Board of Education, Okinawa, Japan.

A compilation of folk tales in Aguni-jima Island, including one story relating to the dugong, a tsunami story. When a fish named Jan (dugong) spoke to a human, it said three large waves would come. One day, a woman saw a fisherman talking to a Jan and ran to the mountain and survived the tsunami.

Endo, Shoji (遠藤庄治編), ed.

- 2002 たまぐすくの民話. *Tamagusuku no Minwa. [Folktales of Tamagusuku]*. In Japanese. Tamagusuku Village Board of Education, Okinawa, Japan.

A compilation of folk tales in Tamagusuku, Nanjo City, including one dugong-related folk tale. This is a story about a dugong found in Mizukin (in Tamagusuku Village) washed up on shore. The villagers got excited. At the time, if a rare thing that washed up the shore was delivered to the king, a reward was expected. The villagers did so and carried it to the castle. But the dugong died on the way, and the villagers were never given a reward.

Executive Operating Committee of Okinawa Folklore Institute (沖縄民話の会常任運営委員会)

- 1981 八重山民話の旅. *Yaeyama Minwa no Tabi. [Journey of Yaeyama Folklore]*. In Japanese. Okinawa Folklore Association, Okinawa, Japan.

One story concerning the mermaid (as dugong) and the tsunami is included.

Fujii, Sami (藤井佐美)

- 2006 「人魚と津波」の伝承世界 -南島の「物言う魚」をめぐって-. “Ningyo to Tsunami” no Densho Sekai - Minami jima no “Mono iu Sakana” wo Megutte. [Folktale World of “A Mermaid and Tsunami” - in Connection with “Speaking Fish” of Southern Island]. In

奄美沖縄民間文芸学 第6号. *Amami Okinawa Minkan Bungei Gaku, Dai 6 Go.* [Private Literary of Amami and Okinawa, No. 6]. In Japanese. Amami Okinawa Private Literary Association, Okinawa, Japan.

A collection of stories about “a mermaid and tsunami” that are distributed throughout the southern islands. The author concludes that the “Speaking Fish” of Okinawa can be considered as a visiting god.

Fukuda, Akira, Anko Sadoyama, Toshiyuki Shimoji, Katsue Okamoto, and Kiyoshi Yamamoto (福田晃 佐渡山安公 下地利幸 岡本克江 山本清)

1991 南島昔話叢書8 宮古島城辺町の昔話(下). *Nanto Mukashi Banashi Sosho 8: Miyako-jima Gusukube Cho no Mukashi Banashi (Ge).* [Series of Old Tales of the Southern Island, No. 8: Old Tales of Gusukube Cho, Miyako-jima Island, Vol. 2]. In Japanese. Doumeisha Shuppan, Co., Ltd., Tokyo, Japan.

A compilation of folk stories in Gusukube, Miyakojima City, including a dugong-related folk tale.

Fukuda, Akira, Jun'ichi Yamazato, and Mitosi Murakami (福田晃 山里純一 村上美登志)

2000 八重山・石垣島の伝説・昔話〈一〉 琉球の伝承文化を歩く1. *Yaeyama/Ishigaki-jima no Densetsu/Mukashi Banashi (1): Ryukyu no Densho Bunka wo Aruku 1.* [Traditions and Old Tales of Yaeyama and Ishigaki-jima Island: Inquiries of Ryukyuan Oral Culture, No. 1]. In Japanese. Miyai Shoten, Co., Ltd., Tokyo, Japan.

Three folk tales related to the dugong are included.

Fukushima, Hoichi (副島豊一)

1982 続・琉球の昔物語. *Zoku/Ryukyu no Mukashi Monogatari.* [Old Stories of the Ryukyu Islands, Sequel]. In Japanese. Kaiho Shuppansha, Okinawa, Japan.

Contains one folk tale related to the dugong, the story of Kouri-jima island origins.

Furuhashi, Nobutaka (古橋信考)

1981 ウソの話とホントの話. *Uso no Hanashi to Honto no Hanashi.* [True Story and False Story]. In ゆがたい 宮古の民話第三集. *Yugatai: Miyako no Minwa Dai 3 Shu.* [Evening Chat: Folklore of Miyako, No. 3]. In Japanese. Part of Miyako Folklore, Okinawa, Japan.

An essay of the validity of folk tales, including one article regarding the dugong. This relates the Yonaitama tale. There is a belief in the worship of the Yonaitama as a sea god in Miyako. The legend refers to the animal known as the dugong in Okinawa. This legend is told far to the north on the Pacific coast side.

Higa, Choshin (比嘉朝進)

2005 沖縄怪奇伝説のナゾ. *Okinawa Kaiki Densetsu no Nazo.* [Mysteries of the Okinawan Mythical Legends]. In Japanese. Kyuyo Shuppan, Okinawa, Japan.

A folk story of a mermaid and tsunami.

Higa, Minoru (比嘉実編), ed.

- 1993 沖縄研究資料14 尚家本『おもろさうし』. *Okinawa-kenkyu Shiryo 14: Shoke Bon "Omoro Saushi."* [Materials of Okinawa Research, No. 14: Sho-ke Family Book "Omoro Soushi"]. In Japanese. Hosei University Institute for Okinawan Studies, Tokyo, Japan.

A compilation of ancient poems and songs edited from 1531 to 1623, including popular songs about the dugong.

Hirasaka, Kyosuke (平坂恭介)

- 1942 人魚雑記. Ningyo Zakki. [Miscellaneous Notes of Mermaids]. In 民俗臺灣 第16号第2巻10月号. *Minzoku Taiwan, Dai 16 Go, Dai 2 Kan, 10 Gatsu Go.* [Taiwanese Folklore, No. 16, Volume 2, October Issue]. In Japanese. Tokyo Shoseki, Co., Ltd., Tokyo, Japan.

About the relationship between mermaid legends and the dugong.

Hokama, Shuzen (外間守善)

- 2000 おもろさうし(上). *Omoro Saushi (Jo).* [Omoro Soushi, Volume I]. In Japanese. Iwanami Shoten Publishers, Co., Ltd., Tokyo, Japan.

A compilation of ancient songs (omoro) originally collected from 1531 to 1623, one of which is concerned with the dugong. Translated by Shuzen Hokama.

Honma, Yoshiharu (本間義治)

- 2003 日本古来の人魚はジュゴンではない. *Nihon Korai no Ningyo ha Dugong Dehanai.* [The Japanese Indigenous Mermaid is Not the Dugong]. In 日本海のクジラたち. *Nihon Kai no Kujira Tachi.* [Whales in the Japan Sea]. In Japanese. Koukodo Shoten, Nigata, Japan.

A commentary on a mermaid legend told in the mainland Japan. The author says the model for the mermaid differs from country to country, and also region to region. Regarding the Japanese mermaid legend, he thinks the mermaid is modeled on a strange deep-sea fish called "Ryugu no tsukai" (appears to be a type of eel).

Hoshi, Isao (星勲)

- 1980 西表島のむかし話. *Iriomote-jima no Mukashi Banashi.* [Old Tales of Iriomote-jima Island]. In Japanese. Hirugisha, Inc., Okinawa, Japan.

One folk tale related to the dugong is included. This is the Kamai (Boar) and Zanoo (Dugong) Story. Long ago, the boar lived in the sea and ate in the mountains, and the dugong lived in the mountains and ate in the sea. The Gods thought this might cause some problems and switched the places where they lived.

Iha, Nantetsu (伊波南哲)

- 1958 沖縄の民話. *Okinawa no Minwa.* [Okinawan Folklore]. In Japanese. Miraisha Publishers, Tokyo, Japan.

One story concerning a mermaid (dugong) and tsunami is recorded.

Ikemiya, Masaharu (池宮正治)

- 1987 人魚を獲る〔巻一の九五〕. Ningyo wo Toru (Kan 11 no 95). [Catching a Mermaid, Volume 11, No. 95]. In おもろさうし精華抄. *Omoro Saushi Seika Sho. [Omoro Soushi (Essential Part of Omoro Soushi)]*. In Japanese. Hirugisha, Inc., Okinawa, Japan.

A compilation of ancient songs (omoro) originally collected from 1531 to 1623, one of which is concerned with the dugong. Translation and commentary by Masaharu Ikemiya. He attempts a translation and interpretation of old folk songs that are recorded in “Omoro Saushi, Volume 11, No. 95.” As his interpretation, he concludes that, in addition to its heroic hunting method, there should be some profound significance to the dugong meat since it was so highly valued as a holy dish only a king could enjoy it, avoiding concrete reference but repeating “are mimon” (meaning ‘how wonderful’).

Inada, Koji, and Toshio Ozawa (稲田浩二 小澤俊夫)

- 1983 日本昔話通観 第26巻 沖縄. *Nihon Mukashi Banashi Tukan Dai 26 Kan: Okinawa. [Observation of Japanese Old Tales, Volume 26: Okinawa]*. In Japanese. Dohosha Printing, Co., Ltd., Kyoto, Japan.

Eleven stories about a mermaid and tsunami. All are stories related to tsunamis. Six of these share the same concept, with the dugong as benefiting humans, where the fisherman who releases the begging dugong is informed about the tsunami and survives. The other five are tragic tales, as the dugong is eaten and all are destroyed. In all these the dugong speaks. Categorized as the Monoi (Talking) type in folkloric studies. Most share common themes with the Yonatama story from Miyako.

Ito, Mikiharu (伊藤幹治)

- 1980 沖縄の宗教人類学. *Okinawa no Shukyo Jinrui Gaku. [Okinawan Religious Anthropology]*. In Japanese. Kobundo Publishers Inc., Tokyo, Japan.

A story about the origin of Kori-jima Island is included.

Iwasaki, Takuji (岩崎卓爾)

- 1974a ユングンドウ (叙情謡). Yungundo (Jojoyo). [Yungundo (Lyrical Song)]. In 岩崎卓爾一卷全集. *Iwasaki Takuji 1 Kan Zenshu. [Complete Works of Takuji Iwasaki, Volume 1]*. In Japanese. Dentoto Gendaisha, Tokyo, Japan.

An introduction of Okinawan folk songs including dugong songs.

Iwata, Akira, Hiroshi Iwase, and Shoji Endo (岩田晃 岩瀬博 遠藤庄治)

- 1980 日本の昔話 30 沖縄の昔話. *Nihon no Mukashi Banashi 30 Okinawa no Mukashi Banashi. [Old Tales of Japan, No. 30: Old Tales of Okinawa]*. In Japanese. Japan Broadcast Publishing, Co., Ltd., Tokyo, Japan.

One folk tale related to the dugong is included.

Kajiku, Naoko (加治工尚子)

- 1989 八重山郡竹富町鳩間島の民話. *Yaeyama-gun Taketomi-cho Hateruma-jima no Minwa. [Folklore of Hateruma-jima Island, Taketomi Township, Yaeyama-gun]*. In Japanese.

One story of a mermaid and tsunami is included.

Kamiya, Toshiro (神谷敏郎)

- 1980 人魚の正体—ジュゴンの生物学—. *Ningyo no Shotai - Dugong no Seibutsu Gaku*. [Natural Shape of the Mermaid - Biology of the Dugong]. In 自然 昭和55年第6号. *Shizen, Showa 55 Nen, Dai 6 Go*. [Nature 1980 (Showa 55), No. 6]. In Japanese. Chuo Koronsha, Tokyo, Japan.

An introduction of the dugong as being the true identity of the mermaid. Biological characteristics of the dugong are included.

Kamiya, Toshiro (神谷敏郎)

- 1994 人魚の博物巷談. *Ningyo no Hakubutsu Koudan*. [Historical Tales of the Mermaid]. In 「UP」 第二十三巻 第九号 (通巻263号). *UP, Dai 23 Kan, Dai 9 Go, Tsukan 263 Go*. [UP, Volume 23, No. 9, Consecutive Number of Volume 263]. In Japanese. University of Tokyo Press, Tokyo, Japan.

An introduction to Sirenia as being the origin of the legends of the mermaid.

Karimata, Keiichi, and Akinori Maruyama (狩俣恵一 丸山顕徳)

- 2003 西表島・黒島・波照間島の伝説・昔話 琉球の伝承文化を歩く 2. *Iriomote-jima/Kuro Shima/Hateruma-jima no Densetsu/Mukashi Banashi Ryukyu no Densho Bunka wo Aruku 2*. [Traditions and Old Tales of Iriomote-jima Island, Kuro Shima Island, and Hateruma-jima Island: Inquiries of Ryukyuan Oral Culture, No. 2]. In Japanese. Miyai Shoten, Co., Ltd., Tokyo, Japan.

A description of a traditional folk tales concerning the dugong, with commentary, is included. Three tales about the mermaid and the tsunami are told, in all of which the humans benefit and are saved from the tsunami. All stories are from Yaeyama.

Kishaba, Kawaishi (喜舎場川石)

- 1929 琉球八重山島に於ける人魚の話. *Ryukyu Yaeyama-jima ni Okeru Ningyo no Hanashi*. [A Mermaid Story Handed Down in Yaeyama islands in the Ryukyus]. In 月刊 旅と伝説 第2年第5号. *Gekkan Tabi to Densetsu, Dai 2 Nen, Dai 5 Go*. [Monthly Magazine - Travel and Folklore, the Second Year, No. 5]. In Japanese. Sangensha Publishers Inc., Tokyo, Japan.

An introduction of Yaeyama folklore relating to the mermaid (dugong). Three houses were banished from Shiraho Village. The persons from the 3 houses were forced to live in the isolated Nohara area. One day, the people of the 3 houses caught a mermaid. They salted half of it and boiled the rest. Then the mermaid prophesized a tsunami and that people will die. The 3 houses returned the remains of the mermaid to the sea, and the tsunami hit Shiraho Village, which had banished the 3 houses, and the people living in Nohara survived.

Konishi, Kanau (小西和)

- 1940 人魚の味. *Ningyo no Aji*. [Taste of a Mermaid]. In 文藝春秋 第18巻第11号. *Bungei Shunju, Dai 18 Kan, Dai 11 Go*. [Bungei Shunju, Volume 18, No. 11]. In Japanese. Bungeishunju, Ltd., Tokyo, Japan.

A consideration of the dugong as a model for the mermaid. The author ate the dugong in Ishigaki-jima Island.

Mabuchi, Toichi (馬淵東一)

- 1971 沖縄先島のオナリ神. *Okinawa Sakishima no Onari Gami*. [Onarigami in the Southern Islands of Okinawa]. In 沖縄文化論叢2民俗編. *Okinawa Bunka Ronso, 2, Minzoku Hen*. [Essay Collection of Okinawan Culture, No. 2, Folklore Volume]. In Japanese. Heibonsha Limited, Publishers, Tokyo, Japan.

An introduction of the mermaid-and-dugong-related story concerning the Sukabuya Utaki, which is included in “the Origin of the Miyako Utaki.”

Maeda, Isshu (前田一舟)

- 2004a 連載第1回 沖縄のジュゴンと村びとの生活. *Rensai Dai 1 Kai, Okinawa no Dugong to Murabito no Seikatsu*. [The First Serialization - Okinawan Dugong and the Village People's Life]. In 環境と正義 第75号. *Kankyo to Seigi, Dai 75 Go*. [Environment and Justice, No. 75]. In Japanese. Japan Environmental Lawyers Federation, Aichi, Japan.

An introduction of the dugong related oral tradition in Okinawa. It includes a human origins story in Kori-jima Island and the dugong-related traditions in Yakena, Uruma City. In Yakena, a shiny human-shaped animal was born after a mating of a dugong princess and a dolphin boy at a cave in Yabuchi-jima Island. And the newborn child is said to be the ancestor of people in the island and Yakena. The dugong and tsunami story is included with the area names of Shimoji-son in Irabu-jima Island, Ikema-jima Island, Takaesu and Toyohara in Gushikawa City and Tana in Iheya-jima Island.

Minakata, Kumagusu (南方熊楠)

- 1973 人魚の話. *Ningyo no Hanashi*. [Stories of a Mermaid]. In 南方熊楠全集 (全一二巻) 第六巻 新聞随筆・未発表手稿. *Minakata Kumagusu Zenshu (Dai 12 Kan), Dai 6 Kan, Shimbun Zuihitsu/Mihappyo Shuko*. [Complete Works of Kumagusu Minakata (12 Volumes), Volume 6, Newspaper Essays and Unpublished Manuscripts]. In Japanese. Heibonsha Limited, Publishers, Tokyo, Japan.

An article which reveals the true identity of the mermaid as the dugong.

Minamoto, Takeo (源武雄)

- 1974 沖縄の伝説. *Okinawa no Densetsu*. [Okinawan Legends]. In Japanese. Dai'ichi Hoki, Co., Ltd., Tokyo, Japan.

Two traditions of the origin of Kouri-jima island, and Tori-ike pond in Irabu-jima Island (both dugong related) are included. The book contains stories of both The Tsunami Legend and The legend of Island Origin.

In The Tsunami Legend, once a man from Irabu caught a Yonaitama (dugong) and ate half of it, and salted the other half. One night, the Ocean God called out “Yonaitama, Yonaitama. Come home!” The Yonaitama replied, “I am half salted, and can not return.” The Ocean God answered, “Then I shall make a Tsunami, which you can ride to return to the sea.” And as the Ocean God spoke, he caused a Tsunami. Meanwhile, a mother and a child living near the Touri-Ike (a natural monument on Shimoji-jima in the Miyako Islands), left their house to visit their Grandmother, for the child would not stop crying. As the mother and child arrived to their Grandmother's home, the child stopped crying. The two spent the night there. They avoided the tsunami disaster by doing this. And as they returned to their house the next morning, they found two giant pits in the ground, which became to be known as the Touri-ike.

According to The legend of Island Origin, long ago there was a young man and a woman at the Kouri-jima Island. The two were naked, and ate the rice cakes, which rain from the sky everyday. Later as the two grew wise, they began to gather and store the rice cakes. The God grew furious as he saw this, and stopped the rice cake from raining. And so the couple had to gather food on their own. One day the couple found the dugongs (kaiba=sea-horse) mating. The two grew ashamed of their naked state, and began to hide their groins with Kuba leafs (Livistona leafs).

The story tells the people of Kouri-jima Island that they are the descendants of the young couple.

Minamoto, Takeo (源武雄)

1974 続・琉球歴史物語. *Zoku, Ryukyu Rekishi Monogatari. [Historical Stories of the Ryukyus, Second Series]*. In Japanese. Okinawa Bunkyo Publishing, Okinawa, Japan.

A story about the origin of the Kouri-jima Island is included.

Miyagi, Shinji (宮城真治)

1954 古代沖縄の姿. *Kodai Okinawa no Sugata. [Aspects of Ancient Okinawa]*. In Japanese. Okinawa Printing, Okinawa, Japan.

A story about the origin of the Kouri-jima Island is included. The author insists the tradition is a creation of later generations of the descendants of the original Kori-jima people.

Miyagi, Shin'yu (宮城信勇)

2008 新編増補版 八重山ことわざ事典. *Shinpen Zoho Ban Yaeyama Kotowaza Jiten. [Dictionary of Yaeyama Proverbs, New Expanded Edition]*. In Japanese. Okinawa Times., Okinawa, Japan.

A corpus of proverbial phrases in the Yaeyama region, one of which is related to the dugong.

Miyara, Toso (宮良當壯)

1922 貢物にされた人魚の話. *Koubutsu ni Sareta Ningyo no Hanashi. [Story of the Dugong as a Tribute]*. In 女学世界 9月号. *Jogaku Sekai, 9 Gatsu Go. [World of Women's Studies, September Edition]*. In Japanese. Hakubunkan, Tokyo, Japan.

An introduction to the dugong as a mermaid in Okinawa. The dugong is also described as a food source and dugong-related folksongs are also included.

Miyata, Noboru (宮田 登)

2007 宮田登日本を語る 14 海と山の民俗. *Miyata Noboru Nihon wo Kataru, 14, Umi to Yama no Minzoku. [Noboru Miyata Talks about Japan, No. 14. Folklore in the Sea and Mountains]*. In Japanese. Yoshikawa Kobunkan, Tokyo, Japan.

A description of the folklore relationship between the mermaid folk stories that are found throughout the mainland Japan and the dugong-related folk stories in Okinawa. The paper is Mr. Miyata's record of a symposium about Mr. Kunio Yanagida's "Sea Route" theory. This holds that Japanese culture originated in and spread from southern islands, Mr. Miyata explains it using the word "mermaid." He is interested in the fact that the

mermaid legend spread from the southern islands, where the dugong is regarded as its root, to northern Japan (as in the name of “Happyakubikuni”).

Nagata, Masaaki (長田昌明)

- 2005 ふる里の民話. *Furusato no Minwa. [Hometown Folklore]*. In Japanese. Warabe Shobo Publishing, Okinawa, Japan.

One story of tsunami and a mermaid is included.

Nakahara, Kikuko (中原喜久子)

- 1993 ザンノイユのはなしーその1. *Zan'noiyu no Hanashi - Sono 1. [A Story about Zan'noiyu (Dugong), No. 1]*. In チリモス Vol. 4 No.1. *Chirimosu Vol 4, No. 1. [Chirimosu Vol. 4, No. 2]*. In Japanese. Amami Mammalogical Society, Kagoshima, Japan.

Stories of the dugong related to Amami Oshima Island.

Nakahara, Kikuko (中原喜久子)

- 1994 ザンノイユのはなしーその2. *Zan'noiyu no Hanashi - Sono 2. [A Story about Zan'noiyu (Dugong), No. 2]*. In チリモス Vol. 5 No.1. *Chirimosu Vol 5, No. 2. [Chirimosu Vol. 5, No. 3]*. In Japanese. Amami Mammalogical Society, Kagoshima, Japan.

Stories of the dugong related to Amami Oshima Island. Includes a story about a dugong washed up the shore, and the people, who didn't know what to do, buried the dugong at the beach. This is not an old folk tale, but the author of this story is unknown.

Nakahara, Zenchu (仲原善忠)

- 1977 仲原善忠全集 第二巻. *Nakahara Zenchu Zenshu, Dai 2 Kan. [Complete Works of Zenchu Nakahara, Volume 2]*. In Japanese. Okinawa Times, Okinawa, Japan.

Includes dugong-related ancient folk songs in “Omoro Saushi.”

Nakahara, Zenchu, and Shuzen Hokama (仲原善忠 外間守善)

- 1978 おもろさうし辞典・総索引 第二版. *Omoro Saushi Jiten/Sosakuin Dai 2 Han. [Dictionary of Omoro Sausshi, General Index, Second Edition]*. In Japanese. Kadokawa Group Publishing, Co., Ltd., Tokyo, Japan.

An index dictionary of “Omoro Saushi,” a compilation of ancient poems and songs, containing an entry of the dugong as “zan.”

Nakaima, Genkai (仲井真元楷)

- 1974 沖縄民話集. *Okinawa Minwa Shu. [Collection of Okinawan Folk Tales]*. In Japanese. Shakai Shisosha Publishing, Co., Ltd., Tokyo, Japan.

One story, the Kouri-jima Island origin legend, is included.

Nakamatsu, Yashu (仲松 弥秀)

- 1978 タイムス選書4 古層の村・沖縄民俗文化論. *Times Sensho 4, Koso no Mura-Okinawa Minzoku Bunka Ron. [Okinawa Times Selection, No. 4: Villages in Layers of History - Okinawan Folkloric Culture -]*. In Japanese. Okinawa Times, Okinawa, Japan.

A discussion of the Unjami (Sea God Festival) on Okinawa, including a reference to the dugong.

Nakanishi, Hiroki (中西弘樹)

- 1999 新編 漂着物事典. *Shimpen, Hyochakubutsu Jiten*. [New Edition, Dictionary of the Driftage]. In Japanese. Kaichosha, Fukuoka, Japan.

About a relationship between the mermaid legend and the dugong.

Nakasone, Koichi (仲宗根幸市)

- 1988 琉球の昔物語 (第1集). *Ryukyu no Mukashi Banashi (Dai 1 Shu)*. [Old Stories of the Ryukyus (No. 1)]. In Japanese. Akatsuki Shobo Publishing, Okinawa, Japan.

One folk tale of a mermaid and tsunami is included.

Nishiwaki, Masaharu (西脇昌治)

- 1965 「人魚について」を読んで. “Ningyo ni Tsuite” wo Yonde. [After Reading Over the Article “About a Mermaid”]. In 科学読売 第17巻第9号. *Kagaku Yomiuri, Dai 17 Kan, Dai 9 Go*. [Yomiuri Science, Volume 17, No. 9]. In Japanese. The Yomiuri Shimbun, Tokyo, Japan.

A description of the biology of the dugong and how it came to serve as a model for the mermaid.

Nishiwaki, Masaharu (西脇昌治)

- 1984 ジュゴンの話. *Jugon no Hanashi*. [Stories of the Dugong]. In 全集日本動物誌30. *Zenshu Nihon Dobutsu Shi 30*. [Complete Works of the Japanese Animal Records, No. 30]. In Japanese. Kodansha, Co., Ltd., Tokyo, Japan.

An analysis of the dugong through its habitat, history, and folklore studies.

Nozawa, Rin (能澤鱗)

- 1923 人魚の正体. *Ningyo no Shotai*. [The Identity of the Mermaid]. In 変態心理 第11巻4号. *Hentai Shinri, Dai 11 Kan, 4 Go*. [Abnormal Mentality, Volume 11, No. 4]. In Japanese. The Japanese Society of Psychiatry, Tokyo, Japan.

A discussion of the dugong as a model for the mermaid.

Nozawa, Suteji (能澤捨次)

- 1924 生物ローマンス 海之巻. *Seibutsu Romance: Umi no Maki*. [Biology Romance, Volume of the Ocean]. In Japanese. Shinkosha, Tokyo, Japan.

About the relationship between the mermaid legend and the dugong.

Orikuchi, Shinobu (折口信夫)

- 1956 民族史観における他界観念. *Minzokushikan ni Okeru Takai Kannen*. [Notion of Death in the Historical View of Ethnology]. In 折口信夫全集16. *Orikuchi Shinobu Zenshu 16*. [Complete Works of Shinobu Orikuchi, No. 16]. In Japanese. Chuo Koronsha, Co., Ltd., Tokyo, Japan.

An explanation of totemism in Okinawa, including the dugong as an example. It uses the example of the how dugongs are caught during particular seasons and the meat submitted to the gods by sharing it within the community.

Oshima, Masamitsu (大島正満)

- 1933 人面魚體の怪物. Jim'men Gyotai no Kaibutsu. [Human-Faced and Fish-Bodied Monster]. In 動物物語. *Dobutsu Monogatari. [Animal Stories]*. In Japanese. Dai Nippon Yusokai Kodansha, Tokyo, Japan.

A description of the biology of the dugong and how it came to serve as a model for the mermaid.

Oshima, Masamitsu (大島正満)

- 1935 人魚の正體をあばく. Ningyo no Shotai wo Abaku. [Disclosure of a Mermaid's Natural Shape]. In 科学画報 昭和10年11月号. *Kagaku Gaho, Showa 10 Nen 11 Gatsu Go. [Illustrated Science Magazine, November 1935 (Showa 10)]*. In Japanese. Seibundo Shinkosha Publishing Co.,Ltd., Tokyo, Japan.

An introduction to the mammal that is said to be the origin of the mermaid legend. The author describes how Mr. Takuji Iwasaki presented him with a dried dugong skin and some pictures when he visited Ishigaki-jima Island.

Oshiro, Akiko, and Minako Ota (大城亜希子・太田三奈子)

- 1995 八重山郡石垣市 大浜の民話. *Yaeyama-gun Ishigaki-shi, Ohama no Minwa. [Folktales of Ohama in Ishigaki City, Yaeyama Gun]*. In Japanese. Unknown, Unknown.

Two stories about “the dugong and tsunami” are included.

Oshiro, Tatsuhiro, Masahiko Hoshi, and Tadashi Ibaragi (大城立裕 星雅彦 茨木憲)

- 1976 日本の伝説 (第1期) 全12巻 2 沖縄の伝説. *Nihon no Densetsu (Dai I Ki) Zen 12 Kan 2: Okinawa no Densetsu. [Japanese Traditions (First Period), Total 12 Volumes, Volume 2: Okinawan Traditions]*. In Japanese. Kadokawa Group Publishing, Co., Ltd., Tokyo, Japan.

Two traditions of the origin of Kouri-jima Island, and Tori-ike pond in Irabu Island (both dugong related) are included.

Ozawa, Toshio (小澤俊夫)

- 1989 始祖伝承と昔話. Shiso Densho to Mukashi Banashi. [Ancestors Lore and Old Tales]. In 東アジアの創生神話. *Higashi Asia no Sosei Shinwa. [Genesis Myths of East Asia]*. In Japanese. Koubundou, Co., Ltd., Tokyo, Japan.

Speculation from folk tales regarding the first ancestors of Japan. Contains dugong-related articles.

Publication Board of Okinawan One Hundred Best Folklore (おきなわの民話百選刊行委員会)

- 1996 おきなわの民話百選. *Okinawa no Minwa Hyakusen. [Okinawan One Hundred Best Folk Tales]*. In Japanese. Department of Livelihood and Welfare, Okinawa Prefecture, Okinawa, Japan.

Two folk tales about the dugong are recorded. One is a story about two brothers who keep their promises to the dugong and a Tenba (the mount of a Chinese god). As a reward for their honesty, the god provides them good fortune. This story might be relatively new. The next story is about a mermaid, who deliberately climbs into a fishermen's boat and asks them to take her to their village. But as she arrives, and the

villagers are all distracted by the mermaid on land, a tsunami hits the island and washes away everything along the path the mermaid took. She returns to the sea with a smile.

Research Committee of Kudaka-jima Island, Hosei University Institute for Okinawan Studies
(法政大学沖縄文化研究所久高島調査委員会)

- 1985 沖縄久高島調査報告書 「沖縄久高島の言語・文化の総合的研究」報告書. *Okinawa Kudaka-jima Chosa Hokokusho: "Okinawa Kudaka-jima no Gengo/Bunka no Sogoteki-kenkyu" Hokokusho. [Survey Report of Kudaka-jima Island, Okinawa: Report of the Comprehensive Research on Language and Culture of Kudaka-jima Island, Okinawa].* In . .

A study of popular songs that remain in Kudaka-jima Island, describing popular songs related to the dugong.

Sakima, Koei (佐喜真興英)

- 1982 南島説話. Nanto Setsuwa. [Stories of Southern Islands]. In 女人政治考・霊の島々〈佐喜真興英全集〉. *Nyonin Seijiko, Rei no Shimajima (Sakima Koei Zenshu). [Discussion of Woman-Led Political Systems, Islands of the Spirits (Complete Works of Koei Sakima)].* In Japanese. Shinsensha, Co., Ltd., Tokyo, Japan.

A long inherited folk story regarding the dugong, handed down in Koja, Okinawa City. The story, also told elsewhere, is about a man in Koja Village, Misato Magiri, who found a strange fish and took it home in a bucket. Later he hears a voice from the bucket saying, "Should it be one or two waves?" The man is frightened and heads to the beach to release the fish. When he meets another man, he gives the fish away. As the other man cooked it and was about to eat the fish a tsunami came and destroyed the village. The Yonatama Legend about the mother and child avoiding the tsunami is also mentioned here.

Sakuda, Shigeru (佐久田繁)

- 1973 カラー 沖縄の伝説と民話. *Color, Okinawa no Densetsu to Minwa. [Okinawan Legends and Folk Tales, Color].* In Japanese. Gekkan Okinawasha, Okinawa, Japan.

A compilation of Okinawan folk tales, including three dugong-related folk tales. The stories are The Korijima Island Legend, the Mermaid and the Tsunami story (one of the gratitude type), and one Yonatama story.

Sakurada, Katsunori (櫻田勝徳)

- 1973 隠岐島前に於ける糸満漁夫の聞書. *Oki Dozen ni Okeru Itoman Gyofu no Kikigaki. [Narrative Recording of the Itoman Fisherman at Oki Dozen].* In 日本常民生活資料叢書第二十四巻. *Nihon Jomin Seikatsu Shiryō Soshō Dai 24 Kan. [Series of Materials of Japanese Common People's Life, Volume 24].* In Japanese. San'ichi Publishing, Co., Ltd., Tokyo, Japan.

Stories of the dugong told by the fishermen of Itoman. This is a record of survey of Itoman settlement and fact-finding inquiries conducted by Katsunori Sakurada. It includes a dialogue with Kame Oshiro as follows.

Sakurada: Is there any story about dugongs?

Oshiro: They do have breasts just as humans do. Especially female dugongs have them. I saw it. They sleep in the shallow waters, and eat seagrass with round leaves (kaininso or makuri, scientifically known as *Digenea simplex*) that vegetate shallow waters. Once,

Itoman people stretched a net and hunted dugongs. They taste quite good and were sold for a high price. People in Oshima also eat the dugong. They are like whales in shape, but don't have a blowhole. Their breasts are similar to that of human female, and there are two fins and tale fin in the form of flukes. They can be hunted by spreading a gill net. They chirp sounds like piipii...

Sesoko, Chizue (せそこ・ちずえ)

1973 おきなわ昔がたり II. *Okinawa Mukashi Gatari III. [Okinawan Old Tales, II]*. In Japanese. Okinawa Kohsoku Printing Press, Co., Ltd., Okinawa, Japan.

One story concerning a mermaid (dugong) and tsunami is recorded.

Shimabukuro, Genshichi (島袋源七)

1929 信仰行事. Shinko Gyoji. [Religious Festivities]. In 山原の土俗. *Yambaru no Dozoku. [Local Customs of Yambaru]*. In Japanese. Unknown, Unknown.

An introduction to the dugong-related omoro (old folk songs) in Ogimi.

Shinyashiki, Kohan (新屋敷幸繁)

1974 沖縄の海の物語. *Okinawa no Umi no Monogatari. [Story of the Sea of Okinawa]*. In Japanese. Fudokisha, Okinawa, Japan.

A compilation of stories related to the Okinawan seas, containing one story handed down on Irabu Island.

Suehiro, Yasuo (末広恭雄)

1964 魚と伝説. *Sakana to Densetsu. [Fish and Legends]*. In Japanese. Shinchosha Publishing, Co., Ltd., Tokyo, Japan.

A mermaid legend, mentioning the dugong in the article.

Suehiro, Yasuo (末広恭雄)

1965 人魚について. *Ningyo ni Tsuite. [About a Mermaid]*. In 科学読売 第17巻第9号. *Kagaku Yomiuri, Dai 17 Kan, Dai 9 Go. [Yomiuri Science, Volume 17, No. 9]*. In Japanese. The Yomiuri Shimbun, Tokyo, Japan.

An discussion of the biology and characteristics of the dugong that are said to be the origin of the mermaid legend. The book introduces how people on Ceylon Island (Sri Lanka) still use dugong meat for food.

Sugimoto, Nobuo (杉本信夫)

2007 新城（上地島）の古謡. *Aragusuku (Uechi-jima) no Koyo. [Old Folk Songs in Aragusuku (Uechi Island)]*. In 八重山・与那国島調査報告書（1） - 地域研究シリーズNo. 34. *Yaeyama, Yonaguni-jima Chosa Hokokusho (1) - Chiiki-kenkyu Series No 34. [Survey Report of the Yaeyama and Yonaguni-jima Islands (I) - Community Survey Series, No. 34]*. In Japanese. Institute of Ryukyuan Culture, Okinawa International University, Okinawa, Japan.

A description of a traditional folk song from Aragusuku-jima Island (Panari). The song tells of young girls from Maja in Shiraho and Yonka (four areas of Tonosiro, Okawa, Ishigaki and Arakawa) gathering fibers from the leaves of screw pine and making a strong net for dugong hunting. When people hunted and brought the dugong to the

island, the young girls saw the net. Since the net was so similar to their sex organs, they dressed themselves pretending to remove a louse.

Suzuki, Hyakuhei (鈴木百平)

- 1915 沖縄の海馬に就て. *Okinawa no Kaiba ni Tsuite*. [About Okinawan Sea Horse]. In 郷土研究 第03巻 第01号. *Kyodo Kenkyu, Dai 03 Kan, Dai 01 Go*. [Local Study, Volume 3, No. 1]. In Japanese. Kyodo Kenkyusha, Aichi, Japan.

Includes a description of dried dugong meat as a miracle medicine to insure that a pregnant woman has an easy delivery.

Takehara, Sonkyo (竹原孫恭)

- 1978 ばがー島 八重山の民話. *Bagaa-jima: Yaeyama no Minwa*. [Bagaa-jima Island: Traditions of Yaeyama]. In Japanese. Daido Design Center, Okinawa, Japan.

One story related to the dugong is included. This is a story of the mermaid and the tsunami.

Tanaka, Shigeho (田中茂穂)

- 1934 奇魚珍魚. *Kigyo Chingyo*. [Weird Rare Fish]. In Japanese. Ko Gakkai Shuppambu Publishing.

A mermaid legend, mentioning the dugong in the article.

Tani, Shinsuke (谷真介)

- 1981 人魚のひみつー沖縄の歴史伝説物語. *Ningyo no Himitsu - Okinawa no Rekishi Densetsu Monogatari*. [Mysteries of the Mermaid - Historical Traditions of Okinawa]. In Japanese. Kodansha, Co., Ltd., Tokyo, Japan.

A description of dugong-related folk tales.

Tanigawa, Ken'ichi (谷川健一)

- 1986 もの言う南海の人魚儒艮. *Monoyu Nankai no Ningyo Dugong*. [Speaking Mermaid Dugong in the Southern Sea]. In 神・人間・動物 伝承を生きる世界. *Kami, Ningen, Dobutsu, Densho wo Ikiru Sekai*. [Gods, Humans, and Animals - World with Traditions]. In Japanese. Kodansha, Co., Ltd., Tokyo, Japan.

A reference to the song of the sea god festival in Ogimi.

Tokashiki Village Board of Education (渡嘉敷村史編集委員会)

- 1983 渡嘉敷村史別冊 とかしきの民話. *Tokashiki-son Shi Bessatsu: Tokashiki no Minwa*. [History of the Tokashiki Village: Folk Tales of Tokashiki, Additional Volume]. In Japanese. Tonaki Village, Okinawa, Japan.

A compilation of folk tales in Tokashiki Village, including one dugong related folk tale. This is a story about the mermaid and the tsunami.

Tomishima, Soei (富島壯英)

- 1988 寄物に関する一考察 -竜糞を中心に-. *Yorimono ni Kansuru Ichi Kosatsu - Ryufun wo Chushin ni*. [A Study of Flotsam - Focusing on Whale Ambergris]. In 窪徳忠先生沖縄調査二十年記念論文集 沖縄の宗教と民俗. *Kubo Noritada Sensei Okinawa Chosa 20 Nen Kinen Rombunshu, Okinawa no Shukyo to Minzoku*. [Memorial

Collection of 20th Anniversary of Dr. Noritada Kubo's Survey Okinawa - Religion and Folklore]. In Japanese. Dai'ichi Shobo, Co., Ltd., Tokyo, Japan.

A mention of the dugong as part of the “yuimun” (flotsam or items adrift) that floats to the island from the sea.

Torigoe, Kenzaburo (鳥越憲三郎)

1968 おもろさうし全釈 第一巻. *Omorosaushi Zenshaku Dai 1 Kan*. [*Omoro Soshi (with Gloss, Translation, and Criticism), Volume I*]. In Japanese. Seibundo Shuppan, Co., Ltd., Osaka, Japan.

An interpretation of “Omoro Saushi.” A section of the Omoro regarding animals contains a description of the dugong as depicted in old songs and folk tales.

Tuji, Kosaku (通事孝作)

2002 航海の島・黒島. *Kokai no Shima・Kuro Shima*. [Voyage Island: Kuroshima Island]. In 情報やいま 第108号. *Joho Yaima - Volume 108*. [*Information of Yaima, No. 108*]. In Japanese. Nanzansha, Co., Ltd., Okinawa, Japan.

An introduction to the dugong in the Okinawan old songs.

Uesedo, Toru (上勢頭亨)

1976 竹富島誌 民話・民俗篇. *Taketomi-jima Shi Minwa/Minzoku Hen*. [*Records of Taketomi-jima Island: Folk Tales and Folklore*]. In Japanese. Hosei University Press, Tokyo, Japan.

One folk tale related to the dugong is included. This is a story about the mermaid and the tsunami.

Unknown (著者不明)

1888 人魚の話. *Ningyo no Hanashi*. [Story of a Mermaid]. In 動物学雑誌 第一巻第一号. *Dobutsu Gaku Zasshi, Dai 1 Kan, Dai 1 Go*. [*Zoological Magazine, Volume 1, No. 1*]. In Japanese. The Zoological Society of Japan, Tokyo, Japan.

A discussion of the dugong as the model for the mermaid.

Watanabe, Yoshio, Nobukatsu Okano, Takehiro Sato, Ryoko Shiotsuki, and Katsuya Miyashita (渡邊欣雄 岡野宣勝 佐藤壮広 塩月亮子 宮下克也 編), ed.

2008 沖縄民俗辞典. *Okinawa Minzoku Jiten*. [*Dictionary of Okinawan Folklore*]. In Japanese. Yoshikawa Kobunkan, Co., Ltd., Tokyo, Japan.

A dictionary of Okinawan folklore, containing an article on the dugong.

Yaeyama Old Tales Seminar (八重山昔ばなしセミナー)

2002 「八重山昔ばなし」 八重山昔ばなしセミナー再話作品集. “*Yaeyama Mukashi Banashi*” *Yaeyama Mukashi Banashi Seminar Saiwa Sakuhinshu*. [*Old Tales of Yaeyama: Rewritten Collected Works of Yaeyama Old Tales Seminar*]. In Japanese. Yaeyama Old Tales Seminar, Okinawa, Japan.

Two traditional Yaeyama stories of “A mermaid and Tsunami.”

Yamashita, Kin'ichi (山下欣一)

- 2003 南島民間神話の研究. *Nanto Minkan Shinwa no-kenkyu. [Research of the Folk Mythology in the Southern Islands]*. In Japanese. Dai'ichi Shobo, Co., Ltd., Tokyo, Japan.

An essay of Okinawan mythology, including a dugong-related tradition.

Yamashita, Kin'ichi, Shoji Endo, and Akira Fukuda (山下欣一 遠藤庄治 福田晃)

- 1989 日本伝説大系 (第15巻 南島編). *Nihon Densetsu Taikei (Dai 15 Kan, Nanto Hen). [Anthology of Japanese Legends, Volume 15: Southern Islands]*. In Japanese. Mizu'umi Shobo, Co., Ltd., Tokyo, Japan.

Two Okinawan mythological stories related to the dugong are included. The story told is the legend of Kouri-jima Island origins.

Yanagida, Kunio (柳田国男)

- 1998 物言ふ魚. *Mono Iu Sakana. [Talking Fish]*. In 柳田国男全集 第七巻. *Yanagida Kunio Zenshu Dai 7 Kan. [Collected Works of Kunio Yanagida, Volume 7]*. In Japanese. Chikuma Shobo, Co., Ltd., Tokyo, Japan.

A study on Japanese narrative tradition "Talking Animals," describing a traditional dugong story handed down in Irabu-jima Island. The story told is that of a man in Koja Village, Misato Magiri, who found a strange fish and took it home in a bucket. Later he hears a voice from the bucket saying, "Should it be one or two waves?" The man is frightened and heads to the beach to release the fish. Along the way he meets another man and gives the fish away. As the other man cooked it and was about to eat the fish a tsunami came and destroyed the village.

Yoshinari, Naoki (吉成直樹)

- 2003 琉球民俗の底流 古歌謡は何を語るか. *Ryukyu Minzoku no Teiryu: Ko Kayo ha Nani wo Kataruka. [Undercurrent of the Ryukyuan Folklore]*. In Japanese. Kokon Shoin, Co., Ltd., Tokyo, Japan.

Contains a tradition of Kouri-jima Island, describing how the village was established and how the dugong was involved.

Hirasaka, Kyosuke (平坂恭介)

- 1933 天然記念物調査報告 第一輯. *Tennen Kinenbutsu Chosa Hokoku, Dai 1 Shu*. [Survey Report of National Monument, No. 1]. In Japanese. Department of Interior, Governor-General of Formosa, Taiwan.

An survey report of the dugong designated as a national monument in Taiwan in 1933, reporting its habitat, history, and the relationship with human culture.

Izumi, Takeshi (泉武)

- 2007 ジュゴンについての文化史的試論. *Dugong ni Tsuiteno Bunkashiteki Shiron*. [Cultural History Essay on the Dugong]. In 日中交流の考古学. *Nicchu Koryu no Kouko Gaku*. [Archaeology in the Exchange Between Japan and China]. In Japanese. Doseisha, Tokyo, Japan.

An enquiry of the relationship between Okinawan culture and the dugong. The report covers the ecology of the dugong and its use by humans in prehistory and history. The essay reviews the information on dugong remains in archaeological sites, the historical records from the time of the Ryukyu Kingdom that mention the dugong, and the Meiji Period fishery reports. It discusses the use of the dugong during prehistory for food, ornaments, and tools, its role during the Ryukyu Kingdom, the hunting of the dugong in the southern islands, and its spiritual role in folklore and ritual. The author discusses the relationship between China and the Ryukyu Kingdom and how the Chinese request for dugong meat may have developed from the ancient customs of eating dugong in southeastern China, including Hainan. This is a major source for information on the significance of the dugong in Okinawa culture over time.

Kato, Mutsuo, Makoto Numata, Kagetaka Watanabe, and Masanori Hata (加藤陸奥雄 沼田眞 渡部景隆 畑正憲)

- 1995 日本の天然記念物. *Nihon no Tennen Kinenbutsu*. [Natural Monuments of Japan]. In Japanese. Kodansha, Co., Ltd., Tokyo, Japan.

A description of the dugong as a national monument, including an article on relationships between the dugong and the Ryukyu Kingdom. During the Ryukyu Kingdom period, the Dugong was regarded as a very special animal and people were not allowed to hunt it or eat it, except for those who live in Aragusuku-jima Island, where dugong hunting was permitted. In Iriomote-jima Island and the Yaeyama-jima Islands, paying dugong was ordered as one of the tributes to the Kingdom. For these reasons, the dugong is still enshrined as a god at an/the utaki on Aragusuku-jima Island. In addition to this, there is a very interesting old folk song called “A Frog by a Well” that sings of the relationship between people in Iriomote-jima Island and the dugong. The islanders trusted their lives and the island’s future to these animals. Animals that sang in the song, the Yaeyama-semaruhakogame (*Cuora flavomarginata evelynae*; Yellow-margined box turtle), Kishinoue-tokage (*Plestiodon kishinouyei*; Kishinoue’s blue-tailed skink), and the dugong, are designated as National Natural Monuments. The dugong was designated on May 15, 1972 in Okinawa.

Arai, Hakuseki (新井白石)

- 1996 新井白石 南島志 現代語訳. *Arai Hakuseki, Nanto Shi, Gendaigo Yaku. [Arai, Hakuseki, Records of Southern Islands, A Modern Translation]*. Translated by Harada, Nobuo (原田禹雄). In Japanese. Yoju Shorin, Inc., Okinawa, Japan.

A modern translation of the original 1791 edition. Politics, culture, customs and history of the Ryukyu Islands are covered based on interviews with the Ryukyu missions that visited Edo in 1714 and other bibliographical sources. Includes descriptions on the dugong.

Chou, Huang (周煌)

- 2003 周煌 琉球国志略. *Shuko Ryukyu Koku Shi Ryaku. [Shuko: History of Ryukyu - China - Japan in Edo Period]*. Translated by Harada, Nobuo (原田禹雄). In Japanese. Yoju Shorin, Inc., Okinawa, Japan.

A journal of a Chinese envoy named “Shuko,” written in 1757, including a description of the use of dugong as food.

City History Compilation Office, General Affairs Department of Ishigaki City
(石垣市総務部市史編集室), ed.

- 1991 石垣市史叢書 1. *Ishigaki-shi Shi Soshō 1. [Series of History of Ishigaki City, No. 1]*. In Japanese. Ishigaki City Office, Okinawa, Japan.

A colloquial translation with commentaries of “Tomikawa Oyakata's regulation on overall affairs in Yaeyama-jima Island,” a source book written in 1875, containing detailed reports of the use of the dugong as tribute.

City History Compilation Office, General Affairs Department of Ishigaki City
(石垣市総務部市史編集室), ed.

- 1993 石垣市史叢書2. *Ishigaki-shi Shi Soshō 2. [Series of the History of Ishigaki City, No. 2]*. In Japanese. Ishigaki City Office, Okinawa, Japan.

A colloquial translation of “Yoseyama Oyakata's Regulation of Overall Affairs in Yaeyama-jima Island,” describing relationship between Aragusuku-jima Island and the dugong.

City History Compilation Office, General Affairs Department of Ishigaki City
(石垣市総務部市史編集室), ed.

- 1994 石垣市史叢書 7. *Ishigaki-shi Shi Soshō 7. [Series of the History of Ishigaki City, No. 7]*. In Japanese. Ishigaki City Office, Okinawa, Japan.

A colloquial translation with commentaries of “Onaga Oyakata's regulation on overall affairs in Yaeyama-jima Island,” a source book written in 1857, containing detailed reports of the use of the dugong as tribute.

Editorial Board of District Records (字誌編集委員会), ed.

- 2004 川田誌. *Kawata Shi. [Records of Kawata]*. In Japanese. Kawata District, Okinawa, Japan.

Records of Kawata District, Higashi Village, including a newspaper tabloid about a dead dugong washed ashore.

Editorial Board of History of Chinen Village (知念村史編集委員会), ed.

- 1989 知念村史 第二巻資料編2 知念の文献資料. *Chinen-son Shi Dai 2 Kan Shiryo Hen 2: Chinen no Bunken Shiryo. [History of Chinen Village, Volume 2, Supplementary Information No. 2: Publication Materials of Chinen]*. In Japanese. Chinen Village Office, Okinawa, Japan.

Dugong-related documents of Chinen Village (currently Nanjo City). It includes a dugong song that appears in the Omoro-Soshi. The island name Kudaka is mentioned, so Chinen Village included it in the village report.

Harada, Nobuo (原田禹雄)

- 1999 徐葆光 中山伝信録 新訳注版. *Jo Hoko Chuzan Denshinroku Shin Yakukchu Ban. [Jo Hoko - Records of Chuzan, New Translation with Notes]*. In Japanese. Yoju Shorin, Inc., Okinawa, Japan.

A journal of a Chinese envoy named “Johoko”, who arrived at Okinawa in 1719, including a description of the dugongs.

Hata, Masanori (畑正憲)

- 1986 人魚の国. *Ningyo no Kuni. [The Country of Mermaid]*. In 人魚の国 天然記念物の動物たち. *Ningyo no Kuni: Tennen Kinenbutsu no Dobutsu Tachi. [Mermaid Country: Protected Species of Animal]*. In Japanese. Kadokawa Group Publishing, Co., Ltd., Tokyo, Japan.

An article regarding the relations between the local residents and the dugong, during the administration of the government of the Ryukyu Islands.

Heshiki, Reiji (平敷令治)

- 1974 沖縄県の衣と食. *Okinawa Ken no I to Shoku. [Okinawan Clothing and Food.]*. In 沖縄・奄美の衣と食. *Okinawa/Amami no I to Shoku. [Clothing and Food of Okinawan and Amami]*. In Japanese. Meigen Shobo, Tokyo, Japan.

A study on the Okinawan diet, describing the dugong as an item of tribute in the Ryukyu Dynastic Age.

Higa, Shuncho and Keiji Shinzato (比嘉春潮・新里恵二)

- 1984 日本庶民生活史料集成 1 探検・紀行・地誌 (南島篇). *Nihon Shomin Seikatsu Shiryo Shusei 1, Tanken, Kikou, Chishi, Nanto Hen. [Historical Material Collection of the Common Japanese Life, I, Explorations, Travelogues, and Topographies (Southern Islands Volume)]*. In Japanese. San'ichi Publishing, Co., Ltd., Tokyo, Japan.

A bibliographical introduction to the “Oshima Hikki” written in 1762. It refers to the dugong as a marine product.

Higashion'na, Kanjun (東恩納寛惇)

- 1950 南島風土記. *Nanto Fudoki. [Southern Islands Chronicles]*. In Japanese. Okinawan Local Cultural Society, Okinawa, Japan.

Descriptions of the dugong as an item of tribute in Aragusuku-jima Island is included.

Kinjo, Sumiko (金城須美子)

- 2003 琉球の食生活と文化. Ryukyu no Shoku Seikatsu to Bunka. [Diet and Culture of the Ryukyu Islands]. In 別冊「環」⑥ 琉球文化圏とは何か?. *Bessatsu Kan 6: Ryukyu Bunka-ken toha Nanika?*. [Additional Volume, Kan, No. 6: What is the Culture of the Ryukyus?]. In Japanese. Fujiwara Shoten, Co., Ltd., Tokyo, Japan.

A study on Okinawan food culture, describing the fact that the dugong was offered to envoys from China as banquet menu in the Ryukyu Dynasty era.

Li, Ting-yuan (李鼎元)

- 2007 李鼎元 使琉球記. *Li Ting-yuan Shi Ryukyu Ki*. [*Li Ting-yuan Journal of a Mission to the Ryukyus*]. Translated by Nobuo Harada (原田禹雄). In Japanese. Yoju Shorin, Inc., Okinawa, Japan.

A record by Ting-yuan Li, an envoy from China sent to the Ryukyus, describing the dugong as a food product.

Makino, Kiyoshi (牧野清)

- 1971 人頭税と上木税. Jinto Zei to Uwagi Zei [Utaki of Yaeyama]. In 沖縄文化 第九卷一・二号 通巻三六・三七合併号. *Okinawa Bunka, Dai 9 Kan, 1-2 Go, Tsukan 36-37 Gappei Go*. [*Okinawan Culture, Volume 9, No. 1 and 2, Consecutive Number of Volume 36 and 37, Double Issue*]. In Japanese. Institute for Okinawan Studies, Okinawa, Japan.

A mention of the dugong as one of the taxes imposed on the people in Yaeyama in the Ryukyu Dynasty era.

Okinawa Prefectural Government

Okinawan Cuisine http://www.wonder-okinawa.jp/026/e/his_2_2.html. In English. Okinawa Prefectural Government, Worldwide Web.

Describes Okinawa's tributary relationship with China during the Ryukyu Kingdom. Discusses the five-course meal that would be fed to the tribute-collecting envoys from China. The “Ryukyu Sapposhi Papers” (1808) and “Ryukyu Kansen Records” (1866) reveal details of the menu. The third course would feature dishes made with ingredients readily obtainable in Okinawa: dugong, eel, sea turtle, prawns, Asachi Ame sweets made by sprinkling white sesame on Kyuhi Mochi, and Santo Kona, which is like Harusame noodles. Surviving records tell that the dugong were presents from the Yaeyama region to the royal court. Dugong was reputed to slow aging, increase robustness and ease childbirth. Dugongs were also presented to the lords of Satsuma.

Ono, Masako (小野まさ子)

- 2006 「第二回勸業博覧会解説書」にみるジュゴン史料について. “Dai Ni Kai Kangyo Hakurankai Kaisetsusho” ni Miru Jugon Shiryō ni Tsuite. [Historical Materials on the Dugong in the “Description of the Second Industrial Exhibition”]. In 史料編集室紀要 第31号. *Shiryō Henshu Shitō Kiyō Dai 31 Go*. [*Bulletin of Historiographical Institute, No. 31*]. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

A description of a book on the dugong displayed at an expedition in Japan before the war.

Sunagawa, Tetsuo (砂川哲雄)

- 2002 新城島とジュゴン (ザン) その盛衰の歴史. Aragusuku-jima to Jugon (Zan), Sono Seisui no Rekishi. [Aragusuku Island and Dugong (Zan) - Its History of Ebb and Flow]. In 情報やいま 第108号. *JohoYaima - Volume 108. [Information of Yaima, No. 108]*. In Japanese. Nanzansha, Co., Ltd., Okinawa, Japan.

Records of the dugong symposium held in Yaeyama Islands, including articles on the dugong history and bibliographic references.

Takara, Kurayoshi (高良倉吉)

- 1982 知られざる沖縄の歴史・9人魚と王様. Shirarezaru Okinawa no Rekishi No 9 Ningyo to Osama. [Unknown History of Okinawa, No. 9, Mermaid and King]. In 月刊 青い海 4月号/第12巻第3号/通巻111号. *Gekkan Aoi Umi 4 Gatsu Go, Dai 12 Kan Dai 3 Go, Tsukan 111 Go. [Monthly - Blue Ocean, April, Volume 12, No. 3, Consecutive Number of Volume: 111]*. In Japanese. Aoiumi Shuppansha, Co., Ltd., Chiba, Japan.

Discussion on the dugong in historical documents. (See also Document # 132).

Takara, Kurayoshi (高良倉吉)

- 1984 おきなわ歴史物語. *Okinawa Rekishi Monogatari. [Okinawan Historic Stories]*. In Japanese. Hirugisha, Inc., Okinawa, Japan.

Discussing the dugong in historical documents, also excerpted in “Gekkan (monthly) Aoiumi.” See Kaneko 1992.

Terashima, Ryoan (寺島良安)

- 1987 和漢三才図会 7 [全18巻]. *Wakan Sansai Zue 7 (Zen 18 Kan). [Pictorial Encyclopedia of Japanese and Chinese, Volume 7 (18 Volumes)]*. Translated by Shimada, Isato, Atsuo Takeshima, and Motomi Higuchi (島田勇雄 竹島淳夫 樋口元巳). In Japanese. Heibonsha Limited, Publishers, Tokyo, Japan.

A Japanese encyclopedia published in 1712 with descriptions of a mermaid, but no separate entry for the dugong. Based on subsequent studies on the dugong, the mermaid can be identified as the dugong.

Tokuno, Toshimi (得能壽美)

- 2002 資料にみるジュゴン. Shiryo ni Miru Jugon. [Dugong in the Historical Materials]. In 情報やいま 第108号. *JohoYaima -Volume 108. [Information of Yaima, No. 108]*. In Japanese. Nanzansha, Co., Ltd., Okinawa, Japan.

A cultural contemplation of the dugong as seen in the historical documents, describing how the dugong was used for food.

Yaeyama Culture Study Group (八重山文化研究会)

- 1980 八重山文化論集 〈第2号〉 -創立十周年記念号-. *Yaeyama Bunkaron Shu (Dai 2 Go), Soritsu 10 Shunen Kinen Go. [Collection of Yaeyama Cultural Theory, No. 2: Commemoration Issue of the 10th Anniversary of the Publication]*. In Japanese. Yaeyama Culture Study Group, Okinawa, Japan.

A colloquial translation of the date-unidentified old chronicle of Yaeyama Islands, describing the dugong.

Asato, Eiko (安里英子)

- 1991 揺れる聖域 –リゾート開発と島の暮らし. *Yureru Sei'iki - Resort Kaihatsu to Shima no Kurashi*. [Influenced Sacred Precincts - Resort Development and Island's Life]. In Japanese. The Okinawa Times, Okinawa, Japan.

A description about the dugong hunting in Aragusuku-jima Island is included.

Domestic Industrial Exhibition Bureau (内国勸業博覧会事務局), ed.

- 1881 第二回内国勸業博覧会出品目録 第五区式篇 五. *Dai 2 Kai Naikoku Kangyo Hakurankai Shuppin Mokuroku, Dai 5 Ku 2 Hen, 5*. [Exhibition Catalogue of the Second Domestic Industrial Exhibition, Fifth Area, Volume 2, No. 5]. In Japanese. Unknown, Unknown.

The exhibition catalogue of the Second Domestic Industrial Exhibition. The dugong skin was put on the exhibition from Okinawa.

Editorial Board of Administrative History of Agriculture, Forestry, and Fisheries of Okinawa Prefecture (沖縄県農林水産行政史編集委員会編), ed.

- 1983a 沖縄県水産一斑. *Okinawa Ken Suisan Ippan*. [Okinawa Prefectural Fisheries Team 1]. In 沖縄県農林水産行政史第17巻 (水産業資料編 I) . *Okinawa-ken Norin Suisan Gyosei Shi Dai 17 Kan: Suisangyo Shiryo Hen I*. [Administrative History of Agriculture, Forestry, and Fisheries of Okinawa Prefecture, Volume 17 (Supplementary Information of Fisheries, I)]. In Japanese. Association of Agriculture and Forestry Statistics, Okinawa, Japan.

The dugong is mentioned in the description of Okinawan marine products announced in the Meiji period.

Editorial Board of Administrative History of Agriculture, Forestry, and Fisheries of Okinawa Prefecture (沖縄県農林水産行政史編集委員会編), ed.

- 1983b 水産調査予察報告 第一巻 第一冊. *Suisan Chosa Yosatsu Hokoku, Dai Ikkan, Dai Issatsu*. [Preliminary Report for Fishery Investigation. Volume 1, No.1]. In 沖縄県農林水産行政史第17巻 (水産業資料編 I) . *Okinawa-ken Norin Suisan Gyosei Shi Dai 17 Kan: Suisangyo Shiryo Hen I*. [Administrative History of Agriculture, Forestry, and Fisheries of Okinawa Prefecture, Volume 17 (Supplementary Information of Fisheries, I)]. In Japanese. Association of Agriculture and Forestry Statistics, Okinawa, Japan.

The dugong is mentioned in the description of Okinawan fishery and marine products announced in the Meiji period.

Editorial Board of History of Naagusuku-mura (Nashiro) (なあぐすくむら誌編集委員会), ed.

- 1988 なあぐすくむら誌 (糸満市字名城誌) . *Naagusuku-mura Shi (Itoman-shi Aza Nashiro Shi)*. [Records of Naagusuku Village (Records of Nashiro District, Itoman City)]. In Japanese. Arakaki, Seiji, Okinawa, Japan.

Reporting a fishery named “Jangumui” off Nashiro, Itoman City, although the text does not clarify the reason.

Editorial Board of History of Nago City (名護市史さん委員会), ed.

- 2001 名護市史・本編 9 民俗 II 自然の文化誌. *Nago-shi Shi, Hompen 9, Minzoku II, Shizen no Bunka Shi*. [History of Nago City, Main Volume 9, Folklore II, Cultural Records of Nature]. In Japanese. Nago City Office, Okinawa, Japan.

Describes a fishery off Sumuide, Nago City, indicating the presence of the dugong in this region.

Editorial Board of History of Sashiki Township (佐敷町史編集委員会編), ed.

- 1984 佐敷町史 2 民俗. *Sashiki-cho Shi, 2, Minzoku*. [History of Sashiki Township, No. 2, Folklore]. In Japanese. Sashiki Township Office, Okinawa, Japan.

Discusses marine products of Sashiki Township (currently Nanjyo City), including an article on the dugong.

First Division of Department of Home Affairs, Okinawa Prefecture (沖縄県内務部第一課)

- 1902 沖縄県統計書 明治33年(1900). *Okinawa-ken Tokeisho, 1900*. [Okinawa Prefecture Statistical Reports, 1900]. In Japanese. First Division of Department of Home Affairs, Okinawa Prefecture, Okinawa, Japan.

Statistical report on various Okinawan industries of the pre-war time, including an entry on the dugong in the fishery category.

First Division of Department of Home Affairs, Okinawa Prefecture (沖縄県内務部第一課)

- 1903 沖縄県統計書 明治34年(1901). *Okinawa-ken Tokeisho, 1901*. [Okinawa Prefecture Statistical Reports, 1901]. In Japanese. First Division of Department of Home Affairs, Okinawa Prefecture, Okinawa, Japan.

Statistical report on various Okinawan industries of the pre-war time, including an entry on the dugong in the fishery category.

First Division of Department of Home Affairs, Okinawa Prefecture (沖縄県内務部第一課)

- 1904 沖縄県統計書 明治35年(1902). *Okinawa-ken Tokeisho, 1902*. [Okinawa Prefecture Statistical Reports, 1902]. In Japanese. First Division of Department of Home Affairs, Okinawa Prefecture, Okinawa, Japan.

Statistical report on various Okinawan industries of the pre-war time, including an entry on the dugong in the fishery category.

Fujikawa, Sankei (藤川三溪)

- 1889 水産図解. *Suisan Zukan*. [Fisheries - Illustration]. In Japanese. Inoue Jinkodo, Hyogo, Japan.

Illustrated reference book of marine products, describing the dugong under the name “Dagongu.”

Government of the Ryukyu Islands (琉球政府)

- 1965 沖縄県史 第14巻 資料編 4 雑纂 1. *Okinawa-ken Shi, Dai 14 Kan, Shiryō Hen 4, Zassan*. [History of Okinawa Prefecture, Volume 14, Supplementary Information No. 4, Miscellaneous Volume 1]. In Japanese. Government of the Ryukyus, Okinawa, Japan.

In the “Ryukyu-hanzatsuki” (Miscellaneous Records of the Ryukyu Han) surveyed in 1873, the name “dugong” appears as a product.

Government of the Ryukyu Islands (琉球政府)

- 1967 沖縄県史 第20巻 資料編10 沖縄県統計集成. *Okinawa-ken Shi, Dai 20 Kan, Shiryo Hen 10, Okinawa-ken Tokei Shusei. [History of Okinawa Prefecture, Volume 20, Supplementary Information No. 10, Compilation of Okinawan Statistics]*. In Japanese. Government of the Ryukyus, Okinawa, Japan.

A statistical report of pre-war industries of Okinawa, including a dugong article.

Governor's Secretariat of Okinawa Prefecture (沖縄縣知事官房)

- 1905 沖縄県統計書 明治36年(1903). *Okinawa-ken Tokeisho, 1903. [Okinawa Prefecture Statistical Reports, 1903]*. In Japanese. Governor's Secretariat of Okinawa Prefecture, Okinawa, Japan.

Statistical report on various Okinawan industries of the pre-war time, including an item on the dugong in the fishery category.

Governor's Secretariat of Okinawa Prefecture (沖縄縣知事官房)

- 1911 沖縄県統計書 明治39～40年(1906～07). *Okinawa-ken Tokeisho, 1906-07. [Okinawa Prefecture Statistical Reports, 1906-07]*. In Japanese. Governor's Secretariat of Okinawa Prefecture, Okinawa, Japan.

Statistical report on various Okinawan industries of the pre-war time, including an item on the dugong in the fishery category.

Ishizawa, Hyogo (石沢兵吾)

- 1888 儒良. Dugong. [The Dugong]. In 大日本水産会報告 第七拾四号. *Dai Nihon Suisan Kai Hokoku, Dai 74 Go. [Report of Japanese Fisheries, No. 74]*. In Japanese. Japan Fisheries Association, Tokyo, Japan.

A report from the fishery point of view regarding the dugong's place of origin and morphology, methods used in hunting it and distributing it, and its usefulness in 1888.

Iwasaki, Takuji (岩崎卓爾)

- 1974a ひるぎの一葉. Hirugi no Ichiyo. []. In 岩崎卓爾一卷全集. *Iwasaki Takuji, 1 Kan, Zenshu. [Complete Works of Takuji Iwasaki, Volume 1]*. In Japanese. Dento to Gendaisha, Tokyo, Japan.

A description of the dugong as food is included. It says that the dugong was served as sashimi (sliced raw dugong meat).

Iwasaki, Takuji (岩崎卓爾)

- 1974b 膳符集 (八重山島). Zenpu Shu (Yaeyama-jima). [A Collection of Meal Menu]. In 岩崎卓爾一卷全集. *Iwasaki Takuji 1 Kan Zenshu. [Complete Works of Takuji Iwasaki, Volume 1]*. In Japanese. Dentoto Gendaisha, Tokyo, Japan.

An introduction of the Yaeyama "Fuzenshu" (meal menu), including descriptions of the dugong meat.

Kawarada, Moriharu (河原田盛美)

- 1886 沖縄県下水産概況. Okinawa Kenka Suisan Gaikyo. [General Condition of Fisheries in Okinawa]. In 大日本水産会報告 第伍拾伍号. *Dai Nihon Suisan Kai Hokoku, Dai 55*

Go. [Report of Japanese Fisheries, No. 55]. In Japanese. Japan Fisheries Association, Tokyo, Japan.

A report of the fishery condition of Okinawa in 1886. The list of marine products includes the dugong.

Kinjo, Sumiko (金城須美子)

- 1993 「沖縄の食文化―料理文化の特徴と系譜」. *Okinawa no Shoku Bunka - Ryori Bunka no Tokuchō to Keifu*. [Okinawan Food Culture - Characteristics and Ties of Cuisine Culture]. In 環中国海の民俗と文化 第一巻 海洋文化論. *Kan Chugoku Kai no Minzoku to Bunka Dai 1 Kan: Kaiyō Bunka Ron*. [Folklore and Culture of the Circum-China Sea, Volume 1: Ocean Cultural Theory]. In Japanese. Gaifusha, Tokyo, Japan.

An essay of Okinawa food culture, including an article stating the dugong was consumed.

Kinjo, Sumiko (金城須美子)

- 1995 近世沖縄の料理研究史料 宮良殿内・石垣殿内の膳符日記. *Kinse Okinawa no Ryori Kenkyū Shiryo, Miyara Dunchi/Ishigaki Dunchi no Zempu Nikki*. [Cookery Research Archive of Modern Okinawa: Meal Journal of Miyara Dunchi House and Ishigaki Dunchi House]. In Japanese. Kyushu University Press, Fukuoka, Japan.

An explanation of the Yaeyama “Fuzenshu” (meal menu), including descriptions of the dugong.

Kinjo, Sumiko (金城須美子)

- 1997 沖縄の肉食文化にかんする一考察. *Okinawa no Nikushoku Bunka ni Kansuru Ichi Kosatsu*. [A Study on Okinawan Meat Eating Culture]. In 全集 日本の食文化 第八巻 異文化との接触と受容. *Zenshu Nihon no Shoubunka Volume 8. Ibunka tonō Sesshoku to Jūyō*. [Complete Works of Japanese Food Culture, Volume 8: Encounter with Foreign Cultures and Its Acceptance]. In Japanese. Yuzankaku, Inc., Tokyo, Japan.

A discussion of meat consumption in Okinawa, including a reference to the dugong.

Kuroshima, Tameichi (黒島為一)

- 1999 〈史料紹介〉 八重山嶋諸物代付帳. (Shiryo Shokai) Yaeyama-jima Shomonodai Tsukecho. [(Description of the Historical Material) Account Book of Yaeyama-jima islands]. In 石垣市立八重山博物館紀要 第16・17号合併号. *Ishigaki Shiritsu Yaeyama Hakubutsukan Kiyo, Dai 16/17 Go Gappei Go*. [Bulletin of Yaeyama Museum, No. 16/17 Issue]. In Japanese. Ishigaki City Yaeyama Museum, Okinawa, Japan.

A colloquial translation of “Account Book of Yaeyama-jima Island”, describing the dugong as a marine product.

Matsubara, Shin'nosuke (松原新之助)

- 1889 日本ニ於テノ儒良. *Nihon ni Oitenō Dugong*. [The Dugong in Japan]. In 動物学雑誌 第一巻第5号. *Dobutsu Gaku Zasshi, Dai 1 Kan, Dai 5 Go*. [Zoological Magazine, Volume 1, No. 5]. In Japanese. The Zoological Society of Japan, Tokyo, Japan.

A description about the dugong's habitat and the method of hunting it.

Matsu'ura, Atsushi (松浦厚)

- 1908 日西海琛 第二回関西九州府県聯合水産共進会之私見. *Nissei Kaichin, Dai 2 Kai Kansai Kyushu Fuken Sogo Suisan Kyoshinkai no Shiken*. [*Nissei Kaichin, the Second Exposition of the United Department of Fisheries Industries of Kansai and Kyushu*]. In Japanese. Suisan Shoin, Tokyo, Japan.

The exhibition catalogue of the Second Exposition of the United Department of Fisheries Industries of Kansai and Kyushu. The sea horse (dugong) skin was displayed from Okinawa.

Miyagi, Tetsuyuki (宮城鉄行)

- 1993 国頭村安田の歴史とシヌグ祭り. *Kunigami-son Yasuda no Rekishi to Shinugu Matsuri*. [*History and Shimugu Festival of Yasuda, Kunigami Village*]. In Japanese. Akebono Printing, Co., Ltd., Ibaraki, Japan.

Stories of the capture of the dugong.

Morimoto, Isao (盛本 勲)

- 2005 ジュゴンの捕獲について 一文献および民俗例を通して一. *Dugong no Hokaku ni Tsuite - Bunken Oyobi Minzoku Reiwo Toshite*. [About Dugong Hunting - Thoughts from the Documents and Folklore Customs]. In 歴史智の構想—鯨岡勝成先生追悼論文集—. *Rekishi Chi no Kousou - Kujiraoka Katsunari Sensei Tsuito Ronbun Shu*. [*Concept of History and Knowledge - Memorial Collection of Academic Papers for Mr. Kujiraoka Katsunari*]. In Japanese. Publication Association for Memorial Collection of Academic Papers for Mr. Kujiraoka Katsunari.

Results of an enquiry concerning dugong hunting methods from documentary sources and interviews. Includes descriptions regarding dugong hunting. Based on the documents and on the interviews that Mr. Morimoto conducted, he writes about the use of nets in hunting, their material, the hunting season and the hunting methods.

Oe, Osamu (大江 修)

- 2006 魂の民俗学 —谷川健一—の思想 —. *Tamashi no Minzoku Gaku - Tanigawa Ken'ichi no Shiso*. [*Folklore of Soul - Thought of Ken'ichi Tanigawa*]. In Japanese. Fuzambo International, Co., Ltd., Tokyo, Japan.

Stories of dugong hunting at Aragusuku-jima Island.

An editor, Osamu Oe, interviews Ken'ichi Tanigawa, a folklorist, and in the interview they refer to the Dugong hunting at Aragusuku-jima Island. Tanigawa describes dugong as one of the tributes to the king and how to hunt the dugong. There is one rare story about a dugong dish. One day, a tutor for Shojun, the third son of the last king of the Ryukyu Kingdom, Shotai, was treated a Japanese style clear broth soup of dugong. Then, the tutor told the prince to lay a piece of white paper under his buttocks, and did so while he was eating the dish. After he finished the dish, he found that the paper was wet with oil. The source of this story is not identified.

Okinawa Prefecture (沖縄縣廳)

1892 沖縄県統計書 明治23年(1890). *Okinawa-ken Tokeisho, 1890. [Okinawa Prefecture Statistical Reports, 1890].* In Japanese. Okinawa Prefecture, Okinawa, Japan.

Statistical report on various Okinawan industries of the pre-war time, including an item on the dugong in the fishery category.

Okinawa Prefecture (沖縄縣廳)

1893 沖縄県統計書 明治24年(1891). *Okinawa-ken Tokeisho, 1891. [Okinawa Prefecture Statistical Reports, 1891].* In Japanese. Okinawa Prefecture, Okinawa, Japan.

Statistical report on various Okinawan industries of the pre-war time, including an item on the dugong in the fishery category.

Okinawa Prefecture (沖縄縣)

1894 沖縄県統計書 明治25年(1892). *Okinawa-ken Tokeisho, 1892. [Okinawa Prefecture Statistical Reports, 1892].* In Japanese. Okinawa Prefecture, Okinawa, Japan.

Statistical report on various Okinawan industries of the pre-war time, including an item on the dugong in the fishery category.

Okinawa Prefecture (沖縄縣)

1895 沖縄県統計書 明治26年(1893). *Okinawa-ken Tokeisho, 1893. [Okinawa Prefecture Statistical Reports, 1893].* In Japanese. Okinawa Prefecture, Okinawa, Japan.

Statistical report on various Okinawan industries of the pre-war time, including an item on the dugong in the fishery category.

Okinawa Prefecture (沖縄縣)

1897 沖縄県統計書 明治27年(1894). *Okinawa-ken Tokeisho, 1894. [Okinawa Prefecture Statistical Reports, 1894].* In Japanese. Okinawa Prefecture, Okinawa, Japan.

Statistical report on various Okinawan industries of the pre-war time, including an item on the dugong in the fishery category.

Okinawa Prefecture (沖縄縣)

1900 沖縄県統計書 明治28・29年(1895-96). *Okinawa-ken Tokeisho, 1895-96. [Okinawa Prefecture Statistical Reports, 1895-96].* In Japanese. Okinawa Prefecture, Okinawa, Japan.

Statistical report on various Okinawan industries of the pre-war time, including an item on the dugong in the fishery category.

Okinawa Prefecture (沖縄縣)

1901 沖縄県統計書 明治30,32年(1897-99). *Okinawa-ken Tokeisho, 1897-99. [Okinawa Prefecture Statistical Reports, 1897-99].* In Japanese. Okinawa Prefecture, Okinawa, Japan.

Statistical report on various Okinawan industries of the pre-war time, including an item on the dugong in the fishery category.

Okinawa Prefecture (沖縄縣)

- 1906 沖縄県統計書 明治37年. *Okinawa-ken Tokeisho, 1904. [Okinawa Prefecture Statistical Reports, 1904].* In Japanese. Okinawa Prefecture, Okinawa, Japan.

Statistical report on various Okinawan industries of the pre-war time, including an item on the dugong in the fishery category.

Okinawa Prefecture (沖縄縣)

- 1907 沖縄県統計書 明治38年. *Okinawa-ken Tokeisho, 1905. [Okinawa Prefecture Statistical Reports, 1905].* In Japanese. Okinawa Prefecture, Okinawa, Japan.

Statistical report on various Okinawan industries of the pre-war time, including an item on the dugong in the fishery category.

Okinawa Prefecture (沖縄縣)

- 1913 沖縄県統計書 明治43年 (1910). *Okinawa-ken Tokeisho, 1910. [Okinawa Prefecture Statistical Reports, 1910].* In Japanese. Okinawa Prefecture, Okinawa, Japan.

Statistical report on various Okinawan industries of the pre-war time, including an item on the dugong in the fishery category.

Okinawa Prefecture (沖縄縣)

- 1914 沖縄県統計書 明治44年 (1911). *Okinawa-ken Tokeisho, 1911. [Okinawa Prefecture Statistical Reports, 1911].* In Japanese. Okinawa Prefecture, Okinawa, Japan.

Statistical report on various Okinawan industries of the pre-war time, including an item on the dugong in the fishery category.

Okinawa Prefecture (沖縄縣)

- 1915a 沖縄県統計書 明治45年 (1912). *Okinawa-ken Tokeisho, 1912. [Okinawa Prefecture Statistical Reports, 1912].* In Japanese. Okinawa Prefecture, Okinawa, Japan.

Statistical report on various Okinawan industries of the pre-war time, including an item on the dugong in the fishery category.

Okinawa Prefecture (沖縄縣)

- 1915b 沖縄県統計書 1-2 大正2年 (1913). *Okinawa-ken Tokeisho 1-2, 1913. [Okinawa Prefecture Statistical Reports 1-2, 1913].* In Japanese. Okinawa Prefecture, Okinawa, Japan.

Statistical report on various Okinawan industries of the pre-war time, including an item on the dugong in the fishery category.

Okinawa Prefecture (沖縄縣)

- 1916 沖縄県統計書 1 大正3年 (1914). *Okinawa-ken Tokeisho 1, 1914. [Okinawa Prefecture Statistical Reports 1, 1914].* In Japanese. Okinawa Prefecture, Okinawa, Japan.

Statistical report on various Okinawan industries of the pre-war time, including an item on the dugong in the fishery category.

Okinawa Prefecture (沖縄県)

- 1917 沖縄県統計書 1 大正4年(1915). *Okinawa-ken Tokeisho 1, 1915. [Okinawa Prefecture Statistical Reports 1, 1915].* In Japanese. Okinawa Prefecture, Okinawa, Japan.

Statistical report on various Okinawan industries of the pre-war time, including an item on the dugong in the fishery category.

Okinawa Prefecture (沖縄県)

- 1918 沖縄県統計書 3 大正5年(1916). *Okinawa-ken Tokeisho 3, 1916. [Okinawa Prefecture Statistical Reports 3, 1916].* In Japanese. Okinawa Prefecture, Okinawa, Japan.

Statistical report on various Okinawan industries of the pre-war time, including an item on the dugong in the fishery category.

Okinawa Prefecture (沖縄県)

- 1919 沖縄県統計書 3 大正6年. *Okinawa-ken Tokeisho 3, 1917. [Okinawa Prefecture Statistical Reports 3, 1917].* In Japanese. Okinawa Prefecture, Okinawa, Japan.

Statistical report on various Okinawan industries of the pre-war time, including an item on the dugong in the fishery category.

Okinawa Prefecture (沖縄県)

- 1921 沖縄県統計書 1 大正9年. *Okinawa-ken Tokeisho 1, 1920. [Okinawa Prefecture Statistical Reports 1, 1920].* In Japanese. Okinawa Prefecture, Okinawa, Japan.

Statistical report on various Okinawan industries of the pre-war time, including an item on the dugong in the fishery category.

Otaishi, Noriyuki (大泰司 紀之)

- 2005 沖縄のジュゴン個体群とジュゴン鯨の復元に向けて. *Okinawa no Dugong Kotaigun to Dugong Ryo no Fukugen ni Mukete. [Aiming at the Population Number Recovery of the Dugong and the Its Hunting Restoration in Okinawa].* In エコソフィア 第15号. *Ecosophia, Dai 15 Go. [Ecosophia, No. 15].* In Japanese. Society of Folklore and Nature Magazine, Kyoto, Japan.

A brief summary of the dugong survey conducted by Mr. Otaishi and others. Descriptions about dugong consumption in Hainan Island, China are included.

Tanigawa, Ken'ichi (谷川健一)

- 1994 海神の贈物 [民俗の思想]. *Wadatsumi no Okurimono [Minzoku no Shiso]. [Gift from the Sea God (Folkloric Thought)].* In Japanese. Shogakukan, Inc., Tokyo, Japan.

Stories of the capture of dugongs at Ikema-jima Island, Miyako-jima Island.

The 2nd Fishing Exhibition Bureau (第二回水産博覧会事務局), ed.

- 1897 第二回水産博覧会出品目録 第二冊 第二部 製造. *Dai 2 Kai Suisan Hakurankai Shuppin Mokuroku, Dai 2 Satsu, Dai 2 Bu, Seizo. [Exhibition Catalogue of the Second Fishery Exhibition, Volume 2, No. 2. Manufacturing].* In Japanese. Ryu'unaku, Unknown.

The exhibition catalogue of the Second Fishery Exhibition. Dugong meat was displayed from Okinawa.

The 5th Domestic Industrial Exhibition Bureau (第五回内国勸業博覧会事務局), ed.

- 1903 第五回内国勸業博覧会出品目録 第三部 水産 第二. *Dai 5 kai Naikoku Kangyo Hakurankai Shuppin Mokuroku, Dai 3 Bu, Suisan Dai 2. [Exhibition Catalogue of the Fifth Domestic Industrial Exhibition, Volume 3, Fisheries, No. 2].* In Japanese. Kinkodo, Co., Ltd., Miyagi, Japan.

The exhibition catalogue of the Fifth Domestic Industrial Exhibition. Dried dugong meat was put in the exhibition from Okinawa.

Toma, Seiko, ed. (當間清弘編)

- 1961 御膳本草. *Gozen Honzo. [Gozen Honzo (or Gyozen Honzo): Edible Plants of Ryukyu].* In Japanese. Mitsuboshi Insatsujo Printing Press, Okinawa, Japan.

An encyclopedia of food ingredients of Okinawa, published in 1832, containing articles on the dugong.

Uni, Yoshikazu (宇仁義和)

- 2003 沖縄県のジュゴン Dugong dugon 捕獲統計. *Okinawaken no Jugon, Dugong dugon Hokaku Tokei. [Okinawan Dugong: Statistics of Captured Dugong dugon].* In 名護博物館紀要・11 あじまあ. *Nago Hakubutsukan Kiyo 11 - Ajimaa. [Bulletin of Nago Museum, No. 11: Ajimaa].* In Japanese. Nago Museum, Okinawa, Japan.

A study on capture statistics of the dugong using the statistical data of the pre-war time.

Unknown (著者不明)

- 1887 儒艮の説. *Dugong Ryo no Setsu. [Theory on Dugong Hunting].* In 大日本水産報告 第六十六号. *Dai Nihon Suisan Hokoku, Dai 66 Go. [Newsletter of Japan Fishery Association, No. 66].* In Japanese. Japan Fisheries Association, Tokyo, Japan.

A detailed description of dugong hunting as conducted in Queensland, Australia.

Unknown (著者不明)

- 1893 儒艮の脂皮. *Dugong no Shihi. [Dugong's Fat Skin].* In 大日本水産會報 第百三十四号. *Dai Nihon Suisan Kaiho, Dai 134 Go. [Newsletter of Japan Fishery Association, No. 134].* In Japanese. Japan Fisheries Association, Tokyo, Japan.

A description of the dugong skin as a marine product, its use and its history.

Unknown (著者不明)

- 1895 儒艮の漁場. *Dugong no Gyojo. [Fishing Grounds of the Dugong].* In 動物学雑誌 第七卷 85号. *Dobutsu Gaku Zasshi, Dai 7 Kan, 85 Go. [Zoological Magazine, Volume 7, No. 85].* In Japanese. The Zoological Society of Japan, Tokyo, Japan.

An introduction to the fishing grounds of the dugong in Ishigaki-jima Island and the price of dried dugong meat.

Unknown (著者不明)

- 1895 儒艮の漁場. Dugong no Gyojo. [Fishing Grounds of the Dugong]. In 大日本水産會報 第百六十二号. *Dai Nihon Suisan Kaiho, Dai 162 Go. [Newsletter of Japan Fishery Association, No. 162]*. In Japanese. Japan Fisheries Association, Tokyo, Japan.

A discussion of the fishing grounds for the dugong in Ishigaki-jima Island and the price of dried dugong meat.

Yanagi, Kaneko (柳兼子)

- 1939 琉球珍味の一夜. Ryukyu Chinmi no Ichiya. [A Night with Ryukyuan Delicacies]. In 月刊民藝 第一卷 第二号. *Gekkan Mingei, Dai 1 Kan, Dai 2 Go. [Monthly - Folklore, Volume 1, No. 2]*. In Japanese. Japan Folk Craft Association, Tokyo, Japan.

One story of eating dugong meat is included.

Editorial Board of Henoko District (辺野古区編纂委員会), ed.

- 1998 辺野古誌. *Henoko Shi. [Records of Henoko]*. In Japanese. Henoko District Office, Okinawa, Japan.

A description of the dugong-related coast names in the section of local place name studies. Coastal names used in the Henoko area are discussed. One place is named “Jangusanumii.” This is known to be an area vegetated by the seagrass that “jan” (dugong) prefer to eat. A map shows the reef area off the Henoko coast referred to by this name.

Editorial Board of History of Nakazato Village (仲里村史編集委員会), ed.

- 2000 仲里村史 第六巻 資料編 5 民俗. *Nakazato-son Shi, Dai 6 Kan, Shiryo Hen 5, Minzoku. [History of Nakazato Village, Volume 6, Supplementary Information No. 5: Folklore]*. In Japanese. Nakazato Village Office, Okinawa, Japan.

A place name, “Zangumui” is reported with with a note explaining that there is a location named Zangumui in Nakazato Village, Kumejima Island (currently known as Kumejima Township). Also a description of a location in the reef called the Zangumui.

Editorial Board of Izena Village Dialect Dictionary (伊是名村方言辞典編集委員会), ed.

- 2004 伊是名島方言辞典 本編. *Izena-jima Hogen Jiten: Hompen. [Dictionary of Izena Village Dialect: Main Volume]*. In Japanese. Izena Village Board of Education, Okinawa, Japan.

A dialect dictionary of Izena-jima Island with descriptions of the dugong.

Editorial Board of Nature of Irabu (いらぶの自然編集委員会), ed.

- 1990 いらぶの自然 動物編. *Irabu no Shizen: Dobutsu Hen. [Nature of the Irabu: Animal]*. In Japanese. Irabu Town, Okinawa, Japan.

Description of the animals inhabiting Irabu-jima Island including the dugong, accompanied by its dialect name in Irabu.

Editorial Board of Okinawan Archaic Words Unabridged Dictionary (『沖縄古語大辞典』編集委員会), ed.

- 1995 沖縄古語大辞典. *Okinawa Kogo Dai Jiten. [Unabridged Dictionary of Old Okinawan Language]*. In Japanese. Kadokawa Group Publishing, Co., Ltd., Tokyo, Japan.

A dictionary of Old Okinawan Language, referring to the dugong as “zan.”

Editorial Board of Records of Ginoza Village (宜野座村誌編集委員会), ed.

- 1989 宜野座村誌 第三巻資料編Ⅲ 民俗・自然・考古. *Ginoza-son Shi, Dai 3 Kan, Siryo Hen III: Minzoku/Shizen/Kouko. [Records of Ginoza Village, Volume 3, Supplementary Information III: Folklore/Nature/Archaeology]*. In Japanese. Ginoza Village Office, Okinawa, Japan.

An ethnographical document of Ginoza Village, recording the local dialect, which includes “zan” referring to the dugong.

Editorial Board of Records of Ginoza Village (宜野座村誌編集委員会), ed.

- 1991 宜野座村誌 第一巻通史編. *Ginoza-son Shi, Dai 1 Kan, Tsushi Hen. [Records of Ginoza Village, Volume 1, Complete History]*. In Japanese. Ginoza Village Office, Okinawa, Japan.

Records of Ginoza Village, including a name whose origin is related to the dugong. This refers to the Jangusanumii (dugong grass area) in the Ino (inner reef). Not an actual place name.

Expert Committee on Language of Nago City History, Editorial Board of History of Nago City (名護市史さん委員会名護市史『言語』編専門部会), ed.

- 2006 名護市史本編・10 言語. *Nago-shi Shi, Hompen 10, Gengo. [History of Nago City, Main Volume 10, Language]*. In Japanese. Nago City Office, Okinawa, Japan.

A dialect dictionary of Nago, containing entries on the dugong.

Ikehara, Hiroshi (池原弘)

- 2004 私の金武方言メモ. *Watakushi no Kin Hogen Memo. [My Memorandum on the Kin Dialect]*. In Japanese. Marumasa Cooperating Union, Okinawa, Japan.

A dictionary of the local dialect of Kin Township, including dugong articles under words of “Akanguayuu” and “Zan’nuyuu.”

Kuno, Mariko, Makio Ono, Makoto Kuno, and Takao Sugimura (久野マリ子・大野眞男・久野眞・杉村孝夫)

- 1992 南琉球新城島の方言. *Minami Ryukyu Aragusuku-jima no Hogen. [Dialect in Aragusuku-jima Island, Southern Ryukyu]*. In Japanese. Institute for Japanese Culture and Classics, Kokugakuin University, Tokyo, Japan.

A collection of the dialect spoken in Ishigaki and Aragusuku-jima Island. A description of the dugong is included in an explanation of “Nanazoowan Utaki.”

Miyagi, Shin’yu (宮城信勇)

- 2003 石垣方言辞典 本文編. *Ishigaki Hogen Jiten, Hombun Hen. [Dictionary of Ishigaki Dialect, Texts]*. In Japanese. The Okinawa Times, Okinawa, Japan.

A dialect dictionary of Ishigaki-jima Island. “Zan,” known to be the dugong, is included.

Nakazato, Chowa (仲里長和)

- 2002 本部町字具志堅の方言. *Motobu-cho Aza Gushiken no Hogen. [Dialect of Gushiken District, Motobu Township]*. In Japanese. Okinawa Kohsoku Printing Press, Co., Ltd., Okinawa, Japan.

A column on the dugong, noted as “Jannoiyuu” in a local dialect dictionary of Gushiken, Motobu Township.

Namihira, Ken’ichiro (波平憲一郎)

- 2004 久米島町字儀間 しまくとぅば辞典. *Kumejima Cho Aza Gima Shima Kutuba Jiten. [Dictionary of the Local Dialect, Gima, Kume-jima Cho]*. In Japanese. Fukuryu Insatsu, Inc., Okinawa, Japan.

A dictionary of dialect in Gima, Kumejima Township.

Research Committee of Cove and District Records, Hosei University Institute for Okinawan Studies
(法政大学沖縄文化研究所小湾字誌調査委員会)

1995 浦添・小湾方言辞典. *Urasoe/Kowan Hogen Jiten. [Dialect Dictionary of Kowan, Urasoe].* In Japanese. Miyahira, Noboru, Okinawa, Japan.

A dialect dictionary of Kowan Buraku, Urasoe City, containing an item on the dugong.

The National Institute for Japanese Language (国立国語研究所)

1983 沖縄語辞典. *Okinawa Go Jiten. [Okinawan Language Dictionary].* In Japanese. National Printing Bureau, Tokyo, Japan.

A dictionary of Old Okinawan Language, referring dugong as “zan” and “zannoiyu.”

Academic Investigation Committee of Izena Shellmound, Okinawa (沖縄県伊是名貝塚学術調査団)

- 2002 伊是名貝塚—沖縄県伊是名貝塚の調査と研究—. *Izena Kaizuka: Okinawa-ken Izena Kaizuka no Chosa to Kenkyu. [Izena Shellmound: Investigative Research of Izena Shellmound, Okinawa]*. In Japanese. Bensey Publishing, Inc., Tokyo, Japan.

An excavation survey report of Izena Shellmound, Izena-jima Island, reporting excavated dugong bone artifacts and bone remains. These date to the Late Jomon period. The artifacts are 1 dugong bone artifact, possibly made from rib bone and 1 dugong bone harpoon made from rib bone.

Arafu Site Excavation Survey Group (アラフ遺跡発掘調査団)

- 2003 アラフ遺跡調査研究 I —沖縄県宮古島アラフ遺跡発掘調査報告—. *Arafu Iseki Chosa-Kenkyu I: Okinawa-ken Miyako-jima Arafu Iseki Hakkutsu Chosa Hokoku. [Investigative Research of Arafu Site I: Excavation Survey Report of Arafu Site, Miyako-jima Island, Okinawa]*. In Japanese. Rokuichi Shobo, Inc., Tokyo, Japan.

An excavation survey report of the Early Neolithic Arafu Site, Miyako-jima Island, reporting excavated dugong bone remains. Remains are non-artifactual and probably are rib bone fragments.

Asato, Shinjun (Shijun ASATO)

- 1990 . . . [Urasoko Site]. In English. Gusukube Township Board of Education, Okinawa, Japan.

The report explains the distribution of the shell adzes in the south Ryukyu Islands, providing data for comparative studies of the shell adzes in these areas. Dugong bones were excavated from the Late Neolithic Urasoko site. One artifact, a bone stabber, was probably made from dugong bone.

Chatan Township Board of Education (北谷町教育委員会)

- 1989 北谷町文化財調査報告書第8集 伊礼原B遺跡
—旧メイ・モスカラー地区雨水排水施設工事に係る発掘調査—. *Chatan-cho Bunkazai Chosa Hokokusho Dai 8 Shu: Ireibaru B Iseki - Kyu Mei Mosukaraa Chiku Amamizu Haisui Shisetsu Koji ni Kakaru Hakkutsu Chosa. [Survey Report of the Cultural Resources of Chatan Township, No. 8: Ireibaru B Site - Excavation Survey Related to Construction Works of the Rainfall Intrusion Prevention Facilities in Former Mei Mosukaraa Area]*. In Japanese. Chatan Township Board of Education, Okinawa, Japan.

An excavation survey report of Ireibaru B Site, Chatan Township. Although containing no dugong related material, a report by Isao Morimoto refers to this report in his reference.

Chatan Township Board of Education (北谷町教育委員会)

- 2007 北谷町文化財調査報告書 第26集 伊礼原遺跡 —伊礼原B遺跡ほか発掘調査—. *Chatan Cho Bunkazai Chosa Hokokusho Dai 26 Shu: Ireibaru Iseki - Ireibaru B Iseki Hoka Hakkutsu Chosa. [Survey Report of the Cultural Resources of Chatan Town, No. 26: Ireibaru Site - Excavation Survey of Ireibaru B Site]*. In Japanese. Chatan Town Board of Education, Okinawa, Japan.

An excavation survey report of Ireibaru B Site, Chatan Township, reporting excavated dugong bone artifacts and bone remains. Ireibaru produced a long occupation sequence from Early Jomon to Gusuku Periods, with dugong bones going back to the some of the

early deposits. Bone artifacts include the butterfly-shaped ornament made from dugong mandible bone.

Chatan Township Board of Education (北谷町教育委員会)

- 2008a 北谷町文化財調査報告書 第27集 伊礼原B遺跡 伊礼原E遺跡
 -キャンプ桑江北側返還に伴う発掘調査事業 (平成10~14年度) -. *Chatan Cho Bunkazai Chosa Hokokusho Dai 27 Shu: Ireibaru B Iseki, Ireibaru E Iseki - Camp Kuwae Kitagawa Henkan ni Tomonau Hakkutsu Chosa Jigyo (Heisei 10~14 Nendo). [Survey Report of the Cultural Resources of Chatan Town, No. 27: Ireibaru B Site, Ireibaru E Site - Excavation Survey Project Associated with the Recession of the North Side of Camp Kuwae (1998-2002)]*. In Japanese. Chatan Town Board of Education, Okinawa, Japan.

An excavation survey report of Ireibaru E Site, Chatan Township, reporting excavated dugong bone remains.

Chatan Township Board of Education (北谷町教育委員会)

- 2008b 北谷町文化財調査報告書 第28集 伊礼原D遺跡
 -キャンプ桑江北側返還に伴う発掘調査事業 (平成10~14年度) -. *Chatan Cho Bunkazai Chosa Hokokusho Dai 28 Shu: Ireibaru D Iseki - Camp Kuwae Kitagawa Henkan ni Tomonau Hakkutsu Chosa Jigyo (Heisei 10~14 Nendo). [Survey Report of the Cultural Resources of Chatan Town, No. 28: Ireibaru D Site - Excavation Survey Project Associated with the Recession of the North Side of Camp Kuwae (1998-2002)]*. In Japanese. Chatan Town Board of Education, Okinawa, Japan.

An excavation survey report of Ireibaru D Site, Chatan Township, reporting excavated dugong bone remains.

Chatan Township Board of Education (北谷町教育委員会)

- 2008c 北谷町文化財調査報告書 第29集 平安山原B遺跡
 -キャンプ桑江北側返還に伴う発掘調査事業 (平成14・15年度) -. *Chatan Cho Bunkazai Chosa Hokokusho Dai 29 Shu: Henzanbaru B Iseki - Camp Kuwae Kitagawa Henkan ni Tomonau Hakkutsu Chosa Jigyo (Heisei 14/15 Nendo). [Survey Report of the Cultural Resources of Chatan Town, No. 29: Henzanbaru B Site - Excavation Survey Project Associated with the Recession of the North Side of Camp Kuwae (2002-2003)]*. In Japanese. Chatan Town Board of Education, Okinawa, Japan.

An excavation survey report of Henzanbaru B Site, Chatan Township, reporting excavated dugong bone remains.

Chinen Village Board of Education (知念村教育委員会)

- 1994 知念村文化財調査報告書第6集 下上原貝塚 -個人住宅建設に係る緊急発掘調査-. *Chinen-son Bunkazai Chosa Hokokusho Dai 6 Shu: Shicha Iibaru Kaizuka - Kojin Jutaku-kensetsu ni Kakaru Kinkyu Hakkutsu Chosa. [Survey Report of the Cultural Resources of Chinen Village, No. 6: Shicha Iibaru Shellmound - Urgent Excavation Related to the Private Residence Construction -]*. In Japanese. Chinen Village Board of Education, Okinawa, Japan.

An excavation survey report of Shicha Iibaru Shellmound, Nanjo City, reporting dugong bone remains. A rib fragment was recovered from Late to Final Jomon Period deposits.

Chinen Village Board of Education (知念村教育委員会)

- 2002 知念村文化財調査報告書第10集 熱田原貝塚 県営農道整備事業に伴う発掘調査.
Chinen-son Bunkazai Chosa Hokokusho Dai 10 Shu: Attabaru Kaizuka - Ken'ei Nodo Seibi Jigyo ni Tomonau Hakkutsu Chosa. [Survey Report of the Cultural Resources of Chinen Village, No. 10: Excavations of Attabar Shellmound Associated with the Improvement Project of the Prefectural Agricultural Road]. In Japanese. Chinen Village Board of Education, Okinawa, Japan.

An excavation survey report of Attabar Site, Nanjo City, reporting excavated dugong bone remains. A deciduous dugong tooth was found in a Late Jomon deposit.

Cultural Affairs Division of the Itoman City Board of Education (糸満市教育委員会文化課)

- 1996 糸満市文化財調査報告書第12集 真栄里貝塚ほか発掘調査報告. *Itoman-shi Bunkazai Chosa Hokokusho Dai 12 Shu: Maezato Kaizuka Hoka Hakkutsu Chosa Hokoku. [Survey Report of the Cultural Resources of Itoman City, No. 12: Excavation Survey Report of Maezato Shellmound].* In Japanese. Itoman City Board of Education, Okinawa, Japan.

An excavation survey report of Maezato Shellmound, Itoman City, reporting excavated dugong bone remains. Dugong bone remains were found in Late to Final Jomon and possibly Late Shellmound Period deposits.

Cultural Affairs Division of the Naha City Board of Education (那覇市教育委員会文化課)

- 1997 那覇市文化財調査報告書第35集 銘苅原遺跡
-那覇新都心と地区画整理事業に伴う緊急発掘調査報告IV-. *Naha-shi Bunkazai Chosa Hokokusho Dai 35 Shu: Mekarubaru Iseki - Naha Shintoshin to Chikukaku Seiri Jigyo ni Tomonau Kinkyu Hakkutsu Chosa Hokoku IV. [Survey Report of the Cultural Resources of Naha City, No. 35: Mekarubaru Site - Report of the Urgent Excavation Survey Associated with New Downtown Naha and the Land Readjustment Project, IV].* In Japanese. Naha City Board of Education, Okinawa, Japan.

An excavation survey report of Mekarubaru Site, Naha City, reporting excavated dugong bone remains. Four rib fragments and a mandible fragment were recovered from Gusuku Period deposits.

Cultural Affairs Division of the Naha City Board of Education (那覇市教育委員会文化課)

- 2003 那覇市文化財調査報告書第57集 銘苅直禄原遺跡
-天久公園整備事業に伴う緊急発掘調査III-. *Naha-shi Bunkazai Chosa Hokokusho Dai 57 Shu: Mekar Sugurukubaru Iseki - Ameku Koen Seibi Jigyo ni Tomonau Kinkyu Hakkutsu Chosa III -. [Survey Report of the Cultural Resources of Naha City, No. 57: Mekar-sugurukubaru Site - Urgent Excavation Survey Associated with the Improvement Project of Ameku Park].* In Japanese. Naha City Board of Education, Okinawa, Japan.

An excavation survey report of Mekar-sugurukubaru Site, Naha City, reporting excavated dugong bone artifacts and bone remains.

Cultural Affairs Division of the Okinawa City Board of Education (沖縄市教育委員会文化課)

- 1988 沖縄市文化財調査報告書第11集 越来城
-個人住宅建設に伴う記録保存調査及び範囲確認調査報告書-. *Okinawa-shi Bunkazai Chosa Hokokusho Dai 11 Shu: Goeku Gusuku - Kojin Jutaku-kensetsu ni Tomonau Kiroku Hozon Chosa Oyobi Han'i Kakunin Chosa Hokokusho. [Survey Report of the Cultural Resources of Okinawa City, No. 11: Goeku Gusuku Castle Ruin Site - Survey Report of the*

Area Definition and Recordation Survey Associated with the Private Residence Construction]. In Japanese. Okinawa City Board of Education, Okinawa, Japan.

An excavation survey report of Goeku Gusuku Castle Ruin Site, Okinawa City, reporting excavated dugong bone artifacts. Two rib bone fragments were excavated at this Gusuku Period site.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

- 1978 沖縄県文化財調査報告書第16集 知花遺跡群. *Okinawa-ken Bunkazai Chosa Hokokusho Dai 16 Shu: Chibana Iseki Gun. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 16: The Chibana Site Group]*. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

Although containing no dugong-related material, a report by Isao Morimoto cites this report in his references, therefore included in this annotated bibliography.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

- 1980 沖縄県文化財調査報告書第32集 大原 -久米島大原貝塚発掘調査報告-. *Okinawa-ken Bunkazai Chosa Hokokusho Dai 32 Shu: Ohara - Kume-jima Ohara Kaizuka Hakkutsu Chosa Hokoku. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 32: Ohara - Excavation Survey Report of Ohara Shellmound, Kume-jima Island]*. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of the Late to Final Jomon Period Ohara Shellmound, Kumejima Township, reporting excavated dugong bone remains and an artifact. Thirteen bone remains were found and 1 point-shaped artifact.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

- 1981 沖縄県文化財調査報告書第38集 沖縄県玉城村百名第二貝塚の試掘調査. *Okinawa-ken Bunkazai Chosa Hokokusho Dai 38 Shu: Okinawa-ken Tamagusuku-son Hyakuna No Ni Kaizuka no Shikutsu Chosa.. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 38: Test Excavation of Hyakuna No. 2 Shellmound, Tamagusuku Village, Okinawa]*. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Hyakuna No. 2 Shellmound, Nanjo City, reporting excavated dugong bone remains. A rib fragment (or fragments) were excavated from Late Jomon deposits.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

- 1982 沖縄県文化財調査報告書第43集 古座間味貝塚 -範囲確認調査報告書-. *Okinawa-ken Bunkazai Chosa Hokokusho Dai 43 Shu: Furuzamami Kaizuka - Han'i Kakunin Chosa Hokokusho. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 43: Furuzamami Shellmound - Survey Report of the Area Definition -]*. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Furuzamami Shellmound, Zamami Village, reporting excavated dugong bone remains. This Late to Final Jomon and possibly Middle Shellmound Period site produced a large number of dugong remains. These include 82 pieces of bone and one unfinished artifact from a rib bone.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

- 1983a 沖縄県文化財調査報告書第48集 伊江島 阿良貝塚発掘調査報告. *Okinawa-ken Bunkazai Chosa Hokokusho Dai 48 Shu: Ie-jima - Ara Kaizuka Hakkutsu Chosa Fukoku. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 48: Decree of the Excavations of Ara Shellmound, Ie-jima Island]*. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Ara Shellmound, Ie-jima Island, reporting excavated dugong bone artifacts and bone remains. Two bone needle artifacts and one sternum were excavated from Middle Shellmound deposits.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

- 1983b 沖縄県文化財調査報告書第50集 稲福遺跡発掘調査報告書 (上御願地区). *Okinawa-ken Bunkazai Chosa Hokokusho Dai 50 Shu: Inafuku Iseki Hakkutsu Chosa Hokokusho (Kami Ugan Chiku). [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 50: Report of the Excavations of Inafuku Site (Kami Ugan Area)]*. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Inafuku Site, Nanjo City, reporting excavated dugong bone remains. Some dugong bone remains and one dugong arrowhead were found in Gusuku Period remains.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

- 1983c 沖縄県文化財調査報告書第51集 伊武部貝塚発掘調査報告書
国道58号線拡幅工事に伴う緊急発掘調査 -遺構・貝製品・石器・貝殻編-.
Okinawa-ken Bunkazai Chosa Hokokusho Dai 51 Shu: Imbu Kaizuka Hakkutsu Chosa Hokokusho; Kokudo 58 Gosen Kakufuku Koji ni Tomonau Kinkyu Hakkutsu Chosa - Iko/Kai Seihin/Sekki/Kaigara Hen. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 51: Report of the Excavations of Imbu Shellmound: Report of the Urgent Excavation Survey Associated with the Widening Works of the National Route 58 - Remains, Shell Artifacts, Stone Tools]. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

Although containing no dugong-related material, a report by Isao Morimoto cites this report in his references, therefore included in this annotated bibliography.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

- 1984 沖縄県文化財調査報告書第57集 野国 -野国貝塚群B地点発掘調査報告-. *Okinawa-ken Bunkazai Chosa Hokokusho Dai 57 Shu: Noguni - Noguni Kaizuka Gun B Chiten Hakkutsu Chosa Hokoku. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 57: Noguni - Excavation Survey Report of the B point of the Noguni Shellmound Groups]*. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Noguni Shellmound, Kadena Township, reporting excavated bone remains. The Late Jomon deposits held a right scapula and a digitorum manus fragment.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

- 1984 沖縄県文化財調査報告書第56集 宮古城辺町 長間底遺跡 発掘調査報告.
Okinawa-ken Bunkazai Chosa Hokokusho Dai 56 Shu: Miyako Johen Cho Nagamazuku Iseki Hakkutsu Chosa Hokoku. [Survey Report of the Cultural Resources of Okinawa Prefecture,

No. 56: *Excavation Survey Report of Nagamazuku Site, Gusukube Town, Miyako*]. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Nagamazuku Site, Miyakojima City, reporting excavated dugong bone remains. This Late Neolithic site contained a dugong rib fragment, membri fragment, and a vertebra.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

1985a 沖縄文化財調査報告書第6 1集 伊江島 具志原貝塚の概要. *Okinawa Bunkazai Chosa Hokokusho Dai 62 Shu: Ie-jima Gushibaru Kaizuka no Gaiyo*. [Survey Report of the Cultural Resources of Okinawa, No. 64: Outline of Gushibaru Shellmound, Ie-jima Island]. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Gushibaru Shellmound, Ie-jima Island, reporting excavated dugong bone remains. Two rib fragments were found in the prehistoric deposits.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

1985b 沖縄県文化財調査報告書第6 3集 名護貝塚
-県道1 1 6号線側溝改修工事に伴う緊急発掘調査-. *Okinawa-ken Bunkazai Chosa Hokokusho Dai 63 Shu: Nago Kaizuka - Kendo 116 Gosen Sokko Kaishu Koji ni Tomonau Kinkyu Hakkutsu Chosa -*. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 63: Nago Shellmound - Urgent Excavation Survey Associated with the Improvements of the Street Side Ditch along the Prefectural Road #116]. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Nago Shellmound, Nago City, reporting excavated dugong bone remains. One dugong rib fragment was found in Late Shellmound or Gusuku Period deposits.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

1985c 沖縄県文化財調査報告書第64集 名蔵貝塚群発掘調査報告書. *Okinawa-ken Bunkazai Chosa Hokokusho Dai 64 Shu: Nagura Kaizuka Gun Hakkutsu Chosa Hokokusho*. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 64: Excavation Survey Report of the Nagura Shellmound Groups]. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Nagura Shellmound, Ishigaki-jima Island, reporting excavated bone remains. Late Neolithic deposits held 3 dugong rib fragments.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

1985d 沖縄県文化財調査報告書第6 6集 与那国島 トウグル浜遺跡
与那国空港整備工事に伴う緊急発掘調査報告. *Okinawa-ken Bunkazai Chosa Hokokusho Dai 66 Shu: Yonaguni-jima Tuguruhamas Iseki Yonaguni Kuko Seibi Koji ni Tomonau Kinkyu Hakkutsu Chosa Hokoku*. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 66: Tuguruhamas Site, Yonaguni Island - Report of the Urgent Excavation Survey Associated with the Improvement Works of Yonaguni Airport -]. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Tuguruhamas Site, Yonaguni Township, reporting excavated dugong bone remains. One dugong humerus, 1 phalanx proximalis, and 1 corpus vertebrae were found in Late Neolithic deposits.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

1986a 沖縄県文化財調査報告書第75集 地荒原遺跡

—県道10号改良工事に伴う発掘調査報告— *Okinawa-ken Bunkazai Chosa Hokokusho Dai 75 Shu: Chiarabaru Iseki - Kendo 10 Go Kairyo Koji ni Tomonau Hakkutsu Chosa Hokoku. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 75: Chiarabaru Site - Excavation Survey Report Associated with the Road Improvement of the Prefectural Road #10].* In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Chiarabaru Site, Uruma City, reporting excavated dugong bone artifacts and bone remains. This Late to Final Jomon Period site produced a wealth of dugong bone. Eight dugong bone stabbers were recovered. Non-artifact remains include 20 cranium fragments, 12 processus spinosus bones, 90 rib fragments, 2 scapula, 3 humeri, and 1 radius.

1986b 沖縄県文化財調査報告書第76集 沖縄県宜野座村松田遺跡

—一般国道329号改良工事に伴う緊急調査— *Okinawa-ken Bunkazai Chosa Hokokusho Dai 76 Shu: Okinawa-ken Ginoza-son Matsuda Iseki - Ippan Kokudo 329 Go Kairyo Koji ni Tomonau Kinkyu Chosa. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 76: Matsuda Site, Ginoza Village, Okinawa - Urgent Survey Associated with the Road Improvements of the National Route 329].* In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Matsuda Site, Ginoza Village, reporting excavated dugong bone remains. Historical Kinsei Period deposits held 1 dugong scapula.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

1986c 沖縄県文化財調査報告書第77集 知花遺跡

—沖縄自動車道（石川—那覇間）建設工事に伴う緊急発掘調査報告書（1）— *Okinawa-ken Bunkazai Chosa Hokokusho Dai 77 Shu: Chibana Iseki - Okinawa Jidosha Do (Ishikawa-Naha Kan)-kensetsu Koji ni Tomonau Kinkyu Hakkutsu Chosa Hokokusho (I). [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 77: Chibana Site - Report of the Urgent Excavation Survey Associated with the Construction Works of the Okinawa Expressway (Ishikawa - Naha) (1)].* In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Chibana Site, Okinawa City, reporting excavated dugong bone remains. One dugong bone stabber was found in Late to Final Jomon Period deposits. The site also contained 1 right mandibula (processus condylaris), 6 rib bone fragments, 2 left humerus bones, and 1 longum fragment.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

1987 沖縄県文化財調査報告書第83集 拝山遺跡

-沖縄自動車道(石川-那覇間)建設工事に伴う緊急発掘調査報告書(5)-

Okinawa-ken Bunkazai Chosa Hokokusho Dai 83 Shu: Uganyama Iseki - Okinawa Jidosha Do (Ishikawa-Naha Kan)-Kensetsu Koji ni Tomonau Kinkyu Hakkutsu Chosa Hokoku. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 83: Uganyama Site - Report of the Urgent Excavation Survey Associated with the Construction Works of the Okinawa Expressway (Ishikawa - Naha) (5)]. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Uganyama Site, Urasoe City, reporting excavated bone artifacts that are assumed to be made of the dugong bone.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

1988 首里城跡 歓会門・久慶門内側地域の復元整備に係る遺構調査. *Shur-jo Ato - Kankai Mon, Kyukei Mon Uchigawa Chiiki no Fukugen Seibi ni Kakaru Iko Chosa. [Shuri-jo Castle Ruin Site: Archaeological Feature Survey Related to the Restoration and Maintenance of Kankai-mon Gate and Kyukei-mon Gate Areas].* In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Shuri-jo Castle Ruin Site, Naha City, reporting excavated dugong bones. These include 1 cranium, 1 corpus vertebra, 1 corpus vertebra process, 2 rib fragments, and 1 metacarpal/metatarsal.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

1989 沖縄県文化財調査報告書第93集 宇佐浜遺跡 発掘調査報告. *Okinawa-ken Bunkazai Chosa Hokokusho Dai 93 Shu: Uzahama Iseki Hakkutsu Chosa Hokoku. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 93: Excavation Survey Report of Uzahama Site].* In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Uzahama B Shellmound, Kunigami Village, reporting excavated bone remains. The Late Shellmound Period deposits held 1 dugong rib bone.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

1990 沖縄県文化財調査報告書第96集

阿波根古島遺跡(一那覇・糸満線道路改良工事に伴う緊急発掘調査報告一)

Okinawa-ken Bunkazai Chosa Hokokusho Dai 96: Ahagon Furujima Iseki - Naha, Itoman Sen Doro Kairyo Koji ni Tomonau Kinkyu Hakkutsu Chosa Hokoku. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 96: Ahagon Furujima Site - Report of the Urgent Excavation Survey Associated with the Road Improvements of Naha to Itoman]. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Ahagon-furujima Site, Itoman City, reporting excavated dugong bone remains. One dugong rib bone was found in Gusuku Period deposits.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

1991a 沖縄県文化財調査報告書 第101集 西表島船浦スラ所跡

-港湾施設用地工事に伴う発掘調査- *Okinawa-ken Bunkazai Chosa Hokokusho Dai 101 Shu: Iriomote-jima Funaura Surasho Ato, Kowan Shisetsu Yochi Koji ni Tomonau Hakkutsu Chosa. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 101: Funaura Surasho Site, Iriomote-jima Island - Excavation Survey Associated with Site Construction of*

the Harbor Facilities]. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Funaura Surasho Site, Iriomote-jima Island, reporting excavated dugong bone remains. One dugong rib bone fragment was found dating to the historical Kinsei Period.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

- 1991b 沖縄県文化財調査報告書 第98集 西表島 上村遺跡 -重要遺跡確認調査報告-.
Okinawa-ken Bunkazai Chosa Hokokusho Dai 98 Shu: Iriomote-jima Uemura Iseki - Juyo Iseki Kakunin Chosa Hokou. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 98: Uemura Site, Iriomote-jima Island - Survey Report of the Important Site].
 In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of the Uemura Site, Iriomote-jima Island, reporting excavated dugong bone remains.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

- 1992a 沖縄県文化財調査報告集 第108集 恩納村久良波貝塚
 -導水管埋設工事に係る緊急発掘調査報告集-.
Okinawa-ken Bunkazai Chosa Hokokusho Dai 108 Shu: Onna-son Kuraha Kaizuka, Dosuikan Maisetsu Koji ni Kakaru Kinkyu Hakkutsu Chosa Hokokushu. [Survey Reports of the Cultural Resources of Okinawa Prefecture, No. 108: Kuraha Shellmound, Onna Village - Reports of the Urgent Excavation Survey Related to the Underground Construction of the Aqueduct -].
 In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Kuraha Shellmound, Onna Village, reporting excavated dugong bone remains. Dugong bones from this Late Shellmound to Gusuku Period site included 2 scapula bones, 4 rib fragments, and 3 unidentified fragments.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

- 1992b 沖縄県文化財調査報告書 第105集 安仁屋トゥンヤマ遺跡
 (-下級下士官隊舎建設に伴う緊急発掘調査報告-) .
Okinawa-ken Bunkazai Chosa Hokokusho Dai 105 Shu: Aniya Tun'yama Iseki (Kakyu Kashikan Taisha-kensetsu ni Tomonau Kinkyu Hakkutsu Chosa Hokokusho. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 105: Aniya Tun'yama Site - Report of the Urgent Excavation Survey Associated with the Construction of the Barracks of the Junior Noncommissioned Officers].
 In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Aniya-tunyama Site, reporting excavated dugong bone remains.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

1993 沖縄県文化財調査報告書第111集 湧田古窯跡 (I)

—県庁舎行政棟建設に係る発掘調査— *Okinawa-ken Bunkazai Chosa Hokokusho Dai 111 Shu: Wakuta Kogama Ato (I), -kenchoshu Gyoseito-kensetsu ni Kakaru Hakkutsu Chosa. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 111: Wakuta Old Kiln Site (I) - Excavation Survey Related to the Construction of the Administrative Building of the Prefectural Government Office].* In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Wakuta Old Kiln Site, Naha City, reporting excavated dugong bone remains. Two dugong rib bones were found in Gusuku to Kinsei Period deposits.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

1995 沖縄県文化財調査報告書第112集 湧田古窯跡 (II)

—県庁舎議会棟建設に係る発掘調査— *Okinawa-ken Bunkazai Chosa Hokokusho Dai 121 Shu: Wakuta Kogama Ato (II), -kenchoshu Gikaito-kensetsu ni Kakaru Hakkutsu Chosa. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 111: Wakuta Old Kiln Site (I) - Excavation Survey Related to Construction of the Administrative Building of Prefectural Government Office].* In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Wakuta Old Kiln Site, Naha City, reporting an excavated dugong bone artifact. A rib bone was found in Gusuku to Kinsei Period deposits.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

1996 沖縄県文化財調査報告書第125集 平敷屋トウバル遺跡

—ホワイトビーチ地区内倉庫建設工事に伴う緊急発掘調査報告書— *Okinawa-ken Bunkazai Chosa Hokokusho Dai 125 Shu: Heshikiya Tobaru Iseki, White Beach Chiku Nai Soko-kensetsu Koji ni Tomonau Kinkyu Hakkutsu Chosa Hokokusho. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 125: Heshikiya Tobaru Site - Report of the Urgent Excavation Survey Associated with the Warehouse Construction in White Beach Region].* In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Heshikiya Tobaru Site, Uruma City, reporting excavated dugong bone artifacts and bone remains. This is one of the richest sites ever reported in terms of dugong remains. The remains date from Late to Final Jomon and from the early Late Shellmound Period. The dugong artifacts were 1 bone stabber, 2 perforated artifacts (unfinished), and 5 bones with scars of unidentified purpose. The non-artifact remains include a complete cranium and nearly 80 cranial fragments, over 1000 rib bone fragments, 1 complete scapula, 18 scapula fragments, 4 maxilla, 16 mandibula, 164 corpus vertebrae, 3 humerus fragments, 1 complete left radius, 2 infant radii, 1 complete ulna, 5 ulna fragments, 2 infant ulna fragments.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

- 1997a 沖縄県文化財調査報告書 第131集 慶来慶田城遺跡 重要遺跡確認調査.
Okinawa-ken Bunkazai Chosa Hokokusho Dai 131 Shu: Kerai Kedagusuku Iseki, Juyo Iseki Kakunin Chosa. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 131: Kerai-kedagusuku Site - Survey of Important Site]. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Kerai-kedagusuku Site, Iriomote-jima Island, reporting excavated dugong bone remains.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

- 1997b 沖縄県文化財調査報告書第130集 伊江島具志原貝塚発掘調査報告. *Okinawa-ken Bunkazai Chosa Hokokusho Dai 130 Shu: Ie-jima Gushibaru Kaizuka Hakkutsu Chosa Hokoku. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 130: Excavation Survey Report of Gushibaru Shellmound, Ie-jima Island].* In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Gushibaru Shellmound, Ie-jima Island, reporting excavated dugong bone remains. Two dugong rib bone fragments were recovered from prehistoric deposits.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

- 1998 沖縄県文化財調査報告書第133集 首里城跡
 -御庭跡・奉神門跡の遺構調査報告-. *Okinawa-ken Bunkazai Chosa Hokokusho Dai 133 Shu: Shuri-jo Ato - Unaa Ato and Hoshin Mon Ato no Iko Chosa Hokoku. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 133: Shuri-jo Castle Ruin Site - Report of Archaeological Feature Survey of the Unaa Site and Hoshin-mon Gate Site].* In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of the Shuri-jo Castle Ruin Site, Naha City, reporting excavated dugong bone remains.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

- 1999a 沖縄県文化財調査報告書 第136集 湧田古窯跡 (IV)
 -県民広場地下駐車場建設に係る発掘調査-. *Okinawa-ken Bunkazai Chosa Hokokusho Dai 136 Shu: Wakuta Kogama Ato (IV),-kenmin Hiroba Chika Chushajo-kensetsu ni Kakaru Hakkutsu Chosa. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 136: Wakuta Old Kiln Site - Excavation Survey Related to the Construction of Underground Parking at Kenmin Hiroba].* In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Wakuta Old Kiln Site, Naha City, reporting excavated dugong bone remains. One dugong rib fragment was excavated from Gusuku to Kinsei Period deposits in the underground parking area.

Department of Culture of the Okinawa Prefectural Education Committee (沖縄県教育庁文化課)

- 1999b 沖縄県文化財報告書 第134集 喜友名貝塚・喜友名グスク
 -宜野湾北中城線 (伊佐ー普天間) 道路改築事業に伴う緊急発掘調査報告 (1) -.
Okinawa-ken Bunkazai Chosa Hokokusho Dai 134 Shu: Kiyuna Kaizuka, Kiyuna Gusuku - Ginowan Kitanakagusuku Sen (Isa-Futenma) Doro Kaichiku Jigyo ni Tomonau Kinkyu Hakkutsu Chosa Hokoku (1). [Survey Report of the Cultural Resources of Okinawa

Prefecture, No. 134: Kiyuna Shellmound and Kiyuna Gusuku Castle Ruin Site - Report of Urgent Excavation Survey Associated with the Road Improvement Project of Ginowan to Kitanakagusuku (1). In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Kiyuna Shellmound, Ginowan City, reporting excavated bone remains. From Late to Final Jomon Period deposits, two butterfly-shaped ornaments made from dugong mandible bone were recovered.

Ginowan City Board of Education (宜野湾市教育委員会)

- 1999 宜野湾市文化財調査報告書第30集 大山前門原第二遺跡
個人住宅建設工事に係る埋蔵文化財緊急発掘調査報告書. *Ginowan Shi Bunkazai Chosa Hokokusho Dai 30 Shu: Oyama Meejobaru Dai Ni Iseki, Kojin Jutaku-kensetsu ni Kakaru Maizo Bunkazai Kinkyu Hakkutsu Chosa Hokokusho*. [Survey Report of the Cultural Resources of Ginowan City, No. 30: Oyama-meejobaru No. 2 Site - Report of the Urgent Excavation Survey of the Buried Cultural Resources Related to the Private Residence Construction]. In Japanese. Ginowan City Board of Education, Okinawa, Japan.

Excavation survey report of the Oyama-Meejobaru No. 2 Site, Ginowan City, reporting excavated dugong bone remains.

Ginoza Village Board of Education (宜野座村教育委員会)

- 1999 前原遺跡 - 県道漠那松田線道路整備工事に伴う発掘調査報告書-. *Meebaru Iseki - Kendo Kanna Matsuda Sen Doro Seibi Koji ni Tomonau Hakkutsu Chosa Hokokusho*. [Meebaru Site - Excavation Survey Report Associated with the Prefectural Road Improvements of Kanna to Matsuda]. In Japanese. Ginowan City Board of Education, Okinawa, Japan.

An excavation survey report of Meebaru Site, Ginoza Village, reporting excavated dugong bone remains. Dugong remains were common in the Late Jomon deposits at this site and included 1 right zygomaticum, 1 left humerus, 12 rib fragments, 1 right humerus, 1 right radius, 1 processus spinosus, and 22 unidentified fragments.

Ginoza Village Board of Education (宜野座村教育委員会)

- 2005 前原貝塚 - 村道サ一原線道路改良事業に伴う埋蔵文化財発掘調査報告書-. *Meebaru Kaizuka - Sondo Saabaru Sen Doro Kairyo Jigyo ni Tomonau Maiso Bunkazai Hakkutsu Chosa Hokokusho*. [Meebaru Shellmound - Excavation Survey Report of the Buried Cultural Resources Associated with the Village Road Improvement Project of Saabaru]. In Japanese. Ginowan City Board of Education, Okinawa, Japan.

An excavation survey report of Meebaru Shellmound Site, Ginoza Village, reporting excavated dugong bone remains.

Goya, Yoshikatsu (呉屋義勝)

- 1989 安座間原第1遺跡. *Azamabaru Dai 1 Iseki*. [Azamabaru No. 1 Site]. In *日本考古学年報40 (1987年度版)*. *Nihon Kouko Gaku Nenpo 40, 1987 Nendo Ban*. [Archaeologia Japonica 40, 1987 Edition]. In Japanese. Japanese Archaeological Association, Tokyo, Japan.

A brief summary of the test excavations of Mashiki-azamabaru No. 1 Site in Ginowan City. The dugong-bone-made perforated hanging ornaments were excavated from Late to

Final Jomon deposits at the site. The number of the excavated ornaments is not identified.

Gushikawa City Board of Education (具志川市教育委員会)

- 1979 具志川市文化財調査報告書第3集 地荒原遺跡・苦増原遺跡. *Gushikawa Shi Bunkazai chosa Hokokusho Dai 3 Shu: Chiarabaru Iseki, Nigamashibaru Iseki. [Survey Report of Cultural Resources of Gushikawa City, No. 3: Chiarabaru Site and Nigamashibaru Site]*. In Japanese. Gushikawa City Board of Education, Okinawa, Japan.

An excavation survey report of Chiarabaru Site, Uruma City, reporting excavated dugong bone remains. The Late to Final Jomon site was rich in dugong remains, including 1 cranium fragment, 1 arcus zygomaticus, 2 vertebrae cervicales, 2 vertebrae lumbales, 1 processus spinosus, 70 rib fragments, 6 unidentified bones, and 12 fragments.

Gushikawa City Board of Education (具志川市教育委員会)

- 1980 宇堅貝塚群・アカジャンガー貝塚 発掘調査報告. *Uken Kaizuka, Akajangaa Kaizuka: Hakkutsu Chosa Hokoku. [Excavation Survey Report of the Uken Shellmound Group and Akajangaa Shellmound]*. In Japanese. Gushikawa City Board of Education, Okinawa, Japan.

An excavation survey report of Uken Shellmound, Uruma City, reporting excavated dugong bone remains. Two unidentified dugong bone fragments were found in deposits dating to the early part of the Late Shellmound Period.

Gushikawa City Board of Education (沖縄県具志川市教育委員会)

- 1986 地荒原貝塚 -個人住宅建築工事に係る発掘調査報告-. *Chiarabaru Kaizuka - Kojin Jutaku-kensetsu Koji ni Kakaru Hakkutsu Chosa Hokoku -. [Chiarabaru Shellmound - Excavation Survey Report Related to the Private Residence Construction]*. In Japanese. Gushikawa City Board of Education, Okinawa, Japan.

An excavation survey report of the Late to Final Jomon Period Chiarabaru Site in Uruma City, reporting excavated dugong bone artifacts and bone remains. The dugong artifacts consist of 8 bone stabbers. The remains include 20 cranium fragments, 12 processus spinosus, 90 rib fragments, 2 scapula, 3 humeri, and 1 radius.

Hirara City Board of Education (平良市教育委員会)

- 1992 住屋遺跡 平良市新庁舎建設に伴う記録保存の為の緊急発掘調査概報. *Sumiya Iseki Hirara-shi Shin Chosha Kensetsu ni Tomonau Kiroku Hozon no Tameno Kinkyu Hakkutsu Chosa Gaiyo. [Sumiya Site: Outline of the Urgent Excavation Survey for Record Keeping Associated with the Construction of the New Government Office of Hirara]*. In Japanese. Hirara City Board of Education, Okinawa, Japan.

An excavation survey report of Sumiya Site, Miyakojima City, reporting excavated dugong bone artifacts. Many dugong artifacts were found in the Gusuku Period deposits. These consist of a bone arrowhead, a bone stabber, a hair stick, a spatula, and a bone artifact of unknown function.

Hirara City Board of Education (平良市教育委員会)

- 1999a 平良市埋蔵文化財調査報告書第4集 住屋遺跡 (I)
-庁舎建設に伴う緊急発掘調査報告書-. *Hirara-shi Maizo Bunkazai Chosa Hokokusho Dai 4 Shu: Sumiya Iseki (I) - Chosha Kensetsu ni Tomonau Kinkyu Hakkutsu Chosa Hokokusho. [Survey Report of the Buried Cultural Resources of Hirara City, No. 4: Sumiya*

Site (I) - Report of Urgent Excavation Survey Associated with the Construction of the Government Office. In Japanese. Hirara City Board of Education, Okinawa, Japan.

An excavation survey report of Sumiya Site, Miyakojima City, reporting excavated dugong bone artifacts.

Hirara City Board of Education (平良市教育委員会)

- 1999b 保里遺跡 (旧県立厚生園跡地) 県営団地建設に伴う緊急発掘調査概報. *Fusati Iseki (Kyu-kenritsu Koseien Atochi) Ken'ei Danchi Kensetsu ni Tomonau Kinkyu Hakkutsu Chosa Gaiho*. [Fusati Site (Former Prefectural Nursing Home Site): Outline of the Urgent Excavation Survey Associated with the Construction of the Prefectural Housing]. In Japanese. Hirara City Board of Education, Okinawa, Japan.

Although containing no dugong-related material, a report by Isao Morimoto cites this report in his references, therefore included in this annotated bibliography.

Hirara City Board of Education (平良市教育委員会)

- 2003 平良市埋蔵分k材調査報告書 第5集 尻川遺跡
—個人住宅建設予定に伴う緊急発掘調査報告書—. *Hirara-shi MaizoBunkazai Chosa Hokokusho Dai 5 Shu: Sushigaa Iseki - Kojin Jutaku Kensetsu Yotei ni Tomonau Kinkyu Hakkutsu Chosa Hokokusho* -. [Survey Report of the Buried Cultural Resources of Hirara City, No. 5: Sushigaa Site - Report of the Urgent Excavation Survey Associated with the Private Residence Construction]. In Japanese. Hirara City Board of Education, Okinawa, Japan.

An excavation survey report of Sushigaa Site, Miyakojima City, reporting excavated dugong bone artifacts. Two dugong bone arrowheads were recovered from Gusuku Period deposits.

Hojo, Teruyuki (北條輝幸)

- 1991 沖縄浦添貝塚出土のジュゴンの上腕骨の意義. *Okinawa Urasoe Kaizuka Shutsudo no Jugon no Jouwankotsu no Igi*. [Significance of the Dugong's Humerus Excavated at Urasoe Shellmound, Okinawa]. In 交流の考古学. *Koryu no Kouko Gaku*. [Interaction with Archaeology]. In Japanese. Higo Archaeological Society, Kumamoto, Japan.

An analysis of the dugong humerus excavated from Urasoe Shellmound, Urasoe City.

Ie Village Board of Education (伊江村教育委員会)

- 1979 伊江村文化財調査報告書第8集 伊江島ナガラ原西貝塚 緊急発掘調査報告書. *Ie-son Bunkazai Chosa Hokokusho Dai 8 Shu: Ie-jima Nagarabaru Kaizuka Kinkyu Hakkutsu Chosa Hokokusho*. [Survey Report of Cultural Resources of Ie Village, No. 8: Report of the Urgent Excavation Survey of the Nagarabaru Nishi Shellmound, Ie-jima Island]. In Japanese. Ie Village Board of Education, Okinawa, Japan.

An excavation survey report of Nagarabaru Nishi Shellmound, Ie-jima Island, reporting excavated dugong bone artifacts and bone remains.

Iheya Village Board of Education (伊平屋村教育委員会)

- 1981 伊平屋村文化財調査報告書第1集 久里原貝塚 範囲確認調査報告書. *Iheya-son Bunkazai Chosa Hokokusho Dai 1 Shu: Kusatobaru Kaizuka Han'i Kakunin Chosa Hokokusho*. [Survey Report of Cultural Resources of Iheya Village, No. 1: Survey Report of

the Area Definition of Kusatobaru Shellmound]. In Japanese. Iheya Village Board of Education, Okinawa, Japan.

An excavation survey report of Kusatobaru Shellmound, Iheya Village, reporting excavated dugong bone remains. This end of Early, Late, and early Final Jomon Period site contained 1 cervical vertebra (vertebral arch), 1 corpus vertebra, 13 ribs, 1 left maxilla fragment, 1 incisor fragment, 1 zygomatic process fragment, 4 mandible fragments, 1 scapula, 2 supraspinous fossa, 1 left humerus, and 4 phalanges of dugong.

Investigation Committee of Nakijin Village Conservation of Cultural Resources
(今帰仁村文化財保存調査委員会)

- 1983 古宇利原遺跡発掘調査報告書. *Kouribaru Iseki Hakkutsu Chosa Hokokusho*. [Excavation Survey Report of Kouribaru Site]. In Japanese. Nakijin Village Board of Education, Okinawa, Japan.

An excavation survey report of Kouribaru A Site, Nakijin Village, reporting excavated dugong bone artifacts and bone remains. The Late Jomon Period deposits contained a sea mammal tooth (probably dugong).

Ishigaki City Board of Education (石垣市教育委員会)

- 1977 石垣市文化財調査報告書第1集 フルスト原遺跡. *Ishigaki-shi Bunkazai Chosa Hokokusho Dai 1 Shu: Furusutobaru Iseki*. [Survey Report of the Cultural Resource of Ishigaki City, No. 1: Furusutobaru Site]. In Japanese. Ishigaki City Board of Education, Okinawa, Japan.

An excavation survey report of Furusutobaru Site, Ishigaki-jima Island, reporting excavated dugong bone remains. Number and types of bones not reported.

Ishigaki City Board of Education (石垣市教育委員会)

- 1983 山原貝塚発掘調査概要. *Yambaru Kaizuka Hakkutsu Chosa Gaiyo*. [Summary of the Excavation Survey of Yambaru Shellmound]. In Japanese. Ishigaki City Board of Education, Okinawa, Japan.

Although containing no dugong-related material, a report by Isao Morimoto cites this report in his references, therefore included in this annotated bibliography.

Itoman City Board of Education (糸満市教育委員会)

- 1985 糸満市文化財調査報告書第5集 米須貝塚 範囲確認調査報告書. *Itoman-shi Bunkazai Chosa Hokokusho Dai 5 Shu: Komesu Kaizuka Han'i Kakunin Chosa Hokokusho*. [Survey Report of Cultural Resources of Itoman City, No. 5: Komesu Shellmound - Survey Report of the Area Definition]. In Japanese. Itoman City Board of Education, Okinawa, Japan.

An excavation survey report of Komesu Shellmound; although no dugong-related artifacts were found, they are referred to in this report.

Itoman City Board of Education (糸満市教育委員会)

- 2003 糸満市文化財調査報告書第19集 大度貝塚ほか発掘調査報告. *Itoman Shi Bunkazai Chosa Hokokusho Dai 19 Shu: Odo Kaizuka Hoka Hakkutsu Chosa Hokoku. [Survey Report of the Cultural Resources of Itoman City, No. 19: Excavation Survey Report of Odo Shellmound]*. In Japanese. Itoman City Board of Education, Okinawa, Japan.

An excavation survey report of Odo Shellmound, Itoman City, reporting excavated dugong bone remains and artifacts. This is a Late to Final Jomon and early Late Shellmound Period site. The artifact is called a dugong bone processed artifact.

Izena Village Board of Education (伊是名村教育委員会)

- 1979a 伊是名村文化財調査報告書第3集 具志川島遺跡群 第三次発掘調査報告書. *Izena-son Bunkazai Chosa Hokokusho Dai 3 Shu: Gushikawa-jima Iseki Gun No 3ji Hakkutsu Chosa Hokokusho.. [Survey Report of the Cultural Resources of Izena Village, No3: Third Excavation Survey Report of the Gushikawa-jima Island Site Group]*. In Japanese. Izena Village Board of Education, Okinawa, Japan.

An excavation survey report of the Gushikawa-jima Island Site Group, Izena-jima Island, reporting excavated dugong bone artifacts. Two circular bone artifacts from a sea mammal are reported from Late to Final Jomon desposits.

Izena Village Board of Education (伊是名村教育委員会)

- 1979b 伊是名村文化財調査報告書第4集 伊是名貝塚 緊急発掘調査報告書. *Izena-son Bunkazai Chosa Hokoku Dai 4 Shu: Izena Kaizuka Kinkyu Hakkutsu Chosa Hokokuksho. [Survey Report of Cultural Resources of Izena Village, No. 4: Urgent Excavation Report of Izena Shell Mound]*. In Japanese. Izena Village Board of Education, Okinawa, Japan.

An excavation survey report of Izena Shellmound, Izena-jima Island, reporting excavated dugong bone artifacts. A bone artifact possibly made from a dugong rib and a bone harpoon, made from dugong rib bone, were found in Late Jomon desposits.

Kadena Township Board of Education (嘉手納町教育委員会)

- 1994 嘉手納町文化財調査報告書第1集 屋良グスク
屋良城跡公園整備計画に伴う範囲確認調査. *Kadena-cho Bunkazai Chosa Hokokusho Dai 1 Shu: Yara Gusuku, Yara Joshi Koen Seibi Keikaku ni Tomonau Han'i Kakunin Chosa. [Survey Report of Cultural Resources of Kadena Township, No. 1: Yara Gusuku Castle - Area Definition Survey Associated with Improvement Project of Yara-jo Castle Ruin Site Park]*. In Japanese. Kadena Township Board of Education, Okinawa, Japan.

An excavation survey report of Yara Gusuku Castle Ruin Site, Kadena Township, reporting excavated bone remains. One dugong rib bone fragment dating to the Gusuku Period was found.

Kadena Township Board of Education (嘉手納町教育委員会)

- 1995 嘉手納町の文化財 第2集 嘉手納町の遺跡 -詳細分布調査-. *Kadena Cho no Bunkazai Dai 2 Shu: Kadena Cho no Iseki - Shosai Bumpu Chosa. [Cultural Resources of Kadena Town, No. 2: Sites in Kadena Town - Detailed Distribution Survey]*. In Japanese. Kadena Town Board of Education, Okinawa, Japan.

An excavation survey report of Kadena Shellmound, Kadena Township, reporting excavated dugong bone remains and an artifact. In Late to Final Jomon desposits, 10

dugong rib bones were found. One butterfly-shaped ornament made from dugong mandible was also recovered.

Kagawa, Mitsuo, and Tawada Shinjun (賀川光夫・多和田真淳)

- 1978 「沖縄県宜野湾市大山貝塚調査概要」. Okinawa Ken Ginowan Shi Oyama Kaizuka Chosa Gaiyo. [Summary of the Excavation Research of Oyama Shellmound in Ginowan City, Okinawa]. In 沖縄文化財調査報告 (一九五六年—一九六二年). *Okinawa Bunkazai Chosa Hokoku (1956-1965)*. [Survey Report of Okinawan Culture, 1956 - 1962]. In Japanese. Naha Shuppansha, Okinawa, Japan.

Although containing no dugong-related material, a report by Isao Morimoto cites this report in his references, therefore included in this annotated bibliography.

Kaneko, Hiromasa (金子 浩昌)

- 1984 貝塚の獣骨の知識—人と動物とのかかわり (考古学シリーズ (10)). *Kaizuka no Jukotsu no Chishiki - Hito to Dobutsu tonon Kakawari, Kouko Gaku Series, No. 10*. [Knowledge of the Animal Remains in Shellmounds - Relationship Between People and Animal, Archaeological Series No. 10]. In Japanese. Tokyo Bijutsu, Inc., Tokyo, Japan.

About the characteristics of dugong bone in archaeological sites.

Kaneko, Hiromasa (金子浩昌)

- 1992 日本考古学における動物遺体研究史
—動物との関わりにみる日本列島の文化の形成—. *Nihon Koukogaku ni Okeru Dobutsu Itai Kenkyushi - Dobutsu tonon Kakawari ni Miru Nihon Retto no Bunka no Keisei -*. [Research History of Animal Remains in Terms of Japanese Archaeology: Culture Development of Japanese Archipelago Seen in the Relations with Animals]. In 国立歴史民俗博物館研究報告 第42集. *Kokuritsu Rekishi Minzoku Hakubutsukan Kenkyu Hokoku, Dai 42 Shu*. [Survey Report of the National Museum of Japanese History, No. 42]. In Japanese. National Museum of Japanese History, Chiba, Japan.

Research history of the bone remains unearthed during excavation survey, including dugong bones.

Kaneko, Hiromasa (金子 浩昌)

- 2000 「蝶形骨器」の素材について. “Choeki Kokki” no Sozai ni Tsuite. [About the Materials of “Butterfly-shaped Bone Products”]. In 高宮廣衛先生古稀記念論集 琉球・東アジアの人と文化 (上巻). *Takamiya Hiroe Sensei Koki Kinen Ronshu Ryukyu/Higashi Asia no Hito to Bunka (Jokan)*. [Memorial Collection of Papers for the Celebration of Prof. Hiroe Takamiya's 70th Birthday: People and Culture of the Ryukyus and East Asia, Volume 1]. In Japanese. Memorial Collection of Papers for the Celebration of Prof. Hiroe Takamiya's 70th Birthday Publication, Okinawa, Japan.

Speculation on the use of dugong bone as a material during prehistoric times.

Kano, Tadao (鹿野忠雄)

- 1946 「火焼島における先史學的豫察」. *Kashoto ni Okeru Senshi Gakuteki Yosatsu*. [Prehistoric Reconnaissance of Burning Island]. In 東南亜細亜民族學先史學研究. *Tonnan Asia Minzoku Gaku Senshi Gaku Kenkyu*. [Folklore and Prehistoric Study of Southeast Asia]. In Japanese. Yajima Shobo, Tokyo, Japan.

Ornaments made from dugong bone were excavated from Burning Island, Taiwan.

Katsuren Township Board of Education (勝連町教育委員会)

- 1984 勝連町の文化財 第6集 勝連城跡 -南貝塚およびニの丸北地点の発掘調査-.

Katsuren Cho no Bunkazai Dai 6 Shu: Minami Kaizuka Oyobi Ni no Maru Kita Chiten no Hakkutsu Chosa. [Cultural Resources of Katsuren Town, No. 6: Katsuren-jo Castle Ruin Site - Excavations of the South Shellmound and Ninomaru North Point]. In Japanese. Katsuren Town Board of Education, Okinawa, Japan.

An excavation survey report of Katsuren Gusuku Castle Ruin Site, Uruma City, reporting excavated dugong bone artifacts and bone remains. Dugong bones were recovered from a Late Shellmound Period midden. A mah-jong tile (or at least an item shaped like a mah-jong tile) was made from dugong bone. Non-artifactual remains were 1 cranium, 1 temporal bone, 1 condylus occipitalis, 7 bones from the processus spinosus, 3 ribs, 1 maxilla, 1 mandible, 2 teeth, and 2 vertebrae. From Gusuku Period deposits within the second enclosure of the castle, numerous artifacts were recovered. The artifacts consisted of 12 bone arrowheads made from rib bone and 6 probable rib bone fragments with cut-marks. One scapula and 1 zygomatic arch were also recovered.

Katsuren Township Board of Education (勝連町教育委員会)

- 1990 勝連町の文化財 第11集 勝連城跡 -北貝塚、ニの郭および三の郭の遺構調査-.

Katsuren Cho no Bunkazai Dai 11 Shu: Katsuren Joshi - Kita Kaizuka, Ni no Kaku Oyobi San no Kaku no Iko Chosa. [Cultural Resources of Katsuren Town, No. 11: Katsuren-jo Castle Ruin Site - The Archaeological Feature Survey of the Kita Shellmound, the Second and Third Divisions]. In Japanese. Katsuren Town Board of Education, Okinawa, Japan.

An excavation survey report of Katsuren Gusuku Castle Ruin Site, Uruma City, reporting excavated dugong bone artifacts and bone remains.

Katsuren Township Board of Education (勝連町教育委員会)

- 1993 勝連町の文化財 第17集 勝連町の遺跡 -遺跡詳細分布調査報告-. *Katsuren Cho no Bunkazai Dai 17 Shu: Katsuren Cho no Iseki - Iseki Shosai Bumpu Chosa Hokoku.*

[Cultural Resources of Katsuren Town, No. 17: Sites in Katsuren Town - Survey Report of the Detailed Distribution of the Sites]. In Japanese. Katsuren Town Board of Education, Okinawa, Japan.

An excavation survey report of Heshikiya-tobaru Site, Uruma City, reporting excavated bone remains.

Katsuren Township Board of Education (勝連町教育委員会)

- 2004 勝連の文化財第22集 町内遺跡発掘調査に伴う埋蔵文化財発掘調査報告書
平成13・14年度

敷屋トウバル遺跡・津堅島キガ浜貝塚・津堅貝塚・南風原古島遺跡. *Katsuren no Bunkazai Dai 22 Shu: Chonai Iseki Hakkutsu Chosa ni Tomonau Maizo Bunkazai Hakkutsu Chosa Hokokusho, Heisei 13/14 Nendo, Heshikiya Tobaru Iseki/Tsukun-jima Kigahama Kaizuka/Tuken Kaizuka/Haeburu Furujima Iseki. [Cultural Resources of Katsuren Town, No. 22: Excavation Survey Report of Buried Cultural Resources Associated with Excavation Surveys of the Sites in Town, 2001-2002: Heshikiya-tobaru Site, Kigahama Shellmound in Tsukun-jima Island, Tsukun Shellmound, a].* In Japanese. Katsuren Town Board of Education, Okinawa, Japan.

An excavation survey report of Tsukun-jima Kigahama Shellmound, Uruma City, reporting excavated bone remains. Dugong bones (number and type unspecified) were recovered during excavation of early Late Shellmound Period deposits.

Maeda, Isshu (前田一舟)

- 2004b 連載第2回 沖縄のジュゴンと村びとの生活. Rensai Dai 2 Kai, Okinawa no Dugong to Murabito no Seikatsu. [The Second Serialization - Okinawan Dugong and the Village People's Life]. In 環境と正義 第77号. *Kankyo to Seigi, Dai 77 Go*. [Environment and Justice, No. 77]. In Japanese. Japan Environmental Lawyers Federation, Aichi, Japan.

A discussion of the use of the dugong for food and for making ornaments in prehistory based on archaeology in Okinawa.

Matsumura, Ryo (松村瞭)

- 1920 琉球茨堂貝塚. *Ryukyu Ogido Kaizuka*. [Ryukyu Ogido Shellmound]. In Japanese. University of Tokyo, Tokyo, Japan.

An excavation survey report of Ogido Shellmound, Kitanakagusuku Village, reporting excavated bone remains, including one dugong rib bone dating to the Late Jomon Period.

Morimoto, Isao (盛本 勲)

- 1989 具志川村文化財調査報告書第1集 久米島具志川村清水貝塚発掘調査報告書. *Gushikawa-son Bunkazai chosa Hokokusho Dai 1 Shu: Kume-jima Gushikawa-son Shimizu Kaizuka Hakkutsu Chosa Hokokusho*. [Survey Report of the Cultural Resources of Gushikawa Village, No. 1: Excavation Survey Report of Shimizu Shellmound, Gushikawa Village, Kume-jima Island]. In Japanese. Gushikawa Village Board of Education, Okinawa, Japan.

An excavation survey report of Shimizu Shellmound, Kumejima Township, reporting excavated dugong bone remains. The Late Shellmound Period deposits contained 1 maxilla, 1 ramus mandibulae, 1 isolated tooth, 1 zygomaticum, 1 processus zygomaticus, 1 atlas, 2 vertebrae (corpus), 17 rib bones, and 1 left humerus.

Morimoto, Isao (盛本 勲)

- 1992 「南琉球圏と台湾の先史時代研究の現状と課題」. Minami Ryukyu Ken to Taiwan no Senshi Jidai Kenkyu no Genjo to Kadai. [Current Status and Future Tasks of the Study of Taiwan and Southern Ryukyu Areas in Prehistoric Times]. In 沖縄県教育庁文化課紀要 第8号. *Okinawa-ken Kyoiku Cho Bunka Ka Kiyo Dai 5 Go*. [Bulletin of Culture Division, Education Department, Okinawa Prefectural Government No. 8]. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

Descriptions of the similarities in archaeological materials between the southern Ryukyu region and Taiwan.

Morimoto, Isao (盛本 勲)

- 1996 ジュゴンの調理および食法. *Jugon no Chori Oyobi Shokuho*. [Preparation and Consumption of the Dugong]. In 月刊 考古学ジャーナル 臨時増刊号 No409. *Gekkan Kouko Gaku Journal Rinji Zokan Go, No 409*. [Monthly - Archaeological Journal, Extra Edition, No. 409]. In Japanese. New Science, Co., Ltd., Tokyo, Japan.

A discussion on methods of preparation and consumption of the dugong as a food source during the prehistoric era.

Morimoto, Isao (盛本勲)

- 2000 古代文化 第52巻 第3号. *Kodai Bunka Dai 52 Kan Dai 3 Go. [Cultura Antiqua Volume 52, No. 3]*. In Japanese. Paleological Association of Japan, Inc., Kyoto, Japan.

A discussion of bone artifacts, including dugong bone artifacts.

Morimoto, Isao (盛本勲)

- 2004 「ジュゴン骨に関する出土資料の集成（暫定）」. *Jugon Bone ni Kansuru Shutsudo Siryo no Shusei (Zantei)*. [Collection of Excavated Materials in Regard to the Dugong's Bones (Interim)]. In 紀要 沖縄埋文研究 2. *Kiyo Okinawa Maibun-kenkyu 2. [Bulletin of Research on Buried Cultural Resources of Okinawa, No. 2]*. In Japanese. Okinawa Prefectural Archaeological Center, Okinawa, Japan.

A compilation of dugong bone artifacts excavated in Okinawa.

Morimoto, Isao (盛本勲)

- 2005a 宮古・八重山諸島のグスク時代出土の骨鏃様製品考. *Miyako/Yaeyama Shoto no Gusuku Jidai Shutsudo no Kotsuzoku Yo Seihin Ko*. [Bone Arrowhead-like Objects of the Gusuku Period in Miyako and Yaeyama Archipelagoes]. In 紀要 沖縄埋文研究 3. *Kiyo Okinawa Maibun-kenkyu 3. [Bulletin of Research on Buried Cultural Resources of Okinawa, No. 3]*. In Japanese. Okinawa Prefectural Archaeological Center, Okinawa, Japan.

A discussion of Gusuku Period bone arrowheads excavated in Miyako and Yaeyama regions, including dugong bone arrowheads.

Morimoto, Isao (盛本勲)

- 2005b ジュンゴン骨に関する出土資料の集成（補遺・1）. *Jugon Hone ni Kansuru Shutsudo Shiryo no Shusei (Hoi 1)*. [Collection of Excavated Materials in Regard to the Dugong's Bones (Supplement 1)]. In 紀要 沖縄埋文研究 3. *Kiyo Okinawa Maibun-kenkyu 3. [Bulletin of Research on Buried Cultural Resources of Okinawa, No. 3]*. In Japanese. Okinawa Prefectural Archaeological Center, Okinawa, Japan.

Supplementary materials prepared by Isao Morimoto for the document with the same title.

Motobu Township Board of Education (本部町教育委員会)

- 1986 本部町文化財調査報告書第3集 具志堅貝塚発掘調査報告. *Motobu-cho Bunkazai Chosa Hokokusho Dai 3 Shu: Gushiken Kaizuka Hakkutsu Chosa Hokoku*. [Survey Report of the Cultural Resources of Motobu Township, No. 3: Excavation Survey Report of Gushiken Shellmound]. In Japanese. Motobu Township Board of Education, Okinawa, Japan.

An excavation survey report of Gushiken Shellmound, Motobu Township, reporting excavated bone remains. This Late Jomon and Middle to Late Shellmound Period site yielded one dugong bone artifact, 20 dugong rib fragments, and one left scapula.

Motobu Township Board of Education (本部町教育委員会), ed.

- 1986 備瀬貝塚 -下水道工事に伴う緊急発掘調査報告-. *Bise Kaizuka - Gesuido Koji ni Tomonau Kinkyu Hakkutsu Chosa Hokoku*. [Bise Shellmound - Urgent Excavation Survey Associated with the Drainage Construction]. In Japanese. Motobu Township Board of Education, Okinawa, Japan.

Nine pieces of dugong bone were unearthed.

Motobu Township Board of Education (本部町教育委員会)

- 1988 本部町文化財調査報告書 第5集 知場塚原遺跡 -発掘調査報告-. *Motobu Cho Bunkazai Chosa Hokokusho Dai 5 Shu: Chibazukabaru Iseki - Hakkutsu Chosa Hokoku. [Survey Report of the Cultural Resources of Motobu Township, No. 5: Excavation Survey Report of Chibazukabaru Site].* In Japanese. Motobu Township Board of Education, Okinawa, Japan.

An excavation survey report of Chibazukabaru Site, Motobu Township, reporting excavated dugong bone remains. This Final Jomon Period site yielded 2 cranium fragments, 1 proximal rib, and 7 rib fragments.

Motobu Township Board of Education (本部町教育委員会)

- 2005 本部町文化財調査報告書第8集 沖縄県国頭郡本部町 アンチの上貝塚発掘調査報告書. *Motobu Bunkazai Chosa Hokokusho Dai 8 Shu: Okinawa-ken Kunigami Gun Motoabu Cho Anchi no Ue Kaizuka Hakkutsu Chosa Hokokusho. [Survey Report of the Cultural Resources of Motobu Township, No. 8: Excavation Survey Report of Anchinoue Shellmound, Motobu Township, Kunigami Gun, Okinawa].* In Japanese. Motobu Township Board of Education, Okinawa, Japan.

An excavation survey report of Anchinoue Shellmound, Motobu Township, reporting excavated dugong bone artifacts and bone remains.

Naha City Board of Education (那覇市教育委員会)

- 2001 那覇文化財調査報告書第47集 首里崎山古墓群 首里崎山公園整備事業に伴う緊急発掘調査報告-. *Naha Bunkazai Chosa Hokokusho Dai 47 Shu: Shuri Sakiyama Kobo Gun - Shuri Sakiyama Koen Seibi Jigyo ni Tomonau Kinkyu Hakkutsu Chosa Hokoku -. [Survey Report of the Cultural Resources of Naha City, No. 47: The Shuri-sakiyama Old Tombs Group - Report of the Urgent Excavation Survey Associated with the Improvement Project of the Shuri-sakiyama Park].* In Japanese. Naha City Board of Education, Okinawa, Japan.

An excavation survey report of the Sakiyama Old Tombs, Naha City, reporting excavated dugong bone remains. One dugong rib bone fragment was found in these Kinsei Period tombs.

Nakijin Village Board of Education (今帰仁村教育委員会)

- 1983 今帰仁村文化財調査報告第9集 今帰仁城跡発掘調査報告 I. *Nakijin-son Bunkazai Chosa Hokoku Dai 9 Shu: Nakijin Joshi Hakkutsu Chosa Hokoku I. [Survey Report of the Cultural Resources of Nakijin Village, No. 9: Excavation Survey Report of Nakijin-jo Castle Ruin Site, I].* In Japanese. Nakijin Village Board of Education, Okinawa, Japan.

An excavation survey report of Nakijin Gusuku Castle Ruin Site, Nakijin Village, reporting excavated dugong bone remains. The numbers and kinds of bone are not specified in the report.

Nakijin Village Board of Education (今帰仁村教育委員会)

- 1986 今帰仁村文化財調査報告書第12集 今帰仁城跡周辺遺跡範囲確認調査報告書.
Nakijin-son Bunkazai Chosa Hokokusho Dai 12 Shu: Nakijin Joshi Shuhen Iseki Han'i Kakunin Chosa Hokokusho. [Survey Report of the Cultural Resources of Nakijin Village, No. 12: Site Extent Confirmation of Archaeological Sites Situated around the Nakijin-jo Castle Ruin Site]. In Japanese. Nakijin Village Board of Education, Okinawa, Japan.

Although containing no dugong-related material, a report by Isao Morimoto cites this report in his references, therefore included in this annotated bibliography.

Nakijin Village Board of Education (今帰仁村教育委員会)

- 1991 今帰仁村文化財調査報告書第14集 今帰仁城跡発掘調査報告Ⅱ. *Nakijin-son Bunkazai Chosa Hokokusho Dai 14 Shu: Nakijin Joshi Hakkutsu Chosa Hokoku II. [Survey Report of the Cultural Resources of Nakijin Village, No. 14: Excavation Survey Report of Nakijin-jo Castle Ruin Site, II].* In Japanese. Nakijin Village Board of Education, Okinawa, Japan.

An excavation survey report of Nakijin Site, Nakijin Village, reporting excavated dugong bone artifacts and bone remains.

Namigata, Sakiko (浪形早季子)

- 2004 「沖縄・先島諸島のジュゴン・ウミガメ・クジラ遺体」. Okinawa・Sakishima Shoto no Jugon・Umigame・Kujira Itai. [Remains of Dugongs, Sea Turtles, and Whales in Sakishima Islands, Okinawa]. In 動物考古学 第21号. *Dobutsu Kouko Gaku Dai 21 Go. [Zooarchaeology, No. 21].* In Japanese. Zoo-archaeological Society, Chiba, Japan.

A collection of the dugong bones as remains excavated from Okinawa Islands.

Nishihara Township Board of Education (西原町教育委員会)

- 1983a 西原町文化財調査報告書第4集 我謝遺跡
 -個人住宅建設に伴う緊急発掘調査報告-. *Nishihara Cho Bunkazai Chosa Hokokusho Dai 4 Shu: Gaja Iseki - Kojin Jutaku-kensetsu ni Tomonau Kinkyu Hakkutu Chosa Hokoku. [Survey Report of the Cultural Resources of Nishihara Township, No. 4: Gaja Site - Report of the Urgent Excavation Survey Associated with the Construction of the Private Residence].* In Japanese. Nishihara Township Board of Education, Okinawa, Japan.

An excavation survey report of Gaja Site, Nishihara Township, reporting excavated dugong bone remains. Dugong bones were recovered from Late Jomon and Gusuku Period deposits, but the number and kind are not specified.

Nishihara Township Board of Education (西原町教育委員会)

- 1983b 西原町文化財調査報告書第5集 我謝遺跡 一分譲宅地造成に係る発掘調査報告一.
Nishihara-cho Bunkazai Chosa Hokokusho Dai 5 Shu: Gaja Iseki - Bunjo Takuchi Zosei ni Kakaru Hakkutsu Chosa Hokoku. [Survey Report of the Cultural Resources of Nishihara Township, No. 5: Gaja Site - Excavation Survey Report Associated with the Development of the House Lot Lands]. In Japanese. Nishihara Township Board of Education, Okinawa, Japan.

An excavation survey report of Gaja Site, Nishihara Township, reporting excavated bone remains. Dugong bones were recovered from Late Jomon and Gusuku Period deposits, but the number and kind are not specified.

Okinawa City Board of Education (沖縄市教育委員会)

- 1979 沖縄市文化財調査報告書第1集 室川貝塚 範囲確認調査報告書. *Okinawa Shi Bunkazai Chosa Hokokusho Dai 1 Shu: Murokawa Kaizuka Han'i Kakunin Chosa Hokokusho. [Survey Report of the Cultural Resources of Okinawa City, No. 1: Site Extent Confirmation Survey Report for Murokawa Shellmound]*. In Japanese. Okinawa City Board of Education, Okinawa, Japan.

An excavation survey report of Murokawa Shellmound, Okinawa City, reporting excavated dugong bone artifacts and bone remains.

Okinawa City Board of Education (沖縄市教育委員会)

- 1995 古代の沖縄市 沖縄市文化財調査報告書第3集. *Kodai no Okinawa Shi - Okinawa Shi Bunkazai Chosa Hokokusho Dai 3 Shu. [Ancient Okinawa City: Survey Report of the Cultural Resources of Okinawa City, No. 3]*. In Japanese. Okinawa City Board of Education, Okinawa, Japan.

A report prepared for public airing of cultural resources, including illustrations of dugong bone artifacts.

Okinawa International University Archaeology Laboratory (沖縄国際大学考古学研究室)

- 1979 沖縄大考古 第3号. *Okikoku Dai Kouko Dai 3 Go. [Okinawa-Kokusai University Department of Sociology, Archaeological Papers No. 3]*. In Japanese. Okinawa International University Archaeology Laboratory, Okinawa, Japan.

Although containing no dugong-related material, a report by Isao Morimoto cites this report in his references, therefore included in this annotated bibliography.

Okinawa International University Archaeology Laboratory (沖縄国際大学考古学研究室)

- 1980 沖縄大考古 第4号. *Okikoku Dai Kouko Dai 4 Go. [Okinawa-Kokusai University Department of Sociology, Archaeological Papers No. 4]*. In Japanese. Okinawa International University Archaeology Laboratory, Okinawa, Japan.

An excavation survey report of Murokawa Shellmound, Okinawa City, reporting excavated dugong bone artifacts. As well as non-artifactual dugong bone remains, numerous artifacts were recovered from deposits. These consisted of 4 animal-shaped artifacts made from dugong rib, 1 ornament, and 14 bone implements, including 8 hair stick-shaped artifacts (hair pins?).

Okinawa International University Archaeology Laboratory (沖縄国際大学考古学研究室)

- 1981 沖縄大考古 第5号. *Okikoku Dai Kouko Dai 5 Go. [Okinawa-Kokusai University Department of Sociology, Archaeological Papers No. 5]*. In Japanese. Okinawa International University Archaeology Laboratory, Okinawa, Japan.

An excavation survey report of Murokawa Shellmound, Okinawa City, reporting excavated dugong bone artifacts. As well as non-artifactual dugong bone remains, numerous artifacts were recovered from deposits. These consisted of 4 animal-shaped artifacts made from dugong rib, 1 ornament, and 14 bone implements, including 8 hair stick-shaped artifacts (hair pins?).

Okinawa International University Archaeology Laboratory (沖縄国際大学考古学研究室)

- 1982 沖縄大考古 第6号. *Okikoku Dai Kouko Dai 6 Go. [Okinawa-Kokusai University Department of Sociology, Archaeological Papers No. 6].* In Japanese. Okinawa International University Archaeology Laboratory, Okinawa, Japan.

An excavation survey report of Murokawa Shellmound, Okinawa City, reporting excavated dugong bone artifacts and bone remains. As well as non-artifactual dugong bone remains, numerous artifacts were recovered from deposits. These consisted of 4 animal-shaped artifacts made from dugong rib, 1 ornament, and 14 bone implements, including 8 hair stick-shaped artifacts (hair pins?).

Okinawa International University Archaeology Laboratory (沖縄国際大学考古学研究室)

- 1999 沖縄大考古 第12号. *Okikoku Dai Kouko Dai 12 Go. [Okinawa-Kokusai University Department of Sociology, Archaeological Papers No. 12].* In Japanese. Okinawa International University Archaeology Laboratory, Okinawa, Japan.

An excavation survey report of Aharen'ura Shellmound, Tokashiki Village, reporting excavated dugong bone remains. Five dugong rib bone fragments were found in Final Jomon to Middle Shellmound Period deposits.

Okinawa Municipal Museum (沖縄市立郷土博物館)

- 1997 沖縄市文化財調査報告書第20集 室川貝塚
 ー沖縄市総合庁舎建設に伴う崖下地区記録保存発掘調査の報告書ー. *Okinawa Shi Bunkazai Chosa Hokokusho Dai 20 Shu: Murokawa Kaizuka - Okinawa Shi Sogo Choshakensetsu ni Tomonau Gake Shita Chiku Kiroku Hozon Hakkutsu Chosa no Hokokusho. [Survey Report of the Cultural Resources of Okinawa City, No. 20: Murokawa Shellmound - Report for the Record Preservation Excavation Survey of the Region under Cliff Associated with Okinawa City Integrated Government Office Construction].* In Japanese. Okinawa City Board of Education, Okinawa, Japan.

An excavation survey report of Murokawa Shellmound, Okinawa City, reporting excavated dugong bone artifacts.

Okinawa Prefectural Archaeological Center (沖縄県立埋蔵文化財センター)

- 2001a 沖縄県立埋蔵文化財センター調査報告書 第2集 天界寺跡 (I)
 ー首里杜館地下駐車場入り口新設工事に伴う緊急発掘調査ー. *Okinawa-kenritsu Maizo Bunkazai Center Chosa Hokokusho Dai 2 Shu: Tenkaiji Ato (I) - Suimuikan Chika Chushajo Iriguchi Shinsetsu Koji ni Tomonau Kinkyu Hakkutsu Chosa. [Survey Report of the Okinawa Prefectural Archaeological Center, No. 2: Tenkaiji Temple Site (I) - Urgent Excavation Survey Associated with New Construction of Underground Parking Entrance of Suimuikan Restaurant].* In Japanese. Okinawa Prefectural Archaeological Center, Okinawa, Japan.

An excavation survey report of Shuri-jo Castle Ruin Site, Naha City, reporting excavated dugong bone remains.

Okinawa Prefectural Archaeological Center (沖縄県立埋蔵文化財センター)

- 2001b 沖縄県立埋蔵文化財センター調査報告書第4集 伊佐前原第一遺跡
 ー宜野湾北中城線
 (伊佐ー普天間) 道路改築事業に伴う緊急発掘調査報告書 (III) ー. *Okinawa-kenritsu Maizo Bunkazai Center Chosa Hokokusho Dai 4 Shu: Isa Meebaru Dai Ichi Iseki - Ginowan Shi Kitanakagusuku Sen (Isa-Futenma) Doro Kaichiku Jigyo ni Tomonau Kinkyu Hakkutsu*

Chosa Hokokusho (III). [Survey Report of the Okinawa Prefectural Archaeological Center, No. 4: Isa-meebaru No. 1 Site - Report of the Urgent Excavation Survey Associated with the Road Improvements of Ginowan-Kitanakagusuku Line (Isa-Futenma) (III)]. In Japanese. Okinawa Prefectural Archaeological Center, Okinawa, Japan.

An excavation survey report of Isa-Meebaru No. 1 Site, Ginowan City, reporting excavated dugong bone remains. The Gusuku Period deposits held the edge of a distal humerus and 1 unidentified fragment, possibly of dugong.

Okinawa Prefectural Archaeological Center (沖縄県立埋蔵文化財センター)

- 2001c 沖縄県立埋蔵文化財センター調査報告書第6集 ヤッチのガマ カンジン原古墓群
-県営かんがい排水事業（カンジン地区）に係る埋蔵文化財調査報告書- *Okinawa-kenritsu Maizo Bunkazai Center Chosa Hokokusho Dai 6 Shu: Yatchi no Gama Kanjinbaru Kobo Gun - Ken'ei Kangai Haisui Jigyo (Kanjin Chiku) Ni Kakaru Maizo Bunkazai Chosa Hokokusho. [Survey Report of the Okinawa Prefectural Archaeological Center, No. 6: The Old Tombs at Kanjinbaru, Yatchinogama Cave - Survey Report of the Buried Cultural Resources Associated with the Prefectural Irrigation and Drainage Project at Kanjin Area].* In Japanese. Okinawa Prefectural Archaeological Center, Okinawa, Japan.

An excavation survey report of Yacchi no Gama (Cave), Kumejima Township, reporting excavated dugong bone remains.

Okinawa Prefectural Archaeological Center (沖縄県立埋蔵文化財センター)

- 2002 沖縄県立埋蔵文化財センター調査報告書 第8集 天界寺跡（Ⅱ）
-首里城公園管理棟新設工事に伴う緊急発掘調査- *Okinawa-kenritsu Maizo Bunkazai Center Chosa Hokokusho Dai 8 Shu: Tenkaiji Ato (II) - Shuri-jo Koen Kanrito Shinsetsu Koji ni Tomonau Kinkyu Hakkutsu Chosa. [Survey Report of the Okinawa Prefectural Archaeological Center, No. 8: Tenkai-ji Temple Ruin Site (II) - Urgent Excavation Survey Associated with New Construction of the Administration Building of Shurijo Castle Park].* In Japanese. Okinawa Prefectural Archaeological Center, Okinawa, Japan.

An excavation survey report of Tenkai-ji Temple Ruin Site, Naha City, reporting excavated dugong bone remains. These came from Gusuku Period deposits and consisted of 1 rib fragment (Report I), 1 left frontale processus zygomaticus, 1 tooth, 1 vertebra thoracicae, 1 atlas, 1 processus spinosus, 1 rib, and 1 scapula.

Okinawa Prefectural Archaeological Center (沖縄県立埋蔵文化財センター)

- 2003a 沖縄県立埋蔵文化財センター調査報告書 第15集 尻並遺跡
-那覇地方裁判所平良支部建て替えに伴う発掘調査- *Okinawa-kenritsu Maizo Bunkazai Center Chosa Hokokusho Dai 15 Shu: Shirinami Iseki - Naha Chiho Saibansho Hirara Shibu Tatekae ni Tomonau Hakkutsu Chosa. [Survey Report of the Okinawa Prefectural Archaeological Center, No. 15: Shirinami Site - Excavation Survey Associated with the Reconstruction of Hirara Branch Office of the Naha District Court].* In Japanese. Okinawa Prefectural Archaeological Center, Okinawa, Japan.

An excavation survey report of Shirinami Site, Miyakojima City, reporting excavated dugong bone artifacts and bone remains.

Okinawa Prefectural Archaeological Center (沖縄県立埋蔵文化財センター)

- 2007a 沖縄県立埋蔵文化財センター調査報告書 第46集 渡地村跡
-臨港道路那覇1号線整備に伴う緊急発掘調査報告- *Okinawa-kenritsu Maizo Bunkazai Center Chosa Hokokusho Dai 46 Shu: Watanji Mura Ato - Rinko Doro Naha 1 Gosen Seibi*

ni Tomonau Kinkyu Hakkutsu Chosa Hokoku. [Survey Report of the Okinawa Prefectural Archaeological Center, No. 46: Watanji-mura Village Ruin Site - Report of the Urgent Excavation Survey Associated with the Improvement of the Naha Route 1, Harbour Road]. In Japanese. Okinawa Prefectural Archaeological Center, Okinawa, Japan.

An excavation survey report of Watanji-mura Village Ruin Site, Naha City, reporting excavated dugong bone artifacts and bone remains.

Okinawa Prefectural Archaeological Center (沖縄県立埋蔵文化財センター)

2009 本部町文化財調査報告書第9集 瀬底島・アンチの上貝塚. *Motobu-cho Bunkazai Chosa Hokokusho Dai 9 Shu: Sesokojima/Anchinoue Kaizuka. [Survey Report of the Cultural Resources of Motobu Township, No. 9: Anchinoue Shellmound, Sesoko-jima Island].* In Japanese. Motobu Township Board of Education, Okinawa, Japan.

An excavation survey report of the Anchinoue Shellmound, Motobu Township, reporting excavated dugong bone remains.

Okinawa Prefectural Archaeological Center, ed. (沖縄県立埋蔵文化財センター編)

2001d 沖縄県立埋蔵文化財センター調査報告書 第1集 首里城跡
-管理用道路地区発掘調査報告書-. *Okinawa-kenritsu Maizo Bunkazai Center Chosa Hokokusho Dai 1 Shu: Shuri-jo Ato - Kanri Yo Doro Chiku Hakkutsu Chosa Hokokusho. [Survey Report of the Okinawa Prefectural Archaeological Center, No. 1: Shuri-jo Castle Ruin Site - Excavation Survey Report of the Administrative Road Area].* In Japanese. Okinawa Prefectural Archaeological Center, Okinawa, Japan.

An excavation survey report of Shuri-jo Castle Ruin Site, Naha City, reporting excavated dugong bone artifacts.

Okinawa Prefectural Archaeological Center, ed. (沖縄県立埋蔵文化財センター編)

2001e 沖縄県立埋蔵文化財センター調査報告書 第3集 首里城跡 -下之御庭跡・用物座跡・瑞泉門跡・漏刻門跡・廣福門跡・木曳門跡発掘調査報告書-. *Okinawa-kenritsu Maizo Bunkazai Center Chosa Hokokusho Dai 3 Shu: Shuri-jo Ato - Shichanu Unaa Ato, Yomotsuza Ato, Zuisen Mon Ato, Rokoku Mon Ato, Kofuku Mon Ato, Kobiki Mon Ato Hakkutsu Chosa Hokokusho -. [Survey Report of the Okinawa Prefectural Archaeological Center, No. 3: Shuri-jo Castle Ruin Site - Excavation Survey Report of Shichanu Unaa Site, Yomotsuza Site, Zuisen-mon Gate Site, Rokoku-mon Gate Site, Kofuku-mon Gate Site, Kobiki-mon Gate Site].* In Japanese. Okinawa Prefectural Archaeological Center, Okinawa, Japan.

An excavation survey report of Shuri-jo Castle Ruin Site, Naha City, reporting excavated dugong bone remains.

Okinawa Prefectural Archaeological Center, ed. (沖縄県立埋蔵文化財センター編)

2003b 沖縄県立埋蔵文化財センター調査報告書 第14集 首里城跡
-右掖門及び周辺地区発掘調査報告書-. *Okinawa-kenritsu Maizo Bunkazai Center Chosa Hokokusho Dai 14 Shu: Shuri-jo Ato - Ueki Mon Oyobi Shuhen Chiku Hakkutsu Chosa Hokokusho. [Survey Report of the Okinawa Prefectural Archaeological Center, No. 14: Shuri-jo Castle Ruin Site - Excavation Survey Report of the Ueki-mon Gate and the Adjacent Area].* In Japanese. Okinawa Prefectural Archaeological Center, Okinawa, Japan.

An excavation survey report of Shuri-jo Castle Ruin Site, Naha City, reporting excavated dugong bone remains.

Okinawa Prefectural Archaeological Center, ed. (沖縄県立埋蔵文化財センター編)

- 2004a 沖縄県立埋蔵文化財センター調査報告書 第18集 首里城跡
 -城の下地区発掘調査報告書-. *Okinawa-kenritsu Maizo Bunkazai Center Chosa Hokokusho Dai 18 Shu: Shuri-jo Ato - Gusuku no Shimojiku Hakkutsu Chosa Hokokusho.*
[Survey Report of the Okinawa Prefectural Archaeological Center, No. 18: Shuri-jo Castle Ruin Site - Excavation Survey Report of Shimoji (Lower) Area of the Castle]. In Japanese. Okinawa Prefectural Archaeological Center, Okinawa, Japan.

An excavation survey report of Shuri-jo Castle Ruin Site, Naha City, reporting excavated dugong bone remains.

Okinawa Prefectural Archaeological Center, ed. (沖縄県立埋蔵文化財センター編)

- 2004b 沖縄県立埋蔵文化財センター調査報告書 第20集 首里城跡
 -東のアザナ地区発掘調査報告書-. *Okinawa-kenritsu Maizo Bunkazai Center Chosa Hokokusho Dai 20 Shu: Shuri-jo Ato - Higashi no Azana Chiku Hakkutsu Chosa Hokokusho.*
[Survey Report of the Okinawa Prefectural Archaeological Center, No. 20: Shuri-jo Castle Ruin Site - Excavation Survey Report of the Eastern Azana Area]. In Japanese. Okinawa Prefectural Archaeological Center, Okinawa, Japan.

An excavation survey report of Shuri-jo Castle Ruin Site, Naha City, reporting excavated dugong bone remains.

Okinawa Prefectural Archaeological Center, ed. (沖縄県立埋蔵文化財センター編)

- 2004c 沖縄県立埋蔵文化財センター調査報告書 第19集 首里城跡
 -城郭南側下地区発掘調査報告書-. *Okinawa-kenritsu Maizo Bunkazai Center Chosa Hokokusho Dai 19 Shu: Shuri-jo Ato - Jokaku Minami Gawa Shimojiku Hakkutsu Chosa Hokokusho.*
[Survey Report of the Okinawa Prefectural Archaeological Center, No. 19: Shuri-jo Castle Ruin Site - Excavation Survey Report of the Southern Shimoji (Lower) Area of the Castle]. In Japanese. Okinawa Prefectural Archaeological Center, Okinawa, Japan.

An excavation survey report of Shuri-jo Castle Ruin Site, Naha City, reporting excavated dugong bone remains.

Okinawa Prefectural Archaeological Center, ed. (沖縄県立埋蔵文化財センター編)

- 2006a 沖縄県立埋蔵文化財センター調査報告書 第28集 首里城跡 -書院・
 鎖之間地区発掘調査報告書-. *Okinawa-kenritsu Maizo Bunkazai Center Chosa Hokokusho Dai 28 Shu: Shuri-jo Ato - Shoin, Sasunoma Chiku Hakkutsu chosa Hokokusho.*
[Survey Report of the Okinawa Prefectural Archaeological Center, No. 28: Shuri-jo Castle Ruin Site - Excavation Survey Report of the Shoin and Sasunoma Area]. In Japanese. Okinawa Prefectural Archaeological Center, Okinawa, Japan.

An excavation survey report of Shuri-jo Castle Ruin Site, Naha City, reporting excavated dugong bone remains.

Okinawa Prefectural Archaeological Center, ed. (沖縄県立埋蔵文化財センター編)

2006b 沖縄県立埋蔵文化財センター調査報告書 第34集 首里城跡

—御内原地区発掘調査報告書—. *Okinawa-kenritsu Maizo Bunkazai Center Chosa Hokokusho Dai 34 Shu: Shuri-jo Ato - Ouchibaru Chiku Hakkutsu Chosa Hokokusho. [Survey Report of the Okinawa Prefectural Archaeological Center, No. 34: Shuri-jo Castle Ruin Site - Excavation Survey Report of the Ouchibaru Area].* In Japanese. Okinawa Prefectural Archaeological Center, Okinawa, Japan.

An excavation survey report of Shuri-jo Castle Ruin Site, Naha City, reporting excavated dugong bone artifacts and bone remains.

Okinawa Prefectural Archaeological Center, ed. (沖縄県立埋蔵文化財センター編)

2007b 沖縄県立埋蔵文化財センター調査報告書 第45集 首里城跡

—黄金御殿地区発掘調査報告書—. *Okinawa Kenritsu Maizo Bunkazai Center Chosa Hokokusho, Dai 45 Shu: Shiri-jo Ato - Kugani Udun Chiku Hakkutsu Chosa Hokokusho. [Survey Report of the Okinawa Prefectural Archaeological Center, No. 45: Shuri-jo Castle Ruin Site - Excavation Survey Report of the Kugani Udun Area].* In Japanese. Okinawa Prefectural Archaeological Center, Okinawa, Japan.

An excavation survey report of Shuri-jo Castle Ruin Site, Naha City, reporting excavated dugong bone remains.

Okinawa Prefectural Archaeological Center, ed. (沖縄県立埋蔵文化財センター編)

2007c 沖縄県立埋蔵文化財センター調査報告書 第44集 首里城跡

—御内原西地区発掘調査報告書—. *Okinawa Kenritsu Maizo Bunkazai Center Chosa Hokokusho, Dai 44 Shu: Shuri-jo Ato - Ouchibaru Nishi Chiku Hakkutsu Chosa Hokokusho. [Survey Report of the Okinawa Prefectural Archaeological Center, No. 44: Shuri-jo Castle Ruin Site - Excavation Survey Report of the Western Area of the Ouchibaru].* In Japanese. Okinawa Prefectural Archaeological Center, Okinawa, Japan.

An excavation survey report of Shuri-jo Castle Ruin Site, Naha City, reporting excavated dugong bone artifacts.

Okinawa Prefectural Archaeological Center, ed. (沖縄県立埋蔵文化財センター編)

2008 沖縄県立埋蔵文化財センター調査報告書 第47集 首里城跡

—下之御庭首里森御嶽地区発掘調査報告書—. *Okinawa Kenritsu Maizo Bunkazai Center Chosa Hokokusho, Dai 47 Shu: Shuri-jo Ato - Shicha Unaa Suimui Utaki Chiku Hakkutsu Chosa Hokokusho. [Survey Report of the Okinawa Prefectural Archaeological Center, No. 47: Shuri-jo Castle Ruin Site - Excavation Survey Report of Shicha Unaa Suimui Utaki Area].* In Japanese. Okinawa Prefectural Archaeological Center, Okinawa, Japan.

An excavation survey report of Shuri-jo Castle Ruin Site, Naha City, reporting excavated dugong bone artifacts.

Onna Village Board of Education (恩納村教育委員会)

1977 恩納村文化財調査報告書第1集 仲泊遺跡

1975、1976年度発掘調査報告書. *Onna-son Bunkazai Chosa Hokokusho Dai 1 Shu: Nakadomari Iseki, 1975/1976 Nendo Hakkutsu Chosa Hokokusho*. [Survey Report of the Cultural Resources of Onna Village, No. 1: Nakadomari Site, Excavation Survey Report of Fiscal Year 1975 and 1976]. In Japanese. Onna Village Board of Education, Okinawa, Japan.

Although containing no dugong-related material, a report by Isao Morimoto cites this report in his references, therefore included in this annotated bibliography.

Oyama, Kashiwa (大山柏)

1944 基礎史前学 第一巻. *Kiso Shizen Gaku, Dai 1 Kan*. [Fundamental Prehistory, Volume 1]. In Japanese. Japan Publication Distribution Agency, Tokyo, Japan.

A discussion of the collections of food remains excavated from archaeological sites. It concludes that dugong remains can be found in Okinawa.

Oyama, Kashiwa (大山柏)

1982 琉球伊波貝塚発掘報告. *Ryukyu Iha Kaizuka Hakkutsu Hokoku*. [Excavation Report of Ryukyu Iha Shellmound]. In Japanese. Dai'ichi Shobo, Co., Ltd., Tokyo, Japan.

An excavation survey report of Iha Shellmound, Chatan Township, reporting excavated dugong bone remains.

Pearson, Richard J.

1969 *Archaeology of the Ryukyu Islands: A Regional Chronology from 3000 BC. to the Historic Period*. In English. University of Hawaii Press, Honolulu.

English language summary of Ryukyu Island archaeology and prehistory through the 1960s. Notes that dugong bones were excavated from Nakama No. 1 Site on Iriomote.

Sakazume, Nakao (酒詰仲男)

1961 日本縄文石器時代食料総説. *Nihon Jomon Sekki Jidai Shokuryo Sosetsu*. [Food Outline of During the Japanese Jomon and Stone Age]. In Japanese. Doyo Kai, Gifu, Japan.

A commentary on foods of the Jomon period in Japan. A description of the dugong bones as food remains in archaeological sites is included.

Shimabukuro, Harumi (島袋春美)

1991 「いわゆる『蝶形骨器』について」. Iwayuru “Chokei Kokki” ni Tsuite. [About So-Called “Butterfly-shaped Bone Products”]. In 南島考古 第11号. *Nanto Kouko Dai 11 Go*. [Southern Islands Archaeology, No. 11]. In Japanese. Okinawa Archaeological Society, Okinawa, Japan.

A study on bone artifacts mainly made of dugong bone in the prehistoric era.

Shimabukuro, Harumi (島袋春美)

2000 「沖縄・奄美諸島における「骨製品」と「模造品」について」. Okinawa・Amami Shoto ni Okeru “Kotsu Seihin” to “Mozo Hin” ni Tsuite. [About “Bone Products” and “Replica” in Okinawa and Amami Islands]. In 高宮廣衛先生古稀記念論集 琉球・東アジアの人と文化 (上巻). *Takamiya Hiroe Sensei Koki Kinen Ronshu*

Ryukyu/Higashi Asia no Hito to Bunka (Jokan). [Memorial Collection of Papers for the Celebration of Prof Hiroe Takamiya's 70th Birthday: People and Culture of the Ryukyus and East Asia, Volume 1]. In Japanese. Memorial Collection of Papers for the Celebration of Prof. Hiroe Takamiya's 71th Birthday Publication, Okinawa, Japan.

An essay on the butterfly-shaped bone tools commonly made from dugong bones and found in several prehistoric archaeological sites in Okinawa.

Social Education Division of the Ginowan City Board of Education
(宜野湾市教育委員会・社会教育課)

- 1984 宜野湾市文化財調査報告書 第5集 喜友名遺跡群. *Binowan Shi Bunkazai Chosa Hokokusho Dai 5 Shu: Kiyuna Iseki Gun. [Report of the Cultural Resources of Ginowan City, No. 5: The Kiyuna Archaeological Sites].* In Japanese. Social Education Division of Ginowan City Board of Education, Okinawa, Japan.

Excavation survey report of Kiyuna-yamakawabaru Dai Go Site, Ginowan City, reporting excavated dugong bone artifacts.

Social Education Division of the Nago City Board of Education (名護市教育委員会社会教育課)

- 1996 部瀬名貝塚 ーフ“セナリソ”ート開発に伴う緊急発掘調査報告一. *Busena Kaizuka - Busena Resort Kaihatsu ni Tomonau Kinkyu Hakkutsu Chosa Hokoku. [Busena Shellmound - Report of the Urgent Excavation Survey Associated with the Development of Busena Resort].* In Japanese. Social Education Division of Nago City Board of Education, Okinawa, Japan.

An excavation survey report of Busena Shellmound, Nago City, reporting excavated dugong bone remains. This Late Shellmound Period site yielded 34 dugong rib fragments, and 1 parietal fragment.

Social Education Division of the Naha City Board of Education (那覇市教育委員会社会教育課)

- 1983 那覇市文化財調査報告書第7集 ガジャンビラ丘陵遺跡発掘調査報告書. *Naha-shi Bunkazai Chosa Hokokusho Dai 7 Shu: Gajambira Kyuryo Iseki Hakkutsu Chosa Hokokusho. [Survey Report of the Cultural Resources of Naha City, No. 7: Excavation Survey Report of Gajambira Hill Site].* In Japanese. Naha City Board of Education, Okinawa, Japan.

An excavation survey report of Gajambira Hill Site, Naha City, reporting excavated dugong bone remains. Dugong bones (number and kind unspecified) were recovered from this Late Jomon, possibly Late Shellmound, and Gusuku Period site.

Summerhayes, Glenn R., and Atholl Anderson

- 2009 *Bulletin of the Indo-Pacific Prehistory Association, Vol. 29.* In English. Indo-Pacific Prehistory Association, Canberra, Australia.

The authors summarize the past archaeological research in the southern Ryukyu Islands and place its prehistory in the general context of the time. The report notes that the early sites in these islands are clearly connected with Taiwan and probably settled from there rather than from Okinawa. Discusses the economy and exchange, providing a context for interpreting the 18 or so sites from this region that contain dugong bone. Mentions the presence of dugong bones, along with boar and turtle, at Nakama No. 1.

Survey Group of Tokijin Hamabaru Shellmound (渡喜仁浜原貝塚調査団)

- 1977 今帰仁村文化財調査報告第1集 渡喜仁浜原貝塚調査報告書〔I〕. *Nakijin-son Bunkazai Chosa Hokoku Dai 1 Shu: Tokijin Hamabaru Kaizuka Chosa Hokokusho (I). [Survey Report of the Cultural Resources of Nakijin Village, No. 1: Survey Report of Tokijin-hamabaru Shellmound (I)]*. In Japanese. Nakijin Village Board of Education, Okinawa, Japan.

An excavation survey report of Tokijin-hamabaru Shellmound, Nakijin Village, reporting excavated dugong bone remains. Numerous dugong bone remains were excavated from this Late and Final Jomon Period site. They consist of 1 complete rib bone, 10 rib fragments, 1 complete vertebra, 3 vertebra fragments, 3 metacarpals, 8 scapula fragments, and 5 unidentified bones.

Tamagusuku Village Board of Education (玉城村教育委員会)

- 1991 玉城村文化財調査報告書第1集 国指定史跡 糸数城跡 発掘調査報告書I. *Tamagusuku-son Bunkazai Chosa Hokokusho Dai 1 Shu: Kuni Shitei Shiseki, Itokazu Joshi, Hakkutsu Chosa Hokokusho I. [Survey Report of the Cultural Resources of Tamagusuku Village, No. 1: Excavation Survey Report of the Itokazu-jo Castle Ruin Site, An Officially Designated Historical Site]*. In . Tamagusuku Village Board of Education, Okinawa, Japan., Okinawa, Japan.

An excavation survey report of Itokazu-jo Castle Ruin Site, Nanjo City, reporting excavated dugong bone artifacts and bone remains. A spatula-shaped artifact of dugong bone was recovered from this Gusuku Period site.

Tawada, Shinjun, and Isamu Chinen (多和田真淳・知念勇)

- 1983 多和田真淳調査収集の考古資料 (II). Tawada Shinjun Chosa Shushu no Kouko Shiryo (II). [Archaeological Materials Collected Under Tawada Shinjun Research (II)]. In 沖縄県立博物館紀要 第9号. *Okinawa-kenritsu Hakubutsu Kan Kiyo Dai 9 Go. [Bulletin of Okinawa Prefectural Museum, No. 9]*. In Japanese. Okinawa Prefectural Museum, Okinawa, Japan.

No description of the dugong was found, although this is a description of archaeological features collected by Mr. Shinjun Tawada. However, a report by Isao Morimoto cites this report in his references, therefore included in this annotated bibliography.

Tawada, Shinjun, Seiko Hokama, and Masahide Takemoto (多和田真淳・外間正幸・嵩元政秀)

- 1978 「地荒原貝塚発掘報告」. Chiarabaru Kaizuka Hakkutsu Hokoku. [Report of the Excavations at Chiarabaru Shellmound]. In 沖縄文化財調査報告 (一九五六年—一九六二年). *Okinawa Bunkazai Chosa Hokoku (1956-1964). [Survey Report of the Okinawan Culture, 1956 - 1962]*. In Japanese. Naha Shuppansha, Okinawa, Japan.

Although containing no dugong-related material, a report by Isao Morimoto cites this report in his references, therefore included in this annotated bibliography.

The Okinawa Prefectural Education Committee (沖縄県教育委員会)

- 1978 沖縄県文化財調査報告書第17集 津堅島キガ浜貝塚発掘調査報告書. *Okinawa-ken Bunkazai Chosa Hokokusho Dai 17 Shu: Tsuken-jima Kigahama Kaizuka Hakkutsu Chosa Hokokusho*. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 17: Excavation Survey Report of Kigahama Shellmound, Tsuken-jima Island]. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Kigahama Shellmound, Tsuken-jima Island, Uruma City, reporting excavated dugong bone artifacts. There were numerous Late to Final Jomon Period artifacts made from sea mammal: 1 stabber, 1 sea mammal bone artifact, 4 butterfly-shaped ornaments made from dugong rib and 1 made from the mandible.

The Okinawa Prefectural Education Committee (沖縄県教育委員会)

- 1980a 沖縄県文化財調査報告書第30集 石垣島県道改良工事に伴う発掘調査報告 大田原遺跡 神田貝塚 附編 平地原遺跡表面採集遺物. *Okinawa-ken Bunkazai Chosa Hokokusho Dai 30 Shu: Ishigaki-jima-kendo Kairyo Koji ni Tomonau Hakkutsu Chosa Hokoku - Otabaru iseki, Kanda Kaizuka, Fuhen, Hirachibaru Iseki Hyomen Saishu Ibutu* -. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 30: Excavation Survey Report of Otabaru Site and Kanda Shellmound Associated with the Prefectural Road Improvements in Ishigaki-jima Island. Annex: Surface Artifacts Collection]. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Otabaru Site, Ishigaki-jima Island, and Kanda Shellmound, reporting excavated dugong bone remains at both from Early Neolithic deposits.

The Okinawa Prefectural Education Committee (沖縄県教育委員会)

- 1980b 沖縄県文化財調査報告第33集 仲宗根貝塚 第一・二次発掘調査概報. *Okinawa-ken Bunkazai Chosa Hokoku Dai 33 Shu: Nakasone Kaizuka Dai 1・2 Ji Hakkutsu Chosa Gaiho*. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 33: Nakasone Shellmound - Outline of the First and Second Excavations]. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Nakasone Shellmound, Okinawa City, reporting excavated dugong bone remains. One mandible was recovered from Late to Final Jomon Period deposits.

The Okinawa Prefectural Education Committee (沖縄県教育委員会)

- 1984 沖縄文化財調査報告書第58集 カンドウ原遺跡 -灌・排水工事に係る緊急発掘調査-. *Okinawa Bunkazai Chosa Hokokusho Dai 58 Shu: Kandobaru Iseki - Kan, Haisui Koji ni Kakaru Kinkyu Hakkutsu Chosa*. [Survey Report of the Cultural Resources of Okinawa, No. 58: Kandobaru Site - Urgent Excavation Related to the Irrigation and Drainage Works]. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Kandoubaru Site, Ishigaki Island, reporting excavated dugong bone remains. Three point-shaped artifacts made of dugong bones were recovered from the Gusuku Period site along with a few non-artifactual remains.

The Okinawa Prefectural Education Committee (沖縄県教育委員会)

- 1985 沖縄県文化財調査報告書第67集 シヌグ堂遺跡 - 第1・2・3次発掘調査報告一. *Okinawa-ken Bunkazai Chosa Hokokusho Dai 67 Shu: Shinugu Kaizuka - No 1, 2, 3 Ji Hakkutsu Chosa Hokoku. [Report of the Cultural Resources of Okinawa Prefecture, No. 67: Shinugudo Site - The First, Second, and Third Excavation Survey Report]*. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Shinugudo Site, Uruma City, reporting excavated dugong bone artifacts and bone remains.

The Okinawa Prefectural Education Committee (沖縄県教育委員会)

- 1986 沖縄県文化財調査報告書第74集 下田原貝塚・大泊浜貝塚 - 第1・2・3次発掘調査報告-. *Okinawa-ken Bunkazai Chosa Hokokusho Dai 74 Shu: Shimotabaru Kaizuka, Otomarihama Kaizuka - No 1, 2, 3 Ji Hakkutsu Chosa Hokoku. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 74: Shimotabaru Shellmound and Otomarihama Shellmound - The First, Second, and Third Excavation Survey Report]*. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Shimotabaru Shellmound, Hateruma-jima Island, reporting excavated dugong bone remains. This Early Neolithic site contained 2 dugong corpus vertebrae fragments, 16 rib fragments, and 4 unidentified fragments.

The Okinawa Prefectural Education Committee (沖縄県教育委員会)

- 1987a 沖縄県文化財調査報告書第84集 石川市古我地原貝塚 - 沖縄自動車道 (石川ー那覇間) 建設工事に伴う緊急発掘調査報告書 (6) - 本文編. *Okinawa-ken Bunkazai Chosa Hokokusho Dai 84 Shu: Ishikawa shi Kogachibaru Kaizuka - Okinawa Jidosha Do (Ishikawa-Naha Kan)-kensetsu Koji ni Tomonau Kinkyu Hakkutsu Chosa Hokokusho (6) - Honbun Hen. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 84: Kogachibaru Shellmound, Ishikawa City - Report of the Urgent Excavation Survey Associated with the Construction Works of Okinawa Expressway (Ishikawa - Naha) (6) - Texts]*. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Kogachibaru Shellmound, Uruma City, reporting excavated dugong bone artifacts and bone remains. Late to Final Jomon Period artifacts consisted of 1 hair pin, 5 stick-shaped artifacts, and 5 bone rings. Other remains included 11 cranium fragments, 20 rib fragments, and 9 unidentified fragments.

The Okinawa Prefectural Education Committee (沖縄県教育委員会)

- 1987b 沖縄県文化財調査報告書第84集 石川市古我地原貝塚 - 沖縄自動車道 (石川ー那覇間) 建設工事に伴う緊急発掘調査報告書 (6) - 図版編. *Okinawa-ken Bunkazai Chosa Hokokusho Dai 84 Shu: Ishikawa Shi Kogachibaru Kaizuka - Okinawa Jidosha Do (Ishikawa-Naha Kan)-kensetsu Koji ni Tomonau Kinkyu Hakkutsu Chosa Hokokusho (6) - Zuan Hen. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 84: Kogachibaru Shellmound, Ishikawa City - Report of the Urgent Excavation Survey Associated with the Construction Works of Okinawa Expressway (Ishikawa - Naha) (7) - Figures]*. In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Kogachibaru Site, Uruma City, reporting excavated dugong bone artifacts and bone remains.

The Okinawa Prefectural Education Committee (沖縄県教育委員会)

- 1989 沖縄県文化財調査報告書 第92集 宮城島遺跡分布調査報告 1宮城島の遺跡分布
2.高嶺遺跡. *Okinawa-ken Bunkazai Chosa Hokokusho Dai 92 Shu: Miyagi-jima Iseki Bumpu Chosa Hokoku, 1 Miyagi-jima no Iseki Bumpu, 2. Takamine Iseki. [Survey Report of the Cultural Resources of Okinawa Prefecture No. 92: A Survey Report of Archaeological Sites Distribution in Miyagi Island, Okinawa. 1. Archaeological Sites Distributed in Miyagi Island. 2. Takamine Site].* In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Takamine Site, Uruma City, reporting excavated dugong bone artifacts and bone remains.

The Okinawa Prefectural Education Committee (沖縄県教育委員会)

- 1994 沖縄県文化財調査報告書 第116集 久良波貝塚
-県道6号線改修工事に係る緊急発掘調査報告書-. *Okinawa-ken Bunkazai Chosa Hokokusho Dai 116 Shu: Kuraha Kaizuka,-kendo 6 Go Sen Kaishu Koji ni Kakaru Kinkyu Chosa Hokokusho. [Survey Report of the Cultural Resources of Okinawa Prefecture, No. 116: Kuraha Shellmound - Report of the Urgent Excavation Survey Related to the Prefectural Road #6 Improvements].* In Japanese. Okinawa Prefectural Board of Education, Okinawa, Japan.

An excavation survey report of Kuraha Shellmound, Onna Village, reporting excavated dugong bone remains.

Toizumi, Takeji (樋泉岳二)

- 2003 脊椎動物遺体からみた奄美・沖縄の環境と生業. Sekitsui Dobutsu Itai Kara Mita Amami・Okinawa no Kankyo to Seigyō. [Environment and Occupation through Vertebrate Animal Remains of Amami and Okinawa]. In 先史琉球の生業と交易 -奄美・沖縄の発掘調査から- 改訂版. *Senshi Ryukyu no Seigyō to Koeki - Amami/Okinawa no Hakkutsu Chosa kara - Kaitei Ban. [Occupation and Trade of Prehistoric Ryukyu - From the Excavations of Amami and Okinawa - New Edition].* In Japanese. Kinoshita Laboratory, Faculty of Letters, Kumamoto University, Kumamoto, Japan.

An analysis of the excavated remnants from Nagarabaru Higashi Shellmound, Ie-jima Island, describing the dugong.

Toma, Shichi (當眞嗣一)

- 1992 考古遺跡は語る. Kouko Iseki ha Kataru. [Archaeological Site Talks]. In 新琉球史 -古琉球編-. *Shin Ryukyu Shi: Ko Ryukyu Hen. [New History of Ryukyu - Old Ryukyu Volume].* In Japanese. Ryukyu Shimpo, Okinawa, Japan.

A brief description of dugong consumption in the prehistoric era.

Tomigusuku City Board of Education (豊見城市教育委員会)

- 2003 豊見城市文化財調査報告書 第6集 宜保アガリヌ御嶽
 -宜保土地地区画整理事業埋蔵文化財調査業務-. *Tomigusuku Shi Bunkazai Chosa Hokokusho Dai 6 Shu: Gibo Agarimu Utaki - Gibo Tochi Kukaku Seiri Jigyo Maizo Bunkazai Chosa Gyomu. [Survey Report of the Cultural Resources of Tomigusuku City, No. 6: Gibo Agarimu Utaki - Operation of Survey of the Buried Cultural Resources, Land Readjustment Project of Gibo].* In Japanese. Tomigusuku City Board of Education, Okinawa, Japan.

An excavation survey report of Gibo-agarinu Site, Tomigusuku City, reporting excavated dugong bone artifacts.

Tomigusuku Village Board of Education (豊見城村教育委員会)

- 1997 豊見城村文化財調査報告書第5集 渡嘉敷後原遺跡群
 老人保健施設（とよみ健康長寿の杜）建設工事に伴う緊急発掘調査報告.
Tomigusuku-son Bunkazai Chosa Hokokusho Dai 5 Shu: Tokashiki Kushibaru Iseki Gun, Rojin Hoken Shisetsu (Toyomi Kenko Chojū no Mori) Kensetsu Kōji ni Tomonau Kinkyū Hakkutsu Chosa Hokoku. [Survey Report of the Cultural Resources of Tomigusuku Village, No. 5: The Tokashiki-kushibaru Archaeological Sites - Urgent Excavation Survey Report Associated with the Construction Work of Extended Care Facility for the Aged named "Toyomi Health and Long"]. In Japanese. Tomigusuku Village Board of Education, Okinawa, Japan.

An excavation survey report of Tokashiki-kushibaru Archaeological Sites, Tomigusuku City, reporting excavated bone artifacts.

Tomon, Kenji (東門研治)

- 2000 伊礼原C遺跡. Ireibaru C Iseki. [Ireibaru C Site]. In 月刊 考古学ジャーナル 1月増大号 No 454. *Gekkan Kouko Gaku Journal, 1 Gatsu Zōdai Gō, No 454. [Monthly - Archaeological Journal, January, Enlarged Issue, No. 454].* In Japanese. New Science, Co., Ltd., Tokyo, Japan.

Introducing Ireibaru C Site excavation survey in Chatan Township, reporting excavated bone remains. Includes the butterfly-shaped ornaments from dugong mandible found at the site.

Tomoyose, Ei'ichiro, and Hiroe Takamiya (友寄英一郎 高宮広衛)

- 1968 伊江島具志原貝塚. Ie-jima Gushibaru Kaizuka. [Gushibaru Shellmound, Ie-jima Island]. In 琉球大学法文学部紀要 社会編 第12号. *Ryūkyū Daigaku Hobun Gakubu Kiyo, Shakai Hen, Dai 12 Gō. [Bulletin of the Faculty of Law and Letters, University of the Ryukyus, Society Volume, No. 12].* In Japanese. Law and Letters, University of the Ryukyus, Okinawa, Japan.

Although containing no dugong-related material, a report by Isao Morimoto cites this report in his references, therefore included in this annotated bibliography.

Uehara, Shizuka (上原静)

- 2004 考古学から見た沖縄の遊戯史. Koukogaku kara Mita Okinawa no Yugishi. [History of Okinawan Play Seen through Archaeology]. In グスク文化を考える 世界遺産国際シンポジウム〈東アジアの城郭遺跡を比較して〉の記録. *Gusuku Bunka wo Kangaeru - Sekai Isan Kokusai Symposium (Higashi Asia no Jōkaku Iseki wo Hikaku shite) no Kiroku. [Consideration of Okinawan Culture in the Gusuku Period (Old Ryūkyū*

Period): *Record of the "Comparison of Castles in East Asia", International Symposium of the World Heritage*]. In Japanese. Shin Jinbutsu Oraisha, Co., Ltd., Tokyo, Japan.

A discussion on artifacts related to play, touching on dugong bone dice, which were recovered from Nakijin Gusuku, in the text.

Urasoe City Board of Education (浦添市教育委員会)

1990 浦添市文化財調査報告書 城間古墓群

牧港補給地区開発工事に伴う緊急発掘調査報告書. *Urashoe Shi Bunkazai Chosa Hokokusho: Gusukuma Furubaka Gun, Makiminato Hokyu Chiku Kaihatsu Koji ni Tomonau Hakkutsu Chosa Hokokusho. [Survey Report of the Cultural Resources of Urasoe City: The Gusukuma Old Tombs - Report of the Urgent Excavation Survey Associated with the Development Construction at the Makiminato Supply Area]*. In Japanese. Urasoe City Board of Education, Okinawa, Japan.

An excavation survey report of the Gusukuma Old Tombs, Urasoe City, reporting excavated dugong bone artifacts. Two butterfly-shaped ornaments of dugong bone were excavated from this old tomb site. Uncertain from which period they derive.

Urasoe City Board of Education (浦添市教育委員会)

1991 浦添市文化財調査報告書第18集 嘉門貝塚A区

牧港補給地区開発工事に伴う緊急発掘調査報告書II. *Urasoe Shi Bunkazai Chosa Hokokusho Dai 18 Shu: Kamon Kaizuka A Ku, Makiminato Hokyu Chiku Kaihatsu Koji ni Tomonau Kinkyu Hakkutsu Chosa Hokokusho II. [Survey Report of the Cultural Resources of Urasoe City, No. 18: Kamon Shellmound Area A - Report II of the Urgent Excavation Survey Associated with the Development Construction at the Makiminato Supply Area]*. In Japanese. Urasoe City Board of Education, Okinawa, Japan.

An excavation survey report of Kamon Shellmound Area A, Urasoe City, reporting excavated dugong bone remains. One dugong rib fragment and one infant maxilla were recovered from Late Shellmound deposits.

Urasoe City Board of Education (浦添市教育委員会)

1992a 浦添市文化財調査報告書第20集 城間古墓群 (図版編)

-牧浦地区埋蔵文化財発掘調査写真報告書-. *Urashoe Shi Bunkazai Chosa Hokokusho Dai 20 Shu: Gusukuma Furubaka Gun (Zuhan Hen), Makiura Chiku Maizo Bunkazai Hakkutsu Chosa Shashin Hokokusho. [Survey Report of the Cultural Resources of Urasoe City, No. 20: Gusukuma Old Tombs Group (Figures) - Photographic Report of the Buried Cultural Properties Excavation Survey at Makiura Area]*. In Japanese. Urasoe City Board of Education, Okinawa, Japan.

An excavation survey report of the Gusukuma Old Tombs, Urasoe City, containing photographic materials on excavated dugong bone artifacts.

Urasoe City Board of Education (浦添市教育委員会)

1992b 浦添市文化財調査報告書第19集 城間遺跡

一牧港補給地区開発工事に伴う緊急発掘調査報告書Ⅲ一. *Urasoe Shi Bunkazai Chosa Hokokusho Dai 19 Shu: Gusukuma Iseki - Makiminato Hokyū Chiku Kaihatsu Kōji ni Tomonau Kinkyū Hakkutsu Chosa Hokokusho III. [Survey Report of the Cultural Resources of Urasoe City, No. 19: Gusukuma Site - Report of the Urgent Excavation Survey Associated with the Development Construction of the Makiminato Supply Area, III].* In Japanese. Urasoe City Board of Education, Okinawa, Japan.

An excavation survey report of Gusukuma Site, Urasoe City, reporting excavated dugong bone artifacts. One artifact from dugong rib bone was recovered from Late to Final Jomon or Late Shellmound deposits.

Urasoe City Board of Education (浦添市教育委員会)

1993 浦添市文化財調査報告書第21集 嘉門貝塚B区

牧港補給地区開発工事に伴う緊急発掘調査報告書Ⅳ. *Urasoe Shi Bunkazai Chosa Hokokusho Dai 21 Shu: Kamon Kaizuka B Ku, Makiminato Hokyū Chiku Kaihatsu Kōji ni Tomonau Kinkyū Hakkutsu Chosa Hokokusho IV. [Survey Report of the Cultural Resources of Urasoe City, No. 21: Kamon Shellmound Area B - Report IV of the Urgent Excavation Survey Associated with the Development Construction at the Makiminato Supply Area].* In Japanese. Urasoe City Board of Education, Okinawa, Japan.

An excavation survey report of B district of Kamon Shellmound, Urasoe City, reporting excavated dugong bone remains. One dugong mandible and 4 rib fragments were excavated from Middle to Late Jomon or Middle Shellmound Period deposits.

Uruma City Board of Education (うるま市教育委員会)

2006 うるま市文化財調査報告書第4集 具志川グスクⅠ -発掘調査報告概報-. *Uruma Shi Bunkazai Chosa Hokokusho Dai 4 Shu: Gushikawa Gusuku I, Hakkutsu Chosa Hokokusho Gaiho. [Survey Report of the Cultural Resources of Uruma City, No. 4: Gushikawa Gusuku I - Summary Excavation Survey Report].* In Japanese. Uruma City Board of Education, Okinawa, Japan.

An excavation survey report of the Gushikawa Gusuku Castle Ruin Site, Uruma City, reporting excavated dugong bone artifacts.

Uruma City Board of Education (うるま市教育委員会)

2008 うるま市文化財調査報告書第5集 南風原古島遺跡

市内遺跡発掘調査に伴う埋蔵文化財発掘調査報告書. *Uruma Shi Bunkazai Chosa Hokokusho Dai 5 Shu: Haebaru Furujima Iseki, Shinai Iseki Hakkutsu Chosa ni Tomonau Maizo Bunakzai Hakkutsu Chosa Hokokusho. [Survey Report of the Cultural Resources of Uruma City, No. 5: Haebaru-furujima Site - Excavation Survey Report of the Buried Cultural Resource Associated with the Excavation Survey of Sites in the City].* In Japanese. Uruma City Board of Education, Okinawa, Japan.

An excavation survey report of Haebaru-furujima Site, Uruma City, reporting excavated dugong bone remains.

Uruma City Board of Education (うるま市教育委員会)

- 2009 うるま市文化財調査報告書第7集 東恩納美川原遺跡・平敷屋古島遺跡・桃原貝塚
 -市内遺跡発掘調査に伴う埋蔵文化財発掘調査報告書-. *Uruma Shi Bunkazai Chosa Hokokusho Dai 7 Shu: Higashionna Mikawabaru Iseki/Heshikiya Furujima Iseki/Tobaru Kaizuka, Shinai Iseki Hakkutsu Chosa ni Tomonau Maizo Bunkazai Hakkutsu Chosa Hokokusho*. [Survey Report of the Cultural Resources of Uruma City, No. 7: Higashionna-mikawabaru Site, Heshikiya-furujima Site, and Tobaru Shellmound - Excavation Survey Report of the Buried Cultural Resource Associated with the Excavation Survey of Sites in the City]. In Japanese. Uruma City Board of Education, Okinawa, Japan.

An excavation survey report of Higashionna-mikawabaru Site, Uruma City, reporting excavated dugong bone remains.

Yomitan Village Board of Education (読谷村教育委員会)

- 1990 読谷村文化財調査報告書第9集 沖縄県読谷村字長浜 吹出原遺跡
 個人住宅建築に伴う緊急発掘調査報告書. *Yomitan-son Bunkazai Chosa Hokokusho Dai 9 Shu: Okinawa-ken Yomitan-son Nagahama Fukidashibaru Iseki - Kojin Jutaku-kenchiku ni Tomonau Kinkyu Hakkutsu Chosa Hokokusho*. [Survey Report of the Cultural Resources of Yomitan Village, No. 9: Report of the Urgent Excavation Survey of the Fukidashibaru Site, Nagahama, Yomitan Village, Okinawa Associated with Private Residence Construction]. In Japanese. Yomitan Village Board of Education., Okinawa, Japan.

An excavation survey report of Fukidashibaru Site, Yomitan Village, reporting excavated dugong bone artifacts and bone remains. Two butterfly-shaped ornaments from dugong mandible were recovered from the Late to Final Jomon Period deposits. Two rib fragments came from these or Gusuku Period deposits.

APPENDIX D.

BIOLOGICAL ANNOTATED BIBLIOGRAPHY

Prepared by Thomas A. Jefferson

AKETA, K., S. ASANO, Y. WAKAI, and A. KAWAMURA

- 2001 Apparent digestibility of eelgrass in dugongs (*Dugong dugon*). *Mammalian Science* [*Honyurui Kagaku*] 41:23-34.

No information on Okinawan dugongs.

AKETA, K., and A. KAWAMURA

- 2001 Digestive functions in sirenians (Review). *Bulletin of the Faculty of Bioresources, Mie University* 13: 85-103.

No information on Okinawan dugongs.

AKETA, K., S. ASANO, Y. WAKAI, and A. KAWAMURA

- 2003 Apparent digestibility of eelgrass *Zostera marina* by captive dugongs *Dugong dugon* in relation to the nutritional content of eelgrass and dugong feeding parameters. *Mammal Study* 28:23-30.

No information on Okinawan dugongs.

AKETA, K.

- 2003 The study of food and digestive characteristics in sirenians. Ph.D. thesis, Mie University, Mie, Japan, 110 pp. (in Japanese).

This Ph.D. thesis consists of three main chapters:

1. The investigation of the analytical method of digestive ratio using captive dugongs.
2. Measurements of digestive ratios using captive dugongs and African manatees (the index method).
3. The stomach contents analysis of six dugongs stranded along Okinawa Island (one each in 1990, 1992, 1996, 1998, and two in 2000). Four of the six were known to be caught in either gillnets or setnets. A total of six species of seagrasses were found. The total amount in a stomach was 200-500g dry weight, which would cover 2.31-15.64 sq. meters of the seagrass floor. Seagrass species eaten by dugongs were different between the east and west coasts of the island. Most of the stomach contents were roots of seagrasses. Because root sections have the highest energy content, dugongs might prefer to eat these parts. The degree of grinding was different, depending on how fibrous the seagrass was. The dry digestive ratio of wild dugongs was estimated at 50.3-92.6%, and energetic digestive ratio was 35.5-89.4%. The

daily energy intake was estimated at 1071.3-68937.3 kcal and it was estimated that animals excreted 691.0-7307.3 kcal daily.

BLAIR, D.

- 1980 *Indosolenorchis hirudinaceus* Crusz, 1951 (Platyhelminthes: Digenea) from the dugong *Dugong dugon* (Muller) (Mammalia; Sirenia). *Annales de Parasitologie* 55:511-525.

Describes parasites from the digestive system of Okinawan dugongs.

- 1981 The monostome flukes (Digenea; families Opisthotremidae Poche and Rhabdiopoeidae Poche) parasitic in sirenians (Mammalia; Sirenia). *Australian Journal of Zoology, Supplement Series* 81:1-54.

Review of parasites (monostome flukes) in sirenians, including some host records of these parasites for dugongs from Okinawa.

BERTRAM, G. C. L., and C. K. R. BERTRAM

- 1973 The modern Sirenia: Their distribution and status. *Biological Journal of the Linnaean Society* 5:297-338.

States that the dugong is “very rare” in the Ryukyu Islands of Japan.

DUGONG NETWORK OKINAWA

- 2000 For the protection of dugongs offshore Okinawa (Material I). Unpublished report, 39 pp.

This report is the first part of a compilation of various documents (e.g., maps, data tables, popular articles, newspaper articles, petitions, resolutions, correspondence) relevant to the conservation status of Okinawan dugongs, and in particular the perceived threat from the expansion of a U.S. military base in the Okinawa area. It was produced by Dugong Network Okinawa, an NGO set-up to work towards protection of the Okinawan dugong.

- 2001 For the protection of dugongs offshore Okinawa (Material II). Unpublished report, 49 pp.

This report is the second part of a compilation of various documents (e.g., maps, data tables, popular articles, newspaper articles, petitions, resolutions, correspondence) relevant to the conservation status of Okinawan dugongs, and in particular the perceived threat from the expansion of a U.S. military base in the Okinawa area. It was produced by Dugong Network Okinawa, an NGO set-up to work towards protection of the Okinawan dugong.

GEO-MARINE, INC.

- 2005 *Marine Resources Assessment for the Japan and Okinawa Complexes Operating Area: Final Report*. Final report to the U.S. Navy, Naval Facilities Engineering Command, Pacific [available as PDF copy on CD].

Provides a relatively-recent review of information about the status and distribution of dugongs in Okinawa and surrounding areas. Maps out Concentrated, Expected, and Low/Unknown occurrence, based on specific records and knowledge of the species' habitat preferences and movement patterns.

HASEGAWA, H.

- 1988 *Paradujaredinia halicoris* (Owen, 1833) (Nematoda: Ascarididae) collected from a dugong, *Dugong dugon*, of Okinawa, Japan. *Biol. Mag. Okinawa* 26:23-25.

Not seen.

HIRASAKA, K.

- 1932 The occurrence of dugong in Formosa. *Memoirs of the Faculty of Science and Agriculture, Taihoku Imperial University* 7:1-4.

States that the dugong was previously fairly abundant in the Ryukyu and Amami Islands of southern Japan.

HIRASAKA, K.

- 1933 Dugong. Pp. 1-22 in *Tennen Kinenbutsu Chosa Hokoku, Dai 1 Shu* [Report of the Survey of National Monuments. Animals, Part 1]. Tokyo Ministry of Education (in Japanese).

A report on the dugong, which was designated as a national monument in Formosa (modern-day Taiwan) in 1933, reporting on its habitat, history, and the relationships with human cultures. Provides detailed descriptions of hunting methods for dugongs, use of dugong parts and derivatives, and legends surrounding dugongs in southern Japan and Taiwan (Formosa). Concludes that dugongs are endangered by hunting and must be protected to avoid destroying the resource.

- 1934 On the distribution of sirenians in the Pacific. *Proceedings of the Fifth Pacific Science Congress* 5:4221-4222.

States that the dugong was previously 'fairly abundant' in the Ryukyu and Amami Islands of southern Japan. Many decades before they were hunted for their meat and oil. At the time of writing, they were considered rare and near extinction in the area.

HOJO, T.

- 1976 Anatomical identification and anthropological consideration of a humerus of the dugong (*Dugong dugon*) from Urasoe shellmound in Okinawa Island. *Journal of the Anthropological Society of Nippon* 84:139-146 (in Japanese).

A dugong humerus bone was excavated from the Urasoe shellmound in Okinawa, in 1970, in addition to some earthenwares. In a list of Japanese papers for dugong anatomical studies, dugong bones had been found in Okinawa historical sites, but there were no morphological details (also no entire skeletons had been found). The author determined that the bone for this study was a humerus from a mature dugong, which is called "Zan" or "Zan-noina" in the Southwestern Islands. In 1965, one male dugong (2.15 m, 350 kg) incidentally taken was dissected by Takayoshi and Nishiwaki. They found many seagrasses (about 5 buckets full) in its stomach. Historically dugong meat was presented to the King and Samurai Lords, and some elders in the Ikeno-shima still remember the good taste of dugong. However, because the excavated bone was not broken down, the author proposed that dugong bone was possibly used for ornaments or the symbols of the mythical faith during the Jomon Period. Some islanders in the Philippines had a similar custom.

KAMIYA, T., S. UCHIDA, T. TOBAYAMA, and Y. YOSHIDA

- 1979a Anatomical sketches of visceral organs of *Dugong dugon* (1). *Geiken Tsushin* [Whales Research Institute News] 325:25-34 (in Japanese).

One female dugong (TL 165cm) was incidentally taken on 18 Jan (1979?) and was under custody of the Cultural Agency (not Fisheries Agency). After WWII, five dugongs were in captivity and only one in the Toba Aquarium had survived. Two female dugongs were presented from the Philippine Government to Japan for the Okinawa Expo in 1975; however, unfortunately both died on the 22nd and 23rd days in the aquarium. This study reports morphological aspects of those animals (the ecological report had already published in the Journal for Zoo and Aquarium Associations, 1978; anatomical aspects are planned to be published in another journal).

- 1979b Anatomical sketches of visceral organs of *Dugong dugon* (2). *Geiken Tsushin* [Whales Research Institute News] 326:35-42 (in Japanese).

The continuing anatomical study from the previous report. At the end of the paper, they described the brief history of dugong research. There were very few Japanese research studies before WWII (mainly by Prof. K.). Dugong study had been getting more active after the Okinawa Expo, and Prof. Nishiwaki organized a research group and made several overseas field projects.

KAMIYA, T., S. UCHIDA, and T. KATAOKA

- 1979 Organ weights of *Dugong dugon*. *Scientific Reports of the Whales Research Institute* 31:129-132.

A study on organ weights of the dugong. Among the specimens studied was a female dugong calf that was captured in January 1979 in a fishing net at Nago, Okinawa. This animal was maintained in captivity for 33 days, but then died.

KAMIYA, T., AND YAMASAKI

- 1981 An morphological note on the sinus hair of the dugong. In *The Dugong: Proceedings of a Seminar/Workshop Held at James Cook University, 8-13 May 1979* (H. Marsh, ed.), pp. 193-198. James Cook University.

No information on Okinawan dugongs.

KAMIYA, T.

- 1984 The biology of the dugong. *Doubutu To Doubutu-en* [Animals and Zoos] 36:316-317 (in Japanese).

Not seen by author.

- 1995 Review of research on sea cow in Japan. In *Mermaid Symposium: First International Symposium on Dugong and Manatees, November 15-17, 1995, Toba Mie, Japan* (T. Kamiya, T. Kataoka, H. Nakamura, and H. Maeda, eds.), pp. 14-15. Toba Aquarium, Japan (in Japanese and English).

Summarizes the history of the study of dugongs and sirenian fossils in Japan.

KASUYA, T., and N. MIYAZAKI

- 1997 The dugong. In Mammalogical Society of Japan (ed.) Red Data: Japanese Mammals, pp. 186-187, 233. Bun-ichi Sogo Shyuppan, Tokyo, 279 pp. (in Japanese).

This short summary paper discusses the distribution and status of the dugongs in Japan, using the IUCN Red List criteria. Also, discusses historical hunting by humans, recent population status (by-catch), suggested protection and research methods. It concludes that the Japanese population of dugongs should be listed as Endangered.

KASUYA, T., H. OGAWA, H. YOSHIDA, T. HOSOKAWA, M. SHIRAKIHARA, AND N. HIGASHI

- 1999 Report of 1998 dugong survey. In 8th Report of Pro-Natura Foundation, pp. 55-63. Japanese Association for Protection of Nature, Tokyo. (in Japanese, with English summary).

Reports on aerial surveys and underwater seagrass bed surveys conducted in Okinawa in April to September 1998. Dugongs were found in northeastern Okinawa. They spend the daytime hours offshore in deep waters outside the reef, but at night move into shallow waters (1-4 m deep) of the reef to feed.

KASUYA, T.

- 1999 Dugongs in Okinawa. *Sirennews* 31:10-11.

Summarizes the status of dugongs in Okinawa, based on studies reported elsewhere. Makes recommendations for management (fishing/mariculture restrictions, public awareness programs, etc.) and research (surveys, photo-identification studies, and study of scientific specimens).

KASUYA, T., M. SHIRAKIHARA, H. YOSHIDA, H. OGAWA, H. YOKOCHI, S. UCHIDA, AND K. SHIRAKIHARA

- 2000 Report of 1999 dugong survey. In 9th Report of Pro-Natura Foundation, pp. 29-36. Japanese Association for Protection of Nature, Tokyo. (in Japanese, with English summary).

Reports on aerial surveys and underwater seagrass bed surveys conducted in the Yaeyama Islands (Iriomote, Kuroshima, and Ishigaki Islands), part of the southern Ryukyu Islands, during 1999. No dugong sightings or feeding trails were observed during the surveys, indicating that dugongs are extinct or exist in very low numbers in the area. This suggests that the dugong population of Okinawa is the last remaining one in Japanese waters.

KASUYA, T., and R. L. BROWNELL

- 2001 Conservation status and future prospects of dugongs in Japanese water. Unpublished manuscript (submitted to Marine Mammal Science), 8 pp.

In the latter half of the 20th century, Ryukyuan dugongs were often thought to be extinct locally; however, they are still present around Okinawa. Bones from archaeological sites suggest that they were hunted for many centuries. Dugongs previously used to be found north to at least Amami Island (28°30'N).

The first surveys for Japanese dugongs were carried out in the 1970s, but these produced no confirmed sightings. In 1998, 900 km of aerial surveys were flown and recorded 10 dugongs off Okinawa (most off the east coast). In 1999, 970 km of surveys were flown off the Sakasahima Islands further north, but no dugongs or feeding tracks were observed.

(however, healthy seagrass beds were found, and many trap and gill nets were observed). The conclusion was that dugongs were already extinct in the Sakashima area, and that Okinawa (especially the middle and northern part of the east coast) was the last remaining area with dugongs in Japanese waters. Despite the apparent low population, recovery was thought to be possible if threats were properly addressed.

The main threats appeared to be takes in fishing nets, and habitat destruction from coastal development and run-off. Of 16 known mortalities in the last 30 years, 6 were killed in trap nets, 3 in gillnets, 1 in an unknown fishery, and 6 were of undetermined cause. Habitat destruction/alteration, especially from a planned US Marines heliport expansion at Camp Schwab (in the middle of the main habitat) was also considered a threat.

Dugongs have been listed as a national monument in Okinawa since 1955, and the Japanese populations have been evaluated as 'Critically Endangered', based on IUCN Red List criteria. There is a need to address threats and conserve deepwater areas used for daytime resting, shallow reef areas used for nighttime feeding, as well as the corridors between them. Current Japanese law does not restrict or reduce the fisheries that are known to cause the majority of dugong deaths (gill and trap nets). The Okinawan dugong is under serious threat of local extinction.

KATAOKA, T., and S. ASANO

- 1981 On the keeping of dugong (*Dugong dugon*) in Toba Aquarium. In *The Dugong: Proceedings of a Seminar/Workshop Held at James Cook University, 8-13 May 1979* (H. Marsh, ed.), pp. 199-204. James Cook University.

Mentions a female dugong kept at the Okinawa Oceanarium for 22 days, and gives information on feeding in captivity.

- 1997 The life of dugong. In *Biology of Marine Mammals* (N. Miyazaki and T. Kasuya, eds.), Pp. 206-217. Scientist, Inc., Tokyo (in Japanese).

Review of the general biology of the dugong, with some incidental mention of the species in Japanese waters.

KATAOKA, T., T. MORI, Y. WAKAI, J. PALMA, A. A. YAPTINCHAY, R. T. R. DE VEYRA, and R. B. TRONO

- 1995 *Dugongs of the Philippines: A Report of the Joint Dugong Research and Conservation Program*. Toba Aquarium, Japan, 167 pp.

This book, although mainly about Philippine dugongs, includes a table listing all known dugongs held in captivity up to 1995. It lists two dugongs from Okinawa held in two different Okinawan aquaria.

KATO, M.

- 1979 A tale of dugongs. *Gakashi Kaiho* [Bachelor's Journal] 745:26-30 (in Japanese).

This paper reports a tale of dugongs in Okinawa, local common names and origins of those names, local hunting methods in Okinawa, a brief history of protection, and a detailed story of a by-caught female dugong (caught on 17 January 1979 and presumably died on 19 February 1979).

MARSH, H. (ed.)

- 1981 The Dugong: Proceedings of a Seminar/Workshop Held at James Cook University, 8-13 May 1979. James Cook University of North Queensland, 400 pp.

This proceedings volume provides a wealth of information about dugongs in general and with some papers that have information on Okinawan dugongs. At the time of its publication in 1981, the volume represented the state-of-the-art in dugong biology, although it is now somewhat outdated.

MARSH, H.

- 2009 Dugong *Dugong dugon*. In *Encyclopedia of Marine Mammals*, 2nd Ed. (W. F. Perrin, B. Wursig and J. G. M. Thewissen), pp. 332-335. Academic Press.

This book chapter provides a very recent, up-to-date summary of the biology of the dugong throughout its range. It is not specific to the Okinawan population, but summarizes the general biology of the dugong quite nicely.

MARSH, H., H. PENROSE, C. EROS and J. HUGUES

- 2002 Dugong: Status report and action plans for countries and territories. UNEP Report No. UNEP/DEWA/RS.02-1, 155 pp.

Dugongs have been hunted in Okinawa since before the 15th century. Okinawa is the northernmost dugong habitat in the world. An accurate Okinawa abundance estimate is not available, but there were at least 6 dugongs (sighted simultaneously) in 1999. Seagrass borders only 10 percent of the Okinawan coastline. Threats from military activities include: pollution (noise, chemical, sedimentation, and radioactivity) and habitat destruction/alteration. Suggested research includes: aerial surveys and recording incidental sightings, detailed studies of seagrass beds, and socio-economic evaluations of closing the trap and gillnet fisheries. Management recommendations include: establishment of a dugong sanctuary to protect important habitat, the use of a rigorous EIA process for any future planned development in dugong habitat, restriction or banning of harmful fisheries, improvement of public awareness programs, listing of the species on all appropriate endangered species lists, and the development of a long-term conservation plan for the population.

MINISTRY OF THE ENVIRONMENT

- 2004 Broad-based survey of dugongs and seagrass beds in 2001-2003. Unpublished report (in Japanese), 31 pp.

The Ministry of the Environment had made a large-scale survey of dugongs around the Okinawa main island in 2001-2003 for the following topics:

- A. The distribution of dugongs: 1) past (references, fact-finding from locals), 2) present (aerial surveys);
- B. The distribution of seagrasses: 1) aerial surveys in shallow sea areas, 2) diving survey for evidence of dugong feeding (dugong tracks or trails), and 3) underwater camera survey of deeper areas.

Also discusses diet and feeding habitats of dugongs from by-catch and stranded specimens, and preliminary study of population distinctness using genetic (mtDNA) methods.

MIYAZAKI, N.

- 1980 *Jugon to Kujira*. [Dugong and Whale]. Pp. 156-166 in *Ryukyu no Shizen Shi* [Natural History of the Ryukyus]. Tsukiji Shokan, Co., Ltd., Tokyo, Japan (In Japanese).

In this chapter, the author reported the general information about dugongs, humpback whales and pilot whales in Okinawa. Pages 158 to 160 are about dugongs. Discussed are general biology of dugongs (old myths, distribution, body size, food). Two records in the past 10+ years: 1) a by-catch in January 1965, 2) a sighting of a live animal in June 1974. Excavation of dugong bones from shell mounds in Okinawa. Old customs in Okinawa and Palau islands suggested ancients might be in awe of dugongs at the same time they hunted dugongs as a source of food. As the additional information, one female was caught in January 1979.

MORIMOTO, I.

- 2004 Preliminary survey of excavated dugong bones [Jugon Bone ni Kansuru Shutsudo Siryo no Shusei (Zantei)]. Bulletin of Research on Buried Cultural Resources of Okinawa 2: pages? (In Japanese).

Provides detailed listing and maps showing locations of excavated dugong bones and bone artifacts from throughout the Japanese islands.

NISHIWAKI, M.

- 1977 Ecology of the dugong and its management. *Marine Research in Indonesia* 19:1-6.

No information on Okinawan dugongs.

- 1984 A tale of the dugong. Pp. 5-52 in *History of Japanese Animals*, Vol. 30. Kodansha Ltd., Tokyo, 369 pp. (in Japanese).

Old legends about dugongs and mermaids in Okinawa and also along the Sea of Japan coastal area (also, local names, how people utilized animals). A story about Dr. M. Nishiwaki's first dugong specimen - where and how it was caught (1967). Dr. Nishiwaki's experience - attacked by a dugong in the captive pool (Indonesia). The general biology of dugongs (morphology, anatomy, brain, digestive system). The distribution and the present population situation (including Japan). Also discusses the meat of dugongs (taste, how to cook, local use). The captive dugongs in Japanese aquariums (all animals from outside of Japan). Mating behavior (observations at Toba Aquarium). Discusses dugongs in an Indonesia aquarium (co-operative research between Japan and Indonesia).

NISHIWAKI, M., T. KASUYA, N. MIYAZAKI, T. TOBAYAMA, and T. KATAOKA

- 1979 Present distribution of the dugong in the world. *Scientific Reports of the Whales Research Institute* 31:133-141.

This paper provides a summary based on literature and an interview survey on the global distribution of the dugong as of 1978/1979. The species was indicated to be 'scarce' in

the southern Ryukyu Islands of Japan, which were also shown to be the furthest north extent of the species.

NISHIWAKI, M., and H. MARSH

- 1985 Dugong *Dugong dugon* (Muller, 1776). Pp. 1-31 in *Handbook of Marine Mammals*, Volume 3: The Sirenians and Baleen Whales (S. H. Ridgway and R. Harrison, eds.). Academic Press.

Provides a useful summary of the biology of the dugong, with information from throughout the range. It states that dugongs do not appear to occur in Japan proper or Korea. It suggests that dugongs occur in Okinawa and the Anami/Oshima Islands area further north, but indicates that the species is rare in Japanese waters.

OGURA, G., T. HIRAYAMA, K. SUDO, N. OTAISHI, H. MUKAI, AND Y. KAWASHIMA

- 2005 Investigation of the northern limit of dugong habitat in the Tokara Islands and Amami-Oshima in the Ryukyu Archipelago, Japan. *Wildlife Conservation Japan* 9:49-58 (in Japanese, with English summary).

The Introduction of this paper reported a dugong that was caught by a set net in Kumamoto Prefecture and a dead dugong that was stranded on the shore nearby a few days later in October 2002. This is the latest "northern limit record" of dugong distribution in Japan. Therefore, the authors investigated to check the northern distribution of dugongs (Tokada Islands) - interviews of the residents and the investigation of seagrasses.

SCHOENBAUM, L. J.

- 2009 The Okinawa dugong and the creative application of U.S. extraterritorial environmental law. *Texas International Law Journal* 44:457-478.

This paper discusses the legal aspects of two recent court cases relating to the US Marines' Futenma Replacement Facility (FRF) and the dugongs of Okinawa: *Dugong vs. Rumsfeld* and *Okinawa Dugong vs. Gates*. The outcome of these cases has resulted in the application of the National Historic Preservation Act (NHPA) to an endangered species (the dugong) overseas in Japan. It is argued that this case effectively serves as a legal precedent by expanding US environmental standards internationally.

SHIRAKIHARA, M., H. YOSHIDA, H. YOKOCHI, H. OGAWA, T. HOSOKAWA, N. HIGASHI, and T. KASUYA

- 2007 Current status and conservation needs of dugongs in southern Japan. *Marine Mammal Science* 23:694-706.

The status of the Japanese dugong population is described and summarized. Aerial surveys for dugongs were flown in April 1998 off Okinawa (837 km) and in April 1999 off the Yaeyama Islands (310 km). Snorkeling surveys of seagrass beds were conducted in July-September 1998 at Okinawa, and in August 1999 at Iriomote Island.

Seagrass beds were found at all survey sites, but dugong feeding trails were only observed at Okinawa, not at the Yaeyama Islands. Dugong sightings were made at Okinawa (10 sightings of single individuals) in waters from <20 m to 100 m deep, all off the east coast of the island. Japanese government groups additionally surveyed Okinawa in 2000-2003 and observed a total of 19 dugongs, including some individuals (as well as feeding trails) off the west coast.

Dugongs off Okinawa apparently occur offshore in deep waters during the day and move over the reef to feed in shallow waters at night, when human activities are less frequent.

Dugongs have been hunted off southern Japan since at least 1637, and a total of 170 were killed between 1894-1904, another 113 were estimated killed between 1905-1916. The catch decreased after 1910 (probably due to decreased dugong abundance), but killing using dynamite occurred during the impoverished post-WWII years.

Incidental kills are a major issue – 12 out of 20 dugongs deaths since 1965 have been caused by either gillnets or trap nets. The recent increase in number of records is probably due to an increase in interest in dugongs. Apparently, both a decrease in range and abundance has occurred. Japanese dugongs currently occur as a small, isolated population off Okinawa, primarily along the east coast of that island. The population is critically endangered.

Current legislation and protection only restricts direct killing and does not regulate incidental kills, nor habitat alteration. Mariculture activities (such as for seaweed) and vessel traffic may represent additional threats to the population. Any future development activities off Okinawa must be closely regulated to avoid disturbance of seagrass beds.

TAKESHI, T. [I.]

- 2003 Sekitsui dobutsu itai kara mita Amami • Okinawa no kankyo to Seigyo [Environment and Occupation through Vertebrate Animal Remains of Amami and Okinawa]. *Senshi Ryukyu no Seigyo to Koeki - Amami/Okinawa no Hakkutsu Chosa kara - Kaitei Ban* [Occupation and Trade of Prehistoric Ryukyu - From the Excavations of Amami and Okinawa - New Edition]. Kinoshita Laboratory, Faculty of Letters, Kumamoto University, Kumamoto, Japan (in Japanese).

This paper contains a brief review of dugong ecology and migration, and provides information on dugong bones excavated from archaeological sites, old records from fishery reports and historical documents of China and the Ryukyu diplomatic relations, as well as records in geographic references. Concludes that trading in dugong parts played a part in the historical relations between China and the Ryukyu peoples, and that the dugong may have been viewed as divine creatures by past cultures of the southern Japanese islands.

UCHIDA, S.

- 1979a The dugongs at the Okinawa Marine Exposition. *Doubutu To Doubutu-en* [Animals and Zoos] 12:6-10 (in Japanese with English summary).

No information on Okinawan dugongs.

- 1979b Animals waiting for salvation (43) dugong. *Doubutu To Doubutu-en* [Animals and Zoos] 12:16 (in Japanese).

General introduction about dugongs of the world. Because of their highly-palatable meat and value of their bones and teeth, dugongs have been hunted in Japan. This caused a decrease of the population(s) in Japan. Even after hunting was banned, some animals were accidentally killed in fishing nets. In January 1979 (?), one dugong was rescued from a gillnet and sent to the Okinawa Aquarium. There were some rescue stories in Okinawa, even though there are no official records. At the time of writing, only three

dugongs were in captivity in the world - one female in the Toba Aquarium, Japan, and two males in the Mahakam (Jaya Ancol?) Aquarium, Indonesia.

- 1994a Cetaceans in Ryukyu waters. In *Pilot Whale and Nago People* (Anonymous, ed.), pp. 75-118. Nago Museum (in Japanese).

In the past, the Yaeyama people presented dugongs to the Ryukyu King and then the king presented them to the Samurai Lords in Japan. Some old songs and stories about dugongs exist in Okinawa. The recent history of scientific investigation about dugongs in Japan is discussed. The first investigation was done by Drs. Takara and Nishiwaki in 1965 (203cm male). A total of seven records were collected between 1979 and 1993 - all from the east coast of the main Okinawa Island.

- 1994b The dugong. In *Base Data of Japanese Rare Wild Aquatic Organisms*, edited by S. Odate, pp. 569-583. Fisheries Agency and Japanese Association for Conservation of Aquatic Resources, Tokyo, 696 pp. (in Japanese).

This paper summarizes the status of the Okinawa population of dugongs. An outline of the contents includes:

1. Species name, including some local names in Okinawa.
2. Biological characteristics (morphology, including some data from stranded animals in Okinawa).
3. Ecological characteristics
 - a. Distribution, including in Japanese waters (old stories, hunting history in Okinawa).
 - b. Life cycle. Mating behavior was observed in the Toba Aquarium. The author did observations on diving behaviors, using captive animals, then compared with manatees. Diet of dugongs - possible food sources (i.e. seagrass species) in Okinawa waters. Estimated daily intake.
 - c. Comparison of distributions between dugongs and the rest of sirenians.
 - d. Swimming and others behavior. Swimming speed 3km/hr (Uchida *et al.* 1979).
4. Environmental conditions

Water temperature for seagrasses as food sources of dugongs. In Japan, Omami Oshima is the northern limit for warm water seagrass species. Ambient temperatures in Okinawa; however there are no data for dugong requirements related to ambient conditions.
5. Fisheries
 - a. Incidental catches by fisheries. Hunting history in Okinawa. A total of 11 dugongs were killed (7) or stranded (4) in Okinawa between 1931 and 1993 (Table 4 and Fig. 3).

- b. Relations between humans and dugongs (old stories in Okinawa)
- 6. Assessments
 - a. Remaining population in Japan close to the extinction (Fig 3). Importance of surveys, especially around the Iriomote Island.
 - b. Academic evaluation.
- 1995 Dugong in the Ryukyu Islands. in Mermaid Symposium: First International Symposium on Dugong and Manatees, November 15-17, 1995, Toba Mie, Japan (T. Kamiya, T. Kataoka, H. Nakamura, and H. Maeda, eds.), p. 2. Toba Aquarium, Japan (in Japanese).

Briefly summarizes the status as of the mid-1990s of dugongs in the southern Japanese islands.
- 1996 Dugong. In *The Encyclopaedia of Animals in Japan*, Volume 2: Mammals II. (Izawa, K., T. Kasuya and T. Kawmichi, eds.), pp. 102-103. Heibonsha Ltd., 155 pp. (in Japanese).

Discusses dugong general distribution in Japan (Southwestern Islands), and local name of dugongs on those islands. It is listed as an endangered species by the Japanese Fisheries Agency. Only one sirenian species is distributed in Japan (eastern limit of the world distribution). Nine species of seagrasses, on which dugongs feed during night, exist in the Southwestern Islands. Mating behavior was observed at the Toba Aquarium, in Mie.
- 1998 Giant fishes and whales. *Iwo-Machi* [Fish Town] 21:1-16 (in Japanese).

This paper is the transcript of a public lecture by Dr Uchida, and stated that it will “continue to the next issue.” But it did not appear in the next issue, which contained anything about dugong. Only p. 14-16 talked about dugongs in this paper.

“The Okinawa Aquarium kept, for a while, one dugong which was taken by a set net at Kinbu. The northern limit of the latest distribution is the Okinawa Island. Taste of dugong meats is very good. Old stories in the world and Japan. Morphological differences between cetaceans, manatees, and dugongs. A total of 13 scientific records exist for Okinawa (Table on p.16).”
- 2005 Dugongs, humans and aquaria. *Kokuritu-kouen* [National Parks] 635:8–11 (in Japanese).

This paper has four main chapters:

 1. About dugongs - General biology of dugongs
 2. Dugongs in Okinawa - Historical stories of Okinawa dugongs. Recent research and records on Okinawa dugongs. Why there are more dugongs on the east coast than the west coast.
 3. Aquaria and Okinawan fishermen – Discusses how to keep a good relationship between aquaria and local fishermen. Also about dugongs from Indonesia.
 4. Do Okinawan dugongs have a future? - Uchida proposes to coordinate scientific surveys, the banning of set-nets and gillnets and a replacement fishery system for

local fishermen. The latest records of by-catch are a small (TL 117 cm) animal (1990), a pregnant female (TL 296 cm, 1995), a large female (TL 298 cm, 2000), and a large male (3 m, 1996).

- 2006 Marine mammals in the Okinawan waters. In *Abstracts, Recent Advances in Cetology and Sirenology* (S. Uchida, ed.). Okinawa Churaumi Aquarium 29 pp.

This abstract briefly summarizes dugong status in Okinawa. States that 20 records of the species have been confirmed since 1975, and that the species occurs year round in the area. Also, give a small amount of life history information.

UCHIDA, S., and H. ONO

- 2001 Fishery effects on endangered animals - dugongs and humpback whales- In National Research Institute of Fisheries Engineering, Fisheries Research Agency (ed.). Problems on Fisheries - Effect by Fisheries on the Environment.

General biology about dugongs. The latest 19 records of Okinawa dugongs (1965-2000, Table 1, Fig. 1). After the Okinawa Aquarium was established in 1975, 17 records of dugongs were obtained. This is a good example of a scientific network. Monthly records are presented and there are more records in January. Eleven records came from by-catch (gill nets, set nets). Since by-catch is the main cause of dugong death, these fisheries should be banned with some compensation to fishermen.

UCHIDA, S., T. TOBAYAMA, and Y. YOSHIDA

- 1978 Keeping dugongs, *Dugong dugon*, at the Ocean Expo Aquarium. *Dobutsuen Suizokukan Zasshi* [Journal of the Japanese Association of Zoological Gardens and Aquariums] 20-1:11-17 (in Japanese with English summary).

No information on Okinawan dugongs.

- 1979 On the physiological properties of dugongs, *Dugong dugon*. *Dobutsuen Suizokukan Zasshi* [Journal of the Japanese Association of Zoological Gardens and Aquariums] 21-3:49-53 (in Japanese with English summary).

No information on Okinawan dugongs.

UCHIDA, S., T. TOBAYAMA, T. KAMIYA, and Y. YOSHIDA

- 1979 External measurements and autopsy findings of two dugongs, *Dugong dugon*. *Dobutsuen Suizokukan Zasshi* [Journal of the Japanese Association of Zoological Gardens and Aquariums] 21-3:54-61 (in Japanese with English summary).

No information on Okinawan dugongs.

UNI, Y.

- 2003 Catch statistics of *Dugong dugon* in Okinawa Prefecture. *Ajima* [Bulletin of Nago Museum] 10:1-14 (in Japanese).

Reports on the analysis of old statistical references - Okinawa Statistics 1894-1940, Investigative Reports of Fisheries 1888-1891, Report of Okinawa Fisheries 1912. Catch statistics for the Okinawa Islands, Miyako Islands, and Yaeyama Islands during the period 1894-1916 (a total of 300 dugongs were killed during this period). During an 11-

year period (1894-1904) in Okinawa, 170 dugongs were killed, and up to 31 were killed in a single year. The author concluded that the dugong fisheries disappeared by the mid-1910s in Okinawan waters, because of overfishing. This conclusion indicated dugongs became endangered earlier than previously thought (Yasuzato 1976, Uchida 1994). Traditional catching methods for dugongs in Okinawa are also discussed.

WAKAI, Y.

- 1995 On the keeping dugong *Dugong dugon* in Toba Aquarium. In Mermaid Symposium: First International Symposium on Dugong and Manatees, November 15-17, 1995, Toba Mie, Japan (T. Kamiya, T. Kataoka, H. Nakamura, and H. Maeda, eds.), p. 29. Toba Aquarium, Japan (in Japanese and English).

Describes the history of the keeping of dugongs in captivity at the Toba Aquarium, Japan, but does not say where the specimens were captured from (Japan or elsewhere in the range).

WAKAI, Y., K. HASEGAWA, S. SAKAMOTO, S. ASANO, G. WATANABE, and K. TAYA

- 2002 Annual changes of urinary progesterone and estradiol-17B of the dugong (*Dugong dugon*) in captivity. *Zoological Science* 19:679-682.

No information on Okinawan dugongs.

YAMAMURO, M., K. AKETA, and S. UCHIDA

- 2004 Carbon and nitrogen stable isotopic ratios of the tissues and gut contents of a dugong from the temperate coast of Japan. *Mammal Study* 29:179-183.

On 9 September 2002, an adult dugong was discovered dead on the coast of Ushibuka (32°N, 130°E) off Kyushu, Japan, much further north (ca. 750 km) than the previously-known northern limit of the species. Studies of the carbon and nitrogen isotopes were conducted to determine if the dugong was a stray from the Okinawa area or had in fact been living further north. The studies were not conclusive, but seem to be consistent with the idea that the animal may have moved from the Ryukyu Islands (presumably Okinawa) area further south.

YAMASAKI, F., S. KOMATSU, and T. KAMIYA

- 1980 A comparative morphological study on the tongues of manatee and dugong (Sirenia). *Scientific Reports of the Whales Research Institute* 32:127-144.

No information on Okinawan dugongs.

- 1981 An anatomical note on the tongue of the dugong, *Dugong dugon*. Pp. 182-191 in *The Dugong: Proceedings of a Seminar/Workshop Held at James Cook University, 8-13 May 1979* (H. Marsh, ed.). James Cook University.

No information on Okinawan dugongs.

YOSHIDA, M., and R. B. TRONO

- 2004 Dugong conservation network in Asia and Pacific. In *Knowledgeable Marketplace Reports: The 3rd IUCN World Conservation Congress, Bangkok, Thailand, Pp. 1-9.*

This paper summarizes three presentations on Okinawan dugongs. The status of the population was reviewed. The Okinawan dugong population was estimated at <50 by the Mammalogical Society of Japan in 1997. Henoko Village is a hotspot for dugongs in Okinawa. The east coast has 21 seagrass beds covering 539 ha, and the west coast has 9 seagrass beds covering only 89 ha. Threats to the population include habitat destruction (the paper focused on the proposed US Marine Air base) and fishery bycatch. Number of dugongs documented bycaught: 5 in 1980s, 9 in 1990s, and 3 in 2000.

An action plan for the Okinawan dugong was prepared by WWF-Japan and summarized by S. Hanawa. It also focused on the proposed U.S. Marine Air base, with little mention of the serious problem in incidental catch. M. Yoshida described recent seagrass surveys. Seagrass surveys were conducted and beds were found to extend up to 1 km offshore of the island. Dugongs use the seagrass beds as feeding habitat at Henoko.

K. Somiya summarized the results of a dugong survey by the Ministry of the Environment in 2001-2003. Between 129 and 139 dugong feeding trails were observed in the different years. A preliminary genetic analysis was also conducted. This showed that Okinawan and Philippine dugongs share part of their maternal genome, but that Australian dugongs are completely genetically distinct.

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