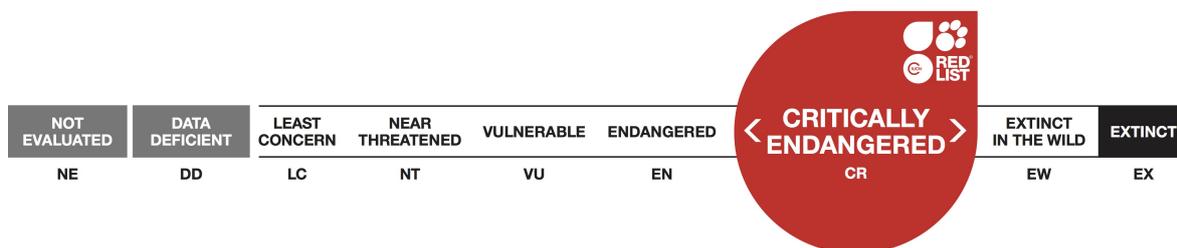


Dugong dugon (Nansei subpopulation), Dugong

Assessment by: Brownell Jr., R.L., Kasuya, T. & Marsh, H.



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Taxonomy

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Mammalia	Sirenia	Dugongidae

Taxon Name: *Dugong dugon* (Nansei subpopulation) (Müller, 1776)

Parent Species: See [Dugong dugon](#)

Common Name(s):

- English: Dugong, Dugong, Sea Cow, Sea Cow

Assessment Information

Red List Category & Criteria: Critically Endangered C1; D [ver 3.1](#)

Year Published: 2019

Date Assessed: August 18, 2019

Justification:

The Nansei Dugong Subpopulation is a geographically distinct group and there is little demographic or genetic exchange with other populations. It qualifies as Critically Endangered as the total subpopulation in 2019 is estimated to number less than 10 animals. If the population was about 30 in 1970s, the reduction exceeds 25% in one generation, using a generation time of 20-25 years (Marsh *et al.* 2011). There is also a continuing observed decline, due to legal hunting (until late 1930s), fisheries bycatch and some illegal hunting (since the 1930s). A secondary concern is habitat loss and degradation.

Geographic Range

Range Description:

The Dugong inhabits sub-tropical and tropical coastal and offshore island waters from East Africa to Vanuatu between about 27° north and south of the equator (Marsh *et al.* 2011, Marsh and Sobtzick 2015). The northernmost limit is in the Southwest Islands or Nansei Islands (also known as Ryukyu-ko or Ryukyu Arc), Japan. The Southwest Islands stretch between Kyushu and Taiwan. Within the Nansei Islands, the northern limit of Dugong distribution was around Amami Island (Carter *et al.* 1946, Nishiwaki *et al.* 1979). All of the Nansei Islands are located in warm-temperate waters (Briggs 1974, Lui 2013). To the south, Dugongs no longer occur off Taiwan with the last recorded strandings in 1986 (Ministry of Culture 2013). The last sightings from the southern tip of Taiwan (the area is now the Kenting National Park) were in the 1950s and 1960s (Zhou 2004), in the region of a seagrass meadow reported by Green and Short (2003). Nonetheless, the animals stranded in Taiwan (Hirasaka 1932) may have been vagrants (Marsh and Sobtzick 2015). The warm Kuroshio Current travels from Luzon Island in the Philippines north along the eastern coast of Taiwan where the continental shelf is narrow and seagrass habitat was not reported by Lui (2013). Further south on the mainland coast of China, Dugongs are mainly found in low numbers southwest of Hong Kong around Hainan Island, along the eastern coast of the Gulf of Tonkin and in the Gulf of Beihai (Marsh *et al.* 2002, Zhou 2004, Lui 2013). However, the

Chinese Dugong population is considered to be 'endangered and almost collapsed' (Lui 2013).

The main island groups in the Nansei region are: Satsunan Islands (including the Amami Islands), Ryukyu Islands (including Okinawa Island), and the Sakishima Islands (including the Miyako Islands and the Yaeyama Islands). Historically within the Southwest Islands, Dugongs are best known from the following islands, from north to south: Amami Oshima, Okinawa Island, Shimoji (Miyako Islands), and Iriomote (Yaeyama Islands) (Welch *et al.* 2010). Since the 1970s, confirmed sightings and specimens of Dugongs have mainly been from the waters around Okinawa Island, where survey effort has been concentrated. There have also been occasional sightings outside the Okinawan region. These sightings are detailed below.

The most northern confirmed records are considered extralimital. In September 2002, an adult Dugong was taken in fishing gear, off Ushibuka (32°N, 130°E), Kyushu, Japan (Yamamuro *et al.* 2004). Another Dugong was captured in a set net off the west coast of Kyushu in October 2002. A few days after another stranded nearby (Ogura *et al.* 2005). Dugongs were widely distributed in the Nansei Islands, probably in the low hundreds during the late 19th century, but at that time and in the early years of the 20th century they were exploited at an unsustainable rate. For example, Uni (2003) conducted a detailed analysis of old statistical references related to Dugong hunting and concluded that a minimum of 327 Dugongs were killed between 1894 and 1916. Dugongs continued to be killed incidentally in the post-World War II years in association with dynamite (blast) fishing (Uni 2003, Shirkihara *et al.*, 2007). Uni (2003) gives annual catch statistics for 1894-1904 (170 Dugongs in total, recorded in number), 1905-1906 (24, recorded in number), 1907-1909 (43-87 estimated from weight or two different prices, which caused a range in the estimates), and 1910-1917 (46 estimated from weight). The total was 283-327 during 1894-1917 (zero in 1917). Small Dugong populations in the waters of several island groups were believed to have been eliminated e.g., Miyako Islands by 1965 and around the Yaeyama Islands by 1967 (Kasuya *et al.* 2000), but as explained above and detailed below, there have been occasional sightings in the Yaeyama Islands since that time. Nonetheless, any remaining Dugongs in this Subpopulation are believed to occur mostly around Okinawa Island, the largest of all the Nansei Islands.

Local extinctions of the Dugong in other parts of its range

Husar (1978) lists the Dugong as extinct in the waters of several islands including: the Maldives, the Lakshadweep Islands, Mascarene Islands of Mauritius and Rodrigues, and Taiwan. Some of these alleged extinctions may have been inferred from records of vagrant individuals. Nonetheless, there is historical evidence of substantial Dugong populations off Mauritius and Rodrigues Islands, where they were harvested in the 18th century and are now extinct (Cheke 1987). There is also anecdotal evidence that the area of occupancy (AOO) of the Dugong has declined in many parts of its range, especially along the coasts of East Africa and India (Marsh and Sobotzick 2015).

Country Occurrence:

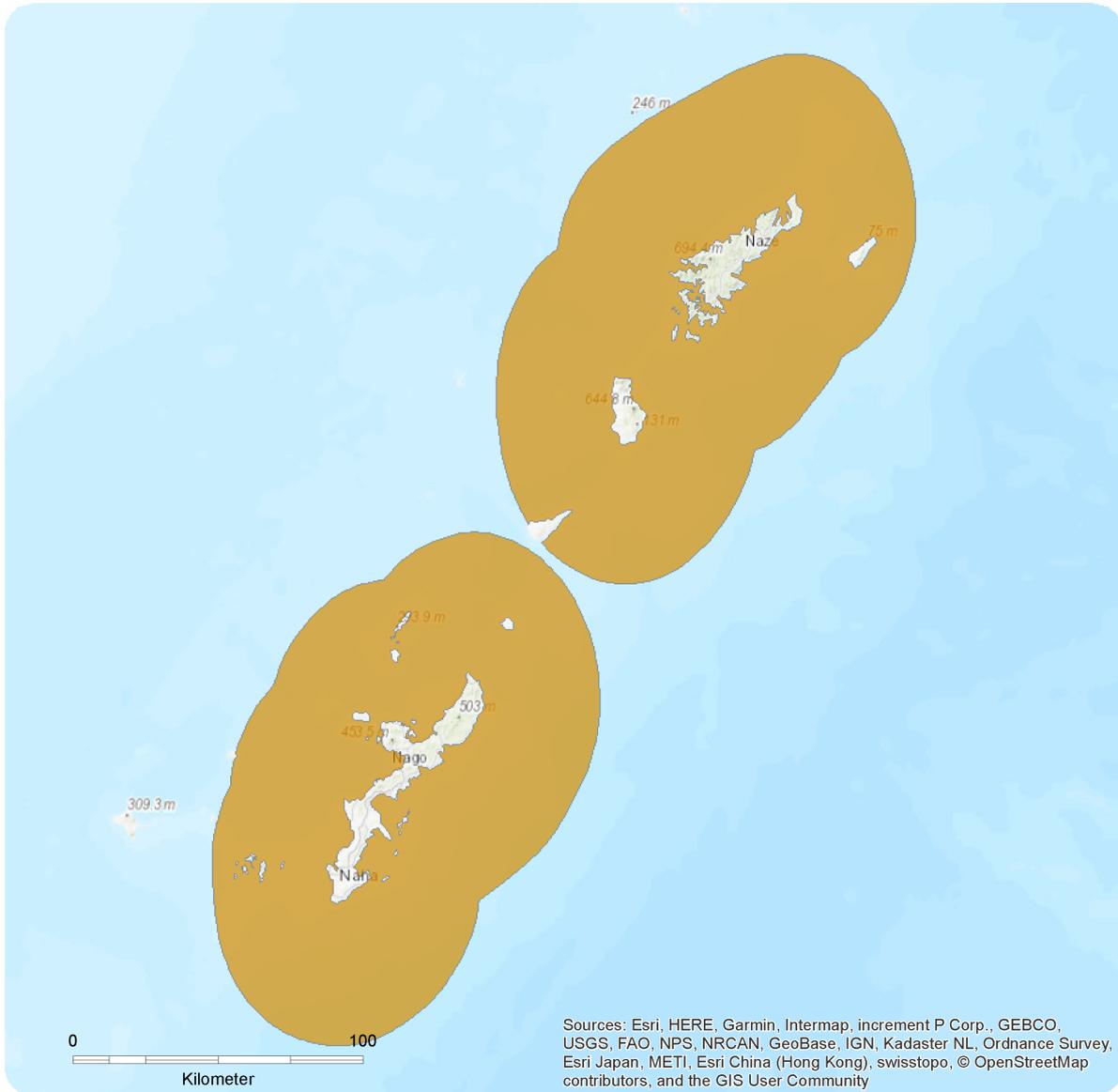
Native: Japan

FAO Marine Fishing Areas:

Native: Pacific - northwest

Distribution Map

Dugong dugon (Nansei subpopulation)

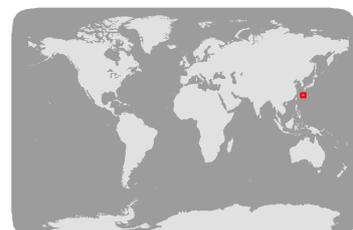


Range

Extant (resident)

Compiled by:

IUCN (International Union for Conservation of Nature)



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.



Population

The Nansei Dugong Subpopulation has been considered to be under serious threat of local extinction for decades (Uchida 1994, Kasuya and Brownell 2001). A scientifically-valid estimate of its size is not available, but numbers are certainly very low. Only ten Dugongs were observed during 1998-99 aerial surveys around Okinawa, Yaeyama and Miyako Islands: ten Dugongs were sighted in 837 km of aerial transects lines in 1998; no Dugongs were observed around Iriomote, Ishigaki, Tarama and the Miyako Islands, despite a total of 310 km transect lines being flown in 1999 (Shirakihara *et al.* 2007). In 1999, an airline helicopter sighted six Dugongs along the east coast of Okinawa Island (Dugong Network Okinawa 2000). Local scale aerial surveys have been conducted by the Defense Agency in association with the planned construction of a US military base in Dugong habitat near Henoko on Okinawa Island. In recent years, the survey area has been very limited. The year 2000 aerial survey around Okinawa Island sighted five (possibly six) Dugongs (Defense Agency 2001). Five Dugongs were sighted in a single survey in 2003 (Ministry of the Environment 2004). Since 2007, a maximum of three Dugongs (each individually recognizable) have been sighted in a single survey (Okinawa Defense Bureau 2012), one of these animals died in March 2019 (see below); the other known individuals have not been seen in recent years. In addition, sightings of single Dugongs have been confirmed in Okinawan waters outside the area surveyed by the Ministry of Defense (Bise, September 2017; Nanjo-Shi, August 2018; near Kouri Island, offshore from Unten Port (Okinawa Prefecture Nature Conservation Division 2019). There have also been occasional sightings outside the Okinawan region. Ogura *et al.* (2005) reported four Dugong sightings from Kasari Bay, Amami-Oshima from the early 2000s, presumably including a Dugong reported from Akaogi in Kasari Bay, Amami-Oshima in September 2002 (Okinawa Prefecture 2018). Other incidental sightings have been reported from Tarama Island (Miyako Group) from June 2013; Iriomote Island (Yaeyama Group) from 2013 to 2014 (Natural Park Foundation 2019); and Tonaki Island, 58 km north-west of Okinawa from July 2017 (Okinawa Prefecture Nature Conservation 2019); Hateruma Island (Yaeyama Group) from August 2018 (Natural Park Foundation 2019). There have been ten Dugong stranding records in Japan from 1998 to 2019. Including one wounded individual that could not be collected, at least eight of these stranded Dugongs were dead. One of these animals, which stranded at Ushibuka-Shi in Kumamoto in 2002, may have died from starvation (Ministry of the Environment 2004). Two animals were killed in fishing nets. The Dugong that died in March 2019 (2.9 m female) at Unten Port, west coast of Okinawa had been stabbed by a ray barb (Ministry of the Environment Okinawa Amami Natural Environment Office 2019), presumably while bottom feeding. The cause of death could not be determined for the remaining four animals.

Current Population Trend: Decreasing

Habitat and Ecology (see Appendix for additional information)

Habitat requirements for Dugongs include coastal areas, shallow to medium deep (<40 m), warm waters (15-17°C minimum with behavioral thermoregulation; Marsh *et al.* 2011; Cleguer 2015, Zeh *et al.* 2018), seagrass beds supporting sub-tropical and tropical species of seagrasses, particularly low fiber species (Lanyon and Sanson 2006 a,b, Hines *et al.* 2012, Marsh *et al.* 2011). Between 1900 and 2000, the stomachs of six dead Dugongs from the Nansei Subpopulation were examined and the remains of seven sea grass species were identified. The species encountered were: *Halophila ovalis*, *Thalassia hemprichii*, *Cymodocea rotundata*, *C. serrulata*, *Syringodium isoetifolium*, *Halodule uninervis* and *H. pinifolia* (Aketa 2003). Mixed species seagrass beds are common around Amami Island to the Sakishima Islands (Yokochi 2002). Ohba and Miyata (2007) reported the following seagrasses from the Nansei Islands: *Halophila*

major, *H. decipiens*, *H. okinawensis*, *H. minor*, and *Zostera japonica*. Seven species of sea grasses are known from around Okinawa (Shirakihara *et al.* 2007). Uchida (1996) reported that nine seagrass species were available around Southwestern Island as food for Dugongs. Ito (1899) reported abundant beds of *H. ovata* and *Enhalus acoroides* between Iriomote and Uchibanare (Yaeyama Islands). He also noted that the *Enhalus* had the leaves partly bitten off by Dugong and that he collected their teeth and skulls. A hundred years later no feeding trails were observed in this area (Shirakihara *et al.* 2007). However, the absence of feeding trails is not definitive evidence of the absence of Dugongs because feeding trails are only produced when Dugongs can excavate seagrasses and invertebrates in soft sediments (Marsh *et al.* 2011, 2018). Feeding trails are not produced when Dugongs feed on *E. acoroides* or *Thalassia hemprichii*. Sheppard *et al.* (2006), documented long-distance movements of Dugongs along the northeast coast of Australia. Dugongs do not appear to undertake regular migrations and their movements have repeatedly been shown to be individualistic (Sheppard *et al.* 2006, Marsh *et al.* 2011, Gredzens *et al.* 2014; Cleguer 2015; Zeh *et al.* 2015, 2016, 2018). The distance between the southern Nansei Islands and the next closest Dugong population in Luzon, Philippines, is substantially greater than the maximum distance traversed by any satellite tracked Dugong to date (625 km; Sheppard *et al.* 2006). However, the distance between the southern Nansei Islands and Luzon is of similar magnitude to recent records of Dugongs moving across deep oceanic waters (Vanuatu to Fiji, Hill-Lewenilovo *et al.* 2018) or (e.g. Java to Cocos Keeling Islands, Hobbs *et al.* 2007). Movement of Dugongs from Luzon to the Nansei Islands would be facilitated by the Kuroshiro Current and preliminary genetic studies indicate that Okinawan and Philippine Dugongs share part of their maternal genome (Yoshida and Trono 2004). However, as Dugongs numbers are now believed to be declining in the Philippines (Marsh *et al.* 2002), it is likely that recruitment from Luzon to Japan occurs only rarely if at all.

As detailed in Marsh *et al.* (2011 and the references therein), the Dugong is a k-selected large mammal. The maximum life span is more than 70 years; the generation length 22-25 years. Sexual maturity occurs at a minimum age of six years in both males and females. The Dugong usually bears one calf at a time at intervals of three to seven years from about age seven after a gestation period estimated to be about 14 months. Lactation is estimated to last about 18 months even though a calf starts eating seagrass soon after birth. The ages of sexual maturity and first breeding can be delayed and the breeding interval lengthened if the food supply is reduced by seagrass diebacks or habitat loss. Adult survivorship must be greater than 95% per year for a population to be maintained. Thus a Dugong population can withstand only very low levels of human-induced mortality and for a very small population, such as the Nansei Subpopulation, the loss of even a single individual is a very serious impact.

Systems: Marine

Use and Trade

It is harvested for food in some places.

Threats (see Appendix for additional information)

Threats to Dugongs vary among different populations as detailed in Marsh *et al.* (2011), Hines *et al.* (2012) and Marsh and Soltzick (2015). Major threats include:

- Incidental capture in fishing gear (e.g. set nets and gill nets), shark nets for bather protection, Illegal, Unreported and Unregulated (IUU) fishing especially if meat is subsequently sold (see Pilcher *et al.*

2017, for a detailed rapid assessment based on questionnaires to provide information on conservation hotspots for Dugongs in 18 countries);

- Hunting: legal (i.e. culturally sanctioned) and illegal;
- Boat strikes and boating activities (e.g. acoustic pollution);
- Damage/modification/loss of habitat, especially seagrass communities caused by human settlement on coasts, including untreated sewage disposal, coastal dredging and land reclamation, inshore commercial trawling and other destructive fishing practices, modification of seagrass beds for the culture of algae, boating (propeller scars), and agricultural pollution), shipping, and natural processes (e.g. cyclones and tsunamis);
- Chemical pollution (e.g. oil spills, heavy metals and organochlorines loads);
- Climate change (extreme weather events and high temperatures);
- Unexploded World War II bombs/underwater bomb disposal/ blast fishing.

Archaeological evidence confirms exploitation of Dugongs by early humans. As long as 6,000 years ago, Dugongs on the small island of Akab in the United Arab Emirates were hunted for food (Mery *et al.* 2009). The same is true for Japan where Dugongs were used as a food resource as early as ca 6,000 -5,000 years BP at (Early Jomon) sites on the island of Okinawa (Welch *et al.* 2010). Dugong bones have been found in more than 100 archeological sites throughout the Ryukyu Islands (Welch *et al.* 2010). During the time of the Ryukyu Kingdom (1429–1879) “the people of Shimoji and Kamiji [the two islands that make up Aragusuku Island] were exclusively allowed to hunt” (Welch *et al.* 2010). Between 1637 and 1903, Nansei Dugongs were hunted with nets and the meat was used to pay taxes to the Kingdom (Ohama 1971). Dugong skulls can still be seen atop stone walls at some of the ‘sacred groves’ (Yaeyaman Utaki) on Aragusuku Island (HM and TK, *pers. comm.*; Welch *et al.* 2010). Hunting, both legal and illegal, has driven this Subpopulation to near extinction over the past 150 years as explained above. During the past 50 years (1969-2019), the major causes of Dugong mortality in the Nansei sub-population has been incidental and illegal direct catches. The minimum total of such catches has been six individuals, including at least three females (Hosokawa, *pers. comm.*).

Habitat loss and degradation are becoming greater concerns. Any future development activities off Okinawa should be closely regulated to avoid disturbance of seagrass beds (Shirakihara *et al.* 2007). One location of major concern is the planned relocation of the current U.S. Marine Corps air base (Futenma), to the central east coast in Oura Bay (Henoko Bay). The new base calls for one seagrass bed to be covered by the new runway and another bed dredged for sand. The new landing field has been under discussion since the late 1990s and in December 2018 construction started by dumping tons of sand into Oura Bay covering acres of coral and seagrass beds. On March 25, 2019 the Defense Ministry's Okinawa Defense Bureau started land reclamation for the new air field. The reclamation area is ca. 160 hectares, a substantial proportion of the total areas of seagrass around Okinawa: the east coast had 21 seagrass beds totalling 539 hectares, and the west coast has nine seagrass beds covering 89 hectares (Uchida 1994; Yoshida and Trono 2004). The loss and damage to these seagrass beds is likely to be a serious impediment to the recovery of the Dugong population in Okinawa.

Conservation Actions (see Appendix for additional information)

As outlined in Marsh *et al.* (2011), globally Dugongs are protected under three international conservation conventions: The Convention on Biological Diversity (CBD), the Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the Convention on

Migratory Species of Wild Animals (also known as CMS or the Bonn Convention). Dugongs are also included in the Coral Triangle Initiative (CTI), goal five (Threatened Species). Additionally, the Convention on Wetlands (the Ramsar Convention) protects some important Dugong habitats. Japan is a signatory to CDB, CITES and the Ramsar Convention but none of these treaties provides any real protection for the Dugongs within Japanese waters. On a worldwide basis, Dugongs are currently listed as Vulnerable on the IUCN Red List, but Kasuya and Miyazaki (1997) classified the population in Okinawan waters using the IUCN Red List criteria as Critically Endangered. This assessment was subsequently reconfirmed by Shirakihara *et al.* (2007). Following up on this assessment the Japanese Ministry of Environment classified the Okinawa Dugong population as Critically Endangered in 2007.

There is some uncertainty as to whether the Dugong was nominated as a natural monument before World War II under Japanese domestic law. Nonetheless, the Dugong was designated in January 1955 under the 1954 Okinawa Law for the Protection of Cultural Properties. After the U.S. returned Okinawa to Japan in 1972, the government placed the Dugong on their list of Natural Monuments (Walsh 2010). Okinawa Dugongs have also been protected by the Fisheries Resources Protection Act since 1993 (Kasuya, Shirakihara and Kawamichi, 2000 and by the Wildlife Protection and Hunting Management Law since 2003 (<http://www.mammalogy.jp/guideline.html>). Welch *et al.* (2010) noted that the “purpose of the Law for the Protection of Cultural Properties as stated in the English translation of Article is to preserve and utilize cultural properties so that the culture of the Japanese people may be furthered and contribution be made to the evolution of world culture.” Today, the current legislation and associated protection only restrict direct killing and do not regulate incidental kills or habitat alteration, both of which threaten the continued existence of Dugongs in Okinawan waters. A fisher must be licensed to operate legally in the small-type set net and gill net fisheries. A license holder is entitled to fish across a wide area. The Ministry of Environment and the Fisheries Agency have made independent efforts to develop techniques to detect a Dugong entering a net and safely release a Dugong from a net. (Hosokawa *pers comm.*). The efficacy of such techniques will be impossible to determine because Dugong numbers are low, making the capture of a Dugong in a net a rare (but serious) event.

Credits

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Bibliography

Aketa, K. 2003. The study of food and digestive characteristics in sirenians. PhD Thesis (in Japanese). Mie University, Mei, Japan.

Briggs, J. C. 1974. *Marine Zoogeography*. McGraw-Hill, New York, NY.

Carter, T. D., Hill, J. E. and Tate, G. H. H. 1946. *Mammals of the Pacific World*. The Macmillan Company, New York, NY.

Cheke, A.S. 1987. An ecological history of the Mascarene Islands, with particular reference to extinctions and introductions of land vertebrates. In: Diamond, A.W. (ed.), *Studies of Mascarene island birds*, pp. 5-89. Cambridge University Press, Cambridge, U.K.

Cleguer, C. 2015. Informing Dugong conservation at several spatial and temporal scales in New Caledonia. PhD Thesis. James Cook University and University Pierre and Marie Curie.

Defense Agency. 2001. Report of "Preliminary Survey on Dugong Habitat" conducted by the Defense Agency in 2000.

Dugong Network Okinawa. 2000. For the protection of Dugong offshore Okinawa. Dugong Network Okinawa.

Gredzens, C., Marsh H., Fuentes M.M.P.B., Limpus C.J., Shimada, T. and Hamann, M. 2014. Satellite Tracking of Sympatric Marine Megafauna Can Inform the Biological Basis for Species Co-Management. *PLoS ONE* 9(6): e98944.

Green, E.P. and Short, F.T. 2003. *World Atlas of Seagrasses*. University of California Press, Berkeley.

Hill-Lewenilovo, R., Vuiyasawa, R. and Piovano, S. 2018. First record of a Dugong (*dugong dugon* Müller, 1776) in Fiji. *Pacific Conservation Biology*: <https://doi.org/10.1071/PC18059>.

Hines, E., Reynolds, J., Mignucci-Giannoni, A, Aragones, L.V. and Marmontel, M. 2012. *Sirenian Conservation: Issues and Strategies in Developing Countries*. The University Press of Florida.

Hirasaka, K. 1932. The occurrence of the Dugong in Formosa. *Memoirs of the Faculty of Science and Agriculture, Taihoku Imp University*. 7: 1-4.

Hobbs, J.-P. A., Frisch, A. J., Hender, J. and Gilligan, J.J. 2007. Long-distance oceanic movement of a solitary Dugong (*Dugong dugon*) to the Cocos (Keeling) Islands. *Aquatic Mammals* 33: 175-178.

Husar, S. L. 1978. *Dugong dugon*. *Mammalian Species. The American Society of Mammalogists* 88: 1-7.

Ito, T. 1899. Some remarkable marine monocotyledons in Japan. *Annals of Botany* 13(51): 464-465.

IUCN. 2019. The IUCN Red List of Threatened Species. Version 2019-3. Available at: www.iucnredlist.org. (Accessed: 10 December 2019).

Kasuya, T., and Brownell, R. L. 2001. Conservation status and future prospects of Dugongs in Japanese waters. unpublished report.

Kasuya, T. and Miyazaki, N. 1997. Kaigyū Moku Dugong. *Red Data Book Nihon no Honyūri Data Book - Mammals in Japan (in Japanese)*, Bunichi Co. Ltd., Tokyo, Japan.

Kasuya, T., Shirakihara, M., and Kawamichi, T. 2000. Background information appended to a resolution of Japanese Society of Mammalogists in 2000 requesting protection of Dugongs in Okinawa.

- Lanyon, J. M. and Sanson, G. D. 2006a. Mechanical disruption of seagrass in the digestive tract of the Dugong. *Journal of Zoology* 270: 277-289.
- Lanyon, J. M. and Sanson, G. D. 2006b. Degenerate dentition of the Dugong (*Dugong dugon*), or why a grazer does not need teeth: morphology, occlusion and wear of mouthparts. *Journal of Zoology* 268: 133-152.
- Lui, J.Y. 2013. Status of marine biodiversity in the China seas. *PLoS ONE* 8(1): e50719.
- Marsh, H. and Sobtzick, S. 2015. *Dugong dugon*. *The IUCN Red List of Threatened Species* 2015(4): e.T6909A43792211. DOI: 10.2305/IUCN.UK.2015-4.RLTS.T6909A43792211.en.
- Marsh, H., Grech, A., and McMahon, K. 2018. Dugongs: seagrass community specialists. In: Larkum, A. Kendrick, G. and Ralph, P. (eds), *Seagrasses of Australia*, Springer, Cham.
- Marsh, H., O'Shea, T.J. and Reynolds III, J.E. 2011. *The ecology and conservation of Sirenia: dugongs and manatees*. Cambridge University Press.
- Marsh, H., Penrose, H., Eros, C. and Hugues, J. 2002. Dugong Status Report and Action Plans for Countries and Territories. Early Warning and Assessment Report Series, United Nations Environment Program. UNEP/DEWA/RS.02-1. 162 pp.
- Mery, S., Charpentier, V., Auxiette, G. and Pelle, E. 2009. A Sugong bone mound: the Neolithic ritual site on Akab in Umm al-Quwain, United Arab Emirates. *Antiquity* 83: 696-708.
- Ministry of Culture. 2013. New Taipei City, Taiwan. (https://english.moc.gov.tw/information_197_76894.html).
- Natural Park Foundation. 2019. [30th year of the Heisei period]. Report on commissioned work to promote symbiosis between Dugong and local communities. Natural Park Foundation.
- Nishiwaki, N., Kasuya, T. and Miyasaki, N. 1979. Present distribution of the Dugong in the world. *Scientific reports of the whales research institute* 31: 33-141.
- Ogura, G., Hirayama, T., Sudo, K., Otaishi, N., Mukai, H. and Kawashima, Y. 2005. Investigation of the northern limit of Dugong habitat in the Tokara islands and Amami-Oshima in the Ryukyu Archipelago, Japan. *Wildlife Conservation of Japan* 9(2): 49-58 [in Japanese].
- Ohama, S. 1971. *Taxes of the Yaeyama Islands [a poll tax in the Yaeyama Islands]*. San-ichi Syobou, Tokyo.
- Ohba, T. and Miyata, M. 2007. *Seagrasses of Japan [in Japanese]*. Hokkaido University Press.
- Okinawa Prefectural Environment Department Nature Conservation Division. 2019. [30th year of the Heisei period] Dugong Conservation Measures Project Report. Okinawa Prefectural Environment Department Nature Conservation Division.
- Pilcher, N. J., Adulyanukosol, K., Das, H., Davis, P., Hines, E., Kwan, D., Marsh, H., Ponnampalam, L., and Reynolds, J. 2017. A low-cost solution for documenting distribution and abundance of endangered marine fauna and impacts from fisheries. *PLoS ONE* 12(2): e0190021.
- Sheppard, J. K., Preen, A. R., Marsh, H., Lawler, I. R., Whiting, S., and Jones, R. E. 2006. Movement heterogeneity of dugongs, *Dugong dugon* (Muller) over large spatial scales. *Journal of Experimental Marine Biology and Ecology* 334: 64-83.
- Shirakihara, M., Yoshida, H., Yokochi, H., Ogawa, H., Hosokawa, T., Higashi, N. and Kasuya, T. 2007. Current status and conservation needs of Dugongs in southern Japan. *Marine Mammal Science* 23: 694-

706.

Uchida, S. 1994. The Dugong. In: Odate, S. (ed.), *Database of Japanese Rare Wild Aquatic Organisms*, pp. 569-583. Fisheries Agency and Japanese Association for Conservation of Aquatic Resources, Tokyo.

Uchida, S. 1996. Dugong. In: Izawa, K., Kasuya, T. and Kawamichi, T. (eds), *The encyclopaedia of animals in Japan, Volume 2: Mammals II*, pp. 102-103. Heibonsha Ltd.

Uni, K. 2003. Harvest report of Dugong (*Dugong dugon*) in Okinawa Prefecture. *Bulletin of Nago Museum* 11: 1-14.

Welch, D.J., Rokkum, A. Jefferson, T.A., Higa, N. and McNeill, J. R. 2010. An anthropological study of the significance of the Dugong in Okinawa culture. Unpublished report prepared for US Marine Corps, Washington, D.C., USA.

Yamamuro, M., Aketa, K., and Uchida, S. 2004. Carbon and nitrogen isotope ratios of the tissues and gut contents of a Dugong from the temperate coast of Japan. *Mammal Study* 29: 179-183.

Yokochi, H. 2002. Seagrasses in the Ryukyu Islands. In: Nakamori, T. (ed.), *Coral reef studies in Japan*, pp. 21-27. Japanese coral reef society.

Yoshida, M. and Trono, R. B. 2004. Dugong conservation network in Asia and Pacific. *Knowledgeable Marketplace Reports*, pp. 1-9. The 3rd IUCN World Conservation Congress.

Zeh, D., Heupel, M., Hamann, M., Jones, R., Limpus, C. and Marsh, H. 2018. Evidence of behavioural thermoregulation by Dugongs at the high latitude limit to their range in eastern Australia. *Journal of Experimental Marine Biology and Ecology* 508: 27-34.

Zeh, D. R., Heupel, M. R., Hamann, M., Limpus, C. J., Marsh, H. 2016. Quick fix GPS technology highlights risk to marine animals moving between protected areas. *Endangered Species Research* 30: 37-44.

Zeh, D. R., Heupel, M. R., Limpus, C. J., Hamann, M., Fuentes, M. M. P. B., Babcock, R. C., Pillans, R.D., Townsend, K. A. and Marsh, H. 2015. Is acoustic tracking appropriate for air-breathing marine animals? Dugongs as a case study. *Journal of experimental marine biology and ecology* 464: 1-10.

Zhou, K. 2004. *Fauna sinica mammalia (vol. 9) Cetacea: Carnivora: Phocoidea Sirenia*. Science Press, Beijing.

Citation

Brownell Jr., R.L., Kasuya, T. & Marsh, H. 2019. *Dugong dugon (Nansei subpopulation)*. The IUCN Red List of Threatened Species 2019: e.T157011948A157011982. <http://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T157011948A157011982.en>

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External Resources

For [Images and External Links to Additional Information](#), please see the [Red List website](#).

Appendix

Habitats

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Habitat	Season	Suitability	Major Importance?
9. Marine Neritic -> 9.9. Marine Neritic - Seagrass (Submerged)	Resident	Suitable	Yes

Threats

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Threat	Timing	Scope	Severity	Impact Score
1. Residential & commercial development -> 1.2. Commercial & industrial areas	Ongoing	Unknown	Slow, significant declines	Unknown
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.2. Species disturbance		
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.1. Intentional use: (subsistence/small scale) [harvest]	Past, unlikely to return	Whole (>90%)	Rapid declines	Past impact
	Stresses:	2. Species Stresses -> 2.1. Species mortality		
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.3. Unintentional effects: (subsistence/small scale) [harvest]	Ongoing	Whole (>90%)	Rapid declines	High impact: 8
	Stresses:	2. Species Stresses -> 2.1. Species mortality		
9. Pollution -> 9.1. Domestic & urban waste water -> 9.1.2. Run-off	Ongoing	Unknown	Slow, significant declines	Unknown
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.2. Species disturbance		

Conservation Actions in Place

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Conservation Actions in Place
In-Place Land/Water Protection and Management
Conservation sites identified: Yes, over entire range
In-Place Species Management
Successfully reintroduced or introduced benignly: No
Subject to ex-situ conservation: No

Conservation Actions Needed

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Conservation Actions Needed
1. Land/water protection -> 1.2. Resource & habitat protection
3. Species management -> 3.1. Species management -> 3.1.1. Harvest management
5. Law & policy -> 5.2. Policies and regulations
6. Livelihood, economic & other incentives -> 6.1. Linked enterprises & livelihood alternatives

Research Needed

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Research Needed
1. Research -> 1.2. Population size, distribution & trends
1. Research -> 1.3. Life history & ecology
1. Research -> 1.5. Threats
1. Research -> 1.6. Actions

Additional Data Fields

Population
Number of mature individuals: 10
Continuing decline of mature individuals: Yes
Extreme fluctuations: No
Population severely fragmented: No
Extreme fluctuations in subpopulations: No
Habitats and Ecology
Generation Length (years): 22-25

The IUCN Red List Partnership



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