



Project to provide training to Pacific Islands Region scientists on cetacean research and conservation techniques and conduct an assessment of cetacean populations in the proposed World Heritage Seascape in Fiji

IMPLEMENTING AGENCIES

Wildlife Conservation Society (WCS), USA
Whale and Dolphin Conservation Society (WDCS) International, UK

COLLABORATING AGENCIES

Secretariat of the Pacific Regional Environment Program
University of the South Pacific
Fiji Department of Fisheries

CO-PRINCIPAL INVESTIGATORS/TRAINERS

Brian D. Smith, Director, Asian Freshwater and Coastal Cetacean Program, WCS
Cara Miller, Program Leader, Pacific Islands Region / Research Biologist, WDCS International

LOCAL PROJECT COORDINATOR

Staff from WCS-South Pacific Program

TRAINER/SURVEY PHOTOGRAPHER/DATABASE MANAGER

Rubaiyat Mansur Mowgli, Principle Researcher, Bangladesh Cetacean Diversity Project

OBJECTIVES

The objectives of this project are to:

- Increase the capacity of local scientists in the Pacific Islands Region to conduct research on cetaceans and to develop and implement science-based strategies for their conservation;
- Assess the conservation status of cetacean populations in the proposed World Heritage Seascape in Fiji, inclusive of the Vatu-i-Ra Channel and waters adjacent to Ovalau, Wakaya, Koro and Gau Islands);
- Integrate cetacean conservation into protected area planning for Fiji and other Pacific Island Countries and Territories;

- Strengthen cooperation among Pacific Island Countries and Territories in support of the CMS Memorandum of Understanding for the Conservation of Cetaceans and Their Habitats in the Pacific Islands Region; and
- Identify and mentor 2-3 graduate students from the Pacific Islands Region to continue and build up cetacean work initiated by this project.

INDICATORS OF ACHIEVEMENT

Indicators of achievement will include:

- Core group of scientists and conservationists from the Pacific Islands Region trained in cetacean population assessment techniques and approaches for conservation management;
- Cetacean concerns integrated into marine protected area planning in Fiji;
- Information generated and published in a peer-reviewed science journal and popular articles in the local and international media on the status of cetaceans and management strategies for their protection in the proposed UNESCO World Heritage Seascape in Fiji; and
- Increased awareness among government officials, NGOs, and local communities of the Pacific Island Countries and Territories on the status of cetaceans and promote cooperation on implementing measures needed for their conservation.

DURATION

April 2009 - Dec 2011

BACKGROUND

There has been a great deal of recent progress on developing policies in support of cetacean conservation in the Pacific Islands Region. This includes declaration of whale sanctuaries in the Cook Islands, Fiji, French Polynesia, Niue and Australia, signing by 11 Pacific Island Countries of the Convention of Migratory Species (CMS) Memorandum of Understanding (MoU) for the Conservation of Cetaceans and their Habitats in the Pacific Islands Region (CMS 2006), and development of the Pacific Islands Region Whale and Dolphin Action Plan (2008-2012) under the South Pacific Regional Environmental Programme (SPREP).

The Pacific Island Region, as defined by the Noumea Convention, contains 22 Pacific Island Countries and Territories, as well as a portion of the Australian continent, both the North and South Islands of New Zealand, and a portion of the Hawaiian Islands. It reportedly supports the most extensive and biologically diverse coral reefs in the world, the deepest ocean trenches, and the world's largest tuna fishery. The Exclusive Economic Zones (EEZs) of these islands also support a range of globally threatened species including at least 30 cetaceans. Threats to cetaceans in the Pacific Island Region include fisheries bycatch, habitat degradation, drive hunts, live captures for captive display and export, and "scientific" whaling conducted by Japan in the summer feeding grounds of fin *Balaenoptera physalus*, minke (*Balaenoptera acutorostrata* sp.) and humpback

Megaptera novaeangliae whales. Outside of Australia, Hawaii, and New Zealand, rapid progress on policy development in support of cetacean conservation has not been matched by intensive implementation of capacity building and field research initiatives.

The EEZ of Fiji includes an area of about 1.3 million sq km that encompasses more than 300 Islands and 500 Islets with an aggregate land mass of slightly more than 1% of the total area. By far the largest islands are Viti Levu, with an area of about 10,400 km², and Vanua Levu, with an area of about 5,600 km² separated by about 65 linear in the Vatu-i-Ra Channel. A UNESCO World Heritage Seascape has been proposed in the Vatu-i-Ra Channel inclusive of waters surrounding Ovalau, Wakaya, Gau, and Koro Islands.

At least four baleen whale species occur in Fijian waters, including Bryde's *B. brydei/edeni*, minke *B. acutorostrata/bonaerensis*, fin and humpback. In addition, blue whales *B. musculus* and sei whales *B. borealis* may also occur in Fijian waters but their presence has not been confirmed. The waters of Fiji were confirmed as breeding grounds for humpback whales according to the presence of young calves and documentation of singing behavior associated with courtship. Humpback whales were apparently much more abundant in the waters around Fiji in the late 1950s compared to the present. This situation is mirrored in other areas of Oceania and can almost certainly be explained by the large take of the species in their high-latitude summer feeding grounds of the Antarctic (Garrigue *et al.* 2000; Paton and Clapham, 2002). During the 1959/60 Antarctic whaling season, Soviet whalers illegally killed almost 13,000 humpback whales (Mikhalev 2000) in waters believed to be the feeding grounds of animals that spend their winter around Fiji. This is in addition to the whales hunted under their quotas sanctioned by the International Whaling Commission.

The waters of Fiji also support a variety of odontocete cetaceans including sperm *Physeter macrocephalus*, short finned pilot *Globicephala macrorhynchus*, false killer *Pseudorca crassidens*, and Blainville's beaked *Mesoplodon densirostris* whales, and spinner *Stenella longirostris*, pantropical spotted *S. attenuata* and bottlenose *Tursiops truncatus/aduncus* dolphins. There are also unconfirmed reports of Orcas *Orcinus orca*, pygmy sperm whales *Kogia breviceps*, and common *Delphinus delphis*, Fraser's *Lagenodelphis hosei*, and rough-toothed *Steno bredanensis* dolphins in Fijian or adjacent waters (Reeves *et al.* 1999; Miller 2007). Other tropical odontocetes are probably also occasional visitors to Fiji, including melon-headed *Peponocephala electra*, pygmy killer *Feresa attenuata*, and Cuvier's beaked *Ziphius cavirostris* whales, and striped *Stenella coeruleoalba* and Risso's *Grampus griseus* dolphins, but their presence has not been recorded probably due to the lack of investigative effort.

No abundance estimates or quantitative information on the ecology of any cetacean species are available for Fijian waters, nor does systematic data exist on the threats they face. This includes cetaceans living in waters of the proposed UNESCO World Heritage Seascape.

ACTIVITIES

This project will consist of a training course on cetacean population assessment techniques for scientists and conservationists (9-12 persons) from the Pacific Islands Region, an intensive line-transect survey in the proposed UNESCO World Heritage Seascape in Fiji conducted by the training course participants, and follow-up mentoring of 2-3 graduate students from the Pacific Islands in cetacean studies. Tentative plans are to develop the training curriculum and organize survey logistics during April-June 2009, and then conduct the training course and survey in July 2009, with data analysis, write-up and graduate student mentoring supported by the project until December 2010.

Training

A four-day training course will be held in Fiji to provide participating scientists and conservationists with the practical skills needed to carry out cetacean assessments, analyze searching effort and sighting data, and integrate research results into protected area planning and fisheries management. The training course will be interactive and include presentations, discussions, and laboratory and field exercises on: (1) Introduction to cetaceans of the Pacific Islands Region; (2) Using conservation science for sustainable management; (3) Identification of cetaceans at-sea and from carcasses and skeletal remains; (4) Data collection and analytical techniques for estimating cetacean abundance using distance sampling and photo-identification techniques; (5) Investigating ecological relationships (6) Use of a GPS for cetacean studies; (7) Collecting and preserving genetic samples; (8) Collecting and using data on marine mammal morphometrics and meristics. A handbook will be provided to each training course participant. The handbook will supplement material covered during the training course and serve as a resource for future reference.

Survey

Scientists participating in the training course will carry out the cetacean survey under the supervision of the co-principal investigators and training assistant. During the surveys observers will stand watch, one stationed on each the port and starboard sides, searching with handheld binoculars from the beam to about 10° past the bow, and one in the center searching in about a 20° cone in front of the bow. The center observer also serves as the data recorder. Observers will rotate through these positions approximately every 30 minutes, and be given at least a one-hour break for every 90-minute period spent actively searching for dolphins (i.e. on-effort). The vessel crew and resting observers will be instructed to keep cetacean sightings a secret until the on-effort observers detect them, or the entire group has passed well behind the vessel beam. A Global Positioning System (GPS) will used to determine our position, speed, course and the distance covered along the trackline. These data, along with Beaufort sea-state and the presence or absence of glare, fog and/or rain, will be recorded on a standardized effort log. Data entries will be made after all observer rotations and any substantial change in vessel course or sighting conditions. Transect lines will be designed to systematically search coastal waters according to the most unbiased route (i.e. one that avoids following environmental

contours). Vessel speed will be maintained at about 15 km/hr. Every five kilometers along the trackline and at the location of cetacean sightings a two-person environmental team will record our position with a Global Positioning System (GPS) and information on environmental parameters such as sea surface temperature, depth, salinity and turbidity.

When a cetacean group is sighted, information will be recorded on a standardized sighting form that includes entries for geographic position, time of sighting, Beaufort sea-state, and estimated distance and relative angle from the bow to the dolphin group. Distances will be estimated according to the number of binocular reticles from the animal cluster to the horizon and the relative angles will be determined from the difference between the vessel course (as measured by the GPS in magnetic degrees) and the bearing to the dolphin group (as measured by the internal compass in our binoculars). Survey effort will then be suspended and the vessel will turn towards the cetaceans for species identification and to obtain a more accurate estimate of group size. Photographs will be taken to confirm species identifications, use in local educational outreach programs, and develop photo-identification catalogues with particular emphasis on Indo-Pacific bottlenose and spinner dolphins and humpback whales. After finishing these tasks, the vessel will return to the transect line while the team remains off-effort (i.e. while not actively searching for new dolphins) to the position where we left the trackline, while at the same time tracking the movements of the cetacean group to avoid double counting the animals when we resume search effort. While searching for cetaceans a separate observer will maintain watch and record sighting data on active fishing vessels (i.e. those with their gear deployed and not just underway or drifting) including the geographic position, number and type, and the estimated distance to the vessel when it was positioned perpendicular to the beam of the survey vessel.

Assuming a sufficient number of sightings to estimate species abundance, the density of cetacean species and their associated coefficient of variation (CV) will be estimated using the program DISTANCE v3.5. Sighting will be plotted on a GIS map prepared from satellite imagery and bathymetry charts, and habitat analyses will be conducted with General Additive Models. The total number of fishing gears according to type will be estimated using a strip-transect technique and CV's calculated from the variance in the number of sightings of each fishing gear type recorded each day.

Generalized Additive Models (GAMs) will be used to investigate relationships between environmental variables measured along the trackline and at the locations of dolphin sightings. Binomial GAMs with a logit link will fit to presence-absence data of cetaceans according to species using R software with a multiple generalized cross-validation (mgcv) package. The mgcv package's Un-Biased Risk Estimator criterion (UBRE) will guide model selection. Mann-Whitney U Tests will be used to investigate environmental differences between species for depth, salinity, sea-surface temperature and turbidity, and a discriminant analysis will be used to explore linear combinations of predictor variables that provide the best discrimination between species..

Mentoring

Two or three students or resource managers from the Pacific Islands will be identified during the training course and survey to continue and build up the cetacean work initiated by this project. Mentoring will consist *inter alia* of involving them in data analysis and write-up of the Fiji survey and promoting them for further professional training and as future cetacean project leaders. Special emphasis will be made to involve members of the Kubulau, Gau, Koro and Ovalau communities and a representative from the Fiji Department of Fisheries.

TIMELINE OF ACTIVITIES

April – June 2009

- Organize training course and survey logistics.
- Develop training course curriculum and student handbook.
- Identify and invite training course and survey participants.

July- September 2009

- Conduct training course and Fiji survey.
- Compile survey data.
- Identify graduate students for mentoring.

October 2009 – May 2010

- Work together with graduate students on data analysis and writing technical paper
- Make conservation management recommendations for incorporating the needs of cetaceans into protected area planning for the UNESCO World Heritage Seascape.
- Assist students with professional training and help them develop a proposal for their own cetacean research projects.

June 2010 – December 2011

- Submit technical paper to peer reviewed science journal and popular articles to the local and international media.
- Support efforts by graduate students to find funds and implement cetacean research projects.
- Assess additional research and conservation needs for Fiji.

BIOGRAPHS OF PROJECT LEADERS

Brian D. Smith directs the WCS Asian Freshwater and Coastal Cetacean Program and has demonstrated leadership through nearly 15 years of cetacean research and conservation projects in Asian countries, including Myanmar, Thailand, Nepal, India, Vietnam, Bangladesh and the Philippines. Mr. Smith previously served as team leader on several large-scale, international cetacean research projects of the U.S. National Marine Fisheries Service. He currently serves as the Asia Coordinator of the IUCN Species Survival Commission Cetacean Specialist Group and is a member of the Convention on

Migratory Species Cetacean Liaison Group. He has a strong publication background and extensive experience as a science and environmental educator.

Cara Miller leads the Pacific Islands Region program for WDCS International. Cara authored the most recent background document on cetaceans in the Pacific Islands Region (*'Current State of knowledge of cetacean threats, diversity and status in the Pacific Islands Region'*), is a member of the SPREP technical advisory group for Pacific cetaceans, and has presented her work at numerous regional and CMS meetings. Cara has recently facilitated two cetacean capacity building workshops in the Pacific Islands Region in Suva, Fiji (September 2007) and Madang, Papua New Guinea (November 2007) and has also been active in setting up regional research projects in both of these countries as well as Vanuatu and the Federated States of Micronesia. Cara has academic experience including university lecturing, a record of peer-reviewed publications and post-graduate degrees in both Biological Oceanography and Applied Statistics. With her Pacific Islands work to date Cara has consistently worked with in-country staff to ensure that research is conducted in a manner that is effective and efficient in use of resources, builds and complements both prior and current work, and is compatible with regional circumstances.

Rubaiyat Mansur Mowgli has been working as a wildlife photographer and nature guide in the Sundarbans mangrove forest since 1992. He became involved with cetacean research in 2002 as a researcher on cetacean surveys in waterways of the Sundarbans mangrove forest and coastal waters of Bangladesh and Myanmar. During the surveys in Bangladesh he also served as trip leader for survey logistics and vessel management. In winter 2005, with support from the Whale and Dolphin Conservation Society, he initiated an investigation on the abundance and movement patterns of Indo-Pacific bottlenose dolphins using photo-identification techniques in the waters surrounding the Swatch-of-No-Ground, a 900m+ deep submarine canyon.. In 2006 Rubaiyat spent one month as a volunteer intern with the Mote Marine Laboratory Sarasota Dolphin Research Program in Florida under the supervision of Dr. Randy Wells. In addition to leading the current photo-identification project on bottlenose dolphins, Rubaiyat currently holds a full-time position as principal researcher for the Bangladesh Cetacean Diversity Project.

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