



# **Biodiversity Conservation at the Landscape Scale**

A Program of the Wildlife Conservation Society  
Supported by the USAID/Global Conservation Program

## **Glover's Reef Living Seascape: Safeguarding Marine Resources and Rural Livelihoods in Belize**

**Implementation Plan  
October 2006 – September 2007**

Living Landscapes Program- Belize/Glover's Reef  
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### Project Goal

To ensure conservation of biological diversity in regions of global biodiversity importance, using a species-based landscape or seascape approach.

The Wildlife Conservation Society believes that protected areas must remain at the core of all nations' biodiversity conservation plans. These areas typically contain a higher diversity and abundance of plants and animals than landscapes or seascapes managed primarily for economic use. Yet, parks and reserves are always embedded in larger, human-dominated landscapes or seascapes and are seldom sacrosanct. Regardless of how large or small a protected area may be, the plants and animals it contains are often threatened either directly or indirectly by human resource use activities.

Management of parks and reserves cannot, therefore, occur in isolation from the surrounding human-dominated landscape or seascape, but must take into account where and how human activities conflict with biodiversity conservation, and where conservation adversely impacts human welfare. As human populations continue to expand over the next 50 years, the incentive for over-exploiting natural resources within and outside of protected areas will likely increase and the need for biodiversity conservation tools that address human-wildlife conflict will become even more important.

The Living Landscapes Program promotes conservation of landscapes or seascapes by focusing efforts on key animal species that require large areas for their conservation, are particularly at risk because they cross land use and jurisdictional borders, and, when protected, will have the greatest positive impact on biodiversity as a whole. These landscape or seascape species are highly mobile, vulnerable animal species, and their conservation fosters a focused and cost-effective way to retain a full complement of biodiversity and overall ecological integrity. To conserve these species, parks and reserves must be integrated into the broader landscape or seascape, a landscape or seascape in which people exploit natural areas and wild species to meet their socio-economic needs.

The BCLS Program is designed to ensure biodiversity conservation in four core sites by identifying actions to conserve landscape or seascape species, and by increasing the capacity of local and national institutions to implement such actions. The four areas of global biodiversity importance for current WCS involvement and USAID activity are:

- Northwestern Bolivian Andes Landscape Conservation Area (Bolivia)
- Glover's Reef Living Seascape (Belize)
- Maya Biosphere Reserve Living Landscape (Guatemala)
- The Eastern Steppe Living Landscape (Mongolia)

## **The Glover's Reef Living Seascape Project**

**Goal:** To conserve the outstanding biodiversity and natural beauty of Glover's Reef and, by synthesizing and disseminating lessons learned, promote the sustainable use of its marine resources through the adoption of best practices within WCS and throughout the conservation community.

Glover's Reef, Belize is one of six globally significant landscapes or seascapes included in WCS' overall GCPI & GCPII/USAID portfolio of conservation sites, and the first coral reef site to be adopted under the WCS Living Landscapes program. This program seeks to develop and test wildlife-focused strategies that will identify and resolve conflicts between people and wildlife that threaten important wild places and the biodiversity they support. The approach is threats-based and highly participatory.

Although Glover's Reef Atoll has been established as a marine reserve, the protected area needs to be integrated into the surrounding region – to be managed within the realities of the regional social and economic context - if it is to prevail within an increasingly human-impacted seascape, as many of the threats originate beyond the boundaries of the reserve. One major means of integration is ensuring that the socio-economic requirements of the various stakeholders are openly considered and addressed.

The Atoll supports extraordinarily high biological diversity and possesses the greatest range of reef types in the Caribbean Sea. Located 30 miles off the coast of Belize, the Atoll's well-developed spur and groove outer reef structure encircles a shallow lagoon that is dotted with more than 800 patch reefs. The shallow protected waters of the Atoll's lagoon provide nursery and feeding habitats for at least three species of sea turtles, eight species of sharks and rays, more than twenty species of aggregating reef fish, and numerous species of coral. The northeastern corner of the Atoll is the site of one of the Caribbean's largest and last remaining Nassau grouper spawning aggregations, a spectacular biological phenomenon with cultural and economic importance that is severely threatened across the Caribbean. The benthic community of corals and sponges on the western wall of Glover's is among the most diverse and densely covered sites reported anywhere in the Caribbean, exhibiting 95% living cover and as many as 11 species per square meter.

Given its biological and ecological importance, its distance from the mainland, and its relatively pristine condition when compared with other Caribbean reef sites, Glover's Reef Atoll has emerged as a priority for long-term conservation. The Atoll is the third largest marine reserve in Belize with an area of almost 36,000 hectares, and was declared a World Heritage Site in 1996. Despite its protected status, Glover's Reef Atoll is threatened by human activities, both on-site from over-fishing and inappropriate tourism development, as well as off-site from increased terrestrial runoff due to deforestation that can lead to increased turbidity and nutrification, and the effects of global climate change such as increasing sea temperatures. In general, coral reefs flourish in clear water that allows sunlight to penetrate and provide the energy required for photosynthesis by the corals' symbiotic algae, promoting optimum coral growth. Waters high in nutrients often lead to overgrowth of macro algae on corals and an ultimate decline in coral cover and diversity. Corals are particularly susceptible to high sea temperatures, which cause many corals to 'bleach' or lose their symbiotic algae, often resulting in coral mortality. The Wildlife Conservation Society seeks to ensure the long-term conservation of this world-class site by identifying specific threats to the Atoll, building and strengthening alliances with stakeholders to support long-term conservation, and strategic implementation of conservation interventions.

Key threats to the Atoll's biodiversity include the following:

- Unsustainable fishing
- Lack of alternative activities for fishermen
- Impacts of global climate change
- Nutrification and high turbidity of the Atoll's lagoon

- Lack of support for the marine reserve by some stakeholders
- Insufficient information available for strategic conservation management
- Lack of long-term financing.

The objectives of the Glover's Reef Living Seascape (GRLS) project, and proposed associated activities, are specifically geared towards reducing these threats through the development and implementation of a multi-partner strategy.

**Total Anticipated Level of Effort in FY2007**

**Glover's Reef Living Seascape: \$ 279,000 (USAID/EGAT: \$90,000; WCS: \$189,000)**

**IMPLEMENTATION PLAN FY2007**

**OBJECTIVE 1: Develop and adopt a participatory strategy to reduce threats to marine life in the Glover's Reef Living Seascape**

**Level of Effort (Total Objective 1): \$38,000 (USAID/EGAT \$13,000; WCS \$25,000)**

We continue to develop and refine the final seascapes and plan to use these as the basis of the Seascape Conservation Strategy for Glover's Reef. The resultant strategy will focus on the priority interventions for reducing threats and will inform the process of adaptive management for the atoll.

**Activity 1.1 Complete threats and stakeholder analyses through a series of focused meetings in consultation with the Glover's Reef Reserve Advisory Committee.**

This activity was completed in FY04.

**Level of Effort: \$0 (USAID/EGAT: \$0; WCS: \$0)**

**Activity 1.2 Create a "roadmap" for conservation intervention by completing a Seascape Species Analysis.**

With conservation seascapes already designed for queen conch, star coral and black long-spined sea urchin, the final remaining conservation seascapes for the hawksbill turtle, Nassau grouper, Caribbean reef shark and osprey will be developed with the assistance of the LLP program in NY, using the MARXAN software. The cost index map, now revised by the stakeholders, as well as the recently collected and compiled data on bathymetry and the caye habitats crucial to the accuracy of these models, will also be fed into the analysis. The set of final seascape maps will be finished during the first two quarters of the year and will inform any changes that need to be made to the priority interventions and to current management measures. Presently our priority interventions are aimed primarily at reducing indirect threats such as inadequate legislation, lack of alternative livelihoods for fishers, weak enforcement and management, lack of key management data, lack of support from stakeholders, insufficient planning and lack of general awareness.

**Level of Effort: \$13,000 (USAID/EGAT: \$3,000; WCS: \$10,000)**

**Activity 1.3 Identify high priority interventions.**

By the third quarter of FY07, the Conservation Strategy will be drafted according to the outline that has been prepared. The document, which will be adopted as a product of the Glover's Reef Advisory Committee (GRAC),

will chronicle the results of the planning process we have followed. This process has included the threats assessment, development of the conceptual models that depicts the links between the priority interventions and the threats, the seascape species selection approach, and the conservation seascapes that represent the intersection between the human and biological seascapes -- all culminating in the final product: the Conservation Strategy that comprises our recommendations for strengthening management of the outstandingly biologically diverse seascape of Glover's Reef. The Strategy document will also include a section on the importance of monitoring and evaluation. It will be reviewed by the GRAC and other key partners and organizations such as the Belize Tourist Board, the Dept. of Environment, the Forest Dept. and the University of Belize. Amendments and additions resulting from the review process will be incorporated in the final version. The report will then be printed and distributed to the many stakeholders of the Atoll reserve.

The Strategy will provide timely input to the revision of the reserve's existing management plan, which we are also planning to assist the Fisheries Department with during this project period. This plan will be prepared according to the format described in the National Protected Area Policy and System Plan for Belize that was approved by the government in January 2006.

As in previous years, investigations will continue (1) to fill the gaps in our knowledge of the causes and the severity of the threats identified, and (2) to show the success of our strategic interventions. These will include continued monitoring of coral health, the predicted recovery of the spawning aggregation site on the northeast corner of the Atoll that was closed to fishing in 2002, and the final stages of the development of a spatial database of these monitoring and research efforts. Our monitoring framework supplies the guide for measuring our progress towards reaching our conservation objectives for our seven seascape species, as well as the reduction of threats and the implementation of our interventions.

**Threats addressed and results/outputs anticipated:**

The Conservation Strategy will be finalized to include recommendations for changes in boundaries of management zones and for changes in management practices. As mentioned above, we expect that recommended actions resulting from the analyses will be incorporated in the new Glover's Reef Marine Reserve management plan. As the recently-endorsed official format for management plans requires that management be based on the reduction of threats, the Strategy will have immediate application to the new plan for this marine reserve.

Documented information on the possible signs of recovery of the spawning site should encourage compliance and support for the closure amongst fishermen. In general, addressing the threat of lack of information by providing the scientific and monitoring data should lead to better-informed managers and stakeholders. We expect that an informed group of managers and stakeholders will in turn lead to improved technical capacity and enhanced motivation to improve management.

**Level of Effort: \$25,000** (USAID/EGAT: \$10,000; WCS: \$15,000)

**OBJECTIVE 2: Develop and implement sustainable and adaptive mechanisms to strategically address threats across the seascape**

Although the Glover's Reef Seascape Conservation Strategy document has not yet been finalized, we have completed most of the components in the planning process for the Strategy. These have revealed the priority actions that will contribute to achieving our conservation objectives and we have been implementing many of these activities. These include monitoring of many of our seascape species, collecting other key management data, strengthening stakeholder support for the marine protected area through our work with the GRAC and with fishermen, providing for alternative livelihoods, conducting various aspects of training, providing technical support for management, and developing educational material.

During this implementation period, work will continue on preparing and implementing development guidelines for sound tourism and residential use of the Atoll's cayes in consultation with the Advisory Committee.

Technical support will continue to be provided on an ongoing basis to the Fisheries Department and NGOs in monitoring the status of the coral reefs, seascape species, water quality and general use of the Atoll. Working with the Glover's Reef Marine Reserve staff, we expect to develop a new management plan that will incorporate the recommendations of the management effectiveness evaluation, the socio-economic surveys, and the conservation strategy for the Glover's Seascape. Training will continue to be provided for marine reserve staff and fishermen in areas such as ecological monitoring methods and enforcement techniques.

Building on the progress we have made, we will continue to work towards the strengthening of the Glover's Reef Advisory Committee with a view to its assuming more management responsibility in the future, and possibly entering in a formal co-management agreement with the Fisheries Department. We also hope to explore the possibility of engaging atoll residents in a partnership to monitor hawksbill turtle nests and in-water sightings.

To address the threat of unsustainable fishing, we plan to work along with the Fisheries Department, reserve staff and fishermen in conducting a pilot study on Fish Aggregation Devices (FADs) in the offshore waters adjacent to Glover's Reef. We also plan to provide further assistance to the local NGO in Sarteneja, SWEET (Sarteneja Wildlife, Environment and Ecotourism Team), that will help them to market the tour guiding services that the newly-trained fishers and community members have now acquired.

**Level of Effort (Total Objective 2): \$221,000 (USAID/EGAT: \$73,000; WCS \$148,000)**

**Activity 2.1 Implement Seascape Conservation Strategy in cooperation with Glover's Reef Marine Reserve staff and Advisory Committee.**

During FY07 we plan to continue our partnership with SWEET, the local NGO based in Sarteneja, to build on the support we provided the previous year in tour guide training for over 20 community members. Training in alternative livelihood activities for fishermen (Intervention 7<sup>1</sup>) is one of our high-priority actions to reduce the threat of over-fishing (Direct Threat 1). SWEET has expressed an interest in our help with equipping their new office with computers in order to assist in providing a marketing service to their newly-trained tour guides. Coupled with this equipment would be the need for training on its use, and we will also explore the possibility of offering adult education in the use of the internet. We plan to start discussions with SWEET in the next couple of months and to have the activities underway in early 2007. As we have during the last three seasons, we will hire at least two fishermen from Hopkins to assist with the monitoring of the Nassau grouper spawning site at Glover's in December/January, thus helping to offset some of their losses in foregoing fishing at this site.

We will continue to work closely with the National Spawning Aggregation Working Group<sup>2</sup> as its secretariat. During this year the Group will be finalizing its work plan, using it as a guide to focus on its main activities of monitoring, data analysis, training and outreach. A Spawning Aggregation newsletter will be prepared by June 2007 in collaboration with the Working Group, working specifically with the Fisheries Department and WWF (Intervention 9 to address Indirect Threat 10). The TV spot will also be updated and aired during the Nassau

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<sup>1</sup> Please refer to Appendix 1 for this and other numbered interventions or threats highlighted in the text that follows. This appendix details the general and seascape species specific conceptual models for the Glover's Reef Living Seascape showing the goal, conservation targets, the key threats militating against those targets and the strategic interventions that are being carried out to mitigate the threats. The conservation targets, threats (direct and indirect) and interventions are uniquely numbered and these numbers carry over between all four models.

<sup>2</sup> Members of the Group include representatives from the Fisheries Department, CZMAI, Belize Audubon Society, Green Reef, Toledo Institute for Development and Environment, Friends of Nature, Toledo Association for Sustainable Tourism and Empowerment, University of Belize, Belize Fishermen Co-operative Association, WWF, TNC and WCS.

grouper spawning season, reminding fishers that 11 spawning sites are closed to fishing year-round and that there is a four-month closed season for Nassau grouper (Intervention 9). In view of the results of a survey we carried out to determine the effect of our public awareness materials, the newsletter and TV spot will both be amended accordingly to impact the widest audience possible.

We are also in discussions with the Fisheries Department with a view to completing a new management plan for the Glover's Reef Marine Reserve (Indirect Threat 7) with the assistance of a consultant, as detailed below. The plan will be developed according to the requirements laid down by the National Protected Area Policy and System Plan. As part of this process, which we expect will begin in the third quarter of FY07, the new plan will incorporate the elements and recommendations included in our management effectiveness evaluation, socio-economic studies, and conservation strategy (Intervention 13). Related to this activity, we are also committed to initiating a study on the financial sustainability of the reserve during FY07 (Intervention 14, addressing Indirect Threat 13). Presently we are not sure what shape this activity will take, but options range from a complete business plan, to a study by a business school similar to the one by INCAE (Instituto Centroamericano de Administración de Empresas) of the University of Costa Rica for the Bacalar Chico Marine Reserve, to the development of the type of plan recommended by the Mesoamerican Reef System (MAR) Fund. It is expected that a decision on the type of plan will be made during FY07.

In addition, as mentioned below, other interventions include the collection of fish catch and effort data, preparing development guidelines for the atoll cayes, training activities, and monitoring of reefs and seascape species. Involvement of fishermen, GRAC members and reserve staff in these activities, and sharing the data with these groups, will also help in raising awareness through increased knowledge (addressing Indirect Threats 9 and 10).

**Threats addressed and results/outputs anticipated:**

Consolidating the training of fishermen in Sarteneja in the alternative livelihood of tour guiding will help to reduce their dependence on fishing and, at the same, time help to reduce the unsustainably high fishing pressure - the largest threat to Glover's Reef. Educational and public awareness activities are geared towards informing users of the reserve of the relevant regulations, thus fostering compliance which will lead to conservation of many of the resources of the coral atoll. Having a comprehensive plan for the reserve will strengthen its management for the longer term.

**Level of Effort: \$75,000** (USAID/EGAT: \$35,000; WCS: \$40,000)

**Activity 2.2 Provide technical support and training to the Glover's Reef Marine Reserve staff, the Belize Fisheries Department, and the CZMAI to improve management of the reserve and enforcement of fisheries and land-use regulations**

Support to the Glover's Reef Advisory Committee (GRAC) will continue over the course of the year (Intervention 1), and travel costs for members to attend the quarterly Committee meetings will be covered. Weather permitting, one of the meetings will be held on site at Glover's Reef to give the members the opportunity to observe reserve management firsthand. As Secretary of the Committee, WCS will provide assistance to the Marine Reserve staff in arranging Advisory Committee meetings, and documenting and distributing the minutes of meetings. During this year, the GRAC will be addressing crucial issues such as the enforcement policy, limited access by fishers to the Glover's Reef Marine Reserve, and the development of the new reserve management plan. We also expect that members will be following up on the results of the management effectiveness evaluation, particularly in relation to membership of the GRAC and the patrols of the reserve.

To address the threat of pollution from sewage discharge (Direct Threat 3) leading to eutrophication (Direct Threat 2) and habitat loss, we will hire a planning consultant during the first quarter. The consultant will prepare development guidelines for the cayes of the atoll that are in keeping with the draft National Cayes Development Policy, the Dangriga Coastal Planning Region guidelines, and the National Coastal Zone Management Strategy

(Intervention 17). This activity will be carried out in consultation with the Glover's Reef Advisory Committee and caye and resort owners, and will include guidelines on matters such as waste disposal and pollution control, building density and land use, coastal structures, vegetation clearance and sensitive habitats, etc. The consultant will also be required to assist in the design of educational material on topics such as the harmful effects of introducing exotic species, the impact of nutrient run-off on corals and the importance of appropriate sewage disposal, and relevant laws governing mangrove clearance, shorelines structures and the beach reserve (Intervention 9). The guidelines will also be reviewed by the Belize Tourism Board, University of Belize, Lands Department, and Department of Environment. We expect that these guidelines will be adopted by the relevant government agencies and that as a result of the participatory mode of their development, they will also be voluntarily adhered to by the caye landowners on Glover's Reef.

**Threats addressed and results/outputs anticipated:**

Enhanced involvement of the Advisory Committee members in the reserve's management, and improved level of attendance and participation at meetings, will help to ensure that management activities will be focused on reducing threats. The development guidelines prepared for the atoll cayes will help to guide future development and minimize the impacts of the current facilities – especially tourism infrastructure – on the atoll's marine environment.

**Level of Effort: \$32,500** (USAID/EGAT: \$7,500; WCS: \$25,000)

**Activity 2.3 Strengthen and expand stakeholder support for the Seascape Conservation Strategy – e.g. fishermen (divers for lobster, conch and finfish, as well as handline fishers), Atoll residents, and tourism operators, as well as mainland communities that are highly dependent on the health of the reef (Hopkins, Sarteneja and Dangriga).**

The fisheries catch data collection program for the Atoll will be an ongoing activity in FY07 (Intervention 8, addressing Indirect Threat 4). The system we are implementing is working successfully, with data collectors active on-site at Glover's and at the landing beach in Hopkins, and with over 60 fishermen participating and being compensated for supplying data with fuel coupons redeemable at a fishing co-operative in Belize City and a marina in Hopkins. In February 2007 we will have data for a two-year period which will lead to more meaningful results and stronger justification supporting the recommendations for a size limit and ban on spear fishing of the Nassau grouper (Intervention 2 addressing Indirect Threat 1), as well as contributing toward the development of a sustainable fishing model for the Atoll (Direct Threat 1). The data should also demonstrate sustained catches near the no-take zone over time, thus showing fishermen the tangible, positive benefits of the reserve to their livelihoods.

During the first quarter of FY07, we plan to conduct the second training session for approximately eight to ten fishermen in patrol techniques for biodiversity protection, and use of radio and Global Positioning System (GPS) (Intervention 6 addressing Direct Threat 1). As in the previous training, it will be carried out in partnership with the Fisheries Department, the Belize Fishermen Co-operative Association, and National Fishermen Co-operative. As part of a complementary project, selected fishermen will also be provided with radios by the Avina Foundation to enable them to fully assist in monitoring at Glover's Reef. Over the year, we will also follow up with the fishermen who have received training and equipment. In addition, during the third quarter of FY07, we plan to partner with the local NGO Green Reef to offer training to selected fishermen in the Reef Check monitoring technique<sup>3</sup>. Green Reef is the focal contact in Belize for this technique and is involved in annual Reef Check monitoring at Glover's Reef. Trained fishermen would be invited to take part in this monitoring program during future Reef Check monitoring activities on the Atoll (Intervention 4). The Reef Check monitoring will not only

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<sup>3</sup> Reef Check, which is the UN's official community-based reef monitoring program and also used by the International Coral Reef Action Network (ICRAN) project, is a globally-used method that is very user-friendly and thus easily taught to groups such as divers and fishermen. The data collected are fed into a global database.

generate useful data on the health of the reef that will be accessible globally, but also give fishermen a better understanding of the marine system by directly involving them in the monitoring of their marine resources. In addition, the annual monitoring program should provide the opportunity of an alternative economic activity for some fishers.

During this period we will also initiate a new activity aimed at reducing the threat of over-fishing of reef fishes. We will conduct a pilot study on Fish Aggregation Devices (FADs), which we will implement in collaboration with the Fisheries Department (Intervention 5 addressing Indirect Threat 2). This type of fishing has been successful in coral reef areas of the Pacific and also in the eastern Caribbean. The intent is to reduce the fishing effort on coral reef species by getting fishers to exploit the populations of pelagic species instead. We plan to work with the Fisheries Department and the Hopkins Fishermen Association in installing two FADs, assist in training interested fishermen to fish the FADs, and to collect the catch data to assess their feasibility.

**Threats addressed and results/outputs anticipated:** Involvement of fishermen in catch data collection, monitoring and patrols is intended to enhance their sense of ownership of the reserve and their appreciation for its benefits, and thus increase their support for its continued protection. Lack of their support has been a major indirect threat, leading to illegal fishing. Over time, the benefits of the reserve to fisheries production should be demonstrated through the results of these data collection and monitoring programs. In addition, the data should help determine the sustainable level of fishing for the General Use Zone of the Atoll for the various commercial species and should lead to the introduction of new legislation such as a size limit for Nassau grouper and a ban on spear fishing in the reserve.

**Level of Effort: \$67,500** (USAID/EGAT: \$14,500; WCS: \$53,000)

**Activity 2.4 Introduce innovative co-management arrangements with stakeholders to foster buy-in for conservation action.**

As the government's moratorium on co-management agreements for protected areas remains in effect for the time being, we have focused on strengthening the capacity of the Glover's Reef Advisory Committee (GRAC) to assume the role of a co-manager partner in the future once the moratorium has been lifted (Intervention 12). We will continue to facilitate this capacity-building process by providing support for its quarterly meetings, visits to the reserve, and collaboration with reserve staff, thus helping to prepare the Committee to assume more management responsibility. We have noted an increase in the level of involvement by the GRAC in crucial issues such as enforcement and limited fishing access.

In relation to other informal co-management agreements, we plan to initiate a turtle nesting and in-water monitoring program with the residents of Long Caye and Northeast Caye during FY07 (Interventions 11 and 26). The preparation of development guidelines (described above) may also provide other opportunities for informal agreements with the caye residents and landowners.

**Threats addressed and results/outputs anticipated:**

We expect that the increased level of responsibility of the Glover's Reef Advisory Committee in the management of the reserve will result in improved day-to-day implementation of activities that will reduce illegal fishing, increase support from stakeholders, and strengthen enforcement. This will lead to overall improvement in the level of protection of the reserve's resources and biodiversity. In addition, the initiation of turtle nest and in-water monitoring will help to supply basic data required to inform management (Indirect Threat 4).

**Level of Effort: \$6,000** (USAID/EGAT: \$1,000; WCS: \$5,000)

**Activity 2.5 Develop new, and strengthen ongoing, sustainable long-term programs to track reef health (e.g. coral cover, algal abundance, and coral species diversity), water quality, and population status of commercially and ecologically important reef species (e.g. groupers, sharks, snappers) by Reserve staff and staff of key agencies such as the Fisheries Department, CZMAI, and other NGOs involved in reef management.**

Each quarter during FY07, GRLS staff will continue to work with marine reserve staff to collect monitoring data on commercially fished species of lobster, conch and five finfish species, using the LAMP (Long-term Atoll Monitoring Program) monitoring protocol (Interventions 18 and 23). In view of the importance of parrotfish in maintaining the health of the reef, we have also added this group of fish to our list of species monitored. The four datasets will be analyzed at the end of the year and the results, along with the results for the previous year, will be presented to the marine reserve staff, the Fisheries Department and the Glover's Reef Advisory Committee. The data will be shared with the Fisheries Department, thus providing the management authority with information demonstrating the importance of no-take areas in sustaining fisheries and also supplying baseline information that can be used to monitor trends over the long term for these commercial species.

Conch and Nassau grouper data collected will track the status of these seascape species over the remaining length of the project. Furthermore, we will be in regular contact with the Fisheries Department throughout the year to monitor progress towards the introduction of new legislation governing these two species<sup>4</sup> as well as the proposed protection of parrotfish.

With the assistance of caye residents and reserve staff, we plan to monitor the nesting and in-water activity of turtles, in particular hawksbill turtles, on the atoll cayes (Intervention 26). This activity is scheduled for the first quarter of FY07. We will also continue the monitoring of osprey nests, mapping the location of nests with the use of a GPS (Intervention 27).

In addition, in collaboration with marine reserve staff, GRLS staff will participate in the monitoring program of spawning aggregations of the Nassau grouper, a seascape species (Intervention 1). Data collected by this monitoring during December 2006 – January 2007 will be placed in the national spawning aggregation database, which is shared by members of the National Spawning Aggregation Working Group, to inform fishermen and other interested parties of the results of our monitoring and whether any sites are showing signs of recovery in response to the protective legislation.

In relation to reef recovery efforts from the 1998 bleaching event, in the second quarter of FY07 we will be synthesizing the results of the Mesoamerican Barrier Reef System Project synoptic monitoring program that have recently been released, the information from a Belizean student's thesis that includes coral reef monitoring data from Glover's, and the results of a recent AGRRA (Atlantic and Gulf Rapid Reef Assessment) survey conducted at the Atoll. Where possible, the sites monitored will be mapped to determine areas that may be more resilient to bleaching and whether they coincide with our previously mapped resilient or resistant areas (Intervention 20). This analysis will help inform our Conservation Strategy.

An additional activity that we plan to initiate this year is a joint monitoring program with the University of Belize to record the recovery of the black long-spined sea urchin (*Diadema antillarum*) (Intervention 24). One of the biology faculty members is an expert in this species, which is also one of our seascape species and an extremely important grazer in coral reef systems. She is interested in working on *Diadema* at Glover's Reef and involving her students in this activity. This would be a good opportunity to strengthen our ties with the national university,

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<sup>4</sup> The Nassau grouper has been threatened by over-fishing and is now an endangered species, and grave concern has been expressed about the populations of conch, a species that is now included on Appendix II of CITES. Therefore our work is geared towards effecting policy changes that will help restore healthy populations of these species.

provide an opportunity for young Belizeans to gain experience in the field, and also gather important information on a keystone species on the reef.

**Threats addressed and results/outputs anticipated:**

One of the weaknesses identified by the National Protected Area Policy and System Plan was biodiversity monitoring. Our activities will address this need by strengthening national capacity in monitoring environmental health and the status of commercial species, which will be accomplished through building a team of well-trained reserve staff and future marine biologists. The data resulting from monitoring is critical to determining whether the status of the conservation targets is improving, whether the investment in management and reduction of specific threats is worthwhile, and whether additional management interventions are necessary.

**Level of Effort: \$40,000** (USAID/EGAT: \$15,000; WCS: \$25,000)

**OBJECTIVE 3: Learn and teach best practices in the Glover's Reef Seascape and beyond.**

During the first three years of the project, important lessons have been learned during the application of the threats assessment methodology, the selection process of the seascape species, building the conservation seascapes, and the development of a monitoring framework. Aspects of these lessons have been included in several LLP Bulletins and Technical Manuals that are being shared as guides to others using this planning approach at landscapes or seascapes around the world.

To date, we have documented lessons learned in applying the Seascape Species Approach to a tropical marine site, had our threats assessment methodology adopted on a national basis as part of the official protected area management planning process, shared our fisheries catch data collection methodology and LAMP monitoring protocol with local partners, and demonstrated the role of no-take areas in conserving commercially fished species.

As we implement the Conservation Strategy in the coming years, we expect that other best practices will be revealed in relation to: (1) the preparation of development guidelines for the small islands of the Atoll; (2) the application of new types of partnerships and co-management arrangements; (3) the importance of creating networks of marine reserves to enhance system resilience; and (4) the introduction of innovative sustainable financing measures. The success of these practices will be monitored and shared with a wider audience within the country, the region and beyond.

**Level of Effort (Total Objective 3): \$20,000** (USAID/EGAT: \$4,000; WCS: \$16,000)

**Activity 3.1 Document the lessons learned from the application of the Living Landscapes approach to priority setting within a marine site.**

The modeling process for developing the conservation seascapes for a marine system – and therefore conservation action priorities – will be documented and contrasted to the process when applied to a terrestrial system. These lessons will be shared during the next LLP annual meeting in 2007, providing the opportunity to discuss and evaluate the lessons learned at other sites applying the Living Landscapes approach and to provide a framework for comparison as the process is applied to a site such as Glover's Reef.

**Level of Effort: \$8,500** (USAID/EGAT: \$2,500; WCS: \$6,000)

### **Activity 3.2 Extract and share best practices, in terms of management and monitoring.**

Best practices regarding the monitoring of fish catch have been shared with another of our partners, Friends of Nature, who are interested in applying the system to the reserve they manage at Gladden Spit. We will continue to provide assistance to this NGO in relation to data management and data analysis once their data collection is underway. We expect that best practices will also be revealed in relation to our development guidelines for the Atoll's cayes and hopefully adopted by other cayes owners along the Belize barrier reef system. And finally, we anticipate that the strengthening of the Glover's Reef Advisory Committee will be setting an important precedent for co-management of marine reserves in Belize and beyond.

#### **Threats addressed and results/outputs anticipated:**

Documentation of these best practices will be expanded and shared during the final years of the project. We hope that the catch data collection program will be initiated by Friends of Nature, and will add to the information base on which decisions for improved fisheries management are taken.

**Level of Effort: \$11,500** (USAID/EGAT: \$1,500; WCS: \$10,000)

### **OBJECTIVE 4: New York Coordination Unit Strategy: Guide the design and testing of wildlife-focused planning, implementation, and evaluation tools for effective conservation at a landscape scale, and promote learning across sites and beyond**

The NY-based Coordination Unit (CU of the Living Landscapes Program (LLP)) is designed to develop and test wildlife-focused, landscape-scale approaches to biological conservation across multiple sites. To ensure the widespread utility of these new conservation approaches, the program is testing them within landscapes that encompass a diverse array of ecological features, land-uses, resource-use issues, and jurisdictional arrangements. The CU is charged with designing and managing the program to develop new approaches, facilitate and harmonize testing and implementation among these core sites, and capture the synergistic benefits of diverse experiences. This unit guides development of landscape-scale conservation strategies, tools and techniques; assists in the design and development of cost-effective intervention and monitoring programs at these sites; promotes cross-site learning; and ensures communication among the sites, WCS staff (central and field), USAID (DC and missions), and the larger conservation community.

During FY07, the priority for the Coordination Unit will continue to be working with field sites to promote adoption of best practice tools for effective conservation at a landscape scale. We have now refined and simplified the process for selecting landscape species, including development of software as a decision-support tool for analysis, and during this year, we will finalize and disseminate a 'how to' manual to accompany the selection software. We will also be working with our field staff to explore how best to integrate project strategic planning elements within annual financial management.

**FY07 Level of Effort: (Total Objective 4): \$106,326** (USAID/EGAT: \$48,792; WCS: \$57,534)

#### **Activity 4.1 Provide technical assistance to site-based conservation**

Members of the NY Coordination Unit will provide technical input to field site operations detailed in the previous sections of this report, some of which will involve consultation at sites, as previously noted.

#### **Results/Outputs:**

Focused and timely technical assistance and collaboration provided to field sites based on needs, leading to conservation landscape strategies, target monitoring of effectiveness, and processes in place to increase participation of stakeholders.

**Level of Effort: \$17,640** (USAID/EGAT: \$10,045; WCS: \$7,595)

#### **Activity 4.2 Design, implementation, and testing of decision support tools**

##### **Activity 4.2.1 Living Landscapes Program technical manuals**

The Living Landscapes Program will continue to produce brief how-to guides, called Technical Manuals, after field testing and fine-tuning the methods at several WCS field sites. In FY07, we will finalize and disseminate four technical manuals that are currently in preparation: *Selecting Landscape Species*, *Range-wide Priority Setting*, *Creating Conservation Landscapes*, *Building Relational Databases for Conservation Information Management*. The manuals are designed to provide clear and practical instructions to field practitioners on using a number of conservation tools. The manuals will also be translated into Spanish and French and disseminated to WCS projects, partners (government, NGO and local), and other conservation colleagues.

##### **Activity 4.2.2 Landscape Species Approach progress**

###### *4.2.2.1 Building Conservation Landscapes*

In FY07, LLP staff in New York will finalize methods for building conservation landscapes, based on implementation experience at our GCP and LLP field sites. By January 2007, we will have drafted a Technical Manual on combining biological and threats landscapes into conservation landscapes that provide field practitioners with guidance as to where and what actions would have the greatest positive impact on wildlife conservation and natural resources management. We will then work with additional field sites to pilot the use of the draft manual as a decision-support tool. Feedback from these pilot sites will help refine and revise the manual before it is published and broadly disseminated in hard copy and as a PDF on our website.

##### **Activity 4.2.3 Integrating strategic planning and project management**

Almost all of the WCS/GCP demonstration sites have developed and fine-tuned their conceptual models and used them to specify their frameworks for monitoring project effectiveness. Though these are important components in an effective project cycle (c.f., The CMP Open Standards for the Practice of Conservation), their utility is greatest when they are integrated into annual financial management (i.e., work plans, budgets and reports). By linking project strategic planning with annual financial management, we will ensure that activities to measure effectiveness are incorporated into the budget process, and that monitoring results (i.e., observed progress towards stated objectives) are presented in annual reports and used to guide subsequent workplans. This will be an important step in institutionalizing adaptive management in the projects. Integrating strategic planning with annual financial management is a challenge because both systems have different (though complementary) purposes. For example, the latter has primarily been concerned with budgeting, recording expenditures, and maintaining an audit trail, rather than tracking project progress and adapting actions to changing conditions. Moreover, given the high management burden already associated with designing, implementing and evaluating conservation projects at a landscape scale, attempts to integrate the two systems must do so without increasing staff time commitments. We envision that this integration process will continue beyond FY07.

##### **Results/Outputs:**

Technical manuals designed, tested in the field and distributed in hard copy as well as on CDs and on-line for wider distribution. A process for integrating project strategic planning with annual financial management will be developed and the draft approach piloted at 1 or 2 sites.

**Level of Effort: \$22,839** (USAID/EGAT: \$13,724; WCS: \$9,114)

### **Activity 4.3 Catalyze cross-site and cross-organizational learning, and communication**

#### **Activity 4.3.1 Annual meeting of WCS/LLP staff**

We will organize and host an annual meeting to bring together WCS/GCP and LLP field site staff to share and capture lessons learned in the implementation of threats-based approaches to biodiversity conservation at landscape scales. These meetings have, in the past, been enormously fruitful for our field staff, as they provide a forum for serious, practical discussions around the challenges to effecting conservation in large, complex landscapes. The final agenda for the meeting, which will be held in the spring of 2007, will be decided after iterative consultation with GCP/LLP project directors and staff. Options include, for example: conducting a series of working groups to identify tried or promising solutions to common challenges faced by our conservation staff, or conduct a writers' workshop to generate a WCS working paper that synthesizes field experience using the Landscape Species Approach for conservation of wildlife and wildlands. During FY06, producing the "Casting for Conservation Actors" report demonstrated that a writers' workshop is one of the few ways to quickly and efficiently generate valuable synthetic information from multiple, geographically-dispersed field projects.

#### **Activity 4.3.2 CMP: leadership, design, writing and audits**

CU staff will continue to play a leadership role in the identification, design and implementation of Conservation Measures Partnership activities. We will work closely with all CMP members to identify best-practice tools to use as models for development of eAdaptive-Management modules. We will provide CMP with ongoing lessons from our efforts to integrate project strategic planning and annual financial management, and offer recommendations as to how this experience can help guide development of eAM (software development for project design and tracking). Lastly, we will continue to provide technical input into measurable Global Indicators of Biodiversity status.

#### **Activity 4.3.3 Local engagement in conservation survey**

In FY06, we completed an analysis of WCS field experience to identify the most appropriate mix of actors and institutions to effect conservation under different ecological, political and economic contexts. This synthesis of field-based practice was published as a WCS working paper: "Casting for Conservation Actors: People, Partnerships and Wildlife." In FY07 we will extend the reach of this ground-breaking analysis by publishing a summary of the findings in a peer reviewed journal and as a Living Landscapes Program Bulletin. These documents will be made available as PDFs on our website.

#### **Activity 4.3.4 Preliminary assessment of the human welfare impacts of establishing national parks**

With funding provided by the John D. and Catherine T. MacArthur Foundation and the National Science Foundation, LLP staff in collaboration with the WCS Gabon program, the Gabon National Parks Authority and Boston College, conducted a baseline household welfare survey of 1,000 households with traditional claims to natural resources within 4 national parks in Gabon, and an additional 1,000 control households living outside the influence of the parks. This survey is the first of three surveys planned over the next 5 years to assess the income, health, consumption, natural resource use, and family function impacts of establishing protected areas on local families. Results of the baseline survey will be analyzed during FY07 and will allow us to assess the role that wild resources and market access play in the welfare status of families proximal to and distant from the parks.

#### **Results/Outputs:**

Summary of "Casting for Conservation Actors: people, partnerships and wildlife" published in a peer review journal and as a LLP Bulletin. Initial findings from the Gabon Parks and People will be published in a peer review journal.

**Level of Effort: \$50,567** (USAID/EGAT: \$20,000; WCS: \$30,567)

#### **Activity 4.4 Application of Living Landscapes Program tools beyond core sites**

##### **Activity 4.4.1 Training workshops and technical assistance in the use of LLP tools**

A number of workshops and other opportunities to train field practitioners in the use of conservation tools will be organized and implemented throughout the year. Specifically, the LLP staff will conduct a workshop on landscape scale strategic planning for WCS and local and national staff working in the transboundary region of Tibet and Xinjiang China, and will continue to work with staff of the national park authorities in Tanzania and Lao PDR on the use of Landscape Species for landscape-scale wildlife conservation planning. LLP staff will also continue to provide assistance to WCS and reserve staff of the Amazon Andes Conservation Program in Brazil, Peru, Ecuador, and Bolivia. Finally, LLP staff will assist WCS and national staff in Central Africa in the use LLP tools to develop a regional strategy for forest elephant conservation.

##### **Activity 4.4.2 Technical Manuals**

We will continue to make our series of technical manuals available to conservation practitioners and decision makers on our website, as hard-copy booklets and on CD. Manuals are available in English, French and Spanish.

##### **Results/Outputs:**

Principles, practice, and tools distilled from implementation of the USAID/EGAT-funded sites to other site-based conservation projects around the world. Recent manuals translated into French and Spanish and distributed.

**Level of Effort: \$5,700** (USAID/EGAT: \$0; WCS: \$5,700)

#### **Activity 4.5 Ensure coordination and communication services for the program**

The program director and assistant director will meet with staff from the core sites and other WCS large-scale conservation sites to discuss the development of the program, on-the-ground implementation of the Landscape Species Approach, and further development of tools relevant to the approach. Program staff will also meet with collaborators, NGOs, governmental officers, and representatives of other stakeholder groups to promote use of the strategies and tools.

Throughout the year, the Coordination Unit will assist field staff in completing annual Implementation Plans, reporting on Performance Monitoring forms, and submitting Annual Reports. The program coordinator and other members (as necessary) will attend quarterly USAID/EGAT meetings in Washington DC and will ensure regular reporting and updates to USAID.

##### **Results/Outputs:**

The Coordination Unit will serve as a hub for communication regarding the Program among WCS field staff, core sites, current and potential conservation partners and interested members of the general public. Timely preparation and submission of USAID reports.

**Level of Effort: \$9,579** (USAID/EGAT: \$5,022; WCS: \$4,557)

#### **TRAVEL SCHEDULE**

The estimated travel schedule for FY07 is shown in the table below.

<b>Name</b>	<b>Destination</b>	<b>Reason</b>
Cynthia Lageaux	from Nicaragua to Belize	To assist with setting up turtle monitoring program with reserve staff and caye residents
Samantha Strindberg	from NY to Belize	To help finalize the Conservation Strategy and provide statistical design & analysis support
1-2 Staff People	Belize to location to be determined	To attend LLP Annual Meeting

## **Branding and Marking Strategy**

Over the course of the project, we plan to produce key informational materials for distribution. These include the following<sup>5</sup>:

- A set of development guidelines for the small islands or cayes of Glover’s Reef Atoll that will address issues such as proper waste disposal, appropriate shoreline structures, mangrove clearance, introduction of exotic species, that have been identified as key threats. Along with the guidelines the consultant will also be required to prepare specific educational material on these issues. It is hoped that caye residents and developers will adhere to these guidelines in order to minimize impacts to these fragile island ecosystems and the surrounding marine environment.
- The Conservation Strategy for Glover’s Reef Atoll, a brief document geared to a general audience that will describe the planning process used and the major management recommendations arising from our strategic analyses, such as the threats assessment and the conservation seascapes. We expect that these recommendations will result in adaptive management measures that improve the conservation and sustainable use of the Atoll’s resources.
- Pamphlets that explain the results of our fisheries catch data collection program. These will be targeted towards an audience of fishermen, demonstrating the value of catch data collection to fisheries management and sustaining their livelihood.
- Newsletters and a TV spot will be developed jointly with the Spawning Aggregation Working Group that inform fishermen and others of the results of the monitoring of the protected spawning sites and remind them of the regulations protecting the Nassau grouper, an endangered species.
- Finally, we also plan to produce some educational flyers on specific activities such as snorkeling and diving for distribution to visitors to the marine reserve, to inform them of the best practices that will minimize impacts to marine life.

For complete branding and marking strategy, please see Appendix 2.

## **Appendices**

1. General and Seascape Species Specific Conceptual Models for Glover’s Reef
2. Glover’s Reef USAID Branding Strategy/Marking Plan

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<sup>5</sup> Some of these activities, such as the pamphlet, TV spot and newsletters, will be completed with complementary funding from other sources such as Avina and Summit.