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FY2003 Annual Report**

Protecting Coral Reefs from Destructive Fishing Practices in the Pacific

Protecting and Managing Reef Fish Spawning Aggregations in the Pacific

PROJECT BACKGROUND

The Goal of this program is to significantly reduce the degradation of coral reef ecosystems in the Pacific region from destructive fishing practices, and especially the over-exploitation and degradation of reef fish spawning aggregation sites.

Destructive fishing practices that target key species and degrade fragile coral habitats are among the major threats to the viability of coral reef ecosystems. Many reef fish form aggregations at predictable places and times, frequently for the purpose of spawning. The nature of spawning aggregations makes them extremely vulnerable to elimination by over-fishing. It can take as few as two to three years of intensive fishing on spawning aggregations to eliminate breeding populations of fishes. There is presently little awareness of—or capacity to address—this threat to the marine resources and biodiversity in the Pacific. The spawning aggregation phenomenon has not been reflected in fishery management plans or the design of marine protected areas (MPAs).

This project is improving resource management and spawning aggregation site protection, increasing awareness of these resources' vulnerability to over-exploitation, and enhancing capacity to manage reef fish spawning aggregations and MPAs that incorporate these sites. There are three objectives: (1) to develop and facilitate the application of cost-effective management controls on the exploitation of aggregating reef fish resources; (2) to strengthen the capacity to assess, monitor, and manage aggregating reef fish resources; and (3) to raise the awareness and appreciation among stakeholders of the vulnerability of aggregating reef fish populations and associated ecosystems, the nature and significance of spawning aggregations, and options for improving management.

This project builds on partnerships and activities carried out under the Protecting Coral Reefs from Destructive Fishing Practices project (focused on the Live Reef Food Fish Trade) supported by EAPEI from FY1999 to FY2003. Site and country level activities are focused on Pacific countries where TNC is presently working. We are developing close partnerships with other international NGOs working at important sites. In addition, a small number of activities are being carried out in collaboration with TNC Indonesia to build on their work with spawning aggregations in Komodo National Park and to facilitate an exchange of knowledge and best practices between Indonesia and Pacific island countries. The Secretariat of the Pacific Community (SPC) will play a role in adapting and disseminating lessons learned and successful approaches from specific site and country activities.

In addition, this project is an important part of the TNC-led component of a global initiative to transform coral reef conservation over the next decade being developed in collaboration with a range of partners. To achieve this ambitious goal, we are catalyzing a multi-partner effort to improve the scientific basis for coral reef MPA selection, design, and management; build the necessary skills and institutional capacity to manage MPAs effectively; and develop innovative solutions for financing marine conservation action to provide for long-term sustainability. This program will provide valuable experience from the Pacific to guide future global efforts to effectively protect and sustainably manage key reef fish species that are essential to the integrity of coral reef ecosystems.

ACTIVITY SUMMARY

Objective 1: *To develop and facilitate the application of cost-effective management controls on the exploitation of aggregating reef fish resources in the Pacific region.*

Major Achievements:

- The draft monitoring and training manual has been completed and tested during two workshops:
 - “Introduction to Monitoring and Management of Spawning Aggregations and Aggregation Sites for Three Indo-Pacific Grouper Species: *Epinephelus fuscoguttatus*; *Epinephelus polyphekadion*; and *Plectropomus areolatus*. A Manual for Field Practitioners” (Draft). Indo-Pacific Draft Field Manual. The Nature Conservancy, June 2003. 59 pp.

Management Issues:

- As noted in the “Protecting Coral Reefs from Destructive Fishing Practices in the Pacific” progress report, during this reporting period the PNG/SI Marine Projects Officer, Paul Lokani, was appointed the Melanesia Program Director, severely limiting the amount of time he could allocate to this project. This was a very deserving appointment and a reflection of his considerable abilities and energy, and an indication of the degree to which his input to this program has been missed. Since that time we have been trying to identify and hire replacements locally (one for PNG and one for the Solomon Islands), but have not been able to do so. One strong potential candidate for the Solomon Islands was identified and offered the position, but he received another offer of an overseas position with another organization and took it instead. This has placed excessive work and travel loads on the one remaining Pacific Island Countries Coastal Marine Program staff person. Our preference has been, and still is, to hire Melanesians to these positions. However, all potential local candidates that we have identified are currently with other agencies and would need to be hired away from those agencies/organizations, something we are reluctant to do. This situation has resulted in significant delays to implementing several of the activities under Objectives 1 and 3.
- At the time of writing, a number of alternative options are being reviewed, including contracting an expatriate (with extensive and relevant experience in PNG and the Solomon Islands), seconding local candidates (as opposed to hiring them away from their agencies), temporarily reallocating TNC staff (something tried in PNG but was not effective in that case), subcontracting to other organizations, or a combination of these options. Once the most effective options have been identified, there will need to be a revision of the FY04 work plan and possibly budget allocations.
- Due to these delays, an extension of the program from a total of two years to three years is requested.

Activity 1.1: *Develop and facilitate the application of cost-effective identification, monitoring and assessment programs for aggregating reef fish resources.*

A specialist in reef fish spawning aggregations (Dr. Kevin Rhodes) was contracted to review all existing and relevant methodologies for assessing and monitoring reef fish spawning aggregations. With the target audience identified as in-country fisheries officers and conservationists, a combined methods and training manual was prepared. This draft manual was used in the training in PNG (see Activity 2.1). It was later revised based on internal and external feedback and the revised manual was then used for the training in Palau (see Activity 2.1). It is currently undergoing further review and revision to ensure we have the most effective and practical manual possible. This draft of the manual has also had significant input from TNC Indonesia Marine Program. The current reference is:

Introduction to Monitoring and Management of Spawning Aggregations and Aggregation Sites for Three Indo-Pacific Grouper Species: *Epinephelus fuscoguttatus*; *Epinephelus*

polyphekadion; and Plectropomus areolatus. A Manual for Field Practitioners. Indo-Pacific Draft Field Manual. The Nature Conservancy, June 2003. (draft) 59 pp.

Some key issues that have been encountered in the last year have related to identifying and obtaining agreement on what methods should be included in the manual, especially given the target audience (in-country practitioners, not scientists), and exactly what to include in the training workshops, and when. Most methodologies have been based on the assumption that trained scientists will be conducting the monitoring, whereas in the Pacific, and especially in Melanesia, this assumption is not always valid. As such, we have attempted to make the methodologies as practical as possible, and related to management questions. That is, we have aimed for methods that can form the basis of a spawning aggregation monitoring program that can be undertaken by in-country fisheries officers and conservationists. The results can be immediately interpreted and used by managers to obtain a *basic* understanding of what is happening to a specific aggregation in relation to their management actions (or lack of). In the training workshops, we do recommend that if more qualified scientists are available, then they should be used to build on the basic methods and data whenever possible to gain a more detailed understanding of what is occurring at the aggregation in question.

Taking this minimalist / basic approach has resulted in some criticism from scientists, in particular those in the Society for the Conservation of Reef Fish Aggregations (SCRFA), who have tended to focus more on the scientific level of assessments and monitoring. We have continued a dialog with the SCRFA board and Director, and they are now slightly more comfortable with what we are teaching. Even within The Nature Conservancy we have continued to have debates over such issues as whether or not to include visual length-frequency training, under what circumstances and when, as well as other issues. This lively debate on methodologies, both within and outside TNC, has been exciting and is helping considerably in developing and refining both the methodologies and training.

We have been taking heed of the debate and the trainees suggestions, and continually modifying the methods and training manual. The January 2003 release by SCRFA of their “manual” (Colin, P. L., Sadovy, Y. J. and Domeier, M. L. 2003. Manual for the Study and Conservation of Reef Fish Spawning Aggregations. Society for the Conservation of Reef Fish Aggregations Special Publication No. 1 (Version 1.0), pp. 1-98+iii) has helped considerably, although it is not actually a “manual”, but rather a review of reef fish spawning aggregation study methods with more of a scientific interest focus—but a very useful and complimentary document to our manual.

We expect the manual to undergo a number of reviews over the next year as the subject of reef fish spawning aggregation assessment, monitoring and management advances.

During the reporting period we initiated the trial of the site identification methodology that was developed for identifying spawning aggregations in the Caribbean. This methodology uses satellite and/or aerial photos to identify potential spawning aggregations based on a set of criteria. It has been used in the Caribbean – especially Belize – with a very high success rate when ground-truthed. We want to test this methodology in the Pacific to see if it works here. To do that, we are using two areas, Palau and Kimbe Bay. Appropriate satellite imagery is available for these areas. The consultant and the TNC team that has been using this methodology in Belize have made an initial assessment of potential spawning aggregation sites, without referring to documents identifying known sites. In Palau, through a separate contract local researchers are documenting Palau’s known spawning aggregations and physically searching for new ones (see below). That study will be completed by the end of the next spawning season in Palau (August 2004). The Society for the Conservation of Reef Fish Aggregations (SCRFA) has also made a quick assessment of local knowledge of reef fish aggregations in Palau. The results of the three approaches can then be compared and the effectiveness of the method assessed. If there is a high correlation between the methodologies (remote images vs. science and local knowledge) then we can be reasonably confident in the use of the methodology (although there will always need to be extreme caution on how the methodology and the results used).

In Kimbe Bay, where there is very limited knowledge of spawning aggregations, the potential aggregation sites identified from the satellite images are being field checked to verify if aggregations are present or not. Checking began late in the 2003 spawning season (due to TNC staff being involved with the training workshop), but at least two aggregations were identified. Further and more extensive field checking will be completed during the next spawning season. This information is being fed into the Kimbe Bay management plan and design of an MPA network for the Bay.

The Coral Reef Research Foundation in Palau has been contracted (only partially funded from this grant) to provide a detailed report in August 2004 that includes, *inter alia*, the following:

- Descriptions and maps of the physical parameters and characteristics of all known reef fish spawning aggregation sites in Palau (including, but not limited to: bathymetric and habitat maps of each site; temperature profiles; current regimes – direction and speed at different depths – during spawning times)
- Descriptions and maps of the biological parameters and characteristics of the aggregations at as many sites as possible (including, but not limited to: species; seasonal, lunar and diurnal timing; numbers of fish, sizes and sex ratios; extent and limits of the species aggregations; confirmation of spawning and descriptions of spawning behavior for as many species as feasible)
- Documentation of new aggregations (including, but not limited to: places, species and timing; and testing of remote identification methods)

The results of this study will, in part, be used to compare the locations derived remotely from the satellite images, and also to compare with the aggregation monitoring being conducted at Ngerumekoal (Ulong Channel), where the training was held (see Activity 2.1). These scientific studies will be used to assist with redesigning the Koror State monitoring program. The training workshop used this site and resulted in a renewed interest in monitoring the spawning aggregation. This is a good example of where a combination of this project's training and methods can be combined with scientific studies to, in this case, revive the monitoring of this site and improve management.

This project has assisted with the monitoring at the following sites:

- Ngerumekoal (Ulong Channel), Koror, Palau: Monitoring being coordinated by Koror State Rangers and supported by the participants in the training workshop. Additional detailed scientific monitoring being undertaken at the site by Coral Reef Research Foundation under a contract to TNC.
- Kehpara Marine Sanctuary (KMS) aggregation site in Pohnpei, FSM: Conservation Society of Pohnpei has received monitoring and management advice from the spawning aggregation consultant, and the TNC project manager.
- Participants of the two training workshops have also undertaken preliminary monitoring at additional sites in their respective countries (see under Activity 2.1).
- The spawning aggregation specialist consultant reviewed and provided suggestions on monitoring improvements to the World Wide Fund for Nature – Solomon Islands program in Gizo. This will also be the location for the Solomon Islands spawning aggregation monitoring training workshop in early 2004.

Activity 1.2: *Develop and have adopted relevant policies and guidelines for application at the regional, national and sub-national levels.*

The progress on this activity has not been as good as planned. In part this is due to the personnel limitations noted in the Management Issues above, and in part as we can only work as fast as our partners that we are advising. Given that, we have provided the NFA with advice on their National LRFFT management plan (see Activity 1.3 in the “Protecting Coral Reefs from Destructive Fishing Practices in the Pacific” report), including suggestions on the protection of spawning aggregation sites (under their plan spawning aggregation sites are not to be fished, however, there are some significant

practical issues concerning enforcement that we are working with NFA to address, such as adding seasonal closures in addition to site protection). Additional management recommendations are also included in the spawning aggregation monitoring workshop report for PNG (see Activity 2.1).

Management recommendations have also been provided to both the Koror State Rangers and the Bureau of Marine Resources in Palau through the training workshop report (see Activity 2.1), video and PowerPoint presentations, and meetings with key decision makers. Amongst other recommendations, we have suggested that Palau extend its four month closure (April 1 to July 31) by another month.

Unfortunately there has been a delay with the Palau Senate passing the Protected Areas Network legislation (it passed the House of Delegates last year), and so we have not yet been able to incorporate spawning aggregation issues into the design of the MPA network as yet.

The protection and management of spawning aggregations was also included in the National LRFF Trade management plan for the Solomon Islands (see Activity 1.5 in the “Protecting Coral Reefs from Destructive Fishing Practices in the Pacific” report).

Regionally, limited discussions have been held with SPC on the protection of spawning aggregations. However, with support from the Society for the Conservation of Reef Fish Aggregations (SCRFA), SPC is about to launch another Special Interest Bulletin on Spawning Aggregations.

Activity 1.3: *Develop and implement specific management strategies, locally and nationally.*

This activity has been delayed due to the difficulties we have had in identifying and hiring appropriately qualified local staff in PNG and the Solomon Islands to replace Paul Lokani who was appointed the Melanesia Program Director. While the plan is to contract local consultants to document the local knowledge of spawning aggregations and marine management practices in Kavieng and Manus in PNG, and in Choiseul in the Solomon Islands, we wanted to ensure that our local staff were involved in the field work to make sure of continuity in dealing with the communities.

Activity 1.4: *Develop appropriate design and management criteria for marine protected areas (including LMMAs) for protecting both spawning aggregations and aggregating reef fish.*

In developing the monitoring and training manual (Activity 1.1) there has been considerable debate not only on the methods and training procedures, but also on how to interpret and use the information for management. Correspondence and notes on this discussion are being recorded and fed into the manual development, and will also be used to guide the development of management criteria. Again, excessive staff workloads have affected progress on this activity.

Objective 2: *Strengthen the capacity of regional and government agencies, national and international NGOs, and others to identify, assess, monitor, and manage aggregating reef fish resources at all relevant jurisdictions.*

Major Achievements:

- Two spawning aggregation monitoring workshops have been held in Kavieng (PNG) and Koror (Palau). The reports from these workshop are available:
 - Rhodes, Kevin L. (June 2003). *Kavieng Spawning Aggregation Monitoring Training Workshop Report, Kavieng, New Ireland, Papua New Guinea, 22-30 April 2003. Report prepared for The Nature Conservancy, Pacific Island Countries Coastal Marine Program. 18pp.*
 - Rhodes, Kevin L. (July 2003). *Palau Spawning Aggregation Monitoring Training Workshop Report, Koror, Republic of Palau, 18-30 June, 2003. Report prepared for The Nature Conservancy, Pacific Island Countries Coastal Marine Program. 16pp.*
- As a result of the spawning aggregation training in Palau, the participants agreed to assist each other's agencies with the monitoring of spawning aggregation sites around Palau. As a result, requests are being made between agencies for the trainees to assist with different monitoring programs.

Management Issues:

- With the broad range of countries involved in this program (PNG, Solomon Islands, Palau, Federated States of Micronesia, and to a limited extent, Indonesia) and with the complexity of reef fish spawning aggregation seasons (usually around 4-5 months) and timing (e.g. some form aggregations up to the new moon, other up to the full moon), it has been extremely challenging organizing the timing and locations of the training workshops. The work plan called for three workshops on successive new moons in PNG, the Solomon Island and then Palau. However, we reduced this to two, due to some uncertainties about the proposed site in the Solomon Islands (access, size of the aggregation, timing of the aggregation, with conflicting reports about aggregations forming at full/new moon). The situation with the proposed Solomon Islands site has been resolved and the training will be held there in early 2004.

Activity 2.1: *Increase the skills of our partners in aggregating reef fish monitoring and assessment.*

Two reef fish spawning aggregation training workshops were held in Kavieng (PNG) and Koror (Palau) in April and June 2003, respectively. The reports from these workshop are available:

- Rhodes, Kevin L. (June 2003). *Kavieng Spawning Aggregation Monitoring Training Workshop Report, Kavieng, New Ireland, Papua New Guinea, 22-30 April 2003. Report prepared for The Nature Conservancy, Pacific Island Countries Coastal Marine Program. 18pp.*
- Rhodes, Kevin L. (July 2003). *Palau Spawning Aggregation Monitoring Training Workshop Report, Koror, Republic of Palau, 18-30 June, 2003. Report prepared for The Nature Conservancy, Pacific Island Countries Coastal Marine Program. 16pp.*

The PNG workshop included three women and had participants from:

- TNC-Papua New Guinea (3)
- Mahonia Na Dari (PNG NGO Kimbe Bay) (1)
- National Fisheries Authority (NFA) (1)
- Ailan Awareness (Kavieng NGO) (2)
- The University of Papua New Guinea (UPNG) (1)
- World Wide Fund for Nature (WWF PNG Madang) (1)
- World Wide Fund for Nature (WWF Solomon Islands Gizo) (1)
- Wildlife Conservation Society (WCS Fiji) (1)
- Conservation International (CI Milne Bay) (1)

- Packard Foundation (PNG Officer) (1)
- Department of Environmental Conservation (DEC) (1)
- James Cook University / Mahonia Na Dari (researcher in residence) (1)

The Palau workshop included one woman and had participants from national and state government agencies and local non-government organizations (NGOs):

- Palau Conservation Society (2)
- Bureau of Marine Resources (2)
- Palau International Coral Reef Center (4)
- Koror State Rangers (3)
- Helen Reef Resource Management Program (3)

The details of the workshop activities and results are provided in the two reports. In addition, the reports also provided some management recommendations based on the trainer and TNC project manager's observations during the workshops. These were provided to the relevant management authorities and personal briefings provided.

The PNG workshop included two international exchanges to help spread the standardization of methods:

- Wildlife Conservation Society (WCS) in Fiji requested that one of their female staff (Lorraini Sivo) participate in the workshop as WCS Fiji is about to investigate the protection of reef fish spawning aggregations in that country.
- World Wide Fund for Nature (WWF) in Gizo, Solomon Islands requested that their reef fish spawning aggregation officer (Alec Hugh) participate to learn the latest monitoring methods. He will also be our contact for the Solomon Islands training workshop to be held in Gizo in early 2004.

Digital video footage of the workshops and underwater footage (and stills) of the aggregations were also taken by the TNC project manager. The underwater footage was used during the workshop to assist the participants with learning species identification and fish behavior. During the last few days of the Palau workshop, the video footage was used to produce a rushed rough-cut 20 minute training video which proved to be a very effective training tool. A better quality training video is now being produced from the aggregation footage. As more underwater footage of specific behaviors and the training are obtained, the training video will be modified. While only a rushed rough-cut, the training video is available on request.

Activity 2.2: *Develop regional and national "teams" composed of fisheries agency staff, locally-based NGOs, and universities to maximize the resources available to identify, assess, and monitor reef fish spawning aggregations*

While no formal national "teams" have yet been formed, there has been some cross-site and cross-agency support with monitoring.

The PNG spawning aggregation monitoring training workshop, held in April 2003, was towards the end of the 2003 spawning season for PNG (note: very little is known about reef fish spawning seasons and timing in PNG. Both this program and the Society for the Conservation of Reef Fish Aggregations are collecting both scientific and anecdotal information at every opportunity). The month (new moon) after the training workshop, two of the participants from Ailan Awareness (Kavieng based NGO) and the Mahonia na Dari (Kimbe Bay based NGO) were invited to join the TNC-PNG staff to undertake the field testing in Kimbe Bay for the possible spawning aggregation sites identified by satellite (see Activity 1.1 above).

As the next PNG spawning season approaches we propose to contact the workshop participants and assess their monitoring support needs (e.g. additional people to monitor, scientific monitoring advice, etc.) and try to link them up with the other participants.

In Palau, the workshop participants came to their own decision that they should support each others' agencies/organizations with monitoring the sites around Palau. In the two months after the workshop (until the end of the spawning season) different agencies did request and receive support from the other agencies. Again, prior to the next season we will further encourage the workshop participants to collaborate and support each other.

Objective 3: *To raise the awareness and appreciation among stakeholders of the limited productivity and vulnerability of aggregating reef fish populations and associated ecosystems, the nature and significance of spawning aggregations, and options for improving management.*

Management Issues:

- As noted under Management Issues for Objective 1 above, the inability to hire local staff to replace the PNG/SI Marine Projects Officer has delayed the implementation of this objective.
- As the intention is to ensure the spawning aggregation awareness materials are compatible with those produced under the LRFT program, it was decided to wait until they have been distributed and then assessed for effectiveness, before investing in the development of the spawning aggregation materials. Additionally, the local knowledge documentation should be undertaken prior to the development of the awareness materials to ensure that they address specific community information gaps identified.

Activity 3.1: *Compile and develop appropriate awareness materials and hold community-level workshops and meetings on the importance, vulnerability and options for the sustainable management of their reef fish spawning aggregation sites.*

This activity has been delayed, in part due to staff time limitations, but also to ensure continuity between the LRFT in-country awareness materials and the spawning aggregation materials. The intention is to ensure the spawning aggregation awareness materials are compatible with those produced under the LRFT program. It was decided to wait until the LRFT materials have been distributed, used and then assessed for effectiveness, before investing in the development of the spawning aggregation materials. Additionally, the local knowledge documentation (Activity 1.3) should be undertaken prior to the development of the awareness materials to ensure that they address the specific community information gaps identified.

The proposed actions have been described in the "Protecting Coral Reefs from Destructive Fishing Practices in the Pacific" progress report (Activity 2.2), and are copied below:

"We anticipate being able to distribute the [in-country LRFT awareness] material packages to our partners – schools, government agencies, local NGOs – for use by the end of the calendar year 2003. A national launch of these materials is planned.

With the unfortunate delays in producing these in-country awareness and education materials, we have decided to roll the distribution and implementation phases into the "Protecting and Managing Reef Fish Spawning Aggregations in the Pacific" grant awareness activities. This is based on the synergy between the materials and the objectives of the spawning aggregation protection project. These in-country awareness materials address the broader "destructive fisheries" issues, of which the LRFFT and the protection of spawning aggregations are two significant components. In addition, taking note of the USAID reviewers' concerns on the FY03 Work Plan awareness activities and the need to be able to measure the effectiveness of

these materials, we have decided on the following approach (described more fully in the FY04 work plan):

1. Complete the production of the materials listed above, and form into packages with overall instructions on use.
2. Distribute to key partners in both PNG and the Solomon Islands (e.g. select schools, appropriate government agencies, and relevant local NGOs).
3. Formally launch the materials in both countries, advising of their existence and by which agencies/organizations they will be used.
4. After three to six months from the formal launch, contract an appropriate consultant (some potential candidates have already been identified at the University of PNG) to undertake a review of the materials usefulness and effectiveness by interviewing a selection of agencies and organizations that were provide with the materials.
5. Use the results of the review to determine what worked, what didn't, what formats are most effective, delivery, and so on. Use the results to determine the type of materials and delivery mechanisms for the awareness materials to be produced specifically for "Protecting and Managing Reef Fish Spawning Aggregations in the Pacific" project."

Activity 3.2: *Develop a set of "fisheries sustainability tools" for aggregating reef fish.*

As reported under Activities 1.1 and 1.4, in developing the monitoring and training manual there has been considerable debate not only on the methods and training procedures, but also on how to interpret and use the information for management. This lively debate has been both internal to TNC (between the Pacific, Indonesia, Caribbean, and Marine Initiative program staff) and externally with various spawning aggregation scientists (e.g. the board and director of the Society for the Conservation of Reef Fish Aggregations). We believe this is a healthy state of affairs for an area—the management and protection of spawning aggregations—that is relatively new to both conservationists and fisheries biologists. The related correspondence and notes on this discussion are being recorded and are being fed into the manual development, as evidenced by the on-going revision of the monitoring and training manual. The results of the discussions are also being used to guide the various management options available depending on the ecological and socio-economic circumstances within which the relevant spawning aggregation occurs.

It is expected that this activity will be on-going, with the "tools" evolving throughout the life of the program.