Chapter 2

Getting Organized – Advance Planning

2.1 Coral Disease Investigative Response System: Goals & Objectives

The goal of a Response System is to facilitate the investigation of coral disease outbreaks that are unusual in nature by providing a framework of operation that promotes a logical, systematic collection of information and samples, sufficient to allow the formulation of a hypothesis to explain why the outbreak occurred (Wobeser 1994).

The objectives of an Outbreak Investigation System are to:

- Provide **field personnel trained** in investigative techniques to ensure proficiency in survey, collection and processing techniques
- Encourage **Responder awareness** of the need to exercise *Critical Observing* (i.e., objective rather than subjective, using validated classification schemes, being aware of problems associated with over-interpretation of vague signs and of bias from prior information) and *Critical Thinking* (ability and willingness to seek both contradictory as well as confirmatory information when collecting evidence and make objective judgments based on well documented information) throughout the investigation.
- Adapt **Incident Command System** components to provide an incident management and procedural framework for conducting a coral disease outbreak investigation
- Execute an organized, systematic approach to collect **relevant epidemiological and environmental data, and samples** for developing clinical and diagnostic case definitions
- Formulate **hypotheses** as to the cause of the outbreak
- Create a **database** of disease information for retrospective and prospective investigations
- Identify **knowledge gaps**
- Formulate **hypotheses for further studies** and focus research goals.
- Provide information to help identify **disease management and control strategies**.

2.2 Regulatory Authority

The Response System and all of its members, including the investigative response team must function within the legal structure of the jurisdiction overseeing the area affected by the outbreak. This may be federal, state, regional and/or local authorities, and in some cases (e.g., when working with ESA listed corals) NOAA/NMFS and U. S. Fish and Wildlife Service, for example, collection of coral in all U.S. jurisdictions requires permitting by the local governing agency(s). Permits may also be necessary for surveys, tagging and other activities associated with the response. It is important to identify local authorities, such as Sanctuary and Park managers and establish partnerships to involve them early in the response process. The assistance of these individuals often is critical in expediting permitting and providing logistical support for their specific areas.

2.3 Organization of Response System

Every response, no matter the size, needs an organized protocol of response. The CDHC Response System is a tiered decision process coordinated through a National Center with input from an Expert Working Group and in collaboration with the Regional Coordinator. The initial phase of a response begins with an observation by a diver of a situation considered unusual and involves diseased coral which is reported to the CDHC. This is followed by notification though the Response network to the area's Regional Coordinator (Chapter 3 and Level I Report; Appendix II). A series of events are then initiated that includes: 1) evaluation of the report by experts; 2) identification of possible responses (Chapter 3 and Level II or Level III; Appendix III & IV); 3) recommendation of possible steps to reduce spread (i.e., quarantine); 4) further assessment of the situation to identify conditions that may aggravate or mitigate the event; and if warranted; 5) mobilization of a Response Team to document and characterize the incident, and collect and stabilize samples for further analyses. These steps may be moved through more quickly, if for example, an experienced research diver familiar with disease is the original observer (e.g., a Level I report could directly trigger a Level III response).

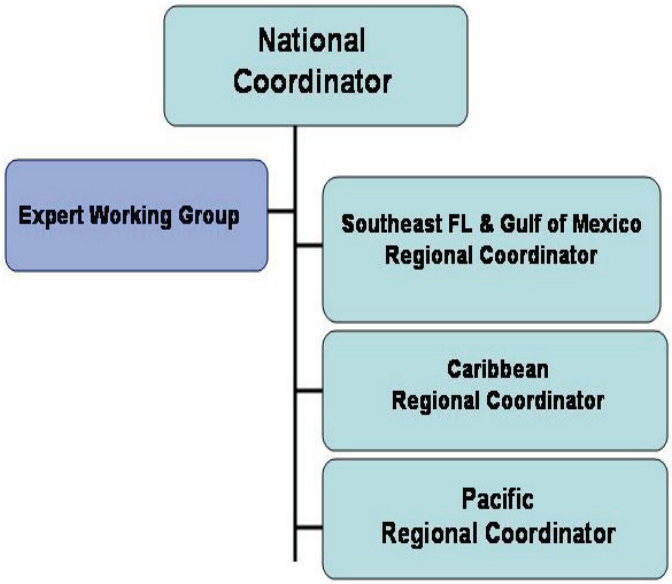

Figure 2.3 Organizational Chart for U.S. Response System.

The implementation of the Response System is through Regional Response Coordinators and a network of responders. Minimally, a lead Regional Coordinator is appointed for each region of the U.S. (Fig. 2.3), with additional Coordinators as appropriate in specific

jurisdictions. Each Response Team includes an Incident Commander (who may also be the Regional Coordinator), a Survey Team, Collection Team and Support Team. Ideally, various members of the Response Team are trained in multiple tasks and can participate in all activities as necessary.

The **essential members** of a response network include:

- An Incident Commander responsible for coordination of all field activities
- An Outbreak Investigation Response Team with a complement of scientists responsible for the collection of field data and samples, and on-boat processing of samples
- Access to veterinary consultations and scientists able to conduct specialized sample collection if necessary
- Local ecological and logistical experts (may be part of the Response Team) able to assist with coordination and knowledgeable about relevant related environmental and ecological parameters
- Public relations specialist
- A set of labs with a compliment of specialty diagnostic or analytical procedures for sample processing and analysis

A specific outbreak investigation will be led by an Incident Commander (IC) under an Incident Command Structured response. The IC will make immediate recommendations to the coral disease outbreak network on how to proceed with response activities.

2.3.1 National Coordinating Center

The primary responsibility of the National Coordinating Center (NCC) is to provide a centralized location for receiving and verifying coral disease outbreak reports and to coordinate the appropriate response. The NCC should also:

- Provide training to response team members and volunteers
- Provide supplies and equipment for surveys and response kits
- Serve as Liaison Office to notify and work with other federal and local authorities.
- Maintain current files on the capabilities of each region i.e., response team members, logistical support, emergency care facilities, and laboratory diagnostic capabilities.
- Maintain communication among all investigative team members
- Track samples sent to authorized laboratories or individuals for analyses
- Gather and archive data

- Review and assist in development of reports and identification of recommendations
- Report findings to appropriate government agencies

2.3.2 National Coordinator

The National Coordinator serves as a central contact for all Regional Coordinators and collates all reports of verified Level I observations and Level II investigations submitted by Regional Coordinators. The National Coordinator will convene the Expert Working Group to make decisions in cases that suggest the need for a Level III Response. The National Coordinator also works directly with the Regional Coordinator to ensure reports are produced in a timely manner and provides analysis and recommendations to the managers. (See sections 2.4 and 3.6 for description of response decision process)

2.3.3 Expert Working Group

The Expert Working Group includes individuals with knowledge and experience in coral diseases and pathology to provide guidance for (i) developing and implementing the contingency plan to assist in responding to unusual coral disease outbreaks; (ii) assists in determining whether an unusual coral disease outbreak is occurring and the need for a Level II or Level III response; and (iii) assists the National Coordinator in determining, after an unusual coral disease investigation response has begun, when response actions with respect to that incident should be terminated.

2.3.4 Regional Coordinators

The regions have been nominally designated based on the location of U.S. coral reefs, history of outbreaks or high prevalence of new or emerging disease and logistical considerations. Initially, there will be one Regional Coordinator designated for Florida and the Gulf of Mexico, the U.S. Atlantic (Puerto Rico and USVI), Hawaii, and the U.S. Pacific (American Samoa, Guam and CNMI). Regions will be added (e.g., Freely Associated States) and subdivided into jurisdictions as responders are available and as needed.

The Regional Coordinator is responsible for the overall communication and logistics for a given Outbreak involving an Incident Response. This includes such activities as:

- Incident Coordination
- Logistics
- Safety and permitting issues
- Determining amount, type and quality of data appropriate to collect

- Initial threat assessment
- How to implement control and prevention procedures
- Transmitting data to a centralized data analysis facility
- Communication with scientists, managers and the public.
- Preparing summary reports

Regional Coordinators should take steps well in advance of an Incident to identify and train Response Team members, compile lists of support services and contacts as well as maintenance and replenishing sampling kits. A list of suggested equipment is provided (Appendix VI), recognizing equipment needs will vary based on location, species affected, and availability.

The Regional Coordinator (RC) is notified when an Incident Report is received (either through the National Office or directly). The RC conducts interviews with those submitting the report to complete Level I information needs (Level I Report form, Appendix II) and contacts the National Coordinator (NC) to report findings and recommendations on whether the case is resolved or if a Level II response (Appendix III) is necessary. After review of the Level I report, if a Level II response is activated, the RC organizes and conducts the Level II response in collaboration with the designated Incident Commander, and reports out on findings to the NC. The RC also participates in the Working Group Consultation to determine the need for a Level III response (Appendix IV).

Once a Level III response is activated, Regional Coordinators, in collaboration with the Incident Commander and Response Team, are responsible for: 1) conducting a preliminary assessment of the outbreak event (including sample collections, if warranted) and notifying management agencies and other appropriate stakeholders of the status; 2) evaluating the seriousness of the outbreak and classifying the threat (i.e., What impacts to the reef ecosystem will result from the outbreak on a local, regional, or national scale?); 3) assessing the feasibility of containing the disease and reducing any contributing anthropogenic stresses (i.e. chemical and thermal inputs); 4) providing recommendations to decision-makers regarding potential response; and 5) providing guidance for efficient control methods.

2.3.5 Media and Public Affairs Official

Unusual outbreaks of disease among coral reefs can become a hot news topic particularly if diving is restricted by quarantining an affected reef. Nearly everyone is influenced by the media; therefore it is critical that the information given by the Response Network is accurate and consistent among responders, and does not extrapolate beyond the facts. Each Region and responding Agency should have a protocol for interacting with the media. It is important to become familiar with the local protocols and contacts. It is recommended that each Regional Coordinator identify a Public Affairs Official who is

familiar with such protocols, and who will be responsible for reporting the progress of the investigation to local authorities and managers, as well as interacting with the press to make public notification as needed.

2.4 The Decision Process

The response process for a coral disease outbreak investigation is essentially a triage that is initiated by a report from the field (i.e., public, research or recreational diver) to a Response Network contact. Public notices providing contact procedures and reporting forms should be widely distributed to commercial dive shops, local management agencies and marine patrols. Consultations with area experts verify the report and determine the sufficiency of information for decision-making. If the report is valid and information is insufficient, then additional data is obtained to determine the existence of an outbreak. If an outbreak is confirmed then a full response conducted under ICS guidelines is initiated and the Response Team is deployed to the field.

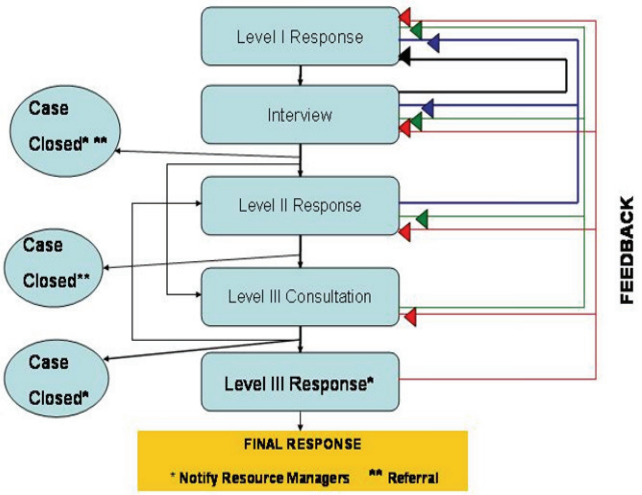

Figure 2.4 Response process, decision points and information flow.

2.5 The Decision Criteria

Until information can be assimilated to accurately diagnose disease and sufficient surveillance has been conducted to determine prevalence and incidence rates it will be difficult to discriminate between enzootic and epizootic diseases. Therefore initially, several reports identifying an event, photographic documentation, and preliminary survey data (Levels I and II) may be needed to determine whether a Level III response is appropriate. The guidelines for making such decisions include:

- Does the incident represent an unexpected increase in disease or mortality in a time or place where it does not normally occur or at a level that cannot be explained? Or in a species in which it has never been reported?
- Is the frequency of occurrence or extent of mortality greater than previously observed?
- Is the disease affecting a particular species of interest?
- Have the manifesting disease signs been previously described?

- Can the cause of the event be readily determined (e.g., major hurricane, oil spill)?

2.6 The Response Team

The **essential elements** of a response include an incident commander and an outbreak investigation response team with a complement of scientists capable of collecting, processing and analyzing samples and data. The composition of the response team will depend on the extent and location of any given outbreak. Different strategies will be required in any given situation and it is vital to distinguish between critical elements in the procedures and where flexibilities are acceptable. Common to all responses is the need to:

- Respond rapidly
- Communicate with local authorities (most often resource management offices) before, during and after a Response
- Evaluate the situation
- Implement the Incident Action Plan
- Ensure safety for the team
- Transport samples and data to designated labs and National Coordinating Center in a timely manner
- Provide relevant information to Public Affairs Officials
- Maintain Communications with the operations center and National Coordinating Center

2.6.1 Responsibilities

The core team requires a wide range of expertise. Foremost is the need for an individual that can organize others, delegate tasks appropriately, make informed decisions and manage all the tasks related to an Incident Response. All of the members should be trained in conducting surveys, sample collection and sample processing and capable of assisting as needed on each of the teams. It is important to realize that individuals differ in their interests, skill level, scientific biases, and endurance levels; therefore, it is important that the Incident Commander recognize their strengths and make team assignments accordingly.

The Response Team should consist of a minimum of 6 team members (1 of the 4 divers may serve as Incident Commander), with two members on each of the three teams listed below:

- **Incident Commander (IC) –** The IC is responsible for overall management of the response. This includes developing incident objectives and managing all

incident operations. The IC sets priorities and defines the ICS organization for the particular response. The IC may also be one of the members of the Survey Team, Collection Team and/or Support Team.

- **Survey Team –** The Survey Team is responsible for documenting the site (above water and underwater), collecting environmental data, mapping and delineating the affected area, documenting the affected corals and other biota, and conducting surveys. One member of the team should video and/or photo-document the scene, surrounding substrate and affected corals. Based on expertise, members can deploy transects, collect colony data, collect relevant data on affected corals, and identify corals for sampling. Their primary objective is to determine the extent of the affected area, the number and species affected (as well as those obviously not affected) and identify colonies for sample collection. It is preferable for this team to include coral biologists with at least one having some coral disease knowledge.

- **Collection Team –** The Collection Team is responsible for photo documenting colonies before and after sampling, collecting water, sediment, coral mucus and tissue-biopsies from reference tissues and lesions, recording relevant data on standardized data sheets and transporting time-sensitive samples to the surface. It is preferable to have one member serve as the bag handler and data recorder, assisting the sample collector by providing appropriate tools and pre-labeled sample bags in a sequential manner.

- **Support Team –** The Support Team is responsible for sample processing and data recording procedures that are conducted both on boat and land. This team may also shuttle samples from the collection site to the boat, and assist in coordinating other on-boat activities. It is preferable for one member to include a laboratory-trained technician capable of handling biological samples for microbiology and molecular procedures or contaminant chemistry, if indicated.

2.6.2 Training

Properly trained individuals proficient in investigative procedures, data collection, specimen collection and handling collection techniques are critical to the success of an investigation. Various formats are important to ensure properly trained teams, including lectures and field practicals, videos and web-based refresher training programs, each designed to develop and maintain essential skills. The topics should include:

- The need and purpose of conducting an outbreak investigation, and differentiating these procedures from a monitoring or research project
- Expected scenarios, and how to plan for varied situations
- Work standards, importance of following an Incident Command Structure and completing assigned tasks

- Decision making, criteria and procedural guidelines
- Procedures and techniques for collection of specimens, field surveys, and completion of data forms:
- Handling, preservation, transport and tracking samples
- Communication and follow-up
- First Aid and Safety

Proficiency Drills

Proficiency drills are exercises both 'on paper' and in the field that give the team experience in reviewing each step in the response, from initial report to closing the investigation. The drills should consist of varying scenarios that include determining each member's proficiency in conducting their assigned task, checking the condition of equipment, testing strategies for developing an action plan for a given situation, practicing collection techniques and methods as well as sample handling, processing and preservation techniques. This type of training is essential to identify deficiencies, correct a problem before an actual incident occurs requiring a coordinated response.

2.7 Logistical Considerations

2.7.1 Personnel sources

Investigative teams may be composed of individuals from local, state and federal agencies, academic institutions, non-government organizations, and trained volunteers. It is critical to maintain an updated list of contact persons and their telephone numbers, email and surface mail addresses. (See Chapter 3 for details.)

2.7.2 Equipment

General Categories

- **Boats:** It is important to identify various agencies that can respond with small vessels to support dive operations. This may include state marine resource agencies, the National Park Service NOAA Offices such as National Marine Sanctuaries, National Marine Fisheries Service, National Ocean Service, or commercial charter companies.
- **Dive gear:** Most likely responders will have their own wetsuits and dive gear; however it is important to identify local dive shops for tanks and air and other equipment as necessary.

- **Medical supplies:** Identify local hospitals, veterinary clinics or marine labs in the area as these facilities can be a valuable resource for various types of equipment and supplies, such as liquid nitrogen, preservatives, and histological fixatives. (See Chapter 4 for details)

- **Sampling Kits:** Pre-assembled kits will vary depending on the reported circumstances. Items often pre-assembled include data forms and pencils, tissue biopsy tools, markers (e.g., flagging tape, colony tags, buoys lift bags), preservatives and storage materials for samples, collection equipment (e.g., hammer, chisel, leather punch for coring or clippers for branching corals, swabs, sampling tubes, bags), dry shippers (aka: liquid nitrogen vapor shipper), coolers and cameras. (See Chapter 4 for details)

- **Freezers:** It is ideal to be prepared with your own dry shipper (i.e., cryoshipper), but in cases where this is not available, interim refrigeration resources are required. Often for frozen samples requiring lower than -20ºC, dry ice can be obtained from local grocery stories and liquid nitrogen from specialty gas suppliers. University research facilities often have -80ºC freezers that can provide temporary storage until shipping can be arranged. Hospitals often have supplies of liquid nitrogen that may provide a stop-gap in an emergency situation. It is prudent to identify venders in your region that offer either liquid nitrogen, dry ice or -80ºC freezer capability.

- **Safety:** Adherence to institutional specific dive regulations and standards must be observed and enforced. All divers should be certified, trained and proficient in appropriate dive techniques, including dive planning, proper buoyancy, bottom times and safety stops, and effective communication with designated dive buddies. The IC should maintain a log of all divers and dive profiles, and review dive plans with the designated Dive Master before and during the event. First aid and oxygen delivery kits should be on board along with the phone number of local Emergency Medical Services, hospitals and location of nearest decompression chamber and hyperbaric medical units.

2.7.3 Supply Sources

Identify sources, addresses and telephone numbers and websites of local or closest sources of supplies (see Appendix VII for suggested list) that maybe need such as:

- Biopsy corers, clippers, hammers, chisels and other hardware
- Dry ice or liquid nitrogen
- Nearest shipping address for air and ground receipt of goods and supplies
- Nearest location for shipping including airlines, courier or express shipping
- Shipping containers and necessary forms, labels and documentation for shipping

2.7.4 Lodging for Response Personnel

Identify locations for lodging response personnel. In addition to local motels, there are frequently marine laboratories with dormitories or housing available for scientists at nominal rates.

2.7.5 Work Areas and Work Flow

Identify working areas and establish a standard operating procedure for work flow, to eliminate cross contamination and attend to time-sensitive samples promptly. As part of any Incident Response there are generally three types of areas designated:

- Clean areas - Clean areas include the command post, meeting rooms, eating areas and equipment and supply receipt areas.
- Transitional areas – These areas are primarily for decontamination of personnel and equipment.
- Contaminated areas – Underwater these are areas with diseased corals. Topside or on land these areas include areas designated for sample processing or laboratory tests.