Chapter 3

Incident Command System

3.1 What is ICS?

The Incident Command System (ICS) (US National Response Team 2000a) is a standardized emergency management strategy that is part of the National Interagency Management System (NIMS). It is used in cases that require a joint effort involving multiple agencies or organizations, and provides a comprehensive framework for managing emergency and non-emergency events. Originally created by fire departments to coordinate their efforts, it has expanded to be used as a more general response network plan. This system allows response without the boundaries that can be created by jurisdiction issues. ICS decreases the duplication of efforts, and coordinates different organizations into one operational unit.

Federal directives mandate use of the Incident Command System (ICS) by their agencies. The Coral Disease and Health Consortium (CDHC) is supported by federal funds and operates as a consortium that includes NOAA, the EPA, and DOI, as well as academia, industry and NGOs, and therefore has incorporated structure and functions into their Coral Disease Outbreak Investigation Response Plan that are consistent with the ICS structure.

ICS uses distinctive titles for each organizational level. The Incident Commander oversees all responsibilities associated with a response. The Command Staff includes the Liaison Officer, Safety Officer and Public Information Officer. The General Staff consists of leaders of the Operations, Planning, Finance/Administration, and Logistics sections. Each is titled a Section Chief, and each report directly to the Incident Commander.

3.2 Adaptation of ICS to Coral Disease Outbreak Investigations

Every response, no matter the size, has an initial response phase. For a Coral Disease Outbreak Investigation, this begins with an observation by a diver of a situation they deem as unusual that involves diseased coral that is reported to the CDHC. This is, followed by notification though the Response network to the area's Regional Coordinator (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 (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).

Once a Level III Response has been declared and the Response Team deployed, the ICS structure and protocols are engaged. This process should be moved as quickly as possible from beginning to end, although in reality it may require up to several weeks to accomplish. The availability of resources (both people and materials) and safe weather conditions will influence the timeline.

3.3 Incident Command System Operational Period Plan

Steps of ICS	Steps of Coral Disease Outbreak Investigation
Incident Occurs	**Observation by someone in the field**
Notifications	**Level I Data Sheet**
Initial Response and Assessment	**Regional Coordinator Interviews Observer, and may conduct a Level II investigation to collect more detailed information. Information is discussed with National Coordinator and Expert Working Group**
Incident Briefing 201	**If the National and Regional Coordinators determine need for a Level III Response, an ICS 201 Incident Briefing ends the Initial Response Phase and launches the ICS process**
Initial Unified Command Meeting	**Use ICS 202 Form to record established jurisdictional limits, operational period to be used in the response, and agreed upon overall response objectives and priorities**
Develop Tactics/ Tactics Meeting	**Coordinators consult others as needed to determine samples to be taken and to train teams in protocols**
Develop priorities, objectives and strategies	**Coordinators determine priority for list of objectives, plan sequence of events for safest and most accurate collection**
Planning Meeting	**All Command Staff and General Staff meet to write the Incident Action Plan**
Incident Action Plan (IAP) preparation and approval	**Purpose of the IAP is to develop the response strategy for the next operational period (OP) and give specific direction to responders. The IAP only contains information needed by the responders to safely conduct the assigned action. ICS-204a form/assignment sheets**
Operations Briefing	**Incident Commander meets with all team members to cover IAP, divide responsibilities and cover safety**
Execute IAP	**Dives to collect samples and data, input and organize data, process and ship samples**
Initiate planning for the next operational period	**Debriefing of teams each night leads to modifications of IAP as needed.**
Assess progress	**Executive Summary Package can be prepared each OP to provide updated incident status report. May contain ExSum form, Situation Map, ICS-209 form, the General Plan, ICS-220 or others**
Unified Commands Objectives Meeting	**Coordinators meet to determine final steps, referrals, recommendations**

Figure 3.3 Incident Commander = Regional or Local Coordinator responsible for onsite response; IAP= Incident Action Plan

3.4 ICS Roles and Responsibilities

3.4.1 Five Management Activities of ICS

- **Incident Command Responsibilities** are to set objectives and priorities with **overall management responsibility** for the incident. Safety, Liaison, and Information functions, unless assigned to Command Staff chiefs who report directly to Incident Commander are included in the IC responsibilities.

- **Operations Responsibilities** are to conduct tactical operations to **carry out the action plan**, develop the tactical objectives and organization, and direct all resources.

- **Planning Responsibilities** are to **develop the Incident Action Plan** to accomplish the objectives, collect and evaluate information, track resources status, and document the response effort.

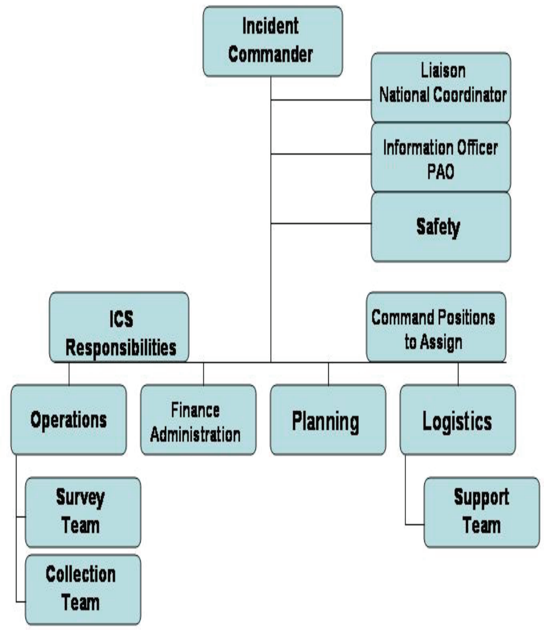


Figure 3.4.1 Overall management structure of an Incident Command Operation

- **Logistics Responsibilities** are to **provide support** to meet the incident needs, provide resources and all other services needed to support the incident response.

- **Finance/Administration Responsibilities** are to monitor costs related to the incident, provide accounting, procurement, time recording, and cost analysis.

Small incidents may be managed by one person, as the Incident Commander, in charge of all five management activities. Larger events will require that the other four management activities be assigned to command staff. Span of control is maintained at 3-7 responders per supervisor.

3.4.2 Incident Commander

The Incident Commander has ultimate responsibility for all five management activities of the IC System. In the case of coral disease outbreak investigations, it is important that the Response Team include a Divemaster responsible for the development and evaluation of the dive plan and supervision of the actual dives. Each of the Response Team members (Survey, Collection and Support Teams) reports to the IC. The IC must also ensure that the Incident Action Plan (IAP) and Site Safety Plan (SSP) are followed. The IC will develop the objectives and tactics to be included in the IAP. Other responsibilities include keeping records of expenses to be sent to the National Coordinator, and maintenance of Incident History and Status Information (including weather and disease) records. The Incident Commander will most likely designate Planning and Logistics Chiefs to handle those responsibilities. Both of these individuals report to the IC, and the IC reports to the Regional and National Coordinators; in some cases the Regional Coordinator could also be the IC.

3.4.3 Planning Chief

The Planning Chief (PC) is responsible for collection, evaluation, dissemination, and use of information about the development of the incident and determines the status of resources. The PC is responsible for writing the Incident Action Plan (IAP). This plan includes tactics, or methods that will be used to complete the goals of the plan. Tactics should address the timing of the response, transportation of team members, and organization of samples, collection protocols, and a materials/equipment list. As the investigation progresses, the Planning Chief prepares status reports and keeps the IC informed of progress. Other responsibilities include: collecting weather information and case history (last few months- any major weather events, SST changes, new industry, overflow, etc.), obtaining necessary permits for dives and collection of samples, and making contact with laboratories to arrange for analyses of samples.

3.4.4 Logistics Chief

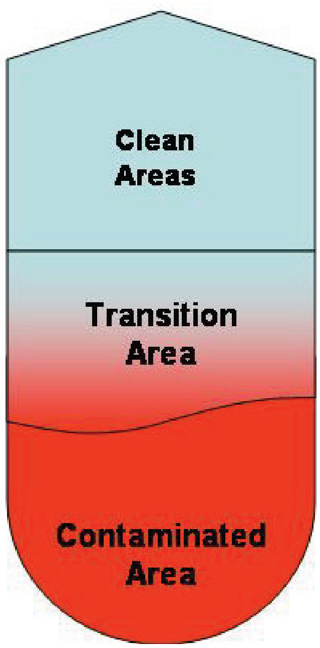
Logistics chief is responsible for:

- Facilities, services, and material support to the incident response
- Lodging accommodations for response team members
- Ordering supplies, kit materials
- Transportation arrangements for personnel, as needed
- Food arrangements, as needed
- Boat and Captain acquisition
- Evaluation of vessel operator qualifications
- Obtaining copies of training certificates and authorizations (given to the Incident Commander to be filed with the Safety Plan)
- Contacting shipping company and arranging shipment

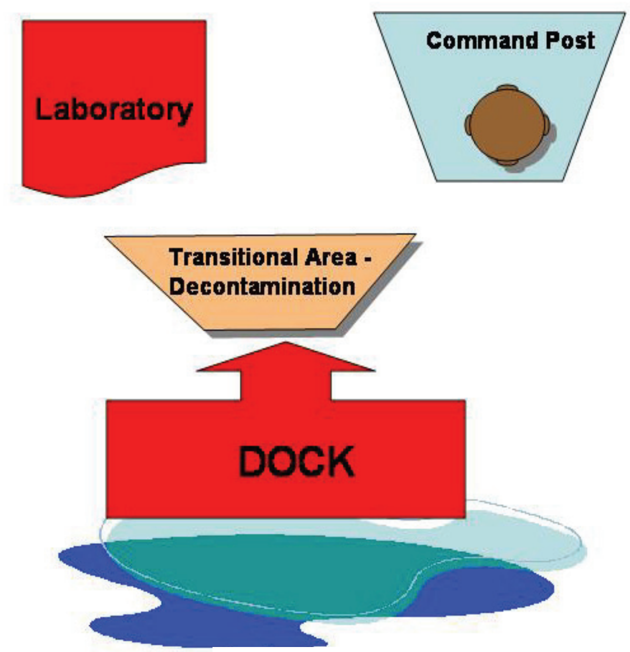
**Liaison Responsibilities*
The National Coordinator will serve as the Liaison Officer during a response. The Liaison Officer is responsible for addressing the concern of local agencies affected by the incident and communicating that information to the Incident Commander. The LO should also identify stakeholders and address their concerns.

3.5 Establishing a Command/Operations Center

The Operations Center is established to continually monitor any incoming information regarding the response, either by phone, fax or email, and to communicate with Coordinators as well as federal and local authorities and involved organizations. This may be a research center, university office, local or federal government office (i.e., National Marine Sanctuary, National Park Service), or similar location, to be determined by the Incident Commander. Promotion and public awareness of the response may also be run from this office, or that of the designated Public Affairs Official. This location also serves to coordinate the response, check in and deploy team members, gather and archive data, and keep track of samples and their shipment/receipt.



Boat Situation



Land Situation

3.6 A Model Response & Decision Making Process

3.6.1 Notification: Level I

A model response begins with an unusual observation in the field. This observation is most easily verified if the observer is a trained coral reef scientist, but it could come from anyone who describes specific coral conditions indicative of disease. The importance of outreach is highlighted at this crucial first step, as we need to make the reporting format readily available to those making the observations. The reporting form will be available on the CDHC website and also available at local sources such as dive shops. This Level I (Appendix II) information is completed and sent to a Regional Coordinator. The observer may be a recreational diver, dive operator, manager or researcher who observes an unusual disease outbreak and notifies the Regional Coordinator directly. In this situation, the Regional Coordinator could fill out the Level I response form during the interview.

The Regional Coordinator (Appendix I, Regional Coordinator Check List) will contact the Initial Observer to conduct an interview and:

- verify the report
- determine the validity of the report
- collect sufficient information to determine the need for further response
- request additional supporting materials, if available, such as photographs

At this point, the Regional Coordinator may elect to close the case and forward the report to the National Coordinator. If this is a new observation, a species at risk, or if a large magnitude incident is suggested, the Regional Coordinator may recommend a Level II response, notify the National Coordinator, and begin to organize a small-scale trip to the site to collect more specific information to determine whether the incident may warrant a Level III investigation. The Decision Tree below illustrates (Figure 3.6.1) this process.

Coral Disease Investigation Decision Tree

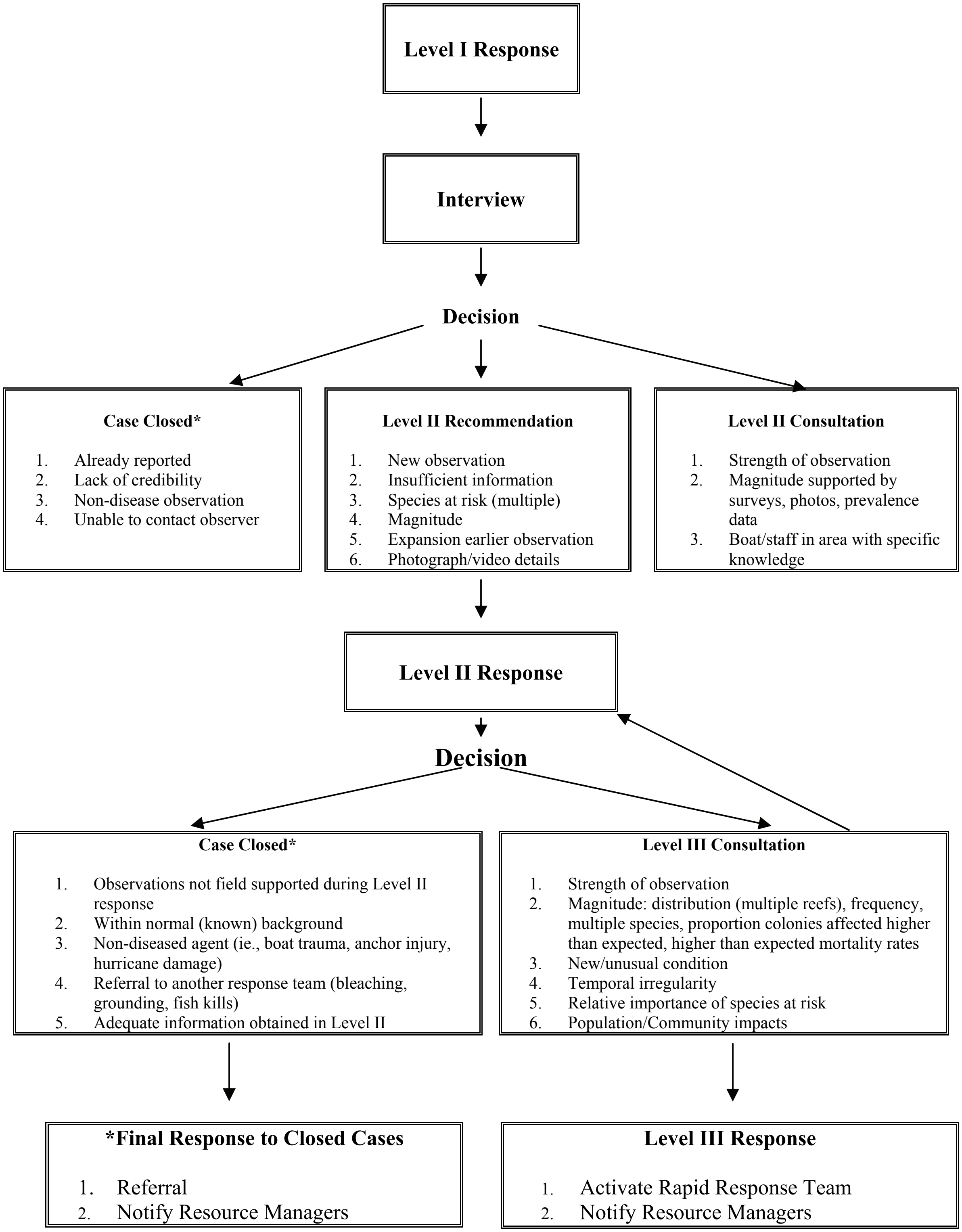


Figure 3.6.1 Decision Tree for Outbreak Investigations

3.6.2 Disease Determinations: Level II Decisions

3.6.2.1 Disease vs. Damage

In corals, gross morphological signs of disease can be manifested as loss of tissue, damage to the underlying skeleton, alterations in color of affected tissue, or changes in shape, size, or texture of the corallum (Work and Aeby 2006). These signs alone can only be used to describe an observed lesion, not to infer causality. Additional morphological features (e.g., histology) and laboratory studies (molecular, microbiology, analytical chemistry) are needed to better characterize the etiology, and determine possible causes. Many lesions found on corals are not the result of an infectious agent but rather a result of physical damage (e.g., predation, abrasion, and storm damage), environmental stressors (e.g., temperature-related bleaching, sediment stress), or chemical damage (e.g., allographic competition, or toxicants). When a coral lesion is encountered in the field it is important to conduct a thorough scene investigation to eliminate predation, bleaching, storm damage, competition and overgrowth, algal interactions and other potential sources of mortality. Some investigators use a small magnifying hand-held lens to help discern these characters underwater, if features are still questionable, a portable dissecting scope, on the support vessel can help in determining more specific features of the lesion. If evidence suggests the lesion may be due to disease, and lesions are widespread and are causing extensive mortality or atypically affecting a certain species, recommendations should be made for an investigation with sample collection for laboratory analyses.

3.6.2.2 Characteristics to Consider for Disease Determination

- **Growth anomalies**

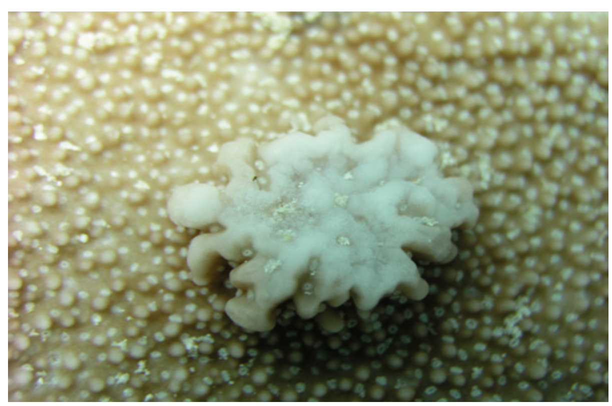


Figure 3.6.2.2.1 Coral growth anomaly *Photo courtesy of Andy Bruckner, NOAA*

Although frequently referred to as ‘tumors’, the abnormal growths found on more than 40 species of coral, result from several different growth processes, most of which do not fit the strict pathology for tumor definition, i.e., neoplasm (uncontrolled growth of abnormal cells). Frequently the anomalous growth forms are due to processes such as hypertrophy or hyperplasia (Domart-Coulon et al. 2006). In general, the growth anomalies of coral are focal or multifocal, circular to irregularly shaped lesions consisting of abnormally arranged skeletal elements (corallites, ridges, valleys), which are larger or smaller than those of adjacent healthy tissue. They may protrude above the colony surface, and may or may not be covered by intact normal-appearing tissue. Pigmentation may be normal, lighter (suggesting loss of zooxanthellae), or completely absent (suggesting absence of zooxanthellae). In some corallites reduced in number or completely absent, and the growth anomaly resembles a white plaque over the colony surface. In other types, corallites may be highly disorganized and tissue may die in irregular patches. Aberrant calyx formation, enlarged calices, reduced number of calices, and color changes are features that may also be associated with coral growth anomalies.

- **Tissue loss**

Figure 3.6.2.2.2 Parrotfish spot biting on star coral (*Montastraea annularis*), *Photo courtesy of Andy Bruckner, NOAA.*

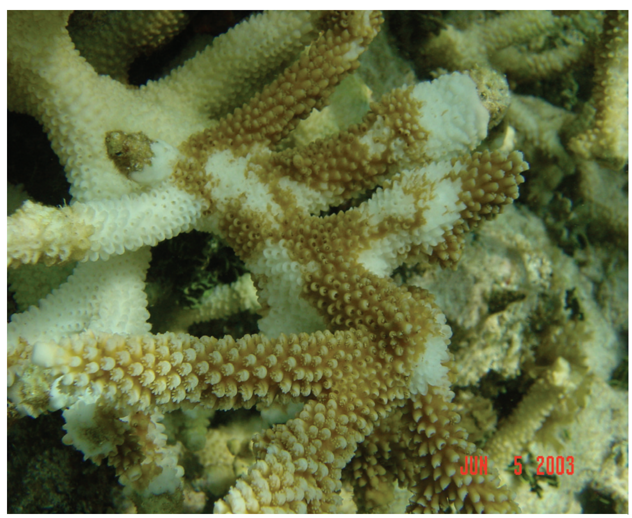


Figure 3.6.2.2.3 Acropora disease of unknown etiology (2003 case from FL Keys), *Photo courtesy of Dana Williams, NOAA*

It is easy to jump to conclusions when faced with corals having complete tissue loss. Caution should be exercised not to assume the lesions are a result of an infectious agent. Lesions can be caused from a variety of factors that include physical damage, environmental changes (e.g., temperature), toxicants or infectious agents. Therefore it is imperative that lesions be inspected closely for distinguishing signs. Knowledge of local predators and their associated feeding patterns is crucial in distinguishing predation from disease. Predators will not necessarily be on the affected coral colony, but their presence in the vicinity should be noted, e.g., snails often can be found hiding at the base of the colony or in other crevices nearby. Many predators are known to cause complete tissue loss. Crown-of-thorns starfish (COTs) often leave a 'trail' of damaged colonies which can lead to the culprit. Coral-feeding fish, on the other hand are usually within the vicinity, as they are site attached. With tissue loss it important to note the pattern of tissue loss, rate of tissue loss, and presence of loose tissue. Presence of loose tissue can suggest a "sloughing" that occurs during some infections. Another sign of disease is progressive tissue loss. The rate of tissue loss can often be estimated by the degree of algal colonization on the bare coral skeleton. Frequently, disease will produce a linear pattern of progressive tissue loss as opposed to a more amorphous pattern associated with certain predators.

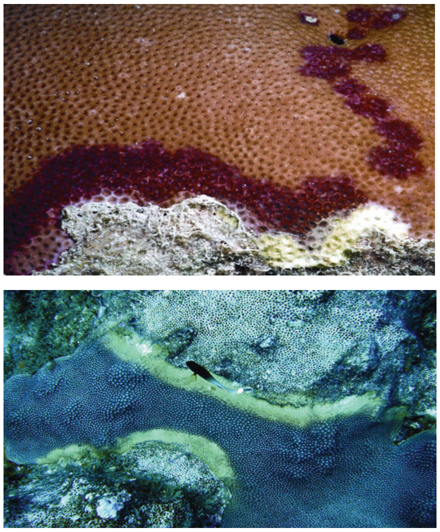


Figure 3.6.2.2.4 Above *Siderastrea siderea* with Dark Spots Disease with some associated tissue loss (white skeleton) in the lower portion of the photo, below Yellow Band Disease on *Montastraea faveolata*. The colony exhibits minimal recent tissue loss. *Photo courtesy of Andy Bruckner, NOAA*

- **Color change**

If there is color change, the observer should look for evidence of interactions with other organisms (coral, algae, other invertebrates). If the colony is white, examine the skeleton and differentiate between bleaching, where the polyps are still present, and tissue loss with a bare skeleton.

Field diagnosis is only the first step in determining presence of coral disease. If the signs of disease are present, etiologic diagnosis will require histological and other laboratory analyses. Level III investigations should be recommended only when the accumulated facts in the case meet the criteria for an unusual disease occurrence (see section 3.6.3).

3.6.3 Decision to Launch an Investigation: Level III

Level II disease assessment and information is forwarded to the National Coordinator and the Expert Working Group (EWG) for consideration. The criteria for determining whether reports constitute an Unusual Coral Disease Outbreak in most instances include a mass mortality event and/or numerous coral colonies with gross signs of recent partial tissue loss and they meet one or more of the following criteria:

- Species of interest is affected (e.g., ESA-listed coral)
- Multiple species affected
- Disease appears at an abnormal time or place
- Frequency of disease (i.e., increased number of colonies affected with lesions) is greater than expected for that time of year or for that location
- Potential ecological effects of concern
- Signs consistent with a known or reported disease, but affected species previously thought to be resistant to that disease
- Possibility of new disease, i.e., disease signs are not consistent with previously described clinical signs

The EWG and the National Coordinator, in consultation with the Regional Coordinator will use their knowledge, experience and judgment to determine whether any of the criteria apply in a way that warrants an organized investigation with sample and data collection, or Level III Response.

3.6.4 Launching an Investigation: Level III ICS

Once a Level III Response is initiated, the Incident Command Structure is implemented. An Incident Commander is appointed, and other General Staff are assigned as necessary. The Incident Commander is responsible for collection of a Case History, Development of an Incident Action Plan (IAP) and Site Safety Plan (SSP), organization of all response team members, acquisition of needed equipment, permits and sampling kits, and execution of the IAP including sample collection, processing and shipment.

A Command Post is designated, where all team members can report and be briefed on the IAP and SSP. Once the field investigation begins, Survey Teams conduct the initial dives to collect site data, set the perimeter of the affected area, document the scene, deploy and assess transects, and identify colonies for sample collection. The Collection Team obtains samples of coral tissue and mucus and associated water and sediment. The Support Team aides in these dives, processes or stabilizes the samples once they arrive on the boat, and finalizes the processing back at the Field Lab. All samples are stabilized, properly processed according to the planned laboratory analyses, logged, labeled, and shipped to the appropriate diagnostic laboratories. The Incident Commander calls to verify safe arrival of samples to the appropriate contact person at each laboratory. Any media information is supplied by the appointed Public Affairs Official for the region. Throughout the Outbreak Investigation, a cycle of planning, execution, reassessment and adjustment to plans will assure the most effective action (See Response Cycle, Figure 3.6.4). Debriefing at the end of each response day will help to identify areas for improvement in the next dive or next day's tactics.

Once the field investigation portion of the response is complete, and feedback is given to the Initial Observer and other management authorities involved in the response in the form of a Quick Report, which is an update that includes any preliminary findings and a summary of laboratory tests being conducted and any follow-up observations recommended. Recommendations are formulated by the Incident Commander, Regional Coordinator and/or National Coordinator and provided to all of the appropriate parties. Analysis reports from samples sent to designated laboratories are collated in the National Office and reviewed by the Expert Working Group and other medical experts as needed, to evaluate the test results and provide a diagnostic report. For example histopathology samples are archived at the International Registry of Coral Pathology at the NOAA Cooperative Oxford Laboratory, Oxford, MD and microbial pathogen screening tests may be conducted at NOAA NOS CCEHBR, Charleston, SC. All information associated with the Response is kept on file by both the regional coordinators and national office, for future reference.

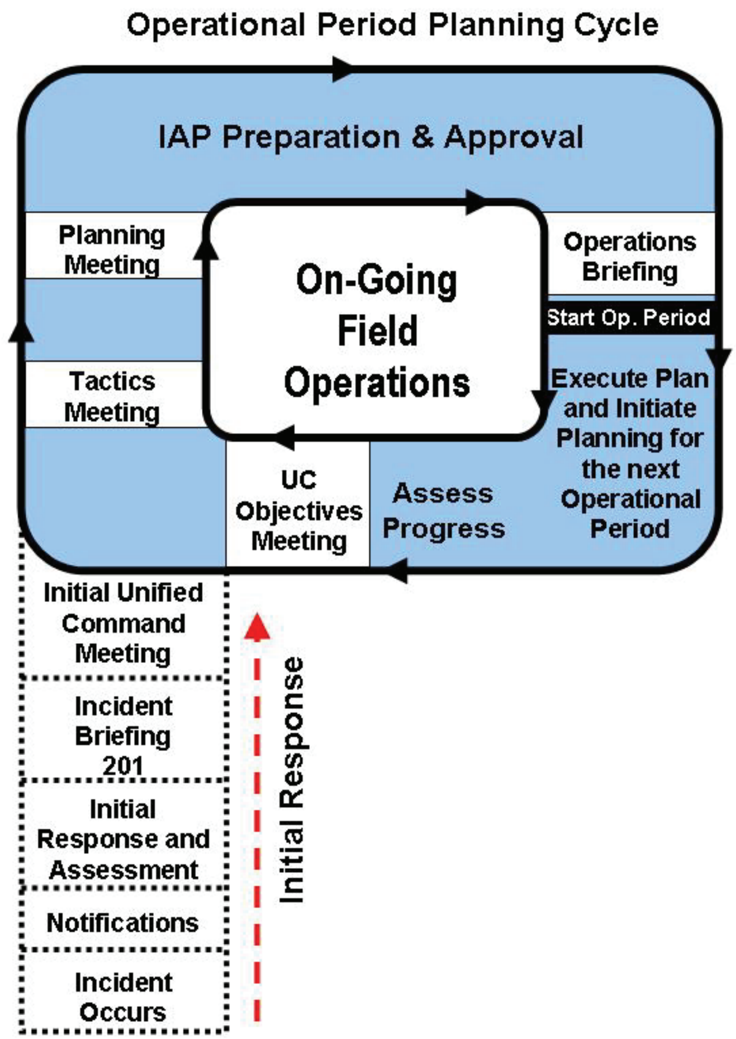


Figure 3.6.4 Flow diagram of operations during a Level III response. *Artwork by Thomas Bartlett.*