# 4.0
# ENVIRONMENTAL CONSEQUENCES

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This chapter describes the potential environmental consequences of the proposed activities by comparing these activities with the affected environment. The amount of detail presented in each section is proportional to the potential for impacts.

To assess the potential for environmental impacts, a list of activities necessary to accomplish the Proposed Action and the Recovery-not-possible Alternative was first developed (chapter 2.0). Next, the environmental setting was described, with emphasis on any special environmental sensitivity (chapter 3.0). In this chapter the Proposed Action and the Recovery-not-possible Alternative are compared with the potentially affected environment to determine the environmental impacts, if any, of the proposed activities. Proposed activities were also reviewed for the potential for cumulative impacts.

**Environmental Resources Eliminated from Detailed Consideration**

In terms of air quality, while there would be mobile emissions from ships, barges, spotter planes, and helicopters involved in the operation, there would be no stationary source emissions. Furthermore, there would be no hazardous or toxic air pollutants from stationary emissions not covered by the National Ambient Air Quality Standards but covered under the National Emission Standards for hazardous air pollutants. Terrestrial biological resources would not be affected since all activities would be confined to either deep-water or shallow-water areas off the coast of Oahu. There are no areas of concern for cultural and archaeological resources, historic buildings and structures, or traditional cultural properties. There are no areas of ethnic importance that could be affected (State Historic Preservation Officer, 2001).

Similarly, no impacts to land, geology (local physiography, topography, and geological resources), and soils would occur. There would be no impacts to land use, or any conflicts with land use plans, policies, or controls. There may be some noise associated with the operations, but any noise would be short-term, intermittent, and no different from regular ongoing vessel and aircraft noise in the area. With such a short timeframe for implementation of the Proposed Action, the potential for adverse socioeconomic impacts to income, population, housing, community services, and infrastructure would not exist. No transportation-related impacts to road, rail, air, or water modes would be expected, and the Proposed Action would have no effect on local utilities in terms of their energy, potable water, wastewater or solid waste processing and distribution capacities, storage capacities, average daily consumption, or peak demand loads. Lastly, no permanent change to the existing character of the landscape or scenic viewshed would occur, and thus there would be no impacts to visual and aesthetic resources.

There is, however, the potential for adverse impacts to water quality, marine biological resources including coral reefs, public health and safety, and airspace. In addition, there is

the potential for hazardous materials and hazardous waste from proposed activities to affect the environment. These resources are addressed in the following sections.

## 4.1 WATER QUALITY

This section describes the potential impacts to water quality from hazardous materials that may remain on *Ehime Maru*. To analyze the potential impacts to water quality, it is important to understand the hazardous materials that may remain on *Ehime Maru* and the natural process that could affect these materials.

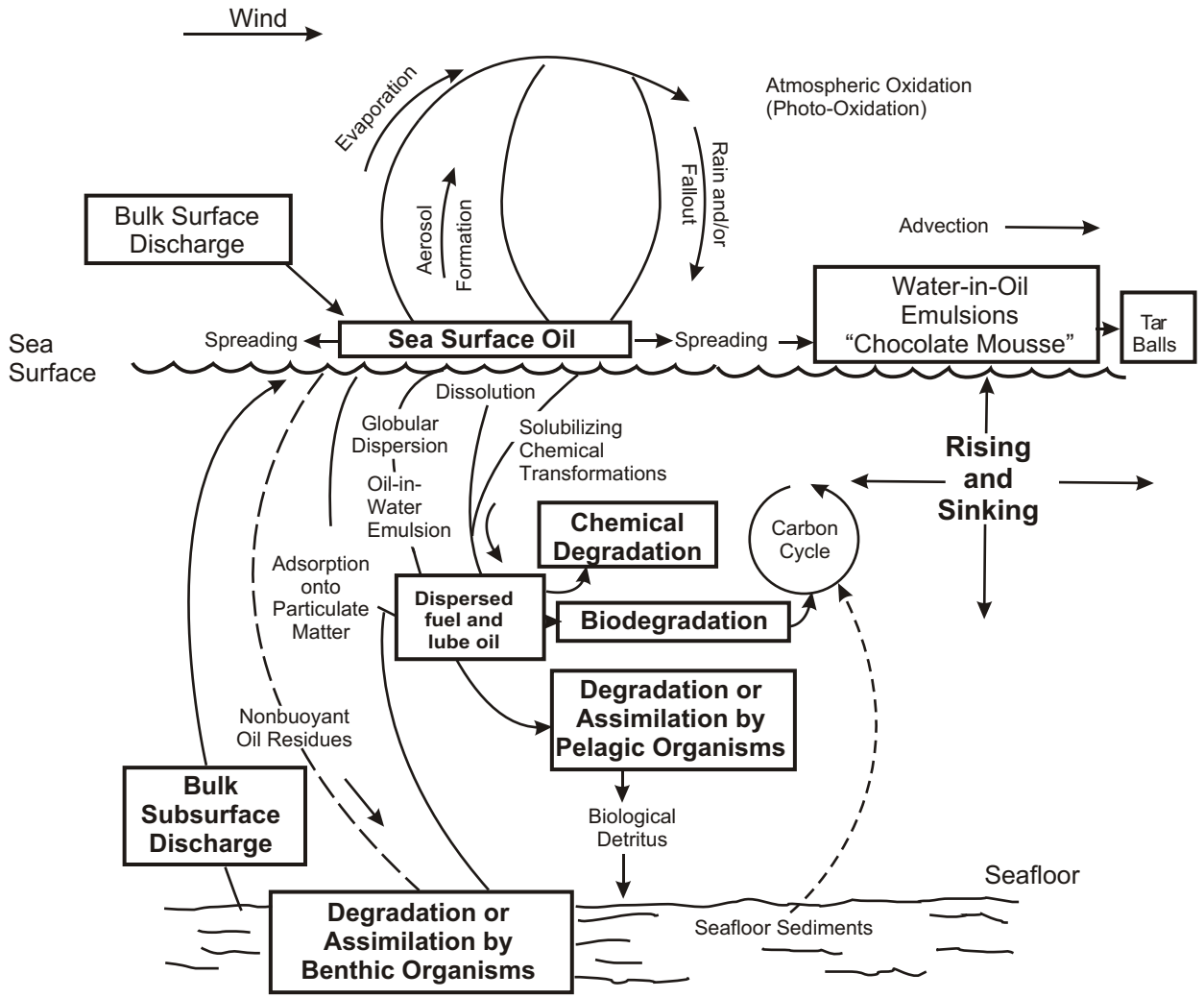
### 4.1.1 PROPOSED ACTION

Records and personal conversations indicate that at the time of the collision, *Ehime Maru* carried approximately 65,000 gallons (246,000 liters) of diesel fuel, 1,200 gallons (4,500 liters) of lubricating oil, and 46 gallons (182 liters) of kerosene. The ship was also equipped with a carbon dioxide fire extinguishing system, some smaller fire extinguishers of unknown content, and a small hazardous material storage locker. The contents of the locker are unknown, but may have included very small amounts of paints, cleaning solvents, and small quantities of other chemicals.

Because sea water at the current ship location exerts a pressure about 62 times the average pressure at sea level, it is probable that all canisters, aerosol cans, and other containers on board that were not open when the ship submerged have collapsed, releasing their contents. Thus, it is considered likely that all significant quantities of liquids and certain gases onboard were released from the ship during its descent, with the possible exception of remaining petroleum products, primarily diesel fuel and lubricating oil that may have been trapped in compartments within the ship.

Petroleum introduced to the marine environment goes through a variety of physical, chemical, and biological changes during exposure to sea water (figure 4-1). Some of the processes such as evaporation may be responsible for the loss of from one-third to two-thirds of fuel released in a period of hours depending on the size of the release, wind speed, and other factors. Appendix I, part 2, provides more details on the physical, chemical, and biological processes that may change released petroleum.

Baseline water samples would be taken at the shallow-water recovery site prior to operations. Baseline samples would also be taken of the diesel fuel *Ehime Maru* used. Recovery personnel would try to obtain a sample of any remaining diesel fuel or lubricating oil from *Ehime Maru*. In the event of a release, initial and periodic sampling for total hydrocarbons and benzene would be taken.




Source: National Academy Press, 1985, pg. 271

**Weathering Processes Affecting Petroleum Products Releases in the Ocean**

**Figure 4-1**

#### 4.1.1.1 Current Location

As stated in section 4.1.1, some liquid and gaseous pollutants on the ship at the time of the collision are very likely to have been released to the water column during the ship's descent. The Proposed Action is judged not to have any measurable effect from liquid or gaseous pollutants originally on board the ship other than petroleum products.

If any remaining petroleum products are released from *Ehime Maru* during mobilization and lifting actions, they could rise to the sea surface. Any diesel fuel or lubricating oil released would be subject to weathering processes. The effect of a diesel fuel or lubricating oil release on water quality is contingent upon a number of factors, including the amount and rate of the release and environmental conditions (e.g., wind, current, sea state) at the time of the release. However, the U.S. Navy would take all reasonable precautions to ensure proposed activities are conducted during favorable sea and wind conditions and would be prepared to contain and remove, to the maximum extent practicable, petroleum on the sea water surface. Therefore, there would be no long-term environmental effect as a result of a petroleum product release during proposed activities at the current location.

The Proposed Action is not expected to measurably alter biologically important parameters of water quality including salinity, temperature, pH, density, and dissolved gases except in the immediate area of such a diesel fuel or lubricating oil release. Potential effects to physical and chemical water quality are judged to be minimal because they would be localized and transitory and would be subject to planned response actions and weathering.

#### 4.1.1.2 Transit to the Shallow-water Recovery Site

Petroleum products are anticipated to be the only pollutants on *Ehime Maru* that are likely to be released in sufficient quantities to result in a measurable water quality effect during transit from the current location to the shallow-water recovery site. Because of this potential, the U.S. Navy has determined that the most likely release scenario would have oil response equipment and a response management team mobilized during the lift and relocation phases, should the need arise. During the transit to the shallow-water recovery site, the heavy-lift vessel would remain at a location approximately 3 nautical miles (approximately 6 kilometers) away from the site to wait for optimal weather conditions and sea state. Transit would only occur during the daylight hours. This would minimize the potential impact from the spread of a diesel fuel or lubricating oil release by allowing immediate detection of any resultant "sheen." Although there would be some short-term degradation in water quality immediately around a release, there would be no long-term environmental effect on water quality after the response operation.

#### 4.1.1.3 Reef Runway Shallow-water Recovery Site

The only significant quantities of water quality pollutants expected to be on *Ehime Maru* during shallow-water recovery operations are petroleum products. Some increase in water turbidity may occur during the placement of *Ehime Maru* on the ocean bottom, installation of the mooring system for the diving barge, and from miscellaneous anchoring from support ships. Sediment at the shallow-water site is primarily sand and coral rubble that

would quickly settle to the bottom. Thus, any exceedance of the state water quality criteria for turbidity of Class A marine water would be localized and very short-term; therefore, no adverse impacts to the Class A water quality for turbidity would occur.

As addressed in the Proposed Action, an attempt would be made to remove any remaining petroleum products on the vessel following crewmember recovery. The potentially affected areas from a catastrophic uncontrolled release of a reasonable amount of petroleum products on board the ship were modeled (appendix H). These simulations indicate with a 90 percent confidence level where the maximum surface area of an uncontained diesel fuel or lubricating oil release would be expected to migrate at different time intervals following a release. The actual area would depend on a number of factors including the amount and type of product released (diesel fuel spreads faster, but is more volatile than lubricating oil), the wind direction and strength, tidal cycle, wave height, ocean temperature, and currents at the time of release. However, because of the potential for a release, the U.S. Navy would take all reasonable precautions to ensure that proposed activities are conducted during daylight hours (allowing detection of resultant sheens from diesel fuel or lubricating oil) and during favorable sea and wind conditions and would be prepared to contain and recover petroleum releases.

Therefore, the environmental effect of a petroleum release during proposed activities at the recovery sites would be minimal. Additionally, removal of any petroleum currently remaining on board the ship would have a long-term beneficial effect on marine water quality.

The Reef Runway shallow-water recovery site, because of its proximity to Honolulu Harbor, Keehi Lagoon, Pearl Harbor, and the Sand Island, Honouliuli, and Fort Kamehameha wastewater treatment plant outfalls, is likely to experience temporary degradations in water quality. Nonetheless, the Proposed Action includes procedures and equipment that would be implemented, such as the establishment of booms and skimmer vessels, to minimize the potential for additional water quality impacts. Because of the procedures and equipment that would be in place to respond to any releases, any further reduction of water quality during proposed activities is expected to be minimal and short term.

#### 4.1.1.4 Transit to the Deep-water Relocation Site

No impact on water quality is expected during transit to the deep-water relocation site. An attempt to remove any petroleum product on *Ehime Maru* would be made during shallow-water recovery activities. Therefore, any quantity of petroleum remaining on board during transit would be minimal, sealed within the ship, and not expected to be released to the environment. If during the recovery effort not all of the diesel fuel and lubricating oil is removed, there is the potential for a release similar to the transit to the shallow-water recovery site. However, the equipment and procedures would be in place to respond to such a release. Overall, no diesel fuel or lubricating oil releases would be expected that would measurably degrade existing water quality during transit.

#### 4.1.1.5 Deep-water Relocation Site

Some metals used in ship construction can be toxic to marine life in high concentrations. However, as evidenced by other ships lying in deep-water for long periods of time, the ship materials would decompose at a very slow rate. *Titanic* is a recently photographed example of the slow rate of metal decomposition in the deep ocean environment. Consequently, no short-term effects are anticipated, and any long-term effect on water quality as a result of ship decomposition would be minimal and localized.

There is potential for a diesel fuel or lubricating oil release during deep-water relocation from petroleum products that may remain aboard *Ehime Maru* after removal efforts at the shallow-water recovery site. However, the Navy would take all reasonable precautions to ensure that proposed activities would be conducted during favorable sea and wind conditions. In addition, the Navy would be prepared to contain and remove all reasonably recoverable diesel fuel and lubricating oil on the sea water surface during the release of the ship at the deep-water relocation site.

Once the ship is relocated in deep water, any remaining petroleum product releases would most likely be minimal and at a slow rate following hull decomposition rather than a rapid release. Product released at a slow rate is anticipated to disperse in the water during movement to the sea surface and not form a noticeable release or measurably degrade water quality.

### 4.1.2 RECOVERY-NOT-POSSIBLE ALTERNATIVE

Under this alternative, *Ehime Maru* would not be recovered and would remain at its current location. This alternative would not allow for the recovery of potentially remaining hazardous materials that could affect water quality and cause long-term degradation of the marine environment through the continued release of the remaining hazardous materials. However, this alternative would eliminate the potential for a release close to shore because the ship would not be moved.

## 4.2 MARINE BIOLOGICAL RESOURCES

Biological resources potentially affected by the proposed relocation and recovery actions are evaluated using an approach based on consideration of habitat quality, duration of the impact, quantity of habitat impacted, and susceptibility of the resource to damage.

### 4.2.1 PROPOSED ACTION

This section analyzes the potential impact to marine biological resources from the Proposed Action. The recovery plan includes measures the Navy would take to minimize impacts to marine biological resources. The appropriate resource agencies would be notified to administer necessary assistance if birds, marine mammals, or sea turtles should come in contact with unanticipated diesel fuel or lubricating oil releases. In accordance with the

recovery plan, the U.S. Fish and Wildlife Service would conduct pre-recovery and post-recovery surveys of three areas on Oahu and one on Kauai to identify any oiled birds. In addition, U.S. Fish and Wildlife Service and/or National Marine Fisheries Service personnel would be aboard an oil skimmer to observe and collect any distressed birds that may become oiled during the lift and relocation phase.

If it is possible, oiled birds would be stabilized and delivered to a rehabilitation facility. Notifications would be made to National Marine Fisheries Service should mammals or turtles be oiled. The International Bird Rescue Research Center would be contracted for technical assistance with rescue and rehabilitation of oiled birds.

#### 4.2.1.1 Current Location

**Marine Fish, Essential Fish Habitat, and Coral**

During the rigging and the lifting action there would be some disturbance of the ocean bottom at the current location of *Ehime Maru*. Drilling beneath *Ehime Maru* with the coiled tube drilling system and jet nozzle assembly, inserting the messenger line under the hull, and rigging of lifting plates would disturb unconsolidated sediments on the seafloor that may provide habitat for bottom dwelling invertebrates and deep-water fishes. Similar disturbances would be expected during the mooring of the coiled tube drilling system and during activities involving the movement of ROV vehicles and ROV umbilical lines on the seafloor. Overall, there would be a limited area that would be subject to disturbance on the seafloor or on marine fish or EFH.

Deep-water lifting of *Ehime Maru* is expected to disturb and re-deposit sand deposits beneath and to either side of the vessel. This action could potentially disturb and/or result in the loss of some bottom-dwelling organisms and result in a small change in the substrate contours in the affected area. Because of the limited area of disturbance, this effect is expected to be minimal.

*Ehime Maru* is located within the EFH for adult and juvenile pelagic management unit species (Western Pacific Regional Fishery Management Council). The Council has designated the water column down to 3,300 feet (1,000 meters) that is above all seamounts and banks within the EEZ shallower than 6,000 feet (2,000 meters) as a habitat area of particular concern for eggs and larvae of pelagic management unit species. The Proposed Action activities in the current location would not be expected to adversely impact the EFH for pelagic management unit species or any other designated EFH.

The greatest potential for impacts would come with the lifting of *Ehime Maru* from the seafloor if there is any remaining diesel fuel or lubricating oil on board. Releases of diesel fuel or lubricating oil from the vessel could occur as it shifts position and reaches the planned transit height above the seafloor. Any releases of this type would be expected to rise to the surface, spread out, and rapidly evaporate. However, boom systems and skimmer vessels deployed at the lift location on the day of the lift in accordance with the Proposed Action (chapter 2) would contain the diesel fuel and lubricating oil. The

countermeasures provided by the Proposed Action would minimize the potential for impacts to marine fish and EFH.

**Marine Mammals**

The potential for impacts to marine mammals due to an unanticipated release of diesel fuel or lubricating oil during the lifting of *Ehime Maru* is remote. It is unlikely that Hawaiian monk seals would be present in the channel area where the vessel rests. There is evidence that dolphins can identify the presence of diesel fuel or lubricating oil and avoid it (St. Aubins, et al., 1985). It is likely that the migratory humpback whale would have left for its northern feeding grounds. The sperm whale would not be expected in the relatively shallow water off Penguin Bank (2,000 feet [600 meters]) when it apparently prefers deeper waters (6,000 feet [1,800 meters]).

**Migratory Birds**

Overall potential impacts to migratory birds would be expected to be minimal with the implementation of the Proposed Action (chapter 2).

**Threatened and Endangered Species**

The threatened green sea turtle may be in the area of the current location only as a transient from one island to another. The endangered hawksbill turtle may also be in Hawaiian waters in very low numbers. Because of the low probability for either of these species to be in the area of the current location at any particular time, the activities of lifting *Ehime Maru* at the current location is expected to have no effect on the green sea turtle or the hawksbill sea turtle.

The endangered humpback whale would have migrated north from Hawaiian waters by the time the lifting of *Ehime Maru* at the current location occurs. There would be no effect on the humpback whale. The endangered sperm whale generally occurs further offshore and in deeper water than the current location. Consequently, there would be no anticipated effect on the sperm whale. Because the blue whale and fin whale are extremely rare in Hawaiian waters, no impact would be expected. The Hawaiian monk seal may only occur in the area of the Proposed Action on a transient basis, if moving from one island to another. The potential that a Hawaiian monk seal would be in the area on the day the vessel would be lifted is very low, and it is expected that there would be no effect on the species.

The endangered Hawaiian petrel and short-tailed albatross, and the threatened Newell's shearwater are expected to forage in the ROI. Hawaiian petrels and Newell's shearwaters may forage in the waters that surround the island of Oahu. The use of light shields to minimize reflection would reduce disorientation of the Newell's shearwater at night during the crew's preparation for the next day's activities.

#### 4.2.1.2 Transit to the Shallow-water Recovery Site

**Marine Fish, Essential Fish Habitat, and Coral**

The transit corridor to the shallow-water recovery site would traverse the marine ecosystem currently included in the EFH for pelagic management unit species. There is a potential that some diesel fuel or lubricating oil may be released during transit. The presence of boom systems and skimmer vessels would minimize any potential for impacts.

**Marine Mammals**

The potential for impacts to marine mammals because of a release of diesel fuel or lubricating oil during the transport of *Ehime Maru* along the transit corridor is low. It is unlikely that Hawaiian monk seals would be present in the area where the vessel is offshore. In the areas where the transit corridor is near shore, the presence of a Hawaiian monk seal is a rare occurrence. There is evidence that dolphins can identify the presence of diesel fuel and lubricating oil and avoid it (St. Aubins et al., 1985). The migratory humpback whale would have left for the northern feeding grounds during the time of the transit to the shallow-water recovery site. The sperm whale generally would not be expected in the shallow-water along the transit corridor. Along the transit corridor, sonar on the ROVs would be used to maintain the necessary clearance from the seafloor. The standard ROV sonar generates sound at a frequency of 700 kHz at a power of 60 decibels at 1 micropascal at 1 meter. This level is outside the hearing range of small whales and dolphins, which can only hear up to 100 kHz. The impacts of underwater sound-producing devices to underwater animals are discussed in more detail in section 4.2.1.5. The slow towing speeds (1 knot [approximately 2 kilometers per hour]) would preclude the potential for collision with a free-swimming marine mammal. Overall, there should be no adverse effects to marine mammals.

**Migratory Birds**

The use of boom systems and skimmer vessels and implementation of the Proposed Action (chapter 2) would further reduce the potential for impacts to migratory birds.

**Threatened and Endangered Species**

The threatened green sea turtle may appear in the offshore areas of the transit corridor as a transient from one island to another. There is a greater chance for the green sea turtle to be present in the nearshore waters where they forage on algae and seagrasses. Because of their low numbers and infrequent occurrences in Hawaiian waters, the endangered hawksbill sea turtle would not be expected in the transit corridor. With the implementation of the countermeasures that are a part of the Proposed Action, there is not expected to be an effect on the green sea turtle or the hawksbill turtle during the relocation of *Ehime Maru* to the shallow-water recovery site.

The endangered humpback whale would be out of Hawaiian waters by the time the transit to the shallow-water recovery site takes place, having migrated to northern waters. There would be no effect on the humpback whale. The endangered sperm whale generally occurs farther offshore and in deeper water than the transit corridor. There would be no

effect on the sperm whale. Because the blue whale and fin whale are extremely rare in Hawaiian waters, no impact would be expected. The Hawaiian monk seal may only occur in the deeper offshore areas of the transit corridor on a transient basis, if moving from one island to another. The potential that a Hawaiian monk seal would be in the area on the day(s) the vessel would be transported is very low. In the nearshore areas at the shallow-water recovery site, the presence of the Hawaiian monk seal is a rare occurrence, and it is expected that there would be no effect on the species during transit.

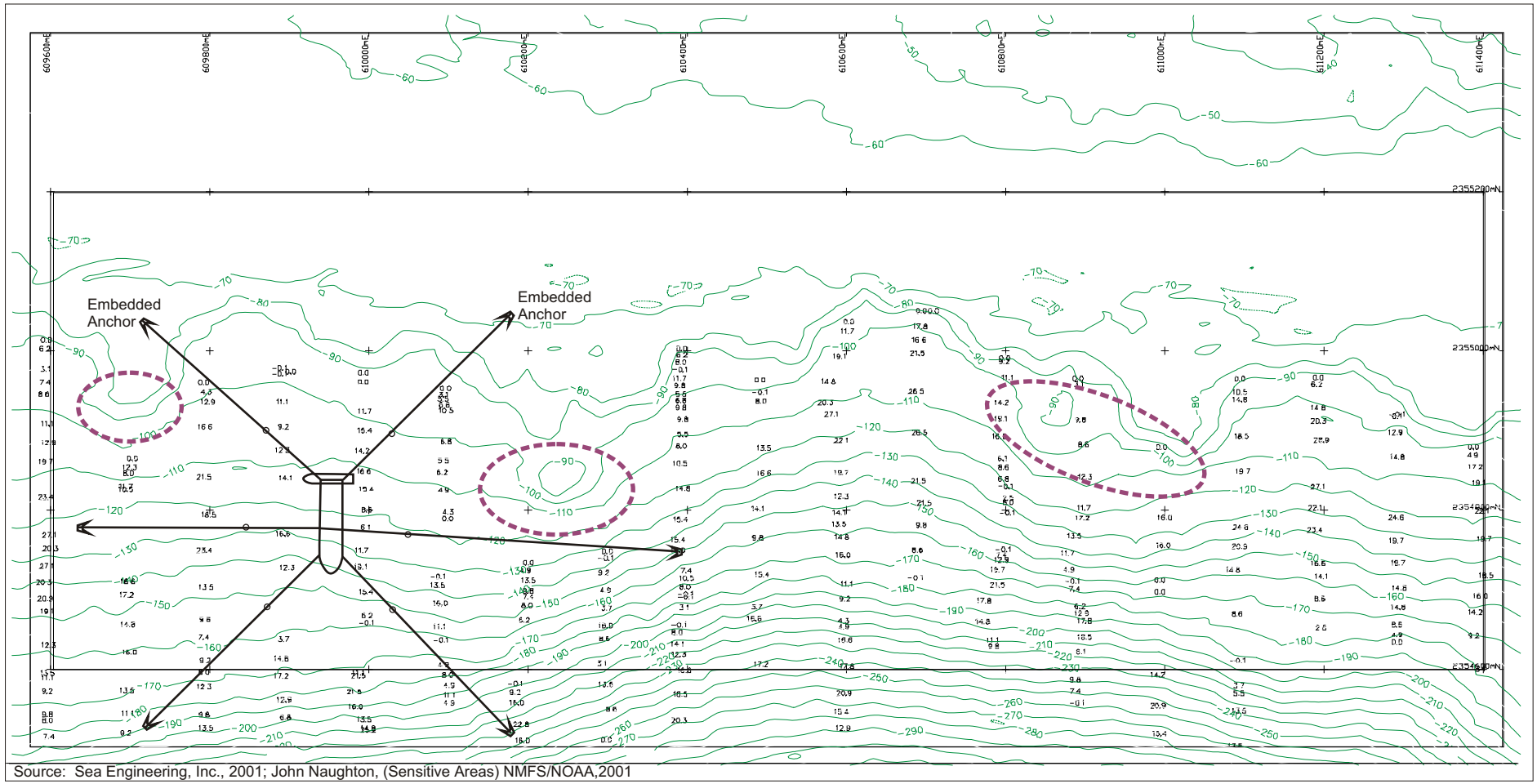
The endangered Hawaiian petrel and short-tailed albatross, and the threatened Newell's shearwater are expected to forage in the ROI. Hawaiian petrels and Newell's shearwaters may forage in the waters that surround the island of Oahu. Because of their relatively low numbers and the unlikely potential for them to forage over the transit corridor, it is expected there would be no effect on the petrels or shearwater. The use of light shields to minimize reflection would reduce disorientation of the Newell's shearwater at night during preparation by the crew for the next day's activities.

#### 4.2.1.3 Reef Runway Shallow-water Recovery Site

**Marine Fish, Essential Fish Habitat, and Coral**

Disturbance to bottom-dwelling biota at the Reef Runway shallow-water recovery site could result from the following actions: (1) vessel alignment and placement at the recovery site; (2) anchoring and mooring of the diving support barge; (3) movement of ROVs and ROV umbilical cables; (4) diver activities; and (5) an unanticipated diesel fuel or lubricating oil release.

1. Alignment and placement of the vessel at the shallow-water recovery site. Given the dynamic positioning system of the heavy-lift ship and the habitat and bathymetric maps that have been prepared depicting sensitive resources (figures 4-2 through 4-4), the alignment and positioning of *Ehime Maru* at the Reef Runway shallow-water recovery site is not expected to result in the vessel scraping or dragging along the seaward reef slope. However, in the shallowest location, there could be minor damage to live corals, scraping of exposed sand-veneered limestone outcrops, alteration to coral rubble communities, and minor disturbance and repositioning of unconsolidated sand and rubble deposits. Because of the past disturbance to the Reef Runway shallow-water recovery site during construction of the runway, and the historic use of the area as an anchorage by large vessels, only minor impacts would be expected.




Source: Sea Engineering, Inc., 2001; John Naughton, (Sensitive Areas) NMFS/NOAA,2001

**LEGEND**

—0— Lines of equal depth to seafloor (in feet)

High vertical relief with good coral growth and diverse and abundant reef fish associated with caves and layers

NORTH

Scale

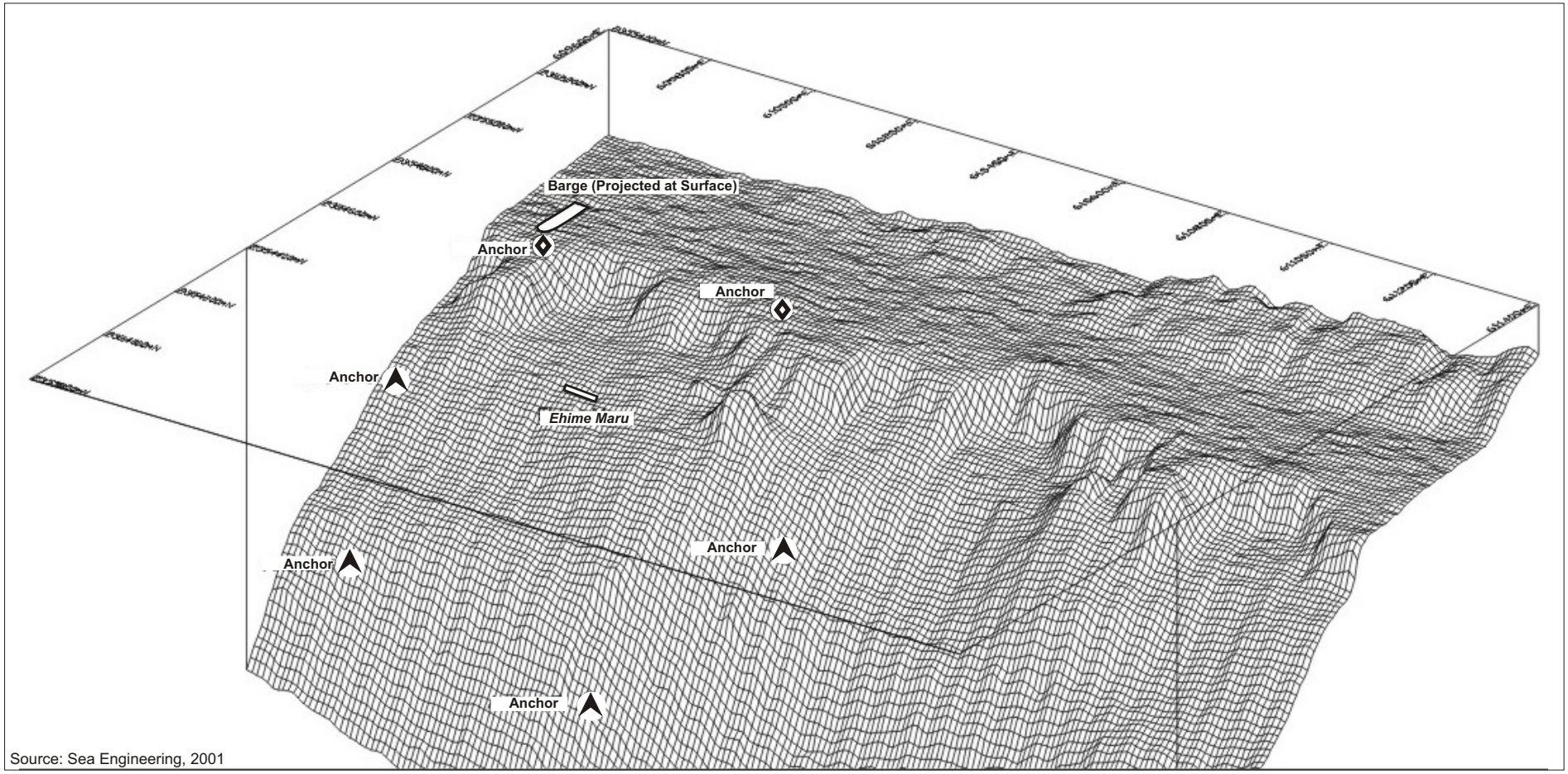
0 328 656 984 1312 Feet

0 100 200 300 400 Meters

# Seafloor Bathymetry and Sensitive Resources, Reef Runway Shallow-water Recovery Area

**Figure 4-2**

4_2SensitveHabitat




Source: Sea Engineering, 2001

**LEGEND**

- 8,000-pound Anchors
- Embedded Anchors

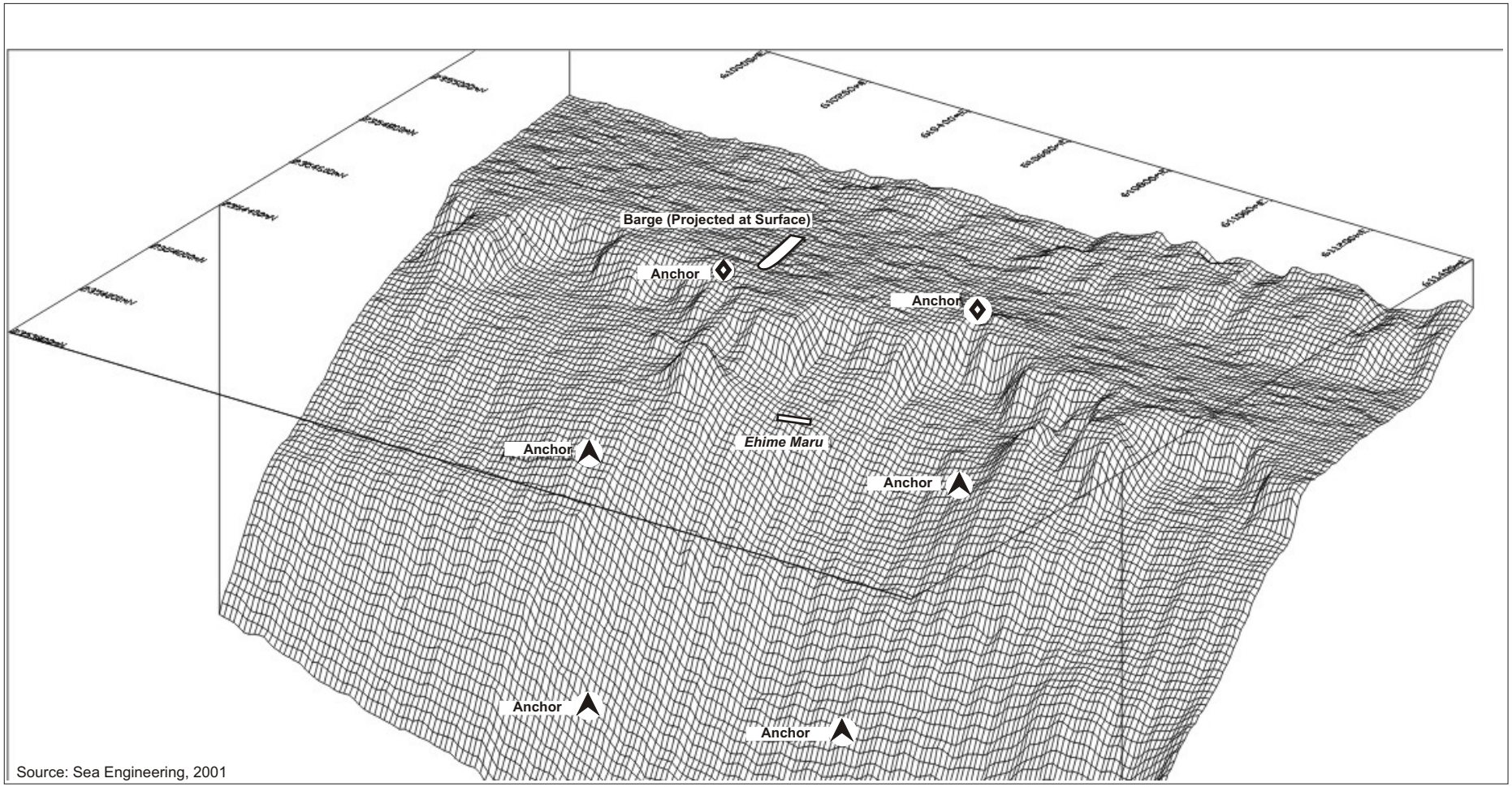
**NORTH**

**No Scale**

# 3-D Perspective of Mooring Plan at the Primary Reef Runway Recovery Area

**Figure 4-3**

4_3_3dReef




**LEGEND**

- 8,000-pound Anchors
- Embedded Anchors

NORTH

**No Scale**

# 3-D Perspective of Mooring Plan at the Alternate Reef Runway Recovery Area

**Figure 4-4**

4_3_3d060101

2. Anchoring and mooring of the diving support barge. The seafloor in the area of the Reef Runway shallow-water recovery site has been disturbed in the past due to the construction of the runway and from having been a designated anchorage for naval vessels. The placement and positioning of the diving support barge's anchors and mooring chains and cables and their post-operational recovery has the potential to impact the benthic marine communities through crushing and surface abrasion. Movement of the chains and cables across the substrate on the submarine reef terraces, ledges, and slopes has the potential to damage the benthic environment, including corals and other bottom dwelling organisms. Except for the substrate on and adjacent to the submarine ridges, and the narrow escarpment between the 80- and 90-foot (24- and 27-meter) depth contours, the affected area is characterized by reef slopes and terraces of generally low (less than 1 percent) coral coverage. At depths of 95 feet (29 meters) or greater, the substrate is dominated by limestone with and without a sand veneer, and sand. Sea urchins and sea cucumbers are the principal organisms associated with this habitat type. Because of the importance and sensitivity of Hawaii's marine resources, a mooring system with a combination of traditional anchor arrangements and imbedded anchor points would be implemented. Anchors would be located to minimize anchor and chain drag and to avoid setting anchors in environmentally sensitive areas.

3. Movement of ROVs and ROV umbilical cables. The movement of ROVs and ROV umbilical cables could result in disturbance or damage to coral, coral rubble, and sand communities of moderate to low biodiversity; however, there would be no effect that would threaten the survival of the species. Such actions may also create localized areas of increased turbidity, but this would be a short-term effect.

4. Diver activities. Diver activities in and around the perimeter of *Ehime Maru* would be expected to result in minor damage to benthic communities from diver contact with scattered invertebrates, such as sea cucumbers, sea urchins, and coral colonies. Suspension of the surficial sediments by diver motions may have a short-term localized impact on corals. Potential sedimentation effects would be restricted to diver mobilization and working areas on the reef slope and are not expected to result in long-term adverse impacts to corals or other marine organisms nor would there be any effect that would threaten the survival of the species.

5. Release of diesel fuel and lubricating oil. During crewmember recovery and cleanup operations, there is an extremely low potential for an unanticipated diesel fuel or lubricating oil release if there is diesel fuel or lubricating oil remaining on *Ehime Maru*. Recovery operations would only occur during daylight hours to ensure detection of "sheens" from releases of diesel fuel and lubricating oil. Containment booms and skimmers would be located onsite. If diesel fuel or lubricating oil were to escape from initial containment areas and could potentially affect the marine environment, the booms and skimmers would be positioned to contain and recover the release of diesel fuel lubricating oil. Prevailing northeasterly trade winds and prevailing currents would carry any such surface release or "sheen" in a southwesterly direction where it would volatilize or be skimmed from the surface of the ocean in accordance with the Proposed Action. In the event of a Kona Wind (winds from the south) or other

unforeseen change in weather conditions or currents, additional booms and skimmers would be available on standby.

The Reef Runway shallow-water recovery site is within the EFH for bottomfish management unit species. The Western Pacific Regional Fishery Management Council has designated the water column and all bottom habitats from the shoreline to a depth of 1,312 feet (400 meters) as EFH for bottomfish. The Council also designated all escarpments and slopes between 131 and 919 feet (40 to 280 meters) as habitat area of particular concern. No habitat areas of particular concern for bottomfish are associated with the site because water depths of 131 feet (40 meters) are outside the recovery area. Given the recovery vessel's precise positioning capabilities, and the availability of detailed bathymetric maps, project actions are not expected to disturb the EFH for any life stage of the bottomfish management unit species.

The Council has adopted a 3,280-foot (1,000-meter) depth as a lower boundary of the EFH for pelagic management unit species, and 660 feet (200 meters) from the shoreline to the outer limits of the EEZ as the upper limit of the EFH covering eggs and larvae of the pelagic management unit species. The Reef Runway shallow-water recovery site is within the EFH for the pelagic management unit species. For the reasons described above, it is unlikely that project actions would adversely disturb the EFH for eggs and larvae of pelagic management unit species.

The Council has designated the EFH for spiny lobster larvae as the water column from the shoreline to the outer limits of the EEZ down to a depth of 492 feet (150 meters). The EFH for juvenile and adult spiny lobster is designated as the bottom habitat from the shoreline to a depth of 318 feet (100 meters). Therefore, the Reef Runway shallow-water recovery site is within the EFH for spiny lobster.

The Council has also designated all banks in the Northwestern Hawaiian Islands with summits less than 98 feet (30 meters) as habitat areas of particular concern for spiny lobster. The Reef Runway shallow-water recovery site is not within the habitat areas of particular concern for spiny lobster. Because of the relatively disturbed nature of the seafloor at the site and the relatively small area of habitat disturbance associated with relocation efforts, the recovery activities would not be expected to impact the EFH included under the crustacean management plan.

Corals are major elements of the EFH for all the management units and are key components of the marine fish habitats. Precious coral beds can occur in depths ranging from 50 to 4,900 feet (15 to 1,500 meters). The species that occurs at the shallowest end of the depth range is black coral. Black corals were not observed at the shallow-water reef runway site. The Proposed Action at the Reef Runway shallow-water recovery site would not affect the EFH for precious coral management unit species.

The introduced seagrass *Halophilia discipiens,* a potential forage area for the green sea turtle, occurs in the general vicinity of the recovery site and would not be affected by recovery operations. The native seagrass *Halophilia hawaiiana* was not observed at this

shallow-water relocation site, but could occur in the area and could constitute forage for the green sea turtle. The proposed shallow-water recovery site would be surveyed for the presence of *H. discipiens*, which may support the endemic gastropod *S. bryanae*. The Reef Runway shallow-water recovery site was reviewed by underwater reconnaissance by resource agency personnel, who provided assistance in the selection of the shallow-water recovery site. The extent of impacts to the corals and EFH would be expected to be minimal because of the care undertaken in selecting a recovery area.

**Marine Mammals**

There is a potential for impacts to marine mammals due to the release of diesel fuel and lubricating oil during the placement of *Ehime Maru* at the Reef Runway shallow-water recovery site. Spinner dolphins use the nearshore area of the coastline from approximately Barbers Point to Waikiki. Bottlenose dolphins have been shown to identify and avoid diesel fuel and lubricating oil when it is present. Other dolphins may also be expected to do so. In the nearshore and onshore area where the Reef Runway shallow-water recovery site is located, the presence of a Hawaiian monk seal is a rare occurrence. The migratory humpback whale would have already left for the northern feeding grounds and would not be in the area. The sperm whale does not occur in the nearshore shallow water along the Oahu coastline.

**Migratory Birds**

The use of containment booms and skimmers in accordance with the Proposed Action would further reduce the potential for impacts to migratory seabirds.

With the implementation of the diesel fuel and lubricating oil release response component of the Proposed Action, there should be no impacts on the common shorebirds that frequent the area of the Reef Runway shallow-water recovery site. These include the Pacific golden plover, ruddy turnstone, sanderling, wandering tattler, and black-bellied plover. The Hawaiian black-necked stilt, which occurs in mudflats within the Keehi Lagoon, would be protected by implementation of the contingency plans. Implementation of these plans would also protect the Hawaiian coot, which may use the more brackish waters in the Keehi Lagoon.

**Threatened and Endangered Species**

The threatened green sea turtle occurs in nearshore waters in the area of the Reef Runway shallow-water recovery site but is not as common as at other locations to the west of Pearl Harbor. A single adult green sea turtle was observed on May 19, 2001 at a depth of 70 feet (21 meters). Green sea turtles are also known to rest along the Fort Kamehameha sewage outfall. Due to construction of the runway channel, dredging, and use of the area as a designated anchorage, the area of the Reef Runway shallow-water recovery site is a disturbed habitat. Some seagrasses and relatively scattered and discontinuous areas of live coral are present at the shallower depths less than 70 to 80 feet (21 to 24 meters), and in a narrow escarpment between the 80- and 90-foot (24- and 27-meter) depth contours. However, *Ehime Maru* would be placed in approximately 115 feet (35 meters) of water, and this is at greater depths than corals and seagrass have been noted in

substantial amounts. Thus, the activities at this location are not expected to affect green sea turtle feeding or resting areas. Mooring activities might involve small areas within the 50 to 70 foot (15 to 21 meter) range for anchor placement. Avoidance techniques would be employed to minimize effects to individual corals and seagrasses.

Because of their low numbers and infrequent occurrences in Hawaiian waters, the endangered hawksbill sea turtle would not be expected to be in the area of the Reef Runway shallow-water recovery site. With the implementation of the diesel fuel and lubricating oil release response element in the Proposed Action, the activities at the Reef Runway shallow-water recovery site are not expected to have an effect on the green sea turtle or the hawksbill turtle.

The endangered humpback whale would be out of the Hawaiian waters by the time the Proposed Action takes place, having migrated to northern waters. Therefore, the Proposed Action would have no effect on the humpback whale. The endangered sperm whale occurs in deeper water than the nearshore water of the Reef Runway shallow-water recovery site. There would be no effect on the sperm whale. Because the blue whale and fin whale are extremely rare in Hawaiian waters, no impact would be expected. In the onshore area where the Reef Runway shallow-water recovery site is located, the presence of a Hawaiian monk seal is a rare occurrence, and it is expected that there would be no effect on the species during the recovery process.

The endangered Hawaiian petrel and short-tailed albatross, and the threatened Newell's shearwater are expected to forage in the ROI. Hawaiian petrels and Newell's shearwater may forage in the waters that surround the island of Oahu. In addition, with the implementation of the diesel fuel and lubricating oil release response element of the Proposed Action, the recovery activities at this site would be expected to have no effect on the Hawaiian black-necked stilt, Hawaiian coot, Hawaiian duck, and Hawaiian moorhen.

#### 4.2.1.4 Transit to the Deep-water Relocation Site

The transit corridor from the shallow-water recovery site to the deep-water relocation site would have little potential for impacts on the marine ecosystem. After the recovery action and the cleanup of diesel fuel and lubricating oil and loose debris from *Ehime Maru*, there would be too little diesel fuel or lubricating oil residue to cause an environmental impact. If not all of the diesel fuel or lubricating oil was removed during the recovery effort, the potential impacts from transit to the deep-water relocation site would be similar to impacts from the transit to the shallow-water recovery site. Overall, there would be no effect of the transport of the vessel to the deep-water relocation site on any EFH, migratory seabirds, marine mammals, or threatened or endangered species.

#### 4.2.1.5 Deep-water Relocation Site

At the deep-water relocation site, a battery-powered pinger (an echo sounding depth recorder) attached to *Ehime Maru* for use in identifying the specific relocation site of the vessel would be activated. The pinger would remain active for about 30 days. The pinger

generates sound at a frequency of 37.5 kHz at an initial 160.5 decibels (dB) re micropascal at 1 meter. After 30 days, the output would decline to 157 dB. This level is well within the hearing range of most small whales and dolphins, which can hear up to at least 100 kHz. The 37.5 kHz frequency sound of the pinger falls within the area of best sensitivity (figure 4-5) (Nachtigall et al, 2000). The frequency of the pinger is relatively high, and as a high frequency sound it will decay rapidly with distance. Figure 4-6 shows the predicted signal attenuation over distance. Most small whales or dolphins have the ability to hear the pinger if it exceeds 60 dB (figure 4-5). This sound level corresponds to a distance of approximately 9,000 to 12,000 feet (3,000 to 4,000 meters) from the pinger. The pinger signal would not be as loud at the surface as it would be at the source on the seafloor. At the approximate depth at which *Ehime Maru* comes to rest at 6,000 feet (2,000 meters), the sound level at the surface would be 77 dB.

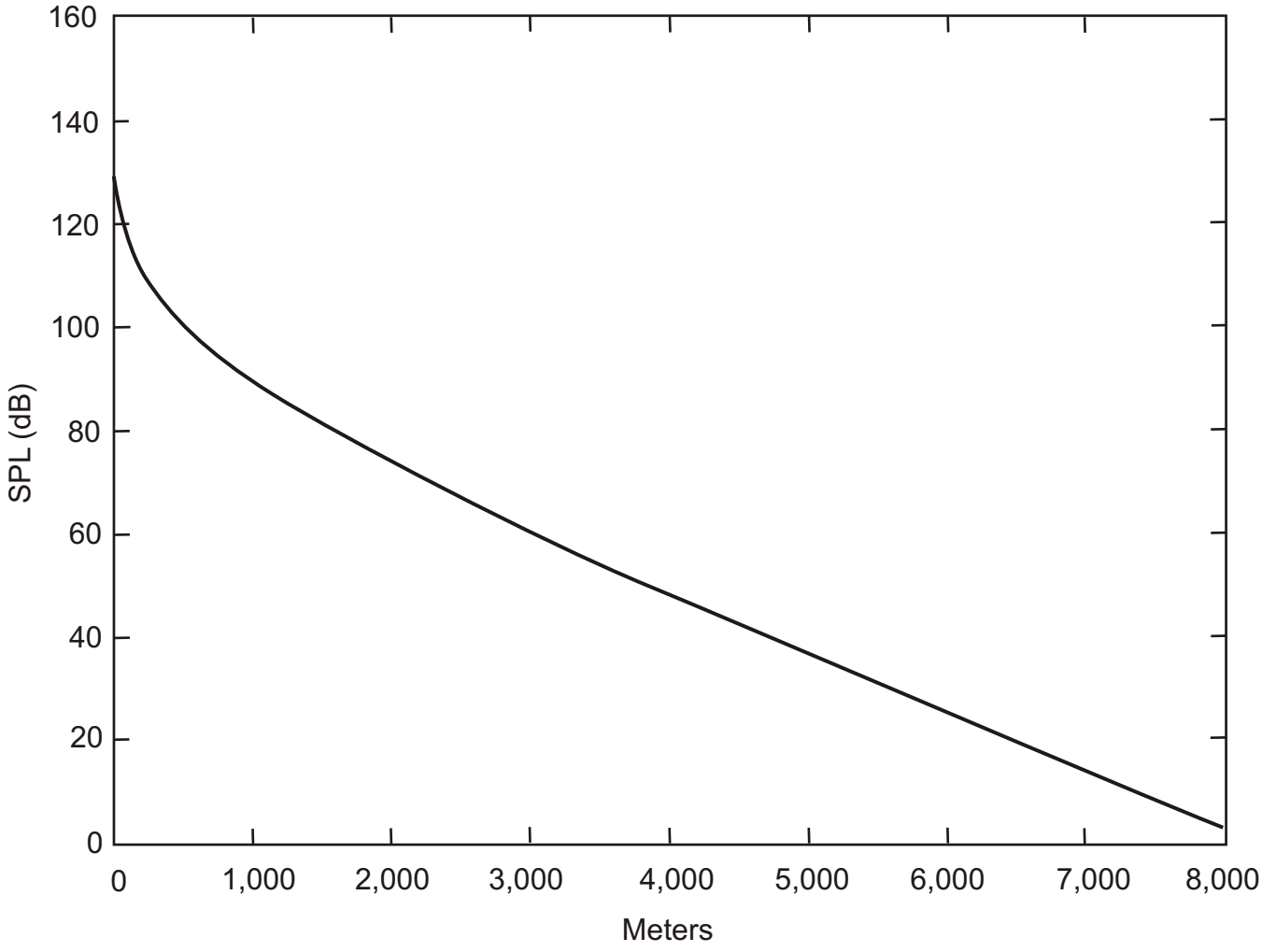
A dolphin searching for a small object beyond 300 feet (100 meters) produces ecolocation clicks exceeding 225 dB (Au, 1993). Dolphin breeches and tail slaps often produce sounds exceeding 150 dB (Nachtigall et al., 2000b). Dolphin whistles generally range between 140 to 150 dB. Animal detection of a sound does not indicate that it would be bothered by the sound. Therefore, the likelihood of small whales and dolphins being disrupted by the pinger is expected to be low.

The Hawaiian monk seal's hearing (Thomas et al., 1990) does extend as high as 40 kHz, but the threshold for hearing at that frequency is 128 dB. Therefore it is extremely unlikely that any Hawaiian monk seal will hear the pinger or be bothered by it.

If diesel fuel or lubricating oil remains on *Ehime Maru* after the recovery efforts, potential impacts from a release to marine resources would be similar to those described under the current location. No significant impacts to marine resources including EFH, migratory seabirds, marine mammals, or threatened or endangered species are expected due to the relocation of *Ehime Maru* to the deep-water site.

### 4.2.2 RECOVERY-NOT-POSSIBLE ALTERNATIVE

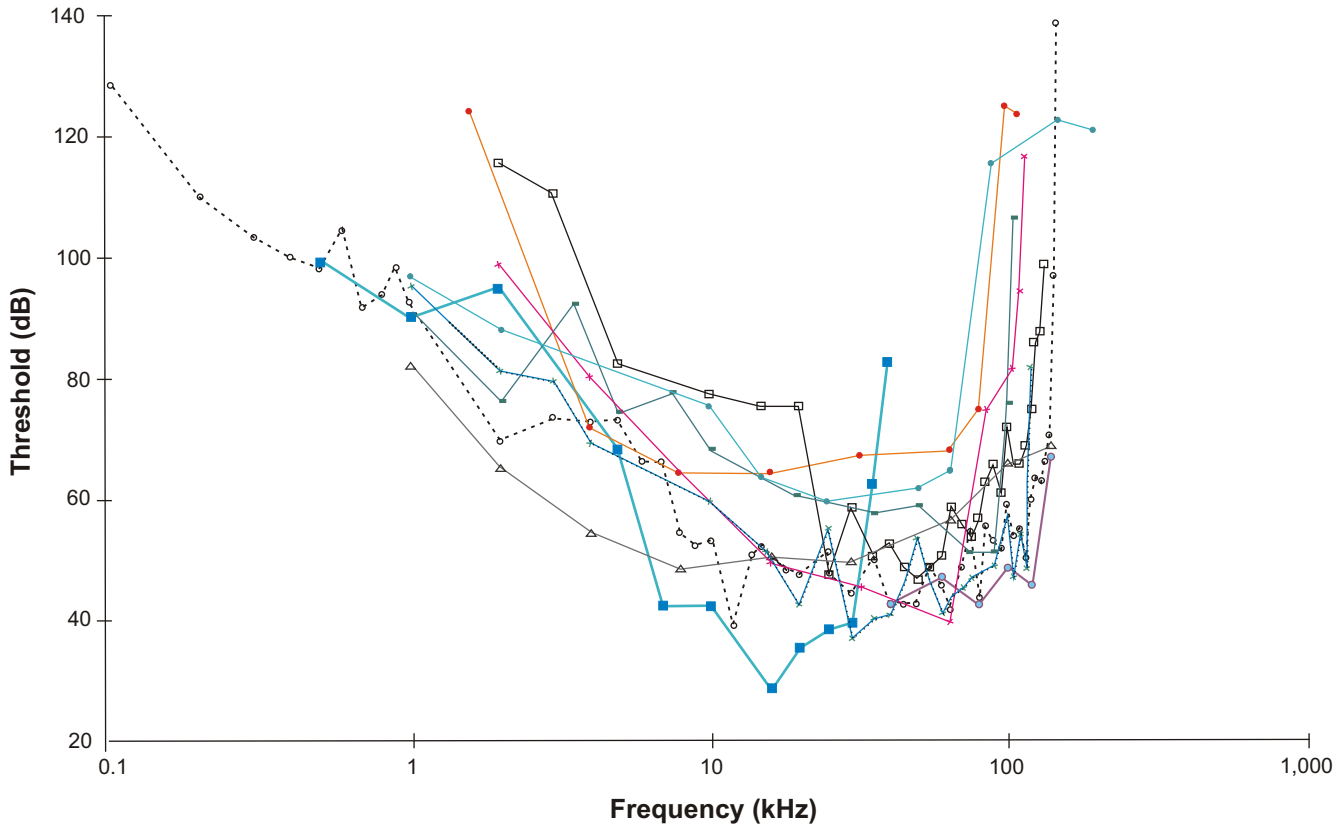
If the Recovery-not-possible Alternative is chosen, *Ehime Maru* would not be recovered and would remain at its current location in its present condition. This alternative would not allow for the recovery of *Ehime Maru* crewmembers, personal effects, and certain characteristic components, or for the removal of diesel fuel and lubricating oil. Because cargo nets, fishing hooks and long lines, rafts, rigging on the masts and other obstacles would not be removed under this alternative, there could be potential impacts to marine resources.




Source: Nachtigall, 2001

**Sound Pressure Level at Varying Distances From Pinger**

**Figure 4-5**




Source: Nachtigall, Lemonds, and Roitblat, 2000

**LEGEND**

- Tursiops truncatus
- Tursiops gilli
- Phocoena phocoena
- Orcinus orca
- Pseudorca crassidens
- Grampus griseus
- Delphinapterus leucas
- Inia geoffrensis
- Lipotes vexillifer
- Tursiops truncatus

dB - Decibel
kHz - kilohertz

# Hearing Thresholds of Dolphins and Small Whales

**Figure 4-6**

## 4.3 HEALTH AND SAFETY

The potential impacts to both public and worker health and safety associated with underwater recovery operations would occur both in and on the ocean and on the shore. Potential impacts could occur as a result of increased safety risk at the recovery sites, during diving activities, and to the public near the recovery operations.

The potential for the release and the proposed response to remediate an unanticipated release of diesel fuel or lubricating oil are discussed in detail in section 4.4 (Hazardous Materials and Hazardous Waste). As analyzed in that section, any unanticipated release that would occur would be quickly responded to in accordance with the IAP (Naval Sea Systems Command, 2001a); therefore, there would be minimal increased risk to public health and safety as the result of an unanticipated release. Additionally, because of the procedures and equipment that would be in place, there would be minimal increased risk to public recreation areas or commercial use areas.

### 4.3.1 PROPOSED ACTION

Both the U.S. Navy and the contractors associated with the recovery of *Ehime Maru* have safety policies and procedures relating to the performance of all activities within the scope of their operations. Individuals, supervisors, and managers give full support to safety efforts. Safety awareness and strict compliance with established safety standards would occur during recovery operations. More detail on recovery and diver safety is provided below.

Inclement weather conditions could also pose a potential safety hazard. Adverse weather conditions include high wind and sea conditions, and hurricanes. It is the Navy Recovery Commander's responsibility to determine if the weather conditions are potentially hazardous, based on available information, experience, and the operational limits of the recovery vessels. Because of the procedures noted above to monitor weather conditions, there would be minimal increased safety risk as a result of weather.

A Site Safety and Health Plan has been prepared for all personnel associated with the cleanup of any diesel fuel or lubricating oil. The Site Safety and Health Plan focuses on the protection of personnel from serious risks to their physical safety and health while responding to a marine discharge. This plan identifies the potential hazard conditions and outlines the specific safety and health training together with the job skills and procedures appropriate to the responder's role in the response operations. Appropriate personnel involved in the cleanup operation will receive training to ensure their awareness of the Site Safety and Health Plan.

#### 4.3.1.1 Current Location

The current location of *Ehime Maru* is within U.S. territorial waters. This is not a restricted use area. The primary activities that would occur in this area would be associated with the

initial lifting operation. During these recovery operations, all workers would adhere to specific safety procedures to minimize the risk to worker health and safety.

The primary activities related to the public in this area are commercial and recreational fishing; however, there would be minimal risk to public health and safety, as they would be excluded from the area around the recovery effort. A temporary flight restriction and a surface safety zone, each with a 3-nautical mile (approximately 6-kilometer) radius, would be established over the lift preparation area. The temporary flight restriction would extend up to an altitude of 2,000 feet (610 meters). The Navy would request that dedicated warning NOTMARs and NOTAMs be issued to warn the public of the potentially hazardous activities.

#### 4.3.1.2 Transit to the Shallow-water Recovery Site

During transit operations there is the potential for an impact to worker and public safety. Potential impacts to worker safety could occur as a result of a mishap during transit operations; however, the appropriate safety procedures would be followed to minimize the risk to worker safety. These procedures would include a survey of the seafloor for potential obstructions. Additionally, adverse weather could increase the potential for a mishap. The National Weather Service and the Navy Meteorological Office at Pearl Harbor would be constantly monitored for weather information. To ensure the lift and transit is accomplished safely, transit would only be conducted during favorable sea states and during daylight hours. The transit speed would be approximately 1 nautical mile per hour (approximately 2 kilometers per hour). It is the Navy Recovery Commander's responsibility to determine if the weather conditions are potentially hazardous, based on available information, experience, and the operational limits of the recovery vessels.

Public ocean activities occurring within the ROI along all transit routes consist of both commercial and recreational fishing until nearshore waters are reached, and then activities become more oriented towards coastal recreation and commercial traffic. However, there would be minimal risk to public health and safety, as established security perimeters would exclude the public from the area around the transit route. A temporary flight restriction and a surface safety zone, each with a 1-nautical mile (approximately 2-kilometer) radius, would be established over the transit route. The temporary flight restriction would extend up to an altitude of 2,000 feet (610 meters). The Navy would request dedicated warning NOTMARs and NOTAMs be issued to warn the public of the potentially hazardous activities. The temporary flight restriction would not interfere with commercial air operations at Honolulu International Airport.

The last 2 nautical miles (approximately 4 kilometers) of the transit route to the Reef Runway shallow-water recover site would occur within the Naval Defense Sea Area. The Reef Runway shallow-water recovery site is within the Naval Defense Sea Area established by Executive Order 8143 that prohibits civilian watercraft within Pearl Harbor and the area immediately surrounding the entrance to Pearl Harbor unless authorized by the Navy. Because the Navy has jurisdiction over the Naval Defense Sea Area, the Pearl Harbor Entrance Channel and Hickam Harbor are restricted to vessels owned and operated by military and DoD personnel. Several commercial fishing and tour boats have been

authorized to operate in the Pearl Harbor vicinity; however, civilian boats are not allowed inshore of the Reef Runway shallow-water recovery site. The restricted access in this area would minimize the potential for public safety issues.

#### 4.3.1.3 Reef Runway Shallow-water Recovery Site

Potential health and safety issues at the shallow-water recovery site would specifically be associated with hazards to the public and divers. Health and safety issues related to an unanticipated diesel fuel or lubricating oil release are addressed in section 4.4 (Hazardous Materials and Hazardous Waste). As analyzed in that section, the Navy would be prepared with the appropriate plans and equipment for a maximum credible release, thus there should be minimal increased safety risk to public health and safety.

**Public Safety**

The diving operation could generate interest from the public. The ability to establish and control public access would be essential to protect the safety of both the general public and divers. To ensure the protection of all persons and property, a 1-nautical mile (2-kilometer) surface safety zone around the recovery operations would be established and implemented for operations in these areas. Therefore, there would be minimal risk to the public during these activities.

**Diver Safety**

Diver safety would be of paramount importance, and all safety measures would be followed during recovery operations. The Navy would establish a surface safety zone around the recovery operations to ensure diver safety. The Coast Guard would respond to any violations of this ground safety zone. Voice communication integrity for the diving recovery operations would be maintained. A temporary flight restriction area at and below 2,000 feet (610 meters) with a radius the same as that of the surface safety zone may be established. A more detailed discussion of airspace and related issues is provided in section 4.5 (Airspace).

During the recovery effort, there is a potential for an increased risk to diver safety. To ensure diver safety, all operations are conducted in accordance with *The U.S. Navy Diving Manual*. This manual, which is based on the Navy's long history of conducting diving operations, provides the latest procedures and equipment for conducting safe diving activities. *The U.S. Navy Diving Manual* identifies the required equipment and procedures for using surface-supplied diving equipment as well as the requirements for emergency gas supply equipment that is used for enclosed space diving. Operating procedures and emergency procedures would be in place to support operation of the system and recovery from emergency situations. In addition, a Diving Medical Officer would be onboard the diving support vessel at all times and would be accompanied by diving medical technicians. Standby divers would be available at all times to render emergency assistance. To ensure appropriate communication between divers, the dive teams would practice together for at least a week before the recovery operations. Given the in-place procedures and equipment, there would no increased risk to diver safety compared to other diving operations.

The Navy Recovery Commander would establish appropriate diver safety requirements for all aspects of environmental response operations. Cleanup standards for oil and hazardous materials removal prior to deep-water relocation would not be achieved if they increase the risk to diver safety. Further, without prior consultation with the Navy Recovery Officer, divers would not undertake any action that might result in an immediate release of oils or hazardous materials into the shallow-water marine environment (Naval Sea Systems Command, 2001b).

In summary, the Navy has a long history of providing diver safety and has extensive experience in conducting diving operations similar to those associated with this recovery effort. Every effort would be taken during recovery operations to minimize the risk to diver health and safety; therefore, no impacts would be expected.

The diving barge has limited medical support capabilities. In the event of a life-threatening emergency, the amount of time required to transfer a diver or barge worker to a hospital would be critical. At least two chambers installed on the barge would be used for surface decompression with oxygen, and the chambers would also be used for the treatment of arterial gas embolism. The Fleet Recompression Chamber is at MDSU-ONE, Pearl Harbor and would be less than 15 minutes away by boat.

Just outside of this area there is the potential for unexploded ordnance on the seafloor. However, the Navy would conduct a survey of the seafloor, and if any unexploded ordnance were found, it would be marked and avoided.

#### 4.3.1.4 Transit to the Deep-water Relocation Site

Since most hazardous materials would have been removed and the ship's compartments would have been sealed to the maximum extent possible, the potential environmental consequences to health and safety from transit to the deep-water relocation site would be minimal. To further ensure safety, a temporary flight restriction and a surface safety zone, each with a 1-nautical mile (approximately 2-kilometer) radius, would be established over the transit route. The temporary flight restriction would extend up to an altitude of 2,000 feet (610 meters). The Navy would request dedicated warning NOTMARs and NOTAMs be issued to warn the public of the potentially hazardous activities.

#### 4.3.1.5 Deep-water Relocation Site

The deep-water relocation site would be outside U.S. territorial waters. The water at this site is at least 1,000 fathoms (1,800 meters) in depth. A temporary flight restriction and a surface safety zone, each with a 3-nautical mile (approximately 6-kilometer) radius, would be established over the deep-water relocation site. The temporary flight restriction would extend up to an altitude of 2,000 feet (610 meters). The Navy would request dedicated warning NOTMARs and NOTAMs be issued to warn the public of the potentially hazardous activities. Given the depth of this site and that most hazardous materials would have been removed and the ship's compartments would have been sealed to the maximum extent possible, there would be no associated health and safety issues.

### 4.3.2 RECOVERY-NOT-POSSIBLE ALTERNATIVE

Under this alternative, the recovery operation would not be initiated and *Ehime Maru* would be left in its current location and present condition. This alternative would not allow for the recovery of crewmembers or the removal of diesel fuel and lubricating oil. Due to the depth, 2,000 feet (600 meters), there would be no increased risk to public health and safety from the implementation of this alternative.

## 4.4 HAZARDOUS MATERIALS AND HAZARDOUS WASTE

Impacts from the release of hazardous materials could occur during transit and recovery operations. These impacts would be associated with the unanticipated release of diesel fuel or lubricating oil that may remain in *Ehime Maru*, which could affect water quality, biological resources, and land coastal areas used for a variety of public and private activities. This section addresses the potential for a release and the procedures and equipment in place to minimize harm to the environment.

### 4.4.1 PROPOSED ACTION

Of the original 65,000 gallons (246,000 liters) of diesel fuel on board *Ehime Maru*, the maximum amount expected after the collision is estimated at 45,000 gallons (170,000 liters). In addition, 1,200 gallons (4,500 liters) of lubricating oil was onboard and may remain. An unanticipated release could occur during any phase of the recovery operations. During such a release, the Navy would have the procedures and equipment in place to minimize the effect of the release. The Navy would use all available resources to protect the environment from any release of diesel fuel or lubricating oil from *Ehime Maru*. These measures are appropriate given the high environmental and economic sensitivity of Hawaiian waters and shorelines and the unusually long lead-time allowed for planning the potential unanticipated release response (Naval Sea Systems Command, 2001a). All diesel fuel and lubricating oil recovery efforts would be in compliance with federal, state, and local regulations.

The risk of a significant unanticipated diesel fuel or lubricating oil release is considered minimal. It is likely that most or all of *Ehime Maru's* fuel tanks are open to the ocean or to the vessel's internal compartments through open tank vents. The integrity of the fuel tanks was potentially compromised from the collision damage and the crushing effects of water pressure on partially filled tanks as *Ehime Maru* descended rapidly to 2,000 feet (600 meters). It is likely that most of the diesel fuel or lubricating oil that could be released has already escaped at depth in the open water, where it was quickly diluted and resulted in minimal environmental effect.

Based upon research into *Ehime Maru's* fuel and lubricating oils, it appears that the fuel is diesel fuel. Diesel fuel is a light, refined petroleum product with a relatively narrow boiling range. This means that when it is released to water, most of the oil will evaporate or naturally disperse (or weather) within a few days or less. Diesel fuel has a very low

viscosity and is readily dispersed into the water column when winds reach 5 to 7 knots (approximately 10 to 14 kilometers per hour) or sea conditions are approximately 3 feet (1 meter). Diesel fuel is much lighter than water, and it is not possible for this oil to sink and accumulate on the seafloor as pooled or free-phase oil. However, it is possible for diesel fuel to be physically mixed into the water column by wave action, forming very small droplets that are carried and kept in suspension by the currents. Diesel fuel is not very sticky or viscous. Shoreline cleanup is usually not needed (National Oceanic and Atmospheric Administration, 2001a). The lubricating oil is more persistent oil, but the Navy anticipates very little of the 1,200 gallons (4,500 liters) would remain because of the likely location and extent of the collision damage.

In terms of toxicity to water-column organisms, diesel fuel is considered to be one of the most acutely toxic oil types. Fish, invertebrates, and seaweed that come in direct contact with a diesel fuel release may be killed. Crabs and shellfish can be tainted from small diesel fuel releases in shallow, nearshore waters. (National Oceanic and Atmospheric Administration, 2001a) Significant releases must be recovered or dispersed before they impact the sensitive resources in Hawaii's nearshore waters (Everson, 2001).

Lifting *Ehime Maru*, transporting it to shallow water, and recovery operations with the vessel resting on the bottom in shallow water may result in continued "sheening" as very small volumes of residual diesel fuel and lubricating oil would be released from the vessel and rise to the sea surface. The Proposed Action includes responses to an unanticipated release of diesel fuel or lubricating oil with advanced mechanical and dispersant capability (Naval Sea Systems Command, 2001a). As part of the contingency plan for unanticipated releases of diesel fuel or lubricating oil, an IAP has been prepared (appendix F) and details the roles and responsibilities of all groups involved and the actions required if an unanticipated release should occur. This plan would also detail sensitive resources and the action that would be taken if an unanticipated release were to occur in their vicinity. If an unanticipated release should occur, the appropriate resource trustees (e.g., U.S. Fish and Wildlife Service, National Marine Fisheries Service, Department of Land and Natural Resources) would be contacted. The U.S. Coast Guard and the Navy would activate an Incident Command structure that would include establishing a Unified Command to be available in the event of an unanticipated release.

The capability of the Navy to respond to anticipated releases described in the Proposed Action consists of three Navy-owned skimming systems, each with a daily recovery capacity of 57,000 gallons (220,000 liters). The Navy would also contract with the Clean Islands Council for a oil spill response vessel with two skimmer systems, each with a daily recovery capacity of approximately 62,000 gallons (235,000 liters). Additionally, dispersant systems would be available that could be deployed. The total capability of these recovery systems exceeds the total expected remaining diesel fuel and lubricating oil on *Ehime Maru*.

Relatively minor diesel fuel or lubricating oil release levels with minimal environmental impact would be anticipated during vessel recovery operations. Periodic overflights would be performed to observe any signs of a release. Any sheening would be highly visible from

the air. However, sheening might not be eliminated entirely with booms and skimmers, and alternate actions may be warranted (sorbents, monitoring, or weathering). In the event of an unanticipated release, the Navy would work with the Coast Guard Captain of the Port, the State of Hawaii, and other federal, state, and local government agencies to amend the IAP in any way practicable to minimize environmental impacts. The recovery operation would maximize the use of available response resources.

Overall, given the procedures and equipment that would be in place to respond to an anticipated release, only minor impacts would be expected. Additionally, preplanning and establishment of an IAP and a Unified Command would provide ready access to additional capabilities (sorbents, dispersants) in the event of an unanticipated release.

#### 4.4.1.1 Current Location

The risk of a diesel fuel or lubricating oil release from *Ehime Maru* as a result of deep-water rigging and lift is considered low, except to the extent that the vessel may be partially rigged and lifted or moved to facilitate further positioning of lift gear. If the vessel is lifted or moved during the rigging phase, release response equipment would be standing by similar to that of the lift and transit phase between the current location and the shallow-water recovery site. Otherwise, response equipment would remain at their normal shoreside staging sites during deep-water rigging. In the event of a diesel fuel or lubricating oil release, offshore site control would consist of vessel safety and area exclusion policies as set forth in the recovery plan. For unanticipated releases, similar measures are outlined in the IAP. Although abrupt changes in sea state could put smaller vessels at risk, there would be no public safety concerns as a result of a diesel fuel or lubricating oil release.

#### 4.4.1.2 Transit to the Shallow-water Recovery Site

Transit activities would occur only during daylight hours to ensure prompt detection of "sheens" from diesel fuel or lubricating oil releases. If diesel fuel or lubricating oil remains on the vessel, it is likely that some would be released as the vessel is initially lifted through the water column and transported toward the shallow-water recovery site. There is some potential that the structural integrity of the vessel has been too severely damaged to withstand the dynamic loads of the lift, and as a result, may accelerate the rupture and release of remaining fuels. However, a release in deep, offshore waters should have minimal impact. Diesel fuel or lubricating oil released from the seafloor would be visible under most weather conditions. Periodic overflights would be conducted to observe for any signs of a release. As described in section 2.1.3.5, the Proposed Action establishes procedures and calls for the placement of equipment before the initiation of lift and relocation activities to minimize the potential for diesel fuel or lubricating oil reaching shore. Given the measures in place to respond to a potential diesel fuel or lubricating oil release, there would be minimal impact to the environment or public use areas.

National Oceanic and Atmospheric Administration conducted modeling (2001a) to determine optimal sea-state and wind conditions for transit to the shallow-water recovery site. These models assumed an average wind speed of 10 knots (20 kilometers per hour)

at the shallow-water recovery site and were run for ebb and flood tide conditions. Trade winds between 10 and 20 knots (20 and 40 kilometers per hour) are normal during the time of year operations would be conducted. Overall, these models showed that winds from the east would push the diesel fuel toward the beach during both tidal conditions over a 24-hour period (figures 4-7 and 4-14) with no intervention. Winds from the east/northeast could also potentially push the diesel fuel toward the beach during either tidal condition over a 24-hour period (figures 4-9 and 4-10) with no intervention. Winds from the north or northeast would push the diesel fuel out to sea (figures 4-11 to 4-14). Kona winds were not modeled since it is readily acknowledged that these winds would push the diesel fuel directly towards the beach. The General National Oceanic and Atmospheric Administration Oil Modeling Environment model that was used has a confidence limit of 90 percent. This means there is a 90 percent certainty the diesel fuel would not go past the confidence limit shown on figures 4-7 to 4-14.

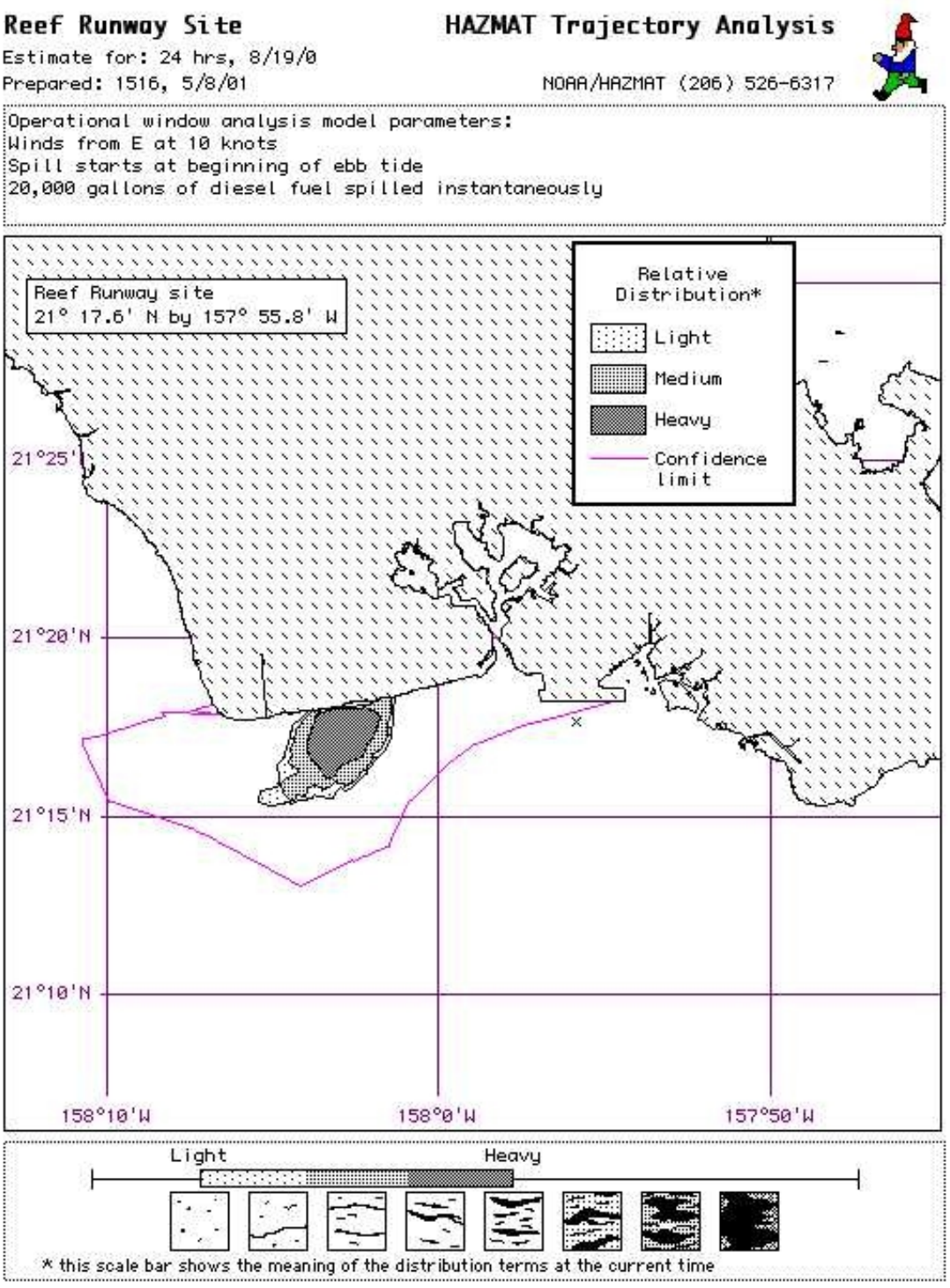
Light trade wind conditions (less than 10 knots [20 kilometers per hour]) during morning hours occur relatively infrequently; however, they can serve as an indicator for an afternoon seabreeze. A seabreeze occurs when the warm air over a land mass rises and cooler air (from the ocean) moves in to replace it. During an uncontained diesel fuel or lubricating oil release, a seabreeze could potentially result in an uncontained release being pushed toward the shore. Because this is also readily acknowledged, these wind conditions also were not modeled (National Weather Service, 2001). Table 4-1 shows the potential for diesel fuel to reach the shore based on a variety of wind directions and tidal conditions.

**Table 4-1: Potential Impacts to Shore**

| Wind Direction | Ebb Tide | Flood Tide |
|---|---|---|
| East | Moderate | Moderate |
| East-Northeast | Low | Low |
| North | Low | Low |
| Northeast | Low | Low |
| Kona* | High | High |
| Southerly* | High | High |

Source: National Oceanic and Atmospheric Administration, 2001a

*Kona and southerly winds not modeled.

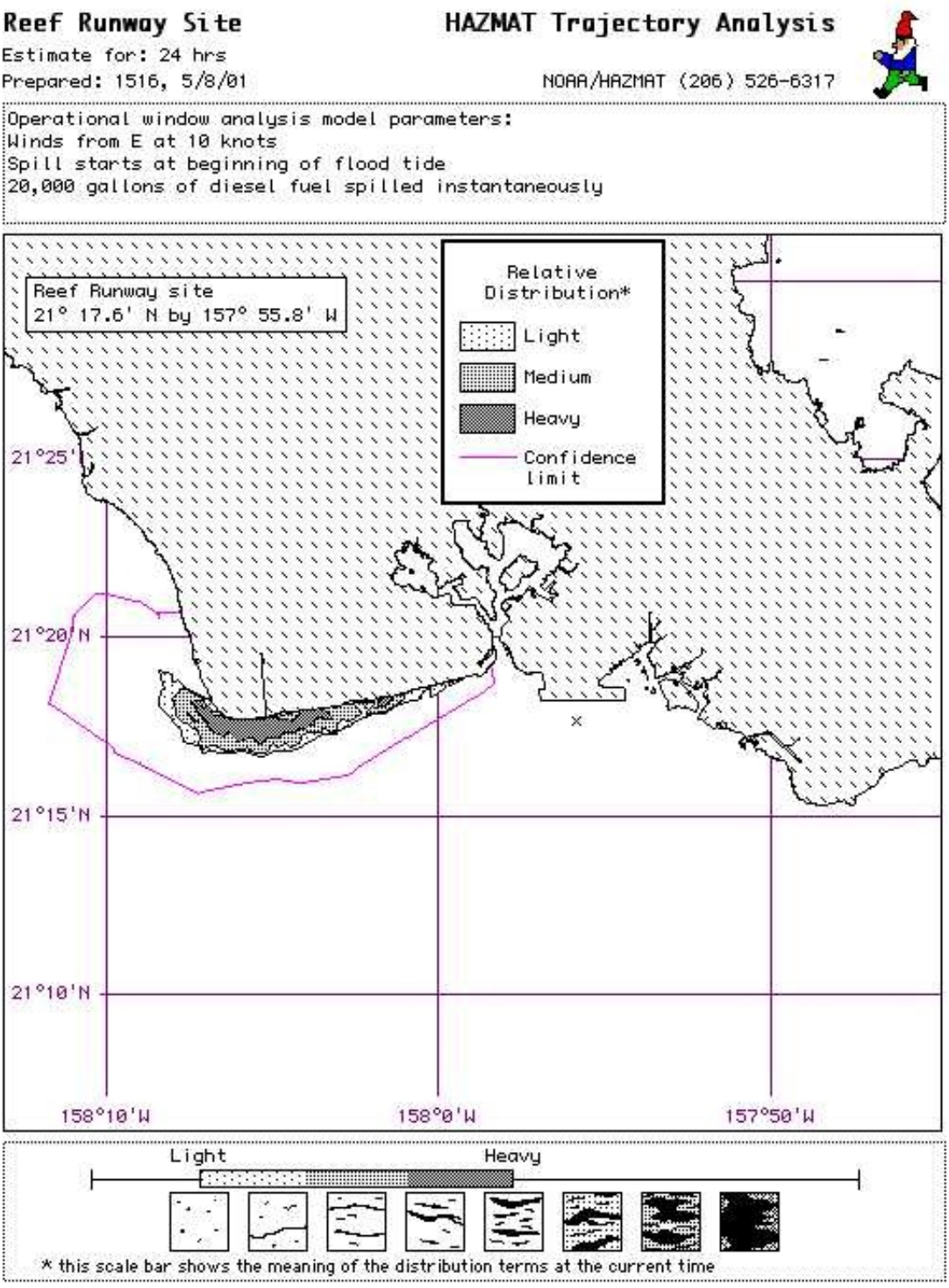



Source: National Oceanic and Atmospheric Administration, 2001a; National Climactic Data Center, 2001

**HAZMAT Trajectory Analysis - Winds East at Ebb Tide**

**Figure 4-7**

**No Scale**

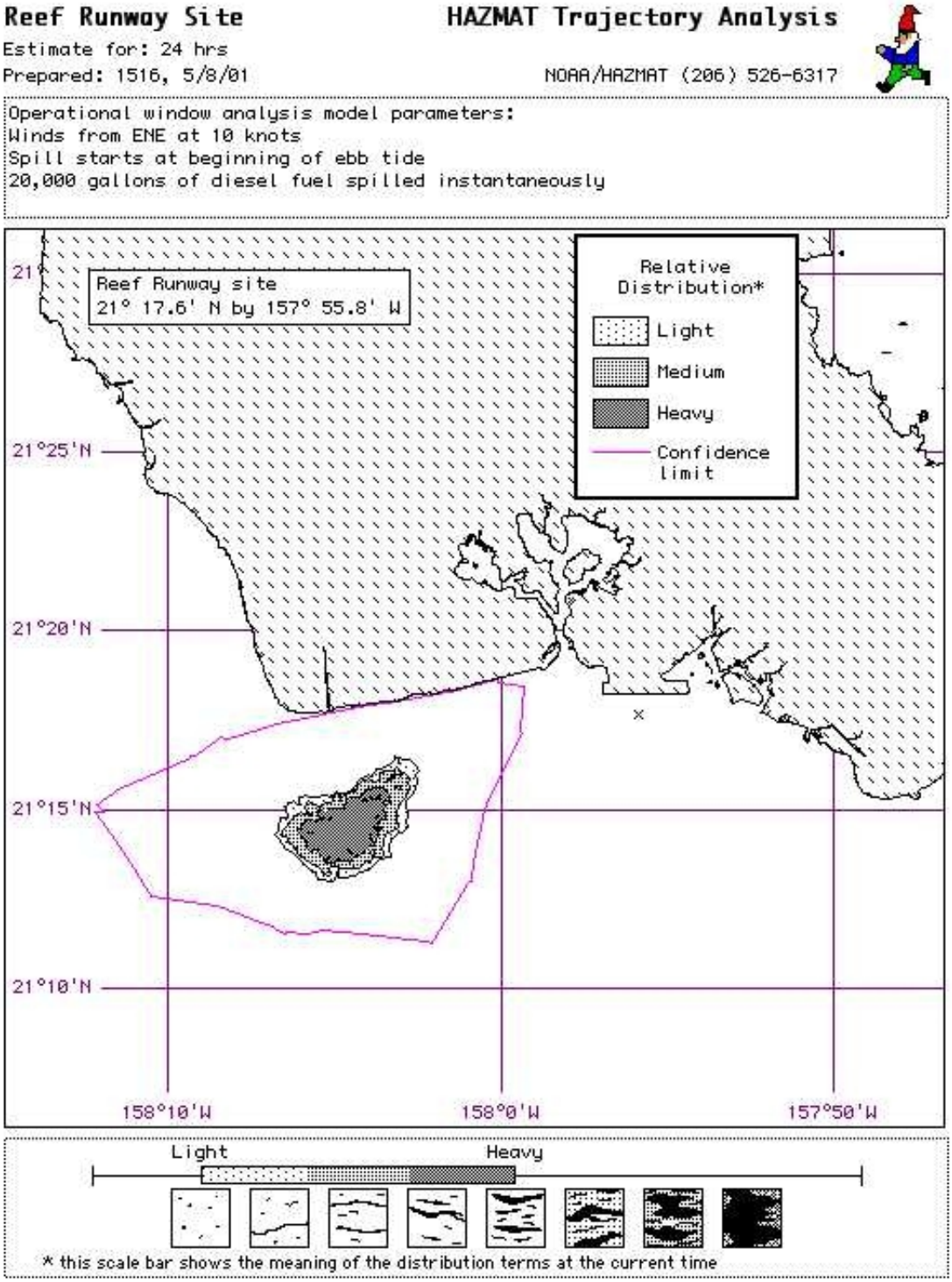



Source: National Oceanic and Atmospheric Administration, 2001a; National Climactic Data Center, 2001

**HAZMAT Trajectory Analysis - Winds East at Flood Tide**

**Figure 4-8**

**No Scale**

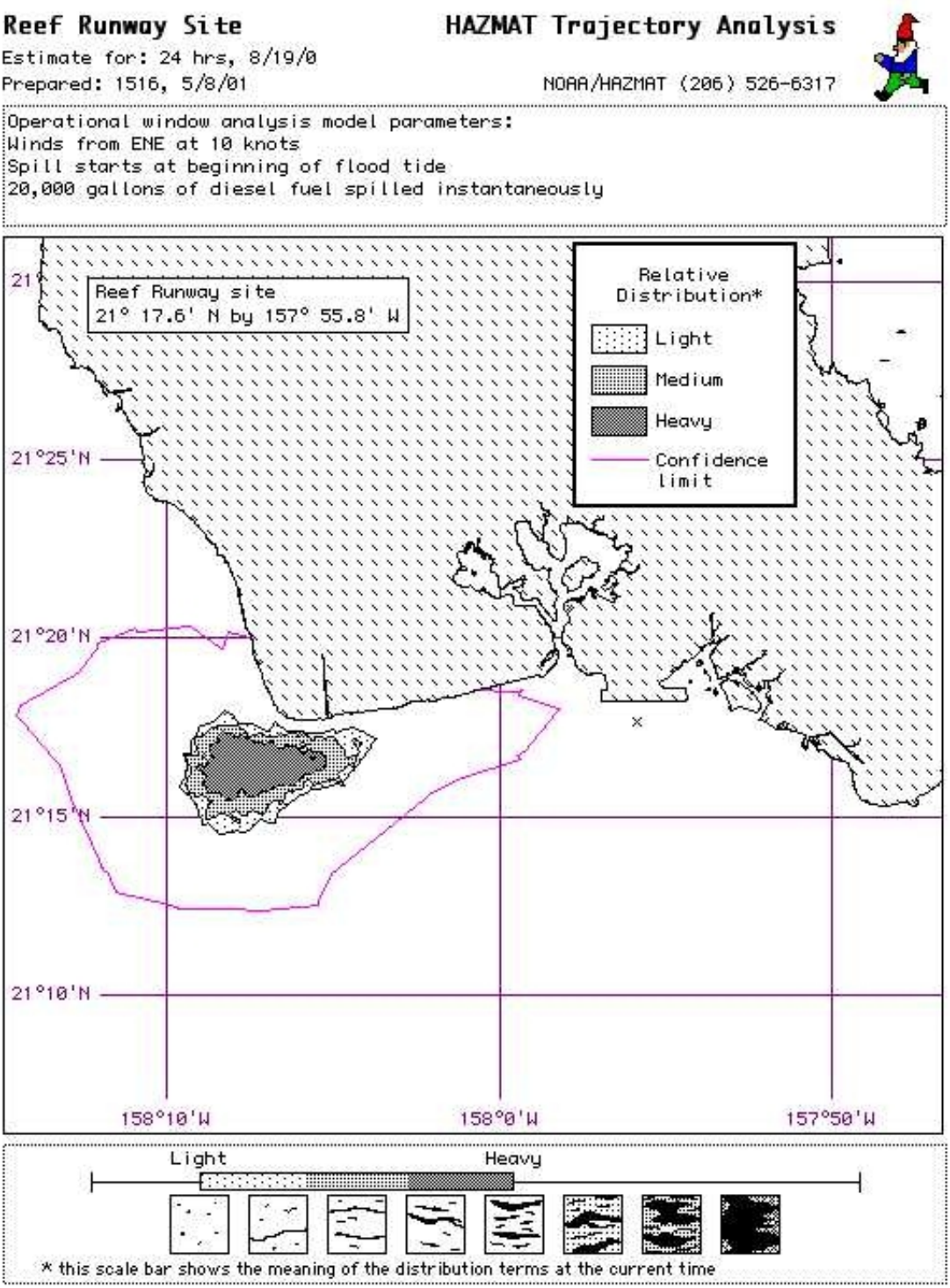



Source: National Oceanic and Atmospheric Administration, 2001a; National Climactic Data Center, 2001

**HAZMAT Trajectory Analysis - Winds East - Northeast at Ebb Tide**

**Figure 4-9**

**No Scale**

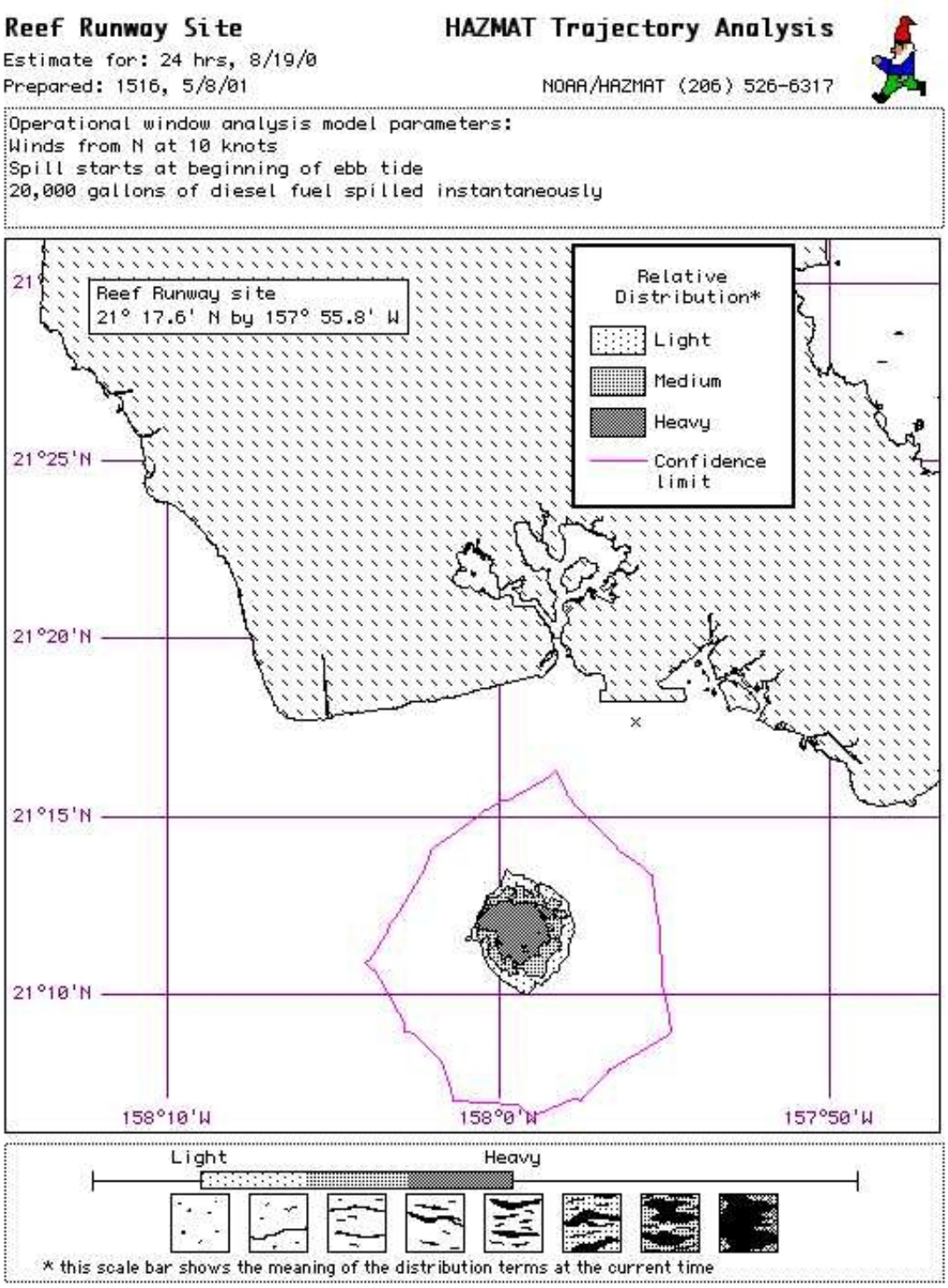



Source: National Oceanic and Atmospheric Administration, 2001a; National Climactic Data Center, 2001

**HAZMAT Trajectory Analysis - Winds East - Northeast at Flood Tide**

**Figure 4-10**

**No Scale**

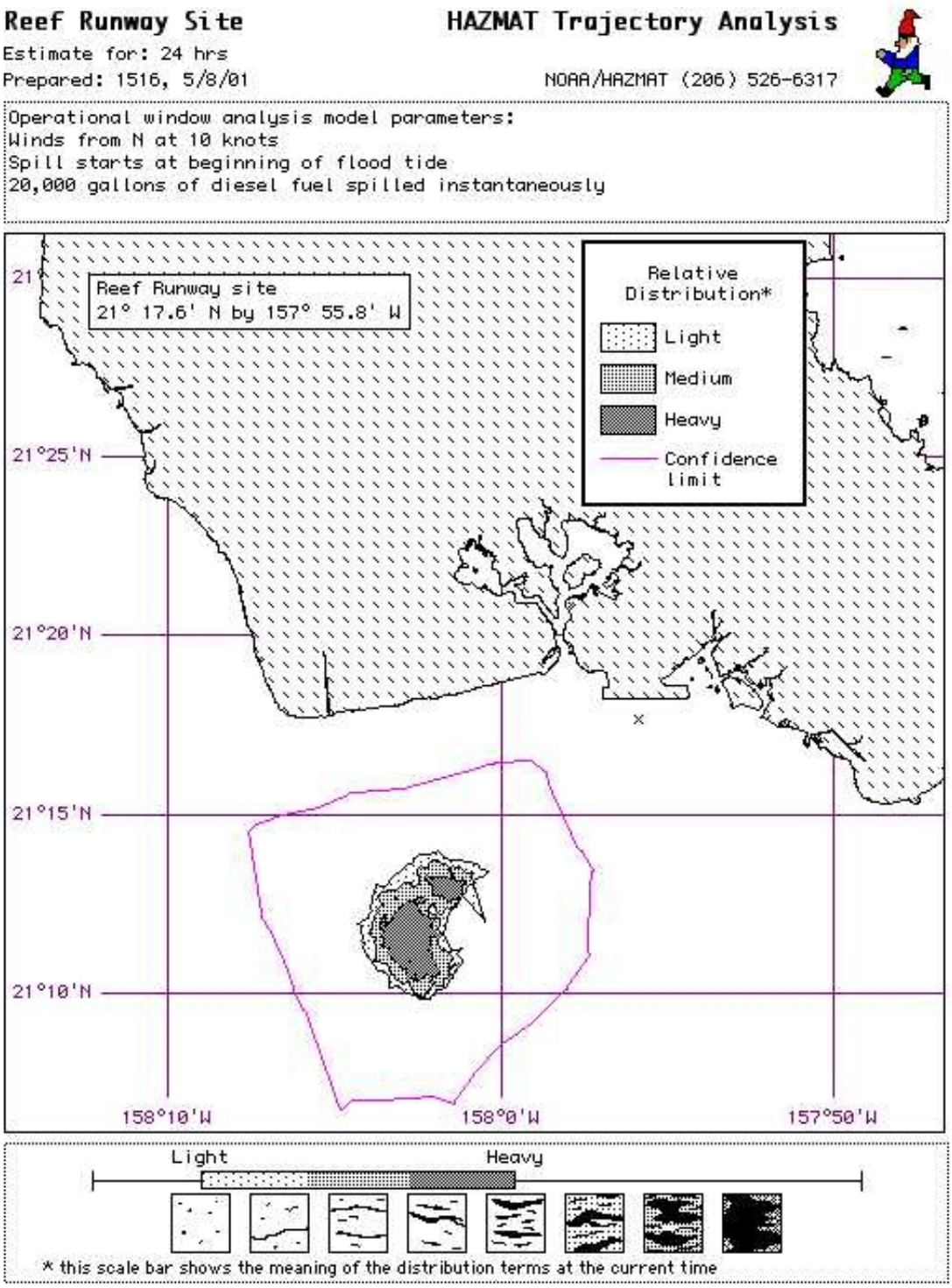



Source: National Oceanic and Atmospheric Administration, 2001a; National Climactic Data Center, 2001

**HAZMAT Trajectory Analysis - Winds North at Ebb Tide**

**Figure 4-11**

**No Scale**

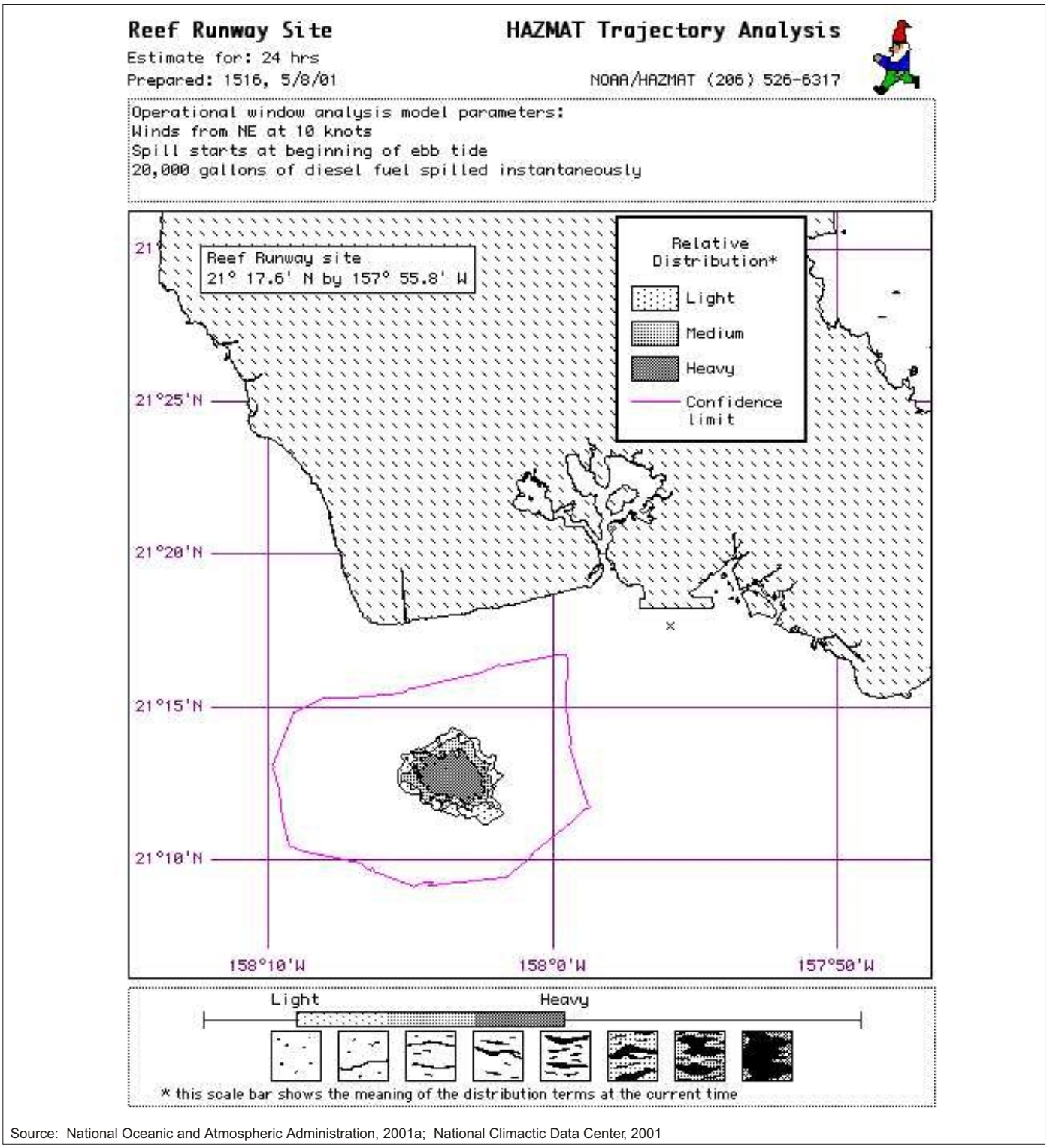



Source: National Oceanic and Atmospheric Administration, 2001a; National Climactic Data Center, 2001

**HAZMAT Trajectory Analysis - Winds North at Flood Tide**

**Figure 4-12**

**No Scale**

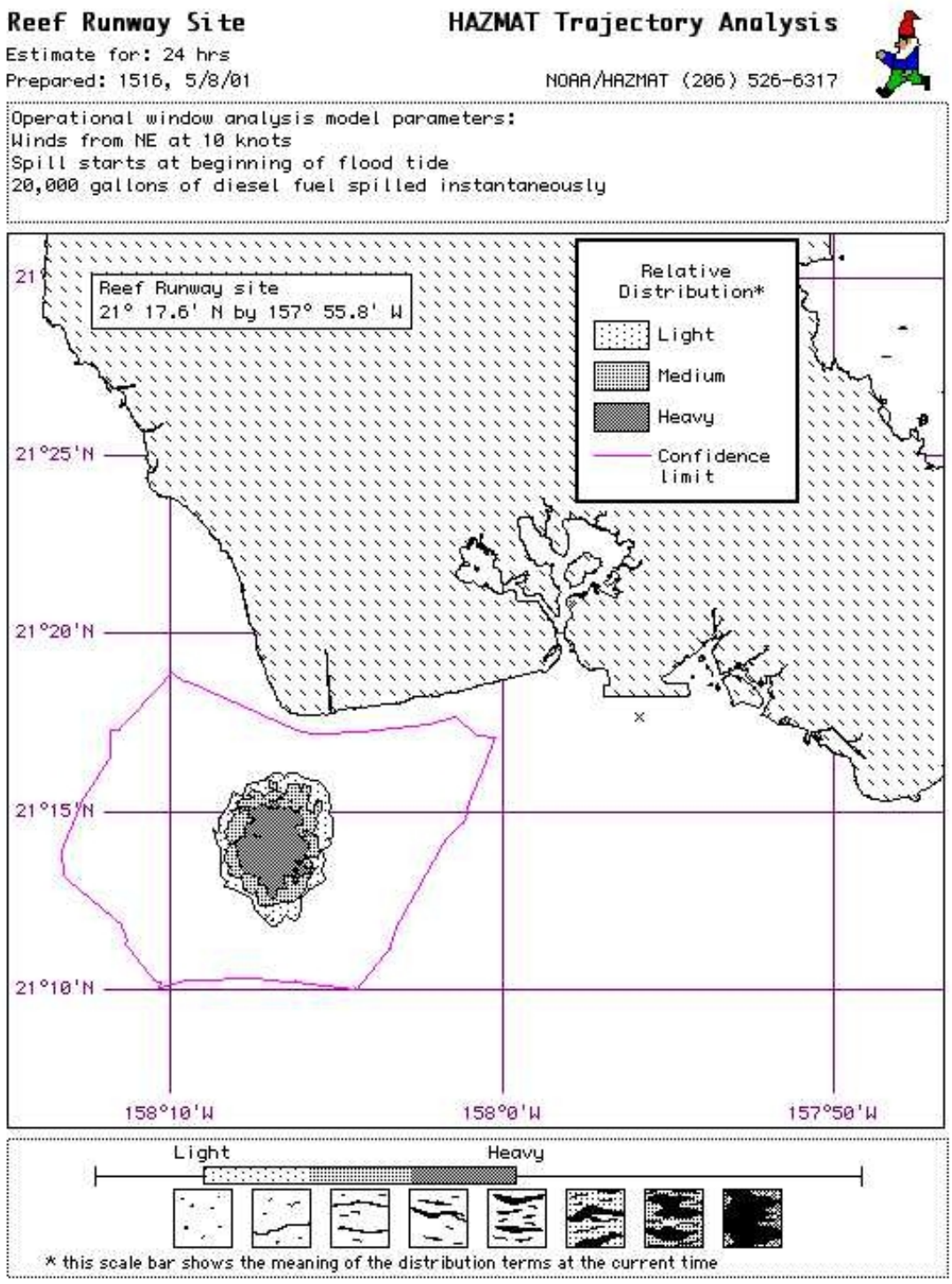



Source: National Oceanic and Atmospheric Administration, 2001a; National Climactic Data Center, 2001

**HAZMAT Trajectory Analysis - Winds Northeast at Ebb Tide**

**Figure 4-13**

**No Scale**




Source: National Oceanic and Atmospheric Administration, 2001a; National Climactic Data Center, 2001

**HAZMAT Trajectory Analysis - Winds Northeast at Flood Tide**

**Figure 4-14**

**No Scale**

To ensure favorable wind and current conditions, real-time surface and subsurface current monitoring would occur. This effort would be facilitated by placing data buoys at the edge of the coral fringe 2 to 3 nautical miles (4 to 6 kilometers) from the shallow-water recovery site, and at the shallow-water recovery site to monitor wind speed and direction, air temperature, current speed in the water column, and wave height and period. These buoys would be in place at least 30 days prior to the start of recovery operations and would help ensure that recovery operations that could potentially result in a diesel fuel or lubricating oil release only take place during the most favorable weather conditions for containing a release.

During the transit to the shallow-water recovery site, the heavy-lift vessel would hold at a location approximately 3 nautical miles (6 kilometers) from the site and wait for optimal sea and weather conditions before proceeding. This would minimize the potential for any diesel fuel or lubricating oil releases to be pushed toward the shore. The transit, which would occur during daylight hours, may occur when east winds are blowing; however, this would only happen if other sea conditions and mechanical intervention systems are optimized and thus potential impacts to the environment from a diesel fuel or lubricating oil release are minimized.

#### 4.4.1.3 Reef Runway Shallow-water Recovery Site

The proposed actions relative to the shallow-water recovery site anticipate a low potential for release of diesel fuel and lubricating oil. As described in section 2.1.4.2, in the event of a release, the Navy would have equipment on standby, mobilize the appropriate equipment, and implement the procedures to quickly contain and clean up the release. In addition, aircraft overflights would be continued during the diving operations to monitor for a diesel fuel or lubricating oil release if ongoing operations indicate a higher likelihood of a diesel fuel or lubricating oil release (Naval Sea Systems Command, 2001a).

The environmental impact of a diesel fuel or lubricating oil release is generally greater in shallow, nearshore waters than at the offshore, deep-water relocation site. The proximity to sensitive nearshore resources is a concern, but the immediate environmental impact of released diesel fuel or lubricating oil is minimal compared with true shallow water depths (of a few feet or less). Both mechanical recovery and dispersant operations are viable options; however, the urgency of response would be greater closer to shore. With appropriate approvals, and assuming agreement as to net environmental benefit as well as approval by the Federal OSC, any diesel fuel or lubricating oil not immediately recovered by surface fuel oil skimmers close to the source could be immediately dispersed by dispersant systems as required, though this measure is unlikely. (Naval Sea Systems Command, 2001a) Helicopters would be used to assist in determining the movement of the release on the water surface to ensure appropriate boom placement. Because of the procedures and equipment to contain and clean up an unanticipated diesel fuel or lubricating oil release, only minimal impacts to the environment would be expected.

Near the shallow-water recovery site there is the potential for public and commercial use activities. These activities include netting, fishing, tropical fish collecting, surfing, scuba diving, paddling, kayaking, aquaculture, and shelling. Section 3.3 provides an overview of

these resources. Every effort would be taken to contain and clean up any release such that no diesel fuel or lubricating oil would impact the shoreline. The diesel fuel and lubricating oil release response outlined previously would be implemented to protect these sensitive resources; therefore, it is anticipated that there would be minimal impact to these resources from a release.

The vessel cleanup operation would occur while the ship is at the shallow-water recovery site. As safety allows, the hazardous material removal would be completed before *Ehime Maru*'s departure from the shallow-water recovery site. Diesel fuel, lubricating oil, and known hazardous materials removal would take place subsequent to crewmember recovery and personal effects surveys after *Ehime Maru* has been relocated into shallow water for dive operations. During the removal operation, hazardous materials that may affect the marine environment would be removed to the maximum extent practicable taking into account diver and equipment operator safety. The removal action would include:

- Removal of diesel fuel and lubricating oil product
- Securing of pipes, tanks, pumps, and fittings
- Removal of other hazardous materials

Because of the hazardous nature of the operation, it is unlikely that attempts to remove freon would be attempted. *Ehime Maru* does not contain any known asbestos or PCBs.

#### 4.4.1.4 Transit to the Deep-water Relocation Site

Once the removal action is complete, *Ehime Maru* would again be transported underwater because of structural integrity concerns. As noted in section 4.3 (Health and Safety), appropriate safety procedures would be taken to minimize health and safety risks during transport. The transit to the deep-water relocation site would present low risk to the environment because most of the hazardous materials such as diesel fuel and lubricating oil would have been removed during the recovery activities and the vessel compartments would have been sealed. However, because there is the potential that not all of the diesel fuel and lubricating oil would be removed during the recovery effort, skimmer vessels would be on standby, and periodic aircraft overflights would occur. The transit route to the deep-water relocation site would avoid the South Oahu Ocean Dredged Material Disposal Site. (Tourresan and Gardner, 2000) Because of the procedures and equipment that would be in place, no adverse impacts would be expected.

#### 4.4.1.5 Deep-water Relocation Site

Before moving *Ehime Maru* to this location, the Navy would attempt to remove most of the hazardous materials to minimize impacts on the environment. Given that most of the hazardous materials would be removed, the vessel's compartments would be sealed, and the depth of the relocation site at 1,000 fathoms (1,800 meters), no impact to the environment would be expected.

If not all of the diesel fuel and lubricating oil is removed during the recovery effort, there is the potential for some small releases at the deep-water relocation site. Diesel fuel and lubricating oil released would be subject to the weathering processes described in section 4.1, Water Quality. It is expected the release would be at a slow rate and anticipated to disperse in the water during movement from the seafloor and not form a noticeable release that would affect the environment.

### 4.4.2 RECOVERY-NOT-POSSIBLE ALTERNATIVE

Under this alternative, the recovery operation would not be initiated and *Ehime Maru* would be left in its current location and present condition. This alternative would not allow for the recovery of potentially remaining hazardous materials that could affect the environment; however, under this alternative the potential for a release close to shore would be minimized because the ship would not be moved.

## 4.5 AIRSPACE

This section describes the potential impacts to airspace as a result of the relocation and recovery activities. These activities would require the implementation of a temporary flight restriction area that could affect airspace.

### 4.5.1 PROPOSED ACTION

The Navy would request the FAA to impose a temporary flight restriction in the airspace above the recovery operations. The temporary flight restriction, allowed by federal aviation regulations, would prevent an unsafe congestion of sightseeing aircraft above the lifting operation. It would also minimize the risk that aircraft noise would interfere with communications on the decks of vessels involved in the operation. A NOTAM would be requested to alert pilots of the temporary flight restrictions. The NOTAM would contain specific information for pilots, including the location, effective period, and exact area and altitudes affected. The NOTAM would also include the FAA coordination facility and commercial telephone number, the telephone number of the U.S. Navy office directing the recovery operations, and any other information considered appropriate by the Honolulu Control Facility.

Aircraft under Honolulu Control Facility's control would be directed around the temporary flight restriction. Aircraft would be allowed through the temporary flight restriction if it becomes impractical for aircraft operating to or from an airport within the area to go above or around it.

The discussion that follows addresses the airspace impacts of the temporary flight restriction above the different phases of the recovery operation.

#### 4.5.1.1 Current Location

**Controlled/Uncontrolled Airspace**

For operations at the current location, the temporary flight restriction would be from the water surface to an altitude of 2,000 feet (610 meters) and cover an area with a radius of 3 nautical miles (approximately 6 kilometers). As indicated in chapter 3, this temporary flight restriction would be in an area of uncontrolled airspace below 700 feet (213 meters) above the surface, but in controlled airspace above 700 feet (213 meters). Establishment of the temporary flight restriction and release of the NOTAM would effectively control the airspace above the operation. It would temporarily change the nature of the airspace above the current location, but would not adversely impact navigable airspace in the ROI.

**Enroute Airways**

The current location lies to the west of the two low altitude enroute airways in the ROI. Therefore, establishment of the temporary flight restriction would not require either a change to an existing or planned flight course or altitude.

**Airports and Airfields**

There are no airports or airfields in the ocean area ROI. Consequently, activities at the current location would have no impacts on airfields and/or airports.

#### 4.5.1.2 Transit to the Shallow-water Recovery Site

There are small differences in the nature of the overlying airspace ROI, as identified in chapter 3.

**Controlled/Uncontrolled Airspace**

For operations during transit to the shallow-water recovery site, the temporary flight restriction would be from the surface to an altitude of 2,000 feet (610 meters with a 1-nautical-mile (approximately 2-kilometer) radius moving from the current location to the shallow-water recovery site. As indicated in chapter 3, this temporary flight restriction would start in an area of uncontrolled airspace below 700 feet (213 meters) above the surface, but in controlled airspace above 700 feet (213 meters).

Establishment of a temporary flight restriction along this transit route and issuance of the NOTAM would effectively control the airspace above the operation. Although the temporary flight restriction would temporarily change the nature of the airspace above the transit route, the temporary flight restriction would not adversely impact navigable airspace in the ROI.

**Enroute Airways**

Although there are a number of low altitude enroute airways that cross over the transit route, aircraft flying in them would be well above the transit operation and the overlying temporary flight restriction. As the transit route approaches the coast of Oahu, aircraft

flying in the low altitude airways change from this network of airways to follow approach procedures given by Honolulu Control Facility. Arriving aircraft would follow flight path procedures that would either be well above the transit route, or avoid it altogether. Departing aircraft would avoid the transit route operations close to the coast, or would be well above them before joining the network of low altitude airways.

Therefore, establishment of the temporary flight restriction over the transit corridor would not require either a change to an existing or planned Instrument Flight Rules minimum flight altitude, a published or special instrument procedure, or an Instrument Flight Rules departure procedure. Neither would the establishment of a temporary flight restriction require a Visual Flight Rules operation to change from a regular flight course or altitude. Consequently, no impacts to the surrounding low altitude airways would occur.

**Airports and Airfields**

There are no airports or airfields in the transit route ROI. The temporary flight restriction that would be established for operations in the transit corridor would therefore have no impacts on airfields or airports.

#### 4.5.1.3 Reef Runway Shallow-water Recovery Site

**Reef Runway Shallow-water Recovery Site**

*Controlled/Uncontrolled Airspace*

All aircraft flying within the inner "core" area of Honolulu's airspace, which surrounds the Reef Runway shallow-water recovery site, operate under Honolulu Control Facility directions. The Navy may request the FAA to impose a temporary flight restriction in the airspace above the recovery operations from the surface to 2,000 feet (610 meters) with a 1-nautical-mile (2-kilometer) radius.

*Enroute Airways*

There are no enroute low altitude airways in the airspace above the Reef Runway shallow-water recovery site. Arriving aircraft change from the network of airways to their final approach patterns to Honolulu International Airport, and departing aircraft follow established departure procedures. All aircraft in the overlying airspace would be under the control of Honolulu Control Facility. Arriving aircraft would follow flight path procedures that would either be well above the Reef Runway shallow-water recovery site, or avoid it altogether. Departing aircraft would avoid the Reef Runway shallow-water recovery site just off the runway at Honolulu International Airport, or would be well above the site before joining the network of low altitude airways. Therefore, a temporary flight restriction would not impact the ROI's enroute airways.

*Airports and Airfields*

Honolulu International Airport is immediately to the north of the Runway Reef shallow-water recovery site. The crane involved in the shallow-water recovery site operation would not be in the runway obstacle free zones. These are three-dimensional volumes of

airspace that protect aircraft arriving and departing from the runway. Therefore, the crane would not constitute an obstruction to air navigation. In addition, appropriate safety lighting would be used on top of the crane. Thus, the Reef Runway shallow-water recovery operations would not affect the use of any airfield or airport available for public use, and would not substantially affect airfield or airport arrival and departure traffic flows.

#### 4.5.1.4 Transit to the Deep-water Relocation Site

A temporary flight restriction with a 1-nautical-mile (approximately 2-kilometer) radius would be established along the transit route. The temporary flight restriction would extend up to an altitude of 2,000 feet (610 meters). The Navy would request dedicated warning NOTAMs be issued to warn the public of the potentially hazardous activities. There would be no adverse impacts to controlled/uncontrolled airspace, to enroute low altitude airways, and/or to airports or airfields along the transit route.

#### 4.5.1.5 Deep-water Relocation Site

**Controlled/Uncontrolled Airspace**

For operations at the deep-water relocation site, the temporary flight restriction would be from the surface to an altitude of 2,000 feet (610 meters), and cover an area with a radius of 3 nautical miles (6 kilometers). As indicated in chapter 3, the temporary flight restriction would be in an area of uncontrolled airspace between the surface and an altitude of 700 feet (213 meters), but in controlled airspace above an altitude of 700 feet (213 meters). Establishment of the temporary flight restriction and release of the NOTAM would effectively control the airspace above the operation. It would temporarily change the nature of the airspace above the deep-water relocation site, but would not adversely impact navigable airspace.

**Enroute Airways**

The deep-water relocation site lies to the west of the one low altitude enroute airway in the ROI. Therefore, establishment of a temporary flight restriction area would not require aircraft flying in the airway to change course or flight altitude and would not impact enroute airways.

**Airports and Airfields**

There are no airports or airfields in the ROI of the deep-water relocation site; therefore, there would be no impacts.

### 4.5.2 RECOVERY-NOT-POSSIBLE ALTERNATIVE

Under this alternative, no temporary flight restriction would be required. Consequently, there would be no impacts to controlled/uncontrolled airspace, enroute low altitude airways, or airports or airfields in the general airspace use ROI.

## 4.6 CUMULATIVE IMPACTS

The proposed recovery effort would occur over a 3-month period. Because the project would be short term and steps would be taken to minimize impacts, no cumulative impacts would be expected with other actions or environmental concerns in the ROI. Although an unanticipated diesel fuel or lubricating oil release could occur and add to other water quality or aquaculture concerns in the area, every precaution would be taken to minimize the environmental impact of the release. In addition, any release would be short term and would not result in any long-term cumulative impacts to the environment.

No cumulative impacts have been identified for the Recovery-not-possible Alternative.

## 4.7 MITIGATION MEASURES

The Navy has made every effort to minimize the potential for significant environmental impacts. During the development of the EA, the Navy worked with resource agencies to determine the locations to conduct recovery activities that would have a minimal impact on the environment.

Unavoidable impacts overall are anticipated to be minor and would be minimized by implementation of standard best management practices and planned contingency responses to unanticipated releases; therefore no compensatory mitigation measures would be required. Should there be an unanticipated significant impact, the Navy and resource trustees would develop compensation commensurate with the level of impacts.

## 4.8 ADVERSE ENVIRONMENTAL EFFECTS THAT CANNOT BE AVOIDED

Other than the potential for some short-term disturbance to marine resources and the temporary unanticipated release of diesel fuel or lubricating oil, there would be no long-term adverse impacts that could not be avoided. All unanticipated releases of diesel fuel or lubricating oil during recovery operations would be prepared for and responded to with mechanical and, if approved and appropriate, dispersant capabilities.

## 4.9 CONSISTENCY WITH FEDERAL, REGIONAL, STATE, LOCAL, OR NATIVE AMERICAN LAND-USE PLANS, POLICIES, AND CONTROLS

Neither the Proposed Action nor the Recovery-not-possible Alternative would conflict with any land use plans, policies, or controls. All necessary permits to conduct the activities would be obtained before the initiation of the project.

## 4.10 ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL

The Proposed Action would require the use of a limited amount of fuel to conduct the recovery effort. During recovery activities, conservation measures would be implemented to the extent practicable, taking into account safety requirements.

## 4.11 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES

The Proposed Action would use a limited amount of fuel during recovery activities. Overall, there would be a limited amount of irreversible or irretrievable commitment of resources.

## 4.12 RELATIONSHIP BETWEEN SHORT-TERM USE OF THE HUMAN ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Given the short-term nature and minimal disturbance to the environment of the Proposed Action, there would be no impacts to long-term productivity. There would be no impacts under the Recovery-not-possible Alternative except for the long-term potential for a slow-rate diesel fuel or lubricating oil release.

## 4.13 NATURAL OR DEPLETABLE RESOURCE REQUIREMENTS AND CONSERVATION POTENTIAL

Other than fuel and oil, no significant natural or depletable resources would be required.