4. Environmental Consequences

4.1 Introduction

This section evaluates the potential direct and indirect environmental and socioeconomic impacts of the alternatives. Table 4-1 lists the alternatives considered in detail and their descriptions. Direct effects are caused by an action and occur at the same time and place as the action. Indirect effects are reasonably foreseeable effects caused by an action, but occur later in time or farther removed in distance from the action. CEQ regulations define the significance of impacts in terms of context and intensity. Context refers to the geographic area of effect, which varies with the setting of the alternatives and with each resource area being analyzed. Intensity refers to the severity of the impact and considers whether the effect would be negligible, minor, moderate, or major. Negligible impacts would not be detectable and would have no discernible effect. Minor impacts would be slightly detectable and would not be expected to have an overall effect. Moderate impacts would be clearly detectable and could have an appreciable effect. Major impacts would be clearly detectable and would have a substantial, highly noticeable effect. Duration, short-term or long-term, must be considered in the assessment of the environmental impacts. Short-term impacts are temporary and would generally end once the proposed activities have stopped. Long-term impacts are typically those effects that would last several years or more or would be permanent. Impacts were also evaluated in terms of whether they would be beneficial and/or adverse.

Mitigation measures are methods to avoid, minimize, rectify, or reduce the adverse environmental impacts of an action. Mitigation measures are discussed in Section 5. These are measures that would be taken to avoid or minimize adverse effects of the proposed actions.

1 **Table 4-1. Alternatives Considered in Detail**

Alternative	Description
Stranding Agreements and Response	
Alternative A1	No Action- SAs expire, stranding response would end.
Alternative A2	Status Quo- Current SAs would be renewed, current stranding response activities continue. Final SA criteria would not be issued.
Alternative A3	SAs issued to any applicants after review, new SA template would not be utilized. Final SA criteria would not be issued. Current and future activities included.
Alternative A4 (Preferred)	Final SA criteria would be implemented, new SA template would be utilized, current and future activities included.
Alternative A5	Final SA criteria would be implemented, new SA template would be utilized, and response to threatened, endangered, or rare animals would be required.
Carcass Disposal	
Alternative B1	No Action- SAs expire, no carcass disposal would occur, carcasses would be left where stranded.
Alternative B2	Status Quo- Current methods of carcass disposal continue.
Alternative B3 (Preferred)	Status Quo with the recommendation to transport chemically euthanized animal carcasses off-site.
Rehabilitation Activities	
Alternative C1	No Action- Current SAs would expire, stranding response would cease, and animals would not be rehabilitated.
Alternative C2	Status Quo- Current rehabilitation activities would continue. Final Rehabilitation Facility Standards would not be implemented.
Alternative C3 (Preferred)	New SAs would be issued, rehabilitation activities continue. Final Rehabilitation Facility Standards would be implemented.
Alternative C4	New SAs would be issued, rehabilitation activities would continue. Rehabilitation of threatened, endangered, and rare animals would be required; response to other animals would be optional. Final Rehabilitation Facility Standards would be implemented.
Release of Rehabilitated Animals	
Alternative D1	No Action- Current SAs would expire, stranding response and rehabilitation would cease, and therefore there would be no animals to release.
Alternative D2	Status Quo- Current release activities would continue. Adaptive changes to release activities would not be permitted. Final release criteria would not be implemented.
Alternative D3 (Preferred)	New SAs would be issued, release activities continue. Final release criteria would be implemented and would include adaptive management of release activities.
Disentanglement Activities	
Alternative E1	No Action- No disentanglement network.
Alternative E2	Status Quo- Disentanglement network would continue current activities, no modifications or new members added.

Table 4-1. Alternatives Considered in Detail (continued)

Alternative	Description
Disentanglement Activities	
Alternative E3 (Preferred)	Disentanglement network would continue current activities on East Coast with modifications to West Coast network. The Disentanglement Guidelines and training prerequisites would be implemented.
Biomonitoring and Research Activities	
Alternative F1	No Action- Biomonitoring and research activities would not occur.
Alternative F2	Status Quo- New ESA/MMPA permit would continue current biomonitoring and research activities.
Alternative F3 (Preferred)	New ESA/MMPA permit would be issued to include current and future biomonitoring and research activities.

4.2 Biological Resources

This section evaluates the potential impacts on biological resources as a result of the alternatives. Impacts on biological resources are evaluated in context and intensity on a population or species-wide scale. Therefore, while more significant impacts may occur on individual animals, the overall impact on the population or species may still be considered minor.

4.2.1 Stranding Agreements and Response Alternatives

4.2.1.1 Alternative A1- No Action

Under Alternative A1 stranding response from current SA (formerly LOA) holders would end once all agreements have expired. Federal (not including NMFS), state, and local agencies authorized under MMPA Section 109(h) would still be able to conduct emergency response to non-ESA listed species, and those ESA-listed species for which response is part of the 4(d) rule (see 50 CFR 223.202(b)(2)). However, response activities would likely be limited and localized in extent, and would consist mostly of carcass disposal for the protection of public health and safety. The authorized level of stranding response would greatly decrease, ESA-listed marine mammals would not be responded to, animals in peril would not be hazed away from hazards, and more animals would likely perish. These animals would be removed from the population, which might have an adverse effect on species, especially those that are depleted, threatened, or endangered. There would be a lack of detection and notification of morbidity and mortality. The valuable information on marine mammal populations, such as biology, health, and disease detection, collected during the examination of stranded animals would no longer be collected. Scientists would not be able to study why strandings occur, which could indirectly affect future marine mammal populations.

In addition, the ability of the stranding network to act as a surveillance network would be eliminated. This could result in the emergence and spread of marine mammal diseases, or the use and spread of fishery practices that were harmful to marine mammals, without any possibility for human intervention or mitigation until population-level effects were observed. At that point, it would likely be too late for any quarantine or translocation program to halt the spread of disease or for a fishery modification to occur. This could have adverse impacts on marine mammal populations, particularly those that are threatened or endangered, where the loss of a relatively small number of individuals represents a greater proportion of the species. One example would be the early detection of a disease such as *Morbillivirus* in the highly endangered Hawaiian monk seal (a naïve population). This outbreak could be mitigated by the isolation/translocation/captivity of affected individuals, but only if it was detected early in the spread of the disease, when few individuals had contracted the virus.

In addition, other environmental conditions have been first detected in marine mammals or beach-cast seabirds, including oil spills and HABS. Early detection of these circumstances also allows the potential for human intervention (finding the source of the oil spill) and reducing the overall number of affected biological resources. When a significant number of strandings occur that share the same findings of fishery interaction, this information can be used to manage the fishery to reduce the impacts on marine mammals. Gear modifications, geographic changes (area closures), and temporal changes (season dates) may all be changed so that the probability of fishery interactions with marine mammal populations (particularly those that are threatened or endangered) is reduced. The stranding network provides critical information about potential issues when first observed, which allows for response and management before the problem becomes widespread and costly or impossible to ameliorate.

No effects on protected and sensitive habitats, SAV and macroalgae, sea turtles, fish, shellfish, other invertebrates, and birds would be expected to occur under this alternative. Effects from leaving a carcass on the beach are described in Section 4.2.2.1, Carcass Disposal.

4.2.1.2 Alternative A2- Status Quo

Under Alternative A2, the current SAs would be renewed and current stranding response activities would continue without the issuance of Final SA criteria. Potential minor, short-term, adverse effects on all biological resources could occur from vessel and vehicle uses, but these impacts are expected to be negligible when compared to other inputs of hazardous materials from vessels, sewage outfalls, runoff, industrial operations, and other beach vehicle uses. Spills of hazardous materials or wastes

from vessels during response to free-swimming animals could impact biological resources. Some materials could be diluted quickly by currents, only causing temporary impacts. Other materials could linger in the water column or adhere to sediment particles, causing slightly longer impacts. As with any activity, vehicular transport, heavy equipment, or medical equipment used during beach response activities could leak oil or other materials into sand and nearshore waters. These would likely be small amounts that would be flushed out and/or diluted rapidly, causing a minor and temporary impact.

Minor, short- and long-term adverse effects on protected and sensitive habitats could occur during response activities. Equipment used for transport or response may traverse protected habitats to access a stranded animal. An animal may be stranded in a protected habitat and equipment might be needed for the response. Response activity could damage sand dunes and associated vegetation. Equipment may also cause compaction of the beach. Response equipment could also disturb or injure nesting sea turtles, depending on the location and time of year. Disturbance of a nesting sea turtle would likely be a short-term, minor impact. Injuring a nesting sea turtle and/or their eggs could produce minor, long-term effects, as all sea turtles are endangered species.

Minor, short-term adverse effects on shellfish and other invertebrates living in the beach and intertidal environment could occur during response activities. The traversing of heavy equipment over shellfish beds could damage or kill shellfish. Digging with a shovel or spade to allow room for an animal's flukes and flippers could also damage shellfish.

Minor to moderate, short-term adverse effects on coastal and marine birds could occur during response activities. The use of equipment and the presence of people could disturb birds nesting or roosting in trees or small bushes, and may cause them to temporarily leave the area. Ground nesting birds could be adversely affected by response activities. Heavy equipment could crush nests and response personnel could disturb or damage a nest. Response activities conducted in shallow waters could disturb foraging birds. This impact would be minimal, as birds could forage in nearby areas and would likely return once response activities ended.

Live stranded animals would most likely experience stress and pain due to the stranding event itself that could be decreased or increased by stranding response activities. The effects of stranding response activities on cetaceans would depend on the condition, species, and history of the animal. An alert and responsive animal may panic when responders approach. Mothers separated from their calves may become aggressive, and members of social species may experience negative effects from

being separated from conspecifics. Debilitated animals that are weakly responsive or non-responsive animals may not physically, but may physiologically, react to responders.

Healthy animals may be released immediately from the stranding site. Tagging may occur before the release in order to monitor the animal's movements. Roto-tags would most commonly be used, but radio tags could be attached if available. During the attachment of the roto-tag, pain would only last during the application, and sedatives or local anesthetic would be used. The tag site could become infected, causing pain to the animal. Tissue damage or infection could occur when the tag is shed. For pinnipeds, animal movement may prolong or prevent healing by producing repetitive stress on the tag site. Epoxy would be used to attach radio tags to pinnipeds and should not cause pain if done properly. However, it may result in discomfort if the placement of the instrument causes pulling of the hair or skin during animal movement. In addition, if the ratio of resin and hardener is not correctly measured, the resulting heat-producing reaction could burn the animal's skin. Both the resin and hardener could cause skin irritation, such as itching, rashes, hives, and dermatitis. The instrument could be knocked or torn off, pulling out hair and possibly some of the underlying skin, which would then be open to infection.

During mass strandings, animals may be marked with a grease pen, crayon, or zinc oxide to keep track of each animal. These materials would not cause an impact on marine mammals.

Handling, lifting, and moving an animal may cause injuries to the animal, including stress and increased shock. Flippers may be crushed or the animal may overheat if stretchers do not have openings for them. Creases or seams in stretchers and transport equipment may press into the skin, causing discomfort, pain, and possible temporary or permanent injuries. Chemical immobilization of a cetacean can be life threatening, if not administered and monitored correctly. When anesthetized, an animal may go into a dive reflex, which would include breath holding, slowing of the heart rate, and the pooling of blood from peripheral vessels. While under anesthesia, a cetacean may develop hypothermia. If the animal is not in water, improper body support could compromise cardiac and respiratory functions (Haulena and Heath 2001). During transport to a rehabilitation facility, animals may overheat in direct sun and heat without protection. Depending on body condition, cetaceans may overheat (hyperthermia) or develop hypothermia during transport. Body surfaces may be exposed to the drying effects of air. Animals may also be knocked around, causing muscle damage or they may inhale exhaust fumes. Improper transport of cetaceans may cause abrasions, pressure necrosis, thermoregulatory problems, and respiratory problems. Muscular stiffness may occur from transport, but most accepted transport methods try to minimize or avoid this entirely. Stiffness would disappear

within a few hours to a few days, unless there was permanent muscle damage (Antrim and McBain 2001).

Beach response activities for live stranded pinnipeds would require physical capture of the animal. Captures may disrupt other animals, including conspecifics, if the capture occurs at a haul-out site or any other area where animals were located. Impacts would be expected, as non-target animals may flee into the water. Pups and young animals may be trampled or abandoned. Juvenile and adult animals may be trampled and killed during stampedes or injured on rocks and cliff faces. If animals were not injured, impacts would be minor and short-term as animals would likely return once responders have left. Handling and restraint, if not properly executed, may further injure or kill a pinniped (*e.g.* suffocation under the weight of a handler). Chemical immobilization (anesthesia or sedation) of a pinniped has risks, especially in ill or injured animals, if not administered and monitored correctly. When anesthetized or sedated, an animal may go into a dive reflex, which would include breath holding, slowing of the heart rate, and the pooling of blood from peripheral vessels. Pinnipeds may develop hypo- or hyperthermia while anesthetized. Transport to a rehabilitation facility may cause muscular stiffness or damage. Stiffness would disappear within a few hours to a few days, unless there was permanent muscle damage (Antrim and McBain 2001). Without protection, animals may overheat in direct sun and heat or develop hypothermia or frostbite in freezing temperatures. Inhalation of exhaust fumes and jolting during transport could injure pinnipeds.

Response may also include the harassment and/or capture of free-swimming animals that are trapped, out of habitat, extralimital, or exhibiting abnormal behavior. Reactions to vessel close approaches and hazing activities from cetaceans may include swimming faster, breaching, diving, tail and fin slapping, or moving away from the vessel. Pinniped reactions to vessels are highly variable, depending on the species (Calkins and Pitcher 1982). Behaviors in response to close approaches by vessel would generally be short-term, with a minimal effect on the animal.

Any capture and/or restraint procedure would likely have some effect on the behavior or activities of marine mammals. The method(s) of restraint, as well as the age and general condition of the animal are all factors that would affect an animal's response to capture. Animals could incur contusions, concussions, lacerations, nerve injuries, hematomas, and fractures in their attempts to avoid capture or escape restraint (Fowler 1978). The stress response could change an animal's reaction to many drugs, including those commonly used for chemical restraint, which could have lethal consequences. Stress could also alter an animal's immune system. It may also lead to behavioral changes including

increased aggressive and antisocial tendencies (Fowler 1986). Stress from capture and restraint could cause capture myopathy, which occurs when an animal cannot cool itself (Fowler 1978). Capture myopathy is characterized by degeneration and necrosis of striated and cardiac muscles and usually develops within 7 to 14 days after significant trauma, stranding, transport, or capture. Animals could also become entangled in the capture net, which may result in injuries or death. Animals may become stressed during handling and restraint. Signs of stress in cetaceans include reduced respiration, prolonged struggling while being held, and arching. Impacts on pinnipeds from capture and restraint are described above.

Response would include hazing an animal(s) when necessary to move it away from a possible health hazard. Potential adverse effects of hazing would likely be from the close approach of vessels, either used to deploy hazing methods or as a method itself. The intent of the activities would be to cause the animal to change their behavior and move away from a potential threat. Acoustic deterrent methods may cause temporary physical discomfort, but would not likely cause long-term injuries. The use of airguns around mysticetes is a concern because of their ability to hear low frequencies better than odontocetes. Concern with using mid-frequency sonar is the close range impacts on harbor porpoise, minke whales, Steller sea lions, and other species. The use of seal bombs near highly volatile oil is also a concern. Exclusion devices used for pinnipeds would not have a significant impact, as animals would not become trapped or entangled. Overall, no significant, long-term impacts to behavior would be expected with proper mitigation. A beneficial impact would be expected from hazing because it would likely prevent an animal from being harmed.

Biological samples may be collected from a stranded animal to help determine the medical and physiological condition of the animal, assess the best course of action, and monitor progress and appropriateness of treatment. Samples would include blood, swabs, biopsies, etc. Sample collection would likely cause minor stress to the animal, beyond the actual stranding event. Response activities would be conducted in an attempt to save an animal's life, to reduce pain and suffering, or to humanely euthanize an animal, which would be deemed in the best interest of the animal. Most adverse impacts on stranded animals would be outweighed by the potential beneficial impacts of saving an animal and/or reducing their pain and suffering.

Response activities would also include euthanasia, when deemed necessary. Euthanasia procedures would be performed by the attending veterinarian or a person acting on behalf of the attending veterinarian. All euthanasia procedures would follow the AVMA guidelines (AVMA 2001) and/or the AAZV guidelines (AAZV 2006). Chemical euthanasia agents may cause hyperexcitability or

violent reactions in some species. Intraperitoneal administration of a euthanasia solution may lead to the prolonged onset of action due to differential or slow absorption rates. It may also cause irritation in the surrounding tissues. Improperly administered chemical euthanasia agents or methods of delivery may prolong the pain and suffering of an animal. When done correctly, the use of ballistics should cause instantaneous unconsciousness followed by respiratory and cardiac arrest. However, improper uses, such as inappropriate caliber of the firearm or untrained personnel, may not cause unconsciousness before death and would then not be considered humane under the AVMA guidelines. During mass strandings, the use of ballistics may stress and exacerbate fear in the surviving animals. The incorrect charge placement of explosives may not cause instantaneous unconsciousness and may cause tissue destruction (Greer *et al.* 2001). Exsanguination (bleeding) may prolong pain and suffering if done incorrectly.

Issuance of SAs only to current SA holders limits the activities of the stranding network to the geographic area that is currently covered. Animals may strand in areas where response is limited or non-existent. Limited response may increase the pain and suffering of stranded animals, and animals would likely die without response from the stranding network. Limiting the issuance of SAs would not allow for new rehabilitation facilities to be added and would affect the amount of animals that could be accepted for rehabilitation. If current rehabilitation facilities do not have space for an animal, the animal would be euthanized or left on the beach during response activities. Prohibiting new activities could reduce the success of a response, as new tools and techniques would not be available for use.

Implementing the SA criteria would ensure that only those individuals, organizations, or institutions qualified and trained to conduct response, assessment, rehabilitation, and/or release of marine mammals would be given SAs. This would reduce the likelihood of increased risks to wild populations with release. Without using the criteria during the review of SA applicants, inexperienced personnel could be issued a SA to respond to and/or rehabilitate stranded animals. Inexperienced personnel could put the animal's health in jeopardy, increase their pain and suffering, and increase the adverse impacts on other biological resources. The potential for an appropriate response (immediate release, animal to rehabilitation, or euthanasia) would decrease. Without a nationwide set of criteria, SA holders in different NMFS regions may not be held to the same standards or require the same minimum experience and qualifications. This would include working with a licensed veterinarian for live animal response and rehabilitation to ensure animals receive adequate and humane care.

4.2.1.3 Alternative A3

Under Alternative A3, SAs would be issued to any applicants after review, the new SA template would not be utilized, and the Final SA criteria would not be issued. Current and future stranding response activities would be included in this alternative. Effects on biological resources from stranding response activities under Alternative A3 would be the same as those described under Alternative A2. Effects of not implementing the SA criteria would also be the same as those described under Alternative A2. Under Alternative A3, as new techniques and tools become available they could be permitted for use during response activities. This would likely have a beneficial impact on marine mammals as response efforts would be conducted using the best available equipment and methods.

Minor, adverse effects on marine mammals would be expected to occur if new SAs are issued to any applicant after they were reviewed by the appropriate NMFS Regional Office. Inexperienced individuals may be responding to stranded marine mammals, which could result in injuries or inhumane techniques. Some beneficial impacts could come from allowing new SA holders to be added, given that they have the proper experience with marine mammal response, as geographic coverage would increase and new rehabilitation facilities may be added to the Stranding Network.

4.2.1.4 Alternative A4- Preferred Alternative

Under Alternative A4, the Final SA criteria and the new SA template would be implemented and current and future stranding response activities would occur. Effects on biological resources from stranding response activities under Alternative A4 would be the same as those described for Alternative A2. Under Alternative A4, as new techniques and tools become available they could be permitted for use during response activities. This would likely have a beneficial impact on marine mammals as response efforts would be conducted using the best available equipment and methods. Modifications could also be made to euthanasia techniques if safer, more effective methods or chemical euthanasia solutions are developed. The use of new techniques and tools would have impacts similar to, or less than, those described under Alternative A2.

Long-term beneficial effects on marine mammals would be expected to occur with the implementation of the SA template and criteria. The template contains the requirement for periodic review and reapplication in order to stay in the stranding network. Reviews would occur by the Regional NMFS Office after the first year for new (probational) network members, every 3 years for members doing live animal response and rehabilitation, and every 5 years for organizations

responding solely to dead animals. In addition, the new agreement provides NMFS with the option to place organizations on probation or suspension, or to terminate the SA, for noted deficiencies or failure to comply with the terms and conditions of the SA. The SA criteria would make certain that SA holders in every NMFS region were held to the same standards and require the same minimum experience and qualifications. A licensed veterinarian would be highly recommended during all emergency response activities and during the transport of cetaceans. A licensed veterinarian would be required at all rehabilitation facilities. This attending veterinarian would meet qualifications as set forth in the Minimum Criteria and Rehabilitation Facility Guidelines, including: 1) having an active veterinary license in the U.S. (has graduated from a veterinary school accredited by the AVMA Council on Education, or has a certificate issued by the American Veterinary Graduates Association's Education Commission for Foreign Veterinary Graduates) or has received equivalent formal education as determined by NMFS; and 2) having the appropriate registrations and licenses (*e.g.*, for handling controlled substances, including registering with the Drug Enforcement Administration [DEA]) to obtain the necessary medications for marine mammal response. This would likely increase the potential for an appropriate response, rehabilitation, and/or release, and may minimize the negative impacts associated with stranding response on biological resources. New SA holders could be added under the alternative, which would be a beneficial impact on marine mammals.

4.2.1.5 Alternative A5

Under Alternative A5, the Final SA criteria and the new SA template would be implemented and response to threatened, endangered, or rare animals would be required. Effects on biological resources from stranding response activities under Alternative A5 would be the same as those described under Alternative A2. Effects on biological resources from the implementation of SA criteria would be the same as those described under Alternative A4.

Requiring response to threatened, endangered, or rare animals would be a positive effect on those populations. However, making response to other animals optional could adversely affect those populations as they could become threatened or endangered in the future. It may also indirectly affect ESA-listed species, as non-listed species often serve as models for other animals. Limiting response to non-listed species would decrease the information gained from strandings that could be beneficial to the survival of threatened and endangered species. Responding to other species allows the detection of new diseases or hazardous conditions in the ocean, which may reduce impacts on threatened and endangered species or species of concern.

4.2.2 Carcass Disposal Alternatives

4.2.2.1 Alternative B1- No Action

Under Alternative B1, no carcass disposal would occur and carcasses would remain on the beach to naturally decompose. Federal (not including NMFS), state, and local agencies authorized under MMPA 109(h) would still be able to conduct carcass disposal of non-ESA listed species. Carcass disposal activities would likely be limited and localized. Carcasses would likely be removed to avoid having a decomposing animal on a public beach. Animal carcasses may contain POPs, toxic metals, pathogens, and/or biotoxins. Contaminant levels would likely be higher in species that feed at higher trophic levels and/or in areas where prey may be more contaminated. A literature review has been conducted to determine the persistent contaminants found in selected marine mammal species (see Appendix J). Species addressed in the review were based upon the frequency and patterns with which they strand. The review concluded that there is a limited amount of information on most species and their contaminants. Therefore, the evaluation of the potential toxicological environmental hazards posed by a decomposing carcass cannot be determined at this time.

4.2.2.2 Alternative B2- Status Quo

Under Alternative B2, current methods of carcass disposal would continue. Current carcass disposal methods under Alternative B2 include on-site burial, transport off-site (for burial or rendering), disposal at sea, and natural decomposition (left on-site). Spills of hazardous materials or wastes from vessels during at-sea carcass disposal activities could impact biological resources. Some materials could be diluted quickly by currents, only causing temporary impacts. Other materials could linger in the water column or adhere to sediment particles, causing slightly longer impacts. Biological resources could be injured or killed if they are in the vicinity of a spill. Equipment used during carcass disposal activities could leak oil or other materials into sand and nearshore waters. Hazardous material leaks from equipment could impact shellfish, other invertebrates, and nearshore fish. However, these would likely be small amounts that would be flushed out and/or diluted rapidly, causing a minor, short-term impact. However, all of these impacts would be negligible when compared to other inputs of hazardous materials from vessels, sewage outfalls, runoff, industrial operations, and other beach vehicle uses.

Digging physically alters and disrupts the site. However, effects would be negligible as on-site burial would not be conducted in protected and sensitive habitats without consulting the proper authorities (see Section 5.2). Potential damage could occur as equipment may need to traverse sensitive habitats

to access the carcass for removal or disposal. Equipment used for disposal at sea and the carcass itself could hit and damage submerged sensitive habitats, such as coral reefs.

Animal carcasses may contain POPs, toxic metals, pathogens, and/or biotoxins. Contaminant levels would likely be higher in species that feed at higher trophic levels and/or in areas where prey may be more contaminated. The evaluation of the potential toxicological environmental hazards posed by a decomposing carcass cannot be determined at this time (see Appendix J). However, the potential does exist for the decay products of carcasses to be released into the surrounding environment or recycled into the food web, with subsequent negative impacts.

Animals may also contain chemical residues from substances administered by stranding response personnel, including chemical euthanasia solution and sedatives. If the animal is a rehabilitated animal that has restranded, it may also contain antibiotics, antifungals, and other medicine. These chemicals persist in the carcass at different concentrations and for different amounts of time. They would not likely create a large-scale environmental hazard, as the levels would be negligible compared to levels found in runoff and sewer discharge, and the compounds are not likely to bioaccumulate through the food web.

Contaminants from potentially toxic carcasses left on site or buried could leach into groundwater and flow into nearshore water, harming sensitive areas in and around the carcass. This impact would be minor and short-term. If contaminants enter groundwater, they would likely be flushed out quickly by tidewater and/or precipitation. Higher concentrations of contaminants may occur in nearshore waters down site from the carcass. These concentrations would be diluted and flushed out by the currents; therefore the impact on biological resources would be temporary and minor. Sediment quality would not likely be impacted by contaminants, as they would be flushed out or diluted before they could adhere to the substrate. Therefore, any organisms using sediment would not be impacted.

SAV and macroalgae could be indirectly affected by on-site burial. Contaminants from chemically euthanized carcasses could leach into groundwater and impact waters used by SAV and macroalgae. Carcass disposal at sea could cause minor, short-term, adverse effects. Equipment used for disposal at sea and the carcass itself could potentially damage SAV and macroalgae or remove SAV from sediment. Impacts would be minor, as SAV and macroalgae would grow back and organisms that use them as habitat would be able to utilize surrounding areas.

On-site carcass burial could adversely affect sea turtles nesting on beaches, depending on the location and time of year. However, carcass burial sites would not be sited near nesting sea turtles, eliminating the potential for adverse effects.

Minor, short-term adverse effects on coastal and marine birds could occur during carcass disposal. The use of equipment and the presence of people could disturb birds nesting or roosting in trees or small bushes, and may cause them to temporarily leave the area. These birds would likely return to the area once response activities ended and impacts would be temporary, as response activities would occur for a short period. Ground nesting birds could be adversely affected by transport and burial activities. Heavy equipment could crush nests and digging for burial could completely remove a nest. Personnel helping with disposal could disturb or damage a nest.

Minor, short-term adverse effects on shellfish and other invertebrates could occur during response activities. The traversing of heavy equipment over shellfish beds to access a carcass could damage or kill shellfish. Shellfish would not be negatively impacted during digging for carcass burial, as burial sites would be chosen well above the high tide line. Other invertebrates could be disturbed and negatively impacted during burial activities. Contaminants from toxic carcasses could leach into groundwater and nearshore waters and impact shellfish. Potential effects on fish may result from contaminants in nearshore waters. Impacts on shellfish and fish from contaminants would be minor, as contaminants would be flushed out and/or diluted rapidly.

Scavengers may be adversely affected if carcasses of chemically euthanized or toxic animals are left to decompose on the beach. Euthanasia solution is toxic and may injure or kill animals feeding on these carcasses, known as secondary toxicosis. In addition, scavengers may consume POPs, other toxic chemicals, and biotoxins which may bioaccumulate over time, with the potential for serious injuries or death. Diseased animal carcasses may also cause serious injuries or death if consumed by scavengers. Likewise, disposal of these carcasses at sea could also affect scavengers, such as sharks and seabirds. Negligible, short-term, adverse effects on scavengers would be expected to occur from the removal of carcasses from beaches. Carcasses provide food many animals, including foxes, coyotes, birds, and polar bears. Threatened bald eagles may feed on marine mammal carcasses left on beaches. California condors, an endangered species recently reintroduced in California, may also feed on marine mammal carcasses. California condors would not be affected, as most carcasses (mainly pinnipeds that have not been chemically euthanized) are left on beaches in California where the condors are located. Effects of carcass removal are expected to be negligible because scavengers

are not solely dependent on marine mammal carcasses for survival. In most areas, strandings are rare and not a major component of scavengers' diets.

Minor, indirect benefits may occur from carcasses towed out to sea. Disposal at sea of carcasses may create food for other organisms. However, this may lead to recycling of contaminants. Large whale carcasses have been known to become habitat and food for a variety of organisms, such as those as seen on natural whale falls (Smith and Baco 2003). Some stranding network members have coordinated carcass disposal efforts with research groups studying whale falls and the transitory benthic invertebrate communities surrounding them.

4.2.2.3 Alternative B3- Preferred Alternative

Under Alternative B3, current methods of carcass disposal would continue with a recommendation to transport chemically euthanized animal carcasses off-site. Effects from Alternative B3 would be the same as those described under Alternative B2, except for the effects from chemically euthanized animal carcasses. Under Alternative B3, these carcasses would be transported off-site to a proper landfill whenever possible, removing the risk of contamination. This would be a positive effect on protected and sensitive habitats, SAV and macroalgae, fish, shellfish, other invertebrates, and scavengers.

Under this alternative, modifications may be made to carcass disposal activities. Currently, the potential toxicological environmental hazards posed by a decomposing carcass are not known. If and when this information becomes available, additional precautions (*e.g.,* removal of certain species carcasses from beaches) would be implemented, if necessary. These modifications would have a beneficial impact on the surrounding biological resources.

4.2.3 Rehabilitation Activities Alternatives

4.2.3.1 Alternative C1- No Action

Under Alternative C1, current SAs would expire, stranding response would end, and animals would not be taken into rehabilitation. Marine mammals not taken into rehabilitation most would likely die from injuries or disease. For populations that are endangered, this could potentially affect the survival of the species. No effects on protected and sensitive habitats, SAV and macroalgae, sea turtles, fish, shellfish, other invertebrates, or birds would be expected to occur from this alternative.

4.2.3.2 Alternative C2- Status Quo

Under Alternative C2, current rehabilitation activities would continue, but the final Rehabilitation Facility Standards would not be implemented. Stranded animals would be taken into rehabilitation with the intent to release them back to the wild, if possible, once they are healthy. Biological samples may be collected from a stranded animal to help determine the medical and physiological condition of the animal, assess the best course of action, and monitor progress and appropriateness of treatment. Samples would include blood, swabs, biopsies, etc. Sample collection would likely cause minor stress to the animal, beyond the actual stranding event. Handling, lifting, and restraining an animal could cause injuries. When anesthetized or sedated, an animal may go into a dive reflex, which would include breath holding, slowing of the heart rate, and the pooling of blood from peripheral vessels. Anesthetized animals could develop hypothermia or hyperthermia. Administration of drugs and surgical procedures could cause injuries or death. However, all rehabilitation activities would be conducted in an attempt to help sick and injured animals. Rehabilitation would be conducted with proper veterinary oversight and the use of established and accepted methods. Most adverse impacts on animals in rehabilitation would be outweighed by the potential beneficial impact of saving an animal and returning it to the wild.

Animal euthanasia may occur, when deemed necessary by the attending veterinarian. Euthanasia procedures would be carried out by, or under the direction of, the attending veterinarian. Chemical euthanasia agents may cause hyperexcitability or violent reactions in some species. Intraperitoneal administration of a euthanasia solution may lead to the prolonged onset of action due to differential or slow absorption rates. It may also cause irritation in the surrounding tissues. Improperly administered chemical euthanasia agents or methods of delivery may prolong the pain and suffering of an animal.

Current facilities may not have enough space or resources to accommodate a stranded animal or may only rehabilitate certain animals. If no rehabilitation facility can take an animal, the animal may be euthanized. Standards for the humane treatment of marine mammals would constantly be developed, applied, and re-examined. Practices currently acceptable may not be acceptable in the future. If adaptive changes are not allowed, the success of rehabilitation would not increase. Animals may not be able to return to the wild, which may mean the animal would be euthanized or placed into permanent captivity in a public display or research facility. Removal of marine mammals from the wild would negatively effect populations that are depleted, threatened, or endangered.

The Rehabilitation Facility Standards would not be implemented, compromising animal health, the success of rehabilitation, and the potential for release to the wild. Inadequate care may increase pain and suffering of a marine mammal. Pool and pen sizes could be inadequate or contain too many animals, which would restrict animal movement and may cause aggressive behaviors between animals. New animals may not be placed into quarantine, which could introduce new pathogens to other animals currently in the rehabilitation facility, which are already compromised. Pathogens may also be introduced and spread through contaminated supplies, equipment, and personnel, by mixing of marine mammal species within the rehabilitation setting (particularly species that do not interact or whose ranges do not overlap in the wild), or by encounters between marine mammals and terrestrial mammals (particularly canids, felids, and raccoons). Any pathogen within a rehabilitation "hospital" setting has the potential to mutate or evolve into a novel organism (including those with drug resistant properties), creating a new (or drug-resistant) disease which could then be introduced into the naïve wild population upon the release of an infected animal following rehabilitation, particularly if the animal is not thoroughly evaluated prior to release.

4.2.3.3 Alternative C3- Preferred Alternative

Under Alternative C3, new SAs would be issued, rehabilitation activities would continue, and the final Rehabilitation Facility Standards would be implemented. The effects on marine mammals from rehabilitation activities under this alternative would be the same as those described under Alternative C2. No effects on protected and sensitive habitats, SAV and macroalgae, sea turtles, fish, shellfish, other invertebrates, or birds would be expected to occur from rehabilitation activities under this alternative.

The Rehabilitation Facility Standards would be implemented, requiring current and future facilities to adhere to the minimum standards as part of their SA. The standards would ensure a healthy environment for animals, maximize the success of rehabilitation, and increase the potential for release to the wild. The standards cover facilities, housing, space, water quality, quarantine, sanitation practices, food handling and preparation, and veterinary medical care. Rehabilitation facilities would be required to submit the maximum holding capacity for their facility based upon the minimum space requirements in order to minimize overcrowding. Long-term beneficial impacts would be expected, as these standards would ensure that safe, healthy, and humane conditions are in place at all facilities. The standards would decrease the risk of disease transmission within the facility with the requirements for quarantine facilities and quarantine protocols for all incoming animals. Minimum quarantine and biosecurity standards include, but are not limited to: having separate filtration and

water flow systems; providing sufficient space or solid barriers between animal enclosures to prevent direct contact; and maintaining equipment and tools strictly dedicated to the quarantine area. Additional quarantine standards are described under mitigation in Section 5.2.3.

Veterinary medical care standards (Sections 1.7 [for cetaceans] and 2.7 [for pinnipeds] in the Rehabilitation Facility Standards) would ensure that veterinarians and other personnel have the appropriate knowledge and experience to properly care for and treat marine mammals. An attending veterinarian would be required to work with staff at all rehabilitation facilities and be involved in making decisions regarding medical care and husbandry of current and incoming animals. Veterinary care standards, including recommended standards, are described under mitigation in Section 5.2.3.

Standards for open ocean/bay net pens reduce the probability of disease transmission to other healthy animals in the pens or the wild population and ensure that good water quality would be maintained. Even with these standards, adverse impacts from the use of net pens may occur. Animals in net pens are still exposed to conditions that cannot be controlled, such as water temperature, HABs, and the elements. The recommended placement of net pens may not always be feasible due to geography, currents, proximity to protected areas, or proximity to economic interests (*e.g.*, aquaculture). The use of temporary pools may adversely affect animal health. Proper water quality and temperature may not be maintainable and disease transmission may occur if more than one animal is housed in a pool. Animals in outside temporary pools would also be exposed to the elements.

Under this alternative, modification of rehabilitation activities could occur. Rehabilitation activities may change with improvements in technologies, techniques, and other aspects of marine mammal medicine. These new activities would have impacts similar to, or less than, those currently conducted. The closure of rehabilitation facilities is also included under modification of activities. Animals being held at a facility would be transferred to the nearest available rehabilitation facility in the region. Impacts from the transfer of animals would include handling, lifting, restraint, and transport. Impacts from handling, lifting, and restraint are the same as those described under Alternative C2.

During transport, cetaceans may overheat (hyperthermia) or develop hypothermia during transport. Body surfaces may be exposed to the drying effects of air. Improper transport of cetaceans may cause abrasions, pressure necrosis, thermoregulatory problems, and respiratory problems. Muscular stiffness may occur from transport, but most accepted transport methods try to minimize or avoid this entirely. Stiffness would disappear within a few hours to a few days, unless there was permanent

muscle damage (Antrim and McBain 2001). Animals may also be knocked around, causing muscle damage or they may inhale exhaust fumes.

4.2.3.4 Alternative C4

Under Alternative C4, new SAs would be issued, rehabilitation activities would continue, and the final Rehabilitation Facility Standards would be implemented. The rehabilitation of threatened, endangered, and rare animals would be required and the rehabilitation of other animals would be optional. The effects on marine mammals from rehabilitation activities under this alternative would be the same as those described under Alternative C2. No effects on protected and sensitive habitats, SAV and macroalgae, sea turtles, fish, shellfish, other invertebrates, or birds would be expected to occur from rehabilitation activities under this alternative. The effects on marine mammals would be the same as those described under Alternative C3.

Adverse impacts would also be expected for animals that are not rare, threatened, or endangered. Rehabilitation of all other animals would not be required, but would be optional depending on facility resources. Animals not taken into rehabilitation would be euthanized on the beach. These animals often serve as models for other species and provide valuable information that could be used during rehabilitation. For example, through the treatment and care of California sea lions (a commonly stranded pinniped along the West Coast) husbandry practices have been refined and are used to the benefit of Steller sea lions (a threatened species), including nutrition; stress reduction; animal monitoring; and veterinary techniques including drugs, sedatives, and anesthetics. Similarly, rehabilitation practices refined on Northern fur seals from the non-listed San Miguel stock off the California coast benefit Northern fur seals from the depleted Eastern Pacific stock, as well as endangered Guadalupe fur seal. Information obtained from California sea lions regarding impacts of disease and environmental conditions, such as domoic acid, provide valuable data regarding food web transfer and exposure routes, possible treatment options, and population-impacts. Due to similar physiology, much of this information may be extrapolated to other otariid species including Steller sea lions and Northern fur seals to determine how these animals may be exposed (via the food web) and affected, as well as treated. In addition, animals from the “common” species are frequently placed with rare, threatened or endangered animal to provide adequate non-human socialization. Absence of common animals, and lack of experience treating them, would lead to difficulties in adequately treating rare, threatened and endangered species. This would be an indirect adverse affect on rare, threatened, and endangered species.

4.2.4 Release of Rehabilitated Animals Alternatives

During the public comment period, particular concerns were raised regarding the release of rehabilitated ices seals in Alaskan waters. In response to these concerns, which raised issues both related to potential impacts on biological resources (conspecifics or other wild ice seal populations) and potential effects on cultural resources for subsistence harvest of ice seals, several of the alternatives would adopt mitigation measures to minimize the potential for disease transmission from rehabilitated ices seals, as described in Section 5.2.4 of this PEIS.

4.2.4.1 Alternative D1- No Action

Under Alternative D1, current SAs would expire, stranding response and rehabilitation would cease, and there would be no animals to release. All marine mammals brought in for rehabilitation would remain in captivity or be euthanized. This alternative would reduce potential impacts on wild populations, as there would no longer be the risk of introducing a diseased animal that could potentially infect other marine mammals. However, it would eliminate the potentially beneficial effects of returning animals to the wild population. No effects on protected and sensitive habitats, SAV and macroalgae, sea turtles, fish, shellfish, other invertebrates, or birds would be expected to occur from release activities under this alternative.

4.2.4.2 Alternative D2- Status Quo

Under Alternative D2, current release activities would continue, adaptive changes to release activities would not be permitted, and the final Release criteria would not be implemented. Minor, short- and long-term adverse effects on protected and sensitive habitats, SAV and macroalgae, sea turtles, fish, shellfish, and birds could occur from release activities under this alternative. Spills of hazardous materials or wastes from release vessels could impact these resources. Some materials could be diluted quickly by currents, only causing temporary impacts but others could linger in the water column or adhere to sediment particles, causing slightly longer impacts on sensitive habitats, SAV, and macroalgae. Hazardous materials could injure or kill sea turtles or marine mammals in the vicinity of a spill. Equipment used for beach release activities could leak oil or other materials into sand and nearshore waters. Sea turtles and birds could be injured and their nests may be damaged. These materials would likely be flushed out and/or diluted rapidly, causing a minor, short-term impact to sensitive habitats, SAV and macroalgae, fish, shellfish, and other invertebrates.

As required under regulations at 50 CFR 216.27, all animals would be tagged or marked prior to release. Commonly used methods of tagging delphinids include freeze branding on or below the

dorsal fin (both sides of the body) and/or the attachment of a roto-tag (cattle ear tag) to the dorsal fin. Freeze branding may cause little or momentary pain during application, which would require 15-20 seconds per brand. Initial discomfort or pain would be relieved by the appropriate anesthetic or analgesic. Discomfort may persist for some time after the procedure, but is expected to be minor. Therefore, impacts would be considered negligible and not significant. However, liquid nitrogen could spill onto an animal during the process, causing more than momentary pain. During the attachment of the roto-tag, pain would only last during the application, and sedatives or local anesthetic would be used. However, the tag site could become infected, causing pain to the animal. When the tag is shed, tissue damage may occur and the site could become infected. NMFS must be contacted if other additional tagging methods may be used, including radio, satellite, or microchip (Passive Integrated Transponder [PIT] tags) (see Section 4.2.6.2 for impacts from other tagging methods). For cetaceans other than delphinids, NMFS must be contacted to determine the appropriate identification method(s).

Pinnipeds would be given flipper tags (roto-tags), with placement dependent on the species. Tags would be attached to the hind flipper of phocids and the foreflipper of otariids (Geraci and Lounsbury 2005). Flipper tagging would cause temporary pain during attachment and the tag site may become infected. The tag may also be ripped out and the site could become infected. Animal movement may prolong or prevent healing by producing repetitive stress on the wound. Additional tagging may include radio, satellite, or microchip (PIT) tags with a variety of attachment methods (see Section 4.2.6.2 for impacts from other tagging methods).

Tagging allows an individual animal to be monitored after being released and evaluate its success in returning to the wild (Lander *et al.* 2001). If released animals appear to be compromised (*e.g.,* not feeding, ill, or interacting with people) based on tag data, animals could potentially be recaptured for further rehabilitation or permanent captivity. This would be beneficial to the individual animal and may also protect the wild population by preventing disease transmission or transfer of negative behaviors, such as human interaction. Conversely, if the tag data indicates that the animal is behaving "normally" (diving to depths indicative of feeding, swimming in normal patterns, in geographic association with other animals of the same species, avoiding people), the rehabilitation may be deemed a success, and the tag can provide basic biological data about the animal and species. For instance, the first rehabilitation and release of a Risso's dolphin occurred at the Riverhead Foundation for Marine Research and Preservation in New York (DiGiovanni *et al.* 2005). After release, this animal was tracked for 67 days. Aerial over flights showed that it was in the vicinity of other Risso's

dolphins and that it was diving up to a maximum of 600 m depth for a maximum duration of 15 minutes. This rehabilitation effort was deemed to be a success, based on this follow-up information. This is also some of the first information that has been collected on a free-ranging Risso's dolphin, so it is beneficial to basic scientific inquiries about marine mammals. For some marine mammal species, particularly those that are offshore or cryptic, tagging may be the only way to monitor these animals and gather necessary life history data (Wilson and McMahon 2006). Over time, data may be collected from a significant number of released animals (particularly those that commonly strand) that can provide population-level insights into species movement and behavior patterns.

Tagging and post-release monitoring is also beneficial in the evaluation and improvement of response, rehabilitation, and release procedures. For example, cetaceans that mass strand in the Northeast U.S. (particularly Cape Cod) are not typically rehabilitated, and are either euthanized or refloated and released off the beach. While animals that are pushed out are not generally observed restranded in the area, their ultimate fate has been unknown. Recently, satellite transmitters were deployed on two beach-released Atlantic white-sided dolphins that were part of separate mass stranding events (Rice and Cooper 2005). Both animals were tracked for over 30 days, and the tracks indicated survivorship as well as vigorous swim and dive behavior following return to offshore habitats. Some studies are also being done on classes or groups of animals that strand due to a common etiology (cause), such as domoic acid in California pinnipeds. California sea lions that have been deemed successfully rehabilitated (passed all of the pre-release screening tests) have been tracked post-release and determined to have long-term medical and behavioral problems that persist from the domoic acid intoxication, including seizures, disorientation, isolation, and not reacting to approach from humans and dogs (Thomas and Harvey 2005). Several animals restranded, and the behavior of others made survivability questionable. As a result, rehabilitation decisions are being re-examined for this and other species, including the definition of a "successful" rehabilitation.

Transport of animals to release sites could cause stress or injuries to an animal. During transport to the release site, animals may overheat in direct sun and heat without protection. Cetaceans may overheat (hyperthermia) or develop hypothermia during transport. Body surfaces may be exposed to the drying effects of air. Animals may also be knocked around, causing muscle damage or they may inhale exhaust fumes. Improper transport of cetaceans may cause abrasions, pressure necrosis, thermoregulatory problems, and respiratory problems. Muscular stiffness may occur from transport, but most accepted transport methods try to minimize or avoid this entirely. Stiffness would disappear

within a few hours to a few days, unless there was permanent muscle damage (Antrim and McBain 2001).

The release of pinnipeds on rookeries or haul-out sites could disrupt other animals. When pinnipeds are startled and disperse from rookeries, pups may be trampled or abandoned. Juvenile and adult animals may be trampled during stampedes or injured on underwater rocks and cliff faces.

Animals deemed releasable after rehabilitation would be returned to the wild, which may have a positive or negative impact on marine mammal populations. Without the use of release criteria, animals that are not medically, developmentally, or behaviorally cleared for release could be released. Releasing unhealthy animals could increase their pain and suffering. An animal that is not healthy or has behavioral issues could re-strand or die, which would counteract the care it received in rehabilitation. Animals that are not healthy could transmit diseases to wild populations (Cunningham 1996, Measures 2004). An animal that is not behaviorally ready for release may not have the skills needed to survive in the wild. The animal may not be able to forage or avoid predators. An animal may have abnormal breathing and may be unable to swim or dive properly. Animals with behavioral issues could also approach, interact, and be aggressive with people, creating hazard to themselves and public safety.

4.2.4.3 Alternative D3- Preferred Alternative

Under Alternative D3, new SAs would be issued, release activities would continue, adaptive changes to release activities would be permitted, and the final Release criteria would be implemented. Effects on protected and sensitive habitats, SAV and macroalgae, sea turtles, fish, shellfish, birds, and marine mammals from release activities under Alternative D3 would be the same as those described under Alternative D2, except for the impacts on marine mammals. Beneficial effects would be expected for marine mammals because the release criteria would be implemented and adaptive changes would be permitted.

Under the release criteria, animals would be medically cleared by the attending veterinarian and their assessment team before a release determination is made. The medical assessment would include a hands-on physical examination and a review of the animal's complete history, diagnostic test results, and medical and husbandry records. These procedures would minimize the risk of disease introduction or transmission to the wild population.

Animals would also be developmentally and behaviorally cleared before release occurred, enhancing their chance for survival. Developmental clearance would ensure that the animal has attained a sufficient age to be nutritionally independent, including the ability to forage and hunt. Behavioral clearance would include an assessment of an animal's breathing, swimming, diving, locomotion on land (pinnipeds) foraging, and hunting abilities. An evaluation of an animal's visual and auditory functions would be conducted. For cetaceans, any behavioral conditioning would be eliminated prior to release such that the association of food rewards with humans is diminished.

An animal that has recovered from an infectious disease would be released near its original stranding site, when feasible, in order to minimize disease risks to the wild population. NMFS must be consulted when an animal cannot be released near their original stranding site to determine a preferred release site.

Adaptive changes would allow the use of new procedures and technology, such as tags and telemetry packages. New tags and telemetry packages would likely be smaller in size and weight and less invasive than those currently used. Impacts from these new activities would be similar to, or less than, those impacts described under Alternative D2 for current tagging activities. The release criteria may change as new information and data are obtained from released animals and as improvements are made in marine mammal medicine. New procedures and technologies may also increase the success of a release and the survival of an animal.

4.2.5 Disentanglement Alternatives

4.2.5.1 Alternative E1- No Action

Under Alternative E1, there would be no disentanglement network. No significant effects on protected and sensitive habitats, SAV and macroalgae, sea turtles, fish, shellfish, or birds would be expected to occur from Alternative E1. However, gear on an entangled animal may be shed and become marine debris, which could potentially harm biological resources. The amount that may be shed would be negligible compared to the amount of gear already in the ocean.

Lines and gear may cause serious injuries to animals and restrict their ability to move, dive, and feed. If an animal cannot free itself from the entangling material it would most likely die. Without disentanglement efforts, animals would likely suffer a slow, painful death. North Atlantic right whales would be greatly affected if disentanglement efforts ceased, as entanglements are known to be a significant source of mortality. The best estimate of the size of the North Atlantic right whale

population is a range of 300 to 350. Although other population size estimates are available, the most recent Stock Assessment Report (Waring *et al.* 2007) indicates that the best estimate minimum population size for the species is 313 individually-recognized whales known to be alive in 2002. Recent models indicate that this population is likely declining, rather than remaining static or increasing (Caswell *et al.* 1999). The loss of one individual, especially a reproductively healthy female, would be a major impact on the species. For biological reasons, the number of reproductive-age females is more essential to a species' ability to maintain itself or grow than the number of males. Humpback whales and other large endangered whales would also be negatively affected if disentanglement activities ended.

4.2.5.2 Alternative E2- Status Quo

Under Alternative E2, the disentanglement network would continue the current activities with no modifications or new members added. Minor, short-term adverse effects on protected and sensitive habitats, SAV and macroalgae, sea turtles, fish, shellfish, other invertebrates, and birds could occur from this alternative. Spills of hazardous materials or wastes from vessels could impact these biological resources. Some materials could be diluted quickly by currents, only causing temporary impacts. Other materials could linger in the water column or adhere to sediment particles, causing slightly longer impacts. No impacts would be expected to occur during pinniped disentanglements on land.

Under Alternative E2, the disentanglement network would continue to disentangle or attempt to disentangle animals. Removal of life-threatening gear would not only increase the chance of survival for the individual animal, but would have a positive impact on those species that are threatened and endangered. These activities pose minimal adverse and significant beneficial impacts to the entangled animal.

Minor adverse effects on marine mammals could occur during disentanglement activities. Takes of entangled animals would occur during close approaches by aircraft (to locate entangled animals or for photo-identification) or by vessel (for documentation, general assessment, photo-identification, and disentanglement attempts). Incidental takes from close approaches are likely if other animals are in the vicinity of the entangled animal. Aerial surveys to locate entangled animals would be of a short-duration and aircraft would circle at an altitude ranging from 300-1,000 ft (91-305 m) above the animal. Harassment of marine mammals could occur if the aircraft operated below a certain altitude. Aerial surveys may cause an animal to change its behavior, such as diving rapidly. However, this

change in behavior would be short-term, with a minimal effect on the animal. Responders have reported that whales they have encountered have not exhibited evasive behavior in response to aerial approaches for the purpose of photo-identification and basic sighting data.

Animal reactions to close approaches may include swimming faster, breaching, diving, tail and fin slapping, or moving away from the vessel. Responders have reported that some whales encountered for assessment and documentation have not exhibited evasive behavior. Whales encountered closely (within 30 m) for the purpose of tagging and disentanglement efforts did exhibit evasive behavior in response to vessel approaches. These behaviors would generally be short-term, with a minimal effect on the animal. Response of the entangled animal to disentanglement attempts depends upon the species. Humpback whales are relatively easy to handle, especially if they have been entangled for a prolonged period of time. Experience has indicated that humpbacks are unlikely to be evasive or aggressive during disentanglement efforts, however there are always exceptions. Right whales tend to respond with aggressive behavior and are uncooperative. To decrease reactions from animals, approaches would be slow and from the side or behind, with minimal noise. Standby vessels maintain some distance to minimize potential whale disturbance.

During attempts to physically restrain whales, floats, buoys, and control lines would be attached. Right whales have been known to tow numerous floats and drag moderate-sized vessels. Physical restraint of the animal may increase stress or pain. Physical restraint of a pinniped may also cause injuries or death. Chemical restraint may lower a free-swimming whale's respiratory rate, slow their breathing, and decrease their swimming strength. Sedatives may be delivered through a blow-dart style syringe, which may startle the animal and cause it to react. Chemical restraint of a pinniped may initiate the dive reflex, which would include breath holding, slowing of the heart rate, and the pooling of blood from peripheral vessels. The short-term effects from physical and chemical restraints would be outweighed by the potential beneficial outcomes.

Potential injuries may occur when cutting line and gear off the animal. Unintentional injuries may occur as an animal moves while cutting or if control of the equipment is lost. Responders may intentionally injure an animal, when no options to safely remove gear exist and only after consideration of the possible damage. The potential for a positive outcome outweighs the short-term effects of these injuries. Potential injuries could also occur if there are hazardous material spills from vessels, including stand-by vessels, during disentanglement activities. These occurrences could cause injury or death to marine mammals in the vicinity.

During large whale disentanglement, biopsy sampling may occur via remote dart. Animal reactions to remote biopsy darting are discussed under Section 4.2.6.2, biopsy sampling. Responders report that while there is typically a low level of evasive response to the close approach for the biopsy sample, there have not been obvious reactions to the biopsy dart itself. Samples of skin or other tissue may be recovered from removed fishing gear and would have no impacts on animals.

During small cetacean disentanglement, the animal typically must be captured utilizing in-water capture techniques, such as encirclement via hoop net, followed by physical restraint. Additional animals may be captured or harassed during the rescue attempt. During pinniped capture and disentanglement activities, non-entangled animals may be disturbed off a haul-out site.

Potential adverse effects could occur, as the addition of new network members would not be allowed. Without the addition of new members, entangled animals may not be responded to, decreasing their chance of survival and increasing their pain and suffering. Modifications are not allowed, including new techniques and tools which could increase the success of disentanglement. Guidelines and training prerequisites which are currently utilized on the East Coast would not be implemented nationwide, which may mean inexperienced people could be conducting disentanglement activities on the West Coast. This would likely increase risks to already vulnerable entangled animals and the surrounding environment, as well as decrease the success of a disentanglement attempt.

4.2.5.3 Alternative E3- Preferred Alternative

Under Alternative E3, the disentanglement network would continue the current activities on the East Coast with modifications to the West Coast network. The disentanglement guidelines and training prerequisites would be implemented. Effects on protected and sensitive habitats, SAV and macroalgae, sea turtles, fish, shellfish, and birds from Alternative E3 would be the same as those described under Alternative E2. Effects on marine mammals from close approaches, physical restraint, chemical restraint, and cutting of lines would be the same as those described under Alternative E2.

Major, long-term beneficial effects on marine mammals would be expected under Alternative E3. The disentanglement network would continue to disentangle or attempt to disentangle whales. Removal of life-threatening gear would not only increase the chance of survival for the individual animal, but would have a positive impact on those species that are threatened and endangered. New members could be added to the network which would increase the number of animals responded to. Guidelines and training prerequisites would be implemented nationwide, helping ensure that only

experienced and qualified individuals are engaged in disentanglement activities. This would likely increase the success of disentanglement and decrease the potential risk to entangled animals and the surrounding environment.

Disentanglement activities may be modified under this alternative, as new techniques and tools are developed. New tools may include safer, more effective cutting instruments and new telemetry buoys. Chemical and physical restraint techniques may be improved, including the administration of sedatives and the attachment of buoys, floats, and control lines. These new activities would have impacts similar to, or less than, those currently used during disentanglement activities.

4.2.6 Biomonitoring and Research Activities Alternatives

4.2.6.1 Alternative F1- No Action

Under Alternative F1, biomonitoring and research activities would not occur. No effects on protected and sensitive habitats, SAV and macroalgae, sea turtles, fish, shellfish, or birds would be expected to occur from Alternative F1. Both beneficial and adverse effects on marine mammals would be expected. Biomonitoring and research activities would end and therefore takes of marine mammals would also end. This would be beneficial to animals, as they would no longer experience any negative impacts from these activities. However, without these research activities, important health and exposure data on marine mammal populations would no longer be collected. This would limit information on exposure of marine mammals to chemical and biological toxins. It would also hinder some research on the adverse health effects of toxin exposure for marine mammals and would restrict investigations into factors for UMEs. This could impede future conservation and management actions and ultimately result in detrimental impacts on marine mammal populations, especially those that are threatened and endangered.

4.2.6.2 Alternative F2- Status Quo

Under Alternative F2, the new ESA/MMPA permit would continue the current biomonitoring and research activities. Potential minor, short-term, adverse effects on all biological resources could occur from vessel and vehicle uses. Spills of hazardous materials or wastes from vessels could impact biological resources. Some materials could be diluted quickly by currents, only causing temporary impacts. Other materials could linger in the water column or adhere to sediment particles, causing slightly longer impacts. Equipment used during beach research activities could leak oil or other materials into sand and nearshore waters during beach releases. These would likely be small amounts that would be flushed out and/or diluted rapidly, causing a minor, short-term impact. However, all of

these impacts would be negligible when compared to other inputs of hazardous materials from vessels, sewage outfalls, runoff, industrial operations, and other beach vehicle uses.

Potential minor, short-term, adverse effects on protected and sensitive habitats could include damage from vessels or researchers in the water or on the beach. Coral reefs and other habitats may be damaged from contact with a vessel or a person.

Negligible, short-term adverse effects on SAV and macroalgae could occur during research activities. Vessels used during research activities conducted in shallow waters may damage SAV and macroalgae with their propellers. Vessel operators would be aware of this potential impact and would avoid these areas, where feasible. Any damage to SAV and macroalgae would be negligible and short-term, as only a minimal amount would be disturbed and would grow back.

Minor to major, short- and long-term effects on sea turtles could occur during research activities. Activities conducted on beaches could disrupt nesting sea turtles or damage their nests.

Minor, short-term adverse effects on coastal and marine birds could occur during research activities. The close approach by vessels or aircraft, the use of equipment, or the presence of researchers on beaches could disturb birds nesting or roosting in trees or small bushes, and may cause them to temporarily leave the area. Ground nesting birds could be adversely affected by research activities. Equipment could crush nests and research personnel could disturb or damage a nest. Research conducted in nearshore waters could disturb foraging birds. This impact would be minimal and temporary, as birds could forage in nearby areas and would likely return once research activities ended.

Beneficial and adverse effects on marine mammals would be expected to occur from Alternative F2. Indirect beneficial effects would occur because valuable information on marine mammals and marine mammal health trends would be collected. This information would be used to understand stranding events, UMEs, and basic biological processes. Under this alternative, new research activities could not be conducted. This would limit the ability to collect information in areas not currently studied or to utilize new technologies and techniques during research activities. This would likely have a negative impact on marine mammals.

Adverse effects on marine mammals from biomonitoring and research activities would be expected to occur under this alternative. Takes of marine mammals would occur from close approaches, euthanasia, capture and restraint, tagging, marking, and biological sampling. General methodologies

used for biomonitoring and research are described in Appendix H and their impacts are described below. The numbers of estimated takes are listed in Appendix I.

Close Approach, Vessel and Aerial Surveys. Takes of animals would occur during close approaches by vessel or aircraft. Close approaches would occur during numerous research activities such as health assessment, biopsy sampling, breath sampling, tagging, photo identification, and collection of sloughed skin and feces. Incidental takes of non-targeted animals, including USFWS species, from close approaches are likely if they are in the vicinity of the targeted animal(s). Reactions from cetaceans may include swimming faster, breaching, diving, tail and fin slapping, or moving away from the vessel. Cetacean reactions to aerial surveys depend on the aircraft's altitude, length of pass, and species or individual behaviors. Approaches to marine mammals below certain altitudes may harass marine mammals and cause a change in behavior, or elicit behaviors, such as diving rapidly. Behaviors in response to close approaches by vessel and aircraft would generally be short-term, with a minimal effect on the animal or the population.

Pinniped reactions to vessels and aircraft are highly variable, depending on the species (Calkins and Pitcher 1982). In Steller sea lion studies, reactions ranged from none to complete and immediate departure from the haul-out site. In most cases, the potential impact to the animal is limited to disturbance; with the animal remaining at the haul-out site. When pinnipeds are startled and disperse from rookeries, pups or young may be trampled or abandoned. Juvenile and adult animals may be trampled during stampedes or injured on underwater rocks and cliff faces. The incidence of stampedes in response to aerial surveys at specific altitudes is unknown. Disturbance from aerial surveys would be dependent on plane specifications, flight patterns, and the altitude.

Capture, Restraint, and Handling. Any capture and/or restraint procedure would likely have at least some short-term effect on the behavior or activities of marine mammals. The number of times an animal would be captured, the method(s) of restraint, as well as the age and general condition of the animal are all factors that would affect an animal's response to capture. Animals could incur contusions, concussions, lacerations, nerve injuries, hematomas, and fractures in their attempts to avoid capture or escape restraint (Fowler 1978). The stress response could change an animal's reaction to many drugs, including those commonly used for chemical restraint, which could have lethal consequences. Stress could also alter an animal's immune system. Stress from capture and restraint could cause capture myopathy, which occurs when an animal cannot cool itself (Fowler 1978). Capture myopathy is characterized by degeneration and necrosis of striated and cardiac

muscles and usually develops within 7 to 14 days after significant trauma, stranding, transport, or capture.

Potential effects from anesthesia used for chemical restraint are described above. Physical restraint of a pinniped, if not properly executed, may injure or kill an animal (*e.g.* suffocation under the weight of a handler). Mechanical restraint methods may pose some risk to pinnipeds. Excessive pressure is possible using squeeze cages, which may cause trauma or interfere with adequate ventilation. Restraint boards may use a hinged guillotine to secure an animal's neck, which could obstruct the airway (Gulland *et al.* 2001).

During health assessments animals could become entangled in the capture net, which may result in injuries or death. Animals may become stressed during handling and restraint. Signs of stress include reduced respiration, prolonged struggling while being held, and arching. During a health assessment study in St. Joseph Bay, FL (July 2006), a bottlenose dolphin became entangled deep in capture net and was found dead during the extrication of other dolphins from the net. Incidental takes of non-target animals, including USFWS species, are possible during capture activities. Animals may be accidentally captured in the net and could also become entangled in the net, which may result in injuries or death.

Tagging/Attachment of Scientific Instruments- Cetaceans. During research activities, tags will not be attached to large cetacean calves less than six months of age or females accompanying such calves. For small cetaceans, no tagging will occur on calves less than one year of age and mothers accompanying these animals would not specifically be targeted. However, they may be tagged if accidentally captured during health assessments. Tagging would include reactions to the close approach and the physical attachment of the tag. Reactions to close approaches are described above. Free-swimming cetaceans often react when hit by tags delivered by remote devices, such as tagging guns and crossbows. Cetaceans may also react when tags miss the animal and hit the water nearby. In most cases, the reactions of the remotely tagged animal and non-target animals last little more than a few minutes, after which behavior appears to return to normal (Watkins and Tyack 1991, Goodyear 1993, Hooker et al. 2001). The physical presence of a tag may lead to an alteration in the normal behavior of tagged animals, including a temporary disruption of feeding or mating activities. The hydrodynamic drag created by the presence of the tag on the animal should not cause an adverse impact. The proportion of the hydrodynamic drag from the tag package to the animal's size and weight is such that the energetic demand on the animal would likely be insignificant. Potential adverse effects would be minimized by using the smallest possible instrument package and the

smallest spear tip practicable. Therefore, animal disturbance would only occur during the close approach and the moment of attachment.

Suction cup tagging procedures have been analyzed by NMFS PR1 in several environmental assessments (EAs) and biological opinions, where findings resulted in no significant impact on the animals (NMFS 2004). The possibility of injury to an animal comes from the remote risk of the suction cup landing in or striking a sensitive part of the animal, such as the eye, mouth, or blowhole. However, given the skills of the experienced researchers, this risk would be minimal or non-existent. The non-invasive nature of suction cup tags eliminates the threat of infection, but not inflammation. The suction cup would not remain attached to the whale for any significant length of time (typically not longer than 48 hours), and likely releases within a few hours. The animal can easily dislodge the tag by rolling, breaching, or rubbing. An animal could sustain injuries while trying to remove the tag by rubbing against the sea floor or other animals. The tag may migrate along the skin of the animal but would not cover the blowhole, as drag would move it away from the blowhole. The ease and speed with which some animals can remove a tag indicates that it is unlikely that an animal would endure long-term stress from the attachment. Vessel strikes pose a risk with suction cup tagging, as the animal must be followed for the duration of attachment. Vessels would be close to animals and may strike both target and non-target animals.

Implantable tags used on cetaceans have a greater potential for disturbance in application and would be more invasive that suction cup tags. Implantable tags typically penetrate the surface of the blubber layer. Tags generally work their way out of the blubber after weeks or months, but some new satellite tags may remain implanted for over a year (Mate *et al.* 2007). Disturbance of the animal would mainly occur during the close approach and attachment of the tag. Responses often seen include head lifts, fluke lifts, exaggerated fluke beats on diving, quick dives, or increased swimming speeds. Other observed responses include evasive swimming behavior, fluke slaps, head lunges, and decreased surfacing rates. Observations after tagging have shown that responses are short-term (Mate *et al.* 2007). These responses would not likely injure individuals. The implanted tag would not be expected to alter the behavior of the whale, particularly with regard to feeding, reproduction, or migratory behavior. Potential adverse effects are minimized by using the smallest possible instrument package, a smaller spear tip to minimize penetration into the blubber, and minimizing the velocity of the package at impact. Inflammation would be expected to occur after tag implantation and infection would be possible. There would be a low potential for an abscess or septicemia to occur after implantation. Post-tagging swelling or indentations may occur after the tags are lost, extruded,

or migrate out. However, there is no evidence that these swellings are signs of infection of the epidermis or poor health (NMFS 2006). A NMFS PR1 EA (NMFS 2006) states that past research and permit annual reports have shown that the chance of infection from the break in the epidermis from an implantable tag is likely to be extremely low and insignificant.

During health assessment captures, animals would be tagged with either a roto-tag or radio tag on the trailing edge of the dorsal fin. No tagging would occur on young of the year animals. Mothers accompanying these animals would not specifically be targeted. However, they may be tagged if accidentally captured so that they may be monitored and/or more readily identified and avoided for future net sets. The attachment of the roto-tag or radio tag would not be considered significant, as pain would only last during the application, and local anesthesia may be used. Little tissue damage to the trailing edge of the dorsal fin would occur when the tag is released.

For saddle tags, the saddle will be raised off the surface of the dorsal fin by inserting foam washers on the pins between the skin and saddle. This will allow for water flow and heat exchange to occur, minimizing any effects from placement on the dorsal fin. Spider tags could be ripped out of the blubber, causing pain and potential infection

Tagging/Attachment of Scientific Instruments- Pinnipeds. Tagging of pinnipeds would cause temporary stress during capture and restraint to attach or implant the tag. Invasive tags would cause temporary pain during attachment or implantation. Animal movement may prolong or prevent healing of flipper tags by producing repetitive stress on the wound. Infection of the wound site would be possible. The tag may pull out of the flipper during swimming or moving on a rookery or haul-out site. The site where the tag was could become infected. There is no quantitative information on the rate of infection caused by flipper tagging (NMFS 2004).

Effects associated with implanted tags may include excessive tissue reaction, infection, and subsequent rejection of implanted materials. Elephant seals had short reactions to PIT tag implants and there were no external signs of tissue reaction (Galimberti et al. 2000). For LHX tags, pain would not occur during surgery, as animals would be anesthetized. Animals may have post-operative pain and discomfort at the incision site. Animals would be held in captive observation for a period of time (6 to 10 weeks) to ensure proper wound healing and the absence of complications. If necessary, animals may be treated with appropriate antibiotics and/or analgesics if an infection or pain occurs. LHX tags have been used in sea otters for over 20 years, and the typical reactions, both behaviorally

and physically, to the tag are innocuous (Lander et al. 2001). LHX tags were implanted into rehabilitated California sea lions with no short- or long-term effects noted (Horning and Hill 2005).

Attachment of scientific instruments to pinnipeds may have both short- and long-term adverse effects, in addition to the effects of capture and restraint. Possible short-term impacts can include a reduction in foraging activity or an increase in grooming, at the expense of other behaviors (Kenward 1987). These types of impacts would likely be present after most tagging events and may be as much a delayed result of the capture and handling as of the tag's presence. Some pinnipeds fitted with crittercams reacted during deployment (tagging) and for a short period after deployment. Few pinnipeds exhibited curiosity about the crittercam or had aggressive reactions toward it for short periods (Marshall 1998). The hydrodynamic drag created by the instrument could exert an additional energetic demand on an animal. Over time, this drag may result in reduced foraging success, increased metabolic load, and stress to the animal.

The attachments of instruments to the hair with epoxy should not cause pain if done properly. However, it may result in discomfort if the placement of the instrument causes pulling of the hair or skin during animal movement. In addition, if the ratio of resin and hardener is not correctly measured, the resulting heat-producing reaction could burn the animal's skin and pelage (Lander et al. 2001). Both the resin and hardener could cause skin irritation, resulting in itching, rashes, hives, and dermatitis. The instrument could be knocked or torn off, pulling out hair and possibly some of the underlying skin, which would then be open to infection.

Marking. Freeze branding may cause little or momentary pain to cetaceans during application, which would require 15-20 seconds per brand (typically six brands per animal). Initial discomfort or pain would be relieved by the appropriate anesthetic or analgesic. Discomfort may persist for some time after the procedure, but is expected to be minor. Potential discomfort or pain would be relieved by the appropriate anesthetic or analgesic. Therefore, impacts would be considered negligible and not significant.

Marking pinnipeds with paint applied remotely using a paint gun may stun an animal and cause momentary stress and a startle reaction. If the target animal is hit or missed, other non-target animals may be temporarily disturbed. Capturing and restraining animals for marking with paint, bleach, or dye would likely involve more stress than remote marking and may cause incidental disturbance of nearby animals. A pinniped may also be marked by gluing a tag to their fur. The epoxy could cause burns, skin irritation, or an allergic reaction. Infection would be possible if the tag was torn off.

Biopsy Sampling. The effects of close approaches needed to conduct biopsy sampling are discussed above. A careful approach generally elicits, at most, a minimal and short-lived response from whales; even those subjected to invasive biopsy procedures (NMFS 1992). A NMFS PR1 EA (NMFS 2004) concluded that, based on existing data and published research, biopsy sampling on large cetaceans (via crossbow, compound bow, dart guns, or pole spears) would not have long-term adverse effects on the target species. Published research has shown that short-term effects of biopsy darting on cetaceans would be startling or momentarily painful to the animal. No evidence of infection at the sight of penetration or elsewhere has been seen among whales resighted in days following biopsy sampling (NMFS 1992).

Minke, fin, blue, and humpback whales showed no behavioral reactions to about 45 percent of successful biopsies, taken with punch-type tips fired from crossbows (Gauthier and Sears 1999). Behavioral responses in the remainder of the biopsies ranged from tail flicks, hard tail flicks, submerging below the water surface, or some combination of these responses. Most individuals of these species resumed their normal behavior within a few minutes of the sample collection. A study by Clapham *et al.* (1993) noted that studies on biopsy procedures showed no evidence of short- or long-term significant impacts on cetaceans.

Surgical biopsy sampling of epidermis and blubber also occur during health assessment captures. Animals may exhibit signs of stress due to capture and restraint, as discussed above. Animals may experience momentary pain during the administration of local anesthesia. In rare occurrences, the biopsied area may become infected. Animals may have some soreness or pain with healing, but other adverse impacts would not be expected from blubber biopsies (Wells *et al.* 2005).

Effects of skin and blubber biopsy samples on pinnipeds would include the effects of the capture and restraint necessary for obtaining these samples are described above. In addition, there would be the potential for an infection after any of these procedures, given the unsanitary environment of rookeries. Healthy animals should be able to heal and recover from a properly performed procedure. Animals with compromised immune systems may develop major complications. The procedures may also cause more than momentary pain.

Blood Sampling. The risks of blood collection would be largely incidental to capture and restraint. Multiple attempts to obtain a blood sample would not only be stressful and cause some degree of pain; they may result in damage to the vein, clotting, and an abscess. Removing a volume of blood

too large relative to the animal's mass and ability to replace the amount can result in fatigue, anemia, weakened immunity, and problems with clotting.

Breath Sampling. Breath sampling activities on free-swimming cetaceans would include close approaches by vessels. Impacts from close approaches are described above. The use of the extended pole and the quick physical contact of the vacuum cylinder may affect an animal. The reaction of cetaceans to physical contact for breath sampling has not been adequately studied. However, the contact of the apparatus on animals is very brief, lasting only a few seconds. This physical contact is not likely to disrupt the behavior of marine mammals and would not have a significant effect on an individual.

Ultrasound Sampling. Ultrasound sampling activities on free-swimming cetaceans would include close approaches by vessels. Impacts from close approaches are described above. The use of the extended pole and the quick physical contact of the ultrasound device may affect an animal. The reaction of cetaceans to physical contact for ultrasound sampling has not been adequately studied. However, the contact of the apparatus on animals is very brief, lasting only a few seconds. This physical contact is not likely to disrupt the behavior of marine mammals and would not have a significant effect on an individual. Ultrasound sampling may occur on animals captured for other research. Impacts from capture and restraint activities are described above. Cetaceans may be sampled out of the water and improper body support could compromise cardiac and respiratory functions (Haulena and Heath 2001). Animals may overheat in direct sun and heat without protection and body surfaces may be exposed to the drying effects of air. The external ultrasound procedure itself would pose minimal to no risk of injury to an animal. Internal ultrasound procedures pose the risks of infection and perforation.

Tooth Extraction. Potential adverse effects from tooth extraction relate to the risks of capture, restraint, anesthesia, and the possibility of infection following the extraction. The procedure may result in more than momentary pain, which could temporarily interfere with foraging.

Other Sampling. Other sampling that could occur includes the collection of feces, swabs, sloughed skin, urine, and other bodily fluids. The close approach of free-swimming cetaceans to collect feces and sloughed skin would have a minor impact on the animals. The collection of pinniped feces may disturb animals on haul-out sites or rookeries. Animals may rapidly depart the area, which could result in injury or death. Skin swabs, feces, urine, and other bodily fluids may be collected from animals during health assessments. Potential adverse effects from this sampling would likely result

from capture and restraint and not from sampling itself. Efforts would be made to reduce the animal holding time.

Hair, Nails, and Vibrissae Sampling. Clipping hair, nails, and whiskers would not likely result in pain. The effects on the animal from clipping are probably incidental to the effects of capture and restraint. Pulling a whisker may cause more than momentary pain, due to the highly sensitive nature of the snout and because the hair bulb is surrounded by blood and neurons.

Administration of Drugs and Euthanasia. Delivery of anesthesia or sedation in marine mammals, especially pinnipeds, can be complicated by their anatomical and physiological specializations to life in the marine environment. Determining the proper dose is dependent on a fairly accurate assessment of the animal's weight and condition. Miscalculation of an animal's weight could lead to an overdose, which can have lethal consequences (Fowler 1986). Anesthesia or sedation may activate the dive reflex, which would include breath holding, slowing of the heart rate, and the pooling of blood from peripheral vessels. Phocids that have died as a result of anesthesia exhibited signs of bradycardia, tachycardia, hypoventilation, cyanosis, hyperthermia, and decreased peripheral perfusion (Haulena and Heath 2001). Other drugs that may be administered include antibiotics, antifungals, and analgesics. Potential adverse effects from all drugs include drug interactions, incorrect drug dosages, side effects, injuries, and death. Effects vary according to drug, dosage, animal, and method of administration.

Chemical euthanasia may be the most humane method available for marine mammal situations. Euthanasia may occur with an overdose of sedatives and anesthetics or with euthanasia drugs. Some euthanasia agents may cause hyperexcitability or violent reactions in animals. Intraperitoneal administration of a euthanasia solution may cause effects due to differential absorption, leading to the prolonged onset of action. It may also cause irritation in the surrounding tissues (Greer et al. 2001). Improper chemical euthanasia agents or methods of delivery may prolong the pain and suffering of an animal.

The correct use of ballistics to euthanize or humanely kill an animal would cause instantaneous unconsciousness, followed by respiratory and cardiac arrest or vice versa. Improper uses may not cause unconsciousness before death and would not be considered humane. During mass strandings, the use of ballistics may stress and exacerbate fear in the surviving animals, if they die in the vicinity. The use of ballistics and explosives require expertise for proper placement. Incorrect charge

placement may not cause instantaneous unconsciousness and may cause tissue destruction (Greer et al. 2001).

Exsanguination may occur when no other options are available, especially in cases of large whales after sedation with analgesics or anesthesia. It requires expertise in anatomical knowledge of the head and cervical spine, or the location and approaches to the heart. Prolonged pain and suffering would occur if done incorrectly. Exsanguination should never be done on a whale that was conscious and responsive (Geraci and Lounsbury 2005).

Auditory Brainstem Response (ABR)/Auditory Evoked Potential (AEP). Potential adverse effects from ABR and AEP procedures would be as a result of capture, restraint, and holding described above. The maximum sound levels presented would be lower than sound levels produced by animal whistles and echolocation clicks. Sounds may be quieter than those animals are normally exposed to on a daily basis. Therefore, impacts from the procedures themselves would not be considered significant. Short-term impacts, including inflammation and hyperemia, would be expected from the suction cups used to attach electrodes to the animal.

Diagnostic Testing and Analysis of Specimens. Diagnostic testing and the analysis of specimens would have no impact on marine mammals. Specimens would be archived in the NMMTB or other authorized laboratory and would not have any adverse impacts.

Import/Export of Marine Mammals or Marine Mammal Parts. Import and export of specimens would not have an impact on marine mammals. All specimens would be collected legally in the U.S. or other foreign countries and meet the other conditions required by the MMPA, and may be subject to additional requirements and evaluation under the Animal Welfare Act. Potential adverse effects of importing or exporting marine mammals in rehabilitation would be the result of restraint and transport. Handling, lifting, and moving an animal could cause injuries. Cetacean flippers may be crushed or overheat if stretchers do not have openings for them. Creases or seems may press into the skin, causing discomfort and possible injury. Transport of animals could cause stress or injuries to an animal. Depending on the mode of transportation, animals may overheat in direct sun and heat without protection. Animals may develop hypothermia and frostbite if transport occurs during freezing temperatures. Cetaceans may be exposed to the drying effects of air. Animals may also be knocked around in the vehicle or vessel or inhale exhaust fumes. Improper transport of cetaceans may cause abrasions, pressure necrosis, thermoregulatory problems, and respiratory problems. Cetaceans transported on airplanes are susceptible to the effects of high-altitude sickness. Most

impacts during transport would be minor and temporary and would end once the animal reached its destination.

The impacts of restraint and transport would also apply to import and export of permanently captive marine mammals (for instance, from a foreign public display facility) for health research purposes under the ESA/MMPA permit. However, the care and handling of captive animals falls under the purview of the USDA/APHIS. Any import/export activities for captive marine mammals would meet the conditions for import or export under the MMPA and would be subject to additional requirements and evaluation under the Animal Welfare Act.

4.2.6.3 Alternative F3- Preferred Alternative

Under Alternative F3, the new ESA/MMPA permit would be issued to include current and future biomonitoring and research activities. Effects on biological resources from Alternative F3 would be the same as those described under Alternative F2, with some exceptions for new research activities.

Passive Acoustic Recording. Passive acoustic recording would not have an adverse effect on marine mammals. The actual presence of the hydrophone in the water would not be expected to have any impact on marine mammals. A NMFS EA (NMFS 2004) noted that, on some occasions, researchers have noted instances of animals investigating the hydrophone. However there is no known documentation of the presence of a hydrophone, or a similar recording device, resulting in any adverse impact.

Active Acoustic Playbacks. Active acoustic playbacks would involve close approaches by one or more vessels and would have negligible adverse behavioral impacts on marine mammals, as described in Section 4.2.6.2. The source levels of the sounds produced under the proposed activities would be sufficiently low and produced at a large enough distance from the animal (minimum 100 m) to not result in levels that would be painful or overly disruptive to the animals. Previous tests indicate that sounds produced by these proposed playback equipment would be less powerful and attenuate more rapidly than other anthropogenic sources in the action area (*i.e.* cruise ships, fishing vessels, and large pleasure craft) (NMFS 2004). Incidental harassment of non-target animals (including USFWS species) is not likely, as the source levels of the sounds would be sufficiently low.

Cognitive Assessment of Sea Lions in Rehabilitation Suffering from Domoic Acid Intoxication. All methods used during the assessment will be low-impact and non-invasive, and no immediate or residual negative impacts on the animals are expected as a result of their participation in the study.

However, mortality rates are high for domoic acid exposed animals, so it is likely that a proportion of the subjects will die unpredictably during the course of the study. Based on the results of a previous 3-year study published in Goldstein et al. (2008) and in Zabka et al. (in press), it is expected that animals suffering from long-term effects of domoic acid will eventually die up to two years post exposure if they have extensive cardiac or hippocampal lesions that can result in cardiac conduction defects or seizures. Therefore, it is possible that as many as 50 sea lions may die during the cognitive assessment procedures as a result of permanent lesions due to domoic acid intoxication.

4.3 Water and Sediment Quality

This section evaluates the potential impacts on water and sediment quality as a result of the alternatives. Impacts on water and sediment quality are evaluated in context and intensity on a wide geographic scale. Therefore, while more significant impacts may occur in localized areas, the overall impact on the watershed, beach, coastline, ocean, etc. would be considered minor.

4.3.1 Stranding Agreements and Response Alternatives

4.3.1.1 Alternative A1- No Action

Under Alternative A1 stranding response from current SA holders would end once all agreements have expired. No effects on water and sediment quality would be expected to occur under Alternative A1, as stranding response activities would end.

4.3.1.2 Alternative A2- Status Quo

Under Alternative A2, the current SAs would be renewed and current stranding response activities would continue without the issuance of Final SA criteria. Minor, short-term adverse effects on water and sediment quality could occur under Alternative A2. Equipment used for transport could leak oil or other materials into sand and nearshore waters. This would likely be localized and flushed out and/or diluted rapidly, causing a minor impact. Tissue, blood, and other body fluids may contain euthanasia solution, other drugs, POPs, toxic metals, pathogens, and/or biotoxins. Chemical residues from euthanasia solution and other drugs persist in the carcass at different concentrations and for different amounts of time. They would not likely create an environmental hazard, as they would be broken down quickly and would not persist in the surrounding environment. Contaminants would also be localized and flushed out of the sand and groundwater by the tides and/or precipitation. Any contaminants entering the nearshore waters would be diluted quickly by the currents, and impacts would be minor and temporary.

Animals may also contain chemical residues from substances administered by stranding response personnel, including chemical euthanasia solution and sedatives. If the animal is a rehabilitated animal that has restranded, it may also contain antibiotics, antifungals, and other medicine. These chemicals persist in the animal at different concentrations and for different amounts of time. They would not likely create an environmental hazard, as they would be broken down quickly and would not persist in the surrounding environment.

4.3.1.3 Alternative A3

Under Alternative A3, SAs would be issued to any applicants after review, the new SA template would not be utilized, and the Final SA criteria would not be issued. Effects on water and sediment quality from stranding response activities under Alternative A3 would be the same as those described under Alternative A2.

4.3.1.4 Alternative A4- Preferred Alternative

Under Alternative A4, the Final SA criteria and the new SA template would be implemented and current and future stranding response activities would occur. Effects on water and sediment quality from stranding response activities under Alternative A4 would be the same as those described under Alternative A2.

4.3.1.5 Alternative A5

Under Alternative A5, the Final SA criteria and the new SA template would be implemented and response to threatened, endangered, or rare animals would be required. Effects on water and sediment quality from stranding response activities under Alternative A5 would be the same as those described under Alternative A2.

4.3.2 Carcass Disposal Alternatives

4.3.2.1 Alternative B1- No Action

Under Alternative B1, no carcass disposal would occur and carcasses would remain on the beach to naturally decompose. Carcasses left on the beach to naturally decompose would not cause an impact, unless the animal contained contaminants. Body fluids may contain POPs, toxic metals, pathogens, and/or biotoxins could seep into the sand beneath the animal or leach into groundwater and flow into nearshore waters. If contaminants enter groundwater, they would likely be flushed out quickly by tidewater and/or precipitation. The impact on water quality would likely be temporary and minor.

Sediment quality would not likely be impacted by contaminants, as they would be localized and flushed out or diluted before they could adhere to the substrate.

4.3.2.2 Alternative B2- Status Quo

Under Alternative B2, current methods of carcass disposal would continue. Potential effects depend on the method of carcass disposal and if the carcass was toxic from the use of euthanasia solution. Carcasses left on the beach to naturally decompose would not cause an impact, unless the animal had been chemically euthanized or contains contaminants. The evaluation of the potential toxicological environmental hazards posed by a decomposing carcass cannot be determined at this time (see Appendix J). Additionally, the types and levels of contaminants in a carcass are generally not known at the time of disposal because of the time delay in processing analytical lab tests. However, the remote potential does exist for decay products of carcasses to be released into the surrounding environment or recycled into the food web, with subsequent negative impacts. Chemical residues from euthanasia solution and other drugs persist in the carcass at different concentrations and for different amounts of time. They would not likely create an environmental hazard, as they would break down quickly and would not persist in the surrounding environment. Body fluids containing POPs, toxic metals, pathogens, and/or biotoxins could seep into the sand beneath the animal or leach into groundwater and flow into nearshore waters. If contaminants enter groundwater, they would likely be localized and flushed out quickly by tidewater and/or precipitation. Higher concentrations of contaminants may occur in nearshore waters down site from the carcass. These concentrations would be diluted and flushed out by the currents. The amount of time for contaminants to flush out of groundwater would depend upon the amount of precipitation, tides, and the permeability of the sand/sediment. The size and number of carcasses would also factor into the amount of time for contaminants to disperse. The impact on water quality would likely be localized, temporary, and minor. Sediment quality would not likely be impacted by contaminants, as they would be flushed out or diluted before they could adhere to the substrate.

Burial of carcasses could increase erosion, but this would be a negligible impact. The burial site would only be disturbed for a short-period of time and would be refilled with sand to match the surrounding ground level. Burial does not inactivate all pathogens in the carcass. Some carcasses may contain POPs, toxic metals, pathogens, and/or biotoxins; however the specific types and levels of contaminants are typically not known at the time of burial. As these carcasses decay, body fluids may leach into the sand and groundwater, potentially impacting the adjacent coastal waters and sediments. As described above, contaminants would be flushed out of groundwater and diluted in nearshore

waters by the currents. Carcasses containing euthanasia solution or other drugs would not likely persist in the environment. Impacts to water and sediment quality would be temporary and minor.

Disposal of carcasses at sea may negatively impact water and sediment quality. Carcasses of euthanized animals could release POPs, toxic metals, pathogens, and/or biotoxins into the water or food web during decomposition. However, the impact would be minor as the contaminants would dilute rapidly in the water. The material used to sink the carcass may have an adverse effect, if it could be considered a contaminant. However, Jersey (concrete) barriers would generally be used to sink a carcass and these would have no impact on water or sediment quality. Transport of the carcass offsite could temporarily increase erosion, due to the use of heavy equipment. This would be a negligible impact as equipment would only be used for a short time period (hours). Spills of hazardous materials or wastes from transport vessels could impact water and sediment quality. Impacts would be considered minor to major, depending on the material, size of spill, location, and/or vicinity of these resources. Some materials could be diluted quickly by currents, causing localized, temporary impacts. Other materials could linger in the water column or adhere to sediment particles, causing slightly longer but still localized impacts.

Heavy equipment or vehicles may be necessary to transport a carcass off-site. Equipment used to transport animals could leak oil or other materials into sand and nearshore waters during operations. These would likely be small amounts that would be localized, flushed out and/or diluted rapidly, causing a minor, short-term impact. Other materials could linger in the water column or adhere to sediment particles, causing slightly longer but still localized impacts.

Burial in a landfill would not create any negative impacts for non-toxic carcasses. If carcasses are known or assumed (based upon test results or prior knowledge of the species) to have contaminant levels that meet or exceed the local definition of hazardous waste, they would be taken to a hazardous waste landfill for proper disposal. Carcasses may be taken to a licensed rendering or incineration facility. Because the landfill, rendering, or incineration facilities have been previously licensed, all environmental impacts from these facilities have already been considered. Any impacts from these activities would be covered by the individual rendering or incinerating facility and their permits, not the MMHSRP or stranding network members.

4.3.2.3 Alternative B3- Preferred Alternative

Under Alternative B3, current methods of carcass disposal would continue with a recommendation to transport chemically euthanized animal carcasses off-site. The effects on water and sediment quality

under Alternative B3 would be the same as those described under Alternative B2. However, under Alternative B3, modifications may be made to carcass disposal activities. Currently, the potential toxicological environmental hazards posed by a decomposing carcass are not known. If and when this information becomes available, additional precautions (*e.g.*, removal of certain species carcasses from beaches) would be implemented, if necessary. These modifications would have a beneficial impact on water and sediment quality.

Composting may be added as a disposal method after on-going research is completed. By-products and finished products from composting a carcass would have little or no adverse effects on water and sediment quality or the surrounding environment (Mukhtar *et al.* 2004). Temperatures during the composting process are high enough to kill pathogens and breakdown contaminants and euthanasia solution (Geraci and Lounsbury 2005).

4.3.3 Rehabilitation Activities Alternatives

4.3.3.1 Alternative C1- No Action

Under Alternative C1, current SAs would expire, stranding response would end, and animals would not be taken into rehabilitation. No effects on water or sediment quality would be expected to occur under Alternative C1. Rehabilitation would no longer occur and therefore potential risks to water and sediment quality would be removed.

4.3.3.2 Alternative C2- Status Quo

Under Alternative C2, current rehabilitation activities would continue, but the final Rehabilitation Facility Standards would not be implemented. Minor adverse effects could occur under Alternative C2. Rehabilitation facilities that discharge directly to surface waters would have the required National Pollutant Discharge Elimination System (NPDES), state, and local permits for facility discharges. Any wastewater effluent discharged to a publicly owned treatment works (POTWs) would be required to meet municipal wastewater treatment standards and have any necessary effluent discharge permits under the Clean Water Act. Impacts from permitted discharges would already be accounted for under the respective Federal, state, and/or local regulations. Facilities discharging to POTWs would have a pretreatment plan in place if necessary, as POTWs do not remove toxic organics or metals.

Net pens could pose minimal adverse impacts to water quality because they are open to ocean and bay waters. Water and sediment near the pen would be exposed to any medicines, materials, or

equipment used in rehabilitation. There would also be an increase in pathogen and fecal exposure. Temporary pools would not have any means to treat effluent. Temporary pools could leak water containing wastes, pathogens, or other contaminants into the soil and groundwater. Temporary pools could also contaminate water and sediment when they are emptied, if the water is discharged into surface waters.

4.3.3.3 Alternative C3- Preferred Alternative

Under Alternative C3, new SAs would be issued, rehabilitation activities would continue, and the final Rehabilitation Facility Standards would be implemented. Effects on water and sediment quality from rehabilitation activities under Alternative C3 would be the same as those described under Alternative C2. However, under this alternative, modification of rehabilitation activities could occur. Rehabilitation activities may change with improvements in technologies, techniques, and other aspects of marine mammal medicine. Impacts on water and sediment quality from these new activities would be similar to, or less than, those currently conducted. The closure of rehabilitation facilities is also included under modification of activities. The closure of a rehabilitation facility would eliminate any potential adverse impacts on water and sediment quality

4.3.3.4 Alternative C4

Under Alternative C4, new SAs would be issued, rehabilitation activities would continue, and the final Rehabilitation Facility Standards would be implemented. Effects on water and sediment quality from rehabilitation activities under Alternative C4 would be the same as those described under Alternative C2.

4.3.4 Release of Rehabilitated Animals Alternatives

4.3.4.1 Alternative D1- No Action

Under Alternative D1, current SAs would expire, stranding response and rehabilitation would cease, and there would be no animals to release. No effects on water or sediment quality would be expected to occur under Alternative D1. Release of rehabilitated animals would not take place and there would be no risks to water and sediment quality.

4.3.4.2 Alternative D2- Status Quo

Under Alternative D2, current release activities would continue, adaptive changes to release activities would not be permitted, and the final Release criteria would not be implemented. Minor, short-term,

adverse effects on water and sediment quality could occur under Alternative D2. Release of rehabilitated animals would not intentionally generate any pollutants or disturb sediment. However, spills of hazardous materials or wastes from release vessels could impact water and sediment quality. Some materials could be diluted quickly by currents, causing temporary impacts. Other materials could linger in the water column or adhere to sediment particles, causing slightly longer impacts. Equipment to transport animals could leak oil or other materials into sand and nearshore waters during beach releases. These would likely be small amounts that would be localized, flushed out, and/or diluted rapidly, causing a minor, short-term impact. Other materials could linger in the water column or adhere to sediment particles, causing slightly longer but still localized impacts.

4.3.4.3 Alternative D3- Preferred Alternative

Under Alternative D3, new SAs would be issued, release activities would continue, adaptive changes to release activities would be permitted, and the final Release criteria would be implemented. Effects on water and sediment quality from Alternative D3 would be the same as those described under Alternative D2.

4.3.5 Disentanglement Alternatives

4.3.5.1 Alternative E1- No Action

Under Alternative E1, there would be no disentanglement network. No effects on water or sediment quality would be expected to occur under Alternative E1, as disentanglement activities would no longer occur.

4.3.5.2 Alternative E2- Status Quo

Under Alternative E2, the disentanglement network would continue the current activities with no modifications or new members added. Minor, short-term, adverse effects water or sediment quality could occur under Alternative E2. Disentanglement activities would not intentionally generate any pollutants or disturb sediment. However, spills of hazardous materials or wastes from disentanglement vessels could impact water and sediment quality. Some materials could be diluted quickly by currents, causing localized, temporary impacts. Other materials could linger in the water column or adhere to sediment particles, causing slightly longer but still localized impacts.

4.3.5.3 Alternative E3- Preferred Alternative

Under Alternative E3, the disentanglement network would continue the current activities on the East Coast with modifications to the West Coast network. Effects on water or sediment quality from Alternative E3 would be the same as those described under Alternative E2.

4.3.6 Biomonitoring and Research Activities Alternatives

4.3.6.1 Alternative F1- No Action

Under Alternative F1, biomonitoring and research activities would not occur. No effects on water and sediment quality would be expected to occur under Alternative F1. Biomonitoring and research activities would no longer occur and therefore potential risks to water and sediment quality would be removed.

4.3.6.2 Alternative F2- Status Quo

Under Alternative F2, the new ESA/MMPA permit would continue the current biomonitoring and research activities. Minor, short-term, adverse effects on water and sediment quality could occur under Alternative F2. Biomonitoring and research activities would not intentionally generate any pollutants or disturb sediment. Spills of hazardous materials or wastes from vessels or the loss of research materials overboard could impact water and sediment quality. Some materials could be diluted quickly by currents, only causing localized, temporary impacts. Other materials could linger in the water column or adhere to sediment particles, causing slightly longer but still localized impacts. Equipment used for beach research activities could leak oil or other materials into sand and nearshore waters. These would likely be small amounts that would be flushed out and/or diluted rapidly, causing a minor, short-term impact.

Any hazardous or non-hazardous wastes from laboratories used for diagnostic testing and analyses would be covered under those laboratories and their hazardous wastes and wastewater permits, not the MMHSRP.

4.3.6.3 Alternative F3- Preferred Alternative

Under Alternative F3, the new ESA/MMPA permit would be issued to include current and future biomonitoring and research activities. Effects on water and sediment quality from Alternative F3 would be the same as those described under Alternative F2.

4.4 Cultural Resources

This section evaluates the potential impacts on cultural resources as a result of the alternatives. Section 5.4 of this PEIS describes mitigation measures that would be taken to protect cultural resources under certain alternatives. These mitigation measures include contacting the appropriate SHPO prior to undertaking actions, such as carcass burial, in areas where there is a potential for submerged or buried cultural resources to be present.

4.4.1 Stranding Agreements and Response Alternatives

4.4.1.1 Alternative A1- No Action

Under Alternative A1 stranding response from current SA holders would end once all agreements have expired. No effects on cultural resources would be expected to occur from Alternative A1. Stranding response activities would end, removing any potential risk to cultural resources.

4.4.1.2 Alternative A2- Status Quo

Under Alternative A2, the current SAs would be renewed and current stranding response activities would continue without the issuance of Final SA criteria. The use of equipment and vehicles on the beach, as well as digging, may affect cultural resources buried in sand or dunes. Equipment used in nearshore waters may affect submerged cultural resources. However, the potential for impact would be minor, as stranding events are scattered along the entire U.S. coastline. The probability that these events, and therefore response activities, may be located on a beach or in water containing cultural resources is small.

Stranding response on Native American/Alaska Native lands would be coordinated with Native American tribes, Alaska Natives, or other aboriginal peoples to accommodate cultural uses of marine mammals. Responders would also be sensitive to the fact that tribal cultures often involve ceremonial, medicinal, or subsistence uses or plants, animals (including marine mammals), and specific geographic locations. There would not be any effects on Alaska Natives, Native American tribes, or other aboriginal people's cultural uses of coastal resources.

4.4.1.3 Alternative A3

Under Alternative A3, SAs would be issued to any applicants after review, the new SA template would not be utilized, and the Final SA criteria would not be issued. The effects on cultural resources from Alternative A3 would be the same as those described under Alternative A2.

4.4.1.4 Alternative A4- Preferred Alternative

Under Alternative A4, the Final SA criteria and the new SA template would be implemented and current and future stranding response activities would occur. The effects on cultural resources from Alternative A4 would be the same as those described under Alternative A2.

4.4.1.5 Alternative A5

Under Alternative A5, the Final SA criteria and the new SA template would be implemented and response to threatened, endangered, or rare animals would be required. The effects on cultural resources from Alternative A5 would be the same as those described under Alternative A2.

4.4.2 Carcass Disposal Alternatives

4.4.2.1 Alternative B1- No Action

Under Alternative B1, no carcass disposal would occur and carcasses would remain on the beach to naturally decompose. No effects on cultural resources would be expected to occur from Alternative B1. Carcass disposal activities would end, removing any potential risk to cultural resources.

4.4.2.2 Alternative B2- Status Quo

Under Alternative B2, current methods of carcass disposal would continue. Minor, adverse effects on cultural resources could be expected to occur under Alternative B2. Carcass burial could damage resources located on or beneath the beach. Digging may unearth artifacts and equipment used for digging could physically impact buried resources. This would negatively impact areas such as the Pacific Islands area, where many known artifacts and habitation sites are buried on beaches. Transporting the carcass off-site has the potential to damage resources, as the equipment used could crush buried resources. However, the potential for impact would be minor, as stranding events are scattered along the entire U.S. coastline. The probability that these events, and therefore disposal activities, may be located on a beach or in water containing cultural resources is small.

Carcass disposal on Native American/Alaska Native lands would be coordinated with Native American tribes, Alaska Natives, or other aboriginal peoples to accommodate cultural uses of marine mammals. Responders would also be sensitive to the fact that tribal cultures often involve ceremonial, medicinal, or subsistence uses or plants, animals (including marine mammals), and specific geographic locations. There would not be any effects on Alaska Natives, Native American tribes, or other aboriginal people's cultural uses of coastal resources.

4.4.2.3 Alternative B3- Preferred Alternative

Under Alternative B3, current methods of carcass disposal would continue with a recommendation to transport chemically euthanized animal carcasses off-site. The effects on cultural resources from Alternative B3 would be the same as those described under Alternative B2.

4.4.3 Rehabilitation Activities Alternatives

4.4.3.1 Alternative C1- No Action

Under Alternative C1, current SAs would expire, stranding response would end, and animals would not be taken into rehabilitation. No effects on cultural resources would be expected to occur under Alternative C1. Rehabilitation activities would end, removing any potential risk to cultural resources.

4.4.3.2 Alternative C2- Status Quo

Under Alternative C2, current rehabilitation activities would continue, but the final Rehabilitation Facility Standards would not be implemented. Potential minor, adverse effects on cultural resources could be expected to occur under Alternative C2. The use of temporary pools could damage cultural resources, depending on where they are sited. The use of net pens may disturb or damage submerged cultural resources.

4.4.3.3 Alternative C3- Preferred Alternative

Under Alternative C3, new SAs would be issued, rehabilitation activities would continue, and the final Rehabilitation Facility Standards would be implemented. The effects on cultural resources from Alternative C3 would be the same as those described under Alternative C2.

4.4.3.4 Alternative C4

Under Alternative C4, new SAs would be issued, rehabilitation activities would continue, and the final Rehabilitation Facility Standards would be implemented. The effects on cultural resources from Alternative C4 would be the same as those described under Alternative C2.

4.4.4 Release of Rehabilitated Animals Alternatives

During the public comment period, particular concerns were raised regarding the release of rehabilitated ices seals in Alaskan waters. In response to these concerns, which raised issues related to potential effects on cultural resources for subsistence harvest of ice seals, several of the alternatives

would adopt mitigation measures to minimize the potential for disease transmission from rehabilitated ices seals, as described in Section 5.2.4 of this PEIS.

4.4.4.1 Alternative D1- No Action

Under Alternative D1, current SAs would expire, stranding response and rehabilitation would cease, and there would be no animals to release. No effects on cultural resources would be expected to occur from Alternative D1. Release of rehabilitated animals would end, removing any potential risk to cultural resources.

4.4.4.2 Alternative D2- Status Quo

Under Alternative D2, current release activities would continue, adaptive changes to release activities would not be permitted, and the final Release criteria would not be implemented. Minor, adverse effects on cultural resources could be expected to occur from Alternative D2. The use of equipment and vehicles on the beach during release activities may affect cultural resources buried in sand or dunes. However, the potential for impact would be minor, as release activities are scattered along the entire U.S. coastline. The probability that these activities may be located on a beach containing cultural resources is small. Archaeological studies have not been conducted in most coastal areas. Release activities conducted at sea would not affect any submerged cultural resources.

4.4.4.3 Alternative D3- Preferred Alternative

Under Alternative D3, new SAs would be issued, release activities would continue, adaptive changes to release activities would be permitted, and the final Release criteria would be implemented. The effects on cultural resources from Alternative D3 would be the same as those described under Alternative D2.

4.4.5 Disentanglement Alternatives

4.4.5.1 Alternative E1- No Action

Under Alternative E1, there would be no disentanglement network. No effects on cultural resources would be expected to occur from Alternative E1. Disentanglement activities would end, removing any potential risk to cultural resources.

4.4.5.2 Alternative E2- Status Quo

Under Alternative E2, the disentanglement network would continue the current activities with no modifications or new members added. No effects on cultural resources would be expected to occur from Alternative E2. Disentanglement activities would generally occur in open ocean areas and would not be near or in contact with any submerged cultural resources. Pinniped disentanglements may occur on beaches, but impacts to cultural resources would not be expected.

4.4.5.3 Alternative E3- Preferred Alternative

Under Alternative E3, the disentanglement network would continue the current activities on the East Coast with modifications to the West Coast network. No effects on cultural resources would be expected to occur from Alternative E3. Disentanglement activities would generally occur in open ocean areas and would not be near or in contact with any submerged cultural resources. Pinniped disentanglements may occur on beaches, but impacts to cultural resources would not be expected.

4.4.6 Biomonitoring and Research Activities Alternatives

4.4.6.1 Alternative F1- No Action

Under Alternative F1, biomonitoring and research activities would not occur. No effects on cultural resources would be expected to occur from Alternative F1. Biomonitoring and research activities would end, removing any potential risk to cultural resources.

4.4.6.2 Alternative F2- Status Quo

Under Alternative F2, the new ESA/MMPA permit would continue the current biomonitoring and research activities. Adverse effects on cultural resources would not likely occur from this alternative. Research activities conducted on beaches could potentially disturb buried resources if vehicles or other equipment is used. Research activities conducted in the water, such as health assessment captures, could damage submerged cultural resources. Activities may involve anchoring boats or nets to the bottom and positioning researchers in the water. Activities in shallow areas could potentially disturb or come in contact with artifacts and other resources. Research activities in open ocean areas would not be near or in contact with any submerged cultural resources. However, the potential for impact would be minor as research activities are scattered along the entire U.S. coastline. The probability that these activities may be located on a beach or in water containing cultural resources is small.

4.4.6.3 Alternative F3- Preferred Alternative

Under Alternative F3, the new ESA/MMPA permit would be issued to include current and future biomonitoring and research activities. The effects on cultural resources from Alternative F3 would be the same as those described under Alternative F2.

4.5 Human Health and Safety

This section evaluates the potential impacts on human health and safety as a result of the alternatives.

4.5.1 Stranding Agreements and Response Alternatives

4.5.1.1 Alternative A1- No Action

Under Alternative A1 stranding response from current SA holders would end once all agreements have expired. Response to all stranded animals, alive or dead, would not occur and animals would be left on beaches. Without response activities, people would likely approach the animal or carcass either out of curiosity or in an attempt to help. Animal carcasses and live animals may contain contaminants or zoonotic diseases that people or domestic animals may come in contact with through tissues, fluids, bites, or scratches. Live animals may bite, roll, or thrash around, causing physical injuries to people who attempt to interact with the animals.

Direct, beneficial effects would be expected for stranding response personnel. As response to stranded animals ends, the safety risks for response personnel would no longer exist.

4.5.1.2 Alternative A2- Status Quo

Under Alternative A2, the current SAs would be renewed and current stranding response activities would continue without the issuance of Final SA criteria. The general public could be affected if they approached the carcass or live animal out of curiosity or in an attempt to help. Animal carcasses and live animals may contain contaminants or zoonotic diseases that people or domestic animals may come in contact with through tissues or fluids. People may have allergic reactions to animal blubber and oils. Serious infections may occur from contact with animals. Pathogens encountered may be antibiotic resistant, making treatment more difficult. Live animals may bite, roll, or thrash around, causing physical injuries. However, the potential for adverse effects is less under this alternative than Alternative A1, as responders would be on scene, reducing the ability for the public to come into contact with an animal.

Risk to responders would also include contaminants, zoonotic diseases, and physical injuries. Contaminants, including biotoxins and petroleum products, may produce short-term affects, such as respiratory problems, lightheadedness, nausea, eye irritation, or skin irritation. Responders may have allergic reactions to animal blubber and oils. Serious infections may occur from contact with animals. Pathogens encountered may be antibiotic resistant, making treatment more difficult. Zoonotic diseases may have short-term affects including swelling, joint pain, skin lesions, and flu-like symptoms. Long-term effects from zoonotic diseases could occur, especially if they are not diagnosed properly. Physical injuries may include strains or bruises from moving an animal or from slips, trips, or falls. Workers may be injured by stepping on broken glass, rusty metal, needles, or other litter. Workers could become entangled in derelict fishing gear during water responses. Workers may also come into contact with contaminated debris, including medical wastes and sewage. Accidental injections or exposure to euthanasia solution could cause adverse effects, depending on the chemical(s) used. Etorphine can be absorbed through broken skin and mucous membranes (*e.g.* eyes, nose, and mouth). Accidental injections of paralytic agents are considered life-threatening (Greer *et al.* 2001). Responses in or close to water could result in drowning if proper safety measures are not taken. Responders in water may come into contact with sharks, jellyfish, rays, and other venomous fish.

4.5.1.3 Alternative A3

Under Alternative A3, SAs would be issued to any applicants after review, the new SA template would not be utilized, and the Final SA criteria would not be issued. Effects on human health and safety from Alternative A3 would be the same as those described under Alternative A2.

4.5.1.4 Alternative A4- Preferred Alternative

Under Alternative A4, the Final SA criteria and the new SA template would be implemented and current and future stranding response activities would occur. Effects on human health and safety from Alternative A4 would be similar to those described under Alternative A2. However, the implementation of SA criteria would ensure that responders are experienced and therefore have the knowledge to avoid or minimize health and safety risks.

4.5.1.5 Alternative A5

Under Alternative A5, the Final SA criteria and the new SA template would be implemented and response to threatened, endangered, or rare animals would be required. Effects on human health and safety from Alternative A5 would be the same as those described under Alternative A4.

4.5.2 Carcass Disposal Alternatives

4.5.2.1 Alternative B1- No Action

Under Alternative B1, no carcass disposal would occur and carcasses would remain on the beach to naturally decompose. Carcasses of most stranded animals would be left on beaches and would naturally decompose (limited carcass disposal may still occur from Federal (not including NMFS), state, and local agencies authorized under MMPA Section 109(h)). People would likely approach and touch the carcass out of curiosity. Animal carcasses may contain contaminants or zoonotic diseases that people may come in contact with through tissues or fluids. Contaminants, including petroleum products and other hazardous materials, may produce short-term affects, such as respiratory problems, lightheadedness, nausea, eye irritation, or skin irritation. If disposal activities occur during a *Karenia brevis* bloom (a HAB), aerosolized brevetoxins may be inhaled by humans and could cause respiratory problems, nausea, vomiting, and neurological symptoms. People may have allergic reactions to animal blubber and oils. Serious infections may occur from contact with carcasses. Pathogens encountered may be antibiotic resistant, making treatment more difficult. Zoonotic diseases may have short-term affects including swelling, joint pain, skin lesions, and flu-like symptoms. Long-term effects from zoonotic diseases could occur, especially if they are not diagnosed or treated properly.

Contaminated carcasses left on the beach could potentially contaminate the groundwater and/or nearshore water. Impacts would be minor and temporary, as contaminants in groundwater would likely be flushed out quickly by tidewater and/or precipitation. Contaminants in nearshore waters would rapidly be diluted and flushed out by currents. Risks to human health could occur if toxic carcasses were consumed.

The alternative would have a beneficial effect, as personnel involved in carcass disposal would no longer be exposed to health and safety risks.

4.5.2.2 Alternative B2- Status Quo

Under Alternative B2, current methods of carcass disposal would continue. Minor, short-term, adverse effects on human health and safety would be expected to occur under Alternative B2. Carcasses of stranded animals may be left to naturally decompose, buried, towed to sea, or transported off-site to a rendering facility, landfill, or compost facility. Animal carcasses may contain euthanasia solution, contaminants, or zoonotic diseases that people may come in contact with through tissues or fluids, if the carcasses are left to naturally decompose. Contaminants, including petroleum products and other hazardous materials, may produce short-term affects, such as respiratory problems, lightheadedness, nausea, eye irritation, or skin irritation. If disposal activities occur during a *Karenia brevis* bloom (a HAB), aerosolized brevetoxins may be inhaled by humans and could cause respiratory problems, nausea, vomiting, and neurological symptoms. People may have allergic reactions to animal blubber and oils. Serious infections may occur from contact with carcasses. Pathogens encountered may be antibiotic resistant, making treatment more difficult. Zoonotic diseases may have short-term affects including swelling, joint pain, skin lesions, and flu-like symptoms. Long-term affects from zoonotic diseases could occur, especially if they are not diagnosed or treated properly.

Carcasses containing environmental contaminants left on the beach or buried could potentially contaminate the groundwater and/or nearshore water. Impacts would be minor and temporary, as contaminants in groundwater would likely be flushed out quickly by tidewater and/or precipitation. Contaminants in nearshore waters would rapidly be diluted and flushed out by currents. Chemically euthanized carcasses left on the beach or buried would not likely effect human health. Risks to human health could occur if toxic or chemically euthanized carcasses were consumed.

Persons involved with the disposal risk physical injuries from using equipment to bury, transport off-site, or tow the carcass out to sea. Persons could be hit or crushed by equipment or may risk drowning when towing the carcass out to sea. Carcasses that are disposed in shipping lanes or resurface could cause vessel accidents.

4.5.2.3 Alternative B3- Preferred Alternative

Under Alternative B3, current methods of carcass disposal would continue with a recommendation to transport chemically euthanized animal carcasses off-site. Effects on human health and safety under Alternative B3 would be the same as those described under Alternative B2, with one exception. Chemically euthanized animal carcasses would not be buried on the beach whenever possible,

minimizing the risk of humans coming in contact with these carcasses. This would be a beneficial impact on health and safety. However, carcasses containing environmental contaminants could still be buried and contaminate the groundwater and/or nearshore water. Impacts would be minor and temporary, as contaminants in groundwater would likely be flushed out quickly by tidewater and/or precipitation. Contaminants in nearshore waters would rapidly be diluted and flushed out by currents. Risks to human health would still exist if toxic carcasses were consumed.

Under this alternative, modifications may be made to carcass disposal activities. Currently, the potential toxicological environmental hazards posed by a decomposing carcass are not known. If and when this information becomes available, additional precautions (*e.g.,* removal of certain species carcasses from beaches) would be implemented, if necessary. These modifications would have a beneficial impact on human health and would remove the risk of toxic carcasses being consumed.

4.5.3 Rehabilitation Activities Alternatives

4.5.3.1 Alternative C1- No Action

Under Alternative C1, current SAs would expire, stranding response would end, and animals would not be taken into rehabilitation. A beneficial effect on human health and safety would be expected to occur from Alternative C1. Rehabilitation of marine mammals would no longer occur and risks to marine mammal workers would end.

4.5.3.2 Alternative C2- Status Quo

Under Alternative C2, current rehabilitation activities would continue, but the final Rehabilitation Facility Standards would not be implemented. Minor, short-term, adverse effects on human health and safety could be expected to occur from under Alternative C2. Animal induced injuries would include bites or physical injuries from being hit by a fin, tail, or other body part. Working on wet surfaces may cause bruises, slips, trips, or falls. Drowning is a possibility as work would occur around or in pools and pens. Physical injuries may occur from the use of other equipment.

Rehabilitation staff may be exposed to contaminants, potential zoonotic pathogens, euthanasia solution, animal drugs, and chemicals used for sanitation purposes. Contaminants, including petroleum products and other hazardous materials, may produce short-term affects, such as respiratory problems, lightheadedness, nausea, eye irritation, or skin irritation. If disposal activities occur during a *Karenia brevis* bloom (a HAB), aerosolized brevetoxins may be inhaled by humans and could cause respiratory problems, nausea, vomiting, and neurological symptoms. Serious

infections may occur from contact with animals. Pathogens encountered may be antibiotic resistant, making treatment more difficult. Zoonotic diseases may have short-term affects including swelling, joint pain, skin lesions, and flu-like symptoms. Long-term affects from zoonotic diseases could occur, especially if they are not diagnosed properly.

Accidental injections or exposure to euthanasia solution could cause adverse effects, depending on the chemical(s) used. Etorphine can be absorbed through broken skin and mucous membranes (*e.g.* eyes, nose, and mouth). Accidental injections of paralytic agents are considered life-threatening (Greer *et al.* 2001). Accidental injections and exposure to other drugs used in animal treatment could occur and affects would depend upon the drug. Facility personnel may come into contact with harmful chemicals used for cleaning or maintaining pool water quality. Improperly stored or handled pool chemicals can be highly reactive and may generate high temperatures, release toxic vapors, or ignite nearby combustible materials. Reactivity may be triggered by the inadvertent mixing of a pool chemical with an incompatible material or wetting the chemical with water (EPA 2001).

4.5.3.3 Alternative C3- Preferred Alternative

Under Alternative C3, new SAs would be issued, rehabilitation activities would continue, and the final Rehabilitation Facility Standards would be implemented. Effects on human health and safety from Alternative C3 would be the same as those described under Alternative C2, with one exception. The Rehabilitation Facility Standards would be implemented under Alternative C3, which would have a beneficial effect on health and safety. While some of these measures may currently occur at rehabilitation facilities, the standards would ensure that all facilities would be implementing the most effective safety measures. The standards would require safety plans for the direct handling of all species seen at the facility. Personnel would be trained to identify potential zoonotic diseases and prevent their transmission from animal to human. Staff would also be trained to properly handle contaminated equipment and proper sanitation techniques. Safety equipment such as eye protection, protective clothing, and eye flushing stations, would be provided.

4.5.3.4 Alternative C4

Under Alternative C4, new SAs would be issued, rehabilitation activities would continue, and the final Rehabilitation Facility Standards would be implemented. Effects on human health and safety from Alternative C4 would be the same as those described under Alternative C3.

4.5.4 Release of Rehabilitated Animals Alternatives

4.5.4.1 Alternative D1- No Action

Under Alternative D1, current SAs would expire, stranding response and rehabilitation would cease, and there would be no animals to release. A beneficial effect on human health and safety would be expected from Alternative D1. Release activities would cease and risks to marine mammal workers would end.

4.5.4.2 Alternative D2- Status Quo

Under Alternative D2, current release activities would continue, adaptive changes to release activities would not be permitted, and the final Release criteria would not be implemented. Minor, short-term, adverse effects could be expected from Alternative D2. Physical injuries, such as strains, cuts, and bruises, may occur while lifting and moving an animal for transport. Injuries from animals, such as bites or being hit by flukes may occur. Exposure to liquid nitrogen, used for freeze branding, may occur while pouring liquid nitrogen or coming in contact with the brand. Liquid nitrogen can cause rapid freezing and tissue damage to skin, eyes, and other exposed body parts. Vessel collisions, fire, capsizing, running aground, and inclement weather during cetacean release activities can result in injuries, including bruises, cuts, drowning, and lightning strikes.

4.5.4.3 Alternative D3- Preferred Alternative

Under Alternative D3, new SAs would be issued, release activities would continue, adaptive changes to release activities would be permitted, and the final Release criteria would be implemented. Effects on human health and safety from Alternative D3 would be the same as those described under Alternative D2.

4.5.5 Disentanglement Alternatives

4.5.5.1 Alternative E1- No Action

Under Alternative E1, there would be no disentanglement network. A beneficial effect on marine mammal responder health and safety would be expected under Alternative E1. Disentanglement operations would end and responders would no longer be at risk of injury. However, adverse impacts on public health and safety could occur if individuals attempted to disentangle an animal themselves. Risks would include serious physical injuries and drowning.

4.5.5.2 Alternative E2- Status Quo

Under Alternative E2, the disentanglement network would continue the current activities with no modifications or new members added. Responders put themselves at risk during all disentanglements. The boat could become entangled in the lines connected to the whale. Animal movements may cause serious physical injuries, knock a person overboard, or capsize the boat. Drowning is a very real threat to responders. Responders could also become entangled in restraint lines onboard the boat or while attempting to cut lines from the animal. Responders could come into contact with drugs used for the chemical restraint of animals. Under this alternative, no responders would enter the water to cut lines.

Modifications, including new techniques and tools, are not allowed. Without modifications, hazards to responders would still occur and could feasibly increase. Human safety risks would also increase without the implementation of disentanglement guidelines and training prerequisites. Less experienced individuals would not have the skills and knowledge to avoid or minimize dangerous situations, putting themselves and others at risk.

Potential adverse effects on public health and safety could occur. Individuals may attempt to disentangle an animal, putting themselves at risk of serious physical injuries and drowning.

4.5.5.3 Alternative E3- Preferred Alternative

Under Alternative E3, the disentanglement network would continue the current activities on the East Coast with modifications to the West Coast network. Risks to responders and safety measures would be the same as those described under Alternative E2. However, there would be less risk under this alternative, as modifications which could reduce threats to responders, would be allowed. New techniques and tools could decrease the time necessary for disentanglements, therefore reducing the time responders are on the water and in contact with animals. New tools, such as cutting instruments, may reduce the potential for injuries. Modifications of safety measures would also reduce threats to responders. Implementation of disentanglement guidelines and training prerequisites would increase the number of experienced responders. Experienced responders would have the skills and knowledge to avoid or minimize dangerous situations. Even with experienced responders and safety measures, there would still be potential for adverse effects on human health and safety.

Potential adverse effects on public health and safety could occur. Individuals may attempt to disentangle an animal, putting themselves at risk of serious physical injuries and drowning. However,

the public may decide not to interfere if they know there are qualified, experienced, and authorized individuals to conduct disentanglement activities. This may reduce some of the potential health and safety impacts.

4.5.6 Biomonitoring and Research Activities Alternatives

4.5.6.1 Alternative F1- No Action

Under Alternative F1, biomonitoring and research activities would not occur. A beneficial effect on human health and safety would occur under Alternative F1. Biomonitoring and research activities would cease and risks to researchers would end.

4.5.6.2 Alternative F2- Status Quo

Under Alternative F2, the new ESA/MMPA permit would continue the current biomonitoring and research activities. Personnel working on sample analyses in laboratories may come into contact with harmful chemicals. Physical injuries may be sustained from the use of laboratory equipment or sharp instruments.

All researchers conducting activities outdoors, either on land or vessel, risk sunburn, heat exhaustion, or heat stroke in hot weather or hypothermia in cold weather. Researchers conducting activities on pinniped rookeries and haul-out sites risk attacks by the animals. Besides a physical injury, bites or other contact may expose researchers to zoonotic diseases.

Sampling animals from vessels pose a variety of safety hazards. The use of crossbows, poles, and other equipment used for tagging and sampling could cause serious physical injuries. Risks would also include vessel collisions, capsizing, and drowning. Walking on wet boat decks increases the chance of slips, trips, and falls.

Cetacean capture-release health assessments create many scenarios where human health and safety may be adversely impacted. Bruises, cuts, drowning, and other physical injuries could occur from vessel collisions, fire, capsizing, running aground, and inclement weather. Entanglement in the capture net may lead to cuts, bruises, and drowning. Physical injury may occur if appendages or a person becomes caught between rafted boats. Exposure to liquid nitrogen, used for freeze branding, may occur while pouring liquid nitrogen or coming in contact with the brand. Liquid nitrogen can cause rapid freezing and tissue damage to skin, eyes, and other exposed body parts. Restraint and handling of the animal may expose personnel to zoonotic diseases. Physical injuries may result if the

animal thrashes around during restraint and sampling activities. Accidental needle sticks and exposure to chemicals may occur during the sampling process. Activities in water may expose individuals to harmful animals, such as venomous rays and skates, sharks, jellyfish, and sea lice. Shallow environments may have shells and other hard parts that can scrape or cut skin.

4.5.6.3 Alternative F3- Preferred Alternative

Under Alternative F3, the new ESA/MMPA permit would be issued to include current and future biomonitoring and research activities. Effects on human health and safety from Alternative F3 would be the same as those described under Alternative F2.

4.6 Socioeconomics

This section evaluates the potential impacts on socioeconomics as a result of the alternatives.

4.6.1 Stranding Agreements and Response Alternatives

4.6.1.1 Alternative A1- No Action

Under Alternative A1 stranding response from current SA holders would end once all agreements have expired. Moderate, long-term beneficial direct effects to current stranding network members would be expected to occur under Alternative A1. Allowing SAs to expire would mean that network members would no longer respond to stranding events, leading to a reduction, if not an elimination, of costs incurred from response activities. However, businesses or individuals whose only function is stranding response would be adversely affected. Businesses would close and individuals would lose their jobs. There may also be minor to moderate indirect adverse effects to those SA holders whose response and/or rehabilitation activities attract external funding. Federal, state, and local government agencies authorized under MMPA Section 109(h) would benefit from the absence of private stranding network members. These agencies would likely compete and receive funding from the Prescott Grant program to enhance their stranding response programs.

Negligible adverse effects may be borne by accommodations and restaurants adjacent to stranding sites. The alternative would reduce the occurrences of temporary local beach closures associated with stranding activities. However, the elimination of SAs would reduce response activities and increase the instances of dead marine mammals left to decompose on the beach (either by not removing carcasses and/or the increased likelihood of stranded animals being left to die). Carcasses may be removed by other Federal, state, or local governments authorized under the MMPA Section 109(h).

Decomposing carcasses left on-site would remain in an unsightly state for longer durations without assistance in their removal, and the duration would increase for larger sized animals. The unappealing sight and smell could reduce tourism activity at that particular beach, as visitors may choose to spend their money at other beaches or alternative recreation sites located further inland. However, tourists may want to see a live stranded animal or a carcass, which could create a beneficial impact on surrounding business.

4.6.1.2 Alternative A2- Status Quo

Under Alternative A2, the current SAs would be renewed and current stranding response activities would continue without the issuance of Final SA criteria. Minor to moderate, long-term adverse effects to stranding network members would be expected to occur under Alternative A2. Current SA holders would continue their response activities and would continue to incur operating costs associated with these activities. However, SA holders whose response activities attract external funding may see minor to moderate, indirect beneficial impacts.

Negligible adverse effects to tourism businesses, such as accommodations and restaurants, could be expected from Alternative A2. Some carcasses may still be left on-site to decompose naturally. The unappealing sight and smell could reduce tourism activity at that particular beach, as visitors may choose to spend their money at other beaches or alternative recreation sites located further inland. However, tourists may want to see a live stranded animal, a carcass, or the response activities, which could create a beneficial impact on surrounding business.

4.6.1.3 Alternative A3

Under Alternative A3, SAs would be issued to any applicants after review, the new SA template would not be utilized, and the Final SA criteria would not be issued. Minor to moderate adverse effects on current stranding network members would likely occur under Alternative A3. Operating expenses for current network members may be offset by the addition of new SA holders. As the number of SA holders increases, travel time and expense should reduce, as there would likely be greater coverage for a particular geographic area. Given that the funding sources for network activities are likely finite, increased competition for funds may result in reduced opportunities for current network members. However, fundraising experience, established relationships with donors, and familiarity with competitive funding opportunities (*i.e.,* Prescott Grant Program), should provide current network members with continued access to funds.

New SA holders would likely bear minor to moderate adverse economic impacts due to the operating costs related to their new response activities and limited fundraising experience and opportunities. The extent of the impact on these new network members would depend on the nature of their pre-existing capacity, their authorized functions (dead animal response, live animal response, and/or rehabilitation), and their fundraising history. New SA holders cooperating within large organizations, for example, may have sufficient facilities and financial resources to ensure economic independence or fundraising success.

Negligible beneficial effects on tourism businesses would likely occur under Alternative A3. Maintaining the current stranding network and adding new participants would enhance responsiveness to nearby live and dead marine mammals.

4.6.1.4 Alternative A4- Preferred Alternative

Under Alternative A4, the Final SA criteria and the new SA template would be implemented and current and future stranding response activities would occur. Alternative A4 is similar to Alternative A3, but under Alternative A4 the Final SA criteria would be implemented. Moderate to major, adverse effects to the current SA holders would be expected to occur. As the Final SA criteria are more stringent than what is currently in place, existing SA holders may need more training or may need to alter existing practices in order to meet the new criteria. However, the level of impacts would depend on the current practices of SA holders. For SA holders who would require no or few changes to meet the new criteria, impacts would be small. Similarly, larger facilities who engage in a wide variety of activities, in addition to stranding response and rehabilitation activities would bear a relatively lower burden in terms of costs. New SA holders, and current SA holders that have difficulty implementing the new SA criteria, would bear moderate to major, adverse impacts depending on their ability to take on new response and rehabilitation activities. With the addition of new SA holders, existing stranding network members may face competition for donations and other, presumably finite, sources of funds available for marine mammal stranding and rehabilitation activities.

Negligible beneficial effects on tourism businesses would likely occur under Alternative A4, similar to those described under Alternative A3.

4.6.1.5 Alternative A5

Under Alternative A5, the Final SA criteria and the new SA template would be implemented and response to threatened, endangered, or rare animals would be required. Minor to major, long-term adverse effects to SA holders would be likely to occur. These impacts are similar to those described in Alternatives A3 and A4, but they would also depend on the proportion of stranded marine mammals that are not rare, threatened, or endangered and whether or not the network member chooses to continue responding to those animals. While implementation of the Final SA criteria may increase operating costs, the impact may be offset if there was a reduction in responses to stranding events under Alternative A5. The reduction in responses could occur if new SA holders covered geographic areas previously covered by another network member.

Negligible beneficial effects on tourism businesses would likely occur under Alternative A5, similar to those described under Alternative A3.

4.6.2 Carcass Disposal Alternatives

4.6.2.1 Alternative B1- No Action

Under Alternative B1, no carcass disposal would occur and carcasses would remain on the beach to naturally decompose. Carcasses would be left wherever they naturally occurred. Removal of non-ESA listed carcasses could be conducted by Federal (not including NMFS), state, and local agencies authorized under MMPA 109(h), but this would likely be localized and limited. Minor to moderate beneficial effects are likely to occur for existing stranding network members that participate in other activities besides response and carcass disposal. The elimination of carcass disposal activities would lower operating costs for these members.

Carcasses left on-site to decompose would remain in an unsightly state for a longer period of time without assistance in their removal. The duration would increase for larger sized animals. Some strandings sites may be in areas of human activity, including commercial areas such as beachfront hotels, casinos, businesses, or natural areas (national parks, seashore, or NERRs). This could result in negligible, adverse impacts in terms of lost revenues, restaurants, and parks in the immediate vicinity of the carcass(es), if the public chose to avoid the area. The resulting unappealing sight and odors could reduce tourism activity at that particular beach, as visitors may choose to spend their money at other beaches or alternative recreation sites further inland. However, negligible, short-term beneficial effects on surrounding businesses may occur if people visit the area to view the carcass.

4.6.2.2 Alternative B2- Status Quo

Under Alternative B2, current methods of carcass disposal would continue. Negligible adverse effects on tourism activities could occur from Alternative B2. Under current response activities, some carcasses may be left on beaches. Carcasses may be left in areas of recreational and tourism activities, such as beachfront hotels or natural areas. However, carcasses would not be left on actively used beaches. Carcasses could be left on remote beaches that may be part of a national park, seashore, or NERR. The foul odors and the sight of a decomposing animal may result in visitors avoiding the area. This impact would be negligible, as visitors could still participate in activities within the area not located near the carcass. However, negligible, short-term beneficial effects on surrounding businesses may occur if people visit the area to view the carcass.

Stranding network participants currently authorized for dead marine mammal response would likely bear minor to moderate adverse effects due to continued time and expense associated with carcass disposal activities.

4.6.2.3 Alternative B3- Preferred Alternative

Under Alternative B3, current methods of carcass disposal would continue with a recommendation to transport chemically euthanized animal carcasses off-site. Alternative B3 is similar to Alternative B2, except that Alternative B3 recommends (but would not require) the removal of chemically euthanized carcasses to an off-site location. The economic impacts from Alternative B3 would be the same as those described under Alternative B2, with one exception. Chemically euthanized carcasses would be removed and towed off-site to a hazardous waste landfill. Towing animals off-site would be expensive and the cost would be incurred by the stranding network member. The adverse effect on individual members would be negligible, minor, or major, depending on the number of animals chemically euthanized. The costs of transporting the chemically euthanized carcass off-site could vary depending on the size of the animal, transport distance, or the means of transport. Some stranding network members may bear a greater cost burden if stranding events tend to involve large animals, multiple carcasses, or if the carcass needs to be transported a great distance for disposal. Adverse effects could also occur due to increased costs affiliated with rendering or incinerating activities or fees imposed by the disposal site, including the need to obtain local or state permits for beach or at sea disposal.

Negligible negative impacts on local tourism businesses could occur under Alternative B3. Transporting chemically euthanized carcasses off-site would reduce the instances when an unsightly

carcass would deter visitors from a particular location. However, other carcasses may be left at stranding sites.

4.6.3 Rehabilitation Activities Alternatives

4.6.3.1 Alternative C1- No Action

Under Alternative C1, current SAs would expire, stranding response would end, and animals would not be taken into rehabilitation. Major, long-term, adverse effects on facilities that focus primarily on rehabilitation activities could occur under Alternative C1. Many facilities in this category may cease operation, unless their activities could be shifted (*e.g.,* they are able to redirect rehabilitation efforts to animals other than marine mammals). Larger facilities that also engage in other activities may experience a minor, long-term positive effect in terms of the reduced operating costs from the elimination of rehabilitation activities.

4.6.3.2 Alternative C2- Status Quo

Under Alternative C2, current rehabilitation activities would continue, but the final Rehabilitation Facility Standards would not be implemented. Minor to moderate, adverse effects on rehabilitation facilities would be expected, as continued expenses would be incurred from rehabilitation activities. Rehabilitation facilities would operate as they currently do and therefore continue to incur supply, equipment, personnel, and maintenance expenses.

4.6.3.3 Alternative C3- Preferred Alternative

Under Alternative C3, new SAs would be issued, rehabilitation activities would continue, and the final Rehabilitation Facility Standards would be implemented. Alternative C3 would be the same as Alternative C2, with two exceptions. Alternative C3 would issue new SAs and implement the Rehabilitation Facility Standards. Minor to major, adverse effects on rehabilitation facilities would be expected to occur from this alternative. The Rehabilitation Facility Standards would be implemented and facilities would need to upgrade to comply with the minimum standards, in order to maintain or obtain their SAs. The level of impact would depend on each facility, if they need to upgrade, and how much they would need to upgrade to meet the minimum standards. Current rehabilitation facilities were contacted to determine the estimated costs of upgrading each facility. The East Coast facility that responded to NMFS' request for information estimated that it would cost $75,000 to upgrade its pinniped rehabilitation facilities. Of the West Coast facilities that responded, the total estimated costs to upgrade facilities ranged from $0 (a facility where the standards were

already met) and $48,000 (cetacean and pinniped facility) on the low end to $1.9 million and $7 million (both pinniped facilities) on the high end. Excluding the facility that reported $7 million in impacts, the average impact among the facilities that responded is estimated to be $518,334.

4.6.3.4 Alternative C4

Under Alternative C4, new SAs would be issued, rehabilitation activities would continue, and the final Rehabilitation Facility Standards would be implemented. Alternative C4 would be the same as Alternative C3, with the exception that the rehabilitation of non-ESA and non-rare marine mammals would be optional. Alternative C4 would adversely affect rehabilitation facilities in the same manner as Alternative C3. Alternative C4 could adversely affect facilities to a lesser extent, however, since under the rehabilitation of non-rare and non-ESA species would only be optional.

4.6.4 Release of Rehabilitated Animals Alternatives

4.6.4.1 Alternative D1- No Action

Under Alternative D1, current SAs would expire, stranding response and rehabilitation would cease, and there would be no animals to release. Eelease activities would cease as stranding response and rehabilitation activities ended. Eliminating activities related to the release of rehabilitated marine mammals would eliminate the expenses related to these activities.

4.6.4.2 Alternative D2- Status Quo

Under Alternative D2, current release activities would continue, adaptive changes to release activities would not be permitted, and the final Release criteria would not be implemented. Minor to moderate, adverse effects on rehabilitation facilities would be expected, as continued expenses would be incurred from release activities. Facilities that release more animals, larger species of marine mammals, or those that need to travel greater distance to release animals would incur a greater share of expenses.

4.6.4.3 Alternative D3- Preferred Alternative

Under Alternative D3, new SAs would be issued, release activities would continue, adaptive changes to release activities would be permitted, and the final Release criteria would be implemented. Alternative D3 would be the same as Alternative D2, except that new SA holders could be added and the release criteria would be implemented. Minor to moderate, adverse effects may be borne by rehabilitation facilities. Costs may increase at each facility in order to comply with the release

criteria. However, the possible addition of rehabilitation facilities could help offset the release activities and costs for some facilities.

4.6.5 Disentanglement Alternatives

4.6.5.1 Alternative E1- No Action

Under Alternative E1, there would be no disentanglement network. Minor to moderate, beneficial effects on current participants could occur from the elimination of expenses incurred from disentanglement activities.

4.6.5.2 Alternative E2- Status Quo

Under Alternative E2, the disentanglement network would continue the current activities with no modifications or new members added. Minor to moderate, adverse effects would continue to be borne by participants engaged in disentanglement activities.

4.6.5.3 Alternative E3- Preferred Alternative

Under Alternative E3, the disentanglement network would continue the current activities on the East Coast with modifications to the West Coast network. In addition, the Disentanglement Guidelines and training prerequisites would be implemented nationwide. East Coast participants already follow these guidelines and training prerequisites, and therefore no additional impacts would be expected. Minor to moderate, adverse effects would be borne by West Coast participants due to modifications of current operations and training expenses.

4.6.6 Biomonitoring and Research Activities Alternatives

4.6.6.1 Alternative F1- No Action

Under Alternative F1, biomonitoring and research activities would not occur. No effects on socioeconomics would be expected to occur under Alternative F1.

4.6.6.2 Alternative F2 Status Quo

Under Alternative F2, the new ESA/MMPA permit would continue the current biomonitoring and research activities. Minor to moderate, adverse effects could occur under Alternative F2 depending on the nature of current biomonitoring and research activities and the ongoing personnel and research expenses.

4.6.6.3 Alternative F3- Preferred Alternative

Under Alternative F3, the new ESA/MMPA permit would be issued to include current and future biomonitoring and research activities. Minor to moderate, adverse effects could occur under Alternative F3 depending on the nature of new biomonitoring and research activities and the ongoing personnel and research expenses.

1 **Table 4-2. Summary Matrix of Impacts**

Alternatives	Impact Area: Biological Resources	Water & Sediment Quality	Cultural Resources	Human Health & Safety	Socioeconomics
Stranding Agreements & Response					
Alternative A1- No Action No Action- SA's expire, stranding response would end.	Moderate, adverse effects on marine mammals, as stranded animals would be removed from the population. Valuable information on marine mammal health would not be collected. No effects on protected and sensitive habitats, SAV and macroalgae, sea turtles, fish, shellfish, other invertebrates, and birds.	No effects on water and sediment quality.	No effects on cultural resources.	Minor, short-term adverse effects as the public interact with stranded animals. Beneficial effects as response personnel no longer needed.	Moderate, long-term beneficial direct effects on stranding network members, as there would be reduction, if not an elimination, of costs. Minor to moderate indirect adverse effects to SA holders whose activities attract external funding. Potential adverse effects if stranded animals reduce the visual and aesthetic such that other beach uses decrease while the stranded animal is decomposing. Negligible adverse effects to businesses adjacent to stranding sites. Potential beneficial effects if people come to see stranding event.
Alternative A2- Status Quo Status Quo- Current SAs would be renewed, current stranding response activities continue. Final SA criteria would not be issued.	Minor, short-term adverse effects on protected and sensitive habitats, SAV and macroalgae, sea turtles, shellfish, and birds from equipment use or leaks on beaches/nearshore waters and the presence of responders. Minor to moderate, adverse effects on marine mammals would be expected from response activities and if new SAs are not issued.	Minor, short-term adverse effects on surrounding sand and nearshore waters could occur from equipment leaks and euthanasia solution or other environmental contaminants in tissue, blood, and other body fluids.	Potential minor, adverse effects on submerged cultural resources or resources buried in sand from equipment and vehicle use on beaches and nearshore waters. There would not be any effects on Alaska Natives, Native American tribes, or other aboriginal people's cultural uses of coastal resources.	Minor, short-term adverse effects on the public (interacting with a stranded animal) and stranding responders (*e.g.*, physical injury and zoonotic diseases).	Minor to moderate, long-term adverse effects to stranding network members from operating costs associated with these activities. Negligible adverse effects to businesses adjacent to stranding sites. Potential beneficial effects if people come to see stranding event.
Alternative A3 SAs issued to any applicants after review, new SA template would not be utilized. Final SA criteria would not be issued. Current and future activities included.	Same effects on biological resources as Alternative A2. Some beneficial impacts could come from allowing new SA holders to be added, given that they have the proper experience with marine mammal response, as geographic coverage would increase and new rehabilitation facilities may be added.	Same effects as Alternative A2.	Same effects as Alternative A2.	Same effects as Alternative A2.	Minor to moderate, long-term adverse effects on network members from operating expenses. New involvement with response activities would help offset expense of these activities. Negligible adverse effects to businesses adjacent to stranding sites. Potential beneficial effects if people come to see stranding.
Alternative A4 (Preferred) Final SA criteria would be implemented, new SA template would be utilized, current and future activities included.	Same effects on biological resources as Alternative A2. Beneficial impacts from use of new techniques and tools during response activities and ability to add new SA holders. Long-term beneficial effects on marine mammals would be expected to occur with the implementation of SA criteria.	Same effects as Alternative A2.	Same effects as Alternative A2.	Same effects as Alternative A2, with one exception. SA criteria would ensure that responders are experienced and have the knowledge to avoid or minimize health and safety risks.	Alternative A4 is similar to Alternative A3, but under Alternative A4 the Final SA criteria would be implemented. Moderate to major, adverse effects to the current SA holders would be expected to occur, as existing SA holders may need more training or may need to alter existing practices in order to meet the new criteria. Negligible adverse effects to businesses adjacent to stranding sites. Potential beneficial effects if people come to see stranding event.

Table 4-2. Summary Matrix of Impacts (continued)

Alternatives	Impact Area: Biological Resources	Water & Sediment Quality	Cultural Resources	Human Health & Safety	Socioeconomics
Stranding Agreements & Response					
Alternative A5 Final SA criteria would be implemented, new SA template would be utilized, and response to threatened endangered or rare animals would be required.	Same effects from stranding response activities as Alternative A2, with two exceptions. Beneficial effect on threatened, endangered, or rare animals and an adverse effect on other species. Same effects from the implementation of SA criteria as Alternative A4.	Same effects as Alternative A2.	Same effects as Alternative A2.	Same effects as Alternative A4.	Minor to major, long-term adverse effects to SA holders similar to those described in Alternatives A3 and A4, but they would also depend on the proportion of stranded marine mammals that are not rare, threatened, or endangered and whether or not the network member chooses to continue responding to those animals. Negligible adverse effects to businesses adjacent to stranding sites. Potential beneficial effects if people come to see stranding event.
Carcass Disposal					
Alternative B1- No Action No Action- SA's expire, no carcass disposal would occur, carcasses would be left where stranded.	Potential adverse effects could occur from leaving carcasses on the beach to naturally decompose. Animal carcasses may contain contaminants, which could negatively impact the surrounding environment. No effects on protected and sensitive habitats, SAV and macroalgae, sea turtles, fish, shellfish, other invertebrates, and birds.	Potential adverse effects could occur from leaving carcasses on the beach to naturally decompose. Animal carcasses may contain contaminants, which could negatively impact the surrounding water and sediment quality.	No effects on cultural resources.	Minor, short-term adverse effects as the public interact with stranded animals. Contaminated or chemically euthanized carcasses could potentially contaminate the groundwater and/or nearshore water. Beneficial effect on personnel involved in carcass disposal, as they would no longer be exposed to risks.	Negligible adverse impacts in terms of lost revenues, restaurants, and parks in the immediate vicinity of the carcass(es), if the public chose to avoid the area. Potential beneficial effects if people come to see stranding event
Alternative B2- Status Quo Status Quo- Current methods of carcass disposal continue.	Minor to moderate, short- and long-term adverse effects, as animal carcasses may contain persistent environmental contaminants or euthanasia solution, which could negatively impact the surrounding environment. Other adverse effects from burial, equipment use, spills of hazardous materials or wastes from equipment or vessels. Disposal at sea might allow contaminants to re-enter the marine environment, but would provide a benefit by serving as a food sources for marine organisms.	Minor, short-term adverse effects on water and sediment quality could occur from equipment leaks; euthanasia solution or other contaminants in tissue, blood, and other body fluids; spills of hazardous materials or wastes from vessels. Burial and equipment use may have a negligible impact on erosion.	Potential minor, long-term, adverse effects on submerged cultural resources or resources buried in sand from beach burial, and equipment and vehicle use on beaches and nearshore waters. There would not be any effects on Alaska Natives, Native American tribes, or other aboriginal people's cultural uses of coastal resources.	Minor and major, short- and long-term adverse effects as the public interacts with a stranded animal. Contaminated or chemically euthanized carcasses left on the beach or buried could potentially contaminate the groundwater and/or nearshore water, making it unhealthy for humans to swim near the carcass site. Workers involved in disposal could be exposed to zoonotic diseases, contaminants, and euthanasia solution.	Negligible adverse impacts in terms of lost revenues, restaurants, and parks in the immediate vicinity of the carcass(es), if the public chose to avoid the area. Potential beneficial effects if people come to see stranding event
Alternative B3 (Preferred) Status Quo with the recommendation to transport chemically euthanized animal carcasses off-site.	Same effects as Alternative B2, with one exception. Chemically euthanized carcasses would not be buried on-site, minimizing some of the adverse effects.	Same effects as Alternative B2.	Same effects as Alternative B2.	Same effects as Alternative B2 with one exception. Recommended that chemically euthanized animal carcasses not be buried on the beach, which would minimize the health and safety risks associated with beach burial.	Effects would be the same as those described under Alternative B2, except that chemically euthanized carcasses would be moved off-site and the cost would be incurred by the stranding network member. Adverse effects would be negligible, minor, or major, depending on the number of carcasses.

Table 4-2. Summary Matrix of Impacts (continued)

Alternatives	Impact Area: Biological Resources	Water & Sediment Quality	Cultural Resources	Human Health & Safety	Socioeconomics
Rehabilitation Activities					
Alternative C1- No Action No Action- Current SAs would expire, stranding response would cease, and animals would not be rehabilitated.	Moderate, long-term, adverse effects as marine mammals would not be taken into rehabilitation and most would likely die from injuries or disease. No effects on protected and sensitive habitats, SAV and macroalgae, sea turtles, fish, shellfish, other invertebrates, and birds.	No effects on water and sediment quality.	No effects on cultural resources.	Beneficial effects would be expected as risks to rehabilitation personnel would end.	Potential major, long-term, adverse effects on facilities that focus primarily on rehabilitation activities. Facilities may cease operation, unless their activities could be shifted. Larger facilities that engage in other activities may experience a minor, long-term positive effect in terms of the reduced operating costs from the elimination of rehabilitation activities.
Alternative C2- Status Quo Status Quo- Current rehabilitation activities would continue. Final Rehabilitation Facility Standards would not be implemented.	Minor to major, short- and long-term, beneficial and adverse effects on marine mammals. Potential adverse effects from sampling, anesthesia, disease, euthanasia, and not implementing the Rehabilitation Facility Standards No effects on protected and sensitive habitats, SAV and macroalgae, sea turtles, fish, shellfish, other invertebrates, and birds.	Minor adverse effects due to use of open ocean/bay net pens and temporary pools and contamination from wastes, pathogens, etc. Rehabilitation facilities would have necessary permits for wastewater discharges.	Potential minor to major adverse effects on from the use of temporary pools and net pens, depending on where they are sited. Net pens may disturb or damage submerged cultural resources.	Minor, short-term, direct adverse effects on rehabilitation personnel, including physical injuries, exposure to chemicals, and exposure to zoonotic diseases.	Current rehabilitation facilities would continue to bear minor to major, long-term adverse effects. Rehabilitation facilities would operate as they currently do and therefore continue to incur supply, equipment, personnel, and maintenance expenses.
Alternative C3 (Preferred) New SAs would be issued, rehabilitation activities continue. Final Rehabilitation Facility Standards would be implemented.	Same effects as Alternative C2, with one exception. Rehabilitation Facility Standards would decrease the risk of disease transmission ensure a healthy environment, maximize the success of rehabilitation, and increase the potential for release to the wild. Would reduce animal pain and suffering.	Same effects as Alternative C2.	Same effects as Alternative C2.	Same effects as Alternative C2, with one exception. Health and safety standards in the rehabilitation facility standards would have a beneficial effect.	Minor to major, adverse effects on rehabilitation facilities. Facilities would need to upgrade to comply with the minimum facility standards. Level of impact would depend on each facility, if they need to upgrade, and how much they would need to upgrade to meet the minimum standards.
Alternative C4 New SAs would be issued, rehabilitation activities would continue. Rehabilitation of threatened endangered and rare animals would be required; response to other animals would be optional. Final Rehabilitation Facility Standards would be implemented.	Same effects as Alternative C3, with a few exceptions. Adverse effects on animals that are not rare, threatened, or endangered. These animals often serve as models for other species and this would be an indirect adverse affect on rare, threatened, and endangered species.	Same effects as Alternative C2.	Same effects as Alternative C2.	Same effects as Alternative C3.	Alternative C4 would adversely affect rehabilitation facilities in the same manner as Alternative C3. Alternative C4 could adversely affect facilities to a lesser extent, however, since under the rehabilitation of non-rare and non-ESA species would only be optional.
Release of Rehabilitated Animals					
Alternative D1- No Action No Action- Current SAs would expire, stranding response and rehabilitation would cease, and therefore there would be no animals to release.	Adverse effects as marine mammals would not be released back to the wild, which negatively impacts all species, but especially threatened or endangered species. Beneficial effect on wild populations, as there would not be the risk of introducing a diseased animal that could potentially infect other marine mammals. No effects on protected and sensitive habitats, SAV and macroalgae, sea turtles, fish, shellfish, other invertebrates, and birds.	No effects on water and sediment quality.	No effects on cultural resources.	Beneficial effects would be expected as risks to release personnel would end.	Beneficial effects as the end of release activities would eliminate the expenses related to these activities.

Table 4-2. Summary Matrix of Impacts (continued)

Alternatives	Impact Area				
	Biological Resources	**Water & Sediment Quality**	**Cultural Resources**	**Human Health & Safety**	**Socioeconomics**
Release of Rehabilitated Animals					
Alternative D2- Status Quo Status Quo- Current release activities would continue. Adaptive changes to release activities would not be permitted. Final release criteria would not be implemented.	Minor, short- and long-term, adverse and beneficial effects on marine mammals. Release activities (tagging, marking, and transport) may have adverse effects. Released animal could carry a zoonotic disease and infect wild population. Adverse effects on all biological resources from equipment use, spills of hazardous materials or wastes from equipment or vessels.	Minor, short-term, direct adverse effects could occur from spills of hazardous materials or wastes from release vessels or leaks from equipment into sand or surrounding waters.	Minor, long-term, adverse effects on cultural resources buried in sand from equipment and vehicle use on beaches.	Minor, short-term, direct adverse effects on release personnel, including physical injuries and exposure to chemicals.	Minor to moderate, adverse effects as continued expenses would be incurred from release activities. Facilities that release more animals, larger species of marine mammals, or those that need to travel greater distance to release animals would incur a greater share of expenses.
Alternative D3 (Preferred) New SAs would be issued, release activities continue. Final release criteria would be implemented and would include adaptive management of release activities.	Same effects as Alternative D2, with one exception. Release criteria would be implemented and may reduce the effects on marine mammals.	Same effects as Alternative D2.	Same effects as Alternative D2.	Same effects as Alternative D2	Minor to moderate, adverse effects as costs may increase at each facility in order to comply with the release criteria. Possible addition of facilities could help offset the release activities and their costs.
Disentanglement Activities					
Alternative E1- No Action No Action- No disentanglement network.	Major, long-term adverse effects on marine mammals from ending the Disentanglement Network as animals would have increased pain and suffering and would most likely die. No significant effects on protected and sensitive habitats, SAV and macroalgae, sea turtles, fish, shellfish, other invertebrates, and birds. Gear on an entangled animal may be shed and become marine debris, which could potentially harm biological resources.	No effects on water and sediment quality.	No effects on cultural resources.	Beneficial effects would be expected as risks to responders would end. Potential adverse impacts on public health if individuals attempt to disentangle an animal.	Minor to moderate, beneficial effects on current participants could occur from the elimination of expenses incurred from disentanglement activities.
Alternative E2- Status Quo Status Quo- Disentanglement network would continue current activities, no modifications or new members added	Minor, short-term adverse effects on protected and sensitive habitats, SAV and macroalgae, sea turtles, fish, shellfish, other invertebrates, birds, and marine mammals from spills of hazardous materials or wastes from vessels. Minor to major, short- and long-term, beneficial and adverse effects on marine mammals. Disentanglement would continue; new responders could not be added. Animal adverse reactions to close approaches, physical/chemical restraint, or be injured during the process.	Minor, short-term, adverse effects could occur from spills of hazardous materials or wastes from release vessels.	No effects on cultural resources.	Adverse effects on responders, including physical injuries, exposure to chemicals, potentially death. Potential adverse impacts on public health if individuals attempt to disentangle an animal.	Minor to moderate, adverse effects would continue to be borne by participants engaged in disentanglement activities.

Table 4-2. Summary Matrix of Impacts (continued)

Alternatives	Impact Area: Biological Resources	Water & Sediment Quality	Cultural Resources	Human Health & Safety	Socioeconomics
Disentanglement Activities					
Alternative E3 (Preferred) Disentanglement network would continue current activities on East Coast with modifications to West Coast network. The Disentanglement Guidelines and training prerequisites would be implemented.	Same effects as Alternative E2, except that new responders and techniques could be added and Disentanglement Guidelines/training would be in place to reduce adverse effects.	Same effects as Alternative E2.	No effects on cultural resources.	Same effects as Alternative E2. There would be less risk under this alternative, as modifications new tools and techniques and the Disentanglement Guidelines/training could reduce safety risks.	No impacts to East Coast participants. Minor to moderate, adverse effects would be borne by West Coast participants due to modifications of current operations and training expenses.
Biomonitoring & Research Activities					
Alternative F1- No Action No Action- Biomonitoring and research activities would not occur.	Adverse effects on marine mammals as important health information would no longer be collected. No effects on protected and sensitive habitats, SAV and macroalgae, sea turtles, fish, shellfish, other invertebrates, and birds.	No effects on water and sediment quality.	No effects on cultural resources.	Beneficial effects would be expected as risks from research activities would end.	No effects on socioeconomics.
Alternative F2- Status Quo Status Quo- New ESA/MMPA permit would continue current biomonitoring and research activities.	Minor, short-term adverse effects on protected and sensitive habitats, SAV and macroalgae, sea turtles, fish, shellfish, other invertebrates, birds, and marine mammals from spills of hazardous materials or wastes from vessels or leaks from equipment into sand or surrounding waters. Protected and sensitive habitats and SAV and macroalgae could be damaged by vessels/researchers. Sea turtles/birds and their nests could be disturbed/ damaged. Fish may be caught in nets or disturbed. Minor to major, short- and long-term, adverse effects on marine mammals from close approach, tagging, marking, restraint, handling, capture, transport, sampling, and other activities. Long-term beneficial effects from collection of health information.	Minor, short-term, direct adverse effects could occur from spills of hazardous materials or wastes from release vessels or leaks from equipment into sand or surrounding waters.	Adverse effects would not likely occur. Potential effects on submerged cultural resources or resources buried in sand from equipment and vehicle use on beaches and vessel use in nearshore waters.	Minor, short-term, direct adverse effects on research personnel, including physical injuries, exposure to chemicals, and exposure to zoonotic diseases.	Minor to moderate, adverse effects could occur depending on the nature of biomonitoring and research activities and the ongoing personnel and research expenses.
Alternative F3 (Preferred) New ESA/MMPA permit would be issued to include current and future biomonitoring and research activities.	Same effects as Alternative F2, with other adverse effects from new research activities. The increase in research activities would have a beneficial affect on marine mammals, as more health information would be collected.	Same effects as Alternative F2.	Same effects as Alternative F2.	Same effects as Alternative F2.	Minor to moderate, adverse effects could occur depending on the nature of new biomonitoring and research activities and the ongoing personnel and research expenses.

1