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Appendices

List of Attachments

BA	**Biological Assessment**
BMPs	**Best Management Practices**
CA	**California**
CDFG	**California Department of Fish and Game**
CFR	**Code of Federal Regulations**
CNDDB	**California Natural Diversity Database**
CORPS	**United States Army Corps of Engineers**
EPA	**Environmental Protection Agency**
ESA	**Federal Endangered Species Act**
FDPA	**Federal Disaster Protection Act**
FEMA	**Federal Emergency Management Agency**
LAA	**Likely to Adversely Affect**
NE	**No Effect**
NFIA	**National Flood Insurance Act**
NLAA	**Not Likely to Adversely Affect**
NMFS	**National Marine Fisheries Service**
PA	**Public Assistance**
PL	**Public Law**
PBA	**Programmatic Biological Assessment**
STAFFORD ACT	**Robert T. Stafford Disaster Relief and Emergency Assistance Act**

The Federal Emergency Management Agency (FEMA) administers Federal programs for response to, recovery from, and preparation for disasters. Such disasters may result from natural events such as floods, earthquakes, wildfires, and windstorms, or from human-caused events such as fires and explosions.

FEMA, as with all Federal agencies, is required under section 7(a)(2) of the Endangered Species Act of 1973, as amended, (16 U.S.C. 1531 *et seq.*)(ESA) to consult with the National Marine Fisheries Service (NMFS) to ensure that any action authorized, funded or carried out by FEMA is not likely to jeopardize the continued existence of any endangered or threatened species under their jurisdiction, or result in the destruction or adverse modification of habitat of such species which is legally designated to be critical. To initiate consultation, FEMA typically prepares a biological assessment (BA) describing the action, the potential effects of that action on listed species, and any avoidance and minimization measures necessary to avoid adverse effects of the action on listed species and their habitats.

FEMA has determined through experience that the majority of the typical recurring actions proposed for funding, and for which a BA is required, can be grouped by type of action or location. These groups of actions, provided that they meet specified criteria, can be evaluated in a Programmatic Biological Assessment (PBA) to comply with the ESA and its implementing regulations without having to produce a time consuming, stand-alone BA for every action. The PBA is then used as the basis for a programmatic consultation that would ultimately eliminate the need for individual consultations on many actions undertaken by FEMA, except in certain circumstances where an action cannot be appended to a programmatic consultation.

FEMA has prepared this PBA for the purpose of initiating a programmatic consultation with the National Marine Fisheries Service (NMFS). This PBA describes the types of projects usually funded by FEMA and it evaluates typical recurring actions undertaken by FEMA within the State of California in preparation for, and in the wake of, disasters. This document will facilitate FEMA's compliance with the ESA by providing a framework to address affects to Federally listed species from projects typically funded in response to flood, earthquake, fire, and wind disasters, and to prevent future disasters resulting from these types of events. Through programmatic consultation, NMFS and FEMA intend to streamline the consultations process for these typically recurring actions in California.

The Federal Emergency Management Agency (FEMA) administers Federal programs for response to, recovery from, and preparation for disasters. Such disasters may result from natural events such as floods, earthquakes, wildfires, and windstorms, or from human-caused events such as fires and explosions. FEMA administers the Federal programs under the following authorities:

? The Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law (PL) 93-288, as amended (Stafford Act). The Stafford Act authorizes FEMA to administer response, recovery, and mitigation programs. The Stafford Act was amended by the Disaster Mitigation Act of 2000, PL 106-390; it includes the following FEMA programs: the Public Assistance Program; the Hazard Mitigation Grant Program, pre-disaster mitigation programs, the Fire Management Assistance Grant Program, and the Assistance for Individuals and Households Program. The implementing regulations for these programs are found in Title 44, Code of Federal Regulations (CFR), Parts 204 and 206.

? The National Flood Insurance Act, as amended, PL 90-448 (NFIA) and the Flood Disaster Protection Act, PL 93-234 (FDPA) authorizes FEMA to administer programs for mapping flood hazards, providing flood insurance, and providing flood mitigation assistance. Implementing regulations for these programs are found in 44 CFR Parts 59–78.

Typical actions taken under these authorities are described below.

In response to disasters, FEMA is authorized under the Stafford Act to provide state and local governments with assistance that is essential to respond to immediate threats to life, public health and safety, and property. Response activities typically include emergency protective measures to save lives, protection of public health and safety, and protection of improved property. These response activities may be undertaken directly by Federal agencies or state and local agencies with financial assistance from FEMA to cover extraordinary costs of such activities.

Under the Stafford Act, FEMA may provide funds to repair, restore, or replace disaster-damaged public facilities as well as facilities owned by certain private nonprofit organizations. Eligible facilities include:

? Roads and associated features, such as lighting, curbs, and sidewalks,
? Bridges, culverts, and associated features, such as abutments, headwalls, and erosion protection,
? Water control facilities, such as embankments, diversion dams, retention basins, and canals,

- ? Buildings and equipment,
- ? Utilities, such as water and sewer lines and electrical distribution facilities,
- ? Mass transit facilities,
- ? Parks and recreational facilities

Often, the entity applying for assistance (referred to as the "sub-grantee") wishes to take advantage of the opportunity presented by the necessary repair of a disaster-damaged facility to make improvements to, or change the design of, the facility. These actions are referred to as "improved projects." In other cases, the sub-grantee determines that the public welfare would not be best served by restoring a damaged facility or the function of the facility. Funds which are originally available for the restoration of the damaged facility may be made available for the expansion or construction of other selected facilities, the purchase of capital equipment, or the funding of hazard mitigation measures. Such actions are referred to as "alternate projects."

The Stafford Act and the NFIA further authorize FEMA to provide assistance with actions that will reduce or eliminate threats to public health and safety and reduce the risk of damage to public and private property during future disasters. FEMA may provide funds for such mitigation measures if they are applied to a specific facility, such as elevating a flood-prone building above the flood elevation, or to reduce risks to the community at large, as through vegetation management to reduce the risk of wildfire. FEMA also may provide funds for the relocation or acquisition of facilities located in areas of hazard, such as floodplains, where repetitive damage is likely to occur.

2.1 PROGRAMMATIC ESA SECTION 7 CONSULTATION

FEMA, as with all Federal agencies, is required under section 7(a)(2) of the Endangered Species Act of 1973, as amended, (16 U.S.C. 1531 *et seq.*)(ESA) to consult with NMFS to ensure that any action authorized, funded or carried out by FEMA is not likely to jeopardize the continued existence of any endangered or threatened species under their jurisdiction, or result in the destruction or adverse modification of habitat of such species which is legally designated to be critical. To initiate consultation, FEMA typically prepares a BA describing the action, the potential effects of that action on listed species, and any avoidance and minimization measures necessary to avoid adverse effects of the action on listed species and their habitats.

FEMA has determined through experience that the majority of the typical recurring actions proposed for funding, and for which a BA is required, can be grouped by type of action or location. These groups of actions, provided that they meet specified criteria, can be evaluated in a PBA such as this to comply with the ESA and its implementing regulations without having to produce a time consuming, stand-alone BA for every action. The PBA is then used as the basis for a programmatic consultation that would ultimately eliminate the need for individual consultations on many actions undertaken by FEMA, except in certain circumstances where an action cannot be appended to a programmatic consultation.

2.2 PURPOSE OF THE DOCUMENT

FEMA has prepared this PBA for the purpose of initiating a programmatic consultation with NMFS. This PBA describes the types of projects usually funded by FEMA and it evaluates typical recurring actions undertaken by FEMA within the State of California in preparation for, and in the wake of, disasters. This document will facilitate FEMA's compliance with the ESA by providing a framework to address affects to Federally listed species from projects typically funded in response to flood, earthquake, fire, and wind disasters, and to prevent future disasters resulting from these types of events. Through programmatic consultation, NMFS and FEMA intend to streamline the consultations process for these typically recurring actions in California.

This PBA proposes specific criteria, guidelines, and measures that FEMA, the Applicant (*i.e.*, the State of California), and their sub-grantees will follow during the implementation of FEMA-funded projects. Once NMFS has determined through the ESA section 7 consultation process that projects meet the guidelines, criteria, assumptions, and intent, as described throughout this document, NMFS will prepare and issue a programmatic "not likely to adversely affect" concurrence letter and a programmatic biological opinion. No additional ESA section 7 consultations with NMFS will be required for those projects that meet the guidelines, criteria, assumptions, and intent of this document, and were covered under the programmatic consultations. FEMA will, however, still need to initiate individual ESA section 7 consultations on all projects that do not meet the guidelines, criteria, assumptions, and intent of this document, and were not covered under the programmatic consultations. The criteria, guidelines, and assumptions proposed in this PBA apply only to projects located where Federally listed species or their habitats occur, or where a project may have an affect on a Federally listed species or its habitat; this includes primarily their designated critical habitat and areas within a species' recommended recovery units or other priority recovery areas. Projects located outside of listed-species habitats, or projects that have no effect on Federally listed species or their habitats, do not need to consult with NMFS under section 7 of the ESA.

This PBA applies immediately to all projects described in Section 3 of this document that have been proposed for funding by FEMA under all open declared rain, flood, fire, earthquake, and wind disasters in California. Open declared disasters are defined as disasters for which FEMA is still providing Federal assistance under the Stafford Act. This PBA also applies to pre-disaster hazard mitigation projects for which FEMA funding has been requested.

This PBA covers only projects of a permanent nature; projects intended to restore damaged facilities or to prevent future damage through mitigating activities such as vegetation management. **<u>It does not cover emergency response actions.</u>** As described in Federal regulations at 50 CFR Part 402.05, the term "emergency circumstances…applies to situations involving acts of God, disasters, casualties, national defense or security emergencies," and described in Appendix C – 44 CFR Part 206.201, "Emergency work means that work which must be done immediately to save lives and to protect improve property and public health and safety, or to avert or lessen the threat of a major disaster.". During an emergency response action, FEMA will call NMFS for technical assistance on effects from emergency response actions to Federally listed species. FEMA will then initiate consultation with NMFS on emergency response activities as soon as practicable and as necessary.

The analysis in this PBA has relied upon FEMA's historic experience of project typology, description, and consequences described in environmental documents from 1994 to 2005. Analysis in this PBA is also based on review of scientific literature and other available information about Federally listed species, consultation with regulatory agency personnel, and expert opinions.

This PBA, and the subsequent ESA section 7 programmatic consultations, cover only projects for which FEMA acts as the lead Federal agency. In order to avoid duplication of efforts, FEMA will not seek compliance under the ESA for minor, in-kind projects (referred to as "small projects" in the January 2000 letter of agreement between the U.S. Army Corps of Engineers (Corps) and FEMA (Appendix A)) where the Corps acts as the lead agency, or for projects completely within the Corps jurisdiction that repair areas to pre-disaster conditions. These projects are subject to review and permitting by the Corps under the Clean Water Act and are, therefore, subject to review and compliance under the ESA. For FEMA-funded projects with a Corps nexus, compliance under the ESA would be completed by the Corps with NMFS prior to the FEMA action being initiated.

2.3 UPDATES AND REVISIONS

At FEMA's discretion, this PBA may apply to subsequent disaster response efforts to be declared by the President, when FEMA so notifies the participating interested public and government parties and agencies. **If FEMA chooses to use this PBA for future disasters, FEMA will update the document, if needed, and in cooperation with NMFS, update any programmatic consultations that resulted from this PBA, as necessary.** For example, if new California counties are included in subsequent disasters where other species occur that were not previously addressed, or if new species are listed or new critical habitats designated, or the scope of FEMA's actions change; FEMA will address these issues in a new PBA or in an amendment to this PBA, and they will re-initiate consultation with NMFS in accordance to 50 CFR Part 402. FEMA will ensure that this PBA, and the resulting programmatic consultation documents, are revised and updated at a minimum of at least every five years from the date that consultation is completed.

3.1 ACTION AREA

The actions described in this PBA occur in several counties within the State of California. The heavy 2005/2006 winter rains in California resulted in a Federal disaster declaration (FEMA-1628-DR) in 30 California counties and later severe storms, flooding, and landslides resulted in a Federal Disaster declaration (FEMA-1646-DR) in 17 California counties, 5 of which were not included in the 1628-DR declaration (Appendix B, Exhibits 1 and 2, respectively). Currently, there are 12 Federally listed or proposed aquatic species and their habitats that could be affected by FEMA-funded actions within those 35 counties (Appendix C). Subsequent Federally declared disasters may occur in other California counties where these species also occur. If this happens, FEMA may chose to expand the action area to include these new counties and then use this PBA and the subsequent programmatic consultation documents (as discussed previously in Section 2.3) to implement their Federal disaster assistance programs in those new counties. For example, during the next Federally declared disaster, Stanislaus and Calaveras counties may be included in the disaster. If this were to occur, most or all of the species and the FEMA-funded actions that may have an effect on those species and their habitats have already been addressed in this PBA.

Specific project locations, footprints, affected areas, *etc.* are defined for each project prior to the project proponent receiving Federal funds.

3.2 PROPOSED ACTION

This section describes typical projects that are funded by FEMA in response to, or in preparation for, disasters. Projects are described independent of the FEMA program that is the source of funding. Only actions with the potential to affect Federally listed species or their habitats are covered in this PBA. Projects that do not follow all of the guidelines, criteria, assumptions, or intent of this document may not be covered under NMFS's programmatic consultations.

Typically recurring actions covered by this PBA include:

- Non-emergency debris removal;
- Constructing, modifying, or relocating facilities;
- Projects involving water courses and coastal features;
- Vegetation management

These project types are described in more detail below.

3.2.1 NON-EMERGENCY DEBRIS REMOVAL

There are situations where debris removal is necessary in non-emergency situations, such as in the restoration of facilities. Sediment and debris removal projects include:

- ? Removal of rock, silt, sediment, or woody debris that has been deposited by floodwaters in stream channels, bridge and culvert openings, canals, sedimentation basins, sewage treatment ponds, ditches, and other facilities in such a manner as to disrupt normal flows, navigation, recreation, or municipal services;

- ? Removal of woody debris from public areas or facilities, such as roads, railroad tracks, and trails following wind or fire events that damage or destroy trees;

- ? Removal of rock and earth from public areas or facilities following landslides caused by earthquakes or heavy rains; and

- ? Removal of building rubble from public areas or facilities following earthquakes.

All removable debris would be disposed of at approved and licensed disposal sites, in compliance with existing laws and regulations. Any hazardous materials or other contaminants would be removed and disposed of in an appropriate manner. Many materials may be recycled, if recycling facilities exist.

3.2.2 CONSTRUCTING, MODIFYING OR RELOCATING FACILITIES

FEMA may provide funds for:

- ? Upgrading or otherwise modifying buildings;
- ? Providing temporary facilities;
- ? Acquiring and demolishing existing facilities;
- ? Repairing, realigning, or otherwise modifying roads, trails, utilities, and rail lines;
- ? Constructing new facilities or relocating existing facilities;
- ? Relocating the function of an existing facility;
- ? Extending the pressurized water service area; and
- ? Developing demonstration projects.

These project types are described in more detail below.

3.2.2.1 UPGRADING OR OTHERWISE MODIFYING BUILDINGS

Under this action, FEMA would provide funds to implement changes required by current building codes and standards or otherwise modify existing buildings. Often, these changes have the effect of making the structure more resistant to damage in future events. Typical activities include:

- Making buildings more fire resistant (*e.g.,* by replacing roofs and doors with fire-resistant materials) or safer during fires (*e.g.,* by installing sprinkler and alarm systems);
- Installing bracing, shear panels, shear walls, anchors, or other features so that buildings are better able to withstand earthquake shaking or high wind loads;
- Modifying buildings to reduce the risk of damage during floods by elevating structures above the expected flood level or by flood-proofing;
- Modifying buildings to meet another need of a sub-grantee, such as with an improved action or an alternate action.

If a building is located in an identified floodplain and is substantially damaged, the NFIA requires that the building be elevated so that the lowest floor is at or above the base flood (100-year) elevation. Newly constructed buildings, such as those built to replace destroyed facilities must also meet this requirement, if located in floodplains. Structures can be elevated on extended foundation walls, piers, posts, columns, or compacted fill. All materials used below the base flood elevation must be flood resistant. Utilities, such as exterior compressors, also must be elevated above the base flood elevation. A building also can be flood-proofed so that floodwaters can encounter it without causing damage to the structure or its contents. "Dry flood-proofing" methods involve the installation of flood shields, water-tight doors and windows, earthen barriers, and pumping systems to prevent water from entering the structure. "Wet flood-proofing" involves the installation of vents and flood-resistant materials so that water may enter and leave areas of the structure without causing damage. With both dry and wet flood-proofing, utilities are modified, elevated, or relocated to prevent floodwaters from accumulating within them. Buildings also may be upgraded to meet codes unrelated to damage from natural hazards, such as upgrades required by changes in capacity or function, and upgrades necessary to meet the requirements of the Americans with Disabilities Act.

3.2.2.2 PROVIDING TEMPORARY FACILITIES

FEMA may provide temporary group housing sites when a disaster renders homes uninhabitable for long periods. Such sites are typically constructed using travel trailers or manufactured housing. Typical activities include:

? Developing the pads for dwellings;

? Constructing ancillary facilities, such as roads, streets, and parking lots;

? Installing utilities, such as potable water lines, sewer hookups, electricity (including proper street lighting), telephones lines, *etc.*

These actions would be implemented only if other housing options, such as vacancies in hotel rooms or availability of rental units, are not feasible. Appropriate sites are not to be located in a floodplain, contain wetlands, critical habitat, or other sensitive areas, affect historic properties or archaeological sites, or contain hazardous materials.

Installation of housing units and utilities is accomplished in accordance with current codes and standards. After temporary housing is no longer needed at the disaster site, the temporary housing units and associated ancillary facilities are removed and the land is restored to its original use. All removed materials are stored for future use or disposed of in accordance with applicable laws and regulations.

FEMA may also provide funding for temporary relocation of essential public services, in the event that the structures housing those services are damaged, destroyed, or otherwise rendered inaccessible by a disaster. In most cases, the lease or purchase of facilities is eligible; however, construction of new facilities may be eligible if this action is also cost-effective. Funds also are provided for the upgrades necessary to meet current codes and standards and the installation or modification of appurtenances necessary to operate facilities, such as utilities.

3.2.2.3 ACQUIRING AND DEMOLISHING EXISTING FACILITIES

FEMA may provide funds for the acquisition and demolition of existing facilities if they are located in high-hazard areas and are subject to repetitive loss. Typically, these facilities are at a high risk because of (1) damage from flooding; (2) erosion of stream banks, beaches, slopes, or bluffs; (3) landslides; or (4) wildfire. These facilities may consist of private properties, such as houses and commercial buildings, or publicly owned facilities, such as utilities, roads, and bridges. Generally, a local government entity purchases private properties on a willing-seller basis; once the property has been purchased, the existing facilities are either removed or demolished and the property will be dedicated and maintained in perpetuity for uses compatible with open space, recreational, or wetlands management practices, pursuant to 44 CFR 206.434(d). All demolition materials are disposed of at approved and licensed disposal sites, in compliance with applicable laws and regulations, and any hazardous materials or other contaminants are removed and disposed of in an appropriate manner. Construction debris and household materials may be recycled, if recycling facilities exist. Once structures are removed, lots are graded to conform to the local topography and disturbed areas are re-vegetated with species approved for the local area. Frequently, the local government will develop the acquired land for recreational or open-space uses, such as parks, athletic fields, or walking and bike trails.

3.2.2.4 REPAIRING, REALIGNING, OR OTHERWISE MODIFYING ROADS, TRAILS, UTILITIES, AND RAIL LINES

Roads, trails, utilities, and rail lines are typically damaged when floods, heavy rains, earthquakes or other natural or man-made disasters occur to cause erosion, subsidence, or landslides. Repairs are accomplished by replacing earthen material lost during the disaster and replacing the damaged surface, utility line, or in the case of rail lines, ballast and track. It may be necessary to stabilize the replacement fill using rock, grout, timber walls, or steel sheet piling. Hazard mitigation measures may be installed to prevent future damage; for example, a pipe may be installed to convey drainage beneath a road, thus preventing future washouts, or a utility line may be encased in concrete in an area vulnerable to erosion. If the area of damage is unstable, does not allow for repair, or is subject to repetitive loss, a facility may be realigned so that the area of damage is avoided. Property acquisition or a change in easement may be necessary. Facilities also may be modified as part of improved actions or alternate actions to meet additional needs of the sub-grantee.

3.2.2.5 CONSTRUCTING NEW FACILITIES OR RELOCATING EXISTING FACILITIES

If a facility is located in a floodplain or other hazard area, is subject to repetitive damage, or has been damaged in such a way that restoration in the current location is not practical or cost effective, FEMA may fund the construction of a new facility or the physical relocation of the existing facility. Examples of this type of action include construction of buildings, roads, trails, utilities and utility lines, and rail lines in a different area from the existing facility. The physical relocation of existing facilities is only practical with buildings. In cases of both new facility construction and physical relocation, FEMA may fund the cost of land acquisition and the construction of appurtenant features, such as access roads and utilities. For properties in the hazard area, FEMA would fund the acquisition of damaged properties, demolition of existing structures (except in cases of physical relocation), and the placement of deed restrictions that would limit future uses to open space in perpetuity. New facilities (including buildings, roads, trails, utilities and utility lines, and rail lines) also may be constructed as improved actions or alternate actions to meet additional needs of the sub-grantee.

3.2.2.6 RELOCATING THE FUNCTION OF AN EXISTING FACILITY

Under this action, FEMA would fund the relocation of the function of a facility to an existing facility that has adequate capacity to handle the additional load with minor modifications, if any. For structures, the occupants and materials would be relocated to alternative structures, traffic would use alternate routes, and utility services would be provided by alternative methods. This action would not entail any major physical construction or addition to the existing facility and, if any work would be required, it would consist of only minor modifications. A typical example is transferring students from a damaged or flood-prone school to a suitable existing school nearby, if feasible in terms of capacity and convenience for students, families, and teachers. For properties in a hazard area, FEMA would fund the acquisition of damaged properties, demolition of existing structures, and the placement of deed restrictions that would limit future uses to open space in perpetuity

3.2.2.7 Extending the Pressurized Water Service Area

As a means of preventing future damage during wildfires, FEMA may fund the extension of pressurized pipelines to a developed area that is prone to repetitive fire damage. Under this action, an existing, pressurized system is extended so that fire hydrants can be installed in the area where damage is likely to occur. Installation, which involves excavation, is typically completed within the road right-of-way.

3.2.2.8 Developing Demonstration Projects

Demonstration projects focus on public education and are designed to highlight procedures that can be employed by the public to reduce property damage during flood, fire, wind, and earthquake disasters. Potential demonstration projects would involve the development of a model facility to demonstrate how hazard mitigation technologies can be used to reduce the potential damage during a disaster. Flood demonstration projects would involve items such as elevating a structure or waterproofing windows and doors that are below the elevation of the 100-year flood event. A fire demonstration project would include vegetation management around a facility and/or replacing roofs, doors, and windows with fire-resistant materials. Wind and earthquake demonstration projects would include changes to the structural design of buildings to allow them to withstand higher wind velocity or more movement during an earthquake.

3.2.3 PROJECTS INVOLVING WATERCOURSES AND COASTAL FEATURES

These projects may involve any inland watercourse such as streams, creeks, rivers, lakes, sloughs, bayous, *etc.* It also may involve ponds, vernal pools, and other wetlands that may be perennial (year-round), ephemeral (may be dry during a portion of the year), or intermittent (wet only during an actual rain event). Coastal features may include estuaries, lagoons, harbors, and beaches. All projects would employ standardized Best Management Practices (BMPs) per state water quality standards and criteria, the California Stormwater Best Management Practice Handbooks, *etc.* in order to reduce soil erosion and prevent or reduce the amount of sediment entering the water course. All BMPs would comply with all state, Federal, and local jurisdictional laws and requirements. All projects would comply with the guidelines, criteria, assumptions, and intent described in this PBA.

3.2.3.1 Repair, Stabilize or Armor Embankments

These projects would involve the repair of earthen or rock embankments damaged by floodwaters. Examples include natural stream banks (such as those in parks); road, trail, and rail line embankments; embankments for irrigation and navigation canals; and levees used for flood control and reclamation. In addition to the repair of damaged features, FEMA may fund measures designed to prevent damage in future flood events. In addition to replacing fill material, embankments may be stabilized or armored through:

? Bioengineering techniques, such as planting vegetation, placing root wads or willow (*Salix* sp.) bundles, *etc.* (Appendix D, Attachment 7);

? Placement of rock riprap;

? Installation of retaining walls, geotextile fabrics, armorflex®, gabions, *etc.*;

? Hardening with concrete or soil cement.

Any combination of these techniques may be employed; for example, rock and geotextile fabrics, when used with root wads and willow bundles, may provide mitigation from erosion while enhancing the natural values of the stream corridor.

3.2.3.2 Create, Widen, or Dredge a Waterway

These projects are employed to reduce the flood hazard to adjacent lands, facilities, or populated areas. Projects may include:

? Construction of new channels to convey excess flows around flood-prone areas during flood events. Drainage swales, earthen channels, concrete channels, or sub-surface concrete pipes may be used as a means of water conveyance. The channel is constructed in a dry environment and connected to the stream after the channel has been completed. The channel may have an inlet weir that is higher than the elevation of the normal flow so that normal flows remain in the natural channel. The outlet may be armored with concrete or rock riprap to prevent excessive erosion of the existing channel.

? Existing channels may be widened to allow the channel to convey a larger volume of water. Conveyance also may be increased by replacing earthen banks or channel bottoms with concrete. To the extent possible, the construction would be conducted from the top of the bank. In perennial streams, work in a stream channel would generally be restricted to the low-flow period.

? As an alternative to constructing a bypass or modifying an existing channel, the existing channel may be cleared of vegetation or sediment to increase conveyance. This alternative is often used in developed areas where modifications are not feasible, as well as in areas where years of inadequate maintenance have allowed trees and brush to grow within the channel, or sediment and debris to accumulate in the channel, or around culverts and bridges. Vegetation may be removed through mechanical means, by hand, or by application of herbicides. Sediment and debris may be removed by dredging, through the use of heavy equipment, or by hand. All removed debris would be disposed of in compliance with existing laws and regulations.

3.2.3.3 Construct or Modify a Water Crossing

Water crossings, such as culverts and bridges, can be eroded or entirely washed away by high stream flows, heavy rains, or storm-driven waves. Wind, earthquakes, or fire events may cause structural damage to bridges or culverts. FEMA may fund the repair or replacement of damaged water crossings; enlargement of openings to allow greater water conveyance and to reduce debris accumulation during floods; or the installation of bank protection and other means to reduce the risk of erosion. The capacity of a culvert crossing may be increased to reduce the risk of flooding to the surrounding area; the culvert may be modified to prevent overtopping or erosion of the crossing; or a bridge may be installed to replace a culvert as a means of increasing the flow capacity of a crossing. Culverts may consist of corrugated metal pipes, reinforced concrete pipes, and reinforced concrete box culverts, or other materials. Crossings also may be relocated to avoid high hazard areas, repetitive damage, or areas where reconstruction is not cost effective or is not feasible. Typical projects include:

? Increasing the size of a culvert, or adding additional culverts;

? Hanging the type of culvert;

? Changing the location or alignment of the culvert; and

? Adding features, such as a headwall, discharge apron, or riprap, to reduce the risk of erosion or damage to the culvert or the crossing.

Destroyed bridges are replaced according to standard building and seismic safety codes. Bridges may be modified to increase channel capacity, thus reducing the risk of flooding, or to reduce the risk of damage to the crossing. Typical projects include:

? Widening of existing openings, or construction of new openings;

? Reconfiguration of bracing to reduce the risk that debris will be trapped;

? Installation of protective features, such as concrete abutments or riprap, to reduce the risk of damage due to erosion and scour; and

? Replacement of a multi-span structure with a clear-span structure.

3.2.3.4 Construct or Modify a Water Detention, Retention, or Storage Facility

These projects include the construction, enlargement, or restoration of detention basins, retention basins, sediment ponds, and reservoirs to reduce flood flows or to provide a water source for fighting fires in an area of high fire hazard. The creation and/or enlargement of water storage reservoirs would be most frequently associated with flood disasters, and to a lesser extent fire disasters. Detention dams, retention dams, and sediment ponds would be constructed routinely to temporarily store flood flows so that downstream peak flows would be reduced. The stored water would be released at a slower rate so that the existing conveyances can convey the water without contributing to downstream flooding. Frequently in rural areas, fire fighting is heavily constrained by the lack of water that can be used by firefighters. In response to this need, proposed actions also may include the creation of retention dams in locations that can be readily accessed by firefighters either as a direct source of water or as a source of water to fill their water supply trucks. These projects also may include the repair or restoration of water retention and detention structures and sediment ponds.

3.2.3.5 Construct or Modify Other Flood Control Structures

A flood control structure is a facility designed to prevent floodwaters from entering a flood-prone area. Typical examples include levees (also referred to as dikes) and floodwalls. These may be damaged by high water from floods, storm driven waves, and structural damage from earthquakes. Projects typically include:

? Repairing damaged facilities, usually during emergency situations;

? Installing embankment protection, as described above;

? Raising the height of existing facilities to prevent overtopping in future floods;

? Constructing new facilities to protect flood-prone areas from damage during future floods; and

? Modifying or installing interior drainage systems to reduce the risk of damage behind levees and floodwalls during heavy rains or flooding events on tributary streams.

Levees are repaired or constructed using compacted fill and, in some cases, geotextile fabric and riprap protection at the base. Typically, a gravel road is installed on the crest of the levee to allow for maintenance. Floodwalls, usually built in urban areas, are constructed using reinforced concrete or grouted and/or reinforced concrete block. Excavation is necessary to install footings. Both types of facilities may include interior drainage systems that may include pumps for removing accumulated water. Bare earth is often seeded with grasses to prevent erosion.

3.2.3.6 Construct or Modify a Coastal Feature

These projects include the repair, replacement, or construction of facilities in coastal environments, such as estuaries, bays, inlets, harbors, and beaches. These facilities typically include:

- Recreational facilities, such as piers and boat ramps;
- Facilities for maritime use, such as docks and slips;
- Shoreline protection devices, such as seawalls, groins, jetties, and revetments; and
- Coastal flood control structures, such as levees

Construction activities generally occur in the water and typically involve driving piles, placing rock or soil, or dredging sand, mud, or other sediment. Minor improvements to meet current building and safety codes, or to prevent future damage in disasters, also may be funded.

3.2.4 VEGETATION MANAGEMENT

Vegetation management is employed to reduce the risk of wildfire and to increase the ability of channels to convey flows, thus reducing the risk of flood damage. These projects may be accomplished using mechanical means, hand clearing, managed animal grazing, application of herbicides, or through the use of prescribed fire. Some projects may include combinations of these methods.

3.2.4.1 Mechanical or Hand-Clearing of Vegetation

This action would involve construction, expansion, and/or maintenance of fuel breaks and fuel reduction zones. For the purpose of this document, fuel breaks are corridors where all woody vegetation has been removed. The purpose of a fuel break would be to reduce the extent of fire and to provide a location in which firefighters can work safely and effectively. Fuel breaks also can be compacted or graded for use as fire access roads.

Fuel reduction zones reduce the speed at which a fire spreads and creates a safer environment for firefighters. Mechanical removal would use heavy equipment that can uproot, crush, pulverize, or cut the trees and brush to be removed. Hand removal would involve the use of chainsaws, axes, and hoes to cut and uproot vegetation. Vegetation downed as a result of mechanical or hand removal would be piled and burned on site, chipped and spread on site, or loaded and hauled from the site. After the removal of the targeted vegetation, cleared areas may be re-vegetated with native fire-resistant species. The project proponent (*i.e.,* the sub-grantee) would be responsible for the maintenance of created fuel breaks and fuel-reduction zones. On occasion, mechanical and/or hand removal of vegetation may be employed around a much larger area that has been targeted for a prescribed fire to reduce the potential that the set fire will escape from the burn area.

3.2.4.2 Herbicidal Treatments

Only registered chemicals will be used to control the growth of undesired vegetation. Only chemicals approved for aquatic use would be used in or near aquatic environments. A registered pesticide applicator will apply all such chemicals that require an applicator's license. After treatment, some areas may be re-vegetated with locally occurring, native vegetation that is fire resistant. Actions generally associated with herbicidal treatment of vegetation include the removal of targeted exotic invasive species within specific areas (*e.g., Eucalyptus* sp.) and the prevention of growth and re-sprouting of undesirable vegetation (*e.g., Baccharis* sp.) once an area has been cleared of excessive vegetation by mechanical removal, hand removal, and/or prescribed fires.

Regulations at 50 CFR Part 402.04 provide that ''the consultation procedures may be superseded for a particular Federal agency by joint counterpart regulations among that agency, the Fish and Wildlife Service (Service), and NMFS." NMFS, in cooperation with the Service and the Environmental Protection Agency (EPA), have published Joint Counterpart Regulations that govern the ESA section 7 consultation process for the use of pesticides in or near Federally listed species and their habitats (69 FR 47732).

3.2.4.3 Prescribed Fire

Prescribed fires would be used in areas with high fire-hazard potential exists due to the amount of fuel available in the environment. The intent of a prescribed fire is to systematically reduce the amount of fuel in a controlled manner, thereby reducing the duration and intensity of wildfires. This is similar to the discussion above about fuel-reduction zones, except that the treatment area is typically larger. Prescribed fires would require interagency coordination by the project proponent to ensure that all appropriate Federal, state, and local agencies have been notified of the action, that all laws and regulations have been fulfilled, and that standardized safety and implementation protocols, and other concerns, have been addressed. FEMA also requires that the applicant follow the burn procedures outlined in the most recently available edition of the California Environmental Protection Agency's *Forest Management Burning Handbook*. As discussed previously, prescribed fire projects frequently would be combined with mechanical and/or hand removal of vegetation around the perimeter of the proposed burn area to help ensure that a fire is controlled and contained within the prescribed area. Prescribed fire actions also may include the burning of trees and brush that have been piled as the result of mechanical and/or hand removal activities. The burning of these piles may require a burn plan, permits, and interagency coordination prior to implementation.

3.2.4.4 Biological Control

Under this action, the project proponent would allow cattle, horses, goats, sheep, or other livestock to graze on vegetation as a means of control. The type of animals, timing, duration, and stocking rate would be selected based on the targets (*i.e.,* the quantity and quality of residue to remain) of an approved vegetation management plan. The project proponent would fence the area proposed for grazing so that the animals would not graze outside of the proposed area. Fences that are appropriate to the target species (*i.e.*, 5-strand barbed wire for cattle; temporary electric fencing for goats, *etc.*) would be installed and a buffer fence located a minimum of approximately 100 feet from the center of all streams, creeks, and rivers would be provided to control grazing animals from permanently damaging the channel and riparian vegetation. This buffer fencing would have gated access points to allow the grazing manager to systematically rotate the animals through the riparian area to better manage the streamside vegetation. Appropriately spaced and sized water gaps also may be included in the buffer fencing to allow animals to access water *ad libidum*. In cases where ponds and other water sources support known populations of Federally listed species, fences with gates would be installed around these areas in order to control the stocking rate, timing, and duration of the grazing at a level that does not adversely affect the species.

NMFS policy stipulates that a salmon population (or group of populations) will be considered "distinct" for purposes of the ESA if it represents an Evolutionarily Significant Unit (ESU) or a Distinct Population Segment (DPS) of the biological species. An ESU or DPS is defined as a population that:

1) is substantially reproductively isolated from specific populations; and

2) represents an important component of the evolutionary legacy of the species.

NMFS established Biological Review Teams that performed status reviews of West Coast populations of salmon and steelhead due to the general decline in populations. In reviewing the biological and ecological information concerning west coast salmon and steelhead, NMFS identified five ESUs for Chinook salmon, two ESUs for west coast coho salmon, and six DPSs for west coast steelhead from California (Myers *et. al*. 1998). Maps of the ESUs and DPSs are included in Appendix C.

Critical habitat is defined in section 3(5)(A) of the ESA as "(I) the specific areas within the geographical area occupied by the species . . . on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by the species . . . upon a determination by the Secretary of Commerce (Secretary) that such areas are essential for the conservation of the species" (see 16 U.S.C. 1532(5)(A)). The term 'conservation', as defined in section 3(3) of the ESA, means ". . . to use and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this Act are no longer necessary" (see 16 U.S.C. 1532(3)). Therefore, critical habitat is the geographic area and habitat functions necessary for the recovery of the species. Section 4(a)(3)(A) of the ESA requires that, to the "extent prudent and determinable", critical habitat be designated concurrently with the listing of a species.

Not all ESUs and DPSs in California currently have critical habitat designated with them. NMFS recently vacated some designated critical habitats pending economic review. NMFS will provide FEMA with Geographic Information Systems (GIS) electronic data of the ESU and DPS boundaries and the area offices with jurisdiction for those ESUs and DPSs.

4.1 LISTED SPECIES AND CRITICAL HABITAT

The species and critical habitats listed below will be addressed within this PBA.

4.1.1 Listed Species

? California Coastal Chinook salmon (*Oncorhynchus tshawytscha*) – threatened

? Sacramento River ESU winter-run Chinook salmon (*Oncorhynchus tshawytscha*) – endangered

? Central Valley California ESU spring-run Chinook salmon (*Oncorhynchus tshawytscha*) – threatened

? Northern California ESU steelhead (*Oncorhynchus mykiss*) – threatened

? Central California Coast ESU steelhead (*Oncorhynchus mykiss*) – threatened

? South-Central Coast ESU steelhead (*Oncorhynchus mykiss*) – threatened

? Southern California ESU steelhead (*Oncorhynchus mykiss*) – endangered

? California Central Valley ESU steelhead (*Oncorhynchus mykiss*) – threatened

? Southern Oregon/Northern California Coast ESU coho salmon (*Oncorhynchus kisutch*) – threatened

? Central California Coast ESU coho salmon (*Oncorhynchus kisutch*) – threatened

? Southern DPS of North American green sturgeon (*Acipenser medirostris*)

The following species have been proposed for listing:

? Central Valley ESU fall\late fall-run chinook salmon *(Oncorhynchus tshawytscha*) -proposed as threatened

4.1.2 Designated Critical Habitats

Critical habitat has been designated for the following:

? California Coastal Chinook salmon

? Sacramento River ESU winter-run Chinook salmon

? Central Valley California ESU spring-run Chinook

? Northern California ESU steelhead

? Central California Coast ESU steelhead

? South-Central Coast ESU steelhead

? Southern California ESU steelhead

? California Central Valley ESU steelhead

? Southern Oregon/Northern California Coast ESU coho salmon

? Central California Coast ESU coho salmon

4.2 DESCRIPTIONS OF THE SPECIES

4.2.1 Coho Salmon

Coho salmon are native to the northern Pacific Ocean and historically, were found in coastal streams from Alaska to northwestern Mexico (Moyle 1976; Weitkamp *et al*. 1995). Santa Cruz County, California is thought to presently have the southern-most population of coho salmon in North America (Weitkamp *et al*. 1995). Coho salmon are usually found in small to moderately sized coastal streams with heavily forested watersheds, perennially-flowing reaches of cool water, dense riparian canopy, deep pools, abundant overhead and instream cover, undercut banks, and gravel or cobble substrates. Adults return in the fall from the ocean to their natal streams to spawn. After the eggs hatch, the juvenile salmon remain in freshwater for several months, feeding and growing. They migrate to the ocean the following spring (Shapovalov and Taft, 1954; Hassler, 1987).

Adult salmon begin the freshwater migration from the ocean to their natal streams after heavy late fall or winter rains breach the sand bars at the mouths of coastal streams (Sandercock 1991). Migration continues until March, peaking in December and January, with spawning occurring shortly after their return to the spawning area. Coho salmon spawn in small to medium gravel substrate and choose spawning areas with nearby overhead and submerged cover, clean, loosely compacted gravel, cool water, and sufficient flow to aerate the eggs, carry away waste products, and assist juvenile emergence from the gravel (Shapovalov and Taft 1954; Phillips *et*. *al*., 1961).

Juvenile coho salmon move to shallow water along stream margins then relocate into deeper water as they grow (Nielsen 1992). They prefer pools at least 1 meter deep shaded by overhead cover, undercut banks and woody debris for submerged cover, cool water temperatures, good dissolved oxygen levels, little turbidity, and a constant supply of food. Juvenile coho salmon feed on drifting insects that derive from the riparian canopy and on aquatic insects that live in the substrate and leaf litter in the pools. In the spring, the juveniles undergo a physiological process called smoltification which enables them to move into, and live in, the marine environment. They begin to migrate downstream to the ocean during late March and early April; out migration usually peaks in mid-May, under favorable conditions (Shapovalov and Taft 1954).

Brown *et al*. (1994) did a comprehensive review of estimates of historic abundance, decline and present status of coho salmon in California. They estimated that coho salmon annual spawning population in California ranged between 200,000 and 500,000 fish in the 1940s, which declined to about 100,000 fish by the 1960s, followed by a further decline to about 31,000 fish by 1991, of which 57 percent were artificially propagated and 43 percent were natural spawners. Brown *et al*. (1994) concluded that the California coho salmon population had declined more than 94 percent since the 1940s, with the greatest decline occurring since the 1960s. Populations continue to trend downward in most watersheds as habitat is lost or degraded.

4.2.2 Chinook Salmon

The historic range of Chinook salmon in North America is from Point Hope, Alaska to the Ventura River in southern California (Healey 1991). There are currently no viable populations of Chinook salmon south of San Francisco, California (Myers *et al*., 1998). Chinook salmon usually reside in the ocean for two to five years, staying along the coast. Fall-run Chinook salmon migrate upstream to spawning grounds from July through April and spawn October through February. Winter-run Chinook enter the rivers November to June and spawn late-April to mid-August. Spring-run Chinook migrate upstream March to July and spawn late-August to early-October (Meyers, *et. al.*, 1998).

Adult female Chinook salmon spawn in streams with clean, loose gravel and cool water, creating nests called redds. The gravel is unsuitable for spawning when it has been cemented with clays or fines, or when sediment reduces intragravel percolation (62 FR 24588). Intragravel percolation is necessary for getting oxygen to the eggs and removing waste products.

Newly hatched Chinook salmon look for cover beneath undercut banks, fallen trees, or other areas providing cover (Everest and Chapman 1972). Larger juveniles move to deeper water areas that still provide cover. Rocks, submerged aquatic vegetation, logs, riparian vegetation, and undercut banks provide cover, forage areas, shade, and shelter from predation. Chinook salmon juveniles feed on insects, both terrestrial and aquatic, and aquatic crustaceans. Smolts usually migrate downstream to the ocean during April through July (Myers *et al*. 1998). They use estuaries and coastal areas for rearing; the brackish water areas in estuaries moderate the physiological stress that occurs during smoltification.

Historic estimates of Chinook salmon population abundance are not available for most ESUs. Population have declined statewide during the last century. Data available to assess specific trends in abundance are limited, but in some ESUs, populations are estimated to be less than one percent (1%) of what they were since records of abundance started being kept during the 19th century (Myers *et al*. 1998). By looking at habitat that was used by salmon before dams were put in place in the 19th century, it is possible to estimate the extent of habitat that was used historically by Chinook populations. In some case it is estimated that over 95% of the historic freshwater habitat in an ESU has been lost (Myers *et al.* 1998), and habitat continues to be lost or degraded.

4.2.3 Steelhead

Steelhead are native to the north Pacific Ocean and in North America are found in coastal streams from Alaska to San Diego County, California (Moyle 1976; Busby *et al*. 1996). Steelhead spend from one to five years in saltwater, with two being the most common (Busby *et al.* 1996). The distribution of steelhead in the ocean is not well known, studies indicate that most steelhead tend to migrate north and south along the continental shelf (Barnhart 1986).

The timing of steelhead migration upstream is correlated with higher flow events, such as freshets or sand bar breaches, and associated lower water temperatures. Steelhead can be divided into two basic reproductive ecotypes, based on their time of river entry and duration of spawning migration. Summer steelhead enter fresh water in a sexually immature condition and requires several months to mature and spawn. Winter steelhead enter fresh water with well-developed gonads and spawn shortly thereafter. Steelhead that enter fresh water between May and October are considered summer steelhead, and steelhead that enter fresh water between November and April are considered winter steelhead. Some river basins have both summer and winter steelhead; others have only one type. Most spawning in California takes place from January through April. Steelhead may spawn more than once before dying (iteroparity), in contrast to other species of the *Oncorhynchus* genus. Repeat spawning rates typically range from 13-24 percent in California coastal streams (Busby *et al.* 1996).

Steelhead prefer cool, clear water, and clean gravel size to spawn in, with adequate water flow for aerating the eggs (Barnhart 1986; Everest 1973). Juveniles inhabit the shallower edge portions of the stream and move gradually into deeper water as they grow larger. The distribution and numbers of fish are proportional to the amount of cover available (Bjornn and Reiser 1991). Young steelhead feed on a wide variety of aquatic and terrestrial insects. Juvenile steelhead in California typically reside in freshwater for two years before smolting. Because steelhead are present year round, sufficient water flow and cool temperatures are also necessary year round. Steelhead juveniles usually migrate downstream during spring and summer, but can be found moving downstream at all times of the year (Shapovalov and Taft 1954).

Environmental variables including water temperature, dissolved oxygen (DO) levels, and the amount of sediment in the water affect the behavior, growth and survival of juvenile steelhead. Water temperature influences the growth rate, population density, swimming ability, feeding ability, and susceptibility to disease of juveniles (Barnhart 1986; Bjornn and Reiser 1991). Juvenile metabolism, swimming speed, food consumption rate, and efficiency of food utilization all decrease with decreasing DO levels. Sediments can reduce egg survival, abrade and clog gills, reduce or eliminate forage, and indirectly change behavior (Phillips *et. al.*, 1961; Reiser and Bjornn 1979). The growth rate, behavior, and ultimately the survival of the juveniles are all dependent on environmental variables being within optimal range.

Historically, steelhead were found in reaches below natural barriers, like waterfalls, in most coastal and many inland streams along the west coast of the United States. Nehlsen *et. al.* (1991) found that 23 indigenous, naturally reproducing stocks of west coast steelhead have gone extinct and more are currently at risk. Quantitative abundance estimates for steelhead are rarely available from before the 1950s. Estimates of steelhead abundance since have shown a decrease in all naturally reproducing populations. Some populations, such as the South-Central California Coast ESU have populations that are only 1% of those of 40 years ago. The Southern California ESU populations are less than 1% of previous population estimates.

4.2.4 Green Sturgeon

The Southern DPS of North American green sturgeon was listed as threatened on April 7, 2005, (71 FR 17757) and includes the North American green sturgeon population spawning in the Sacramento River basin and utilizing the Sacramento River, Delta and San Francisco Estuary. The Southern DPS of North American green sturgeon listing becomes effective on July 7, 2006. Per the ESA section 7 (a)(2), NMFS is required to ensure that any Federal agency that authorizes, funds, or carries out projects does not jeopardize the continued existence of the species. Upon completion of section 4(d) exemptions and take prohibitions, the terms and conditions of this biological opinion will be effective.

North American green sturgeon are widely distributed along the Pacific Coast and have been documented offshore from Ensenada Mexico to the Bering Sea and found in rivers from British Columbia to the Sacramento River (Moyle 2002). As is the case for all sturgeon, North American green sturgeon are anadromous; however, they are the most marine-oriented of the sturgeon species (Moyle 2002). In North America, spawning populations of the anadromous green sturgeon currently are found in only three river systems, the Sacramento and Klamath

Rivers in California and the Rogue River in southern Oregon. Spawning has only been reported in one Asian river, the Tumin River in eastern Asia. Data from commercial trawl fisheries and tagging studies indicate that the green sturgeon occupy waters within the 110 meter contour (NMFS 2005, Erickson and Hightower 2006) of the continental shelf. During the late summer and early fall, subadults and nonspawning adult green sturgeon frequently can be found aggregating in estuaries along the Pacific coast (Emmett *et al.* 1991). Particularly large concentrations occur in the Columbia River estuary, Willapa Bay, and Grays Harbor, with smaller aggregations in San Francisco Estuary (Emmett *et* al 1991, Moyle *et al.* 1992). Recent acoustical tagging studies on the Rogue River (Erickson *et al*. 2002) have shown that adult green sturgeon will hold for as much as 6 months in deep (> 5m), low gradient reaches or off channel sloughs or coves of the river during summer months when water temperatures were between 15 ^{o}C and 23 ^{o}C. When ambient temperatures in the river dropped in autumn and early winter (< 10 ^{o}C) and flows increased, fish moved downstream and into the ocean. In addition, Erickson *et al*. (2002) found individual green sturgeon adults spend up to six months in freshwater.

Two green sturgeon DPSs were identified based on evidence of spawning site fidelity (indicating multiple DPS tendencies), and on the preliminary genetic evidence that indicates differences at least between the Klamath River and San Pablo Bay samples (Adams *et al*. 2002). The northern DPS includes all green sturgeon populations starting with the Eel River and extending northward. The southern DPS would include all green sturgeon populations south of the Eel River with the only known spawning population being in the Sacramento River.

The Southern DPS of North American green sturgeon life cycle can be broken into four distinct phases based on developmental stage and habitat use (it was suggested by Nakamoto *et al*., 1995, to break them into three parts); 1) adult females greater than or equal to 13 years of age and males greater than or equal to 9 years of age, 2) larvae and post-larvae less than 10 months of age, 3) juveniles less than or equal to 3 years of age, and coastal migrant females between 3 and 13, and males between 3 and 9 years of age (Nakamoto *et al*. 1995).

New information regarding the migration and habitat use of the Southern DPS of North American green sturgeon has emerged. Lindley (2006) presented preliminary results of large-scale green sturgeon migration studies at the Interagency Ecological Program meeting in Pacific Grove, California in early March 2006. Lindley's analysis verified past population structure delineations based on genetic work and found frequent large-scale migrations of green sturgeon along the Pacific Coast. It appears Southern DPS green sturgeon are migrating considerable distances up the Pacific Coast into other estuaries, particularly the Columbia. This information also agrees with the results of green sturgeon tagging studies completed by California Department of Fish and Game where they tagged a total of 233 green sturgeon in the San Pablo Estuary between 1954 and 2001. A total of 17 tagged fish were recovered: 3 in the Sacramento-San Joaquin Estuary, 2 in the Pacific Ocean off of California, and 12 from commercial fisheries off of Oregon and Washington. Eight of the 12 recoveries were in the Columbia Estuary (CDFG 2002). In addition, recent analysis by Israel (2006a) indicates a substantial population of

Southern DPS North American green sturgeon to be present in the Columbia estuary (50-80 percent).

Kelley *et al.* (2006) indicated that green sturgeon enter the San Francisco Estuary during the spring and remain until autumn. The authors studied the movement of adults in the San Francisco Estuary and found them to make significant long-distance movements with distinct directionality. The movements were not found to be related to salinity, current, or temperature and the authors surmised they are related to resource availability (Kelley *et al*. 2006). Erickson *et al*. (2002) reported on movement and habitat use of green sturgeon in freshwater habitats in the Rogue River and found adult green sturgeon to hold at specific freshwater sites in the Rogue River for up to six months. Green sturgeon were most often found at depths greater than 5m with low or no current during summer and autumn months (Erickson *et al*. 2002). The majority of green sturgeon in the Rogue River emigrated from freshwater habitat in December after water temperatures dropped (Erickson *et al*. 2002). The authors surmized that this holding in deep pools was to conserve energy and utilize abundant food resources. Based on captures of adult green sturgeon in holding pools on the Sacramento River above the Glenn Colusa Irrigation District diversion (RM 205) and the documented presence of adults in the Sacramento River during the spring and summer months and the presence of larval green stur geon in late summer in the lower Sacramento River indicating spawning ocurrence, it appears adult green sturgeon utilize a variety of freshwater and brackish habbitats for up to six months of the year.

Adult green sturgeon are believed to feed primarily upon benthic invertebrates such as clams, mysid and grass shrimp, and amphipods (Radtke 1966, Adams *et al*. 2002, J. Stuart, NMFS, pers. obs.). Adult sturgeon caught in Washington state waters were found to have fed on Pacific sand lance (*Ammodytes hexapterus*) and callianassid shrimp (Moyle *et al.* 1992).

Based on the distribution of sturgeon eggs, larva, and juveniles the in the Sacramento River, CDFG (2002) indicated that southern DPS of green sturgeon spawn in late spring and early summer above Hamilton City possibly to Keswick Dam. Adult green sturgeon are believed to spawn every 3 to 5 years and reach sexual maturity only after several years of growth (10 to 15 years based on sympatric white sturgeon sexual maturity (CDFG 2002). Adult female green sturgeon produce between 60,000 and 140,000 eggs, depending on body size, with a mean egg diameter of 4.3 mm (Moyle *et al.* 1992, Van Eenennaam *et al*. 2001). Southern DPS of North American Green sturgeon adults begin their upstream spawning migrations into freshwater in late February with spawning occuring between March and July. Peak spawning is believed to occur between April and June (Table 4) and thought to occur in deep turbulent pools (Adams *et al*. 2002). Substrate is likely large cobble but can range from clean sand to bedrock (USFWS 2002). Newly hatched green sturgeon are approximately 12.5 to 14.5 mm in length.

After approximately 10 days, larvae begin feeding; growing rapidly and young green sturgeon appear to rear for the first 1 to 2 months in the Sacramento River between Keswick Dam and

Hamilton City (CDFG 2002). Juvenile green sturgeon first appear in USFWS sampling efforts at RBDD in June and July at lengths ranging from 24 to 31 mm fork length (CDFG 2002, USFWS 2002). The mean yearly total length of post-larval green sturgeon captured in rotary screw traps at the RBDD ranged from 26 mm to 34 mm between 1995 and 2000 indicating they are approximately two weeks old. The mean yearly total length of post-larval green sturgeon captured in the Glen Colusa Irrigation District rotary screw trap, approximatley 30 miles downstream of RBDD ranged from 33 mm to 44 mm between 1997 and 2005 (CDFG, unpublished data) indicating they are approximately three weeks old (Van Eenennaam *et al*. 2001) .

Green sturgeon larvae do not exhibit the initial pelagic swim-up behavior characteristic of other A*cipenseridae*. They are strongly oriented to the bottom and exhibit nocturnal activity patterns. Under laboratory conditions, green sturgeon larvae cling to the bottom during the day, and move into the water column at night (Van Eenennaam *et al*. 2001). After 6 days, the larvae exhibit nocturnal swim-up activity (Deng *et al*. 2002) and nocturnal downstream migrational movements (Kynard *et al.* 2005). Juvenile green sturgeon continue to exhibit nocturnal behavioral beyond the metamorphosis from larvae to juvenile stages. Exogenous feeding starts at approximately 14 days (23-25 mm)((Van Eenennaam *et al*. 2001). Larvae supplimented with live food in lab conditions exhibited significantly higher survival rates (Van Eenennaam *et al*. 2001). Kynard *et al*.'s (2005) laboratory studies indicated that juvenile fish continued to migrate downstream at night for the first 6 months of life. When ambient water temperatures reached 8 ^{o}C, downstream migrational behavior diminished and holding behavior increased. This data suggests that 9 to 10 month old fish would hold over in their natal rivers during the ensuing winter following hatching, but at a location downstream of their spawning grounds. Juvenile green sturgeon have been salvaged at the Harvey O. Banks Pumping Plant and the John E. Skinner Fish Facility (Fish Facilities) in the South Delta, and captured in trawling studies by the California Department of Fish and Game during all months of the year (CDFG 2002). The majority of these fish were between 200 and 500 mm indicating they were from 2 to 3 years of age based on Klamath River age distribution work by Nakamoto *et al*. (1995). The lack of a significant proportion of juveniles smaller than approximately 200 mm in Delta captures indicates juvenile Southern DPS North American green sturgeon likely hold in the mainstem Sacramento River as suggested by Kyndard *et al*. (2005).

Radtke (1966) examined 74 juvenile green sturgeon caught with gill net and otter trawl in the Delta. *Corophium* appeared to be the most important food of smaller green sturgeon and was the only item found in the eight smaller green sturgeon (190–390 mm) examined in the fall. All those examined in the spring and summer had eaten *Corophium*, which made up over half the volume of their diet during these seasons. *Neomysis awatschensis* was also utilized heavily during spring and summer. One fish examined in the spring had eaten shrimp that could not be identified. Growth is rapid as juveniles reach up to 300 mm the first year and over 600 mm in the first 2-3 years (Nakamoto *et al*. 1995). Little is known of the behavioral dynamics of these juveniles, such as habitat preference and water columne usage; however, based on diet work reported above, the feeding morphology, juveniles are likely benthicly oriented. Juveniles appear to spend one to three years in freshwater before they enter the ocean (Nakamoto *et al*. 1995).

Population abundance information concerning the Southern DPS of North American green sturgeon is described in the NMFS status reviews (Adams *et al*. 2002, NMFS 2005). Limited population abundance information comes from incidental captures of North American green sturgeon from the white sturgeon monitoring program by the CDFG sturgeon tagging program (CDFG 2002). CDFG (2002) utilizes a multiple-census or Peterson mark-recapture method to estimate the legal population of white sturgeon captures in trammel nets. By comparing ratios of white sturgeon to green sturgeon captures, CDFG provides estimates of adult and sub-adult North American green sturgeon abundance. Estimated abundance between 1954 and 2001 ranged from 175 fish to more than 8,000 per year and averaged 1,509 fish per year. Unfortunately, there are many biases and errors associated with these data, and CDFG does not consider these estimates reliable. Fish monitoring efforts at RBDD and Glen Colusa Irrigation District on the upper Sacramento River have captured between 0 and 2,068 juvenile North American green sturgeon per year (Adams *et al*. 2002). The only existing information regarding changes in the abundance of the Southern DPS of North American green sturgeon includes changes in abundance at the John E. Skinner Fish Facility between 1968 and 2001. The average number of North American green sturgeon taken per year at the State Facility prior to 1986 was 732; from 1986 on, the average per year was 47 (70 FR 17386). For the Harvey O. Banks Pumping Plant, the average number prior to 1986 was 889; from 1986 to 2001 the average was 32 (70 FR 17386). In light of the increased exports, particularly during the previous 10 years, it is clear that North American green sturgeon abundance is dropping. Additional analysis of North American green and white sturgeon taken at the Fish Facilities indicates that take of both North American green and white sturgeon per acre-foot of water exported has decreased substantially since the 1960’s (70 FR 17386). Catches of sub-adult and adult North American green sturgeon by the IEP between 1996 and 2004 ranged from 1 to 212 green sturgeon per year (212 occurred in 2001), however, the portion of the Southern DPS of North American green sturgeon is unknown as these captures were primarily located in San Pablo Bay which is known to consist of a mixture of the Northern and Southern DPSs. Recent spawning population estimates using sibling based genetics by Israel (2006b) indicates a spawning population of 26 spawners in 2002, 18 in 2003, 30 in 2004, and 42 in 2005 above RBDD. Based on the length and estimated age of post-larvae captured at RBDD (approximately two weeks of age) and GCID (downstream; approximately three weeks of age), it appears the majority of Southern DPS North American green sturgeon are spawning above RBDD. Note there are many assumptions with this interpretation (*i.e.*, equal sampling efficiency and distribution of post-larvae across channels).

There are at least two records of confirmed adult sturgeon observation in the Feather River (Beamesderfer *et al*. 2004); however, there are not observations of juvenile or larval sturgeon even prior to the 1960’s when Oroville Dam was built (NMFS 2005). There are also unconfirmed reports that green sturgeon may spawn in the Feather River during high flow years (CDFG 2002).

Spawning in the San Joaquin River system has not been recorded, but alterations of the San Joaquin River tributaries (Stanislaus, Tuolumne, and Merced Rivers) and its mainstem occurred early in the European settlement of the region. During the later half of the 1800s impassable barriers were built on these tributaries where the water courses left the foothills and entered the valley floor. Therefore, these low elevation dams have blocked potentially suitable spawning habitats located further upstream for over a century. Additional destruction of riparian and stream channel habitat by industrialized gold dredging further disturbed any valley floor habitat that was still available for sturgeon spawning. It is likely that both white and green sturgeon utilized the San Joaquin River basin for spawning prior to the onset of European influence, based on past use of the region by populations of CV spring-run Chinook salmon and CV steelhead. These two populations of salmonids have either been extirpated or greatly diminished in their use of the San Joaquin River basin over the past two centuries.

Recent habitat evaluations conducted in the upper Sacramento River for salmonid recovery planning (Lindley *et al*. 2004) suggests that significant potential green sturgeon spawning habitat was made inaccessible or altered by dams (historical habitat characteristics, temperatures, and geology summarized). This spawning habitat may have extended up into the three major branches of the Sacramento River; the Little Sacramento River, the Pitt River system, and the McCloud River (NMFS 2005).

4.3 DESCRIPTION OF CRITICAL HABITAT

Essential features of the designated critical habitat include adequate:

? Substrate;

? Water quality;

? Water quantity;

? Water temperature;

? Water velocity;

? Cover/shelter;

? Food;

? Riparian vegetation;

? Space; and

? Safe passage conditions.

NMFS includes key riparian functions as an essential feature of critical habitat (65 FR 7764). Riparian zones provide a variety of functions: vegetation shades the stream, stabilizes the bank, provides organic litter, and large woody debris. The riparian zone stabilizes sediment, recycles nutrients and chemicals, mediate stream hydraulics, and controls microclimate. Healthy riparian zones ensure water quality essential to salmonids and the forage species they depend upon (65 FR 7764).

Logging activities, agricultural activities, mining activities, and urbanization have degraded and fragmented habitat. Channelization, dams, dredge and fill, bank stabilization, and water withdrawals have reduced or eliminated historically available habitat. Wetlands and riparian habitat loss results in loss of feeding and sheltering habitat. Unscreened diversions for irrigation can cause death or stranding of juvenile salmonids. Pesticide use, even according to labeling restrictions, has been determined to affect critical habitat. Individually, these factors may not be a substantial impact to the ESU, but cumulatively they are overwhelming.

Specific locations and ranges of critical habitat for each species are outlined in 50 CFR Part 226.

Salmonids statewide have undergone major population declines attributed to human induced factors that intensify the adverse effects of natural environmental stochastic events (64 FR 50394). Thelander (1994) stated that human population growth, with its attendant increased demand for water and other resources, may be the "most clear and present danger" to native fishes in California. Extensive habitat degradation continues to decrease carrying capacity and cause populations of salmonids to decline, either directly or through cumulative negative impacts to river systems (Weitkamp *et al.*, 1995; Busby *et. al.*, 1996; Myers *et. al.*, 1998; NMFS, 1996; NMFS, 1998).

5.1 POTENTIAL IMPACTS

Any activity that involves work in an area with sensitive resources, no matter what the intent, has the potential to negatively effect those resources without careful planning. The proposed actions discussed in Section 2 have the potential to impact salmon and steelhead through disturbing the breeding, feeding, mating, and sheltering of these species by impeding or blocking passage; putting sediment; input of debris or pollutants into waters; entraining fish; or otherwise harming the fish or negatively impacting their environment. Impacts that could be expected from the proposed actions discussed in Section 2 could result in the loss of habitat complexity and degradation of water quality. These effects include:

? introduction of sediment from a project site into the waterways from erosion or runoff;

? loss of in-stream cover or resting places through channel simplification, removal of large woody debris and rocks, or removal of riparian canopy at the project site;

? loss of suitable gravel substrate through removal or burial with sediment;

? decreases in water flow downstream from water withdrawals or diversions at or above the site;

? barriers to fish passage from improperly designed stream crossings or other devices;

? increases in water temperature from loss of riparian shade; and

? introduction of pollutants to waterways from construction materials placed in the water, spills or runoff.

Coho salmon, Chinook salmon, and steelhead all need very similar components and functions of complex freshwater habitats. The loss of essential habitat components and functions through human actions happens in many ways. Sedimentation and/or stream flow reductions can result in the loss of deep, cool water pools; reducing the available habitat that juvenile and adult salmonids can use for shelter or forage. Sediment can also smother the aquatic invertebrates that juvenile salmonids feed on or cement the substrate so that spawning cannot take placed. Loss of instream cover (*i.e.*, large woody debris and rocks) reduces available shelter from predators.

Loss of riparian canopy increases water temperature, causing stress and/or death for the salmonids and their forage species. The introduction of pollutants may kill or stress salmonids and the species they feed on. Lowered water flows, as the result of damming or diverting water, may delay migration, dry out sections of the stream channel stranding fish, and fragment habitat (Berggren and Filardo 1993; Chapman and Bjornn 1969; Reiser and Bjornn 1979). Alternations to a channel may result in a loss of complex habitat, shelter, shade, and availability of forage.

5.2 AVOIDANCE AN MINIMIZATION MEASURES

To reduce the potential for the adverse effects described above, FEMA will implement avoidance and minimization measures. These measures, which have been developed by or in cooperation with NMFS, are described in the attachments included as Appendix B. FEMA will provide the subgrantee with a copy of all these measures. The attachments are listed below.

? Attachment 1: Specific guidelines for the implementation of projects so that adverse effects are avoided and formal consultation is not required.

? Attachment 2: Guidelines for re-vegetation of woody riparian and shaded riverine aquatic habitat.

? Attachment 3: Material guidelines for levee maintenance and bank stabilization projects.

? Attachment 4: Fish screening criteria for salmonids.

? Attachment 5: Construction pollution guidelines.

? Attachment 6: Guidelines for salmonid passage at stream crossings.

? Attachment 7: Bioengineering Practices

FEMA will include the implementation of bioengineering practices where such practices are feasible.

5.3 EVALUATION OF TYPICAL RECURRING ACTIONS

The actions funded by FEMA during disaster response efforts are not intended to adversely affect Federally listed species or their habitats. However, any activity that involves work in an area with Federally listed species, no matter what the intent, has the potential to negatively affect those resources without careful planning.

The proposed actions discussed previously in this PBA may affect threatened and endangered species by disturbing the breeding, feeding, spawning, and sheltering of these species. These affects may be direct or indirect, and either temporary or permanent. Effects that may occur as a result of the actions described in this PBA include the direct or indirect disturbance, modification, or destruction of habitat such that it results in the death, injury, or harassment of individuals or populations of listed species, or impedes or prevents the dispersal of individuals or populations of listed species.

FEMA is proposing avoidance and minimization measures (Appendix D) in order to prevent adverse effects to Federally listed species and their habitats to the maximum extent practicable while still accomplishing their disaster response mission.

Specific actions that adversely affect listed species may include, but are not limited to:

? temporary or permanent loss, fragmentation, and degradation of habitat; *e.g.*, earthmoving activities that directly kill or injure an individual; or the removal or modification of the overstory canopy such that it indirectly affects a species through increased downstream water temperatures;

? increasing the amount of debris or pollutants in the habitat; *e.g.*, type, use, or placement of construction material within a stream that supports fish; spills and/or runoff of construction equipment fuel, *etc.*;

? increasing the amount of sedimentation in the water; *e.g.*, erosion from improperly maintained sediment control devices, *etc.*; and

? withdrawing, de-watering, diverting, degrading, or otherwise negatively affecting water flow either upstream or downstream of a project site; *e.g.*, improperly designed stream crossings or diversions, installing coffer dams, *etc.*

In cooperation with NMFS, FEMA has identified three categories of typically recurring FEMA-funded projects. These categories are described below.

Category 1—No Effect: Projects having no effect (NE) on the listed species or their habitats. “No effect” is defined as having no measurable or discernable effect to the species or their habitat. Consultation with NMFS would not be required when FEMA makes a “no effect” determination.

Category 2—Not likely to adversely affect: Projects not likely to adversely affect (NLAA) listed species or habitat. “Not likely to adversely affect” is defined as having an effect that is insignificant, discountable, or wholly beneficial. For such projects, FEMA would initiate project-specific, ESA section 7 consultations with NMFS for all projects not previously covered under a programmatic "not likely to adversely affect" concurrence letter from NMFS.

Category 3—Likely to adversely affect: Projects likely to adversely affect (LAA) listed species, and therefore requiring take authority through the issuance of a biological opinion. A determination of "likely to adversely affect" occurs when the action is likely to directly or indirectly have an adverse effect to a listed species or its critical habitat. For such projects, FEMA would initiate project-specific, ESA section 7 consultations with NMFS for all projects not covered under a programmatic biological opinion issued by NMFS.

Projects can be covered under Category 2, NLAA, if the subgrantee will meet and implement the General Guidelines listed below, the Specific Guidelines for Category 2 projects (Appendix D, Attachment 1), and the other Guidelines (Attachments 2 through 7), as they apply to avoid impacts to the listed species and their critical habitats.

5.3.1 CATEGORY 1 – NO EFFECT

The actions listed below are determined to have "**no effect**" on Federally listed species or their habitats provided that they are implemented in a manner that meets the guidelines, criteria, assumptions, and intent as described below and throughout this PBA. It will be incumbent upon FEMA (and their applicants and sub-grantees) to ensure that a decision to proceed with an action determined to have "no effect" on a Federally listed species or their habitats is correctly justified and well documented in order to avoid a possible violation under section 9 of the Act. Actions determined by FEMA to have "no effect" do not require additional consultation with NMFS.

Appendices D outlines avoidance and minimization measures that will be adhered to for all actions determined by FEMA to be "no effect" actions.

In general, FEMA considers all actions occurring where there are no known Federally listed species and/or actions occurring outside of Federally listed species' habitats, especially designated critical habitat and/or recommended recovery areas as "no effect" actions. Specific actions and examples that also may be "no effect" actions include:

1. Building repair, where construction activities are not adjacent to a salmonid stream.
2. Upgrade buildings to meet current codes and standards. A project involving fill placement or ground disturbance to elevate a structure adjacent to a stream or waterway above flood levels would be considered under Category 2, below.

3. Floodproof structures, where construction activities are not adjacent to a salmonid stream.

4. The following types of projects, provided they are not located near streams or waterways and would not result in the introduction of sediment through erosion or runoff:

   a) removal of debris from public areas or facilities, including sewage treatment ponds.

   b) provide temporary facilities.

   c) acquire and demolish existing structures.

   d) repair or realign roads, trails, utilities, and rail lines.

   e) relocation of facilities or functions.

   f) extend pressurized water service area.

   g) demonstration projects.

   h) vegetation management that does not effect proposed or designated critical habitat area.

5.3.2 CATEGORY 2 - NOT LIKELY TO ADVERSELY AFFECT

The actions listed below are "**not likely to adversely affect"** Federally listed species or their habitats provided that they are implemented in a manner that meets the guidelines, criteria, assumptions, and intent as described below and throughout this PBA. Appendix D outlines general and species-specific avoidance and minimization measures that will be followed in their entirety, as applicable, in order to ensure that FEMA-funded projects meet Category 2 requirements. All standardized BMPs, as recommended and/or required by all regulatory agencies such as the state regional water quality and air quality boards, county grading permits, California Department of Fish and Game Code Section 1600 Streambed Alteration Agreements, *etc.* also will be implemented to ensure FEMA-funded actions avoid and minimize adverse effects on Federally listed species or their habitats. For projects that initially fall into Category 2, FEMA may choose to work with NMFS to modify those projects, on a case by case basis, to achieve a Category 1 "no effect" status, when possible.

Effects that are insignificant, discountable, or wholly beneficial are, by definition, allowable effects under Category 2. It will be incumbent upon FEMA (and their applicants and sub-grantees) to ensure that a decision to proceed with an action determined as "not likely to adversely affect" a Federally listed species or their habitats is correctly justified and well documented in order to avoid a possible violation under section 9 of the ESA.

In order for the actions described below to not adversely affect Federally listed species or their habitats, all work will be conducted in an area, from a location, or in such a manner that it will not directly or indirectly kill or injure a Federally listed species, will not intentionally or negligently harass a Federally listed species to such an extent as to significantly disrupt normal behavioral patterns, and will not negatively affect Federally listed species habitats. Project planning will consider not only the effects of the action itself, but also all ancillary activities associated with the actions, such as equipment staging and refueling areas, topsoil or spoils stockpiling areas, material storage areas, disposal sites, routes of ingress and egress to the project site, and all other related activities necessary to complete the project.

Projects that are conducted in the vicinity (*e.g.*, within the same watercourse, within the same city or town, within the same USGS quad, on the same property, or by the same applicant) of other Federally funded actions may not be eligible under Category 2 due to their cumulative or otherwise interrelated and/or interdependent affects on Federally listed species and their habitats. For example, the repair of multiple erosion sites along a canal or creek will have cumulative affects upstream and downstream of each individual project site. FEMA will not make a “not likely to adversely affect” determination on this type of project without further consultation with NMFS.

Appendix D outlines general and species-specific avoidance and minimization measures that will be adhered to for all actions determined by FEMA to be “not likely to adversely affect” actions. Projects listed below are **not likely to adversely affect** listed species or their critical habitat if:

? work in a channel is performed only during the period June 15-October 15, however modifications may be made to the timeframe on a site specific basis;

? no heavy equipment is operated in flowing water;

? the avoidance and minimization measures specified in Attachment 2 are implemented,

or,

? work is performed only in a dry channel.

Projects may also fall into this category if they are adjacent to a stream or waterway within an ESU or DPS, but located above a known barrier, no listed species are presumed by NMFS to be present and there will be no downstream effects. If unforeseen circumstances arise in project implementation that may lead to adverse effects to listed species or their habitat, the action will not be undertaken and FEMA will initiate consultation with NMFS.

Projects in this category include:

? projects described in item (4) in Section 5.3.1, if they are adjacent to a stream or waterway;

? removal of debris from stream channels, bridge and culvert openings, canals, sedimentation basins, and ditches;

? upgrade buildings to meet current codes and standards in situations involving fill placement or ground disturbance to elevate a structure adjacent to a stream or waterway above flood levels;

? repair, stabilize, or armor embankments;

? construct or modify a waterway crossing;

? construct or modify a water detention, retention, or storage facility. construction of new onstream facilities would fall under Category 3, below;

? modify flood control structures, including repairing existing facilities, installing embankment protection, raising the height of existing facilities, and installing interior drainage systems; construction of new facilities would fall under Category 3;

? modify coastal features, including repair of recreational facilities, maritime facilities, and shoreline protection devices; construction of new facilities would fall under Category 3.

After applications are received and prior to funding of projects, FEMA will submit to NMFS a summary of proposed projects that FEMA has determined fall into Category 2. This summary shall include details on construction techniques, stream conditions at the time of the proposed work, and proximity and connectivity to known salmonid habitat. NMFS will review the projects and respond in writing within 30 days with additional conditions to avoid adverse impacts, a request for more information where it is needed to make a NLAA determination, or a letter of non-concurrence for projects that are believed not to meet the specified guidelines. Those projects that do not meet Category 2 specifications will be resubmitted on a case by case basis for individual consultation.

5.3.3 CATEGORY 3 - LIKELY TO ADVERSELY AFFECT

Projects in this category are likely to adversely affect Federally listed species or their habitats. As such, FEMA anticipates that many of these types of projects cannot avoid the taking of Federally listed species or their habitats. For some projects, however, FEMA anticipates few, if any, are likely to adversely affect Federally listed species or their habitats; those project types are listed below. One possible exception that may apply to all projects would be if the project was of such a scope (due to the magnitude of the disaster, *e.g.*, post-Hurricane Katrina) that Federally listed species critical habitat was going to be adversely modified as a result of the action.

FEMA anticipates that the following projects are all likely to adversely affect Federally listed species or their habitats, except as noted previously through this document. Incidental take of Federally listed species is anticipated and/or cannot be avoided and coverage under a biological opinion is necessary. Projects in this category are likely to adversely affect listed species or their critical habitat. However, projects that initially fall into Category 3 may be modified on a case by case basis to achieve a Category 2 status. FEMA would initiate project-specific, formal consultations for Category 3 projects. These projects are listed below.

? create, widen, or dredge a waterway;

? construct new on-stream detention, retention, or storage facilities;

? construct new flood control structures;

? construct new coastal features, including repair of recreational facilities, maritime facilities, and shoreline protection devices;

? vegetation management projects in proposed or designated critical habitat.

For projects that cannot be modified to achieve a "not likely to adversely affect" determination, there are two possible outcomes: 1) FEMA will determine that the project may not require additional consultation with NMFS because it was previously reviewed and approved as part of a programmatic consultation with NMFS that resulted in the issuance of a programmatic biological opinion, or 2) FEMA will initiate project-specific, formal consultation with NMFS for all actions not previously reviewed and/or determined eligible under the programmatic consultations.

In addition, projects listed in Section 5.3.2 that do not meet the guidelines specified in attachment 2 would fall into this category. This includes projects that:

? dewater or divert a stream.

? require heavy equipment to operate within the flowing water.

? include bank repair and stabilization over a cumulative total of 250 linear feet.

? withdrawal of stream flow.

? remove areas of vegetation greater than a cumulative total of 100 linear feet within a designated or proposed critical habitat;

? remove riparian trees greater than 6 inches in diameter at breast height;

? have finished grades that exceed a 2:1 side slope;

? cannot meet the fish-screening criteria in Attachment 4;

? cannot meet the guidelines for fish passage at stream crossings presented in Attachment 6.

6.1 CUMULATIVE AFFECTS

Many of the projects described in this PBA are typically-recurring actions where the effects are typically temporary and localized. However, the affects of other State, tribal, local, and private actions that could reasonably be expected to occur in addition to FEMA-funded projects would be additive. Additionally, many of these projects are implemented by the same applicant and are sometimes implemented in the same area, *i.e.*, the same watercourse. As such, there are additional cumulative affects as a result of the action(s). FEMA will consider the cumulative affects associated with funding projects, especially those projects that are in close proximity to each other, and they will consult with NMFS on all actions that do not qualify under the programmatic consultations.

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APPENDIX A

January 2000 Letter between the Corps and FEMA

PLACEHOLDER

January 2000 Letter between the Corps and FEMA

APPENDIX B

Maps of Declared Counties in Disaster 1628 DR

And Disaster 1646 DR

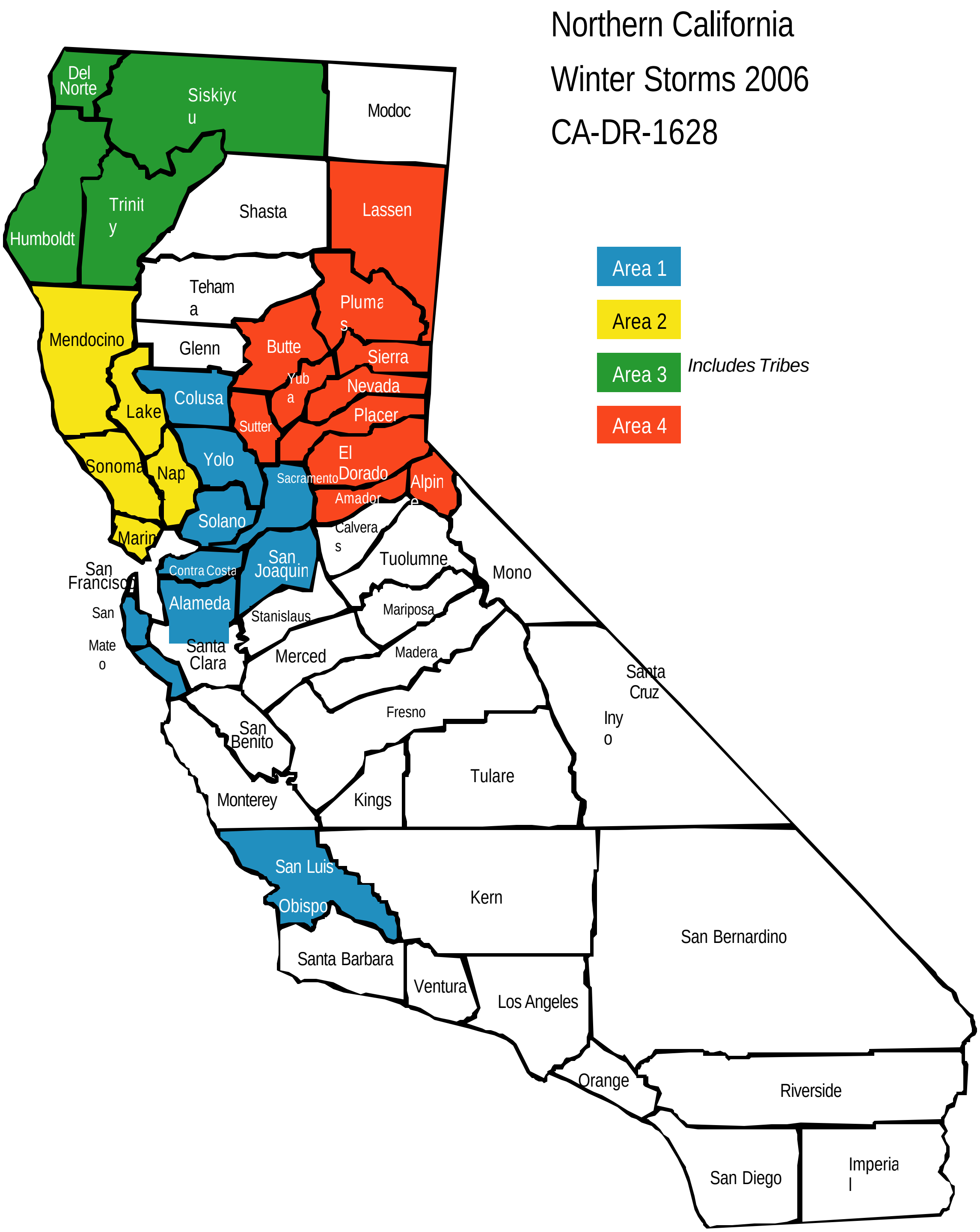

Exhibit 1. California counties within the Federally-declared FEMA-1628-DR disaster.

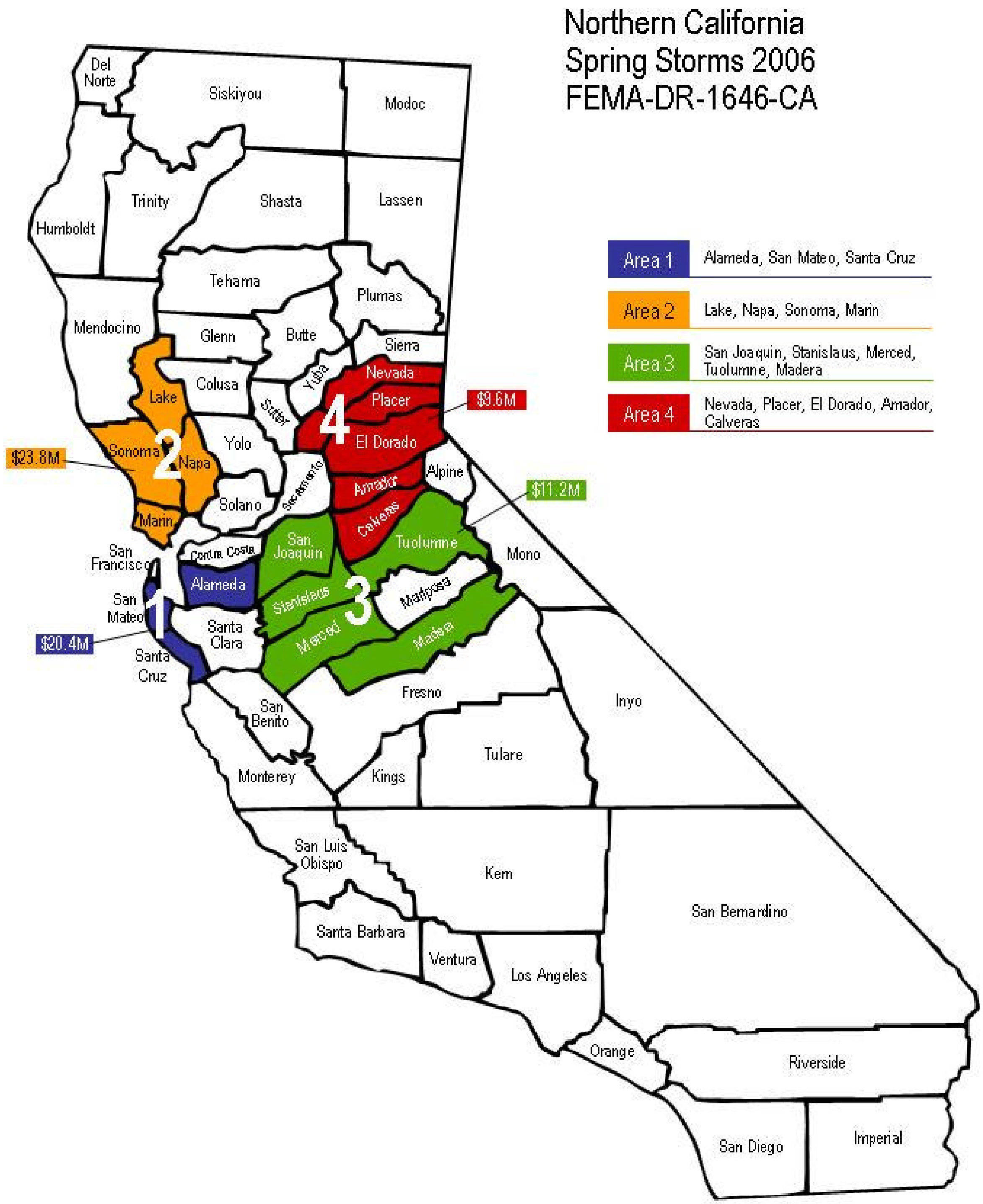

Exhibit 2. California counties within the Federally-declared FEMA-1646-DR disaster.

APPENDIX C

Listed Salmonid ESU and DPS Maps

APPENDIX D

Attachments 1-7

Attachment 1

Specific Guidelines for Category 2 Projects

The following Best Management Practices (BMPs) will be used when designing and implementing projects under the programmatic informal consultation to avoid the potential impacts of the projects on the natural resources and sensitive habitat in the watershed.

1. Where habitat for Federal listed anadromous fish species are identified as on or adjacent to the project work site, all construction and activities in or adjacent to an active stream channel shall be performed only between June 15th and October 15. However, modifications may be made to that time frame on a site specific basis.

2. Disturbance to existing grades and vegetation will be limited to the actual site of the project and necessary access routes. Placement of all roads, staging areas, and other facilities shall avoid and limit disturbance to streambank or stream channel habitat as much as possible. When possible, existing ingress or egress points shall be used and/or work performed from the top of the creek banks. Following completion of the work, the contours of the creek bed and creek flows shall be returned to pre-construction condition or better.

3. Work will **only occur in a dry channel**. If it is necessary to conduct work in a live stream, those projects will be consulted on individually.

4. All projects that require **heavy equipment to operate within the flowing water** shall be consulted on individually.

5. Erosion control and sediment detention devices (e.g. well anchored sandbag cofferdams, straw bales, or silt fences) shall be incorporated into the project design and implemented at the time of construction. These devices shall be in place during construction activities, and after if necessary, for the purposes of minimizing fine sediment and sediment/water slurry input to flowing water, and of detaining sediment laden water on-site. These devices will be placed at all locations where the likelihood of sediment input exists. A supply of erosion control materials would be kept on hand to cover small sites that may become bare and to respond to sediment emergencies.

6. The subgrantee shall inspect instream habitat and performance of sediment control devices at least once each day during construction to ensure the devices are functioning properly.

Attachment 1

Specific Guidelines for Category 2 Projects

7. Sediment will be removed from sediment controls once the sediment has reached 1/3 of the exposed height of the control. Sediment collected in these devices shall be disposed of away from the collection site at approved disposal sites. These devices will be inspected at least once a day to ensure they are functioning properly. Should a control measure not function effectively, the control measure would be immediately repaired or replaced. Additional controls would be installed as necessary.

8. All disturbed soils at each site will undergo erosion control treatment prior to October 15 and after construction is terminated. Treatment includes temporary seeding and sterile straw mulch. Any disturbed soils on a gradient of over 30 percent will have erosion control blankets installed. Permanent revegetation and tree replanting will take place in small openings in the erosion control blanket, with native species.

9. Any stockpiles of soil used for fill material during construction will be covered with a tarp or erosion control blanket and silt fences shall be installed appropriately to contain soils from moving into area waterways. If there is a > 50% chance forecast of rain, the project site shall be "rain-proofed" with erosion control measures so that no sediment or turbidity enters the stream.

10. Deconstruction by-products, such as saw-water, must not be allowed to fall into the water. To reduce bottom substrate disturbance and excessive turbidity, existing piles shall be removed by cutting at the substrate surface or reverse pile driving with a sand collar at the base to minimize resuspension of any toxic substances, and not by hydraulic jetting.

11. All debris, sediment, rubbish, vegetation or other material removed from the channel banks, channel bottom, or sediment basins shall be disposed of at an approved disposal site. All petroleum products chemicals, silt, fine soils, and any substance or material deleterious to listed species shall not be allowed to pass into, or be placed where it can pass into the stream channel. There will be no sidecasting of material into any waterway.

12. All replaced bridges and culverts on anadromous fish bearing streams shall be designed in accordance with NMFS stream crossings criteria in Attachment 6. All stream crossings must pass adult and juvenile listed salmonid species. Culvert design shall be reviewed by NMFS engineers.

13. Construction of flood bypass channels must allow fish passage out of the channel before waters dry up after floods recede.

Attachment 1

Specific Guidelines for Category 2 Projects

14. All materials placed in streams, rivers, lakes, reservoirs, bays, or coastal waters, such as pilings and bulkheads, shall be nontoxic. Any combination of wood, plastic, cured concrete, steel pilings or other materials used for in-channel structures shall not contain coatings or treatments or consist of substances deleterious to aquatic organisms that may leach into the surrounding environment in amounts harmful to aquatic organisms.

15. Any bank repair or stabilization project **over a cumulative total of 250 linear feet** shall be consulted on individually.

16. Any rip rap that is placed where it will be in water at any flow should incorporate large woody cover (logs) and/or vegetation planting depending on the character of the surrounding (natural) stream or river banks.

17. All bank stabilization and fill materials shall follow the guidelines described in Attachment 3.

18. Any replacement, reconstruction, or repair of intake siphons or pumps shall be designed in accordance with NMFS fish screening criteria in Attachment 4. The screen design shall be reviewed by NMFS engineers and shall include an acceptable operations and maintenance plan which includes:

(a) periodic visual inspections;

(b) periodic hydraulic measurements;

(c) periodic assessment of screen performance-component reliability, component durability, and screen-cleaning system effectiveness.

The applicant shall annually submit a log record to NMFS that documents compliance with measures a-c above for the life of the screen.

19. All projects that **cannot meet the screening criteria in Attachment 4** shall be consulted on individually.

Attachment 1

Specific Guidelines for Category 2 Projects

20. Projects removing **riparian trees greater than 6" diameter at breast height (dbh)** shall be consulted on individually.

21. Projects removing **areas of vegetation greater than a cumulative total of 100 linear feet within the designated or proposed critical habitat** shall be consulted on individually.

22. Removal of riparian vegetation within 50 feet of an active channel shall be minimized. If riparian vegetation at the project site is damaged or lost, FEMA shall ensure that the permittee shall replace lost vegetation in accordance with Attachment 2.

23. All invasive species (i.e., Giant reed, *Arundo donax*) shall be completely removed from the stream and riparian area using approved protocols and destroyed.

24. For chemical vegetation control, the chemical would be used as per label directions. No chemicals would be sprayed in or within 50 feet of a running stream, river or other waterbody. Only chemicals approved for aquatic use would be used near water courses.

25. Annual review by FEMA shall occur until the critical area planting is established to control erosion.

Attachment 2

Guidelines for Revegetation of Woody Riparian and Shaded Riverine Aquatic (SRA) Habitat

NMFS anticipates that adherence to these guidelines will result in “no net loss” of riparian vegetation or SRA habitat within the permit area.

1. All remaining, natural woody riparian or SRA habitat shall be avoided or preserved to the maximum extent practicable.

2. Re-planting ratios for woody riparian and SRA shall replace lost habitat at 3:1 on an area or linear foot basis, as appropriate.

3. Species chosen for replanting shall reflect native species lost during the permitted activity or native species usually found in the riparian and SRA zones of the project location.

4. Plantings shall be done during the optimal season for the species being planted. Therefore, completion of the entire mitigation plan may not occur at the same time as the permitted activity.

5. If needed, an irrigation system will be installed to ensure establishment of vegetation.

6. Maintenance plans for revegetated sites shall continue for at least three growing seasons to allow the vegetation to establish.

7. Success of a mitigation project shall be measured as 100 percent or greater replacement after three years.

Attachment 3

Material Guidelines for Levee Maintenance and Bank Stabilization Projects

The following guidelines shall be incorporated into all bank stabilization and levee repair projects.

1. No petroleum products such as asphalt may be used.

2. Concrete or other similar rubble shall be free of trash or reinforcement steel.

3. If anchoring and stabilizing fabrics (geotextiles, armorflex, etc.,) are used, they shall be slit in appropriate locations to allow for plant root growth.

4. No fill material other than clean, silt-free gravel or river rock shall be allowed to enter the live stream.

5. Alternative bank protection methods such as restoration of native vegetation, root wads, or other bioengineering methods of stabilization shall be given first priority for implementation.

6. Hydrological analysis shall be used to ensure that the river channel is designed in a sustainable configuration that does not accelerate erosion upstream or downstream of the project area.

Attachment 4

Fish Screening Criteria for Anadromous Salmonids

PLACEHOLDER

NMFS SCREENING CRITERIA

Attachment 5

Construction Pollution Guidelines

1. The subgrantee shall exercise every reasonable precaution to protect streams, lakes, reservoirs, bays, and coastal waters from pollution with fuels, oils, bitumens, calcium chloride and other harmful materials.

2. Construction by-products and pollutants such as petroleum products, chemicals, fresh cement, or deleterious materials shall not be allowed to discharging into streams or waters, and will be collected and transported to an authorized disposal area.

3. A plan for the emergency clean up of any spills of fuel or other material must be available.

4. Water containing mud or silt from construction activities shall be treated by filtration, or retention in a settling pond, adequate to prevent muddy water from entering live streams.

5. Equipment shall be refueled and serviced at designated construction staging areas. All construction material and fill will be stored and contained in a designated area that is located away from channel areas to prevent transport of materials into adjacent streams. A silt fence will be installed to collect any discharge, and adequate materials for spill cleanup will be maintained on site.

6. Construction vehicles and equipment shall be maintained to prevent contamination of soil or water (from external grease and oil or from leaking hydraulic fluid, fuel, oil, and grease).

7. Building material storage areas containing hazardous or potentially toxic materials shall have an impermeable membrane between the ground and the hazardous material and shall be bermed to prevent the discharge of pollutants to ground water and runoff water.

8. Good housekeeping practices, use of safer alternative products, such as biodegradable hydraulic fluids, where feasible, and implementation of employee training programs shall be utilized. Employees shall be trained to prevent or reduce the discharge of pollutants from construction activities to waters and of the appropriate measures to take should a spill occur.

9. In the event of a spill, work would stop immediately and NMFS will be notified.

APPENDIX D

Attachment 6

Guidelines for Salmonid Passage at Stream Crossings

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GUIDELINES FOR SALMONID PASSAGE AT STREAM CROSSINGS

Attachment 7

Bioengineering Practices

Bioengineering practices are designed and implemented in a manner appropriate to the specific project site and the activity occurring at the site. Selection of bioengineering practices should be made based on the scope and magnitude of the project, specific site conditions, weather, native flora, and material availability. One or more bioengineering practice may be required to accomplish the goal. The California Department of Fish and Game's 1998 *California Salmonid Stream Habitat Restoration Manual* is an excellent resource for bioengineering practices.

Typical bioengineering practices include:

? Brushlayering - used to stabilize shallow slopes; incorporates willow or other branches with soil backfill. Live brush layers act as horizontal drains and improve slope stability by providing tensile strength and natural re-vegetation;

? Brush Mattress – typically formed of live willows and provides a protective covering to the slope that will root and stabilize the slope;

? Brush walls/bundles – branches bound together to create a log-like structure;

? Hand Seeding or Hydro-seeding– broadcasting mixtures of native grass seeds on disturbed soils to minimize erosion and the potential for soil to become airborne or waterborne. Hydro-seed mix is generally applied with a tackifying agent at a rate of at least 2 tons/acre and/or based on manufacturer's recommendations. The tackifying agent is a hydraulic matrix which when applied, and upon drying, adheres to the soil to form a 100% cover which is biodegradable, promotes vegetation, and prevents soil erosion. The hydro-seed mix is not applied before, during, or immediately after rainfall so that the matrix has an opportunity to dry 24 hours after installation;

? Incorporation of large woody debris (LWD) – LWD is generally defined as six inches in diameter or larger and at least ten feet long. It is tailored to the specific requirements of the project, site conditions, and the forces acting at the site;

? Live staking – the planting of live cuttings into the ground so that the stake (cutting) will take root and grow. These stakes are typically cuttings of willow, but may include other species such as cottonwood (*Populus* sp.) that will sprout. Stakes need to be placed in water after they are cut, and until they are used. Willow stakes must be long enough to

Attachment 7

Bioengineering Practices

drive into ground deep enough to reach moisture, or they should be irrigated until established.

These typical bioengineering practices are used in conjunction with other erosion control BMPs, such as coffer dams, well-anchored silt fences, coir fabric or rolls, energy dissipaters, and erosion control blankets. Typical activities that incorporate bioengineering practices include bank repair, stabilization or armoring, construction or modification of a water crossing, repair or realignment of roads, trails, utilities or rail lines, and re-vegetation of disturbed areas. For example, large woody debris, brush layering, live staking and hand seeding may be used with boulders for stream bank stabilization by constructing a rootwad revetment that places large material at the bottom of the slope for stabilization to withstand high water flow forces. The materials become smaller as the construction moves upslope where forces are expected to be less. Live willow staking also may be used in conjunction with riprap, where bioengineering practices alone will not withstand shear forces of the water in the stream channel, as under a bridge. Willow stakes should be placed as the rock is placed, not after when it will be difficult to place them deep enough.