

Example Species Specific Control Measures Control Measures

1.0 Cetaceans

If Southern Resident killer whales or Cook Inlet beluga whales may occur within the area(s) directly or indirectly affected by your cooling water intake structure(s), you must:

- 1.1) Implement the requirements as described for salmonids (see 7.0)

2.0 Pinnipeds

If ESA-listed seals, sea lions, or fur seals or their designated critical habitat may occur within the area(s) directly or indirectly affected by your cooling water intake structure(s), you must:

- 2.1) You must contact the NMFS Regional Office to determine whether you need to apply for a Marine Mammal Protection Act permit.

- 2.2) Install large organism exclusion devices, having a distance between exclusion bars of no greater than nine inches; and

- 2.3) Monitor the intake structure(s) at least every 4 hours (unless otherwise determined by the NMFS Regional Office) for the presence of pinnipeds. In the event a pinniped is found in the intake structure, you must:

- Observe the animal to determine if it has any injuries or appears stressed or unhealthy.
- Immediately contact the NMFS Regional marine mammal stranding coordinator and follow their instructions
- Gather and record information on the animal, including the species, size, condition (dead, injured, or healthy/released). Also record any tags or markings and include photos of the animal in the intake structure. Enter this information on a Marine Mammal Stranding Report Form, which must be submitted to the NMFS Regional marine mammal stranding coordinator within 48 hours of discovery. Also enter this information in your annual incidental take report, which must be submitted to the NMFS Regional Office, NMFS Office of Protected Resources, and Director.
- For healthy, sick, or injured pinnipeds, follow the procedure in 2.4.
- For dead pinnipeds, follow the procedure in 2.5.

- 2.4) If a live pinniped is impinged, entrapped, or entrained, you must contact and follow the instructions of the NMFS Regional marine mammal stranding coordinator. You must take all measures necessary to enable the pinniped to swim out of the intake structure on its own (e.g., reduce flow, turn off pumps, or close cover to intake wells so that sunlight enters only through the intake entrance). You must continue to monitor the pinniped every 15 minutes until it leaves or is released. Do not attempt to capture or handle the pinniped unless you are instructed to do so by the Regional marine mammal stranding coordinator. If you are instructed to capture or handle the pinniped, you must follow the instructions provided by the NMFS Regional marine mammal stranding coordinator.

2.5) If you observe a dead pinniped in the area(s) directly or indirectly affected by your cooling water intake structure(s), you must contact and follow the instructions of NMFS Regional marine mammal stranding coordinator. You must follow the NMFS Regional marine mammal stranding coordinator's protocols for collecting, storing, and transporting the carcass for necropsy. If instructed to do so, you must follow the NMFS Regional marine mammal stranding coordinator's protocol for sampling and disposing of the carcass.

3.0 Sea Turtles

If Federally-listed sea turtles or their designated critical habitat (e.g., prey) may occur within the area(s) directly or indirectly affected by your cooling water intake structure(s), you must:

- 3.1) Install large organism exclusion devices, having a distance between exclusion bars of no greater than nine inches; and
- 3.2) Monitor the intake structure(s) at least every 4 hours (unless otherwise determined by the NMFS Regional Office) for the presence of sea turtles. In the event a sea turtle is found in the intake structure, you must:
 - Observe the turtle to determine if it has any injuries or appears stressed or unhealthy.
 - Immediately contact the NMFS Regional sea turtle stranding coordinator and regional stranding network center and follow their instructions
 - Gather and record information on the turtle, including the species, size, condition (dead, injured, or healthy/released). Also record any tags or markings on the turtle and include photos of the turtle in the intake structure. Enter this information on a Sea Turtle Stranding Report Form and submit to the sea turtle stranding coordinator and NMFS Regional Office within 48 hours. Also enter this information in your annual incidental take report, which must be submitted to the NMFS Regional Office, NMFS Office of Protected Resources, and Director.
 - For healthy turtles, follow the procedure in 3.3.
 - For sick or injured turtles, follow the procedure in 3.3, and 3.4, if instructed to do so.
 - For dead turtles, follow the procedure in 3.5.
 - For hatchlings, you must contact the NMFS Regional Office for additional requirements and instructions.
- 3.3) If a live sea turtle is impinged, entrained, or otherwise adversely affected, you must contact and follow the instructions of the NMFS Regional sea turtle stranding coordinator and regional stranding network center. You must take all measures necessary to enable the sea turtle to swim out of the intake structure on its own (e.g., reduce flow, turn off pumps, or close cover to intake wells so that sunlight enters only through the intake entrance). You must continue to monitor the turtle every 15 minutes until it leaves or is released. Do not attempt to capture or handle the sea turtle unless you are instructed to do so by the NMFS Regional sea turtle stranding coordinator and regional stranding network center. If you are

instructed to capture or handle the sea turtle, you must follow the following guidelines or other instructions provided by the NMFS Regional sea turtle stranding coordinator or the regional stranding network center:

- 3.3.1. All sea turtles should be handled with care.
- 3.3.2. Pick up sea turtles by the front and back of the top of the carapace or by the flippers. Do not pick up sea turtles by the head or tail.
- 3.3.3. Dip nets, cargo nets, and other equipment should be used to lift and move turtles whenever possible.
- 3.3.4. If a sea turtle is actively moving, it should be released (only if healthy) or picked up by the NMFS Regional stranding coordinator or regional sea turtle stranding network center.

3.4) To resuscitate a comatose (non responsive) turtle, follow the following guidelines (50 CFR 223.206(d)(1):

- 3.4.1. Place the animal on its bottom shell (plastron) so that the turtle is right side up.
- 3.4.2. Elevate the hindquarters at least 6 inches for a period no less than 4 hours and no more than 24 hours.
- 3.4.3. A reflex test, performed by gently touching the eye and pinching the tail, must be administered at least every 3 hours to determine if the sea turtle is responsive.
- 3.4.4. Keep the turtle in a safe, contained place, shaded and moist (e.g., with a watersoaked towel over the eyes, carapace, and flippers). Observe the turtle for up to 24 hours.
- 3.4.5. If the turtle begins actively moving, do not release the turtle until the stranding coordinator or rehabilitation center can evaluate it.
- 3.4.6. If the turtle fails to move within 24 hours, it should be transported to the NMFS stranding coordinator or rehabilitation center for necropsy.

3.5) If you observe a dead sea turtle the area(a) directly or indirectly affected by your cooling water intake structure(s), you must contact and follow the instructions of the NMFS Regional sea turtle stranding coordinator, which may include contacting a sea turtle rehabilitation center. You must follow the NMFS stranding coordinator or rehabilitation center's protocols for collecting, storing, and transporting the carcass for necropsy. If instructed to do so, you must follow the rehabilitation center's protocol for sampling and disposing of the carcass.

If leatherback sea turtle designated critical habitat may occur within the area(s) directly or indirectly affected by your cooling water intake structure(s), you must:

3.8) Conduct monitoring studies to determine if jellyfish (e.g., larvae, polyps, medusa) are being entrained or impinged by your cooling water intake structure and provide this information to the appropriate NMFS Regional Office on an annual basis. Monitoring should:

- Be conducted between May 1st and November 30th or otherwise based on the timing and mode of local jellyfish blooms within designated critical habitat.

- Identify planula, polyps, and medusa to the lowest taxonomic level possible.
- Annual reports should include descriptions of weekly, monthly, and annual estimates of jellyfish entrainment across life stages.
- Annual reports should include a complete description of the methodology used to estimate jellyfish entrainment.

4.0 Sawfish

If Federally-listed sawfish may occur within the area(s) directly or indirectly affected by your cooling water intake structure(s), you must:

- 4.1) Install large organism exclusion devices, having a distance between exclusion bars of no greater than nine inches; and
- 4.2) Monitor the intake structure(s) at least every 4 hours (unless otherwise determined by the NMFS Regional Office) for the presence of sawfish. In the event a sawfish is found in the intake structure, you must:
 - Observe the sawfish to determine if it has any injuries or appears stressed or unhealthy.
 - Immediately contact the NMFS Regional Office and follow their instructions
 - Gather and record information on the sawfish, including the species, size, condition (dead, injured, or healthy/released). Also record any tags or markings and include photos of the sawfish in the intake structure. Record this information in your annual incidental take report, which must be submitted to the NMFS Regional Office, NMFS Office of Protected Resources, and Director.
 - For live sawfish, follow the procedure in 4.3.
 - For dead sawfish, follow the procedure in 4.4.
- 4.3) If a live sawfish is impinged, entrapped, or entrained, you must contact and follow the instructions of the NMFS Regional Office. You must take all measures necessary to enable the sawfish to swim out of the intake structure on its own (e.g., reduce flow, turn off pumps, or close cover to intake wells so that sunlight enters only through the intake entrance). You must continue to monitor the sawfish every 15 minutes until it leaves or is released. Do not attempt to capture or handle the sawfish unless you are instructed to do so by NMFS. If you are instructed to capture or handle the sawfish, you must follow the following guidelines or other instructions provided by NMFS:
 - 4.3.1. All sawfish should be handled with care.
 - 4.3.2. Pick up sawfish at the center of the body. Do not pick up sawfish by the head or tail.
 - 4.3.3. Dip nets, cargo nets, and other equipment should be used to lift and move sawfish whenever possible.
 - 4.3.4. If a sawfish is actively moving, it should be released
- 4.4) If you observe a dead sawfish the area(a) directly or indirectly affected by your cooling water intake structure(s), you must contact and follow the instructions of NMFS. You must follow NMFS' protocols for collecting, storing,

and transporting the carcass for necropsy. If instructed to do so, you must follow NMFS' protocol for sampling and disposing of the carcass.

4.5) For juvenile sawfish, you must also:

4.5.1 Use diversion structures near the intake canal to block sawfish from entering the cooling water intake structure.

4.5.2 Use mechanisms to reduce approach-flow velocity (i.e., the V-shaped screen) that will allow sawfish to avoid impingement on their own power should they make it into the canal.

4.5.2 Monitor diversion structure on a daily basis.

5.0 Abalone

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If Federally-listed abalone, their designated critical habitat, or habitats suitable for abalone (e.g., rocky intertidal or subtidal habitats within the depth range of the species) occur within the intake or discharge structure's area of impact (including within XX meters of the area of impact), you must:

5.1) Conduct a benthic and/or intertidal habitat characterization study within the area affected by your cooling water intake structure and discharge, and submit this information along with your NPDES permit application. This benthic habitat characterization study should include the following information:

5.1.1. A map of the study area, indicating the area of impact for the intake and/or discharge structure(s).

5.1.2. Substrate type and extent and distance from intake/discharge

5.1.3. Water depth (for subtidal studies)

5.1.4. Water temperature

5.1.5. Current patterns

5.1.6. Observation of abalone individuals in the study area, including but not limited to:

5.1.6.1. Identification of abalone species and their location

5.1.6.2. Enumeration of the number of individuals by species and the estimated shell length, habitat type (e.g., in a crevice, on open vertical or horizontal surface), and nearest neighbor distance (e.g., distance to the nearest other abalone) for each individual.

5.1.6.3. Identification of abalone aggregations (i.e., two or more individuals with nearest neighbor distances measuring two meters or less), including the number of individuals in the aggregation and the location of the aggregation.

5.2) Conduct an entrainment risk modeling study to determine the risk of federally-listed abalone (e.g., larvae) being entrained by your cooling water intake structure, and submit this information along with your NPDES permit application.

5.3) Monitor entrainment of federally-listed abalone (e.g., larvae) and provide reports to the appropriate NMFS Regional Office according to the schedule specified below. Monitoring should be based on the timing and mode of abalone

spawning appropriate to the listed species present in the area affected by the intake and/or discharge structure(s).

5.3.1. Monitoring schedule: Monitoring for entrainment of abalone (e.g., larvae) is to be conducted at least twice a week during the months of March and August (peak spawning months for black abalone and white abalone, respectively) and at least once a week during the months of February, April, July, and September (white abalone spawning: February – April; black abalone spawning: July – September. Monitoring methods must be appropriate to ensure adequate and representative sampling of the intake water and entrainment of abalone.

5.3.2. Reporting schedule: During the entrainment monitoring period (February – April and July – September), weekly reports must be submitted to the appropriate NMFS Regional Office (electronic submissions are acceptable). An annual report must be submitted to the appropriate NMFS Regional Office by December 31 of each calendar year. Weekly reports should describe monitoring and analysis methods, abalone entrainment results (see 5.3.3. and 5.3.4. below), and relevant information regarding the facility's operations for the monitoring period. Annual reports should include a summary of the monitoring and analysis methods, abalone entrainment results, and relevant information regarding the facility's operations throughout the entrainment monitoring period for that year (e.g., water temperature data, spatial analysis of the water masses affected by intake and discharge, and data on other species entrained, particularly other invertebrate larvae).

5.3.3. Monitoring and estimation of abalone entrainment: As technologies allow, monitoring should include:

5.3.3.1. Identification of larvae to the lowest taxonomic level possible. It is recognized that currently taxonomic identification is limited, but advances in genetic studies, marker development, or other techniques may allow identification in the near future.

5.3.3.2. Enumeration of abalone larvae, and estimation of the number of abalone larvae entrained over the monitoring period (e.g., weekly, annually).

5.3.4. If identification and/or enumeration of abalone larvae is not feasible given currently available technologies or methods, then entrainment of abalone larvae may be estimated by:

5.3.4.1. Conducting a survey of the invertebrate community in the area of impact to determine the proportion of abalone compared to other invertebrates that overlap in spawning seasons.

5.3.4.2. Monitoring entrainment to enumerate invertebrate larvae and estimate the number of invertebrate larvae entrained over the monitoring period (e.g., weekly, annually).

5.3.4.3. Estimating the number of abalone larvae entrained (by species) over the monitoring period, based on the proportion of abalone in the invertebrate community within the area of impact.

5.4) If the average estimated weekly entrainment of abalone larvae (by species) exceeds 99.9% of the veliger potential (see 5.4.1. below) for the adult abalone population in the area of impact, your facility must reduce intake volumes to reduce the estimated average weekly entrainment of abalone larvae to be less than this level. You also must contact the appropriate NMFS Regional Office within one day of exceeding 99.9% of the veliger potential.

5.4.1. Veliger potential: The estimated number of veligers produced from a spawning event involving all adult abalone (by species) within the area, assuming (a) the ratio of females to males in the population is 1:1; (b) each individual spawns once per year; (c) each female can release 4 million eggs per spawning event; and (d) natural mortality from the egg to veliger stage is 99.9%.

5.5) Monitor the effects of the discharge on the abalone community and recruitment as follows and submit annual reports to the appropriate NMFS Regional Office.

5.6) Ensure that discharges do not increase water temperatures where any Federally-listed abalone may be found, including available suitable habitat in the area of impact, above the maximum thermal threshold identified under 5.6.1. and 5.6.2 below. Quarterly monitoring reports must be submitted to the appropriate NMFS Regional Office that describe the temperature monitoring methods, results, and relevant information on the facility's operations for the monitoring period.

5.6.1. Ensure discharges do not increase water temperatures by more than 2°C above ambient water temperatures where any Federally-listed abalone may be found, including available suitable habitat within the facilities' area of impact.

5.6.2. Ensure discharges do not increase water temperatures above a maximum of 23°C for facilities south of Point Conception, CA, or 20°C for facilities north of Point Conception, CA where any Federally-listed abalone may be found, including available suitable habitat within the facilities' area of impact

5.7) Establish replicate monitoring sites (e.g., transects, quadrats), using non-invasive, scientifically acceptable methods to monitor abalone demographics and recruitment. Experimental design should include sites within the area of influence of the discharge and an equal number of replicate sites in comparable habitat (e.g., substrate type, currents, depth, abalone presence) outside of the area of influence of the discharge. Sites should be monitored every 4 to 6 months.

5.7.1. Annual reports must include a description of the monitoring methods; a map and description of the monitoring area and sites; the number and estimated size of individual abalone (by species); the location, habitat (e.g., crevice or open vertical/horizontal surface), depth (for subtidal species), and nearest neighbor distance for each individual abalone; identification of abalone aggregations; and an evaluation of the health of each individual abalone via visual assessment (e.g., note signs of withering syndrome disease, such as a withered and discolored foot muscle or an inability to hold on to the substrate) and/or collection and analysis of fecal samples. Facilities must contact the appropriate NMFS Regional Office and follow the guidelines or instructions regarding protocols for sample collection.

5.7.2. Dead or obviously dying abalone must be collected and placed in a plastic bag (one individual per bag) labeled with the date and location of collection and immediately frozen or preserved as instructed by pathologists. Discovery of the dead or obviously dying abalone must be reported to the appropriate NMFS Regional Office as soon as possible and provide the location(s) and potential cause(s) of the mortality or mortalities. Facilities must follow the guidelines or instructions from the appropriate NMFS Regional Office regarding collection, preservation, and transport protocols.

If Federally-listed juvenile and/or adult abalone are found to be impinged, entrained or otherwise adversely affected, you must:

5.8) Immediately contact the appropriate NMFS Regional Office immediately, and follow the guidelines or instructions provided.

6.0 Corals

If Federally-listed corals or their designated critical habitat may occur within the area(s) directly or indirectly affected by your cooling water intake structure(s), you must use scientifically acceptable (e.g., published in scientific journals) methods to:

- 6.1) Conduct a benthic habitat characterization study of the immediate area extending 50 x 50 meters from your cooling water intake structure. This benthic habitat characterization study should include the following information:
 - 6.1.1. Substrate type and extent
 - 6.1.2. Water depth
 - 6.1.3. Water temperature
 - 6.1.4. Current patterns
 - 6.1.5. Identification of coral species and coral coverage in the study area
 - 6.1.6. Coral demographics (size-class structure) in the study area
- 6.2) Conduct plankton collection studies, using either towed or stationary nets, of the immediate area within 20 m from cooling water intake structure. Studies should be based on timing and mode of coral spawning appropriate to the listed species present.

6.2.1. Identify eggs (gametes) and larvae to the lowest taxonomic level possible (It is recognized that currently taxonomic identification is limited but advances are expected in genetic bar-coding studies, marker development, or other techniques that should allow identification in the near future.)

6.2.2. Enumerate coral eggs and larvae, as technologies allow.

6.3) Contact and coordinate with the appropriate NMFS Regional Office.

If NMFS determines your facility has a high risk for entrainment of federally listed coral species, you must:

6.4) Conduct on-going studies to determine the effect of cooling water intake on coral community and recruitment.

6.4.1. Monitor effects on coral populations.

6.4.1.1. Establish replicate benthic quadrats (i.e., 10 m radius) using scientifically acceptable methods to monitor coral demographics and recruitment. Experimental design should include at least three replicates within 25 m of intake and an equal number of replicates in comparable habitat (e.g., currents, depth, coral composition/cover) at a distance greater than 100 m. Quadrats should be monitored every 4-6 months.

6.4.1.2. Variation in coral size structure or recruitment rates/success between control and impacted quadrats in excess of 25% should be reported to the appropriate NMFS Regional Office.

6.4.2. Conduct an entrainment study to determine if federally listed corals (i.e., coral fragments, gametes, or larvae) are being entrained by your cooling water intake structure (Technological considerations mentioned in 6.2.1, above, apply.)

If Federally-listed coral species are found to be entrained or otherwise adversely affected, you must:

6.5) Contact the appropriate NMFS Regional Office immediately.

7.0 Larval fishes (bocaccio, eulachon, rockfish, larval sturgeon)

If Federally-listed bocaccio, eulachon, rockfish, or sturgeon larval-stage fishes or their designated critical habitat may occur within the area(s) directly or indirectly affected by your cooling water intake structure(s), you must implement the attached screen guidelines, as described in the July 2011 Fish Facilities Technical Team Bay Delta Conservation Plan.

7.1. Use the most biologically protective fish screen concepts as the foundation of the proposed designs, as determined by the NMFS Regional Office.

7.2. Operate at an approach velocity of 0.2 ft/s.

7.3. Required sweeping velocities should be measured adjacent (within twelve inches) to

the screen face and should be equal to or greater than the approach velocity criterion (i.e., 0.2 ft/s or greater).

7.4. Target the height of fish screen panels to fifteen feet of submerged screen height to operate at 0.33 ft/s approach velocity at low river stage; taller screens may be appropriate at specific sites for purposes of reducing the length of the diversion structure. If the screens are constructed 40% taller (additional 6 feet), when the river stage exceeds the design minimum, the extra water depth will allow increased diversion capacity while meeting a 0.2 ft/s approach velocity (during critical times when fish are present). Further refinement of the relationship between screen height and river stage should be addressed during an optimization process associated with final design.

7.5. Bottoms of screen panels should be elevated three to five feet off the existing river bottom to minimize sediment and bed load impacts, and to limit exposure to benthic-oriented fish species. In the Atlantic, where sturgeon are present but salmon are not, locate the screens in shallow waters. In the Atlantic, where salmon are present but sturgeon are not, locate the screens in deep waters. Where both species are present, contact the NMFS regional Office regarding screen location.

7.6. An approximate distance of 100 feet for spacing between refugia is suggested however, final refugia spacing should be further evaluated prior to final design. In order to optimize design, construction, operations and maintenance, the refugia should be modular systems that may be installed in any fish screen slot.

7.7. Flow control baffles should allow diverted flow to be distributed vertically as well as horizontally along the screen face to distribute flow evenly over all operating screen area. Dynamic baffling should be considered to automatically regulate flow through discrete portions of the screen. Selective withdrawal to allow water to be diverted from selected areas of screen (vertically or horizontally) should also be considered.

8.0 Anadromous salmonids and adult sturgeon

If Federally-listed anadromous salmonids or sturgeon, or their designated critical habitat may occur within the area(s) directly or indirectly affected by your cooling water intake structure(s), you must implement the design criteria identified in the latest Anadromous Salmonid Passage Facility Design guidelines and coordinate with the appropriate NMFS Regional Office.

In addition, for Atlantic salmon and sturgeon, site location will play an important role in selecting criteria:

8.1 Facilities should use 3 inch trash rack spacing, in addition to screening requirements required by the NMFS Regional Office.

8.2 Facilities located in upstream freshwater tidal portions of a river must address impingement and entrainment of eggs/larvae, as well as impingement of older life stages, as determined in coordination with the appropriate NMFS Regional Office.

8.3. Facilities in lower brackish-saline stretches of tidal rivers and in marine habitat must address impingement of older life stages but do not need to address eggs/larvae, as they cannot survive saline conditions.

For sturgeon you must also:

8.4 Use diversion structures near the intake canal to block sturgeon from entering the cooling water intake structure.

8.5 Use mechanisms to reduce approach-flow velocity (i.e., the V-shaped screen) that will allow sturgeon to avoid impingement on their own power should they make it into the canal.

8.6 Use full time staff to maintain (i.e., inspect, clean, and repair) the diversion structure on a daily basis.