

Appendix 5.H, Construction Effects Tables for Salmonids and Green Sturgeon

Table 5.H-1. Construction Effects, Head Of Old River Gate, NMFS Species. Draft

Sub-Actions	Duration of Sub-Action ¹	Timing of the sub-action	Period of Potential Fish Exposure	Life Stage(s) Affected	Effect Type	Effect Mechanism	Species or Habitat Response	Risk to Individuals	Effects on Designated Critical Habitat	Primary Avoidance and Minimization Measures	Compensation Measures
Cofferdam installation, levee clearing/grading, riprap placement, dredging, barge operations	3 years	Aug 1–Nov 30	<u>Steelhead</u> Adults: Aug–Nov Juveniles: Nov <u>Green sturgeon</u> Adults: Aug–Nov Juveniles: Aug–Nov	Adults, juveniles	Turbidity and suspended sediment	Temporary, localized reduction in habitat availability/quality due to elevated turbidity and suspended sediment	Behavioral responses (avoidance), sedimentation of benthic habitat/reductions in food availability (benthic invertebrates)	Low likelihood of adverse effects on survival, growth, or reproductive success	Temporary degradation of water quality, food resources	Work window, construction BMPs, SWPPP, erosion and sediment control plan, SPCCP, barge operations plan	None
In-water operation of construction equipment	3 years	Aug 1–Nov 30	<u>Steelhead</u> Adults: Aug–Nov Juveniles: Nov <u>Green sturgeon</u> Adults: Aug–Nov Juveniles: Aug–Nov	Adults, juveniles	Contaminants	Temporary risk of exposure to contaminants from spills or disturbance of contaminated soils/sediment	Adverse physiological effects or mortality from exposure to contaminants	Potential for reduced survival, growth, and reproductive success	Temporary degradation of water quality, food resources	Work window; construction BMPs, SWPPP, erosion and sediment control plan, SPCCP, hazardous materials management plan, barge operations plan	None
Cofferdam and foundation pile installation, riprap placement, dredging, barge operations	3 years	Aug 1–Nov 30	<u>Steelhead</u> Adults: Aug–Nov Juveniles: Nov <u>Green sturgeon</u> Adults: Aug–Nov Juveniles: Aug–Nov	Adults, juveniles	Underwater noise	Temporary increases in underwater noise	Adverse physiological effects, hearing loss, tissue damage, behavioral responses	Increased risk of injury or mortality	Temporary degradation of migratory habitat in areas subject to noise levels exceeding injury and behavioral thresholds	Work window; underwater sound control and abatement plan	None
Cofferdam installation	1 year	Aug 1–Nov 30	<u>Steelhead</u> Adults: Aug–Nov Juveniles: Nov <u>Green sturgeon</u> Adults: Aug–Nov Juveniles: Aug–Nov	Adults, juveniles	Fish stranding	Temporary risk of stranding within cofferdams and potential injury or mortality during rescue and salvage of stranded fish	Injury or mortality	Injury or mortality of stranded or captured fish	Temporary degradation of migratory habitat	Work window, fish rescue and salvage plan	None
Cofferdam installation, riprap placement, dredging, barge operations	3 years	Aug 1–Nov 30	<u>Steelhead</u> Adults: Aug–Nov Juveniles: Nov <u>Green sturgeon</u> Adults: Aug–Nov Juveniles: Aug–Nov	Adults, juveniles	Physical injury	Temporary risk of physical contact of fish with piles, riprap, dredges, and barges	Injury or mortality	Increased risk of injury or mortality	Temporary degradation of migratory habitat	Work window; barge operations plan	None
HOR gate construction, including cofferdam installation, levee clearing/grading, riprap placement, dredging, and barge operations	3 years ²	Aug 1–Nov 30	<u>Steelhead</u> Adults: Aug–Mar Juveniles: Nov–Jun <u>Green sturgeon</u> Adults: year-round Juveniles: year-round	Adults, juveniles	Habitat Loss/Alteration	Temporary to permanent losses or alteration of riverine and riparian habitat due to loss of habitat and changes in water quality and physical habitat (water depths, velocities, substrate, vegetation), food availability, and predator habitat	Reductions in habitat quantity/quality	Increased risk of mortality from predation	Temporary to permanent loss/alteration of 2.5 acres of aquatic habitat and 1,434 linear feet of shoreline habitat	Minimize size of temporary and permanent in-water and shoreline footprints of intakes	Tidal aquatic habitat: 7.5 acres (3:1) Shoreline habitat: 1,434 (1:1) Potential location: TBD

¹Duration encompasses number of years or construction seasons in which sub-actions are expected to occur during construction of the three intake facilities

²Represents the duration of sub-actions only; however, the effects of these sub-actions will range from temporary to permanent losses or alteration of habitat

Table 5.H-2. Construction Effects, Clifton Court Forebay, NMFS Species. Draft

Sub-Actions	Duration of Sub-Action ¹	Timing of the sub-action	Period of Potential Fish Exposure	Life Stage(s) Affected	Effect Type	Effect Mechanism	Species or Habitat Response	Risk to Individuals	Effects on Designated Critical Habitat	Primary Avoidance and Minimization Measures	Compensation Measures
Cofferdam installation, levee clearing/grading, riprap placement, dredging, barge operations	8 years	Jun 1–Nov 30	<u>Steelhead</u> Adults: Aug–Nov Juveniles: Jun and Nov <u>Green sturgeon</u> Adults: Jun–Nov Juveniles: Jun–Nov	Adults, juveniles	Turbidity and suspended sediment	Temporary, localized reduction in habitat availability/quality due to elevated turbidity and suspended sediment	Behavioral responses (avoidance), sedimentation of benthic habitat/reductions in food availability (benthic invertebrates)	Low likelihood of adverse effects on survival, growth, or reproductive success	Temporary degradation of water quality, food resources	Work window, construction BMPs, SWPPP, erosion and sediment control plan, SPCCP, barge operations plan	None
In-water operation of construction equipment	8 years	Jun 1–Nov 30	<u>Steelhead</u> Adults: Aug–Nov Juveniles: Jun and Nov <u>Green sturgeon</u> Adults: Jun–Nov Juveniles: Jun–Nov	Adults, juveniles	Contaminants	Risk of exposure to contaminants from spills or disturbance of contaminated soils/sediment	Adverse physiological effects or mortality from exposure to contaminants	Potential for reduced survival, growth, and reproductive success	Temporary degradation of water quality, food resources	Work window; construction BMPs, SWPPP, erosion and sediment control plan, SPCCP, hazardous materials management plan, barge operations plan	None
Cofferdam and foundation pile installation, riprap placement, dredging, barge operations	8 years	Jun 1–Nov 30	<u>Steelhead</u> Adults: Aug–Nov Juveniles: Jun and Nov <u>Green sturgeon</u> Adults: Jun–Nov Juveniles: Jun–Nov	Adults, juveniles	Underwater noise	Temporary increases in underwater noise	Adverse physiological effects, hearing loss, tissue damage, behavioral responses	Increased risk of injury or mortality	Temporary degradation of migratory habitat in areas subject to noise levels exceeding injury and behavioral thresholds	Work window; underwater sound control and abatement plan	None
Cofferdam and silt curtain installation	8 years	Jun 1–Nov 30	<u>Steelhead</u> Adults: Aug–Nov Juveniles: Jun and Nov <u>Green sturgeon</u> Adults: Jun–Nov Juveniles: Jun–Nov	Adults, juveniles	Fish stranding	Temporary risk of stranding within cofferdams/silt curtains and potential injury or mortality during rescue and salvage of stranded fish	Injury or mortality	Injury or mortality of stranded or captured fish	Temporary degradation of migration habitat	Work window, fish rescue and salvage plan	None
Cofferdam installation, riprap placement, dredging, barge operations	8 years	Jun 1–Nov 30	<u>Steelhead</u> Adults: Aug–Nov Juveniles: Jun and Nov <u>Green sturgeon</u> Adults: Jun–Nov Juveniles: Jun–Nov	Adults, juveniles	Physical injury	Temporary risk of physical contact of fish with piles, riprap, dredges, and barges	Injury or mortality	Increased risk of injury or mortality	Temporary degradation of migration habitat	Work window; barge operations Plan	None
Construction of embankments, pumping plant, siphons, channels, intake, and spillway, including cofferdam installation, levee clearing/grading, riprap placement, dredging, barge operations	8 years ²	Jun 1–Nov 30	<u>Steelhead</u> Adults: Aug–Mar Juveniles: Nov–Jun <u>Green sturgeon</u> Adults: year-round Juveniles: year-round	Adults, juveniles	Habitat Loss/Alteration	Temporary to permanent losses or alteration of riverine and riparian habitat due to loss of habitat and changes in water quality and physical habitat (water depths, velocities, substrate, vegetation), food availability, and predator habitat	Reductions in habitat quantity/quality	Increased risk of mortality from predation	Temporary to permanent loss/alteration of 1,932 acres of aquatic habitat (includes permanent loss of 258 acres of aquatic habitat within the structural footprints of the proposed water conveyance facilities)	Minimize size of permanent and temporary in-water footprints of CCF facilities	None

¹Duration encompasses number of years or construction seasons in which sub-actions are expected to occur during construction of the three intake facilities

²Represents the duration of sub-actions only; however, the effects of these sub-actions will range from temporary to permanent losses or alteration of habitat

Table 5.H-3. Construction Effects, Barge Landings, NMFS Species. Draft

Sub-Actions	Duration of Sub-Action ¹	Timing of the sub-action	Period of Potential Fish Exposure	Life Stage(s) Affected	Effect Type	Effect Mechanism	Species or Habitat Response	Risk to Individuals	Effects on Designated Critical Habitat	Primary Avoidance and Minimization Measures	Compensation Measures
Cofferdam installation, levee clearing/grading, riprap placement, barge operations	2-3 years	Jun 1–Oct 31	<u>Steelhead</u> Adults: Aug–Oct Juveniles: Jun <u>Green sturgeon</u> Adults: Jun–Oct Juveniles: Jun–Oct	Adults, juveniles	Turbidity and suspended sediment	Temporary, localized reduction in habitat availability/quality due to elevated turbidity and suspended sediment	Behavioral responses (avoidance), sedimentation of benthic habitat/reductions in food availability (benthic invertebrates)	Low likelihood of adverse effects on survival, growth, or reproductive success	Temporary degradation of water quality, food resources	Work window, construction BMPs, SWPPP, erosion and sediment control plan, SPCCP, barge operations plan	None
In-water operation of construction equipment	2-3 years	Jun 1–Oct 31	<u>Steelhead</u> Adults: Aug–Oct Juveniles: Jun <u>Green sturgeon</u> Adults: Jun–Oct Juveniles: Jun–Oct	Adults, juveniles	Contaminants	Temporary risk of exposure to contaminants from spills or disturbance of contaminated soils/sediment	Adverse physiological effects or mortality from exposure to contaminants	Potential for reduced survival, growth, and reproductive success	Temporary degradation of water quality, food resources	Work window; construction BMPs, SWPPP, erosion and sediment control plan, SPCCP, hazardous materials management plan, barge operations plan	None
Cofferdam and dock/mooring pile installation, riprap placement, barge operations	2-3 years	Jun 1–Oct 31	<u>Steelhead</u> Adults: Aug–Oct Juveniles: Jun <u>Green sturgeon</u> Adults: Jun–Oct Juveniles: Jun–Oct	Adults, juveniles	Underwater noise	Temporary increases in underwater noise	Adverse physiological effects, hearing loss, tissue damage, behavioral responses	Increased risk of injury or mortality	Temporary degradation of migratory habitat in areas subject to noise levels exceeding injury and behavioral thresholds	Work window; underwater sound control and abatement plan	None
Cofferdam installation	2-3 years	Jun 1–Oct 31	<u>Steelhead</u> Adults: Aug–Oct Juveniles: Jun <u>Green sturgeon</u> Adults: Jun–Oct Juveniles: Jun–Oct	Adults, juveniles	Fish stranding	Temporary risk of stranding within cofferdams and potential injury or mortality during rescue and salvage of stranded fish	Injury or mortality	Injury or mortality of stranded or captured fish	Temporary degradation of migratory habitat	Work window, fish rescue and salvage plan	None
Cofferdam installation, riprap placement, barge operations	2-3 years	Jun 1–Oct 31	<u>Steelhead</u> Adults: Aug–Oct Juveniles: Jun <u>Green sturgeon</u> Adults: Jun–Oct Juveniles: Jun–Oct	Adults, juveniles	Physical injury	Temporary risk of physical contact of fish with piles, riprap, and barges	Injury or mortality	Increased risk of injury or mortality	Temporary degradation of migratory habitat	Work window; barge operations plan	None
Barge landing construction, including cofferdam installation, levee clearing/grading, riprap placement, barge operations	2-3 years ²	June 1-Oct 31	<u>Steelhead</u> Adults: Aug–Mar Juveniles: Nov–June <u>Green sturgeon</u> Adults: year-round Juveniles: year-round	Adults, juveniles	Habitat Loss/Alteration	Temporary to permanent losses or alteration of riverine and riparian habitat due to loss of habitat and changes in water quality and physical habitat (water depths, velocities, substrate, vegetation), food availability, and predator habitat	Reductions in habitat quantity/quality	Increased risk of mortality from predation	Temporary to permanent loss/alteration of 22.4 acres of aquatic habitat and 5,307 linear feet of shoreline habitat	Minimize size of temporary and permanent in-water and shoreline footprints of landings	Tidal aquatic habitat: 22.4 acres (1:1) Shoreline habitat: 5,307 (1:1) Potential location: TBD

¹Duration encompasses number of years or construction seasons in which sub-actions are expected to occur during construction of the three intake facilities²Represents the duration of sub-actions only; however, the effects of these sub-actions will range from temporary to permanent losses or alteration of habitat

Table 5.H-4. Construction Effects, North Delta Intakes, NMFS Species. Draft

Sub-Actions	Duration of Sub-Action ¹	Timing of the sub-action	Period of Potential Fish Exposure	Life Stage(s) Affected	Effect Type	Effect Mechanism	Species or Habitat Response	Risk to Individuals	Effects on Designated Critical Habitat	Primary Avoidance and Minimization Measures	Compensation Measures
Cofferdam installation, levee clearing/grading, riprap placement, dredging, barge operations	5 years	Jun 1–Oct 31	<u>Winter-run</u> Adults: Jun–Jul Juveniles: Oct <u>Spring-run</u> Adults: Jun–Aug Juveniles: Jun <u>Steelhead</u> Adults: Aug–Oct Juveniles: Jun <u>Green sturgeon</u> Adults: Jun–Oct Juveniles: Jun–Oct	Adults, juveniles	Turbidity and suspended sediment	Temporary, localized reduction in habitat availability/quality due to elevated turbidity and suspended sediment	Behavioral responses (avoidance), sedimentation of benthic habitat/reductions in food availability (benthic invertebrates)	Low likelihood of adverse effects on survival, growth, or reproductive success	Temporary degradation of water quality, food resources	Work window, construction BMPs, SWPPP, erosion and sediment control plan, SPCCP, barge operations plan	None
In-water operation of construction equipment	5 years	Jun 1–Oct 31	<u>Winter-run</u> Adults: Jun–Jul Juveniles: Oct <u>Spring-run</u> Adults: Jun–Aug Juveniles: Jun <u>Steelhead</u> Adults: Aug–Oct Juveniles: Jun <u>Green sturgeon</u> Adults: Jun–Oct Juveniles: Jun–Oct	Adults, juveniles	Contaminants	Temporary risk of exposure to contaminants from spills or disturbance of contaminated soils/sediment	Adverse physiological effects or mortality from exposure to contaminants	Potential for reduced survival, growth, and reproductive success	Temporary degradation of water quality, food resources	Work window; construction BMPs, SWPPP, erosion and sediment control plan, SPCCP, hazardous materials management plan, barge operations plan	None
Cofferdam and foundation pile installation, riprap placement, dredging, barge operations	5 years	Jun 1–Oct 31	<u>Winter-run</u> Adults: Jun–Jul Juveniles: Oct <u>Spring-run</u> Adults: Jun–Aug Juveniles: Jun <u>Steelhead</u> Adults: Aug–Oct Juveniles: June <u>Green sturgeon</u> Adults: Jun–Oct Juveniles: Jun–Oct	Adults, juveniles	Underwater noise	Temporary increases in underwater noise	Adverse physiological effects, hearing loss, tissue damage, behavioral responses	Increased risk of injury or mortality	Temporary degradation of migratory habitat in areas subject to noise levels exceeding injury and behavioral thresholds	Work window; underwater sound control and abatement plan	None
Cofferdam installation	3 years	Jun 1–Oct 31	<u>Winter-run</u> Adults: Jun–Jul Juveniles: Oct <u>Spring-run</u> Adults: Jun–Aug Juveniles: Jun <u>Steelhead</u> Adults: Aug–Oct Juveniles: June <u>Green sturgeon</u> Adults: Jun–Oct Juveniles: Jun–Oct	Adults, juveniles	Fish stranding	Temporary risk of stranding within cofferdams and potential injury or mortality during rescue and salvage of stranded fish	Injury or mortality	Injury or mortality of stranded or captured fish	Temporary degradation of migratory habitat	Work window, fish rescue and salvage plan	None

Sub-Actions	Duration of Sub-Action ¹	Timing of the sub-action	Period of Potential Fish Exposure	Life Stage(s) Affected	Effect Type	Effect Mechanism	Species or Habitat Response	Risk to Individuals	Effects on Designated Critical Habitat	Primary Avoidance and Minimization Measures	Compensation Measures
Cofferdam installation, riprap placement, dredging, barge operations	5 years	Jun 1–Oct 31	<u>Winter-run</u> Adults: Jun–Jul Juveniles: Oct <u>Spring-run</u> Adults: Jun–Aug Juveniles: Jun <u>Steelhead</u> Adults: Aug–Oct Juveniles: June <u>Green sturgeon</u> Adults: Jun–Oct Juveniles: Jun–Oct	Adults, juveniles	Physical injury	Temporary risk of physical contact of fish with piles, riprap, dredges, and barges	Injury or mortality	Increased risk of injury or mortality	Temporary degradation of migratory habitat	Work window; barge operations plan	None
Intake facility construction, including cofferdam installation, levee clearing/grading, riprap placement, dredging, and barge operations	5 years ²	June 1-Oct 31	<u>Winter-run</u> Adults: Nov–Jul Juveniles: Oct–Apr <u>Spring-run</u> Adults: Feb–Aug Juveniles: Nov–Jun <u>Steelhead</u> Adults: Aug–Mar Juveniles: Nov–Jun <u>Green sturgeon</u> Adults: year-round Juveniles: year-round	Adults, juveniles	Habitat Loss/Alteration	Temporary to permanent losses or alteration of riverine and riparian habitat due to loss of habitat and changes in water quality and physical habitat (water depths, velocities, substrate, vegetation), food availability, and predator habitat	Reductions in habitat quantity/quality	Increased risk of mortality from predation	Temporary to permanent Loss/alteration of 29.9 acres of aquatic habitat and 13,974 linear feet of shoreline habitat (includes permanent loss of 6.6 acres of aquatic habitat and 5,367 linear feet of shoreline habitat within the structural footprints of the proposed intake facilities)	Minimize size of temporary and permanent in-water and shoreline footprints of intakes	Tidal aquatic habitat: 109.5 acres (3:1) Shoreline habitat: 19,341 (1:1) Potential location: Sacramento River, Steamboat and Sutter Sloughs, or other areas agreed to by NMFS and DFW

¹Duration encompasses number of years or construction seasons in which sub-actions are expected to occur during construction of the three intake facilities

²Represents the duration of sub-actions only; however, the effects of these sub-actions will range from temporary to permanent losses or alteration of habitat