UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
777 Sonoma Avenue, Room 325
Santa Rosa, California 95404-4731

June 14, 2021 **Refer to NMFS No:** WCRO-2021-00557

David White
NOAA Restoration Center
Northern California Area Office
777 Sonoma Avenue, Suite 325
Santa Rosa, California 95404

Becky Miller
U.S. Fish and Wildlife Service
2800 Cottage Way, Room W-1729
Sacramento, California 95825

Kasey Sirkin
U.S. Army Corps of Engineers
601 Startare Drive, #13
Eureka, California 95501

Re: Endangered Species Act Section 7(a)(2) Biological Opinion, and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Ocean Ranch Tidal Restoration Project in the Eel River Estuary, Humboldt County, California

Dear Mr. White, Ms. Miller, and Ms. Sirkin:

Thank you for the letter of March 16, 2021, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for the Ocean Ranch Tidal Restoration Project. This consultation was conducted in accordance with the 2019 revised regulations that implement section 7 of the ESA (50 CFR 402, 84 FR 45016). Thank you, also, for your request for consultation pursuant to the essential fish habitat (EFH) provisions in Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA)(16 U.S.C. 1855(b)) for this action. This letter transmits NMFS' final biological opinion and EFH response for the proposed Ocean Ranch Tidal Restoration Project (Project).

The enclosed biological opinion describes NMFS' analysis of effects on threatened Southern Oregon/Northern California Coast (SONCC) coho salmon (*Oncorhynchus kisutch*), California Coastal (CC) Chinook salmon (*O. tshawytscha*), Northern California (NC) steelhead (*O. mykiss*), and their designated critical habitat in accordance with section 7 of the ESA. Based on the best scientific and commercial information available, NMFS concludes that the proposed action is not likely to jeopardize the continued existence of SONCC coho salmon, CC Chinook salmon, and NC steelhead, nor is the project likely to destroy or adversely modify designated critical habitat for these species. NMFS expects the proposed action would result in incidental take of SONCC coho salmon, CC Chinook salmon, and NC steelhead. An incidental take statement with non-discretionary terms and conditions is included with the enclosed biological opinion.

The enclosed EFH consultation was prepared pursuant to section 305(b) of the MSA. The proposed action includes areas identified as EFH for species managed under the Pacific Coast Salmon Fishery Management Plan (FMP), Pacific Coast Groundfish FMP, and the Coastal Pelagic Species FMP. Based on our analysis, NMFS concludes that the project would adversely affect EFH for all three FMP's and have identified two EFH Conservation Recommendations.

Please contact Matt Goldsworthy, Northern California Office, Arcata, at (707) 825-1621 or via email at Matt.Goldsworthy@noaa.gov if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Enclosure

cc: ARN File # 151422WCR2021AR00071

Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response

Ocean Ranch Tidal Restoration Project
Humboldt County, California

NMFS Consultation Number: WCRO-2021-00557

Action Agencies: NOAA Restoration Center, Northern California Office;
United States Army Corps of Engineers, San Francisco District;
United States Fish and Wildlife Service, Region 8

Table 1. Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	Is Action Likely to Adversely Affect Critical Habitat?	Is Action Likely To Jeopardize the Species?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
Southern Oregon/North California Coast (SONCC) coho salmon	Threatened	Yes	Yes	No	No
California Coastal (CC) Chinook Salmon	Threatened	Yes	Yes	No	No
Northern California (NC) steelhead	Threatened	Yes	Yes	No	No

Table 2. Essential Fish Habitat and NMFS' Determinations:

Fishery Management Plan That Identifies EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Coast Salmon	Yes	Yes
Pacific Coast Groundfish	Yes	Yes
Coastal Pelagic Species	Yes	Yes

Consultation Conducted By: National Marine Fisheries Service, West Coast Region

Issued By:

Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Date: June 14, 2021

Table of Contents

1 INTRODUCTION

This Introduction section provides information relevant to the other sections of this document and is incorporated by reference into Sections 2 and 3 below.

1.1 Background

NOAA's National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement (ITS) portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 USC 1531 et seq.), and implementing regulations at 50 CFR Part 402.

We also completed an essential fish habitat (EFH) consultation on the proposed action, in accordance with section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801 et seq.) and implementing regulations at 50 CFR 600.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (DQA) (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The document will be available within two weeks at the NOAA Library Institutional Repository [Link to Repository]. A complete record of this consultation is on file at the NMFS Northern California Office in Arcata, California.

1.2 Consultation History

On March 16, 2021, NMFS received a request from the NOAA Restoration Center (NOAA RC), United States Fish and Wildlife Service (USFWS), and United States Army Corps of Engineers (Corps) to initiate formal ESA consultation on the proposed Project due to anticipated adverse effects to Southern Oregon/Northern California Coast (SONCC) coho salmon, California Coastal (CC) Chinook salmon, and Northern California (NC) steelhead, and their designated critical habitat. The Action Agencies also determined that the Project would adversely affect EFH for species managed under the Pacific Coast Salmon Fishery Management Plan (FMP), Pacific Coast Groundfish FMP, and Coastal Pelagic Species FMP.

On March 18, 2021, NMFS requested clarification via email from the NOAA RC regarding the anticipated monitoring to be conducted after the construction of the Project in order to understand the magnitude of the monitoring program and its effects on listed species. On April 5, 2021, the NOAA RC responded via email providing the monitoring plan intended to evaluate fish utilization of the restored areas. Formal ESA consultation was initiated upon receipt of this information on April 5, 2021, along with initiation of consultation for EFH.

1.3 Proposed Federal Action

Under the ESA, "action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02). Under MSA, Federal action means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a Federal Agency (50 CFR 600.910).

The NOAA Restoration Center is proposing to provide federal grant funding and is acting as the lead federal action agency responsible for compliance with the ESA and Magnuson-Stevens Act. The USFWS is also proposing to provide federal grant funding. The Corps proposes to issue federal permits under Section 404 of the Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act (RHA).

The Project, with proposed funding from NOAA RC, USFWS, and the California Department of Fish and Wildlife (CDFW), is intended to restore and expand natural estuarine and dune functions in the restoration area, and to assist in the recovery and enhancement of habitat for native fish, wildlife and plant species. More specifically, the primary objective of the estuarine restoration component of the Project is to restore the natural tidal prism and to improve connectivity of tidal and freshwater habitats within the 571-acre estuarine restoration area. The primary objective of the dune restoration component of the Project is to restore Sensitive Natural Communities and dune function within the 279-acre dune restoration area (see Figure 2).

Dewatering, cut, fill, grading, invasive plant removal and re-planting operations involved in the restoration would result in temporary impacts across the 850 acre Project area, which includes 571 acres of former estuarine habitat. Once completed, the Project would provide a matrix of restored landscape features of native salt marsh, fresh and brackish wetland, seasonal wetland, and coastal dune habitats intended to provide habitat for a suite of native fish, wildlife and plant species. Tidal restoration work will span two construction seasons starting in the summer of 2021. Initial treatments of *Spartina* and *Ammophila* are anticipated to begin in 2021 and span three to six years. Post-project monitoring will vary by performance parameter, but will generally be implemented for up to 10 years after construction is complete. The Project also proposes to allow for adaptive management to reconcile future needs as they arise.

1.3.1 Construction Approach

Primary access to the Project Area would be from the existing single-lane gravel road on the north end of the Project Area. Construction equipment would be staged in the parking area, and the adjacent uplands north of the estuarine restoration area. Construction equipment would access individual work sites from the top of existing levees and berms where possible. Low-ground pressure equipment, equipment staged on wetland mats, and/or amphibious equipment would be used in discrete locations that are not accessible from existing levees or berms.

Work in Areas B, C, and D (see Figures 1 and 2) could occur in wet or dry conditions, but most likely in a dry or dewatered condition unless the construction contractor deems it impracticable. If construction occurs when work areas are wet, work would be completed at a low or receding tide using amphibious equipment, low ground pressure equipment staged on mats, and/or equipment staged on existing levees. If construction occurs when work areas are dry, these areas would most efficiently be isolated and dewatered by repairing or removing the damaged tidegate between Area B and McNulty Slough and draining the work area passively at low tides. Existing open culverts in Areas C and D would also be removed to ensure no additional tidal inflow. Screened pumps may be required to remove remaining water that won't discharge through gravity or to accelerate drawdown. Water pumped from work areas would be discharged to Area A (rather than McNulty Slough) to reduce adverse impacts on water quality.

Once dry, heavy equipment (excavators, dump trucks) staged on existing levees or on wetland mats in the marsh to prevent compaction would be used to implement tidal restoration activities. The removal of portions of the McNulty Slough perimeter levee would occur either by installing sheetpile in McNulty Slough to isolate the work area, or preferably by removing half of the infrastructure (i.e., cut in half in place) and backfilling that portion of the levee before removing the second half. All work to remove infrastructure from the perimeter levee would be completed at low tide. If used, sheetpile would be installed using either a vibratory pile driver or pushed into place with the bucket of an excavator to avoid impact noise.

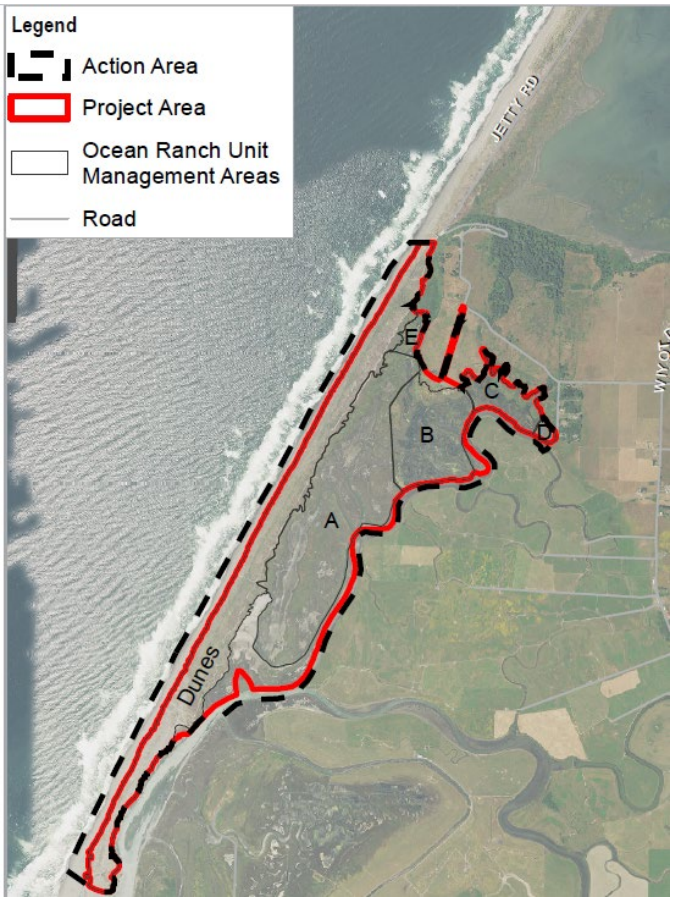

Figure 1. Overview of the Eel River Estuary Ocean Ranch Tidal Restoration Project areas and action area.

Work in Area E would be limited to repairing or replacing in kind an existing box culvert in the levee that separates Area E from Area A. This structure would be installed at a low tide. If necessary, sheetpile would be used to isolate the work area from the freshwater spring that drains to Area E from Table Bluff; a screened pump could be used to divert water from the work area if needed.

Work in Area A would require excavation in tidally influenced areas that can't be readily isolated or dewatered. As a result, excavation in the northern portions of Area A would be completed during a low or receding tide using low-ground pressure equipment, amphibious

equipment, or equipment staged on wetland mats. Construction of the tidal channel from Area A to the North Bay would occur using either excavators staged between North Bay and the levee breach (BR-1, preferred method) or a hydraulic dredge extending from North Bay into Area A (alternate method).

The preferred method would employ excavators and dump trucks to excavate the new tidal channel between North Bay and BR-1. Equipment would use the sand road to access the levee system along the south end of the Project Area. A temporary road built on wetland mats would be used to allow equipment access to North Bay over the salt marsh, where an excavator would offload sediment to dump trucks for disposal onsite (Area B). Silt curtains may be installed to limit the delivery of turbid water outside the immediate work area, if feasible.

If the preferred method is infeasible, the alternative method would be to utilize a hydraulic dredge to excavate the tidal channel extending from North Bay to Area A. The hydraulic dredge would be mounted on a barge and would utilize a cutter head and pump to excavate a new tidal channel north from North Bay, moving the slurry of water and soil to the disposal sites in Area B using an aboveground pipeline. A temporary berm would be constructed across Area B to contain and decant the slurry. Decanted water would be allowed to flow through a series of weirs, where it would ultimately be discharged to McNulty Slough. If a hydraulic dredge is utilized, additional avoidance, minimization and mitigation measures would be implemented to reduce impacts of fish entrainment.

1.3.2 Schedule

Construction of the estuarine restoration component of the Proposed Action would be phased into two construction seasons based on available funding and earthwork sequencing. Construction work may occur year-round, if feasible, but would likely occur primarily between August and October. All in-water work would be limited to the period between June 15 and October 15. Construction is currently anticipated for years 2021 and 2022.

Initial phases of construction would include isolating Areas B, C and D and constructing interior site elements, such as channel excavation, habitat ridges, and ditch blocks, throughout the entire estuarine restoration area. Public access elements would likely be implemented concurrent with the above interior site work. Subsequent phases would include excavation of the BR-1 breach and channel to North Bay in Area A, and excavation of BR-4 in Area D.

1.3.3 Tidal Channel Excavation and Dewatering

Up to 9,400-linear feet of new tidal channels would be excavated in Areas A, B and C, to convey tidal flows through the Project Area (see Figure 2). These new channels would be approximately 25 feet wide, constructed to a depth of -5 feet NAVD88, and would generally follow the flow line of remnant slough channels within the Project Area. A new approximate 1,050-linear foot tidal channel would also be excavated to connect Area A to North Bay. This channel would be 30 feet wide and constructed to a depth of -5 feet NAVD88. As many as seven large wood structures will be constructed in Areas A and B and would consist of pieces of wood anchored or pinned down into the substrate to increase habitat complexity. As many as eight shelves will be installed as part of the excavations in Areas A, B, and C to create slower water refuge for Tidewater Goby. The flat, wide shelves would be located at the outward bend of tidal channels at an elevation 2-3 feet below the marsh plain. Each shelf would be about 40 feet wide (i.e.,

perpendicular to the channel) and 150 feet long (i.e., along the channel). The shelves would encompass about 51,000 square feet (1.2 acres).

Some areas, such as near the large breach connecting Area A to the North Bay (BR-1), and all other work within Area A, are too large or impractical to be isolated and dewatered, and therefore work will occur in wet areas employing minimization measures previously described. Portions of Area A may also be excavated by using a hydraulic suction dredge mounted on a barge. If a hydraulic dredge is used, monitoring of the slurry is proposed in order to quantify take and adjust minimization measures. Work in the other areas may occur in either a dewatered or wet condition, depending onsite conditions or scheduling.

In order to excavate tidal channels in Areas B, C, D, E and McNulty Slough, many areas would first be isolated and dewatered. Before dewatering or other in-water activities begin, a Service-approved biologist would ensure that fish and aquatic species are relocated out of the construction footprint into a flowing tidal channel segment. A Service-approved biologist would perform appropriate seining or other trapping procedures to a point at which the Service-approved biologist is assured that almost all individuals within the construction area have been caught. These individuals would be kept in water buckets with aerators and relocated to an appropriate flowing tidal channel segment or other appropriate habitat. Dewatering would occur using a pump that is screened to NMFS specifications to avoid entrainment.

1.3.4 Levee Breach and Removal

The Project proposes to breach existing levees in two locations in order to re-connect the Project area to the North Bay (of the Eel River Estuary) and the second to connect to McNulty Slough, allowing for full tidal inundation of these former tidelands. The breach connecting Area A to the North Bay (BR-1) would be the largest and would be approximately 30 feet wide and excavated to a depth of -5 feet NAVD88. The second breach (BR-2) would connect Area D to McNulty Slough at an historic slough location, and would be excavated to be approximately 10 feet wide and to a depth of 2 feet NAVD88. Two internal levee breaches (BR-3 and BR-4) are also proposed within the Project area to facilitate tidal flow between and among units A, B, and C.

Up to 4,500 linear feet of internal levees would be removed to improve tidal exchange and water quality within the Project Area. Levees would be removed to the adjacent marsh plain elevation. Soil associated with these levees would be relocated within the Project Area and described below.

1.3.5 Habitat Features Created with Reuse of Spoils

Material excavated to create the tidal channels and removed from the levees would be used for a variety of purposes, including the creation of the following elements: higher elevation marsh; habitat transition edges; and habitat ridges. About 12 acres of higher elevation marsh habitat along the southeastern portion of Area B would be created by increasing the elevations of the area. Soil would be placed to an elevation of 6 to 7 feet NAVD88 to facilitate establishment of native pickleweed.

Habitat transition slopes would be constructed along the McNulty Slough perimeter levee in Areas B and C. These slopes would provide habitat migration areas (i.e., sea level resiliency) and additional wind wave erosion protection along the levee slope. They would be constructed from an elevation of 8 feet NAVD88 along the existing perimeter levee with a 10:1 side slope into the saltmarsh.

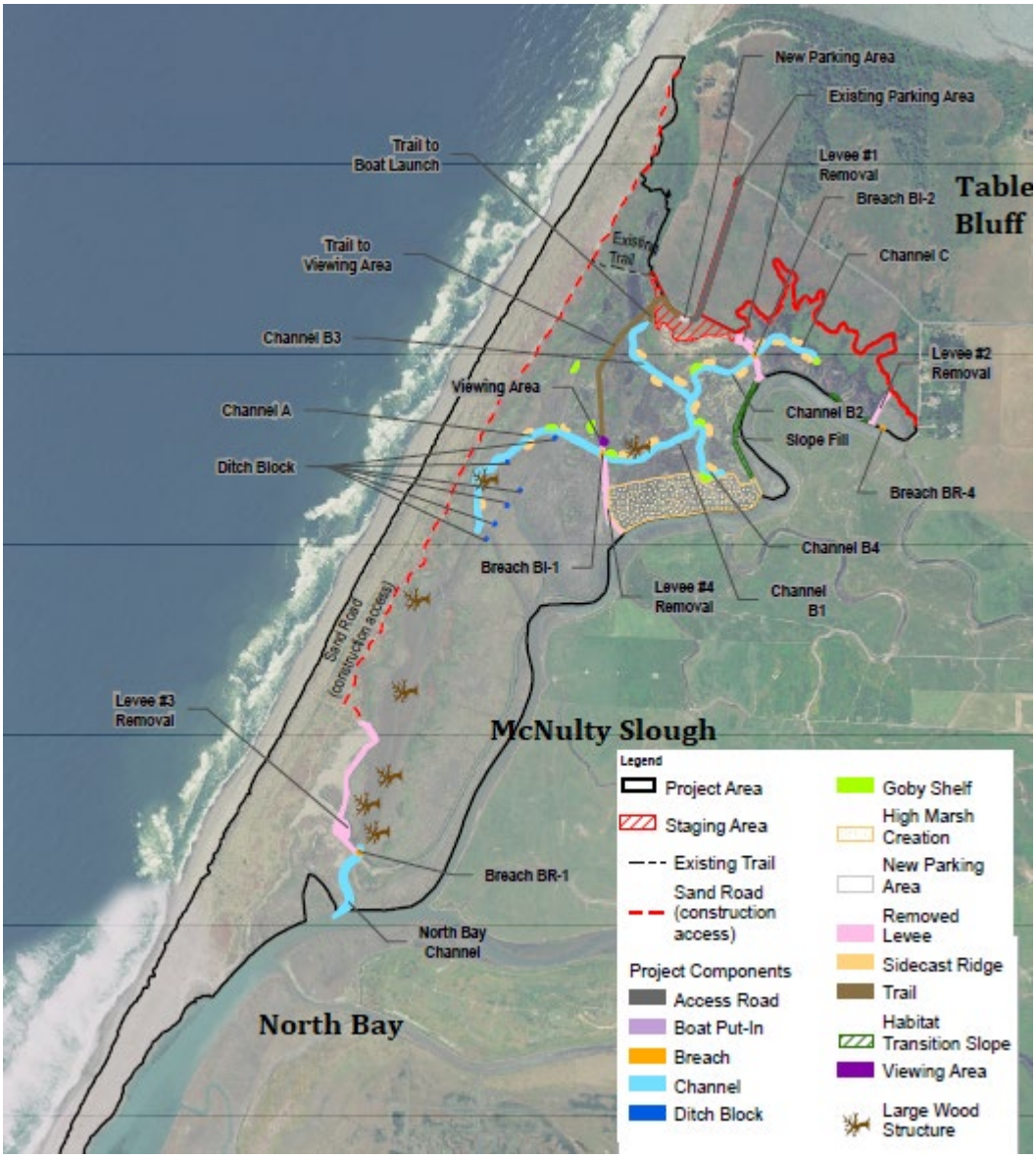

Figure 2. Conceptual design elements of the Ocean Ranch Tidal Restoration Project.

Up to 18 habitat ridges would be placed along the outside meander of newly constructed tidal channels in Areas A, B and C to provide for channel confinement and facilitate revegetation. Habitat ridges would be constructed to a crest elevation of approximately 6.5 feet NAVD88 (i.e., the approximate elevation of MHHW) with 10:1 side slopes and would be offset at least 5 feet from the edge of the adjacent tidal channel.

1.3.6 Invasive Plant Species

The two most prevalent invasive plant species found in the Project Area are dense-flowered cordgrass and European beachgrass. Within the Project Area, coastal salt and brackish marshes are heavily infested by dense-flowered cordgrass and coastal dune habitat is heavily infested by European beachgrass. Both of these invasive plant species form dense stands to the exclusion of other plant species, and both pose threats to native plant communities and special-status plants in the Project Area.

Targeted control of dense-flowered cordgrass would occur on up to 571 acres within the estuarine restoration area using mowing, grinding, excavation, prescribed burning and/or herbicide application methods. No more than 200 acres of dense-flowered cordgrass would be treated annually, and no site would be treated with herbicides more than three times during any 5 year period. Targeted control of European beachgrass would occur on up to 279 acres within the dune restoration area using manual, mechanical, prescribed burning and/or herbicide application methods. To treat European beachgrass, an herbicide could be applied to kill rhizomes after prescribed burning, or to selectively treat re-sprouts after mechanical or manual removal efforts. Herbicide applications would be performed by a Qualified Applicator or under the supervision of a Qualified Applicator, in accordance with label requirements. Depending on the need for selective control, herbicide would be applied using all-terrain vehicles (ATV) or utility terrain vehicles (UTV) with applicator booms, backpack sprayers or wick applicators. Targeted control of dwarf eelgrass populations would occur using only manual removal and smothering methods.

Treatments for invasive plant species include herbicide use. Only the herbicide Imazapyr and its surfactant would be used. Imazapyr would not be applied directly into water. Additional measures to prevent herbicide movement in the environment include a prohibition on all herbicide application within 48 hours of forecast rain, or when vegetation is wet from rain or fog; applying herbicides only during dry conditions to ensure they adhere to, and are not washed off of, target plant species; requiring herbicides not be applied when winds exceed 10 mph; and setting spray nozzles at the coarsest level appropriate for the work to reduce herbicide drift.

1.3.7 Public Access

The Proposed Action includes improvements to an existing access road and parking area, construction of a new parking area, construction of a non-motorized multi-use trail system, and construction of a non-motorized boat put-in. The existing 10-foot wide, 2,100-linear foot road would be resurfaced with asphalt or impervious concrete. A new 4-foot wide footpath, surfaced with gravel, would be constructed parallel to the improved access road. A new 5,990-square foot asphalt or pervious concrete parking area would be established near the south end of the improved access road. Approximately one mile of trails will be maintained to access portions of the Ocean Ranch Unit, including trail access to the non-motorized boat launch. The non-motorized boat launch would be constructed in Area B near the new parking area and trail system. The boat launch would be a simple foot accessible ramp with an all-weather gravel surface sloped from the trail system to the water. The boat launch would provide boaters with water access during most tides and would connect to the tidal channel system in Area B.

1.3.8 Maintenance and Adaptive Management

Ongoing maintenance activities may be necessary to assure the long-term hydraulic and ecological functions of the Proposed Action, and to continue to support safe and reliable access to the Project Area by the public. Minor maintenance of built infrastructure is anticipated, including: grading and/or resurfacing portions of the access road and parking area (as needed; approximately once in 10 years); cleaning debris from the non-motorized boat launch and water control structures (as needed; at least annually); mowing vegetation from the trail system (as needed; approximately semi-annually).

Adaptive management and maintenance is also anticipated for controlling invasive plants. For dense-flowered cordgrass, removal of up to 10 acres per year from the estuarine restoration area, as needed and contingent on funding. For dwarf eelgrass, any population of dwarf eelgrass observed during potential future eelgrass surveys would be removed manually or by smothering. For European beachgrass, removal of up to 10 acres per year, as needed and contingent on funding. Minor amounts of sediment may be removed from tidal channels if ongoing monitoring determines they are not meeting the objective of increased hydrologic connectivity with the Project Area. No more than 100 CY of sediment would be removed from tidal channels in any given year for maintenance purposes. The methods used would be similar to those used during construction, but may not include dewatering efforts.

1.3.9 Monitoring

Monitoring of fish use of the restoration area is expected to occur for five years (2023-2027) after the construction of the Project is complete, with annual reports provided by December 31 of each year in which monitoring occurs. Monitoring techniques may include seining (beach and/or pole), trapping (fyke, channel net, minnow traps), dip net, eDNA/water samples, collecting tissue samples, and passive integrated transponder (PIT) and/or acoustic tags. Sampling methods will involve capturing, handling, and releasing various life stages and species of fish, including juvenile ESA-listed salmonids and Tidewater Goby. Sampling will occur at multiple sites throughout the Project area to characterize fish assemblages in a variety of habitats (i.e., open slough, head of slough, open water, etc.). Ideally, monitoring will occur monthly to capture seasonal variability in fish abundance and distribution, but may be limited to quarterly monitoring (spring, summer, fall, winter) based on funding and staff constraints.

For all sampling methods, fish captured will be identified to species and enumerated. During each sampling event, up to 30 specimens of each species will be measured for total length. In all cases, buckets used for holding fish will be filled with clean ambient source water and equipped with battery-operated bubbler units that will ensure re-circulation of oxygen-rich water throughout processing of captured specimens. Sampling will not occur if ambient water temperatures exceed 21°C. A biologist will visually monitor numbers of captured fish held in each bucket to ensure low densities of animals (< 15 juvenile salmonids or Tidewater Goby). If many fish are captured, or there is a delay in field processing, held specimens will be relocated to a flow-through mesh-net bag anchored nearby in the source stream/water body. Special-status species will be processed first and immediately released back to the source area following

recovery from handling. Any adult SONCC coho salmon, CC Chinook salmon, or NC steelhead captured incidentally during any monitoring activity would be released immediately.

1.3.9.1 Sampling Methods Proposed

Beach and/or pole seining: Beach and/or pole seining may be used to sample for juvenile salmonids or Tidewater Goby. Beach seines encircle and concentrate fish, and then the seine is brought to shore where fish are removed and placed into aerated buckets. Seines with knotless nylon mesh will be utilized to minimize scale and mucus abrasion. Seine tows will be short to prevent suffocation and to ensure that no debris (e.g., rocks, logs, abundant vegetation) are trapped in the seine that may suffocate or crush fish. If debris is trapped within the seine, the debris will be removed before fish are centralized in the net to prevent harm.

For juvenile salmonids, biologists will use the smallest mesh-size seine-net that is appropriate to achieve sampling objectives while reducing the probability that smaller fish will become gilled in the net. A total of 50 SONCC coho salmon, 100 juvenile CC Chinook salmon, and 100 NC steelhead are expected to be captured annually using seining methods.

Channel Net/Fyke Net: A channel or fyke net will be used to sample for juvenile salmonids. A channel net or fyke net will be fixed within the channel during a moderate high slack tide and will be fished on the outgoing tide for approximately three hours. Sampling with a channel net or fyke net will be terminated or discontinued if tidal flow velocity decreases significantly making the channel net inefficient and dangerous for fish. A total of 25 SONCC coho salmon, 50 juvenile CC Chinook salmon, and 50 NC steelhead are expected to be captured annually using channel net/fyke net methods.

Minnow Traps: Minnow traps, baited with salmon or steelhead eggs, may be used to augment seine sampling for juvenile salmonids. Traps will be fished on the bottom of the channel next to habitat structures if possible, with a soak time of approximately one to three hours. Fish and invertebrates captured with minnow traps will be identified to species or genus and enumerated. A total of 25 SONCC coho salmon, 50 juvenile CC Chinook salmon, and 50 NC steelhead trout are expected to be captured annually using baited minnow trap methods.

PIT and Acoustic Tagging Methods: A subset of juvenile coho salmon, Chinook salmon, and NC steelhead will be marked with a PIT or acoustic tag. Prior to tagging, fish will be anesthetized using Alka Seltzer or MS222. Fish will be closely observed in an anesthetic bath of Alka – Seltzer Gold (aspirin free) brand sodium bicarbonate (NaHCO3) or MS222 until loss of equilibrium is achieved but operculum movement is still present. The lowest concentration of anesthetic that will permit safe handling will be used depending on fish size and water temperature. The anesthetic material will be allowed to completely dissolve before fish are added to the anesthetic bath. Salmonid fry and juveniles will be anesthetized in groups of 3-5 fish, and larger parr and smolts will be anesthetized in groups of 1-3 fish. Salmonids should be able to be handled after 1-2 minutes in the anesthetic bath and will be processed immediately following loss of equilibrium. Once anesthetized, juvenile salmonids will be placed individually onto a wetted Plexiglas measuring board and measured to the nearest mm fork length, then transferred to a wetted container on an electronic scale and individually weighed to the nearest 0.01 gram.

PIT or acoustic tags will be inserted into the body cavity through a small incision made with a sterile scalpel anterior to the pectoral fin. Wound closure and suture material to close the body wall will be conducted in a manner that will promote the most efficient healing. Following processing, fish will immediately be transferred to recovery buckets filled with clean ambient source water and equipped with battery-operated bubbler units that will ensure recirculation of oxygen-rich water to facilitate recovery of equilibrium. Water temperature in the recovery bucket will be monitored and maintained to be within 2 degrees of the ambient river temperature. Following adequate recovery time, all processed fish will be released back to the site of their capture.

The following handling techniques will be practiced to ensure fish survival: 1) proper body support of fish during handling (not holding by jaw or covering eyes or gills); 2) using wetted, gloved hands to reduce loss of protective mucus; 3) minimizing time out of the water/holding time; and 4) ensuring temporary holding buckets are properly sized to fully submerge fish. Holding water will be changed frequently to prevent a stressful or lethal drop in dissolved oxygen level, water temperature, pH, and/or salinity. A portion of the fish captured with one of the methods described above would be tagged. The maximum annual number of individual juvenile salmonids to be tagged annually include: 15 juvenile SONCC coho salmon, 15 juvenile CC Chinook salmon, and 15 juvenile NC steelhead.

eDNA: Environmental DNA (eDNA) methods are used to detect DNA that is shed into the aquatic environment by cryptic or low-density species by collecting water samples. eDNA methods provide an ideal means to address limitations of visual and other traditional sampling survey techniques. No take of juvenile ESA-listed salmonids or Tidewater Goby would occur using this sampling method. No fish will be captured using this method.

Tissue Samples: Non-lethal tissue samples will be collected by taking a fin clip from juvenile salmonids. Tissue sampling will only be conducted by staff with experience in fish handling, tissue sampling, and sample preparation and preservation. The following handling techniques will be practiced to ensure fish survival: 1) proper body support of fish during handling (not holding by jaw or covering eyes or gills); 2) using wetted, gloved hands to reduce loss of protective mucus; 3) minimizing time out of the water/holding time; and 4) ensuring temporary holding buckets are properly sized to fully submerge fish. Holding water will be changed frequently to prevent a stressful or lethal drop in dissolved oxygen level, water temperature, pH, and/or salinity. A portion of the fish captured with one of the methods described above would be tissue sampled. The maximum annual number of juvenile salmonid individuals to be fin clipped annually include: 25 juvenile SONCC coho salmon, 50 juvenile CC Chinook salmon, and 50 juvenile NC steelhead.

Table 1. Monitoring elements proposed to be conducted annually for five seasons after construction to evaluate fish utilization of the restored areas, including methods and intended numbers of captured individuals, and the portion of captured juveniles to be tagged or sampled.

Sampling Method	Annual Total Number of Juveniles Captured, Handled, Released	Portion[1] of Juveniles Captured, Handled, Tagged, Released	Portion[1] of Juveniles Captured, Handled, Sampled, Released
Beach and Pole Seining	50 SONCC coho salmon 100 CC Chinook salmon 100 NC steelhead	15 SONCC coho salmon 15 CC Chinook salmon 15 NC steelhead	25 SONCC coho salmon 50 CC Chinook salmon 50 NC steelhead
Fyke and Channel Net	25 SONCC coho salmon 50 CC Chinook salmon 50 NC steelhead		
Minnow Traps	25 SONCC coho salmon 50 CC Chinook salmon 50 NC steelhead		

1.3.10 Other Activities

We considered whether the proposed action would cause any other activities that would have consequences on listed species or designated critical habitat and determined that it would. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. The restoration work will create and provide for new recreation opportunities within the deeper channels, and increases in non-motorized vessel traffic are expected to occur after the installation of a boat launch and new parking area. Increases in other recreational uses are expected to occur along the new trail system, such as walking, hiking, biking, and wildlife viewing.

2 ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat upon which they depend. As required by section 7(a)(2) of the ESA, each Federal agency must ensure that its actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. Per the requirements of the ESA, Federal action agencies consult with NMFS and section 7(b)(3) requires that, at the conclusion of consultation, NMFS provides an opinion stating how the agency's actions would affect listed species and their critical habitats. If incidental take is reasonably certain to occur, section 7(b)(4) requires NMFS to provide an ITS that specifies the impact of any incidental taking and includes non-discretionary reasonable and prudent measures (RPMs) and terms and conditions to minimize such impacts.

2.1 Analytical Approach

This biological opinion includes both a jeopardy analysis and an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "to jeopardize the continued

[1] The monitoring plan will rely on various methods to capture individuals, and a portion of those individuals captured would be either tagged or sampled by taking a fin clip.

existence of" a listed species, which is "to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

This biological opinion relies on the definition of "destruction or adverse modification," which "means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species" (50 CFR 402.02). The designation(s) of critical habitat for (species) use(s) the term primary constituent element (PCE) or essential features. The 2016 critical habitat regulations (50 CFR 424.12) replaced this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a ''destruction or adverse modification'' analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

The 2019 regulations define effects of the action using the term "consequences" (50 CFR 402.02). As explained in the preamble to the regulations (84 FR 44977), that definition does not change the scope of our analysis and in this opinion we use the terms "effects" and "consequences" interchangeably.

We use the following approach to determine whether a proposed action is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- Evaluate the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.
- Evaluate the environmental baseline of the species and critical habitat.
- Evaluate the effects of the proposed action on species and their habitat using an exposure-response approach.
- Evaluate cumulative effects.
- In the integration and synthesis, add the effects of the action and cumulative effects to the environmental baseline, and, in light of the status of the species and critical habitat, analyze whether the proposed action is likely to: (1) directly or indirectly reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species, or (2) directly or indirectly result in an alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species.
- If necessary, suggest a reasonable and prudent alternative to the proposed action.

2.2 Rangewide Status of the Species and Critical Habitat

This opinion examines the status of the species that would be adversely affected by the proposed action. The status is determined by the level of extinction risk that the species faces, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' current "reproduction, numbers, or distribution" as described in 50 CFR 402.02. The opinion also examines the condition of

critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the current function of the PBFs essential for the conservation of the species.

2.2.1 Species Description and General Life History

2.2.1.1 SONCC Coho Salmon

Coho salmon have a generally simple 3-year life history. The adults typically migrate from the ocean and into bays and estuaries towards their freshwater spawning grounds in late summer and fall, and spawn by mid-winter. Adults die after spawning. The eggs are buried in nests, called redds, in the rivers and streams where the adults spawn. The eggs incubate in the gravel until fish hatch and emerge from the gravel the following spring as fry. These 0+ age fish typically rear in freshwater for about 15 months before migrating to the ocean. The juveniles go through a physiological change during the transition from fresh to salt water called smoltification. Coho salmon smolts typically outmigrate between March and July (Ricker et al. 2014). Coho salmon typically rear in the ocean for two growing seasons, returning to their natal streams as 3 year-old fish to renew the cycle.

2.2.1.2 CC Chinook Salmon

CC Chinook salmon are typically fall spawners, returning to bays and estuaries before entering their natal streams in the early fall. The adults tend to spawn in the mainstem or larger tributaries of rivers. As with the other anadromous salmon, the eggs are deposited in redds for incubation. When the 0+ age fish emerge from the gravel in the spring, they typically migrate to saltwater shortly after emergence. Therefore, Chinook salmon typically enter the estuary as smaller fish compared to coho salmon. Chinook salmon are typically present in the stream-estuary ecotone, which is located in the downstream portions of major tributaries to estuaries like Humboldt Bay, from early May to early September, with peak abundance in June/July (Wallace and Allen 2007). Similar to coho salmon, prey resources during out-migration are critical to Chinook salmon survival as they grow and move out to the open ocean. A study by MacFarlane (2010) indicated that juvenile Chinook salmon require less prey in the estuary, equivalent to one northern anchovy (*Engraulis mordax*) per day, compared to a range of one to four anchovies needed per day in the ocean.

2.2.1.3 NC Steelhead

Steelhead are the anadromous form of O. mykiss, spending time in both fresh and saltwater. Steelhead generally return to freshwater to spawn as 4 or 5 year old adults. Unlike other Pacific salmonids, steelhead can survive spawning and return to the ocean only to return to spawn in a future year. It is rare for steelhead to survive more than two spawning cycles. Steelhead typically spawn between December and May. Like other Pacific salmonids, the steelhead female deposits her eggs in a redd for incubation. The 0+ age fish emerge from the gravel to begin their freshwater life stage and can rear in their natal stream for 1 to 4 years before migrating to the ocean.

Steelhead have a similar life history as noted above for coho salmon, in the sense that they rear in freshwater for an extended period before migrating to saltwater. As such, they enter the estuary as larger fish (mean size of about 170 to 180 mm or 6.5 to 7.0 inches) and are, therefore, more oriented to deeper water channels in contrast to Chinook salmon that typically enter the

estuary as 0+ fish. The CDFW data indicate that steelhead smolts generally migrate downstream toward the estuary between March 1 and July 1 each year, although they have been observed as late as September (Ricker et al. 2014). The peak of the outmigration timing varies from year to year within this range, and generally falls between early April and mid-May.

2.2.2 Status of Species and Critical Habitat

In this biological opinion, NMFS assesses four population viability parameters to help us understand the status of each species and their ability to survive and recover. These population viability parameters are: abundance, population productivity, spatial structure, and diversity (McElhaney et al. 2000). While there is insufficient information to evaluate these population viability parameters in a thorough quantitative sense, NMFS has used existing information, including the Recovery Plan for SONCC Coho Salmon (NMFS 2014), to determine the general condition of each population and factors responsible for the current status of the Evolutionarily Significant Unit (ESU). We use these population viability parameters as surrogates for numbers, reproduction, and distribution, the criteria found within the regulatory definition of jeopardy (50 CFR 402.02).

2.2.2.1 Status of SONCC Coho Salmon

SONCC Coho Salmon Abundance and Productivity: Although long-term data on coho salmon abundance are scarce, the available evidence from short-term research and monitoring efforts indicate that spawner abundance has declined since the last status review for populations in this ESU (Williams et al. 2016). In fact, 24 of the 31 independent populations in the ESU are at high risk of extinction because they are below or likely below their depensation threshold, which can be thought of as the minimum number of adults needed for survival of a population. No populations are at a low risk of extinction and all core populations are thousands short of the numbers needed for recovery (Williams et al. 2016).

SONCC Coho Salmon Spatial Structure and Diversity: The distribution of SONCC coho salmon within the ESU is reduced and fragmented, as evidenced by an increasing number of previously occupied streams from which SONCC coho salmon are now absent (NMFS 2001, Good et al. 2005, Williams et al. 2011, Williams et al. 2016). Extant populations can still be found in all major river basins within the ESU (70 FR 37160; June 28, 2005). However, extirpations, loss of brood years, and sharp declines in abundance (in some cases to zero) of SONCC coho salmon in several streams throughout the ESU indicate that the SONCC coho salmon's spatial structure is more fragmented at the population-level than at the ESU scale. The genetic and life history diversity of populations of SONCC coho salmon is likely very low. The SONCC coho salmon ESU is currently considered likely to become endangered within the foreseeable future in all or a significant portion of its range, and there is heightened risk to the persistence of the ESU as Viable Salmonid Population parameters continue to decline and no improvements have been noted since the previous status review (Williams et al. 2016).

2.2.2.2 Status of CC Chinook

CC Chinook Salmon Abundance and Productivity: Low abundance, generally negative trends in abundance, reduced distribution, and profound uncertainty as to risk related to the relative lack of population monitoring in California have contributed to NMFS' conclusion that CC Chinook salmon are likely to become an endangered species within the foreseeable future

throughout all or a significant portion of their range. Where monitoring has occurred, Good et al. (2005) found that historical and current information indicates that CC Chinook salmon populations are depressed. Uncertainty about abundance and natural productivity, and reduced distribution are among the risks facing this ESU. Concerns regarding the lack of population-level estimates of abundance, the loss of populations from one diversity stratum[2] as well as poor ocean survival contributed to the conclusion that CC Chinook salmon are likely to become an endangered species in the foreseeable future (Good et al. 2005, Williams et al. 2011, Williams et al. 2016).

CC Chinook Salmon Spatial Structure and Diversity: Williams et al. (2011) found that the loss of representation from one diversity stratum, the loss of the spring-run history type in two diversity substrata, and the diminished connectivity between populations in the northern and southern half of the ESU pose a concern regarding viability for this ESU. Based on consideration of this updated information, Williams et al. (2016) concluded the extinction risk of the CC Chinook salmon ESU has not changed since the last status review. The genetic and life history diversity of populations of CC Chinook salmon is likely very low and is inadequa te to contribute to a viable ESU, given the significant reductions in abundance and distribution.

2.2.2.3 Status of NC Steelhead

NC Steelhead Spatial Structure and Diversity: NC steelhead remain broadly distributed throughout their range, with the exception of habitat upstream of dams on both the Mad River and Eel River, which has reduced the extent of available habitat. Extant summer-run steelhead populations exist in Redwood Creek and the Mad, Eel (Middle Fork), and Mattole rivers. The abundance of summer-run steelhead was considered "very low" in 1996 (Good et al. 2005), indicating that an important component of life history diversity in this DPS is at risk. Hatchery practices in this DPS have exposed the wild population to genetic introgression and the potential for deleterious interactions between native stock and introduced steelhead. However, abundance and productivity in this DPS are of most concern, relative to NC steelhead spatial structure and diversity (Williams et al. 2011).

2.2.2.4 Status of Critical Habitats

The condition of SONCC coho salmon, CC Chinook salmon, and NC steelhead critical habitat, specifically its ability to provide for their conservation, has been degraded from conditions known to support viable salmonid populations. NMFS has determined that currently depressed population conditions are, in part, the result of the following human induced factors affecting critical habitat: logging, agriculture, mining, urbanization, stream channelization, dams, wetland loss, and water withdrawals (including unscreened diversions for irrigation). Impacts of concern include altered stream bank and channel morphology, elevated water temperature, lost spawning and rearing habitat, habitat fragmentation, impaired gravel and wood recruitment from upstream sources, degraded water quality, lost riparian vegetation, and increased erosion into streams from upland areas (Weitkamp et al. 1995). Diversion and storage of river and stream flow has dramatically altered the natural hydrologic cycle in many of the streams within the ESU's and

[2] A diversity stratum is a grouping of populations that share similar genetic features and live in similar ecological conditions.

DPS. Altered flow regimes can delay or preclude migration, dewater aquatic habitat, and strand fish in disconnected pools, while unscreened diversions can entrain juvenile fish.

2.2.3 Factors Responsible for the Decline of Species and Critical Habitat

The factors that caused declines of species and degradation of critical habitat include hatchery practices, ocean conditions, habitat loss due to dam building, degradation of freshwater habitats due to a variety of agricultural and forestry practices, water diversions, urbanization, over-fishing, mining, climate change, and severe flood events exacerbated by land use practices (Good et al. 2005, Williams et al. 2016). Sedimentation and loss of spawning gravels associated with poor forestry practices and road building are particularly chronic problems that can reduce the productivity of salmonid populations. Late 1980s and early 1990s droughts and unfavorable ocean conditions were identified as further likely causes of decreased abundance (Good et al. 2005). Since 2014, drought conditions in California reduced stream flows and increased temperatures, further exacerbating stress and disease. Drought conditions during present conditions in 2021 represent near record low conditions in both precipitation and streamflow. Ocean conditions have been unfavorable in past years due to the El Niño in 2015 and 2016 and other anomalously warm waters in the Gulf of Alaska. Reduced flows can cause increases in water temperature, resulting in increased heat stress to fish and thermal barriers to migration.

One factor affecting the range wide status and aquatic habitat at large is climate change. The best available information suggests that the earth's climate is warming, and that this could significantly impact ocean and freshwater habitat conditions, and thus the survival of species subject to this consultation. Recent evidence suggests that climate and weather is expected to become more extreme, with an increased frequency of drought and flooding (IPCC 2019). Climate change effects on stream temperatures within Northern California are already apparent. For example, in the Klamath River, Bartholow (2005) observed a 0.5°C per decade increase in water temperature since the early 1960s, and model simulations predict a further increase of 1-2°C over the next 50 years (Perry et al. 2011).

In coastal and estuarine ecosystems, the threats from climate change largely come in the form of sea level rise and the loss of coastal wetlands. Sea levels will likely rise exponentially over the next 100 years, with possibly a 43-84 cm rise by the end of the 21st century (IPCC 2019). This rise in sea level will alter the habitat in estuaries and either provide an increased opportunity for feeding and growth, or in some cases will lead to the loss of estuarine habitat and a decreased potential for estuarine rearing. Based on the surrounding terrain or other infrastructure, some estuaries will have space to expand as sea level rises, while other estuaries may be reduced in size as saltwater intrusion overwhelms freshwater inputs. Marine ecosystems face an entirely unique set of stressors related to global climate change, all of which may have deleterious impacts on growth and survival while at sea. In general, the effects of changing climate on marine ecosystems are not well understood given the high degree of complexity and the overlapping climatic shifts that are already in place (e.g., El Niño, La Niña, Pacific Decadal Oscillation) and will interact with global climate changes in unknown and unpredictable ways. Overall, climate change is believed to represent a growing threat, and will challenge the resilience of SONCC coho salmon.

2.3 Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The action area includes areas outside the construction footprint where there is the potential to impact federally-listed species (e.g., downstream water quality impacts, noise impacts). The Action Area includes the entire Project area, as well as McNulty Slough from the proposed breach at Area D (BR-4) to its confluence with North Bay, and the portion of North Bay extending about 1,500-feet downstream of the proposed southern breach to Area A labelled as BR-1 (see Figures 1 and 2). The action area includes a 1,500-foot area surrounding the work sites, which is where the effects of suspended sediments and turbidity are expected to occur.

2.4 Environmental Baseline

The "environmental baseline" refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultations, and the impact of State or private actions which are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (50 CFR 402.02).

In the action area, the threat to SONCC coho salmon, CC Chinook salmon, and NC steelhead from climate change is likely to include a continued increase in average summer air temperatures; more extreme heat waves; and an increased frequency of drought (Lindley et al. 2007). In future years and decades, many of these changes are likely to further degrade habitat throughout the watershed by, for example, reducing streamflow during the summer and raising summer water temperatures. Many of these impacts will likely occur in the action area via higher water temperatures and reduced flows in the Eel River.

Coho salmon occurring in the action area belong to the Lower Eel/Van Duzen River population of SONCC coho salmon, which is considered extremely depressed and at a high risk of extinction (NMFS 2014). Chinook salmon in the action area belong to the Lower Eel/South Fork population, which is considered to likely be well below the number needed (2,186 adults, NMFS 2016) to be at a low risk of extinction and likely at a high risk of extinction. Steelhead in the action area may belong to the Van Duzen River population of NC steelhead, which is also likely well below the number needed (6,340 adults, NMFS 2016) to be at a low risk of extinction and also likely to be at a high risk of extinction.

"Impaired Estuary and Mainstem Function" was listed as one of the highest key limiting stressors behind the decline of SONCC coho salmon, while "Channelization and Diking" was identified as a key limiting threat coho salmon are anticipated to face into the future (NMFS 2014). The Coastal Multispecies Recovery Plan for CC Chinook identified 'Channel Modification' as a key limiting threat facing CC Chinook salmon into the future and suggested

improving the quality and extent of the Eel River Estuary as a primary focus for recovery efforts (NMFS 2016). The Multispecies Recovery Plan for NC steelhead also emphasized the Eel River Estuary as a ley limiting stressor. Key recovery actions focused on restoring tidal connectivity (NMFS 2016).

2.4.1 Status of Listed Species and Critical Habitat in the Action Area

The condition of designated critical habitats in the action area, specifically their ability to provide for conservation, is degraded from conditions known to support viable populations. The action area has been subjected to a high degree of human manipulation over time, as the majority of the former tidelands and slough channel networks in the North Bay (Eel River Estuary) have been disconnected from the tides and are no longer supporting their historic tidal prisms (the volume of water between mean high tide and mean low tide). Historically, the action area was an intertidal marsh which was flooded by high tides and then largely dry during low tides. When these areas were converted to support agricultural uses, levees and tidegates were built to prevent the tides from inundating the areas so that they remain dry.

As a result, the surrounding landscapes and channel networks that remain open to tidal inundation and flooding by the Eel River have been rising in elevation as sediments are deposited, while the action area (protected by levees and disconnected from the tides) has subsided in elevation as organics decay in the soils. The removal of the tidal prism during past human manipulations within the action after the area was converted to agricultural uses has impeded the volumes of sediment the river is capable of transporting to the ocean outside of the action area. Combined with similar historic manipulations that occurred at a watershed scale within the Eel River Estuary, the ability of the river to transport sediment has been greatly reduced. As a result, pool depths continue to shallow upstream of the influence of the tides, despite decades of sediment reduction efforts that have contributed to the recovery of habitats further upstream.

Within the action area, the disconnection from tidal flows also contributes to eutrophic conditions within former waterways, leaving important historical habitat often inaccessible to listed species and/or intolerable during most months due to poor water quality. The action area likely provided key estuarine and estuary ecotone areas essential to growth and survival prior to the legacy of manipulation and disconnection. Water quality data to assess the potential for the Action Area to support salmonids and other aquatic species were collected in 2007, 2008/2009 and 2018 (Ray 2018). These data show high salinities (>30 ppt) in the late summer and fall, and high water temperatures (>17°C) in the summer, which may limit use of the action area to the juvenile outmigration period (February to May) (Ray 2018). Currently, the action area is of little value for listed salmonids throughout most of the year.

In 2018, CDFW conducted fish surveys in the Project Area in winter, spring, summer, and fall using beach seines, a channel net and minnow traps (Ray 2018). Although coho salmon or steelhead were not found during these surveys, a juvenile Chinook salmon was captured in a channel net in April (Ray 2018). All captures of listed species within the action area occurred during spring survey efforts (although adults and juveniles were found outside the action area during these efforts during the winter months).

2.4.2 Previous ESA Section 7 Consultations in the Action Area

NMFS' ESA Section 10(a)(1)(A) research and enhancement permits and research projects in the annual CDFW ESA Section 4(d) rule research program could potentially occur in the action area. Salmonid monitoring approved under these programs includes carcass surveys and juvenile surveys. In general, these activities are closely monitored and require measures to minimize take during the research activities. NMFS determined these research projects are unlikely to affect future adult returns.

2.5 Effects of the Action

Under the ESA, "effects of the action" are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (see 50 CFR 402.17). In our analysis, which describes the effects of the proposed action, we considered 50 CFR 402.17(a) and (b) factors for assistance in evaluating when activities are reasonably certain to occur and when consequences are considered to be caused by the proposed action.

2.5.1 Turbidity and Contaminants

Turbidity is expected to extend as far as 1,500 feet from work areas after construction is complete, when the Project is inundated by the first higher tides. As these initial tides inundate work areas, suspended sediments are generally carried inshore and upstream, further into the work areas, until the tide reverses and the turbid water travels the reverse direction. Given the timing of the Project and anticipated poor water quality parameters expected, very few individuals would be exposed to increases in turbidity. Any SONCC coho salmon, CC Chinook or NC steelhead exposed would have nearby habitat available outside the action area within the North Bay where they could escape suspended sediment and turbid waters given the very large size of the North Bay. Regarding toxic contaminants, NMFS expects adverse effects from toxic contaminants leaking into waterways within the action area to be improbable based on most work areas being isolated during construction, and spill prevention and clean-up measures incorporated.

2.5.2 Construction, Dewatering and Fish Relocation

As previously described, the waterways within the action area are expected to be largely unsuitable for the most part due to high salinities and high water temperatures. Therefore, the abundance of listed species expected to be exposed to construction effects is very low. Within North Bay, a 1,050 foot long channel will be excavated to connect Area A to the North Bay. Dewatering will not occur and all excavation, whether via excavators or via hydraulic dredge, will occur within wet conditions where all individuals within the area would be exposed. Work would occur during a low or receding tide, where the area below Mean Higher High Water (MHHW) requiring work and therefore exposing listed species to being injured or killed is 97,699 square feet (2.2 acres). The expected effects to SONCC coho salmon, CC Chinook and NC steelhead, whether the action relies on hydraulic suction dredging or excavators, will likely

be the same as both methods would result in injuries, death, or harm to all listed species residing in the area.

Like the work in BR-1, dewatering will not occur in Area A and all excavation will occur within wet conditions where all individuals within the area would be exposed. Work would occur during a low or receding tide, where the area below MHHW requiring work and therefore exposing listed species to being injured or killed is 8,705,434 square feet (199.0 acres). The hydraulic suction dredge would likely entrain most individuals and/or cause injuries to those who pass downstream. If excavators are used, water quality and clarity will become very poor, likely leading to direct injuries and displacement where individuals would be further exposed to excavation activities.

Within all other work areas (Areas B, C, D, E, and McNulty Slough), dewatering is expected to occur. When combined there will be approximately 5,670,627 square feet dewatered (127.9 acres) and then excavated or otherwise treated as described previously. These are areas where most SONCC coho salmon, CC Chinook or NC steelhead would be captured and removed. Those fish that escape the removal effort would subsequently perish in work areas due to poor water quality or crushing.

North Bay (BR-1) and Area A
Excavations in these areas cover over 8,803,133 square feet at MHHW and densities of all three listed species in these areas are expected to be very low (0.0000046 individuals per square foot) due to higher salinities than the other areas. Although past survey efforts have never encountered or captured a listed salmonid species within the action area during the summer months, NMFS is relying on a very low density that represents approximately one individual for every 5 acres of water at MHHW. This density was based on scaling up fish densities from areas with similar water quality parameters (portions of the Elk River Estuary, in nearby Humboldt Bay) (Wallace and Allan 2012). Therefore, NMFS expects as many 41 juvenile SONCC coho salmon, 41 juvenile CC Chinook salmon, and 41 juvenile NC steelhead to be exposed to suction dredging or excavation work and injured or killed (0.0000046 individuals/square foot x 8,803,133 square feet) (see Table 2).

Areas B, C, D, E, and McNulty Slough
Excavations in these areas cover over 5,670,627 square feet at MHHW and densities in these areas are expected to be low but slightly higher than the other areas due to there being less saline waters. NMFS expects that densities will be higher in Areas B, C, D, E and McNulty Slough than in the more saline areas of North Bay or Area A. NMFS expects there to be approximately one individual for every 2.5 acres of water at MHHW, based on scaling up fish densities from similar areas as previously described. Based on the expected fish density (0.0000093 per square foot), there might be a total of as many as 53 SONCC coho salmon, 53 CC Chinook salmon, and 53 NC steelhead in these areas (see Table 2). Because of the large areas being dewatered, and the difficulty of effectively capturing fish, NMFS assumes that as many as 20% of the listed individuals present may escape the relocation effort and remain in the work areas. There is a large volume of water with very low numbers of listed fish expected to present, making fish relocation efforts rather inefficient and thus it will be difficult to capture all of the fish. These individual fish would be left stranded in work areas where they would likely perish (11 juvenile

SONCC coho salmon, 11 juvenile CC Chinook salmon, and 11 juvenile NC steelhead) (see Table 2).

Table 2. Summary of the numbers of juvenile salmonids relocated before or during dewatering activities and the anticipated mortality rate (1%), and the number of juvenile salmonids who either escape relocation efforts or where relocation efforts will not occur (BR-1 and Area A).

Area and (Year)	Number of Juvenile Fish Relocated	Relocation Mortality (1%)	Number of Juvenile Fish Stranded/Killed
Areas B, C, D, E, and McNulty Slough (Year 1, 2021)	53 SONCC coho salmon 53 CC Chinook salmon 53 NC steelhead	1 SONCC coho salmon 1 CC Chinook salmon 1 NC steelhead	11 SONCC coho salmon 11 CC Chinook salmon 11 NC steelhead
North Bay (BR-1) and Area A (Year 2, 2022)	0 SONCC coho salmon 0 CC Chinook salmon 0 NC steelhead	0 SONCC coho salmon 0 CC Chinook salmon 0 NC steelhead	41 SONCC coho salmon 41 CC Chinook salmon 41 NC steelhead

2.5.3 Invasive Plant Treatments

Treatments for invasive plants will rely on the use of the herbicide Imazapyr and associated surfactants (such as Agri-Dex). The chemicals being used are relatively non-toxic to fish and are not known to bio-accumulate in the tissues of aquatic organisms (Gardner and Grue 1996). Imazapyr is classified by the EPA to be practically nontoxic to aquatic species (EPA 2014). Herbicides and their surfactants are unlikely to enter waterways given the minimization measures and qualifications of those applying it. In the event these chemicals enter waterways because of erosion or other unexpected event, NMFS does not expect them to cause any adverse behaviors, nor influence the fitness of any individual SONCC coho salmon, CC Chinook salmon or NC steelhead exposed.

2.5.4 Monitoring

As previously described, after construction there will be a five year monitoring effort intended to evaluate species utilization of the restored tidal areas that will involve capture and handling of listed species. Any physical handling is known to be stressful to fish (Sharpe et al. 1998). The primary contributing factors to stress and death from handling are excessive doses of anesthetic, differences in water temperatures (between the creek and wherever the fish are held), dissolved oxygen conditions, the amount of time that fish are held out of the water, and physical trauma. Stress on salmonids increases rapidly from handling if the water temperature exceeds 18º Celsius or dissolved oxygen is below saturation. Fish that are transferred to holding tanks can experience trauma if care is not taken in the transfer process, and fish can experience stress and injury from overcrowding in traps if the traps are not emptied regularly. Decreased survival of fish can result when stress levels are high because stress can be immediately debilitating and may also increase the potential for vulnerability to subsequent challenges (Sharpe et al. 1998). The proposed action contain measures that mitigate the factors that commonly lead to stress and trauma from handling, and thus minimize the harmful effects of capturing and handling fish. When these measures are followed, fish typically recover fairly rapidly from handling.

As described above, post construction monitoring is expected to occur annually for five years. Potential capture and handling of listed species would include an annual total of 100 juvenile SONCC coho salmon, 200 juvenile CC Chinook salmon, and 200 juvenile NC steelhead (Table

1). Adult salmonids will not be targeted for sampling; if any are captured using trapping or seining gear, they will be immediately released to where they were captured. The combined five-year total numbers of captures expected using all sampling methods would be: 500 juvenile SONCC coho salmon 1,000 juvenile CC Chinook salmon, 1,000 juvenile NC steelhead, and 5 adult SONCC coho salmon, 5 adult CC Chinook salmon, and 5 adult NC steelhead (see Table 3).

Table 3. Annual combined numbers of listed species captured, and their expected mortalities encountered, during annual monitoring activities that are planned for five years.

Annual Combined Captures	Annual Combined Mortalities	Five Year Total Captures and (Mortalities)
100 juvenile SONCC coho salmon	2 juvenile SONCC coho salmon	500 juvenile SONCC coho salmon (10)
200 juvenile CC Chinook salmon	3 juvenile CC Chinook salmon	1,000 juvenile CC Chinook salmon (15)
200 juvenile NC steelhead	3 juvenile NC steelhead	1,000 juvenile NC steelhead (15)
1 adult SONCC coho salmon	0 adult SONCC coho salmon	5 adult SONCC coho salmon (0)
1 adult CC Chinook salmon	0 adult CC Chinook salmon	5 adult CC Chinook salmon (0)
1 adult NC steelhead	0 adult NC steelhead	5 adult NC steelhead (0)

A small percentage (one percent) of the fish Captured, Handled, Released and Captured, Handled, Tissue Sampled, Released, may become injured and perish. Therefore, there may be 1 juvenile SONCC coho salmon; 2 juvenile CC Chinook salmon; and 2 NC steelhead that perish due to handling-related stress annually. Fish that are Captured, Handled, PIT tagged or acoustic tagged, Released will have a higher rate of injury and handling-related mortality (5 percent). Therefore, there may be 1 juvenile SONCC coho salmon; 1 juvenile CC Chinook salmon; and 1 NC steelhead that perish due to tagging-related stress annually. No adult salmonids are expected to become injured during incidental capture and release.

2.5.5 Effects of Other Activities

The proposed non-motorized boat launch and trail systems are expected to result in an increase in non-motorized vessel traffic, such as kayaks. The action area will become more accessible to both humans and listed species after the two tide gates and earthen dike are removed, and interactions between listed species and the public may become more common. If kayaks or other non-motorized vessels encounter listed species in the action area, fish that are disturbed are expected to redistribute into nearby suitable habitat. NMFS does not expect any fitness consequences to fish that flee into suitable habitats elsewhere. NMFS does not expect the interrelated increase in small vessel traffic to impair the value or function of the PBF's of designated critical habitat within the action area.

2.5.6 Effects to Critical Habitat

All of the effects to critical habitat will be temporary and limited to the construction season when waterways are either dewatered, dredged, or have heavy equipment working in the active channel. During construction, most of these area will be unsuitable for the few individuals likely to be present, and furthermore these activities will reduce the amount of prey available and temporarily adversely affect the PBF associated with prey resources. These effects will be ameliorated when the work areas are reconnected to productive tidal waters and are able to recover from the disturbance of excavation work.

One of the highest priority restoration actions identified in all of the final recovery plans for the subject listed species is the restoration of the Eel River Estuary. NMFS expects the PBF's of designated critical habitat in the action area to be greatly improved by the Project. Fish access to the action area will be restored by the removals of levees and tide-gates, and reconnecting former slough channels. The reconnection of the tidal prism will increase circulation, improve water quality parameters allowing these areas to be suitable for fish for longer periods of time throughout the year. Restoring access and water quality to these essential estuarine areas will likely allow for a greater expression of a diversity of life history traits that rely on estuarine ecotone areas. The adverse effects to critical habitat (turbidity and reductions in prey, for example) will be temporary or minor. Overall, the Project will result in significant improvements in PBF's in the action area into the future as most of the stressors and threats impeding the condition of critical habitat in the action area are ameliorated by the Project.

2.6 Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Some continuing non-Federal activities are reasonably certain to contribute to climate effects within the action area. However, it is difficult if not impossible to distinguish between the action area's future environmental conditions caused by global climate change that are properly part of the environmental baseline *vs.* cumulative effects. Therefore, all relevant future climate-related environmental conditions in the action area are described in the environmental baseline (Section 2.4).

SONCC coho salmon, CC Chinook salmon, and NC steelhead in the action area are likely to be affected by future, ongoing non-federal activities like agriculture and timber harvest, both from upstream sources and within the action area. Water diversions also contribute to diminished stream flows and warmer water temperatures. The future effects of agriculture and timber harvest include continued land disturbance, road construction and maintenance, and higher rates of erosion and sedimentation.

2.7 Integration and Synthesis

The Integration and Synthesis section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action (Section 2.5) to the environmental baseline (Section 2.4) and the cumulative effects (Section 2.6), taking into account the status of the species and critical habitat (Section 2.2), to formulate the agency's biological opinion as to whether the proposed action is likely to: (1) Reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminish the value of designated or proposed critical habitat for the conservation of the species.

SONCC coho salmon, CC Chinook salmon, and NC steelhead have declined to a large degree from historic numbers and almost all of the populations of SONCC coho salmon are at a high risk of extinction. CC Chinook salmon have fragmented population structures, placing them at additional risk. Summer run populations of NC steelhead are in very poor condition. As described in the Effects of the Action section, a small number of juveniles of all three species may be injured or killed during construction and subsequent monitoring activities that are spread out over multiple years. NMFS does not expect that the loss of juveniles by this project would impact future adult returns for SONCC coho salmon, CC Chinook salmon, or NC steelhead. Most of the juveniles remaining rear outside of the action area during project work periods and therefore will not be adversely affected by the project. In NMFS' judgement, they are likely to produce enough future spawning adult fish to outweigh any losses from the action area until the restoration is complete. There will be some minor or temporary adverse effects to critical habitat in the action area during Project construction. The Project will improve critical habitat by improving and enhancing a number of PBFs for all three listed species, and also expected to result in increases in distribution and abundance of these species in the action area. These increases will help increase the abundance of these species. The value and function of critical habitat will be improved by the Project.

The action area could be subject to higher average summer air temperatures and lower total precipitation levels due to climate change. Although the total precipitation levels may decrease, the average rainfall intensity has increased and is expected to continue to increase in the future. Higher air temperatures would likely warm stream temperatures. Reductions in the amount of precipitation would reduce stream flow levels and estuaries may also experience changes in productivity due to changes in freshwater flows, nutrient cycling, and sediment amounts. For this project, all activities would be completed by 2031 and the likely long term effects of climate change described above are unlikely to meaningfully change within that time frame. Because the project will help restore this part of the estuary, NMFS expects it will help improve the resilience of species and habitats to climate change. Overall, the project is unlikely to appreciably reduce the likelihood of survival and recovery of SONCC coho salmon, CC Chinook salmon, and NC steelhead, and the project is unlikely to appreciably diminish the value of designated critical habitat for the conservation of these species.

2.8 Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, the effects of other activities caused by the proposed action, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of SONCC coho salmon, CC Chinook salmon, or NC steelhead, nor destroy or adversely modify its designated critical habitat.

2.9 Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by regulation to include significant

habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). "Incidental take" is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this ITS.

2.9.1 Amount or Extent of Take

In the biological opinion, NMFS determined that incidental take is reasonably certain to occur as follows:

Entrainment, Stranding, and Crushing
NMFS expects that up to 11 juvenile SONCC coho salmon, 11 CC Chinook salmon, and 11 NC steelhead will be killed during the first year of construction. NMFS expects that up to 41 juvenile SONCC coho salmon, 41 CC Chinook salmon, and 41 NC steelhead will be killed during the second year of construction at North Bay/BR-1 and Area A. In total, NMFS expects that up to 52 juvenile SONCC coho salmon, 52 CC Chinook salmon, and 52 NC steelhead will be killed due to entrainment or stranding over two work seasons.

Relocation
NMFS expects that fish relocation efforts will be inefficient until the work areas are partially dewatered, concentrating fish in less area. Only 80% of the listed species will be captured and relocated, or 53 juvenile SONCC coho salmon, 53 juvenile CC Chinook salmon, and 53 juvenile NC steelhead. A small number (1%) of relocated fish are expected to be killed due to handling injuries, or one juvenile SONCC coho salmon, one juvenile CC Chinook salmon, and one juvenile NC steelhead during the first year of construction (the only year in which relocation has been proposed).

Monitoring
During each year of the proposed monitoring plan, NMFS expects that the Applicant would capture and handle the following numbers of listed species: 100 juvenile SONCC coho salmon, one adult SONCC coho salmon, 200 juvenile CC Chinook salmon, one adult CC Chinook salmon, 200 juvenile NC steelhead, and one adult NC steelhead. Of these, 2 juvenile SONCC coho salmon, 3 juvenile CC Chinook salmon, and 3 juvenile NC steelhead are expected to be killed from handling or tagging stress each season. Combined, the total numbers captured and handled over five years are: 500 juvenile SONCC coho salmon, 5 adult SONCC coho salmon, 1,000 juvenile CC Chinook salmon, 5 adult CC Chinook salmon, 1,000 juvenile NC steelhead, and five adult NC steelhead. Combined, the total numbers incidentally killed due to handling stress caused by the monitoring program over five years are: 10 juvenile SONCC coho salmon, 15 juvenile CC Chinook salmon, and 15 juvenile NC steelhead (no adult life stages are expected to be injured if captured and released unhandled).

Total Amount of Take
During the first year of construction, there will be 53 juvenile SONCC coho salmon, 53 juvenile CC Chinook salmon, and 53 juvenile NC steelhead captured and relocated from

work areas, with 1% of those individuals perishing due to handling stress (one juvenile SONCC coho salmon, one juvenile CC Chinook salmon, and one juvenile NC steelhead. NMFS expects that 11 juvenile SONCC coho salmon, 11 juvenile CC Chinook salmon, and 11 juvenile NC steelhead will escape relocation efforts and perish in work areas during the first year. During the second year of construction, there will be 41 juvenile SONCC coho salmon, 41 juvenile CC Chinook salmon, and 41 juvenile NC steelhead to be killed due to entrainment or stranding and crushing. In total, construction work will incidentally take the following totals over two work seasons: 53 juvenile SONCC coho salmon, 53 juvenile CC Chinook salmon, and 53 juvenile NC steelhead will be captured and relocated from work areas while 42 juvenile SONCC coho salmon, 42 juvenile CC Chinook salmon, and 42 juvenile NC steelhead will be killed within work areas.

For the five years following construction of the Project, monitoring efforts are expected to capture and handle 500 juvenile SONCC coho salmon, 5 adult SONCC coho salmon, 1,000 juvenile CC Chinook salmon, 5 adult CC Chinook salmon, 1,000 juvenile NC steelhead, and five adult NC steelhead. Of these fish captured and handled, 10 juvenile SONCC coho salmon, 15 juvenile CC Chinook salmon, and 15 juvenile NC steelhead are expected to be killed due to handling stress over five years.

Combined, there are 553 individual SONCC coho salmon; 1,053 individual CC Chinook salmon; and 1,053 individual NC steelhead expected to be capture, handled, and released. There are 63 individual juvenile SONCC coho salmon; 68 individual CC Chinook salmon; and 68 individual NC steelhead expected to be killed over 7 years of construction and monitoring efforts.

2.9.2 Effect of the Take

In the biological opinion, NMFS determined that the amount or extent of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

2.9.3 Reasonable and Prudent Measures

"Reasonable and prudent measures" are nondiscretionary measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02). NMFS believes the following reasonable and prudent measures are necessary and appropriate to minimize take of SONCC coho salmon, CC Chinook salmon, and NC steelhead:

1. Ensure that all necessary and appropriate actions are taken to minimize injury and mortality to SONCC coho salmon, CC Chinook salmon, and NC steelhead during monitoring, excavation, dredging, fish relocation and dewatering work.

2. Submit annual reports regarding deconstruction activities and results.

2.9.4 Terms and Conditions

The terms and conditions described below are non-discretionary, and the NOAA RC or any contractor must comply with them in order to implement the RPMs (50 CFR 402.14). The NOAA RC or any contractor has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this ITS (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

1. The following terms and conditions implement reasonable and prudent measure 1:

1. NOAA RC shall allow any NMFS employee(s) or any other person(s) designated by NMFS, to accompany field personnel to visit the project site during activities described in this opinion.
2. NOAA RC shall ensure that any minimization measures described in the Proposed Federal Action section are properly implemented.
3. NOAA RC shall inspect and monitor the work areas during and after deconstruction for any individuals which may be injured or killed.
4. NOAA RC shall contact NMFS within 24 hours of meeting or exceeding take of listed species prior to project completion. Notify Matt Goldsworthy by phone at 707-357-1338 or email at Matt.Goldsworthy@noaa.gov. NMFS will review the activities resulting in take and determine if additional protective measures are required.

2. The following terms and conditions implement reasonable and prudent measure 2:

a. NOAA RC shall provide a written report to NMFS by February 15 of each year. The report shall be sent to NMFS via email to Matt.Goldsworthy@noaa.gov. The report shall contain, at a minimum, the following information:

i. **Fish Relocation and Dewatering** – The report will include description of the location from which fish were removed and the release site including photographs; the date and time of the relocation effort; a description of the equipment and methods used to collect, hold, and transport salmonids; the number of fish relocated by species; the number of fish injured or killed by species and a brief narrative of the circumstances surrounding salmonid injuries or mortalities; and a description of any problems which may have arisen during the relocation activities and a statement as to whether or not the activities had any unforeseen effects.
ii. **Construction and Fish Losses** – The report will summarize any observations that occur regarding injury or death of listed species during construction activities, and summarize the construction work completed each year.

iii. **Post-Project Fisheries Monitoring** - The report will contain a summary of all of the sampling events by gear type, including species captured; disposition of species; explanation of mortalities; and any ancillary data. The report will be provided at the end of each of the five years of monitoring proposed.

2.10 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02). NMFS has no conservation recommendations to suggest for ESA.

2.11 Reinitiation of Consultation

This concludes formal consultation for the Eel River Estuary Ocean Ranch Tidal Restoration Project. As 50 CFR 402.16 states, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and if: (1) The amount or extent of incidental taking specified in the ITS is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an effect on the listed species or critical habitat that was not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

3 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT RESPONSE

Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. Under the MSA, this consultation is intended to promote the conservation of EFH as necessary to support sustainable fisheries and the managed species' contribution to a healthy ecosystem. For the purposes of the MSA , EFH means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity", and includes the physical, biological, and chemical properties that are used by fish (50 CFR 600.10). Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) of the MSA also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH. Such recommendations may include

measures to avoid, minimize, mitigate, or otherwise offset the adverse effects of the action on EFH [CFR 600.905(b)].

This analysis is based, in part, on the EFH assessment provided by the NOAA RC and descriptions of EFH for Pacific Coast Salmon (PFMC 2016), Pacific Coast Groundfish (PFMC 2019b), and Coastal Pelagic Species (PFMC 2019a) contained in the fishery management plans developed by the Pacific Fisheries Management Council (PFMC) and approved by the Secretary of Commerce.

3.1 Essential Fish Habitat Affected by the Project

Essential Fish Habitat is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. 1802[10]). "Waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.10). The term "adverse effect" means any impacts which reduce the quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrates and loss of, or injury to, benthic organisms, prey species, and their habitats, and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of it and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.910). The EFH consultation mandate applies to all species managed under a Fishery Management Plan (FMP) that may be present in the action area.

The Pacific Coast Salmon, Pacific Coast Groundfish, and Coastal Pelagic Species FMP's contain EFH that will be adversely affected by the Project. Furthermore, the project is located in a Habitat Area of Particular Concern (HAPC) for federally managed fish species under the Pacific Coast Salmon FMP and Pacific Coast Groundfish FMP. HAPC are described in the regulations as subsets of EFH that are identified based on one or more of the following considerations: the importance of the ecological function provided by the habitat; the extent to which the habitat is sensitive to human-induced environmental degradation; whether, and to what extent, development activities are, or will be stressing the habitat type; and the rarity of the habitat type (50 CFR 600.815(a)(8)). Designated HAPC are not afforded any additional regulatory protection under MSA; however, federal projects with potential adverse impacts to HAPC are more carefully scrutinized during the consultation process. Designated HAPC for Pacific Coast Salmon and Pacific Coast Groundfish FMP's within the action area include: submerged aquatic vegetation and seagrass; estuary; and complex channel and floodplain habitat.

3.2 Adverse Effects on Essential Fish Habitat

Both coho samon and Chinook salmon are expected to occur seasonally within the action area. The effects to coho salmon and Chinook salmon and their critical habitat have already been described in the Effects of the Action section. The adverse effects to EFH for Coastal Pelagic

Species and to EFH and HAPC's of Pacific Coast Salmon and Pacific Coast Groundfish in the action area include:

1. Temporary construction-related effects including dewatering, dredging, acoustics, and water quality degradation will cause adverse effects to EFH of all three FMP's, and adverse effects to the Complex Channel and Floodplain Habitat HAPC, Estuary HAPC, and Submerged Aquatic Vegetation HAPC.

2. Construction work will disrupt and remove significant amounts of prey items for all managed species in the action area, including removals and mortalities of managed species (such as northern anchovies) during construction work.

3.3 Essential Fish Habitat Conservation Recommendations

Most of the adverse effects from the proposed action are temporary, as water quality and other disturbances will subside and improve over time. However, the Project includes a number of components that will disrupt and remove prey items for managed species, including the likely removals and deaths of managed species, as designated EFH is subjected to heavy equipment work or hydraulic dredging activities which will temporarily reduce the quality and quantity of EFH in the action area and temporarily interrupt the ability of EFH to provide for habitat for species to grow to maturity. There may be short time reductions in eelgrass parameters after construction, but eelgrass parameters are expected to improve upon restoration of tidal prism. Therefore, NMFS suggests the following Conservation Recommendation to compensate for the adverse effects to EFH and HAPC:

1. NMFS recommends that two additional shelves (as described in the Proposed Action) be incorporated into Area A or BR-1, bringing the Project total to 10 shelves being proposed to be installed adjacent to the primary channel. Providing additional shelves in Area A or BR-1 would offset and compensate for the unavoidable adverse effects to prey resources and water quality during construction. Additional shelves would help increase the volume of tidal prism restored and provide for greater diversity in depths and velocities in order to support a greater diversity of prey resources and for habitat values of managed species.

Fully implementing this EFH conservation recommendation would protect EFH and HAPC, by avoiding or minimizing the adverse effects described in section 3.2 above.

3.4 Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, Reclamation must provide a detailed response in writing to NMFS within 30 days after receiving an EFH Conservation Recommendation. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH Conservation Recommendations unless NMFS and the Federal agency have agreed to use alternative time frames for the Federal agency response. The response must include a description of measures proposed by the agency for avoiding, minimizing, mitigating, or otherwise offsetting the impact of the activity on EFH. In the case of a

response that is inconsistent with the Conservation Recommendations, the Federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR 600.920(k)(1)).

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we ask that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

3.5 Supplemental Consultation

The NOAA RC must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH Conservation Recommendations (50 CFR 600.920(l)).

4 DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The Data Quality Act (DQA) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended user of this opinion is the NOAA RC, USFWS and the Corps. Other interested users could include the California Department of Fish and Wildlife and the California Coastal Conservancy. A copy of this opinion was provided to the NOAA RC, USFWS, and the Corps. The format and naming adheres to conventional standards for style.

4.2 Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

4.3 Objectivity

Information Product Category: Natural Resource Plan

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01 et seq., and the MSA implementing regulations regarding EFH, 50 CFR 600.

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this opinion and EFH consultation contain more background on information sources and quality.

Referencing: All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by NMFS staff with training in ESA and MSA implementation, and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

5 REFERENCES

Bartholow, J. M. 2005. Recent water temperature trends in the Lower Klamath River, California. North American Journal of Fisheries Management 25(1):152–162.

Gardner S. and Grue, C. 1996. Effects of rodeo® and garlon® 3A on nontarget wetland species in central Washington. Environmental Toxicology and Chemistry. 5(4):44I-45.

Good, T. P., R. S. Waples, and P. Adams (editors). 2005. Updated status of federally listed ESUs of West Coast salmon and steelhead. U.S. Department of Commerce, NOAA Tech. Memo. NMFS-NWFSC-66. 597 pp.

Intergovernmental Panel on Climate Change (IPCC). 2019. Special Report on the Ocean and Cryosphere in a Changing Climate, Cambridge University Press.

Lindley, S. T., R. S. Schick, E. Mora, P. B. Adams, J. J. Anderson, S. Greene, C. Hanson, B. May, D. McEwan, R. B. MacFarlane, C. Swanson, and J. G. Williams. 2007. Framework for assessing viability of threatened and endangered Chinook salmon and steelhead in the Sacramento-San Joaquin Basin. San Francisco Estuary and Watershed Science 5:4.

McElhany, P., M. H. Ruckelshaus, M. J. Ford, T. C. Wainwright, and E. P. Bjorkstedt. 2000. Viable salmonid populations and the recovery of evolutionarily significant units. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-42. 156 pp.

MacFarlane, R.B. 2010. Energy dynamics and growth of Chinook salmon (*Oncorhynchus tshawytscha*) from the Central Valley of California during the estuarine phase and first ocean year. Canadian Journal of Fisheries and Aquatic Sciences 67(10):1549-1565.

NMFS (National Marine Fisheries Service). 2001. Status review update for coho salmon (*Oncorhynchus kisutch*) from the Central California Coast and the California portion of the Southern Oregon/Northern California Coast Evolutionarily Significant Units. National Marine Fisheries Service, Southwest Fisheries Science Center, Santa Cruz, California. April 12. 43 pp.

NMFS. 2014. Final recovery plan for the Southern Oregon/Northern California Coast Evolutionarily Significant Unit of Coho Salmon (*Oncorhynchus kisutch*). September 2014. Arcata, California.

NMFS. 2016. Final Multispecies Recovery Plan for the California Coastal Chinook salmon ESU and Northern California steelhead DPS. 2016. Santa Rosa, California.

Perry, R.W., Risley, J.C., Brewer, S.J., Jones, E.C., and Rondorf, D.W. 2011. Simulating daily water temperatures of the Klamath River under dam removal and climate change scenarios: U.S. Geological Survey Open-File Report 2011-1243. 78 pp.

PFMC (Pacific Management Fishery Council). 2016. The Fishery Management Plan for U.S. West Coast Commercial and Recreational Salmon Fisheries off the Coast of Washington, Oregon, and California. PFMC, Portland. As Amended through Amendment 19, March 2016.

PFMC. 2019a. Pacific Coast Groundfish Fishery Management Plan for the California, Oregon, and Washington Groundfish Fishery. Pacific Fishery Management Council, Portland Oregon. December.

PFMC. 2019b. Coastal Pelagic Species Fishery Management Plan – as Amended Through Amendment 17 (June 2019). Pacific Fishery Management Council, Portland, Oregon. June.

Ricker, S.J., D. Ward, C.W. Anderson, and M. Reneski. 2014. Results of Freshwater Creek salmonid life cycle monitoring station 2010-2013. California Department of Fish and Wildlife, Anadromous Fisheries Resource Assessment and Monitoring Program, Fisheries Restoration Grant P0910513.

Sharpe, C.S., D.A. Thompson, H.L. Blankenship, C.B. Schreck. 1998. Effects of Routine Handling and Tagging Procedures on Physiological Stress Responses in Juvenile Chinook Salmon. The Progressive Fish-Culturist. 60(2):81-87.

Wallace, M. and S. Allen. 2012. Juvenile Salmonids Use of the Tidal Po1t10ns of Selected

Tributaries to Humboldt Bay, California, 2009-2011. Report to the Pacific States Marine Fisheries Commission. State of California Resources Agencies, Department of Fish and Game.

Weitkamp, L. A., T. C. Wainwright, G. J. Bryant, G. B. Milner, D. J. Teel, R. G. Kope, and R. S. Waples. 1995. Status review of coho salmon from Washington, Oregon, and California. NOAA Technical Memorandum NMFS-NWFSC-24. U.S. Department of Commerce, NOAA, Northwest Fisheries Science Center, Seattle, Washington. 258 pp.

Williams, T. H., S. T. Lindley, B. C. Spence, and D. A. Boughton. 2011. Status review for Pacific salmon and trout listed under the Endangered Species Act: Southwest. National Marine Fisheries Service, Southwest Fisheries Science Center, Santa Cruz, California.

Williams, T. H., B. C. Spence, D. A. Boughton, R. C. Johnson, L. Crozier, N. Mantua, M. O'Farrell, and S. T. Lindley. 2016. Viability assessment for Pacific salmon and steelhead listed under the Endangered Species Act: Southwest. 2 February 2016 Report to National Marine Fisheries Service – West Coast Region from Southwest Fisheries Science Center, Fisheries Ecology Division, Santa Cruz, California.

United States Environmental Protection Agency (EPA). 2014. Registration Review—Preliminary Problem Formulation for the Ecological Risk Assessment and Drinking Water Exposure Assessment to be Conducted for Imazapyr and Imazapyr Isopropylamine, PC Code 128829 (isopropylamine salt) and 128821 (imazapyr acid). Office of Prevention, Pesticides, and Toxic Substances. Washington, DC.