



May 26, 2020

*Submitted via* [www.regulations.gov](http://www.regulations.gov)

Robert Markle, NMFS  
West Coast Region  
1201 NE Lloyd Blvd., Suite 1100  
Portland, OR, 97232

**Re: NOAA–NMFS–2019–0097, five-year status review for 17 evolutionarily significant units (ESUs) of Pacific salmon (*Oncorhynchus spp.*) and 11 distinct population segments (DPSs) of steelhead (*Oncorhynchus mykiss*), 84 Fed. Reg. 53,117 (Oct. 4, 2019)**

Dear Mr. Markle:

On behalf of WildEarth Guardians (Guardians) and Native Fish Society (NFS), we appreciate the opportunity to submit comments on the National Marine Fisheries Service (NMFS) – National Oceanic and Atmospheric Administration’s (NOAA) 5-year status review of Pacific salmon (*Oncorhynchus spp.*) and of steelhead (*Oncorhynchus mykiss*) required by the Endangered Species Act (ESA). Specifically, we submit comments here on the Upper Willamette River (UWR) steelhead and Upper Willamette River Chinook salmon and request that due to the continued downward trend of these species, they should be uplisted from “threatened” to “endangered” status.

WildEarth Guardians’ mission is to protect and restore the wildlife, wild places, wild rivers, and health of the American West. Guardians has approximately 279,000 members nationwide and maintains offices in Santa Fe, Denver, Missoula, Boise, Portland, Seattle, and Tucson.

Native Fish Society is guided by the best available science to advocate for the recovery of wild, native fish and promotes the stewardship of the habitats that sustain us all. Native Fish Society maintains an office in Oregon City, Oregon.

## **I. Legal Framework**

The Endangered Species Act (ESA) of 1973, 16 U.S.C. §§ 1531–44, was enacted to halt and reverse the trend towards the irreversible loss of species, whatever the cost. *Tennessee Valley Auth. v. Hill*, 437 U.S. 153, 184 (1978) (“The plain intent of Congress in enacting this statute was to halt and reverse the trend toward species extinction, whatever the cost.”). In the ESA, “Congress has spoken in the plainest of words, making it abundantly clear that the balance has been struck in favor of affording endangered species the highest of priorities, thereby adopting a policy which it described as ‘institutionalized caution.’” *Id.* at 19.

The ESA defines “species” to include “any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature.” 16 U.S.C. § 1532(16). “In determining whether a particular taxon or population is a species for the purposes of the [ESA], the [Service] shall rely on standard taxonomic distinctions and the biological expertise of the Department [of the Interior] and the scientific community concerning the relevant taxonomic group.” 50 C.F.R. § 424.11(a).

The Service’s determination of whether a species is endangered or threatened must be based on its analysis of five factors:

- A. the present or threatened destruction, modification, or curtailment of its habitat or range;
- B. overutilization for commercial, recreational, scientific, or educational purposes;
- C. disease or predation;
- D. the inadequacy of existing regulatory mechanisms; or
- E. other natural or manmade factors affecting its continued existence. 16 U.S.C. §§ 1533(a)(1)(A)–(E).

In order to be listed, a species need only face a sufficient threat under a single factor. *See Humane Soc’y of the U.S. v. Pritzker*, 75 F. Supp. 3d 1, 7 (D.D.C. 2014) *appeal dismissed*, No. 15-5038, 2015 WL 1619247 (D.C. Cir. Mar. 17, 2015) (citing *Sm. Ctr. For Biological Diversity v. Babbitt*, 215 F.3d 58, 60 (D.C. Cir. 2000)). Any combination of threats, considered cumulatively under multiple factors, will also support listing. The Service must consider these same factors in determining whether a listed species warrants delisting. *Id.* § 1533(c); 1533(c)(2)(B)(i); 50 C.F.R. §§ 424.11(c), (d). “Such removal must be supported by the best scientific and commercial data available to the Secretary after conducting a review of the status of the species.” 50 C.F.R. § 424.11(d).

Courts have interpreted the “best available data” standard broadly. The Service may not ignore available biological information. *Connor v. Burford*, 848 F.2d 1441, 1454 (9th Cir. 1988). The agency must address all such available data in its decision making. *San Luis v. Badgley*, 136 F. Supp. 2d 1136, 1147 (E.D. Cal. 2000). In any final rule promulgated to implement a change in a species’ listing status, the Service has a duty under 16 U.S.C. § 1533(b)(8) to summarize the data on which the rule is based and to demonstrate the relationship between the data relied on and the conclusion reached. *See San Luis*, 136 F. Supp. 2d at 1149.

Credible anecdotal evidence may constitute the best available scientific data and the Service cannot ignore it, even if a full-scale study might be preferable. *Ctr. for Native Ecosystems v. U.S. Fish and Wildlife Serv.*, 795 F. Supp. 2d 1199, 1208 (D. Colo. 2011) (citing *Northwest Ecosystem Alliance v. U.S. Fish and Wildlife Serv.*, 475 F.3d 1136, 1147 (9th Cir. 2007)). Where data are available but have not yet been analyzed, the Service may not lawfully fail to analyze whether that data constitutes the best available data. *Greenpeace v. Nat’l Marine Fisheries Serv.*, 80 F. Supp. 2d 1137, 1149–50 (W.D. Wash. 2000).

In considering and drawing conclusions from the best available data, the Service must “give the benefit of the doubt to the species,” as Congress intended. *Connor*, 848 F.2d at 1454; *Ctr. for Biological Diversity v. Lohn*, 296 F. Supp. 2d 1223, 1239 (W.D. Wash. 2003) (agency failed to rely on the best available scientific data when it refused to list the orca); *Defenders of Wildlife v. Babbitt*, 958 F. Supp. 670, 680–81 (D.D.C. 1997) (in applying overly stringent “conclusive evidence” standard to listing decision on Canada lynx, agency failed to rely on the best available scientific evidence).

Of significance here, at least once every five years, the Secretary must conduct a status review of each species listed as threatened or endangered (“the five-year status review”). 16 U.S.C. § 1533(c)(2)(A). The Secretary shall “determine on the basis of such review whether any such species should—(i) be removed from such list; (ii) be changed in status from an endangered species to a threatened species; or (iii) be changed in status from a threatened species to an endangered species.” *Id.* § 1533(c)(2)(B). These determinations must be made in accordance with the same requirements as for listing determinations in the first instance, including that they must be based on the best available science and an analysis of the aforementioned listing criteria. *Id.* (citing 16 U.S.C. §§ 1533(a), (b)). The statute does not require the Secretary to take any further action pending completion of the five-year status review. Indeed, the result of the five-year status review does not necessarily lead to a corresponding change in either the status of the listed species or legal obligations related to a listing. The status review either leaves things as they were or it is the start of a process to change the listing status of a species—a process requiring Administrative Procedure Act rulemaking.

## **II. Threats to UWR Chinook Salmon and Steelhead by Listing Factor**

As outlined above, listing decisions under the ESA must be based on the best scientific data available and must consider five factors. 16 U.S.C. §§ 1533(a)(1)(A)–(E). The 2011 UWR Conservation and Recovery Plan for Chinook Salmon and steelhead details the threats, recovery criteria and recovery actions relevant to the listed species and makes recommendations for future management (ODFW and NOAA Fisheries, August 2011). Nearly the same listing factors outlined in 1999, again in 2011, and again here are continuing to push the species closer to extinction. The 2011 Recovery Plan states:

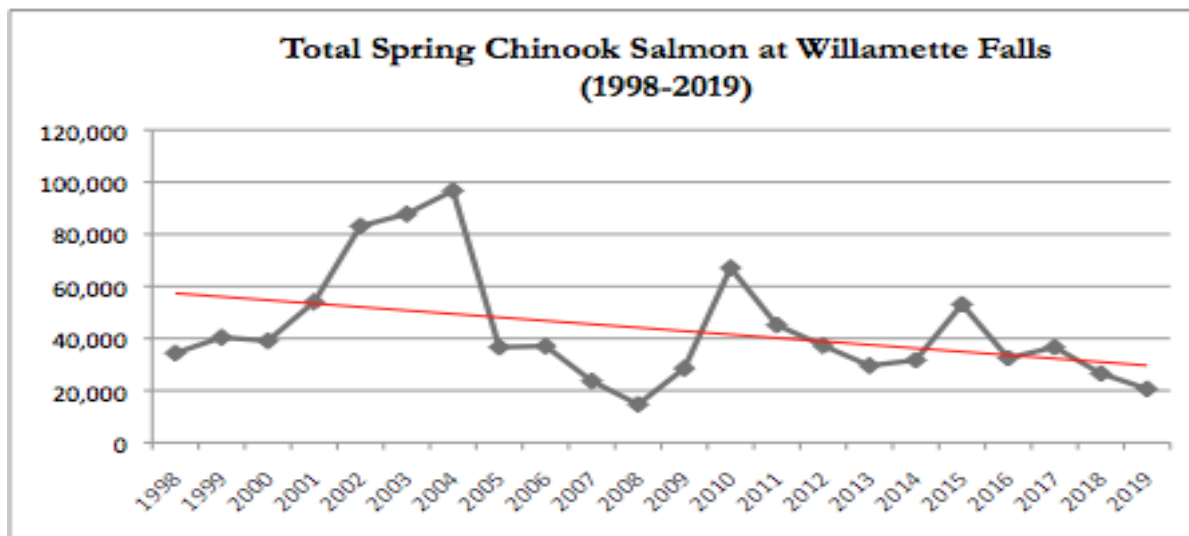
“In 1999, when UWR spring Chinook and winter steelhead were listed under the ESA (64 FR 14308), NMFS cited all of the five listing factors as contributing to the decline of these species. Specifically, the major concerns described were related to: loss of historic spawning and rearing habitat due to dam blockages in the eastside tributaries of the Willamette River, adverse thermal effects downstream from operation of the dams, riparian and stream habitat loss and degradation particularly in the lowland, valley areas (see listing factors A and D), excessive fishery harvest (see listing factor B), and adverse effects from hatchery programs (see listing Factor E).” (ODFW, August 2011, p. 3-6)

We believe that the biggest threats to UWR winter steelhead and Chinook salmon remain unaddressed and continue to foreclose opportunities for recovery of the species. The most significant threats remain the destruction and modification of habitat due to lack of access to historical spawning and rearing habitat (Listing Factor A) along with unnatural flow regimes and thermal effects due to the presence and operation of the dams in the Willamette River (Listing Factor A). Additional continuing key threats include 1) the inadequacy of existing regulatory mechanisms to protect the species (Listing Factor D); 2) low population numbers and loss of genetic diversity (Listing Factor E); 3) climate change (Listing Factor E) and effects from hatchery programs (Listing Factor E).

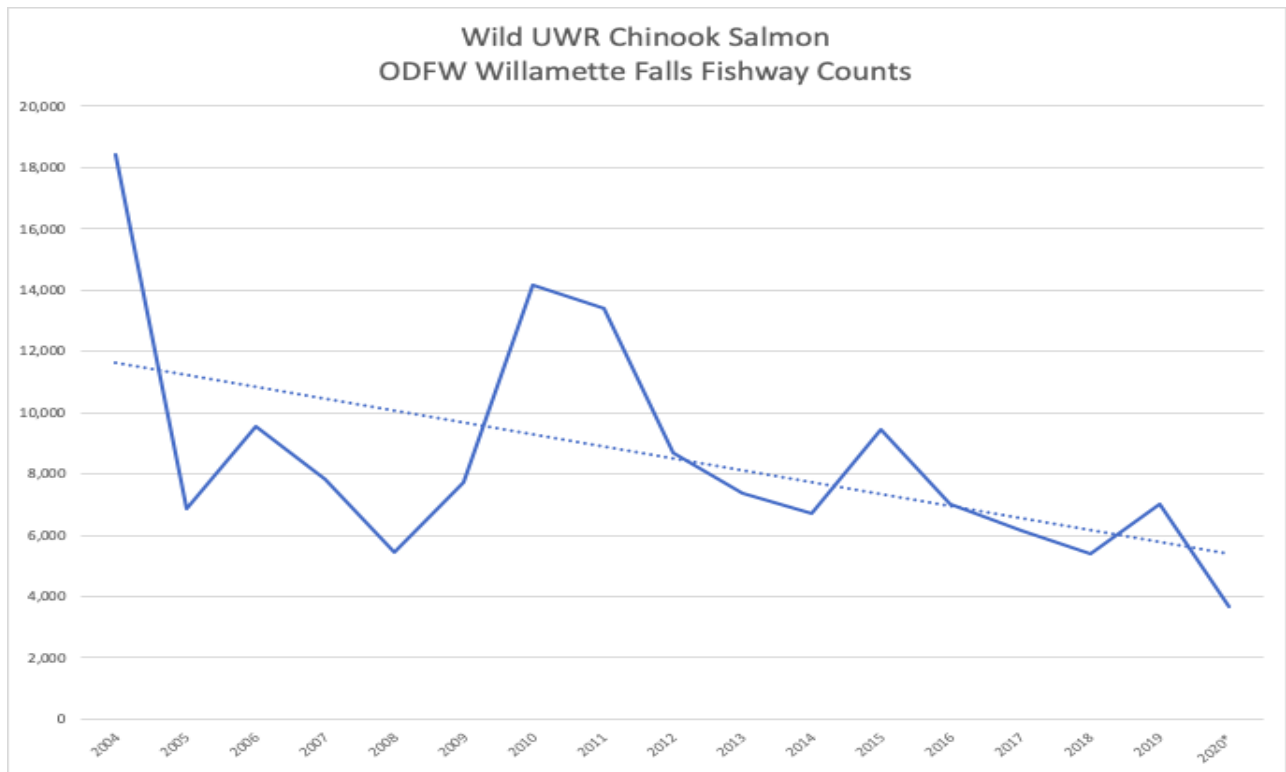
## Population Trends

Population trends are a clear factor in indicating that the status of this species is not improving. In fact, status is dangerously low and trendlines continue downward, which are key reasons that warrant “endangered” status now. Oregon Department of Fish and Wildlife (ODFW) has been counting the number of fish migrating upstream past Willamette Falls since 1961. In that time, total spring Chinook salmon and winter steelhead counts have dropped significantly. For spring Chinook, the 50 year average has been a total of 40,823 fish with the 5 year average being 33,871. For winter steelhead, the 50 year average has been a total of 9,777 with the 5 year average being 8,490. Note that these numbers include hatchery fish, which suggests that actual wild fish counts are much lower. The population counts for these species are not improving, which is a clear reason why uplisting to endangered status is needed now.

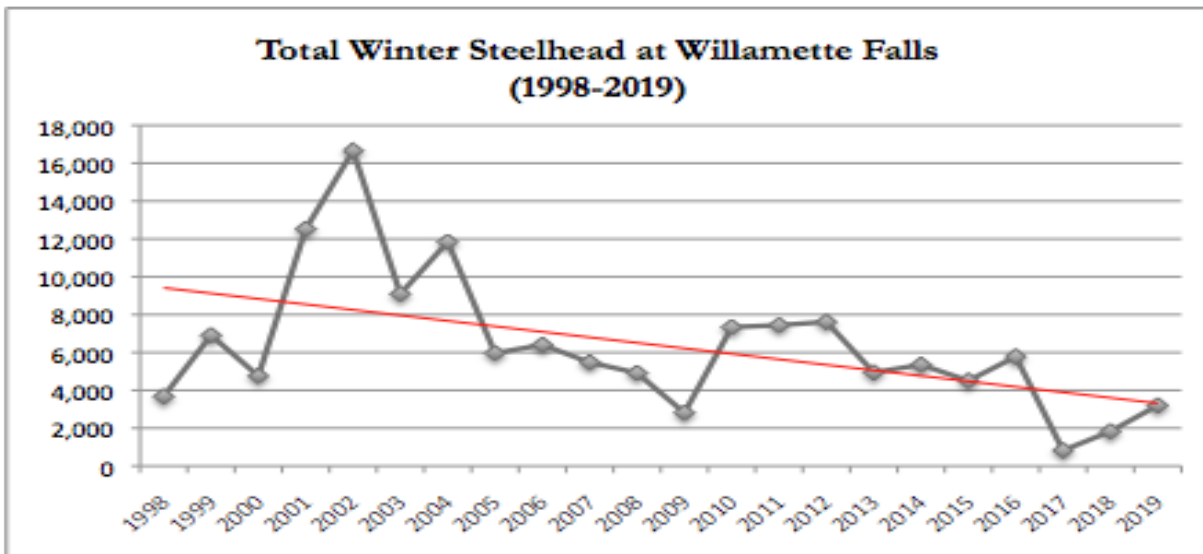
Population data clearly indicate that continued existence of these species is declining dangerously. UWR Chinook salmon and winter steelhead existence continues to be on a downward trend. Since the species were listed as threatened under the Endangered Species Act in 1999, their populations continue to struggle as seen in the following graphs. Note that the graphs labeled “Total” include ALL fish, including hatchery fish. Wild population counts began in 2004 are shown in the graphs labeled “Wild”.



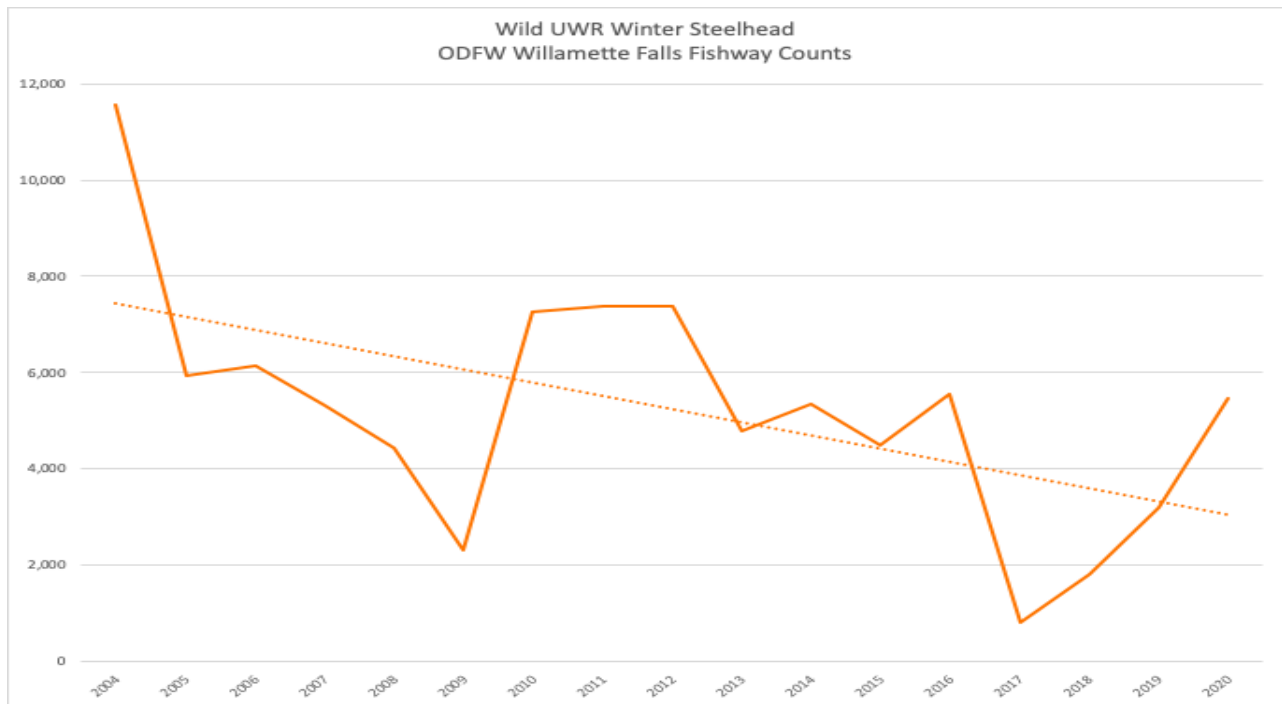
The graph above displays the ODFW counts of UWR Chinook salmon (wild and hatchery) at Willamette Falls with a declining trendline since both ESA listing and since the 2008 Biological Opinion. Even with the inclusion of hatchery fish, last year's count was about half what the count was when UWR Chinook salmon were listed in 1998.



The graph above displays ODFW wild (unclipped fish) counts of UWR Chinook salmon at Willamette Falls. (Note that 2020 data was only available through May 22 while the spring component of the run is counted through August 15). Wild, ESA-listed UWR spring Chinook continue to see declines in population abundance in the period since listing in 1998 and since the establishment and implementation of the 2008 Biological Opinion and 2011 Recovery Plan.



The graph above displays the ODFW counts of UWR winter steelhead (including hatchery fish) at Willamette Falls with a declining trendline since both ESA listing and since the 2008 Biological Opinion. With 2017 being a year of a big dropoff in population with an uptick over the last two years. Again, population counts remain below what they were when the species were first listed in 1998.



The graph above displays ODFW wild (unclipped fish) counts of UWR winter steelhead at Willamette Falls. The Willamette River basin’s winter run steelhead population has been in steady decline since its listing as threatened in 1998. The most recent summary of this populations’ status (Sharpe 2017, pp. 4-5) summarizes monitoring surveys from 1980-2016. These data show a DPS nearing extirpation. This is in spite of the 2008 BiOp calling for an accelerated program for passage of threatened salmonid species above barrier dams in the Upper Willamette Basin (UWB) to increase available spawning habitat and ensure fish access to colder headwaters. In the last 5-year assessment of the status of these fisheries, the NOAA (2016) noted that a number of the requirements in this BiOp had not been met and that this DPS has continued to decline. Note that in 2017, the population of wild adult fish returning through the fishway at Willamette Falls reached a precipitously low population of 822 individual adults.

The downward trendlines indicate a need for further protections for these species that warrant uplisting from threatened to endangered status.

**Listing Factor A: The present or threatened destruction, modification, or curtailment of its habitat or range.**

The Recovery Plan for UWR Chinook salmon and steelhead identifies fish passage at the dams both for natural origin adults and for juveniles as a key metric for recovery (ODFW, 2011, p. 8-21). Fish passage measures continue to be delayed which means that this key recovery metric has not been achieved. The curtailment of their range and continued lack of access to habitat remains a significant threat to the survival of these species and the severe impacts from this listing factor alone warrant uplisting from “threatened” to “endangered” status.

As background, the Willamette Project includes thirteen dams on several tributaries of the Upper

Willamette River with the primary impacts to UWR Chinook salmon and steelhead occurring due to dams in the Middle Fork Willamette, North Santiam, South Santiam and McKenzie Rivers sub-basins. The dams block fish passage to and from extensive spawning habitat, alter natural water flows and water temperatures, and prevent downstream movement of sediment and large woody debris that are important components of fish habitat. For UWR Chinook salmon, dams cut off more than 90% of the historic spawning habitat in the Middle Fork Willamette sub-basin and about 70% historic spawning habitat in the North and South Santiam sub-basins. The McKenzie sub-basin has more spawning habitat lower in the watershed, with just 16% of spawning habitat blocked by Willamette Project dams. For UWR steelhead, about 33% of historic spawning habitat is blocked by dams. The lack of access to suitable habitat is one of the reasons UWR Chinook and steelhead populations collapsed after construction of the Willamette Project and why the species required protection under the Endangered Species Act. The U.S. Army Corps of Engineers (Corps) operates and maintains the dams of concern.

After a 2008 biological opinion concluded that the Corps' continued operation of the Willamette Project would jeopardize the existence of both fish species, a Reasonable and Prudent Alternative (RPA) was agreed to that set forth numerous requirements and deadlines. Not only has the Corps failed to fully and properly implement many of the RPA measures, the Corps is far behind schedule for achieving fish passage, the most critical of the measures included in the RPA. UWR Chinook salmon and steelhead existence is jeopardized due to the lack of timely action.

RPA requirements that were developed to avoid jeopardizing the species included implementing major changes to improve downstream passage at Cougar Dam, Lookout Point Dam, and Detroit Dam by the end of the BiOp term. Passage measures also called for rebuilding adult collection facilities by set deadlines to improve upstream passage at four dams. Another key component addressed water quality, particularly related to water temperatures and total dissolved gas levels. The Corps has failed to implement key actions, resulting in more harm to UWR Chinook and steelhead and causing more degradation of habitat. (Also see timeline included in Appendix.) These include:

- The RPA called for a multi-year study to evaluate significant high-priority actions for fish passage and temperature control and provide recommendations by 2012 on which actions to implement.
  - The Corps did not issue its recommendations from its multi-year study until 2015 - three years behind schedule - and did not include downstream fish passage at Lookout Point Dam.
- The RPA set forth deadlines for completion of downstream passage facilities at three dams: Cougar (2014), Lookout Point (2022) and Detroit (2024). And upstream passage around Dexter by December 2014.

*RPA Measure 4.12.1: The Action Agencies (AAs) will investigate the feasibility of improving downstream fish passage at Cougar Dam through structural modifications as well as with operational alternatives, and if found feasible they will construct and operate the downstream fish passage facility. The AAs will take necessary initial steps beginning no later than 2010, which may include a site/concept study, design report, plans and specifications, if appropriate. The AAs will establish a Major Milestone near the end of 2010, in conjunction with completion of the Cougar Site/Concept Study and DDR. The AAs will make "go/no go" decisions on the feasibility of Cougar downstream passage facilities. The AAs will complete construction of any structural fish passage facilities by Dec. 2014; and by 2015, begin operating downstream fish passage facilities at Cougar Dam.*

- Cougar - passage facilities are now 6 years behind schedule, with earliest completion of 2021. (RPA measure 4.12.1)
  - Detroit - planning has begun but construction will not be completed until 2028 at the earliest. (RPA measure 4.12.3)
  - Lookout Point dam - no plans for downstream passage at this time. (RPA measure 4.12.2)
  - Dexter - no plans at this time.
- The RPA set forth interim measures to address water temperatures and/or dissolved gas levels at Green Peter, Foster, Big Cliff, Dexter, Lookout Point or Hills Creek dams, with the latter two being priorities.

*RPA Measure 5.2: Based on the best available information in 2008, NMFS identifies Detroit as the highest priority dam for construction of a temperature control structure or operational changes to achieve temperature control. The AAs will investigate the feasibility of improving downstream temperatures and reducing TDG exceedances in the N. Santiam River. The AAs will take necessary interim steps beginning no later than 2010, which may include feasibility studies, a design report, authorization and appropriation, and plans and specifications, if appropriate. The AAs will evaluate alternatives to achieve both temperature control and downstream fish passage. If feasible and more efficient to achieve both purposes through one construction project, the AAs will include downstream fish passage in this effort, rather than delaying it until 2023. The AAs will complete construction of any structural temperature control facilities by December 2018. By March 2019, the AAs will begin operation of permanent downstream temperature control at Detroit Dam. The AAs will establish a Major Milestone near the end of 2011 in conjunction with completion of the Detroit Feasibility Study. The major decision associated with that milestone will be “go/no go” on the feasibility of temperature control facilities.*

- Detroit - planning has simply begun on a temperature control tower but the date to be completed is uncertain (RPA 5.1.1 and 5.2).

Despite the clear need and urgency in passage measures needed to ensure access to habitat, the Corps continues to delay or simply fails to implement these measures. This was already the case five years ago when the 2015 NMFS status review noted that absence of effective passage around dams in the four key tributaries to the Upper Willamette was still a significant limiting factor for UWR Chinook salmon. That review indicated that the fish were at an even higher risk of extinction then they were in 2008, and now, five years later, effective passage still isn’t achieved and the downward trajectory of the fish continues. It is clear that additional protections afforded by the ESA were needed in 2015 and more so today. The Recovery Plan made clear that the BiOp and RPA need to be “substantially implemented” and the threats from hydropower operations reduced. This has not happened.

New research also demonstrates how the lack of access to habitat impacts the species. A 2015 study of the iteroparity rates (multiple reproduction cycles) of steelhead in the Willamette River Basin indicated a “moderate” rate of 3.4% compared to other populations partially because of barriers to adult and juvenile passage (Clemens, 2015). This in turn reduces the evolutionary fitness and recruitment of steelhead. Iteroparity is beneficial for the following reasons:

An iteroparous life history can be a source of genetic variability and can increase recruitment, thereby sustaining steelhead populations. Because repeat-spawning steelhead can have a lifetime reproductive success that is up to three times higher than that of virgins, it is clear that having more repeat-spawning steelhead in a given



population can lead to increased recruitment. (Clemens 2015, pp. 1048-1049, *internal citations omitted*)

Because of barriers in the Willamette river, iteroparity may be selected against:

Given the lack of downstream passage facilities in the Willamette River basin, it seems that iteroparity should be selected against in river stretches above dams, which block access to spawning areas. The lack of downstream passage facilities for both juvenile steelhead and kelts encountering dams in the Willamette River has been identified as a factor preventing recovery of the Upper Willamette River DPS. Again, this may partly explain the relatively low iteroparity rate for steelhead in the Willamette River basin relative to those in Oregon coastal basins. (Clemens 2015, p. 1053, *internal citations omitted*)

Lack of access to essential habitat is impacting UWR's steelhead's evolutionary fitness, which is also impacting the species ability to meet recovery goals.

### ***Pre-spawn Mortality***

The Recovery Plan defines prespawn mortality goals (for mature female fish on or near spawning grounds) to "pass" when the percent mortality is less than or equal to 10% for viable populations and less than or equal to 30% for non-viable populations (ODFW, 2011, p. 8-22). Failure is when the prespawn mortality is greater. Recent data indicate:

- particularly poor prespawn mortality in the Middle Fork Willamette, where the run is all but extirpated due to the failure to get fish above the dams and also poor below the dams due, in large part, to thermal problems associated with dam operations. (In 2015, prespawn mortality was estimated as 99% below Dexter Dam, 60% above Fall Creek Dam, 30% in the North Fork Middle Fork and 89% above Hills Creek Reservoir (ODFW, 2017, p.57)).
- all subbasins in the last five years have prespawn mortality rates greater than what is needed for recovery as outlined in the plan.

For decades, trap-and-haul programs have been used to move Chinook salmon above the dams and into historical spawning and rearing habitat. However, this program has not been successful for Chinook salmon in the Willamette River with observed episodically high prespawn mortality of outplanted adults in some years and locations:

Prespawn mortality rates vary widely among years and among sub-basin populations, but have exceeded 90%, rates that may significantly reduce the efficacy of the adult trap-and-haul program. The mechanisms that precipitate premature mortality on the spawning grounds are not fully understood, but are likely to include handling and transport effects, infectious disease processes and energetic exhaustion. Salmon exposure to warm water temperatures exacerbates many of these processes and has also been linked to increased stress, reduced reproductive potential and fitness and elevated prespawn mortality. In the Willamette River basin, premature mortality by Chinook salmon has been associated with warm-water exposure along the migration corridor downstream from hydroelectric dams (Naughton et al. 2018, p. 1996, *internal citations omitted*)

Buffering the impacts of climate change will likely be important for conservation of these populations (a second recent study eliminated toxic chemical concentrations as a cause of prespawn mortality, “indicating that river environment (e.g., water temperature) or other factors like pathogen loads or trap-and-transport experience were the more important drivers of premature mortality” (Keefer et al. 2020, p. 179)).

The Recovery Plan prespawn mortality goals are not even close to being met, due to lack of access to habitat and associated impacts from the trap-and-haul program. This is further reason why UWR Chinook salmon and steelhead warrant uplisting from “threatened” to “endangered” status.

### **Listing Factor C: Disease or predation.**

#### ***Copepods***

Although the Recovery Plan focuses on predation, hatchery management and monitoring for disease, a significant disease problem is associated with copepod populations in the reservoirs and the associated mortality impacts on listed fish. Over the past five years, studies have indicated that the problem is a larger threat than realized with significantly more impact than previously thought. Biologists with the Corps are realizing that juvenile fish need to move through and out of the reservoirs as quickly as possible, yet this is not currently being achieved due to a lack of effective downstream passage.

Parasitic copepods are endemic in fresh water stream of the western United States. However, observations of apparent heavy infestations and associated mortality in juvenile salmonids in and around reservoirs above Willamette Basin dams generated a systematic study of infections in salmonid species in streams and reservoirs above Cougar, Detroit, Fall Creek and Lookout Point dams in 2012 and 2013. (Monzyk, et al, 2015). This study documented heavy parasitic loads of copepods associated with the amount of time juveniles were in reservoirs, the age of the fish and the location of the infections. In streams, copepods were most likely to attach to peripheral structures like fins, whereas in reservoirs, 79% of fish had attachment in their brachial cavity which was more likely to produce organ stress in the fish. The study also showed that infections in both frequency and intensity were associated with the ESA-listed Chinook salmon. The authors note that in a prior study of juvenile sockeye salmon, infection intensity was strongly associated with mortality during salinity tolerance tests. These results have now been replicated in juvenile spring Chinook (see Peterson, J., et al, 2020). The paper concludes with a number of suggestions of practices that might be implemented to improve this situation. To our knowledge, none of these practices have been implemented in the Willamette Basin.

A study of Chinook salmon survival in Lookout Point Reservoir in 2017 and 2018 measured survival time of Chinook salmon and documented their distributions in the reservoir. The authors also stated that “a large percentage of the sampled Chinook salmon were observed to be infected with copepods, which may have had survival consequences.” (Kock, T., et al, 2020).

As a result of these observations, a Willamette Copepod Research Program has been initiated (Peterson, J., et al, 2020) to further evaluate the situation and develop a program to assure that the fitness of Willamette Basin salmonids are not unduly threatened. These authors note that collecting and holding *S. Californiensis* infected juvenile spring Chinook salmon at fish passage facilities may further increase the risk of mortality during downstream fish passage. While the

authors consider their results preliminary, the ESA threatened species of the basin continue to attempt to migrate to the ocean and their numbers continue to decline. It is evident that waiting for definitive, replicated studies should not stand in the way of a rethinking of the programs for managing anadromous fish attempting to get around the barrier dams and their reservoirs.

### ***Trematodes***

Another recent study evaluated how the freshwater trematode *Nanophyetus salmincola* (parasitic flat worm, fluke) impairs immune function in salmonids and thus may lead to increased mortality from secondary infections. Juvenile Chinook salmon experience a high prevalence of infection (60-80%). This has potential implications for UWR Chinook salmon, in particular if they are subjected to rising water temperatures:

An increased susceptibility of juvenile salmonids to freshwater and marine bacterial pathogens suggests the importance of *N. salmincola* to the ecology of disease in out-migrating wild juvenile Chinook salmon throughout the [Pacific Northwest]. For example, wild sub-yearling and yearling Chinook salmon first encounter the trematode while rearing in the upper Willamette River and natal tributaries; there, they might accumulate relatively high *N. salmincola* intensities before entering the ocean, given that *Juga* spp. snails are distributed throughout the Willamette River main stem and tributaries and infected snails have been shown to release *N. salmincola* cercariae as temperatures reach 10°C in the spring. As the juvenile salmon migrate into the main stem, they can encounter increasing densities of bacterial pathogens, particularly when fish densities and river temperatures are high, therefore increasing the risk of infection or mortality for co-infected individuals during migration. (Roon et al. 2015, pp. 214-215, *internal citations omitted*)

The increased occurrence and impacts of copepods, and even trematodes, should be considered in the status review of these species. Their presence increases the vulnerability of UWR Chinook salmon and steelhead and provides another factor that would indicate these species warrant additional protections.

### **Listing Factor D: The adequacy of existing regulatory mechanisms.**

The Recovery Plan suggests that local and State agencies are implementing regulatory actions to achieve recovery goals. RPA measure 2.9 states “In coordination with the Oregon Water Resources Department and Oregon Department of Fish and Wildlife, the Action Agencies will facilitate conversion of stored water to an instream flow water right. Additionally the Action Agencies will identify stored water in addition to the MPSF that could be allocated from reservoirs to enhance salmon and steelhead survival” (NMFS 2008). Yet, the Corps has recently undertaken an action that undermines recovery goals by pushing forward the Willamette River Basin Review Reallocation Study that does not fully incorporate NMFS Final Biological Opinion or RPA from June 2019. The plan recommends allocating water from the reservoirs in a manner that NMFS determined would jeopardize the survival of UWR Chinook salmon and winter steelhead.

The Corps’ water allocation plan has substantive deficiencies, for example: (a) it quantifies total fish and wildlife water needs based only on the minimum subsistence flows for ESA-listed Chinook salmon and winter steelhead, which are not enough to lead to their recovery; (b) it

excludes the water needs of numerous other fish and wildlife species that use the basin; (c) it disproportionately gives other water users (municipal, industrial and agricultural) 100% of their estimated water demands while giving listed fish only a portion (50%) of their estimated water needs just to meet the minimum flow targets; and (d) it overestimates the water needs of the other users while underestimating those of fish and wildlife (e.g., the plan assumes conservation and water-use efficiency will remain stagnant over the next 50 years).

The Corps submitted a Biological Assessment (BA) of the impacts from the proposed water reallocation to NMFS in 2019. After reviewing the BA, NMFS concluded that “the proposed [reallocation] is likely to jeopardize the continued existence of UWR Chinook salmon and UWR steelhead and destroy or adversely modify their designated critical habitats.” (NMFS, 2019 Reallocation BiOp, at 96). In particular, the proposal to reduce water allocations for each water use category (municipal, industrial and agricultural) proportionally in years when the reservoirs do not fully refill - rather than prioritize fish and wildlife needs - will lead to reduced instream flows and higher water temperatures, which will harm ESA listed fish. NMFS concluded that the proposed reallocation would further limit the Corps’ ability to comply with the requirements of the 2008 BiOp that are still incomplete. Instead of proposing and implementing regulatory mechanisms that benefit UWR Chinook salmon and steelhead, the Corps is moving the opposite way and potentially subjecting the fish to more harm. This is far from “adequate”.

There are non-dammed tributaries such as the Molalla and the Yamhill where additional regulatory measures or investments in habitat protection could be beneficial. These tributaries are seeing successful spawning populations and these successes could be enhanced with additional attention. Further information about the Yamhill is found later in this letter.

The lack of instream flow levels set, lack of adequate funding not only for regulatory measures but also for tributaries such as the Molalla and Yamhill, the inadequate water reallocation plan along with the lack of data on other regulatory actions, indicate that this listing factor continues to be of concern.

#### **Listing Factor E: Other natural or manmade factors affecting its continued existence.**

There remain significant natural and manmade factors that affect recovery including climate change and hatchery programs.

##### ***Climate Change***

Oregon’s water resources, and the fish and wildlife that depend on them, are experiencing the deleterious impacts of climate change. Hotter summers, warmer winters, and decreased snowpack have hit the state’s waterways and native fish especially hard. Native fish face the double whammy of decreasing stream flows and a hotter climate. The warm winter of 2015 and the resulting drought conditions the following summer (2015 was Oregon’s warmest year on record) are a harbinger of Oregon’s not-to-distant future (Mote, et. al. 2019). Average temperatures in Oregon are forecast to climb an additional 3-7 degrees Fahrenheit by 2050 if current global trends continue; even under the most optimistic scenarios, Oregon’s temperatures will climb an additional 2-5 degrees Fahrenheit by mid-century (Mote, et. al. 2019). A possible 50% reduction in summer stream flows in some basins will also be a challenge (Mote, et. al. 2019). For Oregon’s native fish, and the communities that care for and depend upon them, this grim reality

necessitates that fish managers take proactive steps to adopt and implement policies and recovery actions that will ensure the resiliency of ESA listed fish in the face of climate change.

A 2019 study by Crozier et al. analyzed climate vulnerability of all anadromous Pacific salmon and steelhead population units listed under the ESA. Of the 39 studied population groups, Chinook in the Columbia and Willamette River basins in Oregon were one of four population groups found to be most at risk. UWR Chinook salmon were ranked “very high” in sensitivity to climate change and “high” in exposure (Crozier et al. 2019, p. 17). UWR steelhead were ranked “high” in sensitivity to climate change and “high” in exposure (Crozier et al. 2019, p. 17). Both had only “moderate” adaptive capacity (Crozier et al. 2019, p. 19).

Upper Willamette River Chinook salmon are highly vulnerable at the adult freshwater stage largely due to stream temperature (Crozier et al. 2019, p. 25). The thermal challenges they face lead to high mortality between adult migration and spawning (Crozier et al. 2019, p. 26). The dams further constrain spawning habitat and with higher temperatures, there is a projected increase in mortality in the egg stage for this DPS (Crozier et al. 2019, p. 26).

Climate change has already imparted profound effects on ocean chemistry and fishery conditions. North Pacific Ocean temperatures continue to steadily increase while increased atmospheric CO<sub>2</sub> has resulted in increasing ocean acidification (decreasing levels of pH). Trophic habits, with warming ocean conditions, are important to understand with salmon appearing to require more food during warm ocean regimes. Further, increased surface ocean temperatures may negatively impact threatened and endangered salmon (Daly et al. 2015). Ocean acidification and sea surface temperature were identified to be the most influential attributes that reflected how vulnerable a species is to climate change (Crozier et al. 2019).

### ***Hatchery Programs***

Since 2016, additional important scientific findings have become available regarding the impact of hatchery programs on UWB threatened fish. A study by Weigel and associates (Weigel et al. 2019a) using microsatellite analysis showed that the winter steelhead fishery was subject to genetic introgression by hatchery-origin summer steelhead. These findings were later confirmed using SNP analyses on the steelhead in the South Santiam River (Weigel et al. 2019b). Previously it has been assumed that these out-of-basin hatchery fish would not threaten the winter steelhead spawning due to the two populations’ differences in spawn timing. One implication of this study is that the current basin steelhead hatchery programs should be evaluated to assure that the winter steelhead DPS is adequately protected.

Important studies of the genomics of both salmon and steelhead have shown that variation in run-timing between sub-populations are in large part controlled by a variation in a single gene associated with maturation (*e.g.* Miller 2018; Prince et al., 2017). An important implication of these findings for conservation is that hybridization between sub-populations with different run timing genes can be damaging to the fitness of either or both populations. Miller (2018) has pointed out that genetic adaptations seem to have considerable time-depth in these salmonid species and, once disrupted, it may take a very long time for the lost fitness to be restored. The damaging process that Miller describes likely occurs in the Upper Willamette Basin steelhead.

The natural spawning escapement of the Upper Willamette River Chinook salmon ESU has remained relatively stable over the past 10 years. However, very high levels of genetic introgression

between hatchery and wild spring Chinook salmon continues. The Hatchery and Genetic Management Plans (HGMP) for basin salmon hatcheries call for a pHOS<sup>1</sup> of 0.10 or less. To date, no progress has been made toward this goal (Sharpe 2017; Normandeau Associates et al. 2019). At the present time the most serious threat is to the native spawning stock on the McKenzie River. This population is notable because prespawn mortality is quite low and it represents at least 40% of the basin spawning population. The McKenzie salmon stock is also notable for having a relatively low level of genetic introgression compared with the other sub-basins, which have pHOS levels of 0.8 or higher. For these reasons, the McKenzie salmon have been considered a “legacy stock” which will provide the basis for basin-wide restoration. However, for this to occur, it is incumbent upon fisheries managers to maintain this population in as strong a position as possible.

Historically, the McKenzie River spring Chinook salmon have had a pHOS in the range of 0.25-0.4. In a recent Federal Court review of the management of this fishery, the Oregon Department of Fish and Wildlife agreed to carry out several changes to the hatchery intended to improve attraction of returning hatchery-origin fish to the hatchery rather than spawning in the river. Some of this work was undertaken, but there has been no reduction of genetic introgression as intended.

In 2019, the McKenzie River side-channel which provides water to the salmon hatchery was taken out of service due to structural issues. At this point there is a serious question as to whether this channel will ever be put back into service. Due to this, salmon could not return to the hatchery and the unit lost any capacity for rearing. To allow operations to continue, a fish trap was put on one side of Leaburg Dam (which has fish passages on both sides) to trap some of the hatchery escapement and continue the hatchery spawning program, with rearing now taking place at the Leaburg Hatchery. Trapping at the dam had previously not been involved with the salmon program. As mentioned, while the trap at Leaburg Dam has some effect on keeping the hatchery-origin escapement out of the river above the dam, there is an unprotected second fish passage and as a result, in 2019 the pHOS on the upper river increased to 0.42 on the main stem of the river. Currently, it is unclear how this situation will be resolved, which means the hatchery program is operating outside of the HGMP for this unit. For these reasons, NOAA should review this program and redefine how it operates in the future.

### ***River Steward Observations***

Native Fish Society coordinates a River Stewards program that engages volunteers in compiling place-based knowledge to inform science, policy and outreach activities in a particular basin. The following information is provided by local River Stewards.

#### *Yamhill River - Andrew Chione*

The Yamhill River Basin has historically supported Upper Willamette winter steelhead. The Upper South Yamhill River is an area designated as Critical Habitat for Upper Willamette winter steelhead. Willamina Creek, which has a steelhead run and has some of the best habitat in the basin, is not included as Critical Habitat. Goodson et al (2005) describe Willamina Creek as “one of the primary steelhead producing streams in the basin.” About 30% of the Willamina Creek Watershed is in federal ownership (Bureau of Land Management (BLM)) and most is managed as “Late Successional Reserve.”

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<sup>1</sup> Mean proportion of natural spawners in a watershed or stream composed of hatchery origin adults each year.

Recent snorkel surveys performed for the Greater Yamhill Watershed Council and the BLM documented widespread distribution of juvenile steelhead in the Willamina Creek Watershed. The surveys resulted in an increase in known steelhead distribution. NFS River Steward Andrew Chiome states the following:

“On my annual volunteer spawning surveys, I have documented steelhead spawning in Willamina Creek every year since I started in 2016. I survey one mile stretch of creek and spot-check two other known spawning pools. In spring 2020, the population seemed to rebound from low redd numbers in recent years. On my latest survey, on April 23, 2020, I counted 17 redds, 8 adult steelhead, and 2 carcasses. An Oregon Department of Fish and Wildlife biologist, Jonathan Cox of the Northwest Oregon district office, was with me to verify my observations.”

Non-native, early-run winter steelhead were historically stocked throughout the Yamhill Basin. This may have had a negative effect on the genetic fitness of the population. Van Doornik et al (2015) analyzed genetic samples collected in 1997 from 26 steelhead in Willamina Creek. The fish were genetically similar to early run winter steelhead. However, the steelhead that currently spawn in Willamina Creek exhibit the spawn timing of Upper Willamette winter steelhead with peak spawning occurring in late April. Upper Willamette winter steelhead spawn later than early-run winter steelhead populations and from observations, the spawn timing of Willamina Creek fish coincides with this (Van Doornik et al 2015).

The habitat in Willamina Creek has been affected by historic splash damming, clearcut logging, and loss of off-channel habitats but the land in federal ownership has been recovering over the past 25 years. There is a need for large wood in the creek to accrue spawning gravel and create pool habitat. Large wood addition has successfully improved spawning and rearing habitat in Agency Creek, part of the Upper South Yamhill Critical Habitat. Recognition of the Willamina Creek Watershed as Critical Habitat for Upper Willamette winter steelhead is necessary to protect and improve the habitat and preserve and increase this steelhead population.

Part of the Willamina Creek Watershed lies within the lands of the Confederated Tribes of Grande Ronde. Upper Willamette winter steelhead are of cultural significance to the Grande Ronde Tribes. The Tribes monitor steelhead and restore habitat in the Yamhill River Basin to benefit Upper Willamette winter steelhead. Recognizing Critical Habitat in the Willamina Creek Watershed and considering future habitat restoration could benefit the Tribes and complement their conservation work.

Unlike other river basins like the Santiam, much of the suitable habitat in the Yamhill Basin is not blocked by large hydropower dams. According to the 2005 Oregon Native Fish Status Report from the Oregon Department of Fish and Wildlife, the Yamhill steelhead population meets all their population health criteria (abundance, productivity, habitat use distribution, and reproductive independence) (Goodson et al 2005). Upper Willamette winter steelhead have a clear shot to Willamina Creek without fish passage issues. There is a unique opportunity to improve Upper Willamette winter steelhead returns by protecting and restoring currently-accessible habitat in Willamina Creek.

### III. Conclusion

The “UWR Conservation and Recovery Plan for Chinook Salmon and Steelhead” (ODFW, 2011) set recovery goals including:

“First, the populations must reach desired levels of biological viability and the recovery effort must reduce the impact of the ‘listing factors’ and ‘threats’ in order to warrant removal of the UWR Chinook ESU and steelhead DPS from the threatened and endangered species list (referred to in this plan as either delisting or ESA recovery).

Second, the State of Oregon seeks to rebuild the wild populations to reach ‘broad sense recovery’ to provide for sustainable fisheries and other ecological, cultural and social benefits.”

These goals have not been met and population trends continue to decline. Given the steep decline in the population, the increasing threat from genetic introgression of hatchery stock, the uncertainty about when or even if effective dam passage will be available to these fish, and impacts from climate change, NOAA should consider changing the ESA listing status of UWR Chinook salmon and steelhead from “threatened” to “endangered.”

Sincerely,

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## Appendix

RPA Category	RPA Measure	RPA NAME	Summary of RPA Language	RPA Status	Date Implemented
COORDINATION	1.1	Charter of WATER	By December 2008, the Action Agencies (AAs), in coordination with the Services, other federal and state agencies with fisheries and water resource management responsibilities in the Willamette River Basin, and affected Tribes, will complete a Charter for a collaborative advisory body to be known as the Willamette Action Team for Ecosystem Restoration (WATER). Once the Charter is completed, the AAs will coordinate with the WATER on operation of the Willamette Project consistent with the Charter.	Implemented	2008; revised in 2017
COORDINATION	1.2	Technical Sub-Committees of WATER	The AAs will establish technical coordinating committees as part of the WATER to provide review and recommendations of AAs' products. At a minimum, these will address flow management; fish passage and hatchery management; environmental coordination for construction projects; water quality/temperature control; habitat restoration; and research, monitoring, and evaluation.	Implemented	2008; revised in 2017
COORDINATION	1.3	WATER Decision-Making Process	The AAs will ensure that the Charter for WATER and its technical coordinating committees describes a decisionmaking process that recognizes the unique role played by NMFS & USFWS in decisions related to measures covered in their respective Biological Opinions. In this process, the AAs will prepare initial proposals for operations, studies, or structural changes and will seek review and comment by the applicable WATER subcommittee. Committee members, including NMFS & USFWS, will provide feedback to the AAs within a maximum 60-day period or less.	On-going	2008; revised in 2017
COORDINATION	1.4	Role of Services in decision-making (agreement with Action Agencies)	The AAs will provide NMFS, USFWS, or both, as appropriate depending on the action and species affected, with draft documents for comment. The AAs will address comments received from NMFS and USFWS when finalizing a document. If the Services do not agree with the final document, then they will elevate the issues for resolution, if appropriate.	On-going	2008; revised in 2017
FLOW MANAGEMENT	2.1	WATER Flow Management Committee	The USACE will establish a Flow Management (FM) Committee under WATER to advise USACE on streamflow management issues related to operation and maintenance of the Willamette Project. The USACE, with review by the FM Committee, will develop and implement the annual Willamette Conservation Plan, and coordinate on all issues related to listed fish with the Services and with Federal and state agencies, Tribes, and entities throughout each flow management season.	On-going	2008
FLOW MANAGEMENT	2.2	Protocol for Notification of Deviations	The AAs will notify the Services when turbine units, regulating outlets, and spillway gates malfunction or are placed out of service for an emergency which results in an unscheduled outage that may have an impact on ESA-listed fish species. The AAs will follow the notification protocol described in RPA 4.3.	On-going	April 2009
FLOW MANAGEMENT	2.3	Minimum Mainstem Flow Objectives	The USACE will operate the system in a manner to meet or exceed minimum mainstem flow objectives listed in Table 9.2-1 as measured at Salem and Albany, Oregon, following the framework described in Appendix D and in collaboration with the Services and other entities as provided in RPA 1 and 2.1. Based on RM&E results and operational experience, and with the approval of the Services and review by the FM Committee, the USACE will amend mainstem flow objectives in its Annual Willamette Conservation Plan.	On-going	2001

RPA Category	RPA Measure	RPA NAME	Summary of RPA Language	RPA Status	Date Implemented
FLOW MANAGEMENT	2.4	Tributary Flow Objectives –Project Release Minimums	The USACE will operate Willamette project dams to meet or exceed minimum tributary flow objectives listed in Table 9.2-2 to ensure adult fish access to existing spawning habitat below USACE dams, protect eggs deposited during spawning, and provide juvenile rearing and adult holding habitat for listed salmonids and other fishes within system constraints. If, during annual operations, the system is unable to meet both mainstem and tributary flow objectives, the AAs will notify NMFS and will coordinate through WATER to determine a suitable course of action to protect priority fish habitat needs. USACE will operate to meet interim draft limits.	On-going	2001
FLOW MANAGEMENT	2.4.1	Lower River Gages	The USACE will establish and operate gage stations at locations near the mouths of the tributaries listed below, by July 1, 2009, and will operate the stations through the term of this Opinion to develop relationships between release flows and gage flows. The plan will initially assess the adequacy of existing gages and need for new gages where none exist, in the lower reaches of the North Santiam River, South Santiam River McKenzie River, Middle Fork Willamette River below Dexter, Middle Fork Willamette River below Hills Creek, and Fall Creek. USACE will work with USGS to ensure that these stations will be part of the USGS' water data program and maintained in USGS' Real-Time data system.	Implemented	August 2009
FLOW MANAGEMENT	2.4.2	Tributary Instream Flow Studies	In coordination with the Services, the AAs will develop a detailed study plan by December 2008 to conduct instream flow studies in 2009 and 2010. The primary goal of these studies will be to identify the relationships between river flow rates and habitat conditions for adult passage, holding, and spawning and juvenile rearing in the following tributaries: N. Santiam, S. Santiam, Fall Creek, Middle Fork Willamette, SF McKenzie, and McKenzie (listed in priority order).	Implemented and on-going	Studies began in 2010: Final Reports in Jan 2014 and June 2015; Other studies on-going
FLOW MANAGEMENT	2.4.3	Revise Minimum Flow Objectives	Following the completion of RPA 2.4.2, the USACE, in coordination with the Services, will determine if the minimum and maximum flow objectives in Table 9.2-2 are appropriate. If the studies suggest that fish protection goals can be better met with different flow levels than those in the table, the USACE will recommend any changes in flow objectives in applicable tributaries to improve benefits to listed fish while continuing to meet Project purposes.	Pending	Contingent on RPA measure 2.4.2
FLOW MANAGEMENT	2.4.4	Modify Project Operations	Following completion of the studies in RPA 2.4.2 and determination of revised minimum flow objectives (2.4.3), the USACE will complete system operational modeling and NEPA analyses, if appropriate, including consideration of all project purposes, to identify modified project operations that optimize dam operations to best meet tributary and mainstem minimum flows needed to protect fish. The USACE will conduct these analyses as high-priority element of the COP. The USACE will carry out alternatives deemed feasible, as selected by the COP analysis, by January 2012.	Pending	Contingent on RPA measures 2.4.2 and 2.4.3
FLOW MANAGEMENT	2.5	Tributary Flows –Project Release Maximums:	During winter steelhead and spring Chinook salmon spawning seasons, the USACE will maintain tributary flows below the specified maximum flow objectives listed in Table 9.2-2 to the extent practical when the reservoirs are below their respective rule curves. The USACE will notify the Services when maximum flow rates are exceeded according to the protocol described in measure 2.2 above.	On-going	2008
FLOW MANAGEMENT	2.6	Ramping Rates	When project outflows are less than those in Table 9.2-3, the USACE will restrict down-ramping (the rate at which outflows are decreased) to the hourly and daily rates listed in Table 9.2-4 to minimize stranding of juvenile fish and aquatic invertebrates and desiccation of redds. NMFS' goal is for downramping rates not to exceed 0.1 ft/hour during nighttime hours and 0.2 ft/hour during daytime hours.	On-going	2008

RPA Category	RPA Measure	RPA NAME	Summary of RPA Language	RPA Status	Date Implemented
FLOW MANAGEMENT	2.6.1	Ramping Rates	When system operations or equipment limits prevent USACE from meeting rampdown rates at all projects, USACE will place priority on achieving ramping rates at those projects marked in Table 9.2-4 as high priority for fish protection.	On-going	2008
FLOW MANAGEMENT	2.6.2	Ramping Rates	The USACE will identify mechanical, operational, or equipment modifications needed to achieve these ramping rates. The AAs will evaluate structural modifications in the COP study, where indicated, to improve their ability to meet ramping rates.	Implemented	Starting in 2008, USACE made modifications. Evaluation of structural modifications occurred in the COP Phase II, App B.
FLOW MANAGEMENT	2.6.3	Ramping Rates	During active flood damage reduction operations, the USACE may deviate from the ramping rates in Table 9.2-4. However, the USACE will comply again with these ramping rates as soon as the flood risk has abated. The USACE must follow the protocol for deviations from Table 9.2-4 described in RPA measures 2.2 and 4.3.	On-going	2008
FLOW MANAGEMENT	2.6.4	Ramping Rates	The AAs will conduct RM&E of ramping rate restrictions to determine if the ramping rates are effectively protecting fish and macroinvertebrates from stranding and redds from dewatering.	Not Implemented; Study plan drafted	NMFS determined it was a low priority due to low impacts and current compliance with the rates
FLOW MANAGEMENT	2.7	Environmental Flow/Pulse Flow Components	The AAs will work through the WATER Flow Management Committee and with the Services, and other aquatic scientists to identify environmental flow improvement opportunities for the mainstem Willamette River and the lower reaches of tributaries with USACE dams. The AAs will design, test, and carry out modifications to flow releases from USACE dams to improve channel morphology in a manner that would create and sustain new, and improve existing, fish habitat through changes in project operations, while still addressing other authorized project purposes. The Services will inform the AAs if they agree with the proposals. The AAs will then carry out these flow modification proposals, initially as pilot studies and then, if determined feasible, as part of its regular water management operations.	On-going	2008; Implemented as water is available per Water Control Manuals
FLOW MANAGEMENT	2.8	Foster Spring Spill	The USACE will spill at Foster Dam between 0.5 & 1.5 feet of water (approx. 92 to 238 cfs), depending upon inflow and forebay elevation fluctuations, over the spillway fish weir. This operation will occur from 0600-2100 hours daily during the primary fish passage season, April 15-May 15. The AAs will evaluate the effectiveness of this operation on downstream fish passage as part of RM&E & COP studies. Based on the results of these studies, the AAs will recommend modifications to this spill operation or new downstream fish passage facilities or operations. If modified operations are warranted and can be carried out within existing physical and operational constraints, the AAs will begin to carry out these operations consistent with RPA measure 4.8. If more extensive modifications are needed, the AAs will follow the process in the COP.	On-going	2008; Additional modifications in March 2018

RPA Category	RPA Measure	RPA NAME	Summary of RPA Language	RPA Status	Date Implemented
FLOW MANAGEMENT	2.9	Protecting Stored Water Released for Fish	In coordination with the OWRD & ODFW, the AAs will facilitate conversion of stored water to an instream flow water right. The State of Oregon is solely responsible for administering and enforcing state water rights. Additionally, the AAs will identify stored water in addition to the MPSF that could be allocated from reservoirs to enhance salmon and steelhead survival. The AAs will proceed with necessary actions to allocate and protect water for this purpose. In particular, USACE & Reclamation will coordinate with OWRD on several tasks to accomplish this measure: 1) identify current water storage at USACE reservoirs that could be allocated to instream flow for ESA listed fish; 2) determine how to legally transfer flow for instream purposes; & 3) proceed with the necessary analyses to implement the transfers. The tasks necessary to accomplish this action may require approval from Congress.	On-going	Study restarted in 2015; Currently in Section 7 formal consultation
FLOW MANAGEMENT	2.10	Flow Related Research, Monitoring and Evaluation (RM&E)	As part of the RM&E plan in RPA 9, the AAs will plan and carry out studies and monitoring of mainstem and tributary flow rates and project ramping rate restrictions necessary to protect fish and aquatic habitat, as well as other evaluations required by measures in this section. The flow and ramping rate studies will be considered high priority and field studies should begin in 2009, with initial results available to inform modified flows and ramping rates by January 2011.	Partially implemented; On-going	Tributary studies began in 2010, Final Reports in Jan 2014 and June 2015, additional studies on-going; Mainstem studies implemented in 2015 and 2016; ramping rate studies not started (see RPA 2.6.4)
WATER CONTRACT PROGRAM	3	Bureau of Reclamation (BOR) Water Contract Program	BOR & USACE will continue the existing irrigation contract water marketing program. BOR will issue new contracts, except as specified in RPA 3.1 regarding new contracts in the N. & S. Santiams, and provided that the total water marketing program does not exceed a total of 95,000 acre feet. In the event that future irrigation demand exceeds 95,000 acre-feet, BOR & USACE will reevaluate the availability of water from conservation storage for the water marketing program and reinstate consultation with the Services if they propose to issue additional contracts. In addition, all contracts will be subject to the availability of water, as determined by USACE. BOR may issue notices, orders, rules, or regulations governing water service as necessary to comply with the requirements of the ESA, including appropriate BiOps and ITs.	BOR Action/ On-going	2008
WATER CONTRACT PROGRAM	3.1	New Contract Issuance	BOR will not issue irrigation water service contracts in the N. & S. Santiam rivers that would in total exceed the current total of 11,574 ac ft and 1,096 ac ft respectively. The USACE will update its flow exceedance models every five years, and, together with results of fish flow studies, determine whether additional water is available during most years for new irrigation contracts based on this information. If the USACE determines that additional water is available to serve irrigation demand without adversely affecting listed fish and their critical habitats, then the USACE will inform BOR and seek the written agreement of the Services. The Services will inform the USACE in writing whether they agree with the USACE's determination. If the result of this process is an affirmative determination that additional water is available, BOR may issue new contracts based on and limited by the USACE's determination.	BOR Action/ On-going	2008



RPA Category	RPA Measure	RPA NAME	Summary of RPA Language	RPA Status	Date Implemented
WATER CONTRACT PROGRAM	3.2	Existing Contracts	All existing contracted diversions will be required to have fish protection devices that comply with NMFS criteria, and are approved by NMFS. Contractors that do not comply with BOR's notice or otherwise fail to obtain certification by NMFS as having adequate fish protection devices will not be eligible to continue to receive irrigation water from the project & their contract may be terminated. <b>1.</b> By Oct. 1, 2008, BOR will send written notification to all existing contractors notifying them that in order for them to continue receiving irrigation water, their diversions must have fish protection devices that comply with NMFS fish protection requirements, and are approved by NMFS. Within the time frame specified by BOR in its notice, contractors will be required to provide BOR with written assessment that their diversions conform to NMFS criteria. BOR will assemble this information & provide it to NMFS. NMFS will then make a determination as to whether it agrees that the fish protection measures are sufficient. <b>2.</b> While contractors proceed with the fish protection device installation or modification and approval process, they may continue to divert water under the terms and conditions of their existing contracts, as long as they meet the deadline provided to them by BOR. <b>3.</b> As another condition of receiving water, every 5 to 7 years, contractors must re-confirm that their diversions are in conformance with NMFS guidelines.	<b>BOR Action/ On-going</b>	2008; 2009 Actions under 1 & 2 completed, but item 3 is on-going every 5 to 7 years
WATER CONTRACT PROGRAM	3.3	New & Renewed Contracts – Conditions	BOR will require renewed and new contracts to meet all of the following: <b>1.</b> Compliance with NMFS fish protection criteria. <b>2.</b> Surface water diversions must have lockable headgates that are capable of easily starting, adjusting and stopping the flow of water. <b>3.</b> Diversions greater than 3 cfs must have devices to enable measurement of the instantaneous rate of water delivery, within 5% accuracy. Diversions over 10 cfs must also have a flow totalizer that calculates total volume of water diverted. <b>4.</b> BOR will include provisions to curtail or cease entirely all water deliveries in specific areas, if certain flows are necessary to protect listed species and their critical habitats.	<b>BOR Action/ On-going</b>	2008
WATER CONTRACT PROGRAM	3.4	Annual Availability of Contract Water for Irrigation	Contract fulfillment is subject to the USACE's annual operating plan in which the USACE determines availability of water for BOR contracts. If USACE determines that a shortage will occur, or is forecasted to occur, USACE can designate this shortage to specific tributary subbasins, certain reaches, or throughout the Willamette basin, limiting the availability of the contract water supply. BOR will notify contractees of storage water shortages as described below. Appendix D further describes how water years are designated and is hereby incorporated into this RPA by reference. Each year on or before April 1, the USACE will determine availability of water for irrigation contracts based on the best information available at that time. See RPA in BiOp for full definitions of water years.	<b>On-going</b>	Annually
FISH PASSAGE	4.1	Adult Chinook Salmon Outplanting	The AAs will continue capturing spring Chinook salmon below USACE dams and transporting them into habitat above the following dams: Detroit Dam; Foster Dam; Cougar Dam; Lookout Point and Hills Creek dams; and Fall Creek Dam. Additionally, if NMFS, after coordination with the FPHM of WATER, determines it is necessary to evaluate passage at Green Peter Dam, then the AAs will also release Chinook salmon above that dam. The Outplant Program will provide upstream fish passage for adults via "trap and haul" facilities while USACE carries out studies to assess upstream and downstream fish passage alternatives at these dams and reservoirs. The Outplant Program will be carried out consistently with the guidelines, protocols, and criteria specified in the Willamette Fish Operations Plan and annual revisions to this plan.	<b>On-going</b>	October 2011

RPA Category	RPA Measure	RPA NAME	Summary of RPA Language	RPA Status	Date Implemented
FISH PASSAGE	4.2	Winter Steelhead Passage	The AAs will continue to trap adult winter steelhead at Foster Dam and transport them to release sites above Foster reservoir. If NMFS & the AAs, in coordination with the FPHM, determine it necessary for evaluation of winter steelhead passage at Green Peter Dam, then the AAs will release some portion of the winter steelhead captured at the Foster Dam trap above Green Peter reservoir. Additionally, if NMFS & the AAs, in coordination with the FPHM, determine it necessary for evaluation of steelhead passage at Detroit and Big Cliff dams, then the AAs will trap winter steelhead at the Minto Trap or other locations in the N. Santiam River below Big Cliff Dam and release them above Detroit and/or Big Cliff dams, as directed by NMFS. This measure requires the AAs to continue to pass UWR steelhead above Foster Dam, and possibly, above Green Peter Dam.	On-going	2008
FISH PASSAGE	4.3	Willamette Fish Operations Plan	The AAs will complete a Willamette Fish Operations Plan (WFOP) by October 1, 2008. The AAs will coordinate with the Services when preparing the WFOP. The AAs will carry out measures identified in the WFOP and in annual revisions to the WFOP. The WFOP will include: <b>1.</b> Identify optimal operating criteria for Green Peter, Foster, Detroit, Big Cliff, Cougar, Fall Creek, Dexter, Lookout Point, and Hills Creek dams to minimize adult and juvenile fish injury and mortality to the extent possible with existing facilities and operational capabilities; <b>2.</b> Identify protocols for optimal handling, sorting, and release conditions for ESA-listed fish collected at USACE-funded fish collection facilities; <b>3.</b> Identify the number, origin, and species of fish to be released into habitat upstream of USACE dams, incorporated into the hatchery broodstock, or taken to other destinations; <b>4.</b> Describe scheduled and representative types of unscheduled maintenance of existing infrastructure that could negatively impact listed fish, and describe measures to minimize these impacts; <b>5.</b> Describe procedures for coordinating with resources agencies in the event of scheduled & unscheduled maintenance. <b>6.</b> Describe protocols for emergency events and deviations.	Implemented	Draft 2013; Final November 2014
FISH PASSAGE	4.4	Annual Revision of Willamette Fish Operations Plan (WFOP)	The AAs will annually revise and update the WFOP, including the "Fish Disposition and Outplant Protocol" sections of each chapter to describe how and where outplanted fish will be collected, held, marked, sampled, transported, and released and to incorporate changes in operations needed to protect fish. The WFOP will be revised annually based on results of RM&E activities, construction of new facilities, recovery planning guidance, predicted annual run size, and changes in hatchery management. Annual revisions will be submitted to the Services by January 15 of each year for review and comment; the Services will inform the AAs by February 15, whether they agree with the revised WFOP. The AAs will release a final updated WFOP by March 14 of each year.	On-going	2014 Revised Annually
FISH PASSAGE	4.5	Employee Training for Fish Protection Operations at Project Dams and Fish Facilities	The AAs will ensure that fish facility personnel, operators, and managers responsible for operating and maintaining fish facilities at each project complete an annual employee environmental awareness training program. The training will include a review of the status of ESA listed aquatic species, the WFOP, and each fish facility's SOPs. Prior to conducting the annual training, the AAs will coordinate with the WATER and appropriate natural resource agencies to identify any specific resource issues that should be addressed or emphasized at that time. The AAs will maintain records of the training including agendas, attendance lists, & any handout materials.	Partially Implemented	Annually

RPA Category	RPA Measure	RPA NAME	Summary of RPA Language	RPA Status	Date Implemented
FISH PASSAGE	4.6	Upgrade Existing Adult Fish Collection and Handling Facilities	The AAs will design, construct, install, operate and maintain new or rebuilt adult fish collection, handling and transport facilities at the sites listed below. The Services will inform the AAs whether they agree with each facility's planned configuration and operation. The AAs will design each facility with and incorporate NMFS' Anadromous Salmonid Passage Facility Design and the best available technology. The order in which these facilities are completed may be modified based on interim analyses and biological priorities, and with agreement of NMFS & USFWS. <b>1.</b> North Santiam Fish Facility – complete construction no later than December 2012; begin operation no later than March 2013. <b>2.</b> Foster Fish Facility – complete construction by December 2013; begin operation by March 2014. <b>3.</b> Dexter Ponds Fish Facility – complete construction by December 2014; begin operation by March 2015. <b>4.</b> Fall Creek Dam Trap – complete construction by December 2015; begin operation by March 2016.	<b>Partially Implemented (exception is Dexter, which has plans and specifications prepared)</b>	Minto April 2013 Foster March 2014 Fall Creek April 2018
FISH PASSAGE	4.7	Adult Fish Release Sites above Dams	The AAs, working in coordination with the USFS or other landowners, will: Complete a site/concept study by February 28, 2009, that will identify at least four to six potential locations suitable for new adult fish release sites for Chinook salmon above Detroit, Foster, Lookout Point, Hills Creek, Fall Creek, and Cougar reservoirs. Sites located above Foster Reservoir will be suitable for releasing both Chinook salmon and winter steelhead; site(s) above Detroit and Green Peter dams should also be suitable for winter steelhead, should adult steelhead be released in these locations in future years. The AAs will work with the USFS and the Services to prioritize and design each release site, which may include infrastructure to minimize stress and injury of adults. The release sites will be prioritized in the context of the COP. The AAs will complete construction of all selected sites by June 2012. If another entity, by December 2010, takes on the responsibility for constructing or improving these sites, the AAs will not be responsible for construction of those sites completed by another entity. Additionally, if, based on results of the COP, additional sites are warranted, construction of additional sites will be completed as soon as possible after identified by the COP. Construction of the sites will be contingent upon availability of funds and cooperation of landowners.	<b>Implemented</b>	October 2011

RPA Category	RPA Measure	RPA NAME	Summary of RPA Language	RPA Status	Date Implemented
FISH PASSAGE	4.8	Interim Downstream Fish Passage through Reservoirs and Dams	Until permanent downstream passage facilities are constructed or operations are established at project dams and reservoirs in subbasins where outplanting of UWR Chinook salmon and steelhead is underway, the AAs will carry out interim operational measures to pass downstream migrants as safely and efficiently as possible downstream through reservoirs and dams under current dam configurations and physical and operational constraints, and consistent with authorized Project purposes. Near-term operating alternatives will be identified, evaluated, and implemented if determined to be technically and economically feasible and biologically justified by the AAs and Services. The AAs will evaluate potential interim measures that require detailed environmental review, permits, or Congressional authorization as part of the COP. The AAs will complete this component of the COP by April 2011, including seeking authorization (if necessary) and completing design or operational implementation plans for those operations selected by the COP. The measures that will be considered in the COP include, but are not limited to, partial or full reservoir drawdown during juvenile outmigration period, modification of reservoir refill rates, and using outlets, sluiceways, and spillways that typically are not opened to pass outflow. The Services will inform the AAs whether they agree with the interim downstream passage measures. The AAs will begin to carry out measures selected by the COP by May 2011, contingent on funding, authorization, and compliance with all applicable statutes and regulations.	On-going	2008 - Foster Fish Weir 2009 - Detroit temperature & downstream passage operations. 2009 - Fall Creek drawdown for downstream fish passage. 2009 - Fall Creek temperature management operations. 2011 only - Cougar fish passage operation due to poor results. 2012 - Cougar Regulating Outlet operations 2012 (June - Sept) - Lookout Point interim temperature control operations. 2014 to 2016 - Cougar PFFC (research) juveniles/ collected transported downstream.
FISH PASSAGE	4.8.1	Fall Creek Drawdown	Beginning in Water Year 2008, the AAs will adjust timing of storage and release of flow at Fall Creek Reservoir to promote downstream passage of juvenile Chinook salmon through the reservoir and dam. Drawdown will be to at least elevation 714.0 by the end of November each year, and the AAs will hold the reservoir at this elevation during all of December and January except during flood events, and possibly longer. The AAs will conduct monitoring and evaluation studies to determine the effectiveness of the operation and to assist in deciding whether or not to continue the operation in future years. The depth and timing of the drawdown may be adjusted in subsequent years, based upon monitoring results, with NMFS' agreement.	On-going	First drawdown in 2007; Performed annually from 2011 to now
FISH PASSAGE	4.9	Head-of-Reservoir Juvenile Collection Prototype	The AAs will plan, design, build, and evaluate a prototype head-of-reservoir juvenile collection facility above either Lookout Point or Foster reservoir. If Foster is chosen for testing the prototype, the AAs will design for collecting both juvenile salmonids and steelhead kelt. The AAs will complete construction by September 2014. As an interim step, the AAs will complete feasibility studies as part of the COP near the end of 2010. At that time, the AAs will make a "go/no go" decision on the feasibility of the prototype facility(s) and the preferred location(s) and design(s) for construction of the prototype(s). The AAs will make the go/no go decision in coordination with the FPHM, and after agreement by NMFS. After construction, the AAs will conduct biological and physical evaluations of the head-of-reservoir prototype collection facilities in 2015 and 2016. After receiving comments, the AAs will make necessary revisions to the draft report and issue a final report by December 31, 2016, on the effectiveness of the facilities, including recommendations for installing full-scale head-of-reservoir facilities.	Implemented	2011 Determined to not be feasible

RPA Category	RPA Measure	RPA NAME	Summary of RPA Language	RPA Status	Date Implemented
FISH PASSAGE	4.10	Assess Downstream Juvenile Fish Passage through Reservoirs	The AAs will, in coordination with and review by the Services, assess juvenile fish passage through the following Project reservoirs: <b>1.</b> Cougar; <b>2.</b> Lookout Point & Dexter; <b>3.</b> Detroit & Big Cliff; <b>4.</b> Green Peter & Foster; <b>5.</b> Fall Creek; and <b>6.</b> Hills Creek. These evaluations will be developed consistent with the RM&E process described in RPA 9. The AAs must seek NMFS' review of evaluation proposals. Comments submitted by NMFS on draft evaluation proposals must be reconciled by the AAs in writing to NMFS' satisfaction prior to initiating any research-related activities anticipated in this RPA. The proposals must identify annual anticipated incidental take levels by species, life stage, and origin for each year. The Services will inform the AAs whether they agree with the proposed studies, reports, and NEPA alternatives. The AAs will begin these studies in 2008; field investigations, study reports, and NEPA analyses, if necessary, will be completed by December 31, 2015.	On-going	Final reports completed: 2010, 2011, 2012, 2013, 2014.
FISH PASSAGE	4.11	Assess Downstream Juvenile Fish Passage through Dams	At Cougar, Lookout Point & Dexter, Detroit & Big Cliff; Foster & Green Peter, Fall Creek, and Hills Creek dams, the AAs will, in coordination with and review by the Services, do the following: <b>1.</b> Assess passage survival and efficiency through all available downstream routes, noting injury and mortality through each route. <b>2.</b> Identify and propose alternatives for reducing juvenile mortality passing through the routes noted above, including operational and structural modifications. <b>3.</b> The AAs will begin these studies in 2008 and will complete all field investigations, study reports, and NEPA analyses by December 31, 2015. <b>4.</b> These evaluations will be developed consistent with the RM&E process described in RPA 9. The AAs must seek NMFS' review of evaluation proposals. Comments submitted by NMFS on draft evaluation proposals must be reconciled by the AAs in writing to NMFS' satisfaction prior to initiating any research-related activities anticipated in this RPA. The proposals must identify anticipated take levels of each species and life stage for each year. The Services will inform the AAs whether they agree with the proposed studies, draft reports, and alternatives. <b>5.</b> The AAs will conduct additional studies in anticipation of additional passage measures constructed and operated beyond 2023.	On-going	Studies completed for Detroit, Foster, Cougar, Fall Creek between 2010 and 2017. Ongoing for Lookout Point.

RPA Category	RPA Measure	RPA NAME	Summary of RPA Language	RPA Status	Date Implemented
FISH PASSAGE	4.12	Long-Term Fish Passage Solutions	Based on the best available scientific information at the time of development of this RPA, additional structural and operational modifications are needed to allow safe fish passage and access to habitat above and below project dams. The AAs will complete this work as part of the COP described in RPA 4.13 and according to the schedule in Figure 9.4-1. The dates for completing interim steps are guidance. However, the dates for completion and operation are fixed. These structural or operational modifications will be analyzed and developed as high priority measures in the COP. The COP will evaluate a range of structural and operational alternatives for improving fish passage and water quality conditions associated with the dams. The three alternatives described below in RPA measures 4.12.1, 4.12.2 and 4.12 .3 will be priority actions evaluated in the COP to determine whether they are biologically and technically feasible. The AAs, FWS, and NMFS will evaluate the information gathered through the COP, NEPA, RM&E measures, and any other sources of information to determine whether the scheduled action, or an alternative, will provide the most cost-effective means to achieve benefits to ESA-listed fish. If the information gathered confirms that the scheduled action is best suited to addressing the effects of the Project, the AAs will proceed with implementation. If the information shows that an alternative action would provide similar biological benefits, is technically feasible, and would be more cost-effective, then the AAs will implement the alternative action. The AAs may need to complete appropriate NEPA analyses and obtain authorization and appropriation before implementation. The AAs will present specific implementation plans to NMFS, and NMFS will evaluate whether the actions proposed in the implementation plans meet the biological results NMFS relied on in its 2008 BiOp.	On-going	<p>2018 - Foster fish weir completed; modifications scheduled for 2020.</p> <p>2019 - Cougar at plans and specifications</p> <p>2022 - construction completion at Cougar</p> <p>2019 - Detroit plans and specifications for selective withdrawal stucture.</p> <p>2024 - Detroit temperature control completion.</p> <p>2028 - Detroit downstream passage structure construction completion.</p> <p>Lookout Point: research ongoing to determine feasibility and incorporate results from Cougar &amp; Detroit to inform downstream passage solution.</p>
FISH PASSAGE	4.12.1	Cougar Dam Downstream Passage	The AAs will investigate the feasibility of improving downstream fish passage at Cougar Dam through structural modifications as well as with operational alternatives, and if found feasible they will construct and operate the downstream fish passage facility. The AAs will take necessary initial steps beginning no later than 2010, which may include a site/concept study, design report, plans and specifications, if appropriate. The AAs will establish a Major Milestone near the end of 2010, in conjunction with completion of the Cougar Site/Concept Study and DDR. The AAs will make “go/no go” decisions on the feasibility of Cougar downstream passage facilities. The AAs will complete construction of any structural fish passage facilities by Dec. 2014; and by 2015, begin operating downstream fish passage facilities at Cougar Dam.	On-going	<p>Finding of No Significant Impact anticipated in 2019;</p> <p>Anticipated construction completion in 2022</p>
FISH PASSAGE	4.12.2	Lookout Point Dam Downstream Passage	The AAs will investigate the feasibility of improving downstream fish passage at Lookout Point Dam, and if found feasible, they will construct and operate downstream fish passage facilities there. The AAs will take necessary initial steps, beginning no later than 2012, which may include feasibility studies, a design report, authorization and appropriation, and plans and specifications, if appropriate. The AAs will complete construction of any structural fish passage facilities by December 2021. By March 2022, the AAs will begin operating downstream fish passage facilities at Lookout Point that will enable collection and transport of fish from above Lookout Point to habitat downstream of Dexter. The AAs will establish a Major Milestone near the end of 2014 in conjunction with completion of the Lookout Point Feasibility Study. The major decision associated with that milestone will be “go/no go” decisions on the feasibility of Lookout Point fish passage facilities. Another Major Milestone may be needed near the end of 2016 pending actions on authorization and appropriation of proposed facilities.	Partially Implemented	<p>NMFS and Action Agencies agreed to a check-in in FY19 for this project</p>

RPA Category	RPA Measure	RPA NAME	Summary of RPA Language	RPA Status	Date Implemented
FISH PASSAGE	4.12.3	Detroit Dam Downstream Passage	The AAs will investigate the feasibility of improving downstream fish passage at Detroit Dam and if found feasible they will construct and operate downstream passage facilities. Temperature control will also be considered in designing the passage facility. The AAs will take necessary initial steps beginning no later than 2015, which may include feasibility studies, a design report, authorization and appropriation, and plans and specifications, if appropriate. The AAs will establish a Major Milestone near the end of 2017 in conjunction with completion of the Feasibility Study. The major decision associated with that milestone will be “go/no go” on the feasibility of fish passage facilities at Detroit Dam. Another Major Milestone may be needed near the end of 2019 pending actions on authorization and appropriation of proposed facilities. The AAs will complete construction of any structural fish passage facilities by December 2023. By March 2024, the AAs will begin operating downstream fish passage facilities at Detroit that would enable collection and transport of fish from above Detroit to habitat downstream of Big Cliff Dam. Any necessary NEPA compliance required for implementation of proposed facilities will occur in conjunction with preparation of the Feasibility Report.	On-going	Environmental Impact Statement Record of Decision anticipated 2020; Anticipated construction completion by 2028
FISH PASSAGE	4.13	Willamette Configuration Operation Plan (COP)	The AAs will carry out the COP, a multi-year, multi-level study process, to evaluate a range of potentially beneficial actions for listed fish species at Project dams and reservoirs. The interim steps will be completed in a timely manner; however, the dates shown in Figure 9.4-1 for interim steps are not firm. Regardless of the timing of interim steps, the AAs will complete each Project measure no later than the final date listed for each measure. The AAs will keep the Services apprised of their progress. The AAs will evaluate in the COP a variety of potential actions intended to benefit ESA-listed fish, including but not limited to, the following measures: (1) Upstream fish passage facilities, other than the collection facilities described in RPA 4.6; (2) Adult fish release sites that require detailed study; (3) Interim operations for downstream fish passage that require detailed study; (4) Head-of-reservoir juvenile collection facilities that require detailed study; (5) Downstream passage facilities or operations; (6) Temperature control facilities or operations; (6) Interim operations for temperature control that require detailed study; & (7) System-wide operational changes to meet tributary and mainstem flow targets.	Implemented	COP Phase I Oct 2009; COP Phase II Oct 2015
WATER QUALITY	5.1	Interim Water Quality Measures	Until permanent temperature control facilities and water quality improvements are constructed or operations are established, the AAs will evaluate and carry out, where feasible, interim operational measures and use existing conduits such as spillways, regulating outlets, and turbine outlets to achieve some measure of temperature control and reduced TDG exceedances below Project dams, including Detroit/Big Cliff, Green Peter/Foster, Hills Creek, Lookout Point/Dexter, Fall Creek, and Blue River.	On-going	2009
WATER QUALITY	5.1.1	Temperature Control at Detroit/Big Cliff Dams	By March 2009, the AAs will complete an evaluation of the feasibility of modifying operations at Detroit/Big Cliff Dams to improve downstream temperature and TDG conditions. The AAs will establish a Major Milestone to occur by March 2009, when the evaluation of feasibility is completed. If determined feasible, the AAs will begin to implement the proposed operation beginning in Water Year 2009. If implemented, the AAs will conduct monitoring and evaluation studies to determine the effectiveness of the operation and determine whether the operation should continue in future years.	On-going	June 2009

RPA Category	RPA Measure	RPA NAME	Summary of RPA Language	RPA Status	Date Implemented
WATER QUALITY	5.1.2	Additional Interim Water Quality Measures	By March 2010, the AAs will identify measures, in addition to those described in RPA 5.1.1, that they can start implementing in April 2010, if feasible. By April 2010, the AAs will carry out those operational changes that will result in immediate downstream temperature and TDG benefits; and that do not require congressional authorization, detailed environmental review, extensive permitting, and that are within existing physical or structural limitations. Specific interim operational measures will be determined by the AAs, with the advice of and review by the Services.	On-going	2010
WATER QUALITY	5.1.3	Complex Interim Water Quality Measures	The AAs will evaluate measures that require detailed environmental review, permits, and/or congressional authorization as part of the COP. The AAs will complete this component of the COP by April 2011, including seeking authorization and completing design or operational implementation plans for those operations that are determined feasible. The AAs will carry out operations that are feasible by May 2011, contingent on funding, issuance of necessary permits and authorization.	On-going	COP Phase I Oct 2009 COP Phase II Oct 2015 OMET Nov 2012
WATER QUALITY	5.1.4	Monitoring and reporting of interim water quality improvement measures	Each year from 2009 through the term of this Opinion, the USACE will monitor and evaluate the effectiveness of interim and permanent water quality improvement measures, and will produce an annual report, by March 1 of the following year, for review and comment by the Water Quality/Temperature committee. The report will include recommendations, if any, to modify project operations to further improve water quality. The Services will comment on the draft report and inform the AAs if they agree with the recommendations.	On-going	Started March 2010
WATER QUALITY	5.1.5	Modifying interim water quality improvement measures	Each year from 2010 through the term of this Opinion, the USACE will carry out modified project operations proposed in the annual reports described above in RPA 5.1.4 unless such modifications require detailed analysis and authorization. If such additional analysis is needed, then the AAs will analyze those proposed modifications as part of the COP.	On-going	Started March 2010
WATER QUALITY	5.2	Water Temperature Control Facilities and Operations	Based on the best available information in 2008, NMFS identifies Detroit as the highest priority dam for construction of a temperature control structure or operational changes to achieve temperature control. The AAs will investigate the feasibility of improving downstream temperatures and reducing TDG exceedances in the N. Santiam River. The AAs will take necessary interim steps beginning no later than 2010, which may include feasibility studies, a design report, authorization and appropriation, and plans and specifications, if appropriate. The AAs will evaluate alternatives to achieve both temperature control and downstream fish passage. If feasible and more efficient to achieve both purposes through one construction project, the AAs will include downstream fish passage in this effort, rather than delaying it until 2023. The AAs will complete construction of any structural temperature control facilities by December 2018. By March 2019, the AAs will begin operation of permanent downstream temperature control at Detroit Dam. The AAs will establish a Major Milestone near the end of 2011 in conjunction with completion of the Detroit Feasibility Study. The major decision associated with that milestone will be “go/no go” on the feasibility of temperature control facilities.	On-going	Feasibility determination made in 2015; Environmental Impact Statement Record of Decision anticipated 2020; Construction completion by 2024
WATER QUALITY	5.3	Protecting Water Quality during Emergency and Unusual Events or Conditions	The AAs will apply protocols developed under RPA measure 4.3 and take actions within existing operational and structural capabilities at all project dams and reservoirs to protect water quality during unusual events and conditions.	On-going	Final Report from RPA 4.3 - November 2014; Implemented when unusual events and conditions occur



RPA Category	RPA Measure	RPA NAME	Summary of RPA Language	RPA Status	Date Implemented
WATER QUALITY	5.3.1	Protecting Water Quality during Emergency and Unusual Events or Conditions	Where the protocols described in RPA 4.3 above cannot ensure adequate protection of water quality and other impacts to ESA-listed fish during unusual events/conditions, the USACE will identify structural or mechanical changes that could be made at project facilities for this purpose. The USACE will produce a draft report by September 1, 2009, proposing to make structural or mechanical changes to protect water quality during anomalous events.	Implemented	October 2009
WATER QUALITY	5.3.2	Protecting Water Quality during Emergency and Unusual Events or Conditions	With review and comment by the WATER Water Quality/Temperature committee, the USACE will produce a final report by January 1, 2010. NMFS and FWS will inform the USACE if the report's recommendations are inconsistent with this RPA.	Implemented	October 2009
WATER QUALITY	5.3.3	Protecting Water Quality during Emergency and Unusual Events or Conditions	The AAs will begin to carry out structural and mechanical changes that will protect water quality during anomalous events and that do not require congressional authorization, detailed environmental review, or extensive permitting by March 1, 2010. These minor changes include only those that meet all of the following criteria: no need to prepare an EIS; no need to obtain additional congressional authorization; no need to submit to extensive permitting procedures; & within reasonable cost.	On-going	Started considering in COP Phase I 2009
WATER QUALITY	5.3.4	Protecting Water Quality during Emergency and Unusual Events or Conditions	The AAs will evaluate those measures that require detailed environmental review, permits, and congressional authorization as part of the COP. The AAs will complete this component of the COP by April 2011, including seeking authorization and completing design for those structural measures that are determined feasible. The AAs will begin to construct and operate those measures determined feasible by May 2011, contingent on funding and issuance of necessary permits. The Services will inform the Action Agencies whether they agree with the structural measures.	On-going	October 2015
WATER QUALITY	5.3.5	Protecting Water Quality during Emergency and Unusual Events or Conditions	As structural and mechanical changes are completed, the USACE will update the protocols described in measure 4.3 above to include any new instructions for operating the modified facilities.	Pending	Contingent on RPA measures 5.3.3 and 5.3.4
WATER QUALITY	5.3.6	Protecting Water Quality during Emergency and Unusual Events or Conditions	Any structural or mechanical improvements that are carried out will be continued through the term of this Opinion unless the AAs and the Services determine, as more information is obtained, that there is a better way to operate for water quality.	Pending	Contingent on RPA measures 5.3.3 and 5.3.4
WATER QUALITY	5.4	Cougar Dam RM&E	The AAs will fund and carry out an extended biological RM&E program associated with the Cougar Dam WTC. The RM&E program will begin in 2011, after completion of the RM&E program included in the previously authorized Cougar project. The RM&E program will evaluate effects of the WTC operation on the downstream ecosystem, fish passage through the reservoir, dam, and regulating outlet, and effectiveness of the trap-and-haul program. It will also quantitatively assess biological benefits realized from these protective and restorative measures. By September 2010, the AAs will prepare a revised Cougar Dam WTC Monitoring and Evaluation Plan. The AAs will begin to carry out the extended RM&E program by March 1, 2011.	Implemented	Final Report February 2011

RPA Category	RPA Measure	RPA NAME	Summary of RPA Language	RPA Status	Date Implemented
HATCHERIES	6.1	Hatcheries General	The AAs will work cooperatively with the State of Oregon to ensure that Willamette Project hatchery programs are not reducing the viability of listed ESUs/DPSS.	On-going	On-going since pre-BiOp
HATCHERIES	6.1.1	Implementation of Hatchery and Genetic Management Plans (HGMPs) (Willamette Basin-wide)	The AAs will implement the actions described in the Willamette HGMPs for spring Chinook, summer steelhead, and rainbow trout, after NMFS approval of these plans. Implementation of these actions requires cooperation with the State of Oregon, who partially funds and operates many of the facilities associated with the Hatchery Mitigation Program.	HGMPs submitted to NMFS; Awaiting NMFS authorization to implement	McKenzie final 2/11/2016; N.Santiam final 9/7/2016; S.Santiam final 9/7/2016; Middle Fork Willamette final 9/7/2016; Summer steelhead final 6/14/2018; Rainbow trout final 10/29/2018
HATCHERIES	6.1.2	Hatchery Facility Improvements (Willamette Basin-wide)	The AAs will improve fish collection facilities associated with the hatchery mitigation program; including salmonid ladders, traps, holding, and acclimation facilities associated with hatchery broodstock collection and the outplanting program. Facilities will be rebuilt according to the schedule described in RPA measures 4.6 and 4.7 above.	Partially implemented (exception is Dexter, which has plans and specifications prepared)	Minto April 2013; Foster March 2014; Fall Creek April 2018
HATCHERIES	6.1.3	Mass-marking of Hatchery Releases (Willamette Basin-wide)	The AAs will continue to mark all hatchery fish releases in the Willamette Basin with an adipose fin clip and otolith mark. The AAs will ensure that coded wire tags will be inserted into all hatchery spring Chinook released into the McKenzie Basin, beginning with the 2008-09 smolt releases. The AAs, with ODFW, will phase in the tagging of all other Chinook releases according to the schedule described in RPA 4.13 so that the first year of the age-4 return can be detected at the rebuilt facilities. There is no need to wire tag Chinook releases unless infrastructure is in place to detect adult returns.	On-going	1998
HATCHERIES	6.1.4	Improvements at Leaburg Dam (McKenzie)	The AAs will fund the design, construction, and operation of a sorting facility at Leaburg Dam on the McKenzie River to reduce hatchery fish straying into core spring Chinook natural production areas upstream. The AAs will complete construction of the sorting facilities by December 2013, and begin operation in 2014. If an acceptable sorting facility at this site is deemed infeasible by the Working Group and agreed to by NMFS, then the AAs will take alternative actions to reduce hatchery fish straying to less than 10% of the total population spawning in the wild.	Implemented	Implemented other improvement actions in lieu of Leaburg sorter (2017)
HATCHERIES	6.1.5	Management of Hatchery-origin Spring Chinook Upstream of Cougar Dam (McKenzie)	The AAs will discontinue releases of all hatchery spring Chinook salmon above Cougar Dam once sufficient numbers of wild fish can be safely collected at the rebuilt Cougar Dam trap and outplanted above the dam. The minimum number of wild fish needed for the outplanting program will be determined by the Fish Passage and Hatchery Management Committee. If insufficient numbers of wild fish are collected at Cougar Dam, then hatchery fish may be used to supplement natural spawning above Cougar Dam, up to a maximum of 50% of the outplanted fish. The FPHM committee will annually update the Willamette Fish Operations Plan with the appropriate number of hatchery-origin fish to be released upstream of Cougar Dam.	On-going	2008

RPA Category	RPA Measure	RPA NAME	Summary of RPA Language	RPA Status	Date Implemented
HATCHERIES	6.1.6	Improve Summer Steelhead Release	The AAs, in cooperation with ODFW, will improve the release of hatchery summer steelhead smolts by allowing volitional emigration from the point of release over an extended period of time with any non-migrants being removed & not released into free flowing waters below the Projects. When the facilities are reconstructed, the AAs will ensure that any new acclimation facilities allow for this operation.	On-going	2009
HATCHERIES	6.1.7	Reduce Summer Steelhead Recycling in the Santiam Basin	The AAs, in cooperation with ODFW, will stop recycling adult summer steelhead for fishery harvest purposes by September 1st of each year in the N. Santiam and S. Santiam rivers. The AAs will continue to operate fish collection traps on a weekly basis through October 15th in order to maximize the collection of summer steelhead, to the extent possible with the current facilities. These fish will then be held at the hatchery for spawning, unless determined otherwise by the FPHM committee.	On-going	2009
HATCHERIES	6.1.8	Adjust Releases of Summer Steelhead in the Santiam Basin	The AAs with ODFW will reduce the hatchery summer steelhead release in the N. Santiam River to 125,000 smolts. To offset this reduction, summer steelhead releases may be increased in one or more of the following subbasins: S. Santiam, McKenzie, and Middle Fork Willamette (up to a total of 36,000 fish) to maintain the existing hatchery mitigation in the Willamette Basin. The revised HGMP for summer steelhead will identify how these production changes will be allocated among the different rivers.	Implemented	2010
HATCHERIES	6.1.9	Future Summer Steelhead Management Actions	The AAs, in cooperation with ODFW, will implement future management actions aimed at reducing the impacts of the summer steelhead hatchery program on ESA-listed species. These actions will be developed according to the process described in section 3.4.10.2 of the Supplemental BA.	On-going	2008
HATCHERIES	6.2	Hatchery Program - see sub RPAs	The AAs will preserve and rebuild genetic resources through conservation and supplementation objectives to reduce extinction risk and promote recovery. These actions rely in part on cooperation with the State of Oregon, which partially funds and operates many of the facilities associated with the Hatchery Mitigation Program.	On-going	2008
HATCHERIES	6.2.1	Implementation of Hatchery and Genetic Management Plans (Willamette Basin-wide)	When approved by NMFS, the AAs, in cooperation with ODFW, will implement the actions described in the NMFS-approved HGMPs for spring Chinook, summer steelhead, and rainbow trout.	HGMPs submitted to NMFS; Awaiting NMFS authorization to implement	McKenzie final 2/11/2016; N.Santiam final 9/7/2016; S.Santiam final 9/7/2016; Middle Fork Willamette final 9/7/2016; Summer steelhead final 6/14/2018; Rainbow trout final 10/29/2018
HATCHERIES	6.2.2	Genetically Integrated Management of Spring Chinook Programs (Willamette Basin-wide)	For spring Chinook hatchery mitigation programs, in each population area the AAs, in cooperation with ODFW, will fund and implement conservation and supplementation programs that build genetic diversity using local broodstocks and manage the composition of natural spawners according to the sliding-scale matrices. The AAs will monitor and evaluate implementation of actions through the end of the ESA take coverage period.	Mostly Implemented; Waiting for authorization from NMFS to incorporate wild fish into the brood	McKenzie final 2/11/2016; N.Santiam final 9/7/2016; S.Santiam final 9/7/2016; Middle Fork Willamette final 9/7/2016
HATCHERIES	6.2.3	Continue Adult Chinook Outplanting Program (Willamette Basin-wide)	The AAs will continue the existing Adult Chinook Salmon Outplanting program, capturing spring Chinook salmon below USACE projects and transporting them into habitat that is currently inaccessible above the following dams: Detroit Dam; Foster Dam; Cougar Dam; and Lookout Point and Hills Creek dams; and carry out the operational and handling protocols described in the HGMP for each subbasin hatchery.	On-going	2008

RPA Category	RPA Measure	RPA NAME	Summary of RPA Language	RPA Status	Date Implemented
HATCHERIES	6.2.4	Adjust Spring Chinook Release Strategy (Willamette Basin-wide)	The AAs will use more natural growth rates and size at release for all juvenile spring Chinook reared and released at hatcheries, as feasible. Actions shall be taken to release hatchery fish that are more similar to their natural-origin counterparts to the extent feasible. The AAs will work with ODFW to develop a plan for an experimental release in 2009, with an associated RM&E program. The FPHM will evaluate RM&E results, current science on release strategies, and additional information resulting from analysis of previous releases, to develop a plan for modifying future releases.	On-going	2009
HATCHERIES	6.2.5	Molalla River Chinook Recovery	The AAs will support ODFW efforts to eliminate the use of the non-local hatchery Chinook stock released into the Molalla River. The AAs will work with ODFW to identify potential funding and implementation mechanisms to develop a locally-adapted broodstock.	ODFW program (Corps does not directly fund)	
HABITAT	7.1	Willamette River Basin Mitigation and Habitat Restoration:	The AAs will plan and carry out habitat restoration programs on off-site lands. Existing programs will continue (7.1.1); a comprehensive program will be established (7.1.2); and additional projects will be done (7.1.3). The purpose of the program will be to protect and restore aquatic habitat to address limiting habitat factors for ESA-listed fish.	On-going	2009
HABITAT	7.1.1	Ongoing Habitat Restoration Projects in the Willamette Basin	The AAs will continue to carry out the projects listed in Table 9.7-1: Willamette Basin Mitigation; Delta Ponds; Springfield Millrace; N. Santiam Gravel Study	On-going	Starting in 1992 (Willamette Basin Wildlife Mitigation Program)
HABITAT	7.1.2	Habitat Restoration Program	The AAs will develop and carry out a comprehensive habitat restoration program which will include funding for carrying out habitat restoration projects. The AAs will work with the Services to pursue authorization and appropriations to carry out the habitat restoration program. The AAs will work closely with the Services to accomplish: <b>1.</b> Develop project selection criteria aimed specifically at addressing factors limiting the recovery of Willamette basin ESA-listed fish populations, focusing on those factors caused at least partially by the Project. <b>2.</b> Identify proposals for habitat restoration projects. <b>3.</b> Forward those proposals that meet project selection criteria to NMFS for review and determination if they are consistent with improving survival and recovery. <b>4.</b> Fund priority projects that NMFS and FWS determine to be consistent with recovery plans for their respective ESA-listed species.	On-going	2010
HABITAT	7.1.3	Habitat Restoration Program	By 2010, the AAs will complete at least two of the highest priority projects that should result in significant habitat improvement for listed fish species. The AAs will complete additional habitat projects each year from 2011 through 2023. Alternatively, larger projects that might require several years to complete could be funded over a multi-year period instead of funding individual, smaller projects each year. NMFS will inform the AAs whether they agree with the decision to fund and carry out these projects.	On-going	2010
HABITAT	7.2	Habitat Restoration and Enhancement on USACE Lands at Project Dams and Reservoirs	The USACE will continue to use existing authorities and programs for land and water resource stewardship on the lands it administers at the 13 Willamette projects to carry out aquatic and riparian habitat projects to benefit terrestrial organisms and resident fish species. Additionally, the USACE may design projects on USACE lands to benefit ESA-listed anadromous species.	On-going	Began pre-BiOp; on-going
HABITAT	7.3	Reservoirs	During annual maintenance operations, the AAs will collect large wood that accumulates at Project dams and make it available for habitat restoration projects above and below Project dams.	On-going	On-going as wood is available and as projects require

RPA Category	RPA Measure	RPA NAME	Summary of RPA Language	RPA Status	Date Implemented
HABITAT	7.4	Restoration of Habitat at Revetments	In coordination with the Services, the AAs will undertake a comprehensive assessment of revetments placed or funded by the USACE Willamette River Bank Protection Program. The revetment assessment will be completed, including identifying sites with potential for modification, by December 31, 2010. The USACE will use applicable existing authorities and programs for funding habitat restoration identified in Table 9.7-2, as well as applicable new programs, to fund priority projects identified in this assessment.	Partially implemented	Study completed June 2013; Sites identified by the study were not selected by the habitat team for restoration actions
HABITAT	7.5	Aquatic Habitat Assessment	By June 2008, the AAs will complete surveys of spawning and holding habitat availability and condition in the major spawning tributaries with USACE dams (N. Santiam, S. Santiam, S. Fork McKenzie, and Middle Fork Willamette rivers). The AAs will distribute copies of the final report to the Services and will make the report available on the USACE's Portland District's website. Habitat survey data will also be available to the public in a GIS format. The Action Agencies will use the assessment to inform habitat restoration priorities for RPA measure 7.1.	Implemented	2009
ESA COMPLIANCE & COORDINATION	8.1	Review of Design and Construction Reports	The AAs will collaborate with the Services on the design, construction and operation of all potential structural modifications to the dams and associated facilities, including fish collection and handling facilities, fish passage improvements, and water temperature control facilities. The AAs will obtain the Services' review of design reports and will address their recommendations in subsequent design reports. The AAs will provide final design reports and drawings to the Services at least 30 days in advance of making the final design decision to allow time for their review and comment.	On-going	2008
ESA COMPLIANCE & COORDINATION	8.2	Construction Practices	Construction and operation will be carried out according to Best Management Practices and design specifications agreed to by the Services. The AAs will follow BMPs provided in Incidental Take Statement. If these are updated, the Services will provide the updates to the AAs, and the AAs should follow the updated BMPs.	On-going	2008
RM&E	9.1	Comprehensive Program: Research Monitoring & Evaluation (RM&E)	The AAs will, in consultation with the WATER RM&E subcommittee, develop and manage the comprehensive Willamette Project RM&E program. In developing and conducting the RM&E studies, the AAs will work closely with the Services to ensure that the studies will provide information useful to the Services and the AAs in making decisions regarding the effectiveness of mitigation measures in the Proposed Action and the RPA, including alternatives for downstream flows and ramping, fish passage, water quality, hatchery program operations, habitat restoration and other measures. The AAs will seek NMFS' review of draft study proposals and draft reports. Comments submitted by NMFS on draft evaluation proposals must be reconciled by the AAs in writing to NMFS' satisfaction prior to initiating any research-related activities anticipated in this RPA. The proposals must identify annual anticipated incidental take levels by species, life stage, and origin for each year. The Services will inform the AAs whether they agree with the proposed studies, reports, and NEPA alternatives. The AAs will make modifications to operations & facilities based on the results of the RM&E information.	On-going	October 2011

RPA Category	RPA Measure	RPA NAME	Summary of RPA Language	RPA Status	Date Implemented
RM&E	9.2	Mainstem Flow, Tributary Flow, and Ramping RM&E	The AAs will develop and carry out RM&E to determine compliance with, and effectiveness of, flow and ramping measures and to better discern and evaluate the relationships between flow management operations and the resulting dynamics of ecosystem function and environmental conditions downstream of Willamette Project dams. Because flow releases and ramping rates are measures that can be implemented immediately, the AAs should give high priority to studies to evaluate their effectiveness. The AAs will begin flow and ramping rate studies by 2009. The AAs will make modifications to Project operations and facilities that affect mainstem and tributary flows, ramping, and Reclamation water contract implementation, including RPA 2 and 3 listed above, no later than January 2011 and with NMFS' agreement.	Partially implemented; On-going	Tributary studies began in 2010, Final Reports in Jan 2014 and June 2015, additional tributary studies; Mainstem studies implemented in 2015 and 2016 - on-going
RM&E	9.3	Fish Passage RM&E	The AAs will develop and carry out RM&E to determine the most effective and efficient means to accomplish safe fish passage at applicable Project dams. The studies will be used to determine: 1) locations where it is feasible to re-establish self sustaining populations; 2) potential population size for each subbasin; 3) effectiveness of rebuilt trap-and-haul facilities; 4) downstream fish passage timing and survival through Project reservoirs; 5) downstream fish passage timing and survival through Project dams; 6) operational methods for higher juvenile and adult survival at Project facilities; 7) infrastructure needs to ensure long term viability of populations; and 8) selection of hatchery or natural-origin broodstock, as well as life stage, for release into habitat above Project dams. These facilities must meet performance standards consistent with NMFS' Fish Passage Criteria and Guidelines or as determined through the FPHM committee of WATER and agreed to by the Services. The AAs will monitor the effectiveness of the fish passage facilities. The AAs will make modifications to Project operations and facilities that affect fish passage, including RPA 4 listed above, as indicated by results of the monitoring and evaluation, and with NMFS' agreement.	On-going	Multiple studies annually since 2009. Planning and design studies completed addressing items 1-8 for fish passage at Detroit, Foster, Cougar and Fall Creek; ongoing for Lookout Dam. Effectiveness evaluations on-going.
RM&E	9.4	Water Quality RM&E	The AAs will develop and carry out RM&E to monitor the effectiveness of measures in the RPA and Proposed Action to improve water quality, including but not limited to: 1) monitor operational performance and associated biological response of water temperature control in the McKenzie River Subbasin at Cougar Dam; 1a) quantify effects of USACE dams on water temperature; 2) evaluate biological effects of water temperature alteration caused by USACE dams on ESA listed fish species in the Santiam and Middle Fork Willamette rivers; 2a) quantify the effects of USACE dissolved gas and turbidity; 3) evaluate the effects of dissolved gas supersaturation and of turbidity alterations caused by USACE dams on ESA listed fish species in the Santiam, McKenzie, and Middle Fork Willamette rivers; and 4) conduct an aquatic macroinvertebrate species abundance and community structure study at USACE projects on the Santiam, McKenzie, and Middle Fork Willamette rivers to discern the extent to which project operations affect macroinvertebrate community composition, structure, and function. The AAs will make modifications to Project operations and facilities that affect water quality, including RPA 5 listed above as indicated by results of the monitoring and evaluation, and with NMFS' agreement.	On-going	1a) Annually since 2009. 2) Multiple studies since 2010. 2a) Study completed in 2018; monitoring of TDG ongoing. 3) Multiple studies since 2011; ongoing. 4) Study ongoing since 2015 to address aquatic community effects of flow and temperature management.
RM&E	9.5	Hatchery Programs RM&E	The AAs will develop and carry out RM&E to monitor the effectiveness of hatchery measures in the RPA & Proposed Action to improve hatchery effectiveness and reduce adverse effects to listed fish species, including to the following sub-measures:	Implemented - Hatchery RM&E Plan completed	June 2011

RPA Category	RPA Measure	RPA NAME	Summary of RPA Language	RPA Status	Date Implemented
RM&E	9.5.1	Spring Chinook	1. Broodstock Management. 2. Composition of Hatchery Fish on the Spawning Grounds. 3. Survival of Adult Hatchery Fish Outplanted above Federal Dams. 4. Reproductive Success of Hatchery Fish in the Wild- Determine juvenile production by hatchery and wild spawners above the dams. 5. Use of Hatchery Fish to Evaluate Migration and Survival through Reservoirs and Dams. Wild fish may be used in the future if risks are deemed acceptable.	On-going	1. & 2. Annually since 2008. 3. Studies completed 2008-2016. 4. Studies completed in 2010-2015; ongoing. 5. Various studies, annually since 2008.
RM&E	9.5.2	Summer Steelhead	1. Fund, design, and implement a study plan, in collaboration with ODFW, to determine the extent of summer steelhead reproduction in the wild. Collect tissue samples from juvenile steelhead for genetic analysis to determine if offspring are of winter- or summer-run origin. Sampling shall begin in 2009. 2. Fund and conduct a spawning survey for three years to determine the extent of summer steelhead spawning in the N. Santiam River Basin. Survey shall be initiated after the reduction of the North Santiam hatchery summer steelhead release is implemented.	On-going	1. Studies completed in 2013. Tissue sampling since 2009 2. Completed using video counts at Bennett as recommended.
RM&E	9.6	Habitat Restoration RM&E	The AAs will develop and carry out RM&E for habitat restoration projects identified in the Proposed Action and this RPA to document changes in ecosystem function and biological response. The AAs will make modifications to Project-related habitat restoration activities and structures, as indicated by the results of the monitoring and evaluation and with NMFS' agreement.	On-going	BPA starting 2010
MAINTENANCE	10.1	Identify fish protection maintenance needs	The USACE will develop and maintain a list of scheduled and unscheduled maintenance needs of existing infrastructure that could potentially negatively impact listed fish and will place high priority on maintaining performance of all such facilities. The timeline for database modification and data entry: 1) All new items entered after 2008 shall include information noting whether they may significantly and adversely affect listed fish, 2) All items, both new and pre-existing, shall be so notated by & after 2015.	Partially implemented (Electronic database was not shared)	Annually
MAINTENANCE	10.2	Inventory of Needed Maintenance	The USACE will provide the maintenance report described in the Proposed Action in electronic database format to NMFS by February 1, 2009, and thereafter whenever requested in writing by NMFS. This report will include an inventory of current major deficiencies, and the anticipated date of correction, and for those previously identified maintenance items that have been corrected, the report will identify the date the deficiencies were corrected. To aid in the identification of repeated problems, all corrected deficiencies will be retained in the database.	Partially implemented (Electronic database was not shared; provides list of annual maintenance events)	Annually
MAINTENANCE	10.3	Perform Timely Maintenance	The AAs will correct the items noted in the inventories identified in RPA measures 10.1 and 10.2 above in a timely manner. All identified maintenance needs will be corrected, subject to congressional appropriation, or unless otherwise concurred with by NMFS. The USACE will correct deficiencies likely to cause substantial fish injury, mortality, or habitat degradation as soon as reasonably possible after discovery. The determination of whether injury, mortality, or loss of habitat function will occur in any particular instance will be collaboratively determined by NMFS and the AAs.	On-going	2008; Annually

Implemented: actions have been fully completed

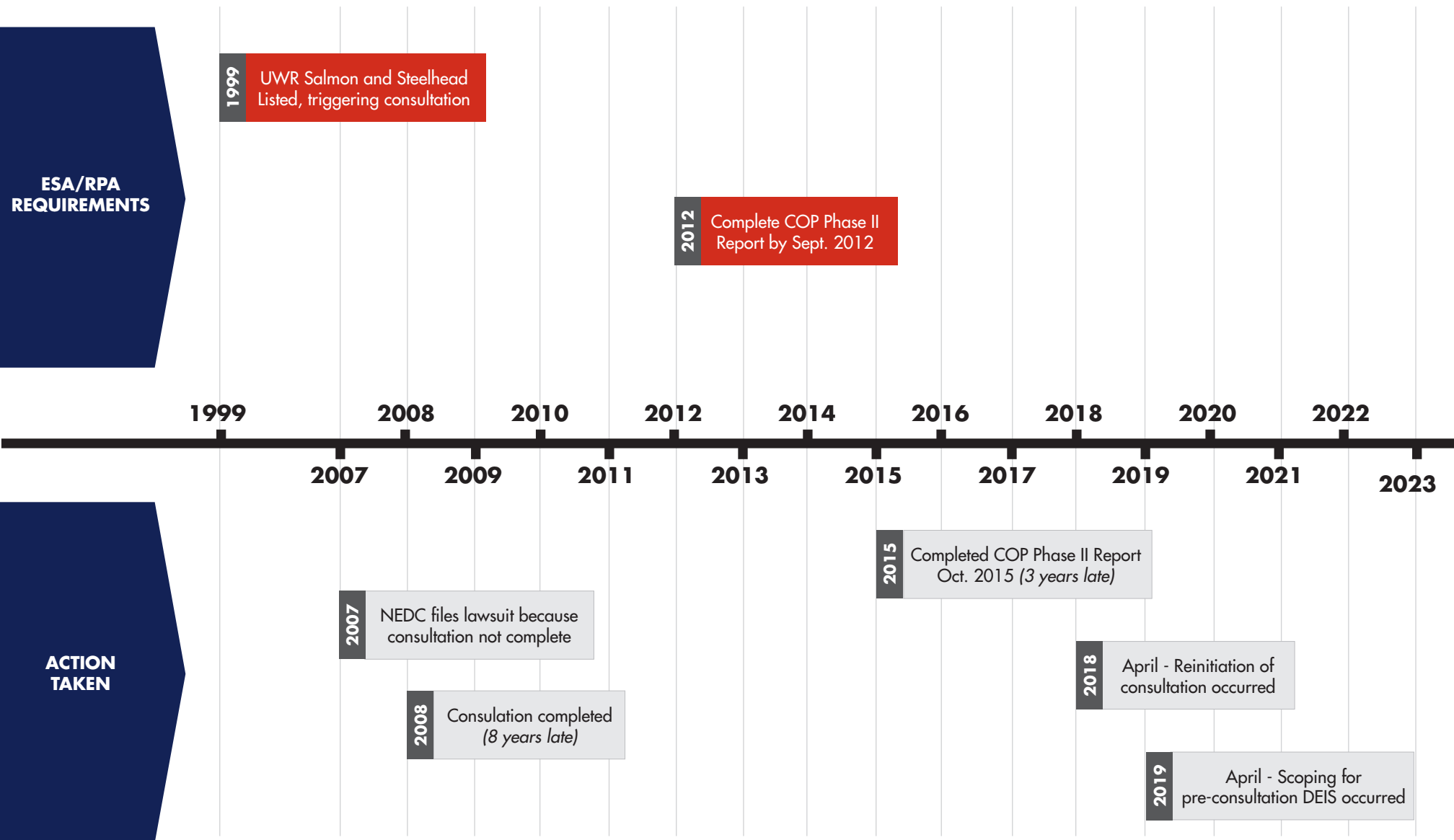
Partially implemented: some actions have been completed; some actions are either on-going or have not been started

On-going: agency is actively working on completing all or part of the action

Pending: starting the action is contingent on another action being completed first

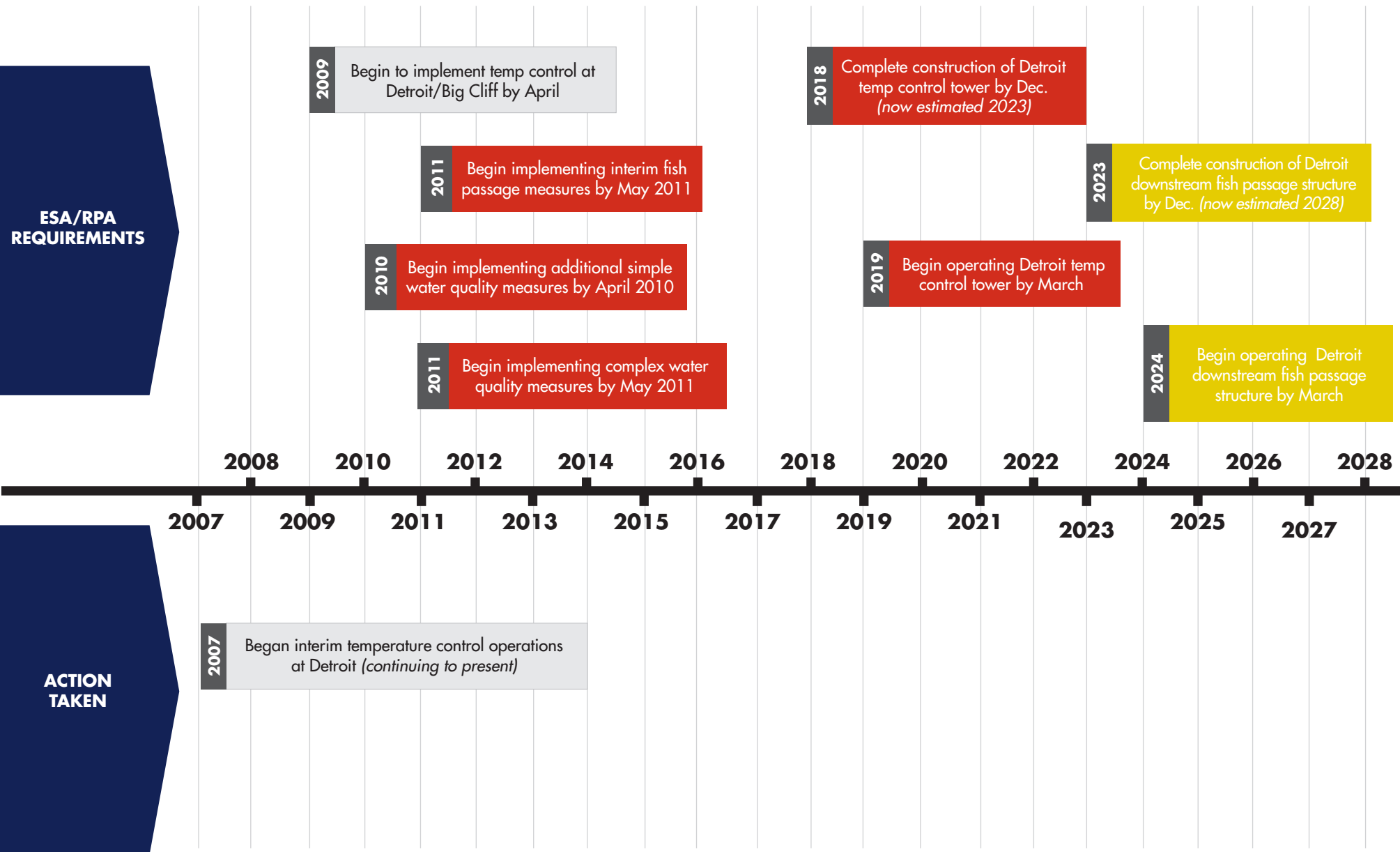
Not Implemented: action has not been started

# KEY BASIN-WIDE DEADLINES





# NORTH SANTIAM (DETROIT, BIG CLIFF)



## Legend

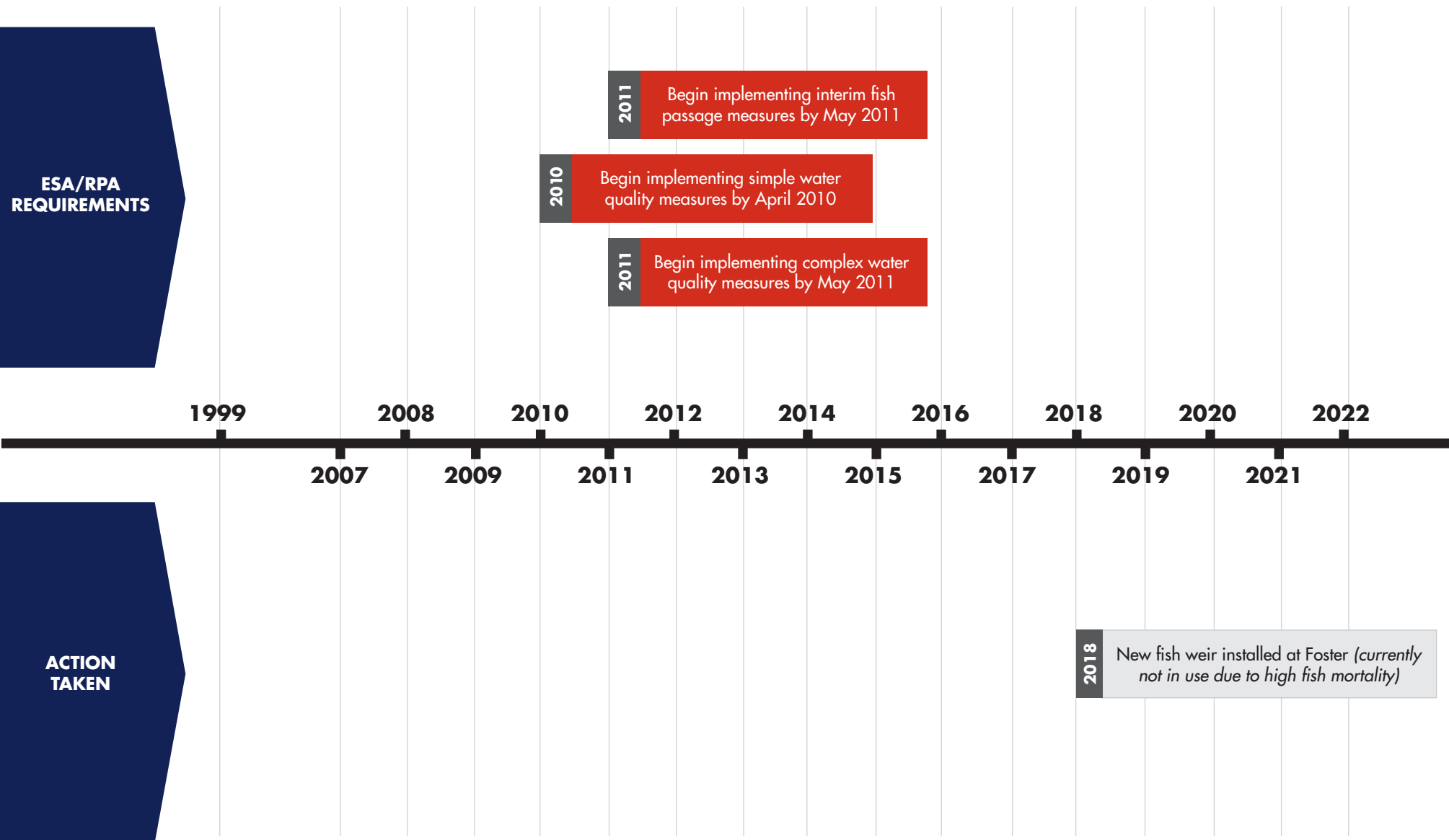


Deadline will be missed



Deadline already missed

# SOUTH SANTIAM (FOSTER, GREEN PETER)



## Legend

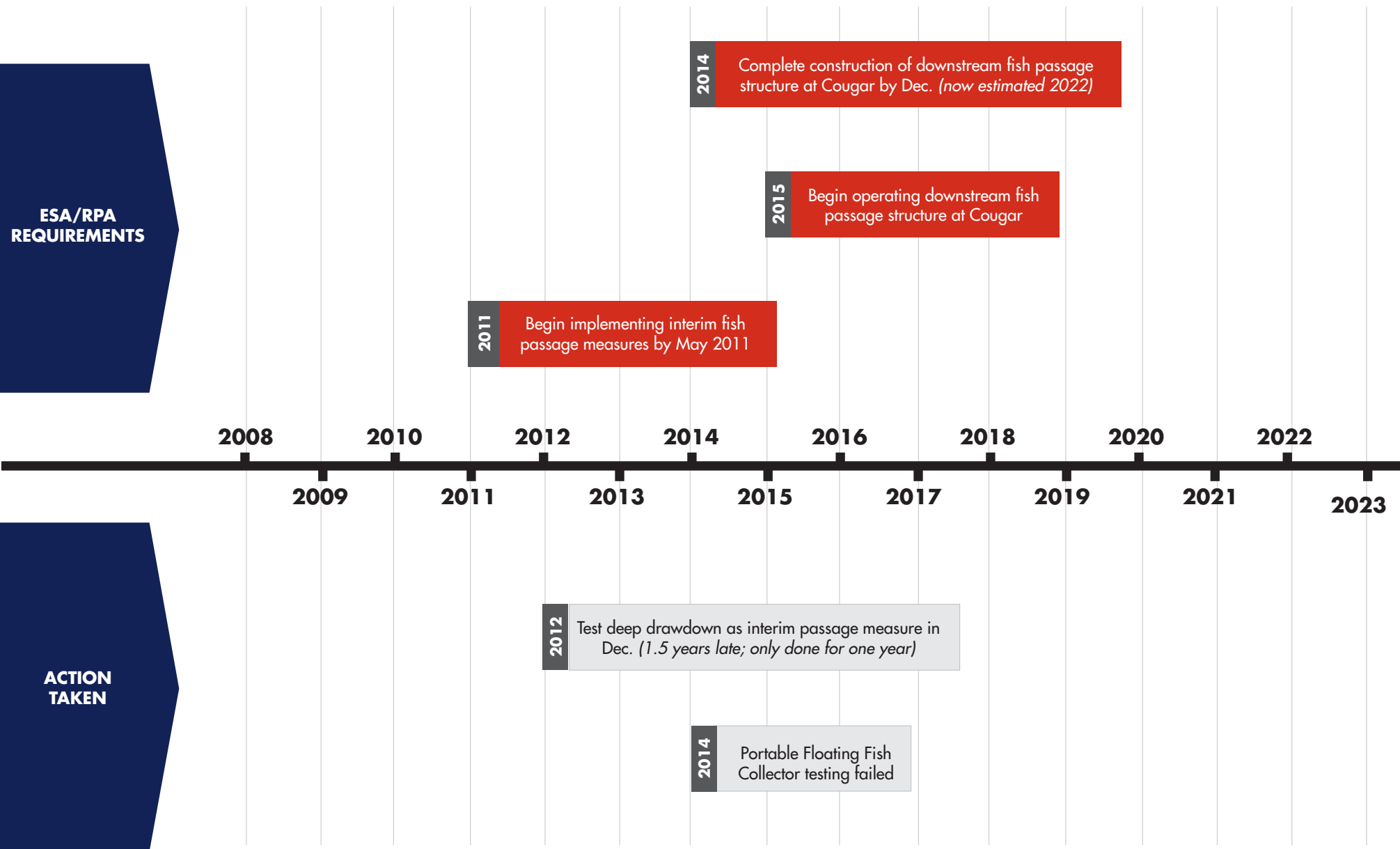


Deadline will be missed



Deadline already missed

# MCKENZIE (COUGAR)



## Legend

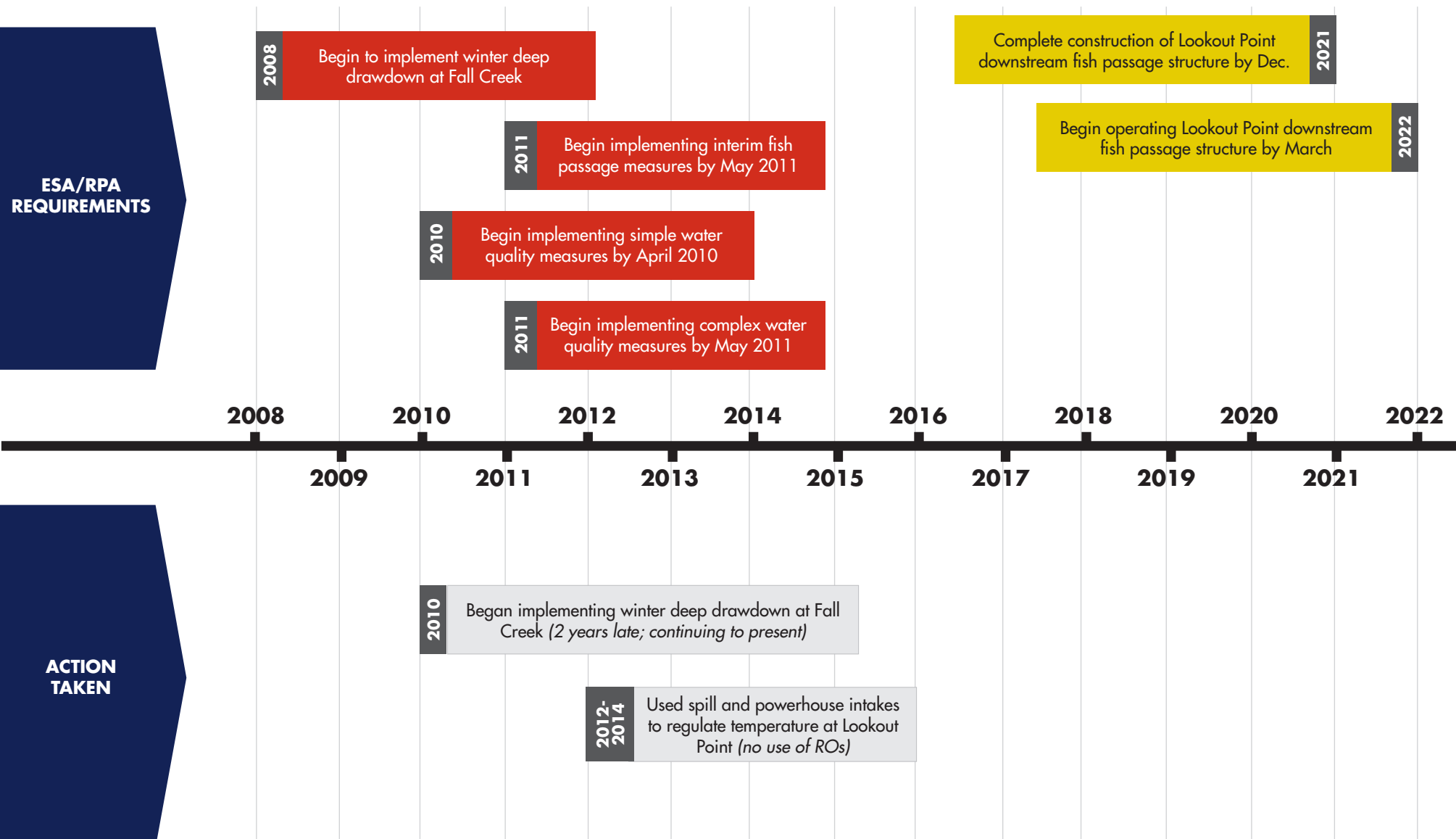


Deadline will be missed



Deadline already missed

# MIDDLE FORK WILLAMETTE (LOOKOUT POINT, DEXTER, HILLS CREEK, FALL CREEK)



## Legend



Deadline will be missed



Deadline already missed