FREQUENTLY ASKED QUESTIONS REGARDING THE KLAMATH RIVER HYDROELECTRIC DAM REMOVAL PROJECT AND THE REINTRODUCTION OF ANADROMOUS FISHES IN OREGON

What dams are being removed and who is responsible for their removal?

Iron Gate Dam, Copco 2 Dam, Copco 1 Dam (located in California), and J.C. Boyle Dam (located in Oregon) are the four hydroelectric dams (Lower Klamath Project [LKP]), owned and operated by PacifiCorp located on the Klamath River that are being removed. Link River Dam and Keno Dam are non-hydroelectric dams located below Upper Klamath Lake in Oregon and will remain in place. Both these dams provide upstream fish passage via fish ladders.

In November 2022, the Federal Energy Regulatory Commission (FERC) approved the removal of the LKP dams. The Klamath River Renewal Corporation (KRRC), a non-profit organization, is responsible for the physical removal of the dams, ensuring fish passage through the dam sites, and the restoration of the reservoir footprints behind the dams. Removal of Copco 2 dam is scheduled to occur in the summer of 2023, with removal of the three other dams (including J.C. Boyle dam) beginning in January of 2024. The completion date for full removal of all four dams is mid-October of 2024. This will mark the point of restored volitional upstream passage for anadromous fishes into the upper Klamath basin.

For FAQ's regarding why the dams are being removed, the process of removing them, funding for dam removal, habitat restoration, and other topics directly related to dam removal see KRRC's FAQ website here: https://klamathrenewal.org/faqs/

What is ODFW's role in the dam process?

Throughout the last 20 years, ODFW has been extensively engaged in the agreements and planning leading to the point of FERC approving the removal the four LKP dams. ODFW contributed to multiple fish and wildlife, habitat restoration and post-dam removal monitoring plans, as part of the environmental analysis required to authorize the transfer of the LKP to KRRC, Oregon and California and the removal of the LKP. ODFW will continue to work closely with KRRC and other multiple partners (State, Federal, Tribal, and nongovernmental organizations) as the dam removal effort moves forward to completion.

Are there any anticipated impacts to native, resident fishes that currently exist in the Oregon portion of the Klamath River Basin by dam removals.

The actual dam removals will not cause any negative impacts to native, resident fishes located above J.C. Boyle Dam (the uppermost dam to be removed). Resident fishes located below J.C. Boyle Dam in the mainstem Klamath River may be impacted from actual dam removal activities related to the drawdown of the reservoir behind the dam and the associated sediment that will be transported down river, though this will be brief.

The benefits of removing J.C Boyle Dam greatly exceed any costs incurred on resident fishes below the dam. The removal of this dam will immediately increase the amount of habitat, restore natural flow and temperature regimes which are currently impacted daily due to energy production from the dam, allow fish below the dam to access to spawning tributaries above the dam. It is anticipated that the robust Redband Trout fishery that currently exists from Keno Dam to J.C. Boyle Reservoir will extend through the state line following the removal of J. C Boyle Dam.

What species of anadromous fishes historically occurred in Oregon prior to the construction of the four hydroelectric dams on the Klamath River?

Spring and fall-run Chinook Salmon, Coho Salmon, Steelhead Trout, and Pacific Lamprey historically occupied habitat in Oregon prior to the construction of Copco 1 Dam in 1912. Currently, fall-run Chinook Salmon, Coho Salmon, Steelhead Trout, and Pacific Lamprey exist up to and immediately below the lower-most hydroelectric dam (Iron Gate Dam) located in California. Spring-run Chinook Salmon are currently only found in the Trinity and Salmon River watersheds in the lower Klamath River Basin, where cooler water temperatures allow for adults to hold through the summer prior to spawning in the early fall. Evidence suggests that spring-run Chinook Salmon were the most abundant anadromous fish in Oregon prior to dam construction.

Does habitat currently exist in Oregon that can support the historical assemblage of anadromous fishes?

It is estimated that there are over 400 miles of potential stream habitat available for anadromous fishes above the four hydroelectric dams. Most of this habitat is in Oregon. The habitat in Oregon is diverse and includes the mainstem Klamath River and tributaries immediately above the hydroelectric dams, which can support fall-run Chinook Salmon, Coho, Steelhead Trout, and Pacific Lamprey as well as large groundwater influenced systems that remain cold throughout the summer such as the Wood River and Williamson River, tributaries to Upper Klamath Lake.

These groundwater-influenced rivers above the lake can provide habitats for all the historically present species, but are especially suitable for spring-run Chinook Salmon, which require cold water throughout the summer months. The Oregon portion of the Klamath River Basin contains most of the climate change resilient habitat within the entire basin due to the numerous cold groundwater inputs.

Is Upper Klamath Lake suitable habitat for anadromous fish?

Upper Klamath Lake is a hypereutrophic lake, meaning that it is shallow and very nutrient-rich. This leads to seasonally high-water temperatures and large algae blooms that then lead to poor water quality conditions for fish in the summer, typically from July through August. Habitat restoration projects in the upper basin are focused on reducing nutrient inputs into the lake. There are numerous large areas within Upper Klamath Lake, such as Pelican Bay and the mouths of the Wood and Williamson Rivers that provide year-round suitable habitat for salmonids due to cold groundwater inputs.

It is anticipated that successful migration of anadromous fishes through the lake will occur when water quality conditions are suitable in the non-summer months (September – June) and the cold-water refuge areas will provide habitat, if needed, in the summer. Due to the nutrient-rich water, Upper Klamath Lake is very productive which has led to the resident Redband Trout that live in the lake to grow at incredible rates. Juvenile anadromous salmonids will also have the opportunity feed in the lake's productive habitat.

Does ODFW have a plan for reintroducing anadromous fishes into Oregon following the removal of the four hydroelectric dams?

In 2008 ODFW wrote *A Plan for the Reintroduction of Anadromous Fish in the Upper Klamath Basin* (2008 Reintroduction Plan). This plan established the goal for reintroduction, species-specific approaches for reintroduction, and called for an Implementation Plan to be written to help guide reintroduction. The 2008 Reintroduction Plan was adopted by the Oregon Fish and Wildlife Commission which then established department policies regarding reintroduction efforts specific to the Oregon portion of the Klamath River Basin.

In 2021 ODFW co-authored, with The Klamath Tribes, an *Implementation Plan for the Reintroduction of Anadromous Fishes into the Oregon Portion of the Upper Klamath Basin* (Implementation Plan). The

Implementation Plan was informed and developed from input gathered from partner fisheries management agencies (State, Federal, and Tribal) located throughout the Klamath River Basin. The purpose of the Implementation Plan is to guide reintroduction efforts in Oregon and begins with a summary of the Upper Klamath Basin (the Klamath River Basin upstream of Iron Gate Dam) habitat, historical assemblage of anadromous fishes, identifies key uncertainties regarding reintroduction, and summarizes the species-specific approaches to reintroduction that will be taken.

The Implementation Plan contains a section on a strategy for monitoring the natural repopulation of anadromous fishes and describes the potential tools that could be used for monitoring efforts. The last section of the Implementation Plan recommends a strategy for actively reintroducing spring-run Chinook Salmon in Oregon. The recommended strategy for active reintroduction includes, first conducting studies involving releases of a relatively small amount of tagged juvenile spring-run Chinook to help inform future active reintroduction efforts.

The 2008 Reintroduction Plan and the 2021 Implementation Plan can be found on ODFW's website here: https://www.dfw.state.or.us/fish/CRP/klamath_reintroduction_plan.asp

What is the goal of ODFW's Klamath anadromous reintroduction program?

The goal of this program is to re-establish viable, self-sustaining, naturally producing populations of anadromous fishes in the Oregon portion of the Upper Klamath Basin. Re-established populations will help sustain harvests that significantly contribute to the welfare of fishery-dependent Klamath Basin communities, while also restoring an integral component to the ecosystem that has been absent for over a century.

What are the species-specific approaches to reintroduction that ODFW plans on pursuing?

The species-specific approaches to reintroduction are based on whether there is a source population of that species present immediately below the Iron Gate Dam (the lower most dam) and habitat exists for that species immediately upstream of the dams. Because fall-run Chinook, Coho, Steelhead Trout, and Pacific Lamprey currently exist downstream and immediately below Iron Gate Dam and suitable habitat for those species exists in Oregon immediately above the three California dams, ODFW will be taking a passive approach to reintroduction with these species, that is, ODFW will allow these fishes to repopulate habitat in Oregon on their own once the dams are removed. The term ODFW uses for this approach is *Natural* or *Volitional Repopulation.* After three fish-generations following dam removals an assessment will be made to determine if any active measures need to be taken to repopulate habitat with these fish.

On the other hand, the nearest source population of spring-run Chinook Salmon is located over 125 river miles downstream of Iron Gate Dam and suitable habitat identified for them above the dams is in the tributaries above Upper Klamath Lake. Because of the long distance between a source population and newly available habitat it is recommended that an active approach transporting juveniles from an in-basin source be used to repopulate habitat in Oregon, referred to as *Active Reintroduction or Active Repopulation*. (See table below)

Summary of reintroduction implementation approaches for anadromous fishes in the Oregon portion of the Upper Klamath Basin.

Location	Reintroduction Implementation Approaches									
	Natural repopulation					Active repopulation				
	Steelhead Trout	Pacific Lamprey	Coho Salmon	Fall-run Chinook Salmon	Spring-run Chinook Salmon	Steelhead Trout	Pacific Lamprey	Coho Salmon	Fall-run Chinook Salmon	Spring-run Chinook Salmon
Oregon portion of Klamath River and tributaries (below Link River Dam, rkm 414.4)	yes	yes	yes	yes	yes	Assessment will be made after **15** years of monitoring and evaluation to determine if active reintroduction is warranted	Assessment will be made after **15** years of monitoring and evaluation to determine if active reintroduction is warranted	Assessment will be made after **9** years of monitoring and evaluation to determine if active reintroduction is warranted	Assessment will be made after **12** years of monitoring and evaluation to determine if active reintroduction is warranted	no
Upper Klamath Lake and tributaries (above Link River Dam, rkm 414.4)	yes	yes	yes	yes	yes	Assessment will be made after **15** years of monitoring and evaluation to determine if active reintroduction is warranted	Assessment will be made after **15** years of monitoring and evaluation to determine if active reintroduction is warranted	no	Assessment will be made after **12** years of monitoring and evaluation to determine if active reintroduction is warranted	yes

What is ODFW's recommended strategy for monitoring the repopulation of anadromous fishes?

ODFW is taking a mostly hands-off approach to reintroducing anadromous fishes into Oregon following dam removal. Because of this, a robust monitoring strategy is needed to determine if fish are repopulating on their own. To do this ODFW recommends a boots-on-the-ground approach, where staff will conduct spawning and carcass surveys of salmon to determine if fish are moving into new habitat and where they are moving to. Estimating the abundance of fall-run Chinook Salmon in Oregon will be a priority as this data will need to be incorporated into other abundance data throughout the lower basin to help determine the fishery allocation for tribal, commercial, and recreation harvest in the Ocean as well as in the lower Klamath River. ODFW has identified potential facilities within the upper basin, such as Link River Dam as a place where all fish will have to migrate through to access the habitat above Upper Klamath Lake, to aid in counting and tagging fish. ODFW has also identified multiple tools such as SONAR and eDNA as potential tools to help monitor repopulation. ODFW will continue to monitor resident salmonid populations and conduct habitat assessments to help inform anadromous fish repopulation.

What is ODFW currently working on to help prepare for monitoring?

ODFW is currently working with multiple partners (State, Federal, Tribal, Landowners, Universities, and NGOs) on multiple projects that will help inform monitoring and reintroduction when the dams are removed. ODFW and partners recently completed a pre-dam removal, basin-wide genetic assessment of Redband/Rainbow/Steelhead Trout. This information will help inform monitoring of Steelhead Trout repopulation by identifying potential source populations and serve as baseline data for any future introgression that may occur with resident Redband/Rainbow Trout populations and Steelhead. ODFW and partners are investigating potential tools such as SONAR, telemetry, Passive Integrated Transponder (PIT) technology, and others to evaluate their usefulness in monitoring efforts.

What is ODFW currently doing to help inform the active reintroduction of spring-run Chinook Salmon?

ODFW is working with multiple partners (NMFS/NOAA, CDFW, The Klamath Tribes, Trout Unlimited, USBR, USGS, USFWS, U.C. Davis, and Cal Poly Humboldt) on a multiyear study help understand how juvenile spring-run Chinook Salmon might migrate through the current landscape of the Upper Klamath Basin. To accomplish this, 10,000 fertilized spring-run Chinook eggs from the CDFW Trinity River Fish Hatchery in California were raised in ODFW's Klamath Hatchery on Crooked Creek to yearlings and released in the spring of 2022 in tributaries of Upper Klamath Lake and other key areas such as Link River Dam.

These fish were tagged with PIT tags and a subsample were tagged with acoustic and radio telemetry tags. They will be monitored through detection of their tags as they migrate through the landscape of the upper basin with a goal of understanding migration behavior, reach-specific survival, predation, and passage through Link River Dam and Keno Dam (two dams that will remain in place). This study will help inform ODFW how to best proceed with active reintroduction efforts such as the most appropriate time and place to release them, how to monitor them, the abundance needed to achieve returning adults, and will help inform any restoration activities needed to improve survival, such as the screening of irrigation diversions. This multiyear study will include different release strategies such as release timing and locations in the future. It is important to note, that at this point, this is not the active reintroduction effort. This is only a study to help inform future reintroduction efforts. The geographic scope of this study ends at J.C Boyle Dam (one of the dams that will be removed).

If the current spring-run Chinook Salmon reintroduction effort is just a study when will actual reintroduction begin?

The current capacity to raise spring-run Chinook Salmon at the ODFW Klamath Hatchery is limited to 10,000 smolt-sized fish. It would take substantially more released fish to accomplish an effective reintroduction. This study will help inform how many fish, at what size/age, time, and location are best to achieve returning adults and a future self-sustaining population. ODFW plans on conducting release studies for one to five years and as funds allow to better understand the uncertainties regarding reintroduction. After these studies have been completed ODFW will have a better grasp on what is needed to effectively reintroduce spring-run Chinook Salmon to the Upper Klamath Basin.

Are there any anticipated impacts to native, resident fishes that currently exist in the Oregon portion of the Klamath River Basin by anadromous fish reintroduction?

Resident fishes of the upper basin evolved with anadromous fishes; the last 100 years absence of anadromous fishes is only a tiny fraction of the thousands of years they co-existed with each other. There are no foreseen negative impacts to resident fishes in the upper basin because of reintroduction of anadromous fishes. In fact, the Recovery Plan for ESA Threatened Klamath Bull Trout highlights the need for anadromous fishes, and the marine derived nutrients they bring to help produce food for Bull Trout that are currently only found in the unproductive headwaters. Having anadromous fishes again in the upper basin will help inform and bring other funding sources for habitat restoration that will help recover all fishes of the basin.

Will harvest of anadromous fishes be allowed in Oregon once dams are removed?

Harvest of Chinook Salmon, Steelhead Trout, Coho, and Pacific Lamprey will not immediately be allowed in Oregon once the dams are removed. The goal of this reintroduction is self-sustaining, naturally produced populations. To achieve this, the harvest of anadromous fish that are beginning to access newly available habitat following dam removal will need be protected against harvest. Once sustainable populations of anadromous fishes are achieved ODFW will develop conservation plans that could include harvest.

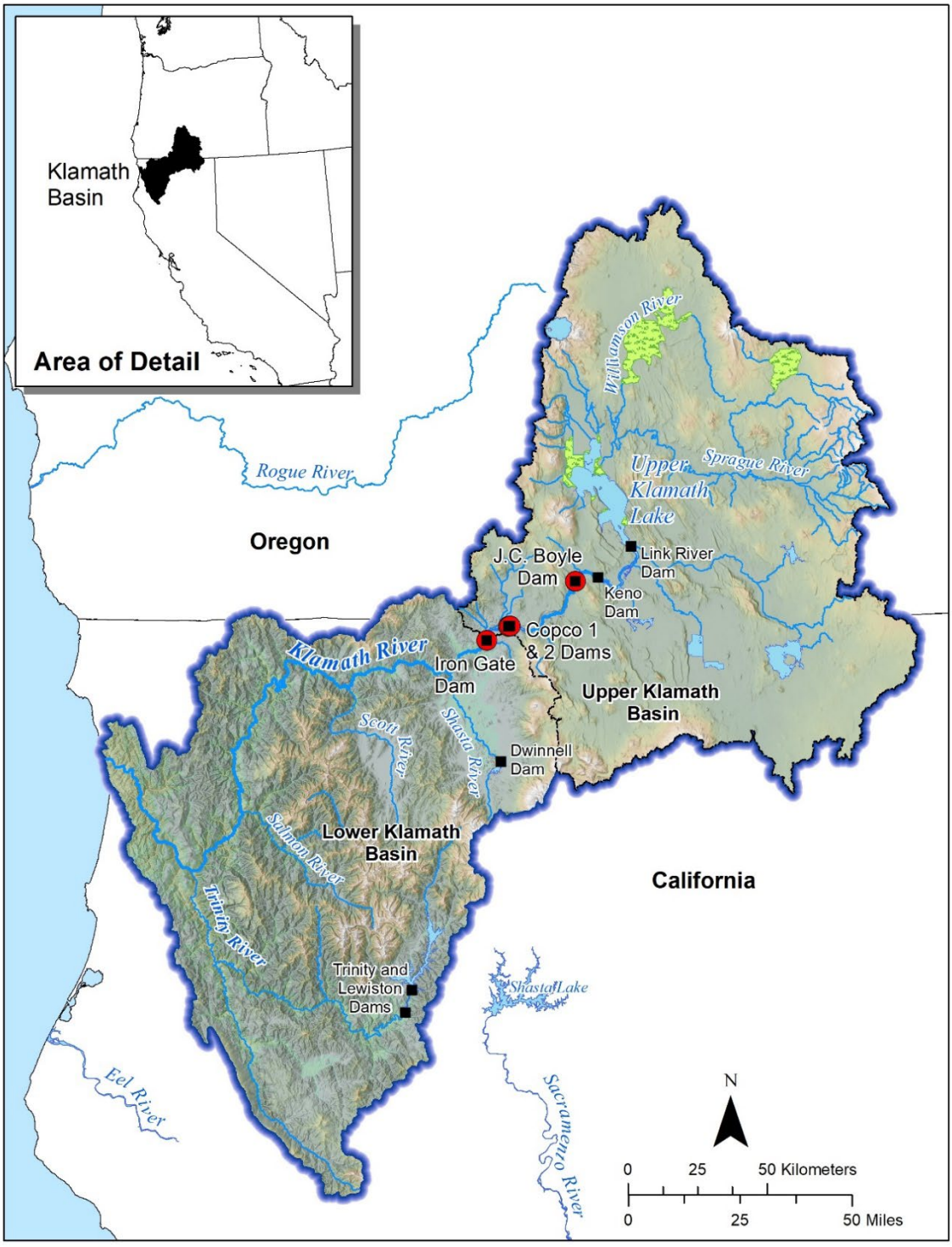
How will harvest regulations in California influence harvest regulations in Oregon?

ODFW is communicating closely with California Department of Fish and Wildlife in regarding the respective state's fishing regulations.

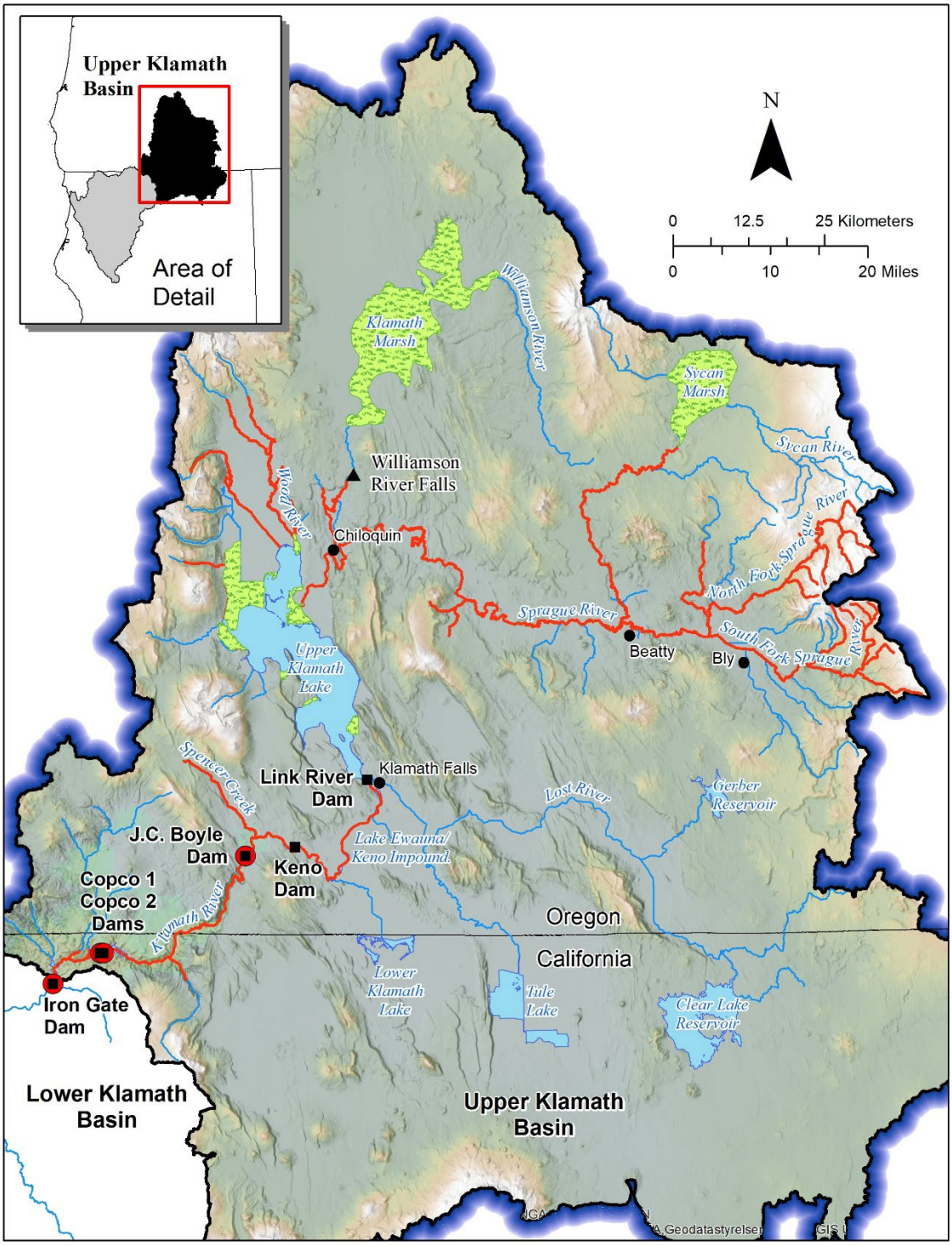
How long will it take for anadromous fishes to repopulate habitat in Oregon to sustainable levels?

One of the uncertainties regarding reintroduction is the time it will take for anadromous fishes to repopulate the newly available habitat in Oregon following dam removal. Using examples from other dam removals throughout the northwest, depending on the source populations abundance and locations of fishes readily available to repopulate plays a large role in the timing of repopulation. Source populations of fall-run Chinook Salmon, Steelhead, Coho, and Pacific Lamprey existing immediately below Iron Gate Dam along with habitat existing immediately above the dams (Klamath River and tributaries) provides an opportunity for relatively rapid repopulation of habitat immediately above the dams. Habitat further upstream from the source populations will likely take longer for anadromous fish to repopulate. Because of this uncertainty, it will be important for a robust monitoring program to determine if repopulation is occurring.

See maps below.



Selected hydrography of the Klamath Basin, including the distinction between the upper (upstream of Iron Gate Dam) and lower basin (downstream of Iron Gate Dam). Locations of dams in the Klamath Hydroelectric Project that are to be removed in 2023 (Iron Gate Dam, Copco1 and 2 Dams, and J.C. Boyle Dam) are highlighted in red, and other major dams in the Klamath Basin are shown. The current upstream extent of anadromous fishes is Iron Gate Dam.



Selected hydrography of the Upper Klamath Basin with Klamath River mainstem dams. The Upper Klamath Basin is defined as that portion of the Klamath Basin above the site of Iron Gate Dam, which excludes anadromous fishes. Dams (Iron Gate, Copco 1 and 2, and J.C. Boyle Dam) planned to be removed in 2024 are highlighted in red. Potential existing streams with suitable anadromous fish habitat are highlighted in red.