

**2024 RESIDENT FISH ASSEMBLAGE STUDY PLAN  
WELLS HYDROELECTRIC PROJECT**

**FERC PROJECT NO. 2149**

March 2024

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## 1.0 INTRODUCTION

In November 2012, the Federal Energy Regulatory Commission (FERC) issued a new Operating License (License) for the Wells Hydroelectric Project (Wells Project). To ensure active stakeholder participation and support during the relicensing process, the Public Utility District No. 1 of Douglas County (Douglas PUD) developed six Aquatic Resource Management Plans in close coordination with agency and tribal natural resource managers (Aquatic Settlement Work Group or Aquatic SWG) as part of an Aquatic Settlement Agreement (Agreement). During the development of these plans, the Aquatic SWG focused on developing management priorities for resources potentially impacted by Wells Dam (Wells Project) operations. Entities invited to participate in the Aquatic SWG include the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), Bureau of Land Management (BLM), Bureau of Indian Affairs (BIA), Washington Department of Ecology (Ecology), Washington State Department of Fish and Wildlife (WDFW), the Confederated Tribes of the Colville Reservation (Colville), the Confederated Tribes and Bands of the Yakama Nation (Yakama), and Douglas PUD.

The Resident Fish Management Plan (RFMP) is one of the six Aquatic Resource Management Plans required to be implemented under the Project FERC license. Douglas PUD, in consultation with the Aquatic SWG will direct implementation of measures identified within the RFMP to protect and enhance native resident fish populations in the Wells Reservoir. Objective 2 of the RFMP requires Douglas PUD to conduct a study to determine the relative abundance of resident fish species found in the Wells Reservoir in year 2 and every 10 years thereafter during the new license term.

To satisfy the ten-year requirement this study plan was developed in consultation with the Aquatic SWG. The study objectives will focus on (1) identifying whether there have been major shifts in the resident fish populations resulting from the implementation of the White Sturgeon, Bull Trout, Pacific Lamprey, and Aquatic Nuisance Species (ANS) Management Plans, and (2) collecting information on resident predator fish populations found within the Wells Reservoir. Methodology for monitoring species composition shall remain consistent with the methods described in Beak (1999), allowing for comparisons between previous and future resident fish species assemblage studies. Information collected from these monitoring activities may be used to inform the implementation activities of the other Wells Aquatic Resource Management Plans and the Wells Anadromous Fish Agreement and Habitat Conservation Plan (HCP) predator control activities (Douglas PUD 2002).

## 2.0 STUDY GOALS AND OBJECTIVES

Consistent with Section 4.2 of the RFMP, the primary goal of the 2024 Resident Fish Assemblage Study will be to determine the relative abundance of the various resident fish species found within the Wells Reservoir. Specific objectives of the study include:

1. Collect resident fish abundance data using previously established methods and make comparisons to results of past studies.
2. Collect baseline resident fish abundance data using alternative sampling methods, with focus on species ineffectively sampled by previously established methods.

3. Compare the effectiveness of previously established and alternative sampling methods for individual resident fish species and develop relationships for comparing results among sampling methods.
4. Use established and alternative sampling methods to determine the abundance and distribution of non-native predator species (Walleye [*Sander vitreus*], Smallmouth Bass [*Micropterus dolomieu*], and Largemouth Bass [*Micropterus salmoides*], Northern Pike [*Esox lucius*], and native predators (Northern Pikeminnow [*Ptychocheilus oregonensis*] and Burbot [*Lota lota*]).

## **3.0 BACKGROUND**

### **3.1 Resident Fish Species**

The resident fish assemblage present in the Wells Reservoir is composed of a diverse community of native and introduced, warm and cold-water, and sport and non-sport fish species. Since the construction of Wells Dam several studies have either directly (McGee 1979; Beak 1999; Kyger 2015) or indirectly (Dell et al. 1975; Burley and Poe 1994) addressed the resident fish assemblage in the Wells Reservoir.

#### **3.1.1 Wells Project Resident Fish Assessments**

Many previous studies in the upper and middle Columbia River have commented either directly or indirectly on resident fish assemblage. For example, during a study assessing the occurrence of gas bubble disease in fish in the mid-Columbia River reservoirs, Dell et al. (1975) observed that the most abundant resident fish species in the Wells Reservoir were suckers (*Catostomus* spp.), Northern Pikeminnow, and Redside Shiners (*Richardsonius balteatus*). These researchers also determined that Bluegill (*Lepomis macrochirus*) and Pumpkinseed (*Lepomis gibbosus*) were the most abundant resident sport fish, although these two species accounted for less than two percent of the total 32,289 fish sampled in the study area, which encompassed the area from Priest Rapids Dam upstream to Chief Joseph Dam. Overall, 27 species of resident fish were identified in the study area (Table 1).

**Table 1 Native and non-native resident fish species that have been documented in the Wells Reservoir from past resident fish assessments, monitoring efforts, and miscellaneous studies (Dell et al. 1975; McGee 1979; Burley and Poe 1994; Beak 1999; NMFS 2002; BioAnalyst, Inc. 2004).**

Native Species	Non-Native Species
White Sturgeon - <i>Acipenser transmontanus</i> *	Carp - <i>Cyprinus carpio</i>
Chiselmouth - <i>Acrocheilus alutaceus</i>	Black Bullhead - <i>Ictalurus melas</i>
Longnose Sucker - <i>Catostomus catostomus</i>	Brown Bullhead - <i>Ictalurus nebulosus</i>
Bridgelip Sucker - <i>Catostomus columbianus</i>	Pumpkinseed - <i>Lepomis gibbosus</i>
Largescale Sucker - <i>Catostomus macrocheilus</i>	Bluegill - <i>Lepomis macrochirus</i>
Prickly Sculpin - <i>Cottus asper</i>	Smallmouth Bass - <i>Micropterus dolomieu</i>
Threespine Stickleback - <i>Gasterosteus aculeatus</i>	Largemouth Bass - <i>Micropterus salmoides</i>
Burbot - <i>Lota lota</i>	Yellow Perch - <i>Perca flavescens</i>
Peamouth - <i>Mylocheilus caurinus</i>	Black Crappie - <i>Pomoxis nigromaculatus</i>
Rainbow Trout - <i>Oncorhynchus mykiss</i>	Walleye - <i>Sander vitreus</i>
Mountain Whitefish - <i>Prosopium williamsoni</i>	Tench - <i>Tinca tinca</i>
Northern Pikeminnow - <i>Ptychocheilus oregonensis</i>	Lake Whitefish - <i>Coregonus clupeaformis</i>
Redside Shiner - <i>Richardsonius balteatus</i>	
Dace - <i>Rhinichthys spp.</i>	
Bull Trout - <i>Salvelinus confluentus</i> *	

\* Individual management plans for both White Sturgeon and Bull Trout have been developed and as such, they are not addressed in this Resident Fish Management Plan.

McGee (1979) noted that Chiselmouth (*Acrocheilus alutaceus*), Redside Shiners, and Largescale Suckers (*Catostomus macrocheilus*) were the most abundant non-sport fish captured during Wells Reservoir surveys while Pumpkinseed were the most abundant sport fish caught. Similar sampling methods to the 1974 study (Dell et al. 1975) were employed to ensure that results of the study were comparable with past observations. In total, 2,480 fish were collected during the study using live traps, beach seines and angling. Twenty of the 27 known species previously trapped in other mid-Columbia reservoirs (Dell et al. 1975) were captured in the Wells Reservoir during the study.

In 1998, Douglas PUD conducted an updated Wells Reservoir resident fish assessment (Beak 1999). Again, an effort was made to implement a sampling design similar to the two previous studies (1974 and 1979) thereby allowing comparisons with past results. In total, 22 species of fish were identified with 5,657 fish captured using beach seines and 716 fish observed via diving transects. Beak (1999) reported suckers as the most abundant resident fish captured in beach seining sampling in the Wells Project study area. These species represented 41% of the beach seining catch and 46% of the underwater diver survey count. Other abundant species in the beach seine catch were Bluegill (32%), Northern Pikeminnow (10%), Peamouth (*Mylocheilus caurinus*, 6%), and Carp (*Cyprinus carpio*, 5%). Fifteen other species represented the remaining 7% of the total catch of 3,783 fish.

In 2014, Douglas PUD conducted the 2014 Resident Fish Assemblage Study (Kyger 2015). The study utilized beach seine and snorkel sampling methods that were comparable to previous resident fish studies in the Wells Reservoir in addition to boat electrofishing and baited setline sampling methods. Another objective of the study was to estimate the abundance of Smallmouth Bass, in the Okanogan River from the mouth upstream to the Wells Project boundary, and Burbot in the deeper areas of the reservoir. Twenty-two different species of resident fish were observed during the study and nearly 13,000 individual fish were captured or observed (Table 2). Threespine Stickleback (*Gasterosteus aculeatus*) and Redside Shiner (*Richardsonius balteatus*) were the most abundant fish species observed in the Wells Reservoir wide. Similar to the results from past studies, sucker species and Northern Pikeminnow were some of the most abundant species. Northern pikeminnow were the most abundant predator species, followed by Smallmouth Bass. These results were similar to what has been observed in previous resident fish studies conducted in the Wells Reservoir.

**Table 2. Resident fish species observed during previous resident fish assessments in the Wells Reservoir.**

Species	Resident Fish Assessment Year			
	1974	1979	1999	2015
Black Crappie		X	X	
Bluegill	X	X	X	X
Bridgelip Sucker	X	X	X	X
Brown Bullhead	X	X	X	X
Bull Trout	X			
Burbot				X
Carp	X	X	X	X
Chiselmouth	X	X	X	X
Lake Whitefish			X	
Largemouth Bass	X	X	X	X
Largescale Sucker	X	X	X	X
Longnose Sucker			X	
Mountain Whitefish	X	X	X	X
Northern Pikeminnow	X	X	X	X
Peamouth	X	X	X	X
Prickly Sculpin	X	X	X	X
Pumpkinseed	X	X	X	X
Rainbow Trout		X	X	X
Redside Shiner	X	X	X	X
Smallmouth Bass	X	X	X	X
Speckled Dace	X	X	X	X
Tench	X	X		X
Threespine Stickleback		X		X
Walleye	X		X	X
White Sturgeon*				
Yellow Bullhead	X		X	X
Yellow Perch	X	X	X	X

\*White Sturgeon have been documented in the Wells Reservoir but have not been captured during previous resident fish assessments.

### 3.1.2 Sport Fish Species

A number of species of fish with recreational value are either known to exist in the project or are suspected to be present in low numbers. These species are of particular interest given their recreational value. Many of these species are native, while others are considered non-native originating from above Wells Dam or at one time stocked into the Wells Project waters. These recreational fish species are summarized below.

#### Burbot

Burbot (*Lota lota*) are the only freshwater member of the cod family. They are native to Washington State and are found in several lakes in the Columbia River Basin and have also colonized the reservoirs of the Columbia River as dams were constructed. Burbot typically inhabit deep water and are most active at night. Burbot are predatory, feeding on invertebrates as juveniles with fish becoming an increasingly important part of their diet as they reach larger sizes. Spawning occurs during late winter and early spring in shallow bays of lakes and rivers over sand or gravel bottom (Wydoski and Whitney 2003). Burbot are classified as a Washington sport fish with recreational harvest occurring in some waters.

#### Kokanee

Landlocked Sockeye (*Oncorhynchus nerka*), known as Kokanee are a native fish which occur in several lakes in the mid and upper Columbia basins including Lake Wenatchee, Lake Chelan, Lake Osoyoos, and Lake Roosevelt. Although previous resident fish assessments have not detected the presence of this fish species in the Wells Project, anecdotal information exists indicating that low numbers of Kokanee may be present in the Project. These fish likely originate from Lake Roosevelt, above Grand Coulee Dam, and during periods of high spring flow are displaced downstream through Grand Coulee and Chief Joseph dams and into the Wells Reservoir.

#### Largemouth Bass

Largemouth Bass (*Micropterus salmoides*) were widely introduced in Washington State in the late 1800s (Wydoski and Whitney 2003). They are listed as a priority species in Washington State because of their vulnerability to habitat loss or degradation and their recreational importance (WDFW 2002). Largemouth Bass prefer clear water habitat with mud and sand substrates, which is best suited for aquatic vegetation production (Wydoski and Whitney 2003). Largemouth Bass are known to inhabit the lower 10 miles of the Okanogan River and the Columbia River immediately adjacent to the mouth of the Okanogan River. Little is known about the behavior of largemouth bass in the Wells Reservoir as they were infrequently captured during past resident fish studies (Kyger 2015; Beak 1999; Duke 2001; Burley and Poe 1994).

#### Mountain Whitefish

Mountain Whitefish (*Prosopium williamsoni*) are assumed to occur in all small-order tributaries to the Methow, Okanogan, Wenatchee and Entiat rivers, and in larger lakes throughout the Columbia River Basin. They are also believed to occur in the mainstem reservoirs, although

their behavior patterns are not known. They mostly inhabit riffles in summer and large pools in winter (Wydoski and Whitney 2003). Spawning typically occurs from October through December, generally in riffles, but also on gravel shoals of lake shores. Mountain Whitefish feed primarily on instar forms of benthic aquatic insects, although they also occasionally eat crayfish, freshwater shrimp, leeches, fish eggs and small fish. In lakes, they feed extensively on zooplankton, particularly cladocerans. There is evidence that Mountain Whitefish still spawn in the lower reaches of some tributaries (NMFS 2002). Mountain Whitefish appear to use the Wells Reservoir principally as a migration route between spawning areas in the Methow River and the Wells Dam Tailrace (Zook 1983).

### Northern Pikeminnow

Northern Pikeminnow are a slow-growing, long-lived predator native to the Columbia River Basin. In summer, adult Northern Pikeminnow prefer shallow, low velocity areas in cool lakes or rivers. During the winter, they use deeper water and pools (Scott and Crossman 1973). Spawning occurs during the summer, in shallow water areas with gravel substrate. Northern Pikeminnow tend to concentrate in tailrace areas downstream of mainstem dams during the juvenile salmonid migration period, holding in relatively slow-moving water areas (less than about 3 feet per second) near passage routes (NMFS 2002). Due to their large numbers and distribution throughout the Columbia River Basin, Northern Pikeminnow are considered to pose the greatest predation threat to migrating juvenile anadromous salmonids (NMFS 2002). Since 1995, Douglas PUD has implemented a Northern Pikeminnow removal program. Since 2004, this program has been a requirement of the Wells HCP. Removal efforts have taken approximately 380,000 from Wells Dam Tailrace during the past 20 years of implementation (Jerald 2022).

### Redband Rainbow Trout

Redband Rainbow Trout (*Oncorhynchus mykiss gairdneri*) are native interior Rainbow Trout. The resident form remains in freshwater its entire life and the anadromous form migrates to the ocean and is referred to as a steelhead. The life history of Rainbow Trout appears to be plastic, with some resident forms becoming anadromous, and some offspring of anadromous fish becoming resident (Peven 1990). Resident Rainbow and juvenile Steelhead are not distinguishable from each other until the Steelhead undergo smoltification. The mid-Columbia River tributaries contain a mixture of resident Rainbow and ocean-migrating Steelhead. Resident Rainbow Trout are likely present in low numbers in the Wells Reservoir. During the 1998 resident fish assessment, Rainbow Trout consisted of 0.05% of the relative catch (Beak 1999).

### Smallmouth Bass

Smallmouth Bass (*Micropterus dolomieu*) are a non-native sport fish that have inhabited the mid-Columbia River reach since at least the 1940s. Preferred habitat for this species includes rocky shoals, banks, or gravel bars. Adult Smallmouth Bass in the mid-Columbia River are most abundant around the deltas of warmer tributary rivers. In the Wells Reservoir, Smallmouth Bass are typically found in the lower Okanogan River and the confluence of the Okanogan and

Columbia rivers (Beak 1999). They are also abundant upstream of Wells Project in Lake Roosevelt and in Lake Osoyoos.

Smallmouth Bass were the second most abundant predator species captured in the mid-Columbia River during predator assessment sampling conducted in 1994. They were most frequently captured from the Wells Forebay sampling sites (Burley and Poe 1994). Similar relative abundance estimates of Smallmouth Bass were observed in recent sampling programs in other mid-Columbia River reservoirs (Beak 1999; Duke 2001). They are a significant fish predator species in the Columbia River, and are known to prey on juvenile salmonids among other forage items. In the 1994 predator assessment, fish composed 87% of the Smallmouth Bass diet, with salmonids consisting of 11% of the prey fish.

### Walleye

Walleye (*Sander vitreus*) are a cool-water, piscivorous sport fish believed to have moved downstream into the mid-Columbia River reach from a population established for recreational fishing in Lake Roosevelt and Banks Lake in the late 1950s (Zook 1983). They were the least abundant predator species captured in the mid-Columbia River in 1994 (Burley and Poe 1994). They are listed as a priority species in Washington State because of their vulnerability to habitat loss or degradation and their recreational importance (WDFW 2002).

Walleye occur throughout the mainstem reservoirs but are not typically found in the tributaries. Although suitable spawning habitat appears to be plentiful in the mid-Columbia River, peak summer temperatures in this section of river are suboptimal and appear to restrict the recruitment of subyearling Walleye to the yearling age class (Zook 1983). Recruitment of Walleye into the mid-Columbia River reservoirs is suspected to result from the entrainment of young fish through Grand Coulee and Chief Joseph dams during spring run-off (Zook 1983).

### **3.1.3 Other Resident Non-Sport Species**

Resident non-sport species make up the bulk of the fish biomass in the Wells Reservoir. Many of these species are native to the Wells Reservoir, including Chiselmouth, Peamouth Chub, Redside Shiner, Largescale Sucker, Bridgelip Sucker (*Catostomus columbianus*), Prickly Sculpin (*Cottus asper*), Threespine Stickleback, and dace species (*Rhinichthys spp.*) (See Table 1). Currently, no management actions or active fisheries for these species occur.

## **4.0 STUDY METHODS**

A variety of sampling methods will be used to achieve the study objectives. Due to the reliance of past studies on beach seining as a primary sampling method, it will again be employed to allow for appropriate comparisons of results between study years. To address possible data gaps for individual species due to sampling gear bias or inefficiency, methods such as boat electrofishing, fyke netting, baited hoop nets, minnow traps, and gill nets will also be used. Boat electrofishing was used in 2014 but not in previous resident fish investigations on the Wells Project.

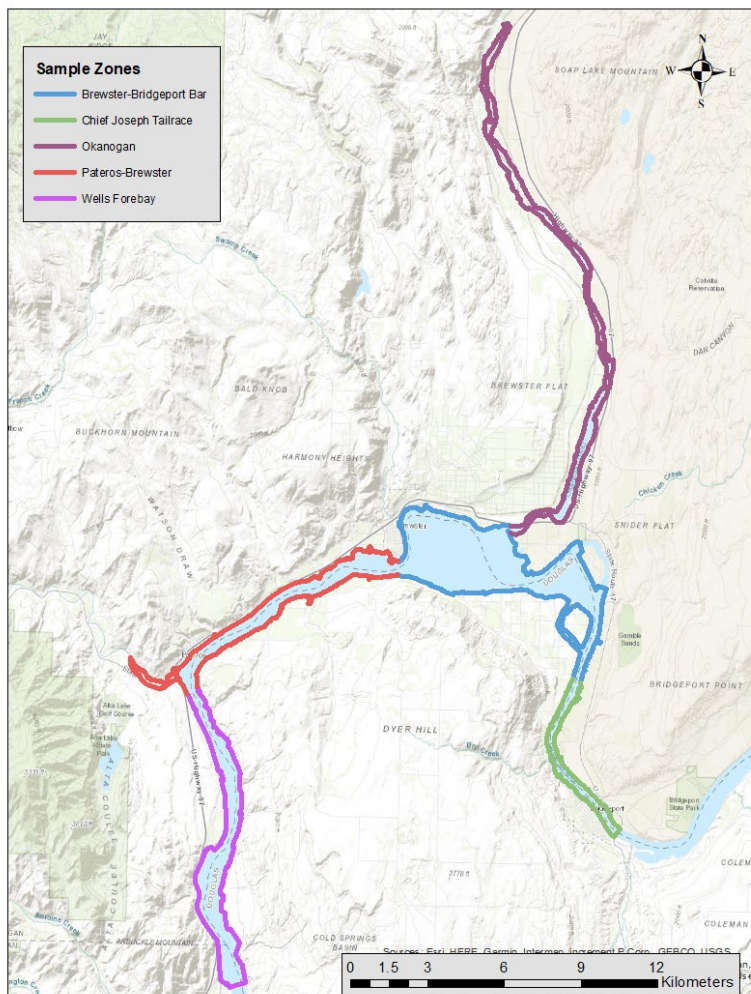


## 4.1 Sample Sites and Timing

### 4.1.1 Sampling locations

Sampling sites will be stratified into five sampling zones. (Figure 1):

1. Wells Forebay – from the face of Wells Dam upstream to the confluence of the Methow River.
2. Pateros-Brewster – from the confluence of the Methow River to the highway 173 bridge in Brewster including the Methow River to the Wells Project boundary at river mile (RM) 1.5.
3. Brewster-Bridgeport Bar – from the highway 173 bridge in Brewster to just upstream of Bridgeport bar at RM 540.
4. Okanogan River – the Okanogan River from the mouth upstream to the Wells Project boundary at RM 15.5.
5. Chief Joseph Tailrace – from RM 540 to the boat restricted zone below Chief Joseph Dam.



**Figure 1. Map of resident fish sampling zones in the Wells Project.**

The greatest sampling effort will be focused in the Brewster-Bridgeport Bar zone, where the greatest sampling effort took place in previous resident fish investigations. Specific sample sites in each zone will be in the same general locations sampled by Beak (1999). Information on sampling site characteristics will be collected at each site. The information collected will include: depth, water temperature, bottom substrate type, presence of aquatic macrophytes, and presence of woody debris.

#### **4.1.2 Seasonal timing of sampling**

Previous resident fish investigations in the Wells Project (Kyger 2015 and Beak 1999) focused sampling during the months of August and September. The 2024 study will also encompass these summer months to allow for comparisons to previous results. However, in 2024 the sampling period will be expanded to allow for observations of seasonal patterns of resident fish abundance and distribution and to provide insights into potential seasonal bias of sampling methods.

### **4.2 Sampling Methods**

#### **4.2.1 Beach seining**

Beach seining will be the primary sampling method used during the study in order to make comparisons to results from previous investigations. The specifications of the beach seines will match those used by Beak (1999):

Length	30.5 meters
Bag Dimensions	3 meters x 3 meters x 3 meters
Panel Depth	1.8 meters
Mesh	Knotless 6.4mm stretch
Float Spacing	0.5 meters

Beach seines will be deployed from the bow of a boat with one end attached to shore. The end of the net attached to the boat will be pulled ashore and any fish captured will be quickly removed from the net bag and placed in aerated holding containers filled with fresh water. Captured fish will be identified to species and enumerated. Total length (mm) and weight (g) measurements of each fish will also be taken. For non-sport non-predator species captured in large numbers (>100 per sample; i.e. stickleback, shiners, etc.) numbers may be estimated and no length and weight measurements taken. Native fish species will be released at the location of capture. Non-native fish species will be euthanized and removed.

Sixty sites throughout the reservoir will be sampled by beach seine. At least 30 of the sites sampled by beach seines will be within sampling zone 3 (Brewster-Bridgeport Bar). Sample sites will be selected using generalized random tessellation stratified design (GRTS) to ensure a spatially balanced sample. Beach seines will not be fished in areas with high concentrations of outmigrating smolts during the peak outmigration season (May-July) to avoid impacts of those species.

#### **4.2.2 Fyke netting**

Fyke nets will be used to sample littoral areas in the Wells Project Reservoir. Sixty fyke net sites will be selected using GRTS, stratified by sampling zone. Fyke nets will consist of two 60cm x 90cm rectangular frames with two 30cm hoops leading to a single throat with an opening size 8cm and a 7.5m long center lead. All components will use 3.2mm delta mesh netting. Nets will be set perpendicular to shore and fished overnight. Upon retrieval, fish will be removed from the net and identified to species and enumerated. Total length (mm) and weight (g) measurements of each fish will also be taken. For non-sport non-predator species captured in large numbers (>100 per sample; i.e. stickleback, shiners, etc.) numbers may be estimated and no length and weight measurements taken. Fyke nets will not be fished in areas with high concentrations of outmigrating smolts during the peak outmigration season (May-July) to avoid impacts of those species. Native fish species will be released at the location of capture. Non-native fish species will be euthanized and removed.

#### **4.2.3 Boat electrofishing**

Boat electrofishing will be used to sample littoral areas in the Okanogan River zone. Ten sample sites will be selected using GRTS for sampling on a single occasion; five sites sampled April to June and five sites sampled July to September. An additional five sites selected using GRTS will be sampled during recurring visits, three times each, approximately every two weeks from July through September. Electrofishing sampling will follow the methods outlined in the Washington Department of Fish and Wildlife Standard Fish Sampling Guidelines for Washington State Ponds and Lakes (Bonar et al. 2000). Sampling sites that are selected will serve as the starting point of the electrofishing session. A boat mounted electrofishing unit with power settings standardized to water conductivity for each sampling area will be used to immobilize and collect fish. Two technicians at the bow of the boat will use long handle dip nets to collect immobilized fish and place them into an aerated live well onboard. Each boat electrofishing sampling occasion will consist of approximately 600 seconds of effort, as recorded by the electrofishing unit, beginning at the selected start point and moving upstream while thoroughly sampling the available habitat. The total sampling effort time will be recorded along with start and end locations. All fish collected will be identified to species, enumerated and have total length (mm) and weight (g) measurements taken. Fish will be checked for fin clips, and any other marks or tags. Native fish species will be released at the location of capture. Non-native fish species will be euthanized and removed, with the exception of Smallmouth Bass which will be tagged and released to support mark-recapture abundance estimation objectives.

#### **4.2.4 Hoop nets/ traps**

Baited hoop nets/ traps will be used to capture Burbot at 12 sites in the Wells Reservoir. Sites will be chosen from the list of Burbot sites developed during the 2014 Resident Fish Assemblage Study. Each site will be sampled three times approximately one week apart in the Spring and again in the Fall. Hoop nets will be 4.5 meters in length with a diameter of 0.6 meters with seven hoops tapering to an inner throat diameter of 25cm and consist of 12.7mm square knotless nylon netting. Hoop nets/traps will be baited with cut chunks of herring or Northern Pike/minnow. Traps will be fished on the river bottom attached to an anchor and will be fished

overnight. Upon retrieval, fish will be removed from the trap and identified to species and enumerated. Total length (mm) and weight (g) measurements of each fish will also be taken. Fish will be checked for fin clips, and any other marks or tags. Burbot will be implanted with a PIT tag if no existing tag is present. Native fish species will be released at the location of capture. Non-native fish species will be euthanized and removed. A descending device will be used to release Burbot at depth to mitigate impacts of barotrauma.

#### 4.2.5 Minnow Traps

Cylindrical minnow traps will be fished in littoral areas at 40 sites selected using GRTS: 5 per month March through November. Minnow traps will be constructed of vinyl dipped 3mm steel mesh with dimensions 25cm in length and 23cm in diameter with 3 cm openings on each end. Traps will be baited with mesh sacks filled with fish feed pellets (approximately 25g). Traps will be fished overnight and retrieved the following day. Upon retrieval, fish will be removed from the trap and identified to species and enumerated. Total length (mm) and weight (g) measurements of each fish will also be taken. Native fish species will be released at the location of capture. Non-native fish species will be euthanized and removed.

#### 4.2.6 Fall Gill Netting

During the month of November, gill nets will be fished at 20 sites selected using GRTS. Experimental monofilament gill nets measuring 1.8 m x 61m containing eight sections of increasing mesh sizes (25, 38, 51, 64, 76, 102, 127, and 152 mm) will be deployed following the Fall Walleye Index Netting (FWIN) protocol used for monitoring Walleye populations in Washington lakes based on Morgan (2002). Nets will be set overnight and retrieved the following morning. Upon retrieval, fish will be removed and identified to species and enumerated. Total length (mm) and weight (g) measurements of each fish will also be taken. Native fish species will be released at the location of capture. Non-native fish species will be euthanized and removed.

**Table 3. Summary and timing of sampling methods.**

Sampling Method	Number of Sites	Timing/Frequency	Total number of Samples
Beach Seine	60	10 sites per month (May-Oct)	60
Fyke Net	60	10 sites per month (Mar-May, Oct-Dec)	60
Hoop Nets/Cod Traps	12	3 times (Mar-June), 3 times (Oct-Dec)	72
Minnow Traps	40	5 sites per month (Mar-Nov)	40
Boat Electrofishing (Single Occasion)	10	5 sites (Apr-Jun), 5 sites (July-Sept)	10
Boat Electrofishing (Recurring)	5	3 times (July-Sept)	15
Fall Gill Net (FWIN)	20	20 sites (Nov)	20

## **4.3 Predator Species of Interest**

### **4.3.1 Burbot**

Burbot are a native cold-water predator species known to inhabit the upper Columbia River and have previously been documented in the Wells Reservoir. Targeted sampling of Burbot occurred during the 2014 Resident Fish Assemblage Study and abundance of Burbot in the Wells Reservoir was estimated between roughly 5,000 and 7,000 fish (Kyger 2015).

In an effort to better characterize the Burbot population in Wells Reservoir, baited traps will be used to target Burbot. The hoop nets/cod traps methodology described in Section 4.2.5 is specifically designed to target Burbot and will be used to capture and tag Burbot at 12 sample sites. Native fish species will be released at the location of capture. Non-native fish species will be euthanized and removed.

### **4.3.2 Smallmouth Bass**

Smallmouth Bass populations have flourished in the lower Columbia River near John Day Dam especially with efforts dedicated to reducing Northern Pikeminnow (Carey et al. 2011). Over 1,200 Smallmouth Bass were captured during the 2014 Resident Fish Assemblage Study with the highest relative abundance observed in the Okanogan Zone. Consistent with the goals and objectives of the RFMP, Douglas PUD intends to gather more data on Smallmouth Bass distribution and relative abundance in the Wells Reservoir to monitor their abundance over the course of the new license.

Smallmouth Bass will be sampled in concurrence with the other general resident fish sampling methods, and also by recurring electrofishing sampling at a subset of 5 sites in the Okanogan River Zone and in the Columbia River near the mouth of the Okanogan River. Three sampling sessions will be conducted roughly one month apart. The same electrofishing sampling methods used to sample general resident fish sampling sites will be employed to sample additional Smallmouth Bass sampling sites. Smallmouth Bass that are captured will have total length (mm) and weight (g) measurements taken and will be marked with an individually numbered Floy® T-bar anchor tag (Floy) below the dorsal fin and have a PIT tag implanted prior to release. Recaptured Smallmouth Bass will have total length (mm) and weight (g) measurements taken and have their tag information recorded and be released.

### **4.3.3 Northern Pikeminnow**

Northern Pikeminnow are the most abundant predator in the Wells Reservoir observed during previous resident fish assemblage studies (Kyger 2015 and Beak 1999). Ongoing Northern Pikeminnow removal efforts in the Wells Project have shown a steady decline in catch per unit effort (CPUE) for set-line caught Pikeminnow (Jerald 2022). While results of the removal program suggest a downward trend in relative abundance of Northern Pikeminnow, these efforts are not designed for estimating the distribution and abundance of the species throughout the reservoir. Beginning in 2024, setlines will be fished at up to 20 sites selected using GRTS during the typical Northern Pikeminnow removal fishing period (March-November). Data

collected during these efforts will be incorporated in this resident fish assemblage study and will also be used in future years to monitor trends in Northern Pikeminnow abundance and the effectiveness of the removal program.

Northern Pikeminnow relative abundance will be estimated for each sampling zone using beach seining, fyke netting, and electrofishing as part of general resident fish sampling. In addition, the Northern Pikeminnow removal program will continue in the Wells Project in 2024. Total catch and CPUE from baited set-lines used in Pikeminnow removal efforts will be compared to previous year's efforts and with the other sampling techniques employed in 2024. In addition, Northern Pikeminnow captured in 2024 that exceed 250mm in length will be tagged with a Floy tag, and if data are sufficient mark-recapture abundance estimates will be produced for fish within the size class.

#### **4.3.4 Walleye**

The results of previous resident fish investigations, along with the limited number incidental encounters during sampling as part of other fisheries activities, suggest that low numbers of Walleye are present in the Wells Reservoir. Some recreational angling effort takes place for Walleye in a limited number of locations, but Walleye are not thought to be widely distributed throughout the Wells Reservoir. Previous resident fish investigations focused sampling primarily in the littoral zone. It is possible that Walleye inhabit deeper areas seasonally that were not effectively sampled with the methods utilized in past studies. Fall gill netting following the FWIN methodology will be used to target Walleye specifically during this study.

#### **4.4 Non-target Fish Species of Concern**

Endangered Species Act (ESA)-listed Steelhead, spring Chinook, and Bull Trout are known to inhabit the Wells Reservoir especially during the migration period between May and July. While it is unlikely that these species will be encountered during resident fish sampling, Douglas PUD holds the appropriate permits regarding the incidental capture or harassment of these species and will employ proper fish handling techniques if they are encountered. Any encounter with ESA-listed species during the course of the study will be documented and reported to the appropriate regulating agency in accordance with the permits.

Douglas PUD is actively monitoring the presence of White Sturgeon in the Wells Project area. Any Sturgeon captured or observed during the resident fish sampling will be examined for scute markings. If captured, PIT tag codes will be recorded and a length measurement taken. The location of each Sturgeon captured will also be recorded. Untagged fish will be given a PIT tag. A tissue sample (pectoral fin clip) will be collected from all captured Sturgeon and stored in vials of 90% ethanol for future genetic analysis in support of the objectives of the White Sturgeon Management Plan.

## **5.0 DATA ANALYSIS AND REPORTING**

### **5.1 Data Analysis**

#### **5.1.1 Comparisons to previous studies**

Mean CPUE of each resident fish species for each sampling method will be calculated. A two-factor ANOVA will be used to assess differences in mean CPUE among gear type and sampling season during this study. If statistically significant differences or interaction among gear type and season are observed, post-hoc tests will be conducted to determine which gear types and seasons are different. Mean CPUE for beach seine and electrofishing methods from Kyger (2015) will be compared to mean CPUE of those methods in 2024. Should the results indicate no statistically significant difference in mean CPUE among gear type or season in 2024, data from similar methods and seasons will be pooled and compared to the results of Kyger (2015).

#### **5.1.2 Burbot, Smallmouth Bass, and Northern Pikeminnow**

In addition to total catch and relative abundance, if data are sufficient, mark-recapture estimates of abundance will be calculated for Burbot, Smallmouth Bass, and Northern Pikeminnow. Length-frequency histograms will also be developed for each species.

Sampling for Burbot, Smallmouth Bass, and Northern Pikeminnow is designed to collect data to be used to estimate the abundance of each species using an open capture-recapture model such as POPAN (Schwarz and Arnason 1996). If recapture numbers are insufficient to estimate abundance using open mark-recapture models alternative methods such as N-mixture models will be used to estimate abundance of these species (Royle 2004).

### **5.2 Reporting**

A report summarizing the results of the 2024 Resident Fish Assemblage Study will be provided to the Aquatic SWG in February 2025. The report will also include a map of resident fish species distribution and relative abundance in the Wells Project. In-season updates of the progress of the study will also be provided at the request of the Aquatic SWG.

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