# Fish Passage Plan (FPP) Change Form

**Change Form # & Title**: 22AppF001 – Dewatering Removal of Invasive Species

**Date Submitted**: 22-December-2021

**Project**: The Dalles Dam

**Requester Name, Agency**: Bob Cordie, Corps TDA

**Final Action: APPROVED 1/27/22**

**FPP Section**: Appendix F – Dewatering Guidelines & Fish Salvage Plans, section 6.

**Justification for Change**:

Known and verified non-native salmonid predators encountered during fishway and turbine dewatering are bass, walleye, and channel catfish. The potential threat of northern pike (not pikeminnow) in the upper Columbia basin should also be included for removal if this species is encountered during fishway and turbine dewatering. These fish will either be removed and euthanized without returning to the Columbia river or they will be left in place if removal requires excessive efforts. Non-native fish are a scientifically proven detriment to salmonid populations for many years. This effort will add to the protection of Columbia River ESA listed salmonids and other native fish species.

Some of the past studies for this action can be found in the summary of literature copied below.

Other more recent information is readily available on-line.[[1]](#footnote-1) The evidence is overwhelming and changes in our practice are well overdue. We welcome a list of potential *‘benefits of non-native predators’* for all managers to consider in this decision.

Zimmerman 1999. Lower Columbia, 1990-1996:

* Walleye consume almost exclusively fish, and in spring, salmonids are largest component of diet by wt
* # Fish consumed by walleye: 13.8% salmonids
* # Fish consumed by SMB: 14.2% salmonids
* NPM consume proportionally more salmonids (>84%) than other fish, compared to walleye and SMB, but Poe et al. 1994 suggest nonnatives outcompete NPM for other non-salmonid prey, thereby increasing salmon predation by NPM



Fritts et al. 2004. Yakima River, WA 1998-2001

* Chinook salmon compose 47% of fish in smallmouth bass gut contents on Yakima River (up to nearly 30% of total gut contents)
* SMB pop 3,3470-19,438, late March to June
* SMB consumed average of 200,405 salmonids/yr; 3,176 were yearlings
* Consumed more naturally-spawning ocean-type (fall) Chinook (up to 85%) than hatchery fish; ate smallest salmon available (subyearlings)
* Predation of yearling salmonids never exceeded 3% of annual production

Baldwin et al. 2003. Lake Roosevelt, WA 1999-2000

* Hatchery kokanee 75-100% of large walleye (>300mm) diet by weight in 1999
* Kokanee and rainbow trout 25-79% of large walleye diet by wt in 2000, 8% of small walleye diet
* Ate more small than large salmonids, but larger walleyes ate larger prey
* Consumption 3-12.4 g/d in 1999, 0.1-8.8 g/d in 2000
* Predation 15% of 1999 hatchery kokanee release; 9.4% of 2000 kokanee release; 7.3% of 2000 rainbow trout release

Vigg et al. 1991 (abstract only). John Day Reservoir, 1983-1986

* Greatest daily consumption of salmonids: Walleye- 0.2 prey/predator, SMB- 0.04 prey/predator, NPM- 0.7 prey/predator, channel catfish- 0.5 prey/predator
* Consumption rates highest in July, coincident with max temp and juv salmonid abundance

Poe et al. 1991 (abstract only). John Day reservoir, April- August 1983-1986

* % of diet salmon and steelhead: NPM-67%, channel catfish- 33%, walleyes- 14%, SMB- 4%

Rieman et al. 1991 (abstract only). John Day reservoir, 1983-1986

* Mean annual loss 2.7 mil juv salmonids (78% by NPM, 13% by walleyes, 9% by SMB)
* Total consumption of 14% of all juv salmonids that entered the reservoir

Tabor et al. 1993. Hanford Reach, upstream end of McNary Reservoir, May-June 1990 (lotic system)

* Juv. salmonids 59% of SMB diet by wt, present in 65% of collected fishes
* SMB consumed ave 1.4-1 (May-June) juv salmonids/predator daily, mostly subyearling chinook salmon
* NPM consume more crayfish (41%) than fishes (28.8%) by wt; juv salmonids present in 29% of collected fishes
* NPM consumed ave 0.55-0.34 (May-June) juv salm./predator
* SMB important predator in free-flowing river reaches, esp. in salmonid rearing habitat

Erhardt et al. 2018. Lower Granite Reservoir, Snake River, 2013-2015

* Chinook salmon 2nd or 3rd most abundant prey by wt for SMB from April-Aug, peaking in early summer
* For larger SMB (249 mm+), salmonids were predominant prey item during April (61%)
* For smaller SMB (150-174mm), salmonids comprised up to 29% of diet, peaking in mid-May
* Compared to previous studies, SMB are consuming proportionally more salmonids than during the mid-1990’s (could be compensatory response to NPM decline, or increase in salmonids)
* Est. total loss in study area 2013-2015: 300, 373 Chinook salmon
* Consumption rate: 0.05-0.27 prey/pred/day

Tinus, Rinearson, VanDyke, Mallette. Abundance and Diet Smallmouth Bass at The Dalles, John Day and McNary Dams, 2012

* ‘local predation by smallmouth bass on juvenile salmon and steelhead - coincident with a large outmigration of juvenile salmon - can be intense in some areas and during specific times of year.’
* Est 149,000-322,000 juvenile salmon consumed by SMB for 3 dams. John Day vast majority of salmonid consumption.
* SMB abundance est TD tailrace 455, TD forebay 109, JD tailrace 1741, JD forebay 1193, McN tailrace 271, McN forebay 667

Randall. Juv Salmonid Predation by SMB in Forebay of John Day Dam

* 7 of 50 SMB (14%) sampled had salmonids in stomach. Possible as high as 24% due to unconfirmed fish bones
* Lamprey identified as well

2017 WDFW Dam Angling Annual Report. Pit Tag recovery from ingested juv. Salmonids

* TDA: NPM-1 tag/355 individuals, Walleye/SMB- no tags
* JDA: NPM-1 tag/3472 individuals, Walleye- 1 tag/423 individuals, SMB- no tags

ISAB 2016

* A key finding was that the pikeminnow predator control program produced a 27% reduction in smolts eaten by pikeminnow, but this immediate mortality estimate was compensated by an increase in predation by non-native predators and birds that were not managed. Ultimately, total smolt predation declined less than 11% rather than 27% because of responses by other predators in the John Day reservoir.

**Proposed Change**:

Add new bullet to section 6.3:

6. FISH HANDLING PROCEDURES

**6.1.** The Plans shall include procedures to minimize fish mortality and stress. The primary fish handling objective will be to collect and transport fish to release sites with minimal stress and without injury or mortality to any fish.

**6.2.** Plans shall specify the details of all fish handling activities including how to crowd and handle fish within each facility, specifics on the number of fish that can be hauled or transported in containers or transport tanks at varying water temperatures, and how and where to release fish at each project.

**6.3.** The Plans should reflect the following general fish handling guidelines:

* + - * 1. Adult salmonids and other large adult fish should be salvaged first.
        2. Netting of fish should be minimized whenever possible.
        3. Fish should not be crowded in the holding containers.
        4. Fish will be less stressed in larger containers (≥ 300 gallons preferred), in colder water, and with supplemental oxygen or aeration.
        5. If fish are transported in warmer water (>65o F), reduce fish loading density and holding times.
        6. All fish will be returned to the river as soon as possible at predetermined release sites.
        7. Fish should not be held in holding tanks or containers for more than two hours under any circumstances.
        8. Fish should be released from the holding tanks into the river as soon as the fish salvage operation stops for any reason.
        9. Fish should be carefully released into the tailwater or forebay with a short vertical drop to the river. Fish release slides are desirable.
        10. Water temperature in the transport tank should be monitored and maintained within 2oF of the river water at the release site.
        11. Fish should be removed prior to debris removal if possible.
        12. Do not release any non-native fish back to the river when encountered. Known predators will be analyzed for diet content. In some cases they will be left in place due to excessive effort needed for removal.

**Comments**:

1/27/22 FPOM FPP Meeting:

Morrill – Who will analyze the diet content and by what methodology?

**Record of Final Action**:

1. For example, info from the Willamette concerning impact of non-native predators on salmon fry: <https://esajournals.onlinelibrary.wiley.com/doi/10.1002/ecs2.3757> [↑](#footnote-ref-1)