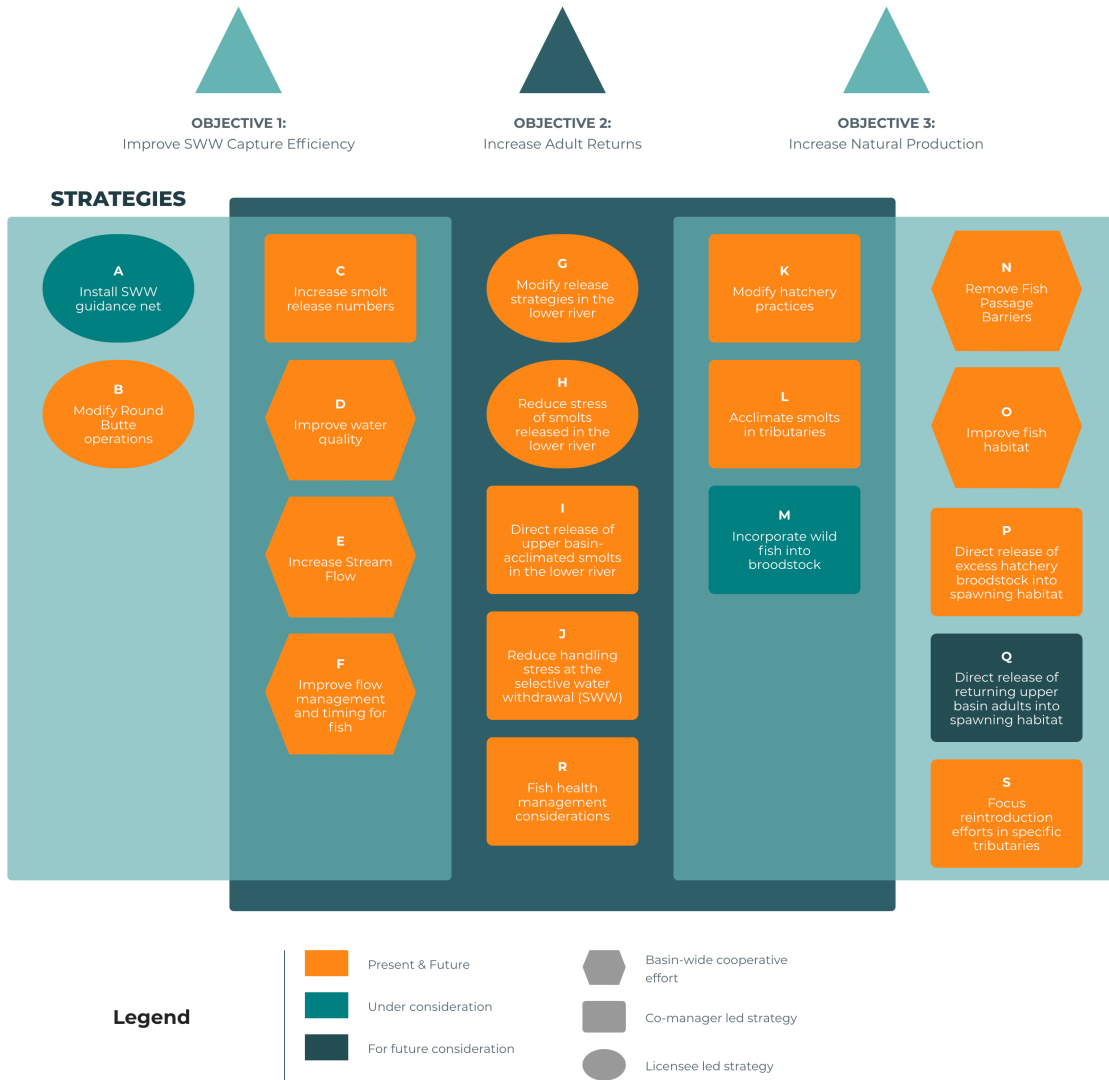## Pelton Round Butte Fish Committee

# Reintroduction Road Map

The reintroduction road map is a high level guide to strategies current and future, to impact the goal of returning self-sustaining and harvestable runs of spring Chinook, sockeye and summer steelhead to the Upper Deschutes Basin. Learn more about the history and purpose of our work in the Executive Summary.

The road map is organized by objectives with each strategy represented by a shape that indicates who is responsible and a color to illustrate whether strategies are current or planned.

# Overview of Reintroduction Road Map

**Goal: self-sustaining and harvestable runs of Chinook, sockeye, and steelhead.**



**OBJECTIVE 1:**
Improve SWW Capture Efficiency

**OBJECTIVE 2:**
Increase Adult Returns

**OBJECTIVE 3:**
Increase Natural Production

**STRATEGIES**

**A** Install SWW guidance net

**B** Modify Round Butte operations

**C** Increase smolt release numbers

**D** Improve water quality

**E** Increase Stream Flow

**F** Improve flow management and timing for fish

**G** Modify release strategies in the lower river

**H** Reduce stress of smolts released in the lower river

**I** Direct release of upper basin-acclimated smolts in the lower river

**J** Reduce handling stress at the selective water withdrawal (SWW)

**R** Fish health management considerations

**K** Modify hatchery practices

**L** Acclimate smolts in tributaries

**M** Incorporate wild fish into broodstock

**N** Remove Fish Passage Barriers

**O** Improve fish habitat

**P** Direct release of excess hatchery broodstock into spawning habitat

**Q** Direct release of returning upper basin adults into spawning habitat

**S** Focus reintroduction efforts in specific tributaries

**Legend**

- 🟧 Present & Future
- 🟩 Under consideration
- ⬛ For future consideration

- ⬡ Basin-wide cooperative effort
- ▬ Co-manager led strategy
- ⬭ Licensee led strategy

**A**
Install SWW
Guidance Net

# A: Install SWW Guidance Net

**Description:** The principle behind installation of a fish guidance net system would be to improve collection of out-migrating salmonids. The guidance net would extend out from the Selective Water Withdrawal (SWW) and guide fish by inducing a sweeping current, parallel to the net, that leads migrating fish to the facility. It also prevents fish from swimming behind the SWW.

In the late 1980s, the number of outmigrants captured at Upper and Lower Baker Dams increased over 400% the first year, following installation of guide nets. However, fish collection efficiency increases attributable to installation of guidance net systems at other projects has varied widely due to variability in operating environments. The effectiveness of fish collection systems in northwest reservoirs has been linked to multiple factors, but collector inflow and effective forebay area stand out as variables that strongly influence guidance system success. At Round Butte Dam, collector inflow is at least six times that of the next highest system, while effective forebay area was intermediate within the eight systems examined, whichsuggests a positive impact to fish collection efficiency if guidance nets are installed.

**Anticipated Outcome:** Increase the number of smolts captured at the fish collection facility at the SWW.

**Evaluation Method:** The main categories of performance factors are:

▶ Fish Collection Efficiency – Tracked with annual monitoring of the percentage of PIT-tagged fish collected at the SWW from releases at the upper ends of the tributary arms. Given the likely effects of environmental flow variation on effectiveness of guidance nets, evaluation would be based on averages of discrete units stratified on periods of similar hatchery/acclimation operation, similar broodstock, and the SWW operation.

▶ Guidance System Integrity – This category includes debris collection, wear and abrasion, net deformation, and net inspection procedures. The proposed design of the guidance net is a curtain, and a very small mesh net below, that is designed to prevent capture or "gilling" of fish in the net.

▶ Perform acoustic study to determine fish behavior in the vicinity of the SWW in response to the presence of the guidance net.

**Timeline:** Under Consideration – Initial cost estimate in 2020 required additional supporting data to justify expense.

**Lead Organization/Agency:** Licensees.

**Fish Committee Role:** The Fish Committee provides input and approval.

**Related Studies/Actions/Decisions:**

**2022** – Installation of an SWW lead net is planned prior to 2022 smolt outmigration season.

**2020 – 2021** – Portland General Electric (PGE) contracts with U.S. Geological Survey (USGS) to conduct baseline acoustic studies to determine fish behavior in the vicinity of the SWW without the presence of a guidance net. Results of initial study leads to efforts, beginning in 2021, to "fine tune" hours of nighttime generation (Road Map Strategy B).

**2019 – 2020** – PGE and consultants collaboratively develop conceptual design and high-level cost estimate for guidance net to support PGE's budgetary planning process. Initial cost estimate required additional data on benefits of net prior to decision on construction.

**2018** – Portland General Electric (PGE) begins researching guidance net effectiveness at other high head dams (Upper and Lower Baker, North Fork Reservoir and Swift Reservoir). PGE engineers do preliminary modeling to assess if Round Butte Dam would be a good candidate for a guidance net.

**2016** – Pilot testing of fish passage/flow model. PIT-tagged fish were released under varying conditions and their collection efficiency was

measured. Collection showed a positive response to increased nighttime flow (Pyper 2017).

**2015 - 2016** – Physical reservoir studies. Studies show that flows change with the SWW as predicted, but flow magnitudes are very low. Zone of influence shifts with changing generation (Nugraha and Khangaonkar 2017, Stillwater Sciences 2015).

**2014 - 2015** – Statistical model relating fish passage to generation is developed. This shows that more flowat night will likely improve fish passage collection (Pyper 2015, Pyper 2016).

**2010 - 2013** – Juvenile migration studies. Initial passage rates looked good; Licensees met the Phase 1 goal in year one of the SWW operations. Radio-tagging studies show that most fish enter the forebay, but many fail to enter the SWW, indicating an issue with either: 1) SWW avoidance, and/or 2) guidance. Acoustic studies in the forebay show long residence times (Hill et al. 2014, Thompson et al. 2013).

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