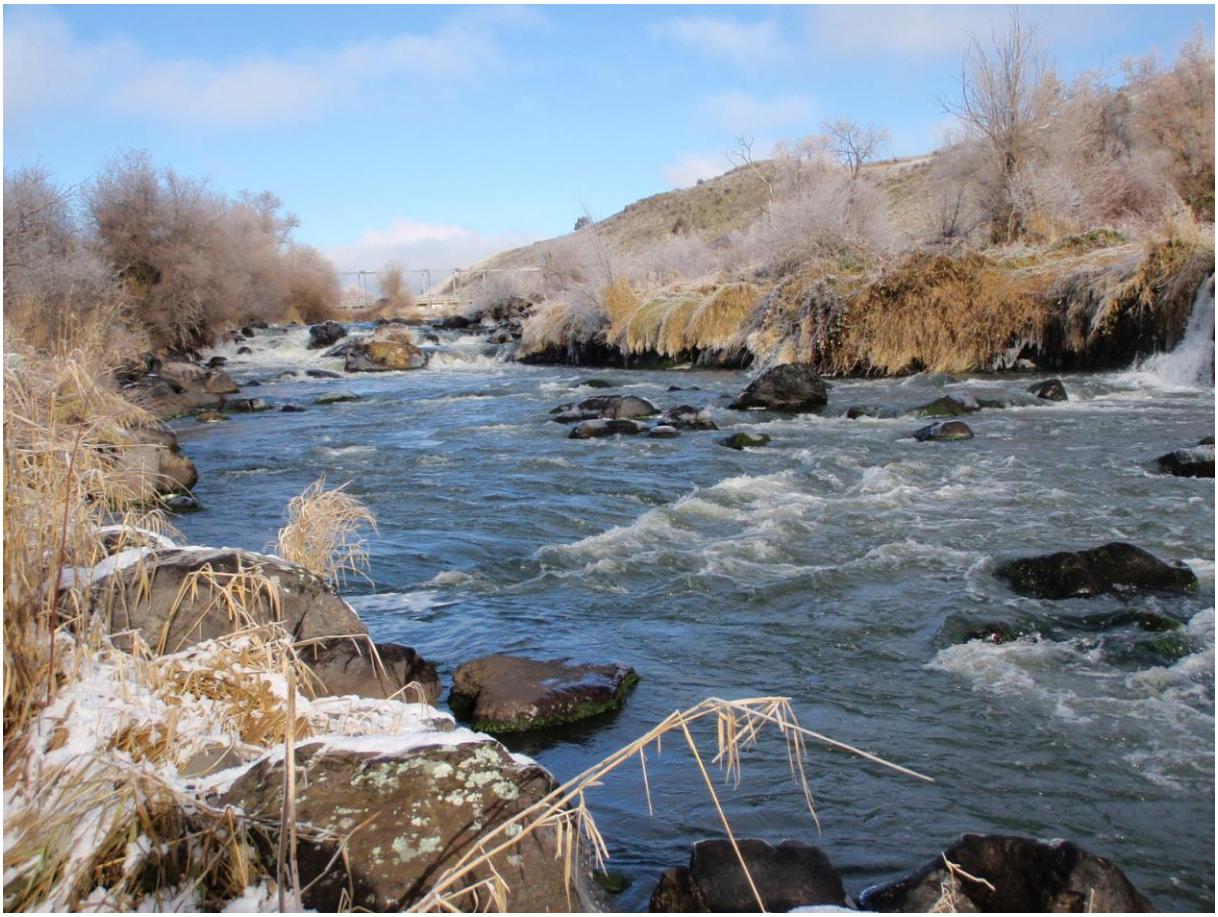
RECLAMATION
Managing Water in the West

Link River Fish Stranding Prevention and Salvage Plan



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Cover Photograph - Photograph of the historic falls in the Link River during December 2010 near Klamath Falls, Klamath County, Oregon. Link River Dam is visible in the background. Photo credit – D. Taylor, U.S. Bureau of Reclamation.

Introduction

The Link River originates at the outflow of Upper Klamath Lake from Link River Dam and flows approximately two kilometers before emptying into Lake Ewauna and forming the head of the Klamath River (Figure 1). Flows from Link River Dam are regulated by the U.S. Bureau of Reclamation (Reclamation) and PacifiCorp for maintenance of water level in Upper Klamath Lake, delivery of water for irrigation and refuge use, maintenance of downstream Klamath River flows, and power generation. In addition, some flows are diverted for operation of the Link River Dam fish ladder to provide for fish passage. Flows through the fish ladder are the combined flows through the gate at the top of the ladder and attractions flows through a gate from Westside Canal.

Native fish species, including redband trout (*Oncorhynchus mykiss*)[1], Endangered Species Act (ESA)-listed Lost River sucker (*Deltistes luxatus*), and ESA-listed shortnose sucker (*Chasmistes brevirostris*) are known to inhabit the Link River. When flows from Link River Dam are low or a sudden flow reduction occurs, fish may become stranded in isolated pools along the river margins downstream of the dam.

In response to the risk of fish stranding, a Link River fish stranding prevention and coordination plan was developed to: minimize the risk of stranding; establish a process for monitoring flow conditions; describe the flow conditions that trigger fish salvage operations; identify the parties responsible for coordination, in-field actions, and reporting. This document is intended for inclusion in the following agreements on the Link River operations:

1. Link River Dam operations agreement between Reclamation and PacifiCorp;
2. Habitat Conservation Plan between the U.S. Fish and Wildlife Service (USFWS) and PacifiCorp; and,
3. Biological opinions for the Klamath Project.

Minimum Flows and Ramping Rates

Desired minimum flows and desired ramp down rates at the Link River Dam are outlined in Tables 1 and 2. The desired minimum flows at the Link River Dam are the combined discharge through the Link River Dam main gates and through the fish ladder[2]. Unfortunately, discharge at Link River Dam are calculated and only considered approximates. The USGS gauge on the lower Link River will be used to evaluate ramping rates and minimum flows at the Link River Dam.

[1] Redband trout are a subspecies of rainbow trout, and exist in two well-defined geographic regions. The Columbia River redband trout is found in Montana, Washington and Idaho, and the Great Basin redband trout is found in southeastern Oregon and parts of California and Nevada.

[2] Here after, fish ladder flows are the combined flow through both the attraction flow gate and the gate at the top of the fish ladder.

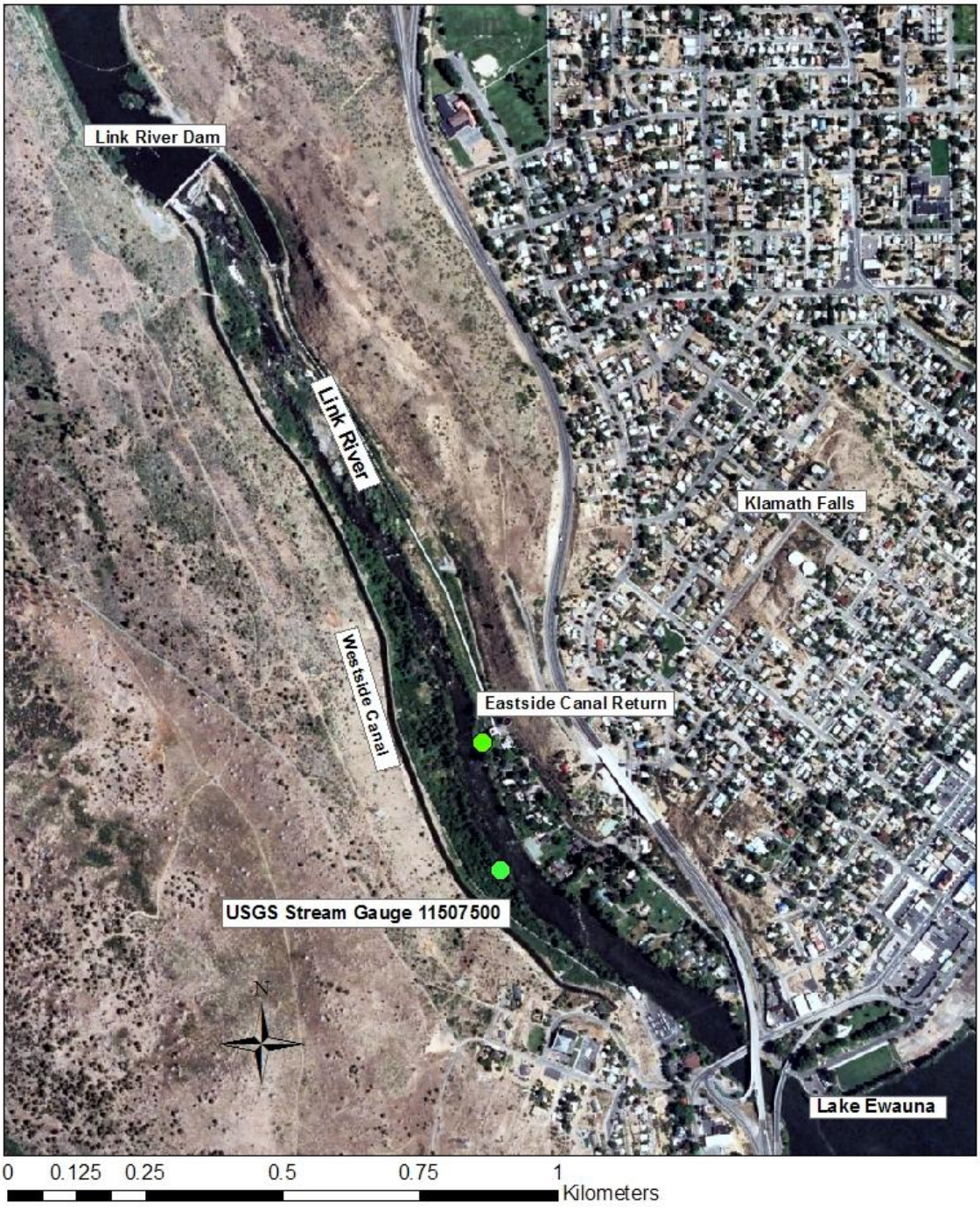

Figure 1. Aerial photograph shows the Link River between the Link River Dam and Lake Ewauna, near Klamath Falls, Klamath County, Oregon.

Table 1. Desired Link River Dam flows. Link River Dam flows are considered the combined releases through the Link River Dam main gates, the fish ladder attraction flow gate, and the gate at the top of the fish ladder.

Period	Link River Dam Desired Minimum Discharge
December 1 through February 14	200 ft^3/second
February 15 through end of February	250 ft^3/second
March 1 through November 30	300 ft^3/second

Table 2. Desired Link River Dam ramping rates. There are no ramping rates for Link River Dam when flows exceed 1500 ft^3/second. Link River Dam flows are considered the combined releases through the Link River Dam main gates, the fish ladder attraction flow gate, and the gate at the top of the fish ladder.

Link River Dam Flow	Link River Dam Desired Ramp Rate
0 to 300 ft^3/second	20 ft^3/second per 5 minutes
301 to 500 ft^3/second	50 ft^3/second per 30 minutes
501 to 1500 ft^3/second	100 ft^3/second per 30 minutes

Flow measurements at the U.S. Geological Survey (USGS) gauge 11507500 on the lower Link River include discharge at Link River Dam and accretions between the Link River Dam and the USGS gauge. The accretions include leaks and discharge from PacifiCorp's eastside canal and penstock. PacifiCorp's eastside canal and penstock remain "charged" year-round, and is estimated to leak more than 100 ft^3/second.

Minimum flows at the Link River gauge will be monitored to determine when a fish stranding assessment is needed (Table 3). Minimum ramping rates at the Link River gauge will also be monitored to determine when a fish stranding assessment is needed (Table 4). Monitoring the Link River gauge minimum flows and ramping rates assume accretions of 100 ft^3/second between the dam and the gauge.

When using the USGS gauge to evaluate minimum flows, only the top-of-the-hour average should be used. The top-of-the-hour average is the average of the four preceding 15-minute data. For example, flow in the 1100 hour is calculated by taking the average of the readings at 1015, 1030, 1045, and 1100.

Table 3. Minimum flows at the Link River gauge (USGS 11507500) that will be monitored to determine when a fish stranding assessment is needed.

Periods	Link River Monitored Minimum Discharge
December 1 through February 14	300 ft^3/second
February 15 through end of February	350 ft^3/second
March 1 through November 30	400 ft^3/second

Table 4. Ramping rate at the Link River gauge (USGS 11507500) that will be monitored to determine when a fish stranding assessment is needed. There are no ramping rates when flows at the gauge exceed 1600 ft^3/second.

Link River Gauge Reading	Link River Gauge Monitored Ramp Rate
0 to 400 ft^3/second	20 ft^3/second per 5 minutes
401 to 600 ft^3/second	50 ft^3/second per 30 minutes
601 to 1600 ft^3/second	100 ft^3/second per 30 minutes

Initiation of Stranding Assessment

Adhering to the minimum flows and ramping rates as monitored at the Link River gauge (USGS 11507500) will reduce the risk of fish stranding. However, circumstances can occur that result in flows below minimums and flow reductions outside of the prescribed ramping rates. A fish stranding assessment will occur at the request of the USFWS, or when three or more consecutive top-of-the-hour average readings at the Link River gauge are below:

1. the monitored minimum flows (Table 3) and/or,
2. the monitored ramping rates (Table 4).

It will be the responsibility of Reclamation, PacifiCorp, and the USFWS to monitor the Link River gauge (USGS 11507500). When three or more consecutive top-of-the-hour average readings at the Link River gauge are below the identified minimums, Reclamation should be notified as soon as possible. Once notified, Reclamation will conduct a fish stranding assessment as soon as practical. The stranding assessment will include, at minimum, a two person crew conducting an on-site survey of the margins of the Link River. The field crew will directly communicate their assessment of potential stranding to Reclamation fish biologists (see contact information below) as soon as practical. If limited stranded fish are observed during the assessment, then the field crew may salvage the stranded fish to the river without requesting further assistance. However, the field crew's primary purpose is to assess fish stranding and determine if an additional effort is necessary to salvage stranded fish.

Initiation of salvage

If fish salvage is necessary, Reclamation will notify the USFWS, Oregon Department of Fish and Wildlife (ODFW), and PacifiCorp at the contact information provided below. The USFWS, ODFW, and PacifiCorp will assist in salvage operations if available.

As soon as practical, Reclamation will initiate two, two-person crews to capture fish from disconnected pools and channels using electrofishers, seines, or dip nets, and return fish to either the main channel of the Link River when sufficient water is present or to Upper Klamath Lake. Fish salvage will ideally occur on both sides of the river simultaneously. Electrofishing operations should only be conducted by individuals trained in proper and safe electrofishing techniques.

Contact information

U.S. Bureau of Reclamation: During regular business hours, contact Reclamation fish biologists Torrey Tyler at (541) 880-2573 or Alex Wilkens at (541) 880-2574. After hours and on weekends, contact Torrey Tyler at (541) 281- 3585 or Alex Wilkens at (541) 891-3705.

U.S. Fish and Wildlife Service: During regular business hours, contact the USFWS biologists at (541) 885-8481. After hours and on weekends, contact Josh Rasmussen at (541) 850-5224 or Nolan Banish at (919)-622-1454.

Oregon Department of Fish and Wildlife: During regular business hours contact Bill Tinniswood or Roger Smith at (541) 883-5732.

PacifiCorp: Contact Diane Barr at (541) 776-5433 (office) or (541) 261-4886 (cellular phone).

Incident Reporting

When stranding incidents occur, an incident report will be prepared by Reclamation. A draft incident report should be provided electronically to the USFWS, ODFW, and PacifiCorp within two weeks of the incident. The final incident report will be completed within four weeks of the incident. Incident reports will contain at least the following information:

- Conditions leading up to the stranding incident
- Where stranded fish were encountered (indicate on map)
- When the stranding assessment and salvage (if applicable) occurred
- How the stranding was addressed
- If fish salvage occurred, the numbers of suckers and trout salvaged
- Observed sucker and non-sucker mortality
- Photographs if possible
- Recommendations for potential follow-up activities

- Review of flows at the Link River gauge and comparison to identified minimums and prescribed ramping rates

Responsible Party

Based on the incident report, a party may be responsible for the Link River gauge falling below the identified minimums or flow reductions outside of the prescribed ramping rates. In the event the responsible party is not Reclamation, Reclamation will seek restitution for the costs associated with the stranding assessment and the salvage operation. If the identified party disagrees with the findings, then an Alternative Dispute Resolution will be used to come to a resolution.

Annual Coordination Meeting

Prior to April 1 each year, Reclamation will coordinate an annual meeting between the USFWS (Klamath Falls Office), PacifiCorp, State of Oregon, and Reclamation. These meetings will discuss any needed changes and updates to the Link River Fish Stranding Prevention and Salvage Plan.