# Highline Creek Westslope Cutthroat Trout and Slimy Sculpin Translocation Framework

Summary of Project Background, Methods, and Translocation Options

Boundary Hydroelectric Project: FERC No. 2144

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*This document provides a framework for translocation of Westslope Cutthroat Trout and Slimy Sculpin into Highline Creek, Sullivan Creek Watershed, Pend Oreille County, WA, following two piscicide treatments to remove non-native Brook Trout.*

# CONTENTS

LIST OF FIGURES ..... 2
LIST OF TABLES ..... 2
1. INTRODUCTION ..... 3
2. STUDY AREA ..... 4
3. PERMITTING ..... 5
3.1 State Environmental Policy Act (SEPA) ..... 5
3.2 USDA Forest Service Special Use Permit ..... 5
4. FISH HEALTH ..... 5
5. TRANSLOCATION METHODS ..... 5
5.1 Westslope Cutthroat Trout Donor Stock Collection ..... 5
5.2 Westslope Cutthroat Trout Translocation ..... 6
5.3 Westslope Cutthroat Trout Donor Stock(s) ..... 6
5.3.1 Sullivan Creek Headwaters Subwatershed WCT ..... 6
5.3.2 Deemer Creek WCT ..... 7
5.3.3 Leola Creek WCT ..... 7
5.3.4 Pass Creek WCT ..... 7
5.4 Slimy Sculpin Donor Stocks and Translocation ..... 7
6. MONITORING ..... 7
7. EFFECTS OF TRANSLOCATION ON FISH POPULATIONS OUTSIDE THE HIGHLINE CREEK WATERSHED ..... 8
8. REFERENCES ..... 9
9. FIGURES ..... 12
10. TABLES ..... 13
11. PHOTOGRAPHS ..... 14

# LIST OF FIGURES

**Figure 1**. Highline Creek translocation reaches with location of Highline Creek in Washington State. .. 12

# LIST OF TABLES

**Table 1.** Size classes (fork length; mm) and proportion of the total number of donor fish proposed for translocation of adult and sub-adult Westslope Cutthroat Trout into Highline Creek. .....**Error! Bookmark not defined.**

**Table 2.** Number of WCT by size class proposed to be translocated into the Upper Reach of Highline Creek. Color listed corresponds to reach color in Figure 1..... 13

**Table 3.** Number of WCT by size class proposed to be translocated into the Middle Reach of Highline Creek. Color listed corresponds to reach color in Figure 1..... 13

**Table 4.** Number of WCT by size class proposed to be translocated into the Lower Reach of Highline Creek. Color listed corresponds to reach color in Figure 1..... 13

**Table 5.** Number of WCT by size class proposed to be translocated into Highline Creek. ..... 13

# 1. INTRODUCTION

On March 20, 2013, the City of Seattle was awarded a 42-year Federal Energy Regulatory Commission (FERC) license for operation of the 1,040-megawatt Boundary Hydroelectric Project (hereafter Project; FERC No. 2144), located on the Pend Oreille River in Pend Oreille County, Washington. The license stipulates that the City of Seattle (hereafter Seattle City Light; SCL) shall implement measures under License Article 9 to protect and enhance fish and aquatic resources in the Project area, especially in support of native salmonid recovery in Project tributaries (FERC 2013).

Westslope Cutthroat Trout *Oncorhynchus clarki lewisi* (WCT) are native to the Pend Oreille River basin in northeastern Washington (Gilbert and Evermann 1895), and historically occupied approximately 99% of all streams in the watershed (Andersen 2008). Legacy impacts of logging, road construction, mining, and agriculture have combined with the construction of three dams on the mainstem Pend Oreille River (Washington) to degrade habitat and block fish passage (Baker et al. 2014). Non-native salmonids were also introduced into many areas of the Pend Oreille Basin, establishing self-perpetuating populations (WDFW unpublished stocking data; Andersen 2008). Habitat losses, combined with competition, predation, and hybridization with non-native fishes, have greatly reduced numbers of WCT in the Pend Oreille River watershed (Shepard et al. 2003). Sampling indicates that WCT are currently found in fewer than 35% of streams in the basin, and that WCT distribution and population sizes are shrinking (e.g., Cee Cee Ah Creek prior to 2011; Andersen 2008). Pure (non-hybridized) populations of WCT in the Pend Oreille watershed are now typically found only above fish passage barriers that prevent invasion from downstream populations of non-native salmonids (Small et al. 2007).

In consultation with Project stakeholders that comprise the Fisheries and Aquatic Workgroup (FAWG), formed to oversee implementation of license requirements, SCL developed a Fish and Aquatics Management Plan (FAMP; SCL 2010) to guide measures implemented under the current FERC license. The presence of non-native fish species, particularly Brook Trout *Salvelinus fontinalis*, has been identified as a serious threat to persistence and/or recovery of native salmonids in the Pend Oreille Basin through interbreeding or competition for habitat and food resources (Andonaegui 2003). License Article 9(D) and FAMP section 5.4.2 describe measures for the suppression or eradication of non-native fish species in the Project area, including eradication through piscicide treatments (SCL 2010, FERC 2013).

Seattle City Light, in partnership with the Kalispel Tribe Natural Resources Department (KNRD), began mechanical suppression of Brook Trout in the Sullivan Creek watershed in 2016. Highline Creek (Figure 1), a small, westerly flowing tributary to Sullivan Creek, was found to have the highest Brook Trout density in the watershed (Terrapin 2011). Highline Creek likely functioned as a source population, contributing Brook Trout to Sullivan Creek and hindering suppression efforts. The presence of a complete upstream fish passage barrier (log-

crib dam) on the lower mainstem and absence of native salmonid populations made Highline Creek and its tributaries a viable candidate for non-native fish eradication via piscicide treatment. Native Slimy Sculpin *Cottus cognatus*, previously unreported, were sampled in 2016 and salvaged (translocated to Sullivan Creek) prior to the initial piscicide treatment in 2017. Washington Department of Fish and Wildlife (WDFW), in partnership with KNRD and SCL, conducted successful piscicide treatments in Highline Creek in 2017 and 2018 (Bean et al. 2017, Baker and Walker 2017, 2018). Environmental DNA (eDNA) samples collected in May 2019 tested negative for the presence of Brook Trout DNA (KNRD unpublished data), and follow-up electrofishing in June 2019 confirmed the absence of fish in the treated section (WDFW unpublished data). Following successful removal of Brook Trout, SCL, KNRD, and WDFW now propose to reintroduce native WCT and Slimy Sculpin to the treated area.

Translocation of WCT to Highline Creek will represent the second WCT reintroduction effort in Washington's Pend Oreille River Basin. From 2008 – 2010 WDFW and KNRD conducted rotenone treatments on the upper 8.4 km of Cee Cee Ah Creek to eradicate Brook Trout, resulting in the complete removal of the population above Cee Cee Ah Falls (Andersen 2008, Baker and Donley 2010, Andersen 2012). One hundred adult WCT were re-introduced to Cee Cee Ah Creek above Cee Cee Ah Falls in 2011 (Andersen 2012). In addition, 178 fry were released in 2012 from remote site incubators (RSI) (Andersen and Bean 2013). Monitoring of the restored WCT population began in 2013, with confirmation of natural reproduction and an estimated population of 2,310 fish (age-1+). Cee Cee Ah Creek WCT have continued to increase in number, with approximately 5,000 fish present in 2016. Highline Creek WCT restoration will occur concurrently with WCT translocation into Smalle Creek (tributary to the Pend Oreille River) in southern Pend Oreille County. Smalle Creek was treated with piscicide to remove non-native Brook Trout from 2015-2017, with a similar goal of establishing an allopatric, naturally reproducing WCT population in the watershed.

## 2. STUDY AREA

Highline Creek joins Sullivan Creek 0.36 miles upstream of the mouth of Outlet Creek. Highline Creek was the site of a Diamond Match Company lumber mill (1940's – 1960's), with a log-crib dam constructed at RM 0.19 (circa 1930's-1940's). The mill pond was stocked with Brook Trout in 1965, and provided a recreational fishery for local residents. Deposition of sediment behind the dam resulted in the loss of the mill pond, with the creek currently flowing over the historic mill pond bed. The log-crib dam creates a fish passage barrier, isolating upper Highline Creek from downstream fish populations. Fish species endemic to Highline Creek are unknown, however, the presence of non-migratory native Slimy Sculpin above the log-crib dam strongly suggests that a fish assemblage typical to the Sullivan Basin (including WCT) was present in Highline Creek prior to anthropogenic alteration and stocking of non-native Brook Trout. It is likely that WCT were extirpated from the Highline Creek watershed through competition with Brook Trout as observed in other Pend Oreille River watersheds (e.g., Cee Cee Ah Creek; Andersen 2008).

# 3. PERMITTING

Specific permits and licenses required for implementation of the proposed 2019 translocation of WCT to Highline Creek are listed below, including a description, lead agency, permit numbers, valid dates, status update (if applicable), and access to permit/license information.

## 3.1 State Environmental Policy Act (SEPA)

A SEPA checklist for translocation of WCT and Slimy Sculpin must be submitted to the WDFW SEPA coordinator for review and public comment prior to stocking a species of fish into a specific waterbody for the first time. The SEPA checklist will be accompanied by this framework document.

## 3.2 USDA Forest Service Special Use Permit

The Highline Creek treatment area is located on property owned by the Colville National Forest, United State Forest Service (USFS). The USFS required a Special Use Permit (SUP) to authorize access for the Highline Creek translocation (SUP # SLK40, received May 16, 2017).

# 4. FISH HEALTH

Westslope Cutthroat Trout and Slimy Sculpin are presumed native to Highline Creek. Fish reintroduced to Highline Creek will be collected exclusively from within the Sullivan Creek Basin, thus minimizing the risk of pathogen and parasite transfer into the Highline Creek watershed.

# 5. TRANSLOCATION METHODS

The SCL Native Salmonid Conservation Facility has not yet been constructed, and the project size is relatively small. Thus, the limited number of WCT required for reintroductions to Highline Creek is feasible through translocations. Translocation of WCT to Highline Creek will occur in fall 2019, as lower water temperatures reduce handling stress, increasing survival of captured donor fish. Translocated adult fish are available to spawn the following spring and contribute to the newly restored population (Small et al. 2014). Sub-adult fish mature over time to replace adult fish as they age out of the population, ensuring that there is no gap in fry production (Walker et al. 2015).

Translocation of Slimy Sculpin will occur following successful reestablishment of WCT in Highline Creek (evidenced by multiple years of natural reproduction and geographic expansion).

## 5.1 Westslope Cutthroat Trout Donor Stock Collection

Westslope Cutthroat Trout donor stock will be collected using a Smith Root LR-24 (or equivalent) backpack electrofishing unit fished with pulsed-DC at the lowest voltage, amperage, and frequency setting adequate to collect fish without injury. To achieve a mixture of adult and sub-adult fish, captured fish will be assigned to a size bin based on fork length (FL) (Table 1). One quarter (25%) of translocated fish will be from Size Class 1 (juvenile; 70-100 mm), 50% of

translocated fish will be Size Class 2 (sub-adult; 101-150 mm), and 25% will be Size Class 3 (adult; 151-200 mm). To minimize relatedness of donor fish, only 25 total fish (across all bins) will be collected per each 100 m electrofishing unit. Prior to selecting captured WCT for translocation, individuals will be scanned for PIT tags to ensure they were not previously tagged. In the event a tagged fish is observed, it will be released to avoid influencing ongoing monitoring efforts within the Sullivan Basin. Retained fish will be measured for FL (mm), weighed (g), marked by clipping the adipose fin, tissue sampled for genetic analysis, and PIT-tagged. Selected WCT will then be transported to Highline Creek (Photo 1).

## 5.2 Westslope Cutthroat Trout Translocation

Translocated fish will be held at release locations in covered totes or pens for a 24-hour monitoring period. Holding containers will be perforated to allow stream flow to move freely through the container. Westslope Cutthroat Trout will be observed to determine condition post-transport and evaluated for PIT tag loss prior to release. Highline Creek will be divided into three reaches (Figure 2), with each section to receive a specified number of fish (Tables 2-4). Fish will be removed from the tote, placed into buckets, and scatter-planted throughout each section of mainstem Highline Creek (Photo 2). No fish will be planted within 75 m of the log-crib dam in an attempt to minimize loss of translocated individuals due to downstream emigration (Buffer Zone; Figure 1).

## 5.3 Westslope Cutthroat Trout Donor Stock(s)

Genetically pure (<1% introgression) populations of WCT occur throughout the Sullivan Creek Basin (Small et al. 2017), although few populations in the watershed are of sufficient abundance to allow mining of donor fish (KNRD unpublished data). Genetic metrics from the Sullivan Basin suggest that an admixture of local WCT stocks will be appropriate for re-establishment of WCT in Highline Creek. Combined, populations in mainstem Sullivan, Deemer, Leola, and Pass creeks are sufficiently robust (population density and genetic diversity) to provide donor fish (R2 2014b, Small et al. 2017).

### 5.3.1 Sullivan Creek Headwaters Subwatershed WCT

The Sullivan Creek Headwaters Subwatershed WCT population is genetically distinct from other populations in the Pend Oreille River Basin. Despite past stocking of Rainbow Trout *O. mykiss* and hatchery-origin WCT, this population is essentially free of introgression (Small et al. 2007, Small et al. 2017). Rainbow Trout, Rainbow Trout/WCT hybrids, and WCT introgressed with the Kings Lake WCT hatchery stock are present in Sullivan Creek, but have not been detected in the Headwaters Subwatershed (Small et al. 2017). The population in upper Sullivan Creek (upstream of RM 19) exhibits low genetic diversity (0.127–0.133) and allelic richness (1.27-1.28), with low to moderate effective population size ($N_e$; 28-99).

### 5.3.2 Deemer Creek WCT

Deemer Creek WCT have moderate genetic diversity (0.263-0.343) and allelic richness (1.56-1.73), with low to moderate $N_e$ (23-116). Suitability as a donor stock is high due to comparatively large numbers of individuals for translocation and similar habitat conditions to Highline Creek.

### 5.3.3 Leola Creek WCT

The WCT population in Leola Creek exhibit moderate genetic diversity (0.268-0.335) and allelic richness (1.57-1.72), with low to moderate $N_e$ (15-71).

### 5.3.4 Pass Creek WCT

Westslope Cutthroat Trout in upper Pass Creek are isolated from downstream populations by a 1 m step with a shallow plunge pool located approximately 600 m from the confluence with Sullivan Creek. Upper Pass Creek WCT have low genetic diversity (0.136) and allelic richness (1.29), with very low $N_e$ (3). Sufficient numbers of individuals to contribute to translocation and a compatible life history when combined with other stocks in an admixture make this population suitable as a donor stock (R2 2014b).

## 5.4 Slimy Sculpin Donor Stocks and Translocation

Slimy Sculpin are native to Highline Creek and were salvaged prior to the intial rotenone treatment (Photo 3). Slimy Sculpin will be collected according to the methods described in Sections 6.1 (minus marking and PIT tagging) from mainstem Sullivan Creek and translocated into Highline Creek. Slimy Sculpin translocation will not occur until the WCT population is naturally reproducing and firmly established. Slimy Sculpin are piscivorous and have been found to predate significantly on salmonid eggs (Savino and Henry 1991, Foote and Brown 1998, Marsden and Tobi 2014, Arciszewski et al. 2015). Translocation of Slimy Sculpin is unlikely to occur prior to 2024.

# 6. MONITORING

The reintroduced population of WCT will be monitored annually via electrofishing, with the exception of 2020. Monitoring in the first year will be conducted via snorkeling to avoid undue impact on the new established WCT population. Monitoring during the initial year will consist solely of counts of adult and juvenile fish to confirm successful reproduction.

Monitoring via multiple-pass electrofishing will begin in fall 2021. As established in the Cee Cee Ah restoration project, monitoring will consist of annual collections of fish from index reaches (block netted) by multiple-pass depletion electrofishing surveys. For Highline Creek, one 100 m index reach will be established in each of the three translocation sections identified in section 6.3. Young-of-the-year captured on the first pass will be counted and transported above or below the index reach and released without further handling. Age 1+ fish will be enumerated,

measured for FL (mm) and weight (g), inspected for an adipose fin clip, scanned for a PIT tag, and released. Age-1 fish will be tissue sampled for genetic analysis to determine parentage.

Monitoring will continue on an annual basis to assess population abundance and geographic expansion. Monitoring in 2022 will be the same as in 2021, except that age-1 and age-2 year old fish will be tissue sampled to determine parentage. Monitoring beyond 2022 will follow the methods described above sans tissue sampling. However, it is recommended that genetic assessment of the population be conducted once every 10 years following 2022. If genetic bottleneck or other problems are detected, additional translocations of genetically pure WCT from the Sullivan Basin can be conducted.

# 7. EFFECTS OF TRANSLOCATION ON FISH POPULATIONS OUTSIDE THE HIGHLINE CREEK WATERSHED

Reintroduced populations of WCT and Slimy Sculpin should not impact fish populations outside of the project area. Westslope Cutthroat Trout in the Sullivan Creek Headwaters Subwatershed rarely make movements greater than 1 km (SCL unpublished data). Small et al. (2017) found very little genetic exchange between discrete populations of WCT within mainstem Sullivan Creek and its tributaries, even though the watershed is largely connected and has few fish passage barriers (R2 2014b). Slimy Sculpin are territorial and are not prone to extensive movements (< 1 km; Gray et al. 2018). Interactions between reintroduced WCT or Slimy Sculpin and Endangered Species Act (ESA) listed Bull Trout *Salvelinus confluentus* are unlikely. However, the species co-occur in many locations throughout the Columbia Basin. Thus, no negative interactions would be anticipated.

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# 9. FIGURES

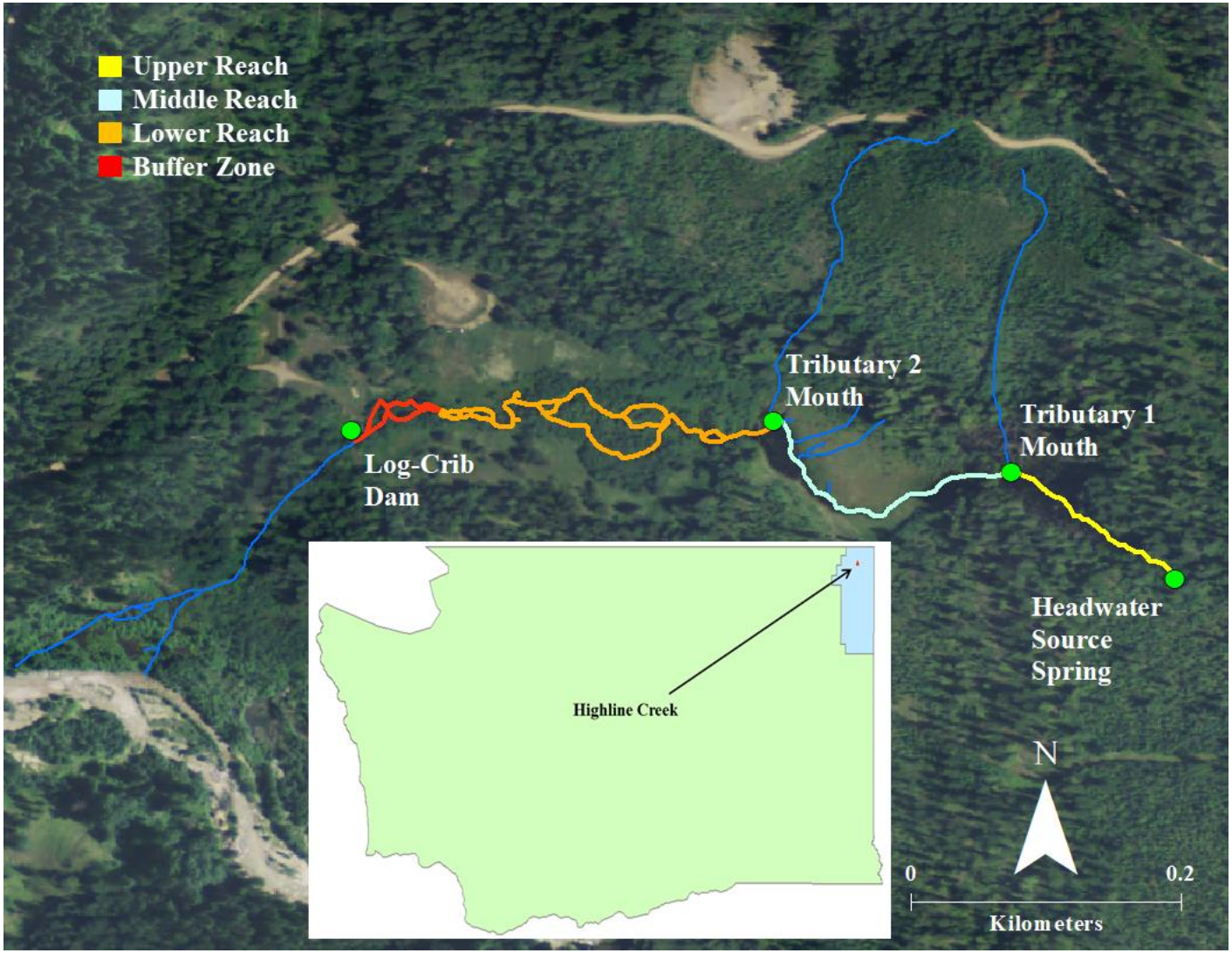


**Figure 1.** Highline Creek translocation reaches with location of Highline Creek in Washington State.

# 10. TABLES

**Table 1.** Number of WCT by size class proposed for translocation into Highline Creek**.**

| | Translocation Total | | | |
|---|---|---|---|---|
| **Source** | **70-100 mm** | **101-150 mm** | **151-200 mm** | **Total** |
| Sullivan | 18 | 39 | 18 | 75 |
| Deemer | 27 | 51 | 27 | 105 |
| Leola | 18 | 39 | 18 | 75 |
| Pass | 12 | 21 | 12 | 45 |
| **Total** | **75** | **150** | **75** | **300** |
| **% of Total** | **25** | **50** | **25** | |

**Table 2.** Number of WCT by size class proposed to be translocated into the Upper Reach of Highline Creek.

| | Upper Reach | | | |
|---|---|---|---|---|
| **Source** | **70-100 mm** | **101-150 mm** | **151-200 mm** | **Total** |
| Sullivan | 5 | 10 | 5 | 20 |
| Deemer | 6 | 12 | 7 | 25 |
| Leola | 5 | 8 | 6 | 19 |
| Pass | 3 | 5 | 3 | 11 |
| **Total** | **19** | **35** | **21** | **75** |

**Table 3.** Number of WCT by size class proposed for translocation into the Middle Reach of Highline Creek.

| | Middle Reach | | | |
|---|---|---|---|---|
| **Source** | **70-100 mm** | **101-150 mm** | **151-200 mm** | **Total** |
| Sullivan | 6 | 13 | 6 | 25 |
| Deemer | 9 | 17 | 9 | 35 |
| Leola | 6 | 13 | 6 | 25 |
| Pass | 4 | 7 | 4 | 15 |
| **Total** | **25** | **50** | **25** | **100** |

**Table 4.** Number of WCT by size class proposed for translocation into the Lower Reach of Highline Creek.

| | Lower Reach (Orange) | | | |
|---|---|---|---|---|
| **Source** | **70-100 mm** | **101-150 mm** | **151-200 mm** | **Total** |
| Sullivan | 7 | 16 | 7 | 30 |
| Deemer | 12 | 22 | 11 | 45 |
| Leola | 7 | 18 | 6 | 31 |
| Pass | 5 | 9 | 5 | 19 |
| **Total** | **31** | **65** | **29** | **125** |

# 11. PHOTOGRAPHS

**Photo 1.** Transporting trout for out-planting.

**Photo 2.** Scatter-planting trout.

**Photo 3.** Slimy Sculpin captured from Highline Creek in November 2016.