University of Idaho Experimental Forest
West Hatter Creek Fish Population Survey

by
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Introduction

The University of Idaho Experimental Forest consists of over 28 km^2 of land located northeast of Moscow, Idaho, administered by the University of Idaho College of Natural Resources. Five major streams are found on the Experimental Forest, and include Big Meadow Creek, Flat Creek, East Hatter Creek, West Hatter Creek, and Long Creek. Several of these streams supported fishes in the early 20th century (Harold Osborne, University of Idaho Experimental Forest Manager, Personal Communication). However, events within the last century, such as damage from railroad camps, the loss of beavers, cattle grazing, and construction of the Village of Troy Reservoir on Big Meadow Creek, have impacted fish populations. Fish may be observed on the Experimental Forest, but no known studies have been conducted to determine the species and populations present.

The purpose of this study was to assess community composition and abundance of University of Idaho Experimental Forest streams. The study was limited to West Hatter Creek as a result of the summer 2001 drought, which resulted in streams such as Big Meadow Creek and Flat Creek not running water during the fall. Time constraints prohibited me from surveying East Hatter Creek and Long Creek. The results of the West Hatter Creek fish population survey are presented here.

Study Area

I surveyed 2,040 m of West Hatter Creek, beginning at the northern boundary of the West Hatter Creek Unit and extending upstream to a series of steep cascades (Figure 1). The West Hatter Creek Unit is located 7 km south of Princeton, Idaho. West Hatter Creek is a tributary of

the Palouse River, and between the Palouse River and the West Hatter Creek Unit it runs through several kilometers of private property. The survey was stopped at the cascades as a result of the difficulty of moving the electrofishing equipment any farther upstream.

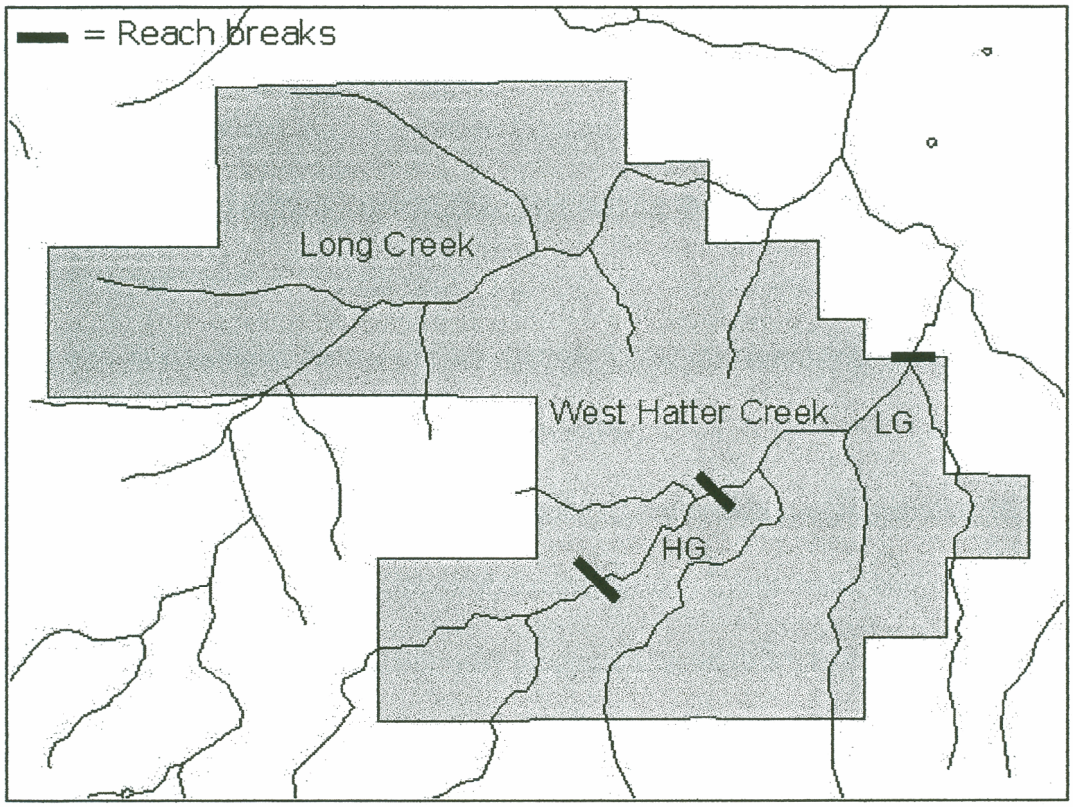

Figure 1. West Hatter Creek Unit of the University of Idaho Experimental Forest near Princeton, Idaho, with designated low gradient (LG) and high gradient (HG) reaches of West Hatter Creek

Methods

I used backpack electrofishing and a three-pass depletion technique to conduct the West Hatter Creek fish population survey. First, the stream was divided into a low gradient and high gradient reach (Figure 1). Within each reach, I then measured 30 m sections, and randomly selected five in each reach for sampling. One of these five sections was randomly selected for the three pass depletion, whereas the other four were sampled using a single pass. Electrofishing effort was quantified, but not used in my report. I used blocknets on upstream and downstream sections prior to electrofishing to prevent fish from exiting the section. Fork length of captured fish was taken in millimeters. Wetted width measurements were taken of the stream section at intervals of 6 m, beginning at the top of each section. These measurements were averaged to provide an average wetted width for each stream section.

Brook trout *Salvelinus fontinalis* were the only species captured in numbers sufficient to calculate abundance or compile population size composition. Brook trout data from the three pass depletions was entered into the computer program Microfish 3.0 to estimate capture probability (Van Deventer and Platts 1986). Capture probability was then applied to the single pass sections to estimate the total brook trout population of those stream sections according to the formula: $P_N = P_1 / C_P$, where P_N is estimated population of the stream section, P_1 is brook trout captured on the first pass, and C_P is the capture probability (David H. Bennett, University of Idaho Professor of Fishery Resources, Personal Communication).

The stream section population estimates were then averaged as the basis for the brook trout populations of all of 30 m stream sections, which provided population estimates for the low gradient reach and the high gradient reach. Stream length of each reach was multiplied with the

average wetted width to provide stream area. Brook trout population estimates for each reach were then divided into stream area to provide brook trout population density in number of fish/m^2. Finally, the lengths of captured fish were used to construct a length-frequency distribution based upon 25 mm size classes.

Results

Brook trout, rainbow trout *Oncorhynchus mykiss*, and spotted frogs *Rana pretiosa* were the three species captured in West Hatter Creek. Five brook trout and one spotted frog were captured while electrofishing the low gradient section, and forty-two brook trout and two rainbow trout were captured while electrofishing the high gradient section.

Abundance and density of the brook trout population varied significantly between the low gradient reach and high gradient reach of West Hatter Creek. I estimated that 55 brook trout were present in 1,742 m^2 of low gradient stream, providing a density of 0.03 fish/m^2. I estimated that 270 brook trout were present in the 788 m^2 of high gradient stream, providing a density of 0.34 fish/m^2.

The length-frequency distribution of the brook trout of West Hatter Creek reveals a population consisting primarily of smaller individuals (Figure 2). The mean length of brook trout captured from the low gradient reach was 99 mm, and ranged from 56 mm to 146 mm. The mean length of brook trout captured from the high gradient reach was 57 mm, and ranged from 30 mm to 150 mm.

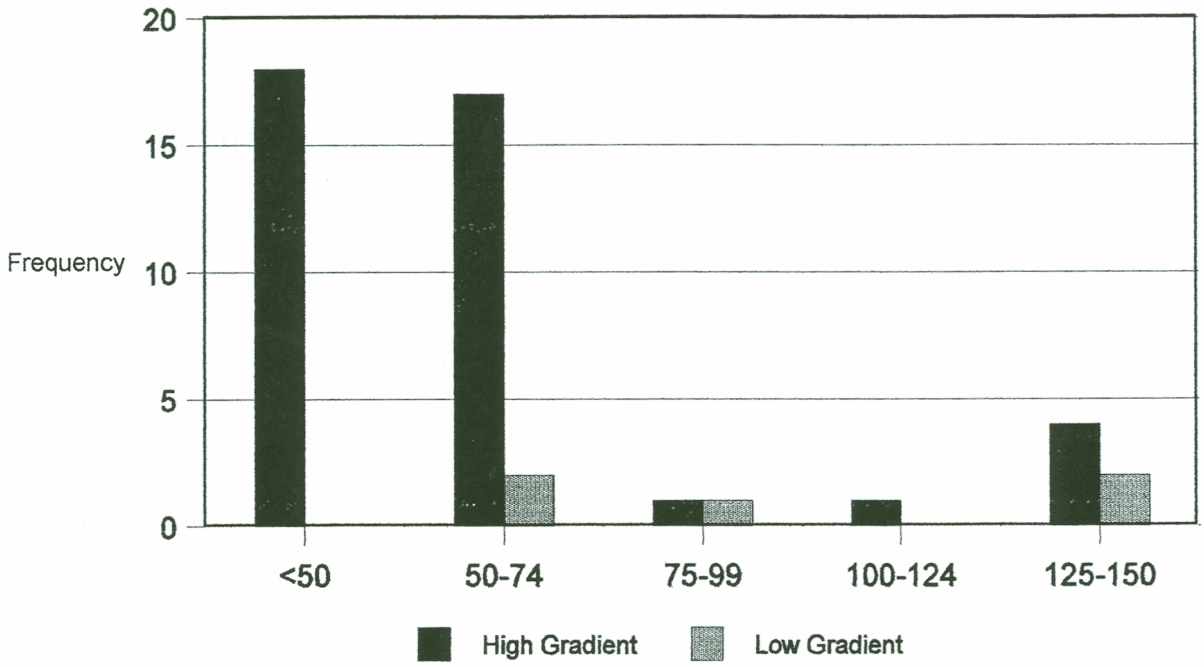

Figure 2. Length-frequency distribution (mm) of brook trout from West Hatter Creek, West Hatter Creek Unit, University of Idaho Experimental Forest near Princeton, Idaho

Discussion

Species captured in West Hatter Creek are not unexpected for a stream in the Palouse River drainage. Brook trout and rainbow trout are both found in the Palouse River, and consequently are likely to have migrated upstream into West Hatter Creek (Simpson and Wallace 1982). Spotted frogs are highly aquatic amphibians commonly found in northern Idaho, and consequently were not an unusual find in West Hatter Creek (Nussbaum *et al.* 1983).

In 1994 and 1995, Dunnigan (1997) estimated densities of westslope cutthroat trout *Oncorhynchus clarki lewisi* in third order and smaller tributaries of the Coeur d'Alene River basin ranging from 0.003 to 0.606 fish/m^2, with a mean predicted density of 0.125 fish/m^2. In

1996, Abbott (2000) found densities in the same small tributaries of the Coeur d'Alene River basin ranging from 0.001 to 0.219 fish/m^2, with a mean density of 0.057 fish/m^2. Compared to these densities from small streams in a nearby drainage, the estimated West Hatter Creek low gradient brook trout density of 0.03 fish/m^2 is low, and the high gradient brook trout density of 0.34 fish/m^2 is average to high. This variation between the brook trout densities of the low gradient reach and high gradient reach of West Hatter Creek may possibly be attributed to the summer 2001 drought which impacted northern Idaho. During September of 2001, a USGS flow monitoring station on the Palouse River downstream of the confluence of West Hatter Creek recorded a mean monthly streamflow of 3.81 ft^3/s, as opposed to the historic mean monthly streamflow of 11.4 ft^3/s (USGS Waterdata Website). Like the Palouse River, West Hatter Creek is likely to have experienced reduced flows during 2001. Disturbances, such as droughts, often result in patchiness of stream biota (Lake 2000). Consequently, it is possible that the 2001 drought and reduced West Hatter Creek stream flows are responsible for the variation in brook trout densities observed between the low gradient and high gradient reach.

In 1996, Abbott (2000) found a length-frequency distribution of cutthroat trout with a mean length of 102 mm and a range of 19 mm to 250 mm in small streams in the nearby Coeur d'Alene River basin. Compared to these figures, the West Hatter Creek low gradient brook trout mean length of 99 mm is average, while the range of 56 to 146 mm is more narrow than what was observed in the Coeur d'Alene basin. The West Hatter Creek high gradient brook trout mean length of 57 mm is smaller than what was observed in the Coeur d'Alene basin, and the range of 30 to 150 mm is also narrow.

Summary

1.) Community composition and abundance of West Hatter Creek on the University of Idaho Experimental Forest was assessed during the fall of 2001 using backpack electrofishing and a three-pass depletion technique.

2.) Brook trout *Salvelinus fontinalis*, rainbow trout *Oncorhynchus mykiss*, and spotted frogs *Rana pretiosa* were the three species captured in West Hatter Creek, with only brook trout present in numbers sufficient to calculate abundance or compile population size composition.

3.) Brook trout were found at a density of 0.03 fish/m^2 in the low gradient reach of stream and at a density of 0.34 fish/m^2 in the high gradient reach of stream. Compared to similar studies in the nearby Coeur d'Alene River basin, the low gradient brook trout density is low while the high gradient brook trout density is average to high.

4.) The mean length of brook trout captured from the low gradient reach was 99 mm and length ranged from 56 mm to 146 mm, while the mean length of brook trout captured from the high gradient reach was 57 mm and length ranged from 30 to 150 mm. These length-frequency distributions are more narrow than those found in similar studies in the Coeur d'Alene River basin.

5.) Variation in brook trout density between low gradient and high gradient reaches might be attributable to drought conditions in 2001 which may have contributed to patchiness in stream biota.

Acknowledgments

I would like to thank Dr. David Bennett for his advice and support throughout this project, which not only made the West Hatter Creek fish population survey possible, but also a valuable learning experience. I would also like to thank Harold Osborne, University of Idaho Experimental Forest Manager, for his recommendations and support, as well as Eva Strand of the UI College of Natural Resources GIS Lab. I am also appreciative of the efforts of everyone who assisted with my field work, including Brandon Barton, Natalie Beiser, Thad Berrett, Justin Brown, Matt Corsi, Kimberly Stout, and Becky Ternes.

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Appendix: Data

Low Gradient Reach
Sections: 42
Sections Surveyed: 7, 13, 15, 29, 36
Section Used for Depletion Estimate: 29
Low Gradient Reach Length: 1,260 m
Average Wetted Width: 1.38 m
Stream Area: 1,742 m^2

Unit 7
Effort: 176 s

Depletion Estimate Y/N	**Pass**	**Species**	**Length (mm)**
N	1	Spotted Frog	19
	1	Brook Trout	56

Unit 13
Effort: 303 s

Depletion Estimate Y/N	**Pass**	**Species**	**Length (mm)**
N	1	Brook Trout	143

Unit 15
Effort: 300 s

Depletion Estimate Y/N	**Pass**	**Species**	**Length (mm)**
N	1	Brook Trout	72

Unit 29
Effort: 308, 234, 241 s

Depletion Estimate Y/N	**Pass**	**Species**	**Length (mm)**
Y	1	Brook Trout	146
	2	Brook Trout	77
	3	-	-

Unit 35
Effort: 322 s

Depletion Estimate Y/N	Pass	Species	Length (mm)
N	1	-	-

High Gradient Reach
Sections: 26
Sections Surveyed: 1, 3, 14, 16, 17
Section used for Depletion Estimate: 3
High Gradient Reach Length: 780 m
Average Wetted Width: 1.01 m
Stream Area: 788 m^2

Unit 1
130 s

Depletion Estimate Y/N	Pass	Species	Length (mm)
N	1	Brook Trout	42

Unit 3
Effort: 107, 135, 115 s

Depletion Estimate Y/N	Pass	Species	Length (mm)
Y	1	Brook Trout	140
	1	Brook Trout	130
	1	Brook Trout	130
	1	Brook Trout	45
	1	Brook Trout	55
	1	Brook Trout	55
	1	Brook Trout	45
	1	Brook Trout	45
	2	Brook Trout	150
	2	Brook Trout	50
	3	Brook Trout	45

Unit 14
Effort: 265 s

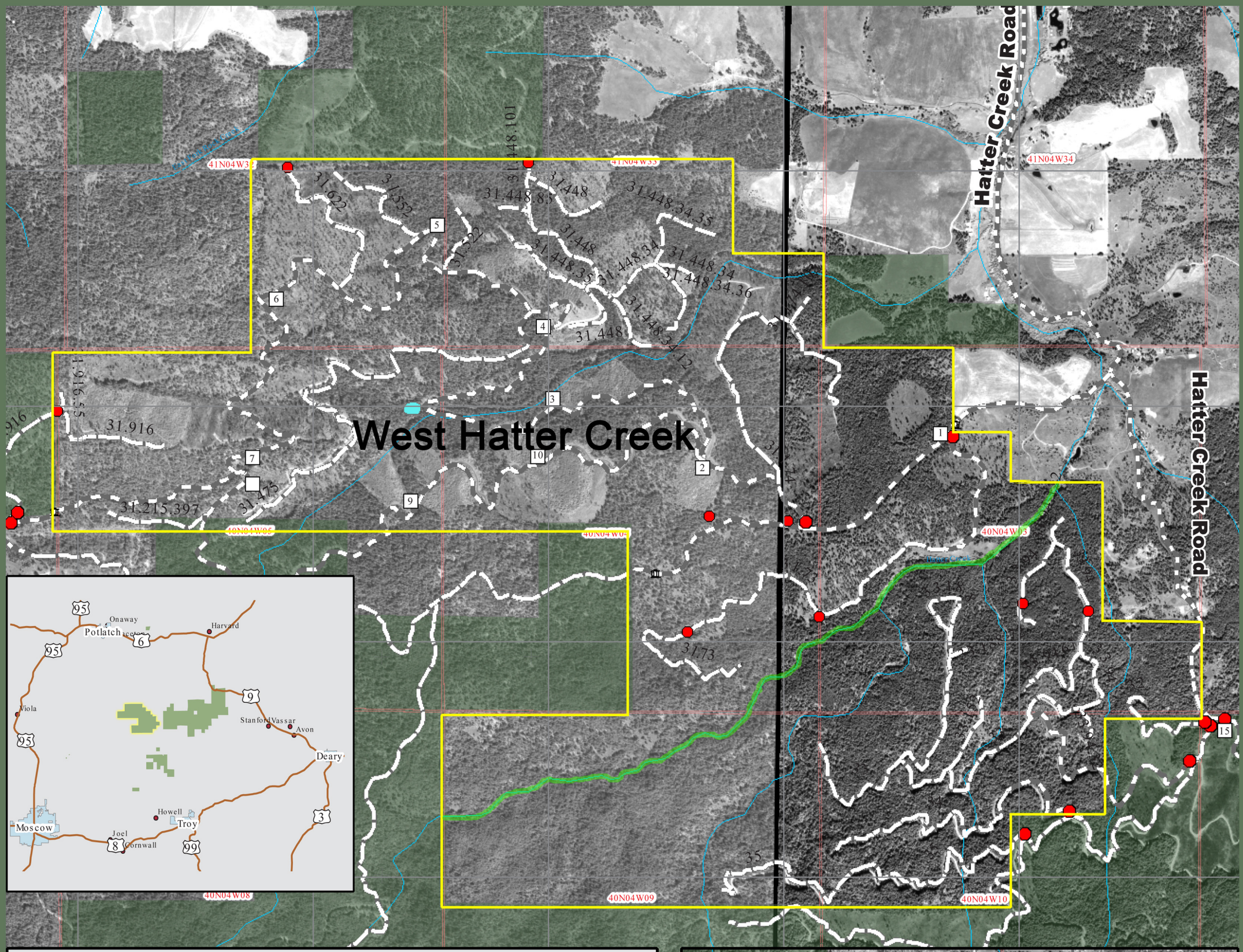
Depletion Estimate Y/N	Pass	Species	Length (mm)
N	1	Brook Trout	52
	1	Brook Trout	52
	1	Rainbow Trout	75
	1	Brook Trout	50
	1	Brook Trout	52
	1	Brook Trout	48
	1	Brook Trout	55
	1	Brook Trout	65
	1	Brook Trout	35
	1	Brook Trout	40
	1	Brook Trout	50
	1	Brook Trout	50
	1	Brook Trout	30
	1	Brook Trout	55

Unit 16
Effort: 257 s

Depletion Estimate Y/N	Pass	Species	Length (mm)
N	1	Brook Trout	110
	1	Brook Trout	52
	1	Brook Trout	48
	1	Rainbow Trout	70
	1	Brook Trout	90
	1	Brook Trout	55
	1	Brook Trout	40

Unit 17
Effort: 265 s

Depletion Estimate Y/N	Pass	Species	Length (mm)
N	1	Brook Trout	50
	1	Brook Trout	35
	1	Brook Trout	45
	1	Brook Trout	52
	1	Brook Trout	30
	1	Brook Trout	48
	1	Brook Trout	55
	1	Brook Trout	37
	1	Brook Trout	45
	1	Brook Trout	45



UI Experimental Forest Administrative Map 2004

- Running Surface Water
- Railroad Grade
- Forest Gravel Road
- County Paved Road
- County Gravel Road
- County Dirt Road
- State Road
- Public Land Survey System
- Forest Gates
- CB Mile Markers
- Cattleguards
- Fire Ponds
- Bennett Lumber Products
- Potlatch Corporation
- City of Troy Forest

Feet

0 850 1,700 3,400 5,100 6,800

1 inch equals 0.25 miles

520 260 0 520 1,040 1,560

Meters

N

West Hatter Creek

Location of Complete Research:

Author & Title: Larson, Eric;
University of Idaho Experimental Forest West Hatter Creek Fish Population Survey (Fall 2001)

This electronic document is complete; a hard copy is no longer available for review as this survey was for a directed study course and is not published.