FISHERY RESEARCH

Job Performance Report
August 25, 1997 to June 30, 1999

PROGRESS REPORT

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Project 13. Understanding Factors Affecting the Epidemiology of Whirling Disease In Idaho

By:

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UNDERSTANDING FACTORS AFFECTING THE EPIDEMIOLOGY OF WHIRLING DISEASE IN IDAHO

progess report for

IDAHO DEPARTMENT OF FISH AND GAME

by

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Research Facility: University of Idaho
Department of Fish and Wildlife Resources
College of Forestry, Wildlife and Range Management
Moscow, ID 83844-1136

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Summary of Progress

This project explores the dynamics of *Myxobolus cerebralis,* the causative agent of whirling disease, in salmonid populations in Idaho. We are exploring environmental factors that affect the prevalence and intensity of infection in positive watersheds. We will use these relationships to begin to define the risks of M. *cerebralis* infection in other watersheds. The project began in late August 1997, when graduate student Monica Hiner began her masters program in the Department of Fish and Wildlife Resources at the University of Idaho. The first objective was to establish a data base of information about M. *cerebralis* in Idaho. We prepared maps of the known distribution of M. *cerebralis* in Idaho, and details of the areas that had been sampled for *M. cerebralis.*

We produced a conceptual model of the factors that affect M. *cerebralis* in natural populations. Graduate student Hiner has contacted agencies that have collected data on the aquatic habitat in the areas in which we have data on the fish populations. These sources include USGS, IDFG, USFS, DEQ, the University of Idaho, and Idaho State University researchers. Data bases will include sampling history of major watersheds by date and location, fish species, life stage. Environmental data will include land use patterns, flow and temperature regimes, stream gradients, sediment loading.

We met with Steve Elle of IDFG. Elle conducted exposure tests in 1996 and in 1997. Areas evaluated in 1997 include the South Fork of the Boise River, the Big Wood River, Lost River Drainage and the Teton River. We visited several of these sites in early November 1997. In the South Fork of the Boise River fish from the two exposure sites and nearby natural populations showed considerable variation in the prevalence and intensity of infection within a 15 mile reach that appeared worthy of pursuing in greater detail in the 1998 field season.

We have begun experimental exposures at four sites within the South Fork of the Boise River, and in collaboration with IDFG biologist Steve Elle, in the Coeur d' Alene and St. Joe Drainage. We are raising fish for all exposure studies in 1998 at the University of Idaho, and will provide laboratory rearing of all exposed fish for 4 months. We will analyze selected samples with paraffin H & E histology, DNA probes and PCR analysis. For the South Fork study, we are testing both rainbow and cutthroat trout and exposing fish at three windows during the field season, and over time to quantify the rate of exposure.

Using all these data we will develop test and refine models that can to predict the prevalence and level of infection in fish populations. For the sites positive for M. *cerebralis,* prevalence of *M. cerebralis* will be determined by H&E histology, in situ hybridization, and/or PCR. We will analyze experimentally exposed fish at the University of Idaho. Samples from the natural fish populations will be collected and quantified by spore digest and H&E histology. The level of infection in fish will be obtained from histology scoring of extent of pathology, quantification of infection with DNA probes, or any quantitative PCR.

We will use several approaches for modeling such as logistic regression techniques for dichotomous variables, multiple linear regression techniques for data sets with continuous

variables, to determine the significance of various environmental variables. Using these models, we will explore risks and factors affecting the distribution of the parasite.

Anticipated Products From this Project

The products of this research effort will include a masters thesis, a completion report, and a peer-reviewed journal publication. Monica Hiner presented her conceptual model of environmental factors at the Whirling Disease Workshop in Fort Collins in February. Christine Moffitt presented an oral presentation of the conceptual model and some of the data from 1997 exposure work at the Idaho Chapter AFS meeting in March in Idaho Falls. We are preparing a poster presentation of the preliminary results of this effort at the International Fish Health Workshop in Baltimore MD in September.

Color Plates

Distribution of *M. cerebralis* determined from IDFG sampling of salmonids in Idaho, separated by geographic region (northern, central and southeastern). Location of samples is given when known, and results of samples collected and tested that were negative for *M. cerebralis* are separated by samples greater or less than 10 fish.

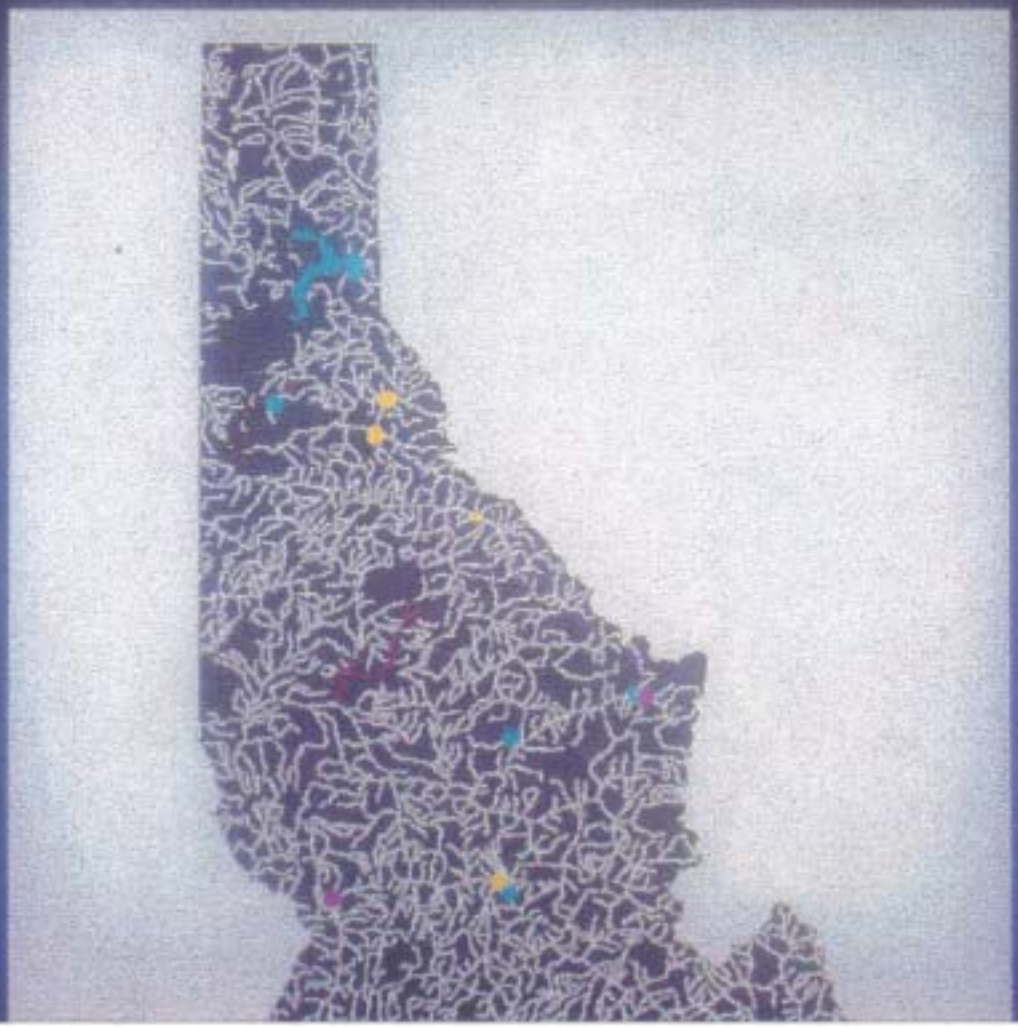
SOUTH EASTERN

- Positive
- Negative (N>10)
- Negative (N<10)

CENTRAL IDAHO

- Positive
- Negative (N>10)
- Negative (N<10)

NORTHERN IDAHO



- Positive
- Negative (N>10)
- Negative (N<10)