

STUDY PLAN
MONITORING FISH AND FISH HABITAT

FISH & GAME
DIRECTOR

1964 SPRUCE BUDWORM PROJECT
DIVISION OF TIMBER MANAGEMENT
REGION FOUR

JUL 2 8 07 AM '64

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I. Objective of Study

- A. Evaluate protective controls specified in the revised project plans (300 ft. nonspray protective width on each side of designated streams) to verify the adequacy of control measures or recommend modifications in project operations as needed.
- B. Evaluate the impact and effects of aerial spraying of DDT on fish and fish habitat within the spray project area.

II. Assignment of Personnel

This study will be directed and supervised by the Project Fisheries Biologist who is directly responsible to the Monitor Coordinator. Personnel to assist the Fisheries Biologist will consist of two Forest Service wildlife biologists detailed from other Forests, and four wage board employees assigned to the project. The Regional Fisheries Biologist will assist the Project Fisheries Biologist in an advisory capacity.

A Cooperative Agreement between the Forest Service and the Idaho Fish and Game Department provides that the Department will be assigned to specific portions of the aquatic monitoring program.

The Idaho Fish & Game Department will be specifically responsible for planning and conducting aquatic monitoring of Hughes Creek. There is a separate approved study plan for that phase. Monitoring the remainder of the spray project is the responsibility of the Forest Service as set forth in this study plan. It is mutually agreed that during spray operations as peak workload periods of aquatic monitoring shift from one phase to the other there will need to be a corresponding shift in manpower so that personnel from each agency may be required on the other phase than the one for which their individual agency is responsible.

It will be the responsibility of the Department's Area Fisheries Biologist and the Project Fisheries Biologist to coordinate exchange of personnel in field assignments. All personnel will remain administratively responsible to the agency by which they are employed but will be directed to follow instructions of the fisheries biologist in charge of the particular field job to which they may be assigned.

The Pesticide Chemicals Research Branch of the Agricultural Research Service, Yakima, Washington, will cooperate in this study program as consultant to the project design and operation and will analyze water and fish samples to determine pesticide residues.

III. Timing

Timing of the aquatic monitoring program is dependent on spruce budworm development. However, prespray sampling will begin three to four days before spraying starts and will terminate approximately October 15, 1964.

IV. Methods

A. Bottom Sampling

Aquatic insect populations are measurable by various methods of bottom sampling. For the purpose of this study, bottom samples will be taken as follows:

1. Areas for sampling will be selected on the basis of uniformity of water depth, size of bottom materials, and stream velocity.
2. Ten square feet will be sampled at each station two days before spraying, again as soon after spraying as possible and again approximately October 15, 1964.
3. A sampling station will be located at each of the following locations (field conditions may make it necessary to modify these somewhat):
 - a. The main channel of Salmon River near the lower end of the project area.
 - b. On the lower end of Panther Creek.
 - c. On the lower end of North Fork of Salmon River.
 - d. On the lower end of Moose Creek or Pierce Creek.
 - e. On the lower end of Opal Creek or Cabin Creek.
 - f. Two control streams well outside of the Project area. These are yet to be selected.

Bottom sampling apparatus will consist of a circular frame with a sampling area of two square feet. Insects collected in bottom samples will be preserved in alcohol and placed in plastic bottles and labeled. A quantitative taxonomical analysis of bottom samples will be made. Identification work will be done by Idaho Fish and Game Department and project fisheries biologists.

Each bottom sample will be placed in an individual glass vial. Identification labels of white paper, with writing in pencil, will be put inside each vial.

October samples will be collected by Forest Service personnel assisted by Idaho Fish & Game Department personnel.

B. Aquatic Insect Drift Sampling

Drift samples of insects will be taken for a one-day period either one or two days before spraying and daily during spraying. Hourly, drift samples will be taken for five-minute periods from 0400 through 1600 o'clock.

1. Drift sample stations will be located:
 - a. On the lower end of Pierce or Moose Creeks.
 - b. On the lower end of Sheep Creek if time permits.
 - c. On the lower end of Big Sheepeater or Little Sheepeater Creeks.
 - d. On the lower end of Opal or Cabin Creeks.
 - e. On the lower end of Deep Creek if time permits.
 - f. Two in the control streams which will be selected for other phases of this program.
2. The location of drift sampling stations in regard to stream channel will take into consideration:
 - a. Uniformity of depth.
 - b. Uniformity of velocity.
 - c. Uniformity of main flow current.

Sampling apparatus for collecting drift samples will consist of a bag type sampler made with aluminum screen with mesh of 144 openings per square inch. The mouth or opening of the sampler will be one square foot in area.

Samples collected will be preserved in alcohol and placed in plastic bottles. Each bottle will be labeled. Labels will be of white paper with writing in pencil.

C. Live Box Testing

Live box tests will be done to measure the effects of DDT on fish during spraying operations. Live box testing stations will be located near the mouths of Panther Creek, the North Fork of the Salmon River, Moose Creek or Pierce Creek, and Opal Creek or Cabin Creek. In addition a station will be located near the bottom sampling station on the main Salmon River at the lower end of the project area. Three

species (steelhead, chinook salmon, and rainbow trout) will be placed in each set of boxes, each species in a separate box.

Control stations will be placed in two streams well outside the spray project area. These will be the same control stations as those used for the Hughes Creek monitoring program.

Wild chinook salmon fingerlings will be collected in live traps in the Lemhi River and held in raceways until just before project spraying starts. They will then be moved to holding boxes on the control streams and held until needed for the testing stations. Steelhead and rainbow fingerlings will be obtained by the Game Department from one of their hatcheries and put in holdings boxes in the control stream until needed for the testing stations.

Three sides and one-half the bottom will be boarded solid to reduce physical stream impact on fish. Each box will be placed in a slow moving pool within the stream with the open side of the box down stream.

A total of 200 fish, if available, will be placed in each box two to four days prior to spraying in the drainages of the test stations. On the morning that spraying is to commence, all but 110 live, vigorous fish will be removed and discarded. Ten of those remaining will be randomly selected, sacked, labeled, and put in the freezer.

Each live box will be checked every day for a minimum of seven days after spraying begins in the test drainage. Live fish from each box will be counted and the dead ones removed, sacked, labeled, and put in the freezer. Ten fish will be randomly selected from those remaining alive at the end of testing period in each live box, sacked, labeled, and put in freezer. The remaining live fish will be sacked according to individual live boxes and frozen.

D. Analysis of Fish

Upon compilation of records those live boxes, if any, having a significant mortality of fish following spraying will be noted. Those batches of fish taken from each such box will be analyzed for pesticide residues. This will mean three batches for each box: (1) pre-spray removals; (2) spray and post-spray mortality if it occurs; and (3) post-spray survivals.

Survival results will be analyzed for each live box of fish from the treatment areas and compared for significant differences from survival in the controls. If significant differences do occur

samples of fish taken from those boxes and from those controls used for controls will be analyzed for residue levels.

E. Wild Fish

Using the electric shocker, pre-spray samples of wild fish will be collected from five stations within the spray areas and three control stations. Samples will be segregated as to species--chinook or trout (impossible to distinguish trout from steelhead which have not gone to the ocean). The same areas will be sampled from two to four weeks after spraying and again about the middle of October 1964. All collections will be identified, packaged, and frozen. These will be held for possible residue analyses. Determination as to whether analysis will or will not be made will be dependent on the needs for additional information in connection with other aquatic monitoring findings.

Any other dead fish picked up within the spray project will be collected, identified, packaged, and frozen. If determined later that a residue level of dead wild fish would be desirable, analysis will be made.

F. Water Sampling

One-pint water samples will be taken to determine the amount of DDT coming down the streams. Water samples will be collected in conjunction with insect drift sampling on Big or Little Sheepeater Creeks, Pierce or Moose Creeks, Opal or Cabin Creeks, and both Deep and Sheep Creeks, if time permits. Pre-spray water samples will be taken for one day immediately preceding spraying at 0400, 0800, 1200, and 1600 hours. On spray days samples will be collected hourly from 0400 through 1600.

Fluorescein dye will be used experimentally to trace and time the flow of water in some streams. This will be done to assist in the timing for water sample collections.

Samples will be collected in 16-oz. screw-cap tins. They will be shipped to the following laboratory for analyses:

Analytical Investigations
Pesticide Chemicals Research Branch
Agricultural Research Service
3706 Nob Hill Boulevard
Yakima, Washington 98902
c/o Kenneth Walker

For analyses the entire sample will be used, including a solvent rinse of the can after pouring out the water. Findings will be reported in parts per billion of DDT and its metabolites and of any other identifiable pesticide residue.

For those periods of water sampling which might seem extra critical in identifying residues duplicate samples will be taken for use in case anything happens to the original.

Identification numbers and other necessary information will be scratched on the sides of the sample cans.

G. Aquatic Vegetation

Samples of the following vegetation will be taken before spraying and again in mid-October:

Emergent - watercress from mouth of Wagonhammer Creek.

Submergent - filamentous algae from one undetermined source.

These samples will be frozen and held for later analyses if deemed necessary to have the information.

H. Spray Card Analysis

A pattern of oil sensitive spray card use is being developed by the Project Ground Operations Officer for the purpose of monitoring spray distribution within the project. The Project Fisheries Biologist will coordinate his spray distribution monitoring program with Ground Operations to make all possible use of that information. Where the Ground Operations spray card pattern will not monitor the streams, especially upstream from the aquatic monitoring stations, sufficiently to identify stream-side spray distribution the aquatic monitoring personnel will set out card lines. These will be located in selected areas. Some will be parallel and immediately adjacent to stream banks and others will be perpendicular to the stream, extending through the protective nonspray zone and the one-half pound application zone.

V. Monitoring for Project Control Specifications

During the first three days of spray application, close and intensive aquatic monitoring will be carried on to determine, so far as possible, the effectiveness of protective controls being applied.

Techniques used will be those for the regular monitoring program which will provide daily information on the immediate impact. Specifically these are:

- A. Aquatic insect drift sampling immediately before and during spraying at both test and control stations.
- B. Additional spray card lines, some lines perpendicular to the streams and other parallel and adjacent to stream edges.
- C. All other field conditions having any bearing on spraying as it might affect the streams will be observed.

Following each day of intensive monitoring, findings of that day will be reported. This will include the results of A, B, & C listed above from both the treatment and the control areas. Advise and counsel from the on-the-ground Idaho Fish & Game Department biologists will be sought and considered with Forest Service biologists recommendations of the spray operations. The Monitor Coordinator will make an evaluation of all information and will make daily recommendations to the Project Leader. Based on this evaluation and the recommendations the decision will be made by the Project Leader whether to increase or decrease the average non-spray width along the selected streams or to continue at the established width.

Throughout the project period following these first three days of intensive monitoring, findings of the regular monitoring program described in this study plan will be interpreted each day. If apparent adverse effects on streams appear at any time the situation will be reported immediately to the Monitor Coordinator. He will evaluate the information, consult with the Fish & Game Department, then make recommendations as needed to the Project Leader.

VI. Reports

Any recommendations made during project operations for adjustments in control specifications will be documented by the individual making them and transmitted through or by the Monitor Coordinator to the Project Leader.

The Project Fisheries Biologist will maintain files of all field data results and laboratory analyses of samples collected under this study program. A final report will be written by the Project Fisheries Biologist, and submitted to the Monitor Coordinator. Target date for this report will be November 1, 1964. Final report will be submitted by the Monitor Coordinator to the Project Leader by November 15, 1964.