

**THE BULL TROUT (*SALVELINUS CONFLUENTUS*) POPULATION
WITHIN CRATER LAKE NATIONAL PARK:**

**SUMMARIZED INFORMATION RELATING TO ITS
CONSERVATION AND PERPETUATION**

DRAFT

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March, 1992

TABLE OF CONTENTS

PREFACE		1
INTRODUCTION		2
THE PROBLEM		3
CONCERN OVER LOSS OF NON-TARGET ORGANISMS		4
LAYING THE GROUNDWORK		4
ERADICATION OF UNWANTED TROUT-PROPOSAL I		5
Removal of brook trout downstream of the bull trout section of Sun Creek		5
Removal of brook trout upstream of the bull trout section of Sun Creek		6
ERADICATION OF UNWANTED TROUT - PROPOSAL II		7
ERADICATION OF UNWANTED TROUT - PROPOSAL III		8
EVALUATION OF PROPOSALS		8
MONITORING		9
EPILOGUE		9
APPENDIX A.	Conservation genetics of bull trout in the Columbia and Klamath River drainages.	11
APPENDIX B.	Status of bull trout in Sun Creek, Crater Lake National Park.	
APPENDIX C.	Statement regarding genetics/taxonomy of Sun Creek bull trout for Crater Lake bull trout recovery.	
APPENDIX D.	A survey of the macroinvertebrates in Annie, Lost, Sun, and Sand creeks, Crater Lake National Park.	
APPENDIX E.	Comments concerning design and construction of fish barriers on lower Sun Creek.	
APPENDIX F.	Possibilities presented by Sand Creek and Lost Creek for the rearing of bull trout.	
APPENDIX G.	Proposal for the stabilization and expansion of the Sun Creek bull trout population, Crater Lake National Park, with an emphasis on the use of fish toxicants.	
APPENDIX H.	Toxicity test report - Antimycin.	
APPENDIX I.	The application of electrofishing equipment and techniques in the Crater Lake bull trout recovery program.	

On October 7 and 8, 1991 an advisory panel\recovery team met at Crater Lake National Park to review the status of the park's only native fish population, and to develop recommendations for a recovery program to restore the Sun Creek Bull Trout population to historic range and abundance within Crater Lake National Park. The following is a summary of the work conducted to date, by the park, the panel, and contributors, toward the conservation and perpetuation of the park's bull trout population.

PANEL CHAIR:

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Fish Biologist

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25 years experience in mountain stream restoration, using antimycin, rotenone and migration barriers for salmonids.

PANEL MEMBERS:

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Project Leader

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13 years experience in stream restoration, including Rocky Mountain National Park and Yellowstone National Park, using antimycin.

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Fish Biologist

National Park Service, Great Smokey Mts. National Park, Tenn.

Extensive experience in eradication and control of rainbow trout in mountain streams using electrofishing techniques.

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Designed numerous successful stream barriers in California mountain streams, including barriers in wilderness areas with no road access.

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Work on Oregon Bull Trout Population Status, bull trout/brook trout hybridization, and Metolius River bull trout ecology.

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Extensive work with aquatic macroinvertebrates in the Pacific Northwest.

PROJECT LEADERS:

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PREFACE

In the more than 30 years during which I have been involved in projects designed to preserve threatened and endangered taxa of Western fishes, I have never before had the opportunity to work with a more sound and complete data base, nor a more competent group of biologists. The National Park Service is to be commended in its selection of individuals to provide input into this effort. Several reports have been submitted by members of this recovery group, and these will be appended and referred to by letter designation in the text, in the general order of their past or future entry into the recovery program, as follows:

<u>APPENDIX</u>	<u>PREPARED BY</u>
A. Conservation genetics of bull trout in the Columbia and Klamath River drainages.	Robb F. Leary, Fred W. Allendorf, and Stephen H. Forbes, University of Montana.
B. Status of bull trout in Sun Creek, Crater Lake National Park.	Jeffrey Dambacher, Oregon Department of Fish and Wildlife; Mark Buktenica, Crater Lake National Park; and Gary Larson, U.S. National Park Service, Oregon State University.
C. Statement regarding genetics/taxonomy of Sun Creek bull trout for Crater Lake bull trout recovery.	Douglas R. Markle, Oregon State University.
D. A survey of the macroinvertebrates in Annie, Lost, Sun, and Sand creeks, Crater Lake National Park.	Robert W. Wisseman, Corvallis, Oregon.
E. Comments concerning design and construction of fish barriers on lower Sun Creek.	Thomas A. Felando, Deschutes National Forest, Bend, Oregon.
F. Possibilities presented by Sand Creek and Lost Creek for the rearing of bull trout.	Jeffrey Dambacher, Oregon Department of Fish and Wildlife.

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| G. | Proposal for the stabilization and expansion of the Sun Creek bull trout population, Crater Lake National Park, with an emphasis on the use of fish toxicants. | Bruce Rosenlund, U.S. Fish and Wildlife Service, Golden, Colorado. |
| H. | Toxicity test report - Antimycin. | Wayne Seim, Oak Creek Laboratory of Biology, Department of Fisheries and Wildlife, Oregon State University. |
| I. | The application of electrofishing equipment and techniques in the Crater Lake bull trout recovery program. | Steven E. Moore, U.S. National Park Service, Great Smoky Mountains National Park, Gatlinburg, Tennessee. |

INTRODUCTION

Bull trout (*Salvelinus confluentus*) populations existing within the Columbia and Klamath basins were shown by Leary et al. (Appendix A) to be "evolutionarily distinct," qualifying them for treatment as separate species under the Endangered Species Act. Although the Klamath Basin population is not yet listed as endangered, it fully qualifies as such. Often, official listing has little to do with the actual conservation status of the species, and such is the case here. Every attention should be given to assure its recovery and safety. This is especially true within Crater Lake National Park, when one considers the full responsibility of the National Park Service, which under policy and law is committed to the concept of conserving natural biological diversity. To meet this obligation fully, it becomes necessary not only to rehabilitate the bull trout population within the Park, but related to this and equally as important, to remove the introduced brook trout in the process.

Significant preliminary work has been devoted to the bull trout rehabilitation project, as discussed in the Preface. However, a definite action plan has not yet been completed. The purpose of this document is to

lead into this process by providing recommendations concerning how the project can best be accomplished. The document is not intended to constitute a plan per se, but only to provide review panel consensus and recommendations concerning what are felt to be the major issues and considerations in the recovery effort. We stand ready to advise in the plan preparation, should this be requested of us.

THE PROBLEM

The basic problem is caused by populations of introduced eastern brook trout (*Salvelinus fontinalis*) that have existed for many years in Sun Creek to the long-term detriment of the bull trout through both hybridization with bull trout and direct competition. It is therefore necessary to remove the brook trout in Sun Creek before the bull trout population may be expected to recover. Eradication of brook trout from Sand and Lost creeks would enable these streams likewise to serve as temporary refugia for bull trout and to constitute a step toward the ultimate removal of introduced fishes within the Park.

The mandate of the review team is to suggest means of accomplishing this removal with a minimum of environmental impact, while achieving the basic intent of the project. Fortunately, work by Markle (Appendix C) reveals a method of identifying pure bull trout, eastern brook trout, and hybrids thereof through dorsal fin markings. This allows the desirable option of accurately identifying, then selecting and/or removing the three component fish groups during the rehabilitation process. Research by Dambacher et al. (Appendix B) details the fish population status in Sun Creek. Dambacher (Appendix F) also details fish population status in

nearby Sand and Lost creeks, which play a key role in the long-term rehabilitation process.

CONCERN OVER LOSS OF NON-TARGET ORGANISMS

A thorough study of the Sun Creek drainage area by Wisseman (Appendix D) indicates that it is highly unlikely that the use of piscicides in the various drainages considered to be within the project area would effect any permanent damage to macroinvertebrate populations. An important consideration would be to stagger any proposed treatments to allow untreated streams to serve as sources of recolonization into treated areas by winged forms. Invertebrate recolonization into treated portions of Sun Creek would occur both from nearby streams, and untreated portions of the stream upstream from the bull trout area. The same is true, of course, with Lost and Sand creeks. To the knowledge of the various researchers, there are no other life forms, either vertebrate or invertebrate, that might be extirpated or rendered extinct during the bull trout rehabilitation process. The review panel remains keenly aware of the inherent danger of extirpating one life form while attempting to save another!

LAYING THE GROUNDWORK

Irrespective of the means finally decided upon to remove the brook trout and hybrids, it will be absolutely necessary eventually to construct two barriers in the lower portion of Sun Creek to prevent reinvasion of the bull trout rehabilitation area by unwanted fishes that may exist outside the treatment area. Felando (Appendix E) offers detailed suggestions and cost estimates concerning this work. The Park Service should give barrier

construction highest priority in order that this work may be completed by early summer 1992 (mid-July at latest). This will allow the remaining work for 1992 to continue unimpeded.

Two barriers are necessary to provide a "fail-safe" circumstance, wherein if undesirable fish make it up past the lower barrier (through human intervention or otherwise), eradication may be restricted to between the two barriers without having to involve the entire stream system. It would seem desirable that both barriers be completed in 1992. However, this would not be absolutely necessary. Construction of the second barrier could be delayed until 1993, although we advise against this. Priority should be given to construction of the most downstream barrier. Doing so would eliminate the necessity of having to chemically treat the section between the two barriers when the second barrier would be completed.

The panel strongly urges that permission be obtained to utilize an articulating backhoe as suggested in Appendix E. The strongest possible barrier is one of the major requirements of a successful recovery effort, and use of a backhoe would allow for building the most durable structure. Barrier construction should also be considered at some future date for the lower portion of Sand creek.

ERADICATION OF UNWANTED TROUT-PROPOSAL I

Removal of brook trout downstream of the bull trout section of Sun Creek

Rosenlund (Appendix G) details the use of piscicides for the rehabilitation project. In addition, Appendix G also provides a wealth of information relating to the entire project, and should be read by everyone involved in project planning and execution. Brook trout eradication would be accomplished, using a piscicide, in the lower reach of Sun Creek

(downstream of the bull trout section) prior to spawning time in 1992. Ideally, this work should be completed prior to mid-August, and by Labor Day at the very latest. Removal of brook trout from Sun Creek will allow for enhanced spawning success and growing conditions for the remaining bull trout. Bioassay information for Antimycin is provided by Seim (Appendix H).

During this same period all brook trout should be removed from Lost and Sand creeks using piscicides or electrofishing techniques. The panel recommends that both of the latter two streams be renovated in order to provide optimum survival and growing conditions for a limited number of young-of-the-year bull trout electrofished and transplanted from Sun Creek, beginning in 1993 and continuing until a stable breeding population is established. These streams will act as refuges and allow for temporary backup populations of bull trout in the event that complete or partial retreatment of Sun Creek is necessary in the future.

Removal of brook trout upstream of the bull trout section of Sun Creek

Moore (Appendix I) details electrofishing practice and technology in this highly important work, which should be undertaken during the same general time period as the chemical treatment. This will minimize the likelihood of pre-treatment spawning, which obviously carries the potential of adding thousands of new brook trout to Sun Creek when the eggs hatch-out in the spring of 1993. Electrofishing of this area would be continued annually, beginning in 1992, until such time as there were no more brook trout. Appendix I covers this entire subject thoroughly and details equipment and manpower requirements.

Compared to the use of piscicides, electrofishing is a much less certain way of removing fish from a stream. However, electrofishing would constitute the only feasible means of removing brook trout from above the bull trout area on Sun Creek. It would incur far too much risk to attempt to remove the brook trout from this area of Sun Creek by using piscicides. One "slip" (and these can occur irrespective of care and prior planning) could extirpate the bull trout. This would constitute an inexcusable tragedy.

ERADICATION OF UNWANTED TROUT - PROPOSAL II

In the event that the required administrative approval cannot be obtained for the use of piscicides, the review panel feels that it would be wise to outline an alternate proposal. The importance of the restoration project is such that it simply cannot be "dropped" for any reason whatsoever. It must continue in some form for both legal and ethical reasons.

Should the required permits for use of piscicides not be obtainable, the next most efficient means of removing brook trout would be by electrofishing. It would become necessary to purchase additional electrofishing equipment and hire additional crews (refer to Appendix I) in an effort to accomplish what may be done with relative ease with piscicides.

Cost of additional electrofishing crews imply that the overall project would necessarily be scaled back somewhat, for instance utilizing either Sand or Lost creek (but not both) to serve as rearing areas for young-of-the-year bull trout introduced from Sun Creek. The panel feels that the chances of complete brook trout removal in the lower section of

Sun Creek would be greatly reduced utilizing electrofishing techniques due to increased stream flows and structural complexity of the stream channel. Short term and long term costs would increase due to increased labor and the need for repeated intensive treatments for several years. The need for barrier construction would not change.

ERADICATION OF UNWANTED TROUT - PROPOSAL III

Should severe budgetary problems arise (and assuming administrative approval is obtained for the use of piscicides), rehabilitation could be implemented on a short term basis by removing brook trout from Sun Creek downstream of the bull trout area, removing brook trout from either Lost or Sand creeks (but not both) for reintroduction of young-of-the-year bull trout in 1993 and ensuing years, and constructing only one barrier. Electrofishing would be conducted to remove brook trout upstream of the bull trout area on Sun Creek, but less intensively.

EVALUATION OF PROPOSALS

The review team strongly endorses adoption of Proposal I which, of the three proposals, constitutes the only acceptable long-term rehabilitation plan. Proposals II and III, although steps in the right direction, could only be considered stop-gap measures implemented to keep the already very small bull trout population from growing even smaller, and thereby further reducing the already dangerously low genetic diversity required for long term population survival. Leary, et al. further address this key matter in Appendix A.

Sun Creek will be monitored and considered for complete chemical renovation in the future (5-10 years) if the partial chemical treatment and

annual electrofishing does not result in conditions that allow for the continued existence of a stable bull trout population. However, complete chemical renovation should be considered only after replicate and stable populations of bull trout have been established in Sand and/or Lost Creeks. It is also recommended that the recovery group reconvene at that time and assess management strategies in light of up-to-date bull trout population status.

MONITORING

A monitoring program is essential regardless of the proposal chosen. This is important to make sure that all of the brook trout are removed and that the bull trout are in fact re-inhabiting reclaimed sections of Sun Creek. If piscicides are used the panel strongly recommends that surveys of aquatic macro-invertebrates be conducted to monitor recolonization.

EPILOGUE

The review panel considers it a privilege to cooperate with National Park Service personnel toward accomplishment of this extremely important project. It is not inappropriate in this particular instance to close with a personal anecdote which relates strongly to the National Park Service and its enabling legislation and operational philosophies.

I first met Horace Albright at a John Muir memorial program held at Yosemite about 1970. At that time I found myself deeply involved as a California Department of Fish and Game biologist in the rehabilitation of golden trout populations near Sequoia-Kings and even more endangered taxa of desert fishes in and near Death Valley. He listened with his usual enthusiasm and deep interest as I discussed these projects.

On July 12, 1972 Horace sent me a note concerning a *Los Angeles Times* article describing our work on the golden trout. Here is his second paragraph:

When I was a boy in Inyo County and an ardent fisherman, I remember how once in awhile there would be a story of the golden trout told by a forest ranger or some person who had made a pack trip into the high back country. I never caught a golden trout until 1915 when I was on the famous Mather Mountain Party that came via packtrain from Giant Forest to Lone Pine, and camped at Horseshoe Meadows after traversing the Kern and Camping at Crabtree Meadows two nights for the climb of Mt. Whitney . . . I have never been in favor of roads in that high country and have worried about the golden trout.

I feel that Stephen Mather and Horace Albright, and others who were instrumental in the creation of the National Park Service and whose thinking did so much to give us what we have today, would voice their enthusiastic approval over what we plan to do with a seemingly insignificant fish in a seemingly insignificant drainage off the south slope of Crater Lake. We owe it to them and to the fish to do our very best job. This consideration of our responsibility to future generations of Americans is what the Park Service is all about and what makes the National park System all that it is: the sum of its constituent parts, both physical and biological. It is in this spirit and with enthusiasm that the review panel submits its recommendations.

Respectfully submitted this 15th day of February 1992.

Edwin P. Pister
Panel Chair