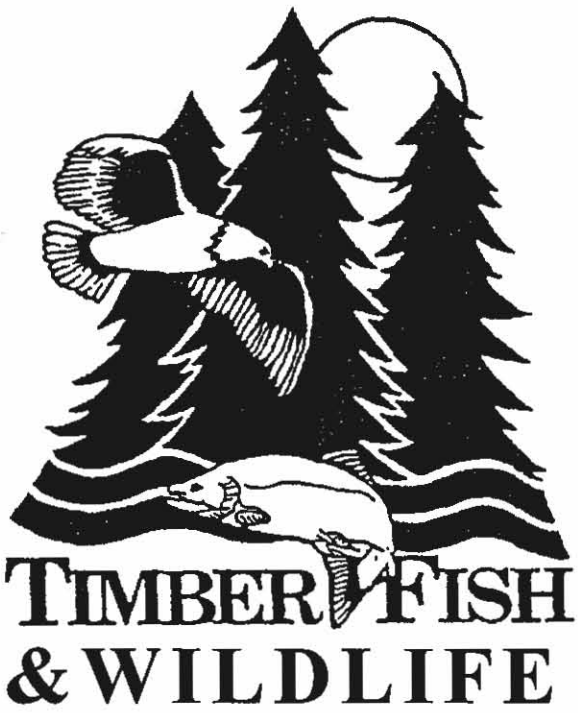
MANAGEMENT TRIALS TESTING PLAN

FOR THE

T/F/W STREAM TEMPERATURE

METHOD



JUNE 1991

Timber/Fish/Wildlife

Co-operative Monitoring, Evaluation and Research Committee

Management Trials Testing Plan

for the

T/F/W Stream Temperature Method

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Prepared for the
T/F/W CMER Water Quality Steering Committee
and Washington Dept. of Natural Resources

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Table of Contents

Disclaimer

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Section I. Executive Summary

A stream temperature study was undertaken in 1988 by the Temperature Work Group (TWG) of the Cooperative Monitoring and Evaluation Committee (CMER) to develop a method to address stream temperatures and the impact of harvest practices at both a site and basin level. The results of that study are presented in the 1990 Temperature Report (Sullivan and others, 1990). A method for identification of temperature-sensitive streams and appropriate shade requirements to meet Water Quality temperature standards was presented to T/F/W through the CMER and Administrative Committees.

The Temperature Study identified that current regulations for shading of riparian zones may not meet water quality standards in all stream locations, and provided an initial recommendation on where and how to determine appropriate alternative shade levels. These conclusions appear to be verified by a current riparian temperature study conducted by the Dept. of Ecology, which evaluates the regulations (E. Rashin, Dept. of Ecology, pers. comm.)

The recommended method includes an simple graph which classifies stream reaches based on their elevation and shading levels. Using this, the amount of shade needed to maintain water temperatures within the Water Quality standards can be determined. As a backup, a computer model is also presented, to be used at stream sites where circumstances suggest that additional temperature evaluation is necessary. Widespread use of the computer model is not foreseen at this time. The current version of the recommended method is presented in the Stream Temperature Method Users' Manual (Doughty and others, 1991).

The CMER Workplan (1990) calls for new tools or products developed by T/F/W research to go through a testing phase before recommendations are made regarding adoption of new tools and processes, with accompanying regulation changes. This is important in assuring that new tools meet the needs of field managers, and perform as well in routine field use as they do in more controlled experimental testing.

This document is a companion to the Temperature Method Users' Manual. Together, they present a method for field testing the recommended temperature method. Recommendations for two avenues of additional investigation are also made. The first is an assessment of current information regarding typical levels of riparian shade on Washington streams, and the second is an investigation of the Water Quality standard's stream classification system and ambient stream temperatures.

At this time, no definite plans are in place to proceed further with the management trials. This project was one of the first T/F/W research products to approach this field testing phase. Some policy questions and administrative concerns encountered by the Temperature Work Group and the CMER/FIC Implementation Subcommittee are discussed, in order to aid future investigators.

Section II. Acknowledgements and Introduction

Acknowledgements

The Temperature Work Group would like to thank the members of the ad-hoc implementation subcommittee (Steve Bernath, DNR, Glenn McDonald, DOE, Ben Cleveland, DNR, Jon Hansen, Colville Tribe, and Dale Bambrick, Yakima Tribe) for their participation in scoping and developing the management trials, and reviewing the Draft User's Manual. While this document intends to reflect the discussions of the Temperature Work Group and the Implementation Subcommittee, the contents and conclusions of this report remain, as always, the responsibility of the authors. We also acknowledge the support received from Weyerhaeuser Co. for this project, which included report production services, and the interest expressed by Washington Forest Protection Association members, and the Colville Tribe, in participation in the management trials themselves.

Introduction

A stream temperature study was undertaken during 1988-1990 to develop a method to investigate temperature on a site and basin scale. The study generated information for two purposes. Data was collected from forest streams at 92 sites throughout the state, in order to develop a method to screen stream reaches for potential temperature concerns during harvest planning. Data was also collected at 33 sites to evaluate the predictive capabilities of existing reach and basin temperature models. Study sites represented Type 1-3 streams, with a variety of riparian shading conditions ranging from mature conifer forests to sites without shading.

The results of that study are presented in Sullivan and others (1990). A recommended method was presented to T/F/W through the CMER and Administrative Committees. The recommended method includes an easy-to-apply test, which categorizes stream reaches based on their elevation and shading levels. Using this "temperature screen", the amount of shade needed to maintain temperature within the Water Quality criteria for maximum temperatures can be reliably determined at most sites from a simple graph. As a backup, a computer model is also presented, that can be used at sites where circumstances suggest that additional temperature evaluation is necessary, or to verify screen predictions. Widespread use of the computer model is not foreseen at this time. The current version of the recommended method is presented in the T/F/W Stream Temperature Method Users' Manual (Doughty and others, 1991).

The Cooperative Monitoring, Evaluation, and Research Committee's (CMER) Draft Workplan (1990) identifies a series of evaluation steps that may be necessary to bring recommended management tools, such as the Temperature Method, on line for use by T/F/W managers. The plan outlines steps to identify the most promising methods to approach a given problem, and perform technical evaluations to prove their effectiveness. The T/F/W Temperature Method has gone through the research and technical assessment steps. The next step in developing the method is to show that it works as well in routine field use as it does under experimental conditions. Management trials, where users work with the recommended methods, is seen as a means to test the method's application in a routine resource management setting, with follow-up evaluations to determine user satisfaction and product effectiveness. A further point of investigation during a management trial is to identify, to the extent possible, the effects of the possible change in Forest Practice Regulations if the method is implemented. After all results from the management trials are evaluated, the process of accepting the Temperature Method for use within T/F/W, and developing any needed regulation changes would then start.

The objectives of this document are to outline a plan for a management trial of the T/F/W Temperature Method. At this time implementation of a trial has not been scheduled by the T/F/W co-operators, although attempts have been made to do so. Sufficient road blocks to implementation of this first trial of a new T/F/W method were encountered that it is worthwhile to highlight them, so problems can be addressed for future trials. The experiences of the Temperature Work Group may be of use to future investigations.

Another section discusses policy-level issues and concerns that arose among participants during the process of trying to implement the management trials. The intent of this section is to note turning points where timely policy decisions must be made, and directions given, to enable technical people to successfully conduct a management trial.

This document is a companion to the T/F/W Stream Temperature Method User's Manual (Doughty and others, 1991), and both documents should be consulted together in executing the management trials.

Section III. Testing Plan

Objective

The objective is to test the Recommended T/F/W Temperature Method, as outlined in the Users' Manual, by T/F/W co-operators who design riparian zones. Feedback would be solicited from field managers regarding method strengths and weaknesses, and problems and solutions. Potential changes in Riparian Management Zone designs, and the amount of additional trees that may need to be left when using the Temperature Method would be investigated. A report would be made to the Co-operative Monitoring Evaluation and Research, and Field Implementation Committees with recommendations for future actions. If the recommendations include a change in the Forest Practices regulations, information collected during the management trials will be submitted to the Administrative Committee in order to help assess the economic impacts of the regulation change.

Process

The trials co-ordinators will identify a group of foresters, from industry and DNR, to test the method during pre-harvest planning. Recruitment will attempt to ensure that all ecoregions of the state as well as various kinds of landowners are represented (including DNR foresters, large industrial foresters and small landowners). The testers will rely on the Users' Manual for directions on applying the method, although training sessions for testers would also be arranged. Assistance in recruiting interested testers will be needed from both industry and the DNR.

It is necessary that testers be those individuals who routinely design Riparian Management Zones. Timely scheduling of the trials is also important, so that the testers can be trained prior to the peak influx of forest practice applications (FPA) in late winter. The test would most likely occur during the spring months.

Each field tester will apply the method on a number of harvest units during harvest planning and riparian zone design, for Type 1-3 streams. The number of Forest Practice Applications will be defined by the testers, in response to their typical workloads and the forest planning ongoing during the months of the test. It is hoped that enough responses will be gathered to do statistical analysis if needed. The method will be applied as part of their routine unit layout process. A brief checklist/response sheet will be filled out for each FPA, and another general response sheet for the method as a whole. Telephone interviews with testers to gain general impressions and suggestions for improvement will take place. No actions on the ground would be taken as a result of the test, and no conditions that relate to the temperature method would be added to the FPA.

Testing the temperature method will add a minimal amount of time to the testers' processing of Forest Practices Applications. Once training has been provided, it is estimated that additional time required for applying the method to each FPA would be: one half-hour office time, one hour or less field time (depending on the RMZ layout), and one quarter-hour to fill out the feedback and evaluation form. Until adequate shade data is available, application of the method does require a site visit. The necessary field work can easily be accommodated during the RMZ layout.

The number of field testers will be dependent on the number of interested co-operators, available funding, and work loads. However, during the development of this document,the Users' Manual and the 1990 Temperature Report, many T/F/W co-operators expressed an interest in participating in the management trials. A minimum number of testers would be 10 - 15, in order to have participation from as wide a range of ecoregions within Washington as possible. A minimum number of FPA's tested would be on the order of 10 for each ecoregion.

(Current drafts of the response forms are in Appendix A.)

Results

After the testing period, and when forms and telephone interviews have been completed, the trials co-ordinators will assess the results, both qualitatively and quantitatively if possible. Topics to be considered include the following issues, and any others identified during the test period by the trials coordinators and the field testers.

- An evaluation will be made of the usefulness and practicality of the method. Does it answer the necessary questions, and does it fulfill the need for documenting that the temperature issue is addressed?

- Given that a RMZ is currently designed for many purposes, including provision of large organic debris and wildlife needs, will current practices protect stream temperatures according to this method?

- Can the method be used successfully by a variety of T/F/W participants, including land managers with a variety of responsibilities?

- How many additional trees, if any, would need to be left in an RMZ to meet the temperature criteria (size, species, estimated value)? Sites on streams where no trees could be removed would also be identified, and values of trees left estimated. This may include trees both within and outside of the RMZ; situations may exist where trees outside the RMZ, but providing stream shading, would need to be left.

• Forest practices are managed under different regulations in Eastern and Western Washington (WAC 222). The riparian regulations for Eastern Washington are themselves a product of T/F/W research (Bilby and Wasserman, 1989), and were designed to maximize both harvesting flexibility and riparian protection (primarily for sources of large organic debris). During the method assessment, attention should focus on how use of the temperature method might affect the flexibility of those regulations.

Flexibility will be required on the part of both the trials co-ordinators and any overseeing committee during the testing period. Management trials are relatively new within T/F/W, and like all new processes, it is almost certain that unexpected information, feedback from testers, or redirection from an oversight committee will happen during the testing period, and may well change the scope and direction of the test. It will be important for all participants to remain flexible in order to respond appropriately (including budgeting flexibility if necessary). This tendency for unexpected information to alter project scope was encountered by the Temperature Work Group, and may be a normal part of implementing research under an adaptive management model.

Section IV. Additional Analyses

There are two additional analyses that should be done as part of the management trials, since they will add important perspective to the future use of the Temperature Method. These should be undertaken by the trial coordinators, not the forester testers, with results synthesized into the final recommendations.

Shade Characteristics of Washington Forests

The Temperature Method relies on the user being able to specify both a pre-harvest and a post-harvest shading level. Because the method is a planning-level tool, and will often be used at a time of year when it might not be possible to determine pre-harvest shading (because of deciduous trees or site inaccessibility), the use of a regionalized shading database of shading levels, if it is possible to develop one, would assist users considerably. At this time it is not known if currently available information could be organized to serve this purpose.

The objective of this analysis would be to analyze current information, from both within and outside of T/F/W, regarding typical levels of riparian shade, for different species associations, seral stages, site elevations, stream sizes, and ecoregions.

Existing data on forest shading levels are known to be available from other T/F/W studies, including;

- Washington Dept. of Wildlife Riparian Surveys (Carlson, 1990).
- T/F/W Ambient Monitoring Basin Surveys (Ralph, 1990).
- Eastern Washington Riparian Surveys (Bilby and Wasserman, 1989).
- Temperature Work Group 1988 Site Surveys (Sullivan and others, 1990).

Other information that may be useful includes a comprehensive ecological survey of the Olympic National Forest (Henderson and others, 1989). The Forest Service is continuing the survey effort on the Mt. Baker/Snoqualmie National Forest (D. Peter, USFS, pers. comm.).

The analysis product would be an assessment of available information, and identification of data gaps. Recommendations would be made regarding the appropriateness and possibilities for eventual development of regionalized forest shading databases. Additional information required would be identified. This assessment would be made by ecoregion, since it is very possible that typical shading levels will be able to be developed for some regions of the state, but not others.

Analysis of Water Quality Regulations' Stream Classification and Ambient Stream Temperatures

During the process of developing results reported in Sullivan and others (1990), some complexities were discovered regarding two systems of stream classification existing in the State regulations. The first, familiar to foresters, is the stream typing system in the Forest Practices regulations, with associated timber practices and temperature levels expressed as Best Management Practices (BMP's). The second system, generally not used in forestry at this time, is in the DOE Water Quality Regulations (WAC 173-201). This classification system (which reflects an array of water quality parameters, including temperature) is not completely compatible with either the DNR stream typing system, or with actual ambient stream temperatures (as presented in Sullivan and others, 1990).

The objective of this analysis would be to analyze the current stream classifications, for Class A and Class AA waters, in the Water Quality regulations with respect to water temperature, and assess the extent of stream reaches that may be incorrectly classified with respect to baseline stream temperatures for mature forest conditions.

Concerns exist that the current classification system may not be totally congruent with ambient basin water temperature patterns, even in areas with mature tree canopies. The amount of available information available in the 1990 Temperature Report on basin-level temperature patterns, plus any available recent information, would be used to determine whether stream reaches are correctly classified. Investigation into this topic using basin characteristics, available data on shading levels present on streams with mature riparian canopies, and possibly the TEMPEST reach model (Adams and Sullivan 1990), should easily identify problem reaches, if any exist. At that time, changes in the stream reach classifications, if needed, could be recommended and discussed in time for the next triennial review of the Water Quality regulations. The next review period will end in mid-1994 (G. McDonald, DOE, pers. comm.).

The use of the "distance from divide" concept presented in Sullivan and others (1990) would form a practical approach for analyzing stream classification with respect to temperature. Results in that report suggest that stream reaches at a distance greater than 19 km (12 mi.) from the watershed divide are not likely to meet Class AA temperature criteria even under a mature forest canopy. Regional variation may exist, and this relationship will need to be verified at a regional level.

The analysis product would be a discussion, for T/F/W participants, on whether some stream reaches may need to be reclassified, for the temperature component of the Water Quality regulations. Recommendations could include reclassification from Class A to Class AA (example: a small tributary to Class A waters, currently Class A), or from AA to A (example: a larger mainstem stream with higher ambient temperatures, currently Class AA). Integration of the Water Quality Regulations' stream classification system with the DNR Stream Typing system is highly recommended.

Section V. Results and Recommendations

Results of the field trials and information from the additional analyses will be reviewed. Recommendations will be discussed with the Temperature Work Group, as well as the committee designated to oversee the management trials. After recommendations are developed, they would be presented to the CMER Committee, and a report written as a CMER document. Results and recommendations would also be presented to the field testers and other interested T/F/W participants. At that point, the issue of the recommended Temperature Method, results and recommendations of the management trials, and needed regulation changes to implement the Method within T/F/W would then move under the direction of CMER, to a policy group to identify future action.

Section VI. The Management Trials Planning Process

Recommendations for the Temperature Method were presented during 1989 to the Water Quality Steering Committee, and to the CMER Committee. Accepted by CMER, they were presented to the Administrative Committee on several occasions during 1989 and 1990, and to T/F/W participants in general in March 1991. In late September 1990, approval to proceed with the management trials was given to the Temperature Work Group. The TWG proceeded to meet with an ad-hoc TWG/FIC implementation subcommittee from October 1990 through March 1991. Members of the Subcommittee included representatives from Dept. of Natural Resources, Dept. of Ecology, and the Colville and Yakima Tribes.

The implementation subcommittee had two general goals. The first was to review the Draft User's Manual and the accompanying TFWTEMP computer model. Many good suggestions came from the subcommittee's reviews of the Manual and the model, and the products were much improved by their input. This goal was successfully reached (Doughty and others, 1991).

The second goal of the subcommittee was to help develop and implement the trial plans. Much discussion took place, and the scope of the tests was developed and refined. However, implementation of the trials did not happen, because of regulatory agency concerns, policy issues, and possibly the fact that this project is the first in T/F/W tool to go through this process. Technical and policy decision points encountered by the subcommittee are discussed below.

One of the characteristics of adaptive management is supposed to be that co-operators "allow actions to proceed in the face of uncertainty and potential opposition" (AMSC 1989). This admirable goal was not fully reached during this process. First, concerns surfaced during the planning discussions about whether the trials could take place before changes in the Forest Practices Regulations had been made. The Temperature Work Group was of the opinion that it was appropriate, and necessary, to use the Temperature Method in a "testing mode", to gather information about its usefulness and appropriateness, for policy considerations of regulation changes. Other subcommittee members were concerned about confusion resulting from information or tools reaching T/F/W participants "too soon", before policies and regulations were in place. Much discussion occurred on this topic.

A second series of complications arose from the determination that the DOE Water Quality Regulations should be the appropriate standard against which to test the Temperature Method. That was not a problem for the Method, which is designed to be flexible and can adapt to different regulatory standards. However, this did create problems for the trials design process. The first problem was that the decision process for reconciling the two sets of regulations was unclear, and the forum where it was to be decided was not defined during the period the ad-hoc implementation subcommittee was active. Adequate communication between the appropriate agencies and all subcommittee members about the decision-making process did not occur. Much discussion occurred regarding the responsibility, if any, of the

subcommittee or the Temperature Work Group to participate in this reconciliation effort. Different policy people consulted had differing opinions regarding this issue.

A related problem was that foresters, the field testers, generally refer to the Forest Practices regulations for techniques and management practices to meet the temperature standard. Therefore, the trials had to be designed NOT to test a new tool in a familiar regulatory context, but to test the new tool while introducing both an unfamiliar regulation and a different stream classification system. This made the management trial a little more difficult, but not impossible. However, it does mean that policy decisions regarding reconciliation of the two standards are absolutely critical, and that they needed to be clearly expressed to the trials co-ordinators in order to have the trials test properly in the right administrative context.

Failure to resolve these questions has seriously stalled further field testing of the Temperature Method. While attention to the problem was evinced, especially by agency representatives, commitment to follow through with needed changes in a co-operative fashion was not shown.

Section VII. Policy Considerations

It is quite possible that, as T/F/W develops, many of the research products and new management tools will require a change in the regulations in order to be implemented. A management trial will greatly assist policy people in assessing the value of the proposed tool and any regulatory changes needed.

Unlike some research projects, which can take place outside day-to-day T/F/W operations, management trials take place squarely within the implementation arena. For successful trials, future trials co-ordinators will require ongoing policy and technical support from T/F/W participants.

Leadership and support from within the user's groups will be needed for the trials to proceed. For this trial, the user's group would be industry and state foresters who design Riparian Management Zones and would use the method during harvest planning. These professionals will be able to assess whether this tool meets their needs with regard to current temperature regulations. Their expertise will also be needed to correctly value any economic impacts from adoption of the Method, resulting from additional shade trees left in or near the riparian zone.

Leadership and support from the regulatory agencies will also be necessary. For the temperature method, regulators are both the DNR and the DOE. From the DNR, DNR foresters who design Riparian Management Zones will be needed to field test the method. A certain amount of staff time will also be needed to help determine if the information gained will meet the DNR's needs for the Forest Practices Application process, pre-harvest planning, and SEPA compliance. Assistance with determining the correct value of any additional leave trees may also be needed.

From the DOE, staff support will be needed to discuss the Forest Practices regulations' water typing system and the Water Quality standards' stream classification with the testers and trials coordinators, and to help develop appropriate management strategies in stream reaches where ambient temperatures exceed the regulations, and for situations where it is possible that a stream classification may be inappropriate with respect to the temperature criteria. Because the Temperature Method works to manage stream temperature levels to comply with the Water Quality standards, and because the testers will be foresters, most familiar with the Forest Practices regulations, co-operative and flexible participation from the state regulators will go a long way to allowing the trial co-ordinators to gather appropriate information. Strong policy support from both agencies will also assist greatly.

All T/F/W participants will need to accept, on both a policy and a technical level, the experimental nature of a management trial. As long as the testing methods are found to be well-designed, and the test can be performed without damage to the resource, it should be acceptable to T/F/W participants that the management trial might lead to regulatory changes, but not until the experimental phase is over.

Several kinds of inappropriate responses to this experimental nature were received by the subcommittee during its planning process. The first was from T/F/W participants who assumed, when the method was proposed, that it was the "right thing", and something that should be implemented immediately even if not tested. The second, on the other hand, were reactions from other participants that treated the proposed testing plans as if they were project permit applications, that must be required to comply with current regulations. At times a third response was encountered, which asserted that the tests should be designed to emphasize enforcement of current regulations (which would be difficult since no actions on the ground would be taken as a result of the test).

Acceptance that management trials, by definition, are experimental, assess possible regulatory alternatives, and do not replace education or enforcement efforts will expedite future projects of this kind.

A last requirement for successful trials will be better definition by T/F/W on the role of an ad-hoc implementation subcommittee. Confusion existed during the trials planning regarding the role of the designated TWG/FIC implementation subcommittee. All subcommittee members did agree that part of their role was feedback to the Temperature Work Group on the presentation of the temperature method recommendations, review of the User's Manual and the computer model, and participation in trials planning.

However, the process by which any remaining concerns about or disagreements with the temperature recommendations themselves would be worked out was confusing. Is an Implementation Subcommittee the appropriate forum for re-evaluating and possibly revising the technical or policy aspects of the Temperature Method? The responsibilities of both the subcommittee and the technical work group needs to be more clearly defined in this step. Avenues of communication between these two groups need to be more fully developed than they were during our process, and the role of CMER in providing project guidance and conflict resolution needs to be defined. Clear direction from a T/F/W policy level regarding roles, responsibilities, follow-up and conflict resolution avenues of this kind of a subcommittee will expedite future projects. Recognition by T/F/W participants of the difficulties of designing a project while supervised by a committee will help future management trials planners.

In summary, the authors believe that the concept of a management trial as part of the assessment of T/F/W research is extremely sound, and should be implemented to assess future tools developed by T/F/W research. many changes that make the recommended method more workable in the field evolved during the process. Actual field trials would have undoubtedly generated important contributions as well. It is our recommendation that the Temperature Method be tested and an assessment made regarding its usefulness to T/F/W field managers. Many of the difficulties faced by the Temperature Work Group and the Implementation Subcommittee arose from the Temperature Method's position as first T/F/W research product to undergo this process. It is our hope that clarification on the policy and protocol questions raised by our experience will assist future investigators to avoid problems and successfully complete the important development stage of management trials.

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Appendix A
T/F/W TEMPERATURE METHOD MANAGEMENT TRIALS
CONCEPT FOR FIELD TESTER RETURN FORMS DRAFT 6/91
FORM I. Site-Based Comments

Name:_____
phone:_____
organization:_____

FPA number:_____
Watershed:_____
Stream Classification: FP:_____WQ:_____
Temperature Region: (Coast, East, West):_____
Site Elevation:_____(Ft? M?)
Pre-harvest shade estimate:_____(%)
Post-harvest shade estimate:_____(%)

Was a standard RMZ initially proposed in the FPA?_____
Did the temperature screen initially predict an acceptable
water temperature with the proposed RMZ layout?_____
If not, how much additional shade did the screen say was needed?_____

Did Table 3.1 in the User's Manual suggest that the incremental temperature increase criteria would be met?_____

Did you use the TFWTEMP computer model?_____
(If yes, please attach a printout of the model results,
or identify the filename on your enclosed diskette:_____)

Did you leave additional trees in the RMZ layout specifically to meet the temperature criteria?_____

What is your estimate of additional trees needed, over and above leave trees specified by current regulations, to meet the temperature standard (please estimate by species, age, dbh)?

Please indicate the number, and average dbh, of any of the additional leave trees (resulting specifically from the application of this method) would be outside the RMZ:

T/F/W TEMPERATURE METHOD MANAGEMENT TRIALS
CONCEPT FOR FIELD TESTER RETURN FORMS
DRAFT 6/91

Form 2. Summary Comments
Name:_____
phone:_____
organization:_____

Please fill out with your opinions those topics where you would like us to have your feedback. Feel free to add any other opinions or information you think necessary.

1. Use of Water Quality Stream classifications
   How easy was it to classify your stream reach?
   Do you have suggestions on implementation of this classification system?

2. Temperature Screen

   Was it useful?
   Did it match your regional needs/expectations?
   Do you have suggestions that would improve the screen's usefulness?

3. Incremental Criteria
   (See Table 3.1, Incremental temperature increase criteria test, User's Manual)

   Was it useful?

   Were the directions clear?

   Did you rely more on Table 3.1 or the TFWTEMP model to predict incremental increases?
   Do you have suggestions that would improve the figure's usefulness?

4. Eastern Washington Riparian Rules

   For foresters operating under the Eastern Washington RMZ regulations, how did this method affect your current operation under those rules?

5. Time

How much additional office time did this process take?
Per FPA, on average?
Per FPA, where modeling was necessary?

How much additional field time did this process take?
Per FPA, on average?

6. Shading Level Estimates

What was your comfort level with your pre-harvest shade estimates?

With your post-harvest shade estimates?

Do you have comments on recommended shade estimation methods in Draft Manual? Can you suggest alternate assessment techniques?

Would you feel comfortable using a regionalized database of shading levels, indexed by seral stage, species association, ecoregion and site elevation?

7. User's Manual

What was your opinion of the Users' Manual?
Style? Usefulness?

Can you identify data gaps, missing information or poor explanations that can be improved?

Do you have any suggestions for additional topics to be covered?

8. TFWTEMP Computer Model

Were the directions clear?

Are the help screens useful? Adequate?

Did you have any problems getting the model to run on your computer? (If so, please specify the computer system used.)

Are the printouts adequate? (If not, do you have any suggestions for changes?)

9. What other suggestions do you have to improve the Temperature Method?