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I.I Adaptive Management

Adaptive Management is an essential component of the Idaho Forestry Program (IFP). Over the 30-year term of the IFP, it will provide a means for refining IFP terms as necessary to achieve goals and habitat objectives, and will provide additional certainty that the desired outcomes will be achieved. This section describes the administrative structure and decision-making process of adaptive management.

The IFP incorporates adaptive management concepts consistent with the Services' Habitat Conservation Planning Handbook (November 1996). This adaptive management process is designed to minimize uncertainty regarding the effect of IFP management measures upon watershed processes and stream habitat, and the ability of the IFP to achieve its long-term conservation goals. However, while new information gathered through adaptive management is intended to supplement the IFP basic conservation strategy, it is not intended to substitute for it. The IFP is premised on the existing body of scientific evidence demonstrating relationships between the effects of forest management upon key watershed processes, the effect of these processes upon stream habitat, and the importance of habitat to the health of the aquatic species that occupy, or that potentially could occupy, this habitat.

The IFP's effects upon physical watershed processes (e.g., improved road drainage reduces sediment delivery) are reasonably certain. These watershed processes and potential changes in them associated with implementation of the IFP management measures are known to potentially affect stream habitat. However, effects of change in these processes on stream habitat in a specific watershed are variable, and therefore difficult to predict or measure with certainty. Moreover, linkages and exact response of species populations in a given watershed or stream are known to be affected by historic and future watershed effects (e.g., floods, fires, and landslides) and by effects downstream of these watersheds not related to IFP management measures (e.g., dams, reservoirs, and fishing). Species population responses are even more variable and difficult to detect than are habitat responses. Despite these complexities, physical changes in habitat attributable to implementation of the IFP management measures are reasonably inferred to have an effect – positive or negative – on the species. This relationship and linkage of habitat to the covered species is herein referred to as "biological relevance." The IFP assumes biological relevance unless some new body of science and weight of evidence demonstrates that such relevance does not exist, or that it is altered such that management measures could be relaxed (e.g., water temperatures optimal for bull trout found to be 15°C, rather than 12°C). Because of the biological relevance assumption, adaptive management will be focused on the effects of the IFP to habitat components such as stream temperature, rather than directly monitoring the effects of the IFP on individual fish or fish populations.

The IFP is proactively designed to apply conservation measures to riparian and hillslope areas, to expeditiously verify that these measures have been applied as required, and to determine the effectiveness of the measures at protecting fish habitat. The IFP monitoring requirements are also designed to measure stream response and effects upon fish habitat subsequent to application of the measures. These instream measures begin immediately with implementation of the IFP. However, the effect of the conservation measure on some watershed processes can only be evaluated with the passage of years. For instance, IFP monitoring is designed to detect whether sediment delivery to streams from roads is being controlled by management measures as intended, but implementation of these measures will require as many as 15 years to complete.

IFP commitments were developed using the best data and science applicable to state and private lands in the Clearwater and Salmon River basins available at the time of assessment. These assessments provide a reasonably high level of certainty that IFP conservation goals will be met. However, complete certainty that the IFP will be perfectly successful is difficult, if not impossible, to achieve. This would require having either extremely conservative conservation measures that may provide only negligible additional benefits to the covered species, or would mean postponing implementation of the IFP conservation measures and benefits until "perfect" knowledge is achieved. Neither of these approaches is desirable. The IFP's adaptive management approach balances strong commitments at the outset with a procedure for improving them in the future if found to be necessary based on monitoring and new information.

Adaptive management provides the basis for any future revision of IFP commitments that might be needed to incorporate new information regarding the effects of the IFP management measures and covered activities. New information may result from the IFP monitoring commitments or may be obtained from other sources of technical information and data applicable to IFP project areas.

The starting point for adaptive management is a determination that the relevant circumstances, conditions, or information upon which the IFP was originally based have significantly changed subsequent to agreement and implementation of the IFP. The detection of any such change initiates, or "triggers," the adaptive management response process. This "feedback loop" allows adjustment of management practices to further ensure that the IFP habitat objectives and conservation goals are achieved. Moreover, the IFP adaptive management commitments are designed to detect impacts and trends as early as is possible following IFP implementation to further ensure that any potentially detrimental impacts caused by the IFP may be reversed, and that the IFP achieves its goals and objectives. The IFP's adaptive management program consists of five basic elements: 1) monitoring that allows timely detection of changes in the action area that may require an adaptive management response, 2) monitoring that allows determination

of whether or not IFP measures are sufficiently protecting stream habitat, 3) an evaluation process to determine whether revision of management commitments is warranted, 4) revision of applicable management commitments, and 5) implementation of the revised commitments. The IFP management measures are also subject to adaptation through consideration of information relevant to key uncertainties that may come to Idaho's attention through sources external to the structured Effectiveness Monitoring Project (EMP) studies outlined later in this section.

During development of the IFP adaptive management and monitoring measures, and coincident with development of the IFP document, Idaho examined a wide array of issues, processes, and circumstances related to potential effects of the IFP management measures and the overall ability of the IFP to maintain and recover covered species. Most of these considerations were well understood and could be discussed with reasonable certainty in the IFP document. Some of these same considerations may also require continued examination of the technical literature, both actively and passively,[1] while others will require additional monitoring and inventory efforts during the course of IFP implementation. Some considerations were identified during IFP development as preliminary "key uncertainties" based on their importance to the success of the IFP, and based on the degree of uncertainty that expected results would actually occur. These uncertainties and their treatment in the IFP will be subject to further modification by the IFP Adaptive Management Advisory Group (AMAG). In all cases, the purpose of future examination of uncertainties is to determine if management measures require modification in order to achieve the IFP conservation goals for maintenance and recovery of the covered species. Key uncertainties were associated with large woody debris (LWD), sediment, and water temperature. Examination of these key uncertainties generally requires controlled experimental research studies, and preliminary outlines for such studies are provided and discussed later in this section.

The following questions describe the "key uncertainties."

- Will implementation of the IFP management measures on enrolled lands provide adequate large wood recruitment to streams from those lands?
- Would the effects of management on Class I stream RPZs from the IFP management measures, when isolated from the negative effects of noncovered activities, result in suitable stream temperatures?

[1] Active review requires specific examination and discussion of the available literature. Passive review means that literature that comes to Idaho's attention will be reviewed and considered as it may develop through the course of the IFP's 30-year term.

- Would the effects of management on Class II and Class IIa stream RPZs from the IFP management measures, when isolated from the negative effects of noncovered activities, result in suitable stream temperatures?
- Will implementation of the IFP road management measures on enrolled lands, when isolated from the negative effects of noncovered activities, adequately reduce contributions of sediment associated with storm events?

The IFP adaptive management monitoring approach is designed to answer specific questions directly related to the conservation goals and habitat objectives. This monitoring will allow the Services and Idaho to evaluate the effects of the IFP as early as is possible following IFP implementation and throughout its 30-year life. In addition, IFP monitoring focuses on the effects of management measures upon habitat of the species and the watershed processes that affect this habitat. Variables that will be measured are referred to in the IFP as "measurement metrics," and the basics of how the data relevant to these metrics will be collected are described.

The IFP relies upon two primary types of monitoring: 1) implementation (compliance) monitoring, and 2) effectiveness monitoring.

Implementation monitoring (previously described in Section I.H.2.d, subsection Implementation Monitoring) determines whether or not the IFP measures were properly executed. Implementation monitoring will occur throughout the life of the IFP to continuously measure compliance with individual conservation measures. The commitments tracked using implementation monitoring generally involve measures whose benefits are fairly certain. Retention of required leave-trees in riparian zones is an example of a commitment that would be evaluated with implementation monitoring; that is, a site inspection would reveal whether trees had been retained in the required numbers and stand composition. The IFP specifically defines responses that are required responses to implementation monitoring results.

Effectiveness monitoring will be designed and initiated within the first 4 years. This adaptive management monitoring system is designed to provide information regarding both site-specific effects (e.g., what is the effect of riparian harvest on water temperature of adjacent Class I streams), and the extent of such affects throughout the IFP area (e.g., how much of the stream system occupied by a covered species is affected by changes in temperature) that was not available or that could not reasonably be evaluated at the time of IFP development and adoption.

Effectiveness monitoring often requires carefully designed research efforts intended to provide data and tests of the effectiveness of the IFP management measures that did not exist at the time the IFP was

developed and initially implemented. The IFP effectiveness monitoring and research approach is designed to ensure that all data is properly collected, analyzed, and used to adjust conservation strategies, as appropriate. If this adaptive management monitoring determines that IFP effects are outside specific parameters or thresholds (triggers), the effectiveness of the applicable management measures will be reviewed. These "thresholds for review" are linked to key elements of the IFP, are clearly defined, and are based upon measurable criteria.

The following terms are utilized in this discussion of adaptive management and are defined as:

- Management Commitments. These are the IFP management measures (the "terms") designed to contribute to a given habitat objective. Detailed description of each management commitment is provided in earlier sections of this IFP document.
- Performance Metrics. One or more units of measurement are used to evaluate success of each management commitment in this implementation framework (Table I.I-1). All performance metrics are to measure the effects of covered IFP actions when isolated from the negative effects of noncovered activities.
- Triggers. For each performance metric, a threshold of review is established in this IFP that initiates ("triggers") the adaptive management process.

Effectiveness monitoring is employed to determine if IFP management commitments are in fact achieving the IFP goals and objectives as originally anticipated. Effectiveness monitoring is designed to reduce uncertainty that may be associated with specific key questions that are identified in the IFP. The IFP Effectiveness Monitoring Projects (EMPs) require research studies conducted according to specific experimental designs. The EMPs focus on physical measurement of fish habitat, and upon the processes that affect this habitat. They are described in detail at the end of this section.

Effectiveness monitoring, as presented within the IFP, also includes what is sometimes discussed as a third form of monitoring, "validation monitoring." The IFP includes elements of validation monitoring within effectiveness monitoring studies particularly where these studies are designed to determine whether actual on-the-ground outcomes occur as predicted. For instance, studies designed to measure actual results as compared to predictions made during effects analysis of the IFP are validation forms of effectiveness monitoring. An example of this type of effectiveness monitoring would be studies designed to better determine natural levels of wood loading within undisturbed streams of the Salmon and Clearwater River basins compared to the body of data available at the time of IFP approval used to estimate the amount of natural wood loading assumed in the effects analysis.

The IFP addresses effectiveness monitoring and research needs with a series of study plan outlines that directly address the IFP objectives. Idaho, in cooperation with the Services, will perfect and implement these study plans upon implementation of the IFP with the assistance of an Adaptive Management Technical Team (AMTT). Idaho will then assemble the monitoring results and status reports and will provide these reports to the Services for their review. The outlines for these studies and the membership and responsibilities of the AMTT are described in detail later in this section.

Implementation Framework

The IFP Adaptive Management Implementation Framework provides the procedures and commitments that the IFP uses to evaluate information that guides the adaptive management process.

Purpose and Intent:

Information gathered as part of the adaptive management framework is assessed to determine if the purpose and intent of the IFP are being achieved. The purpose and intent of the IFP are as follows:

- To establish and maintain an adequate and active program for the conservation of listed salmonids on enrolled state and private forest lands.

In order to accomplish the purpose and intent of the IFP, the goals listed below were established. These goals apply only to the potential effects of the IFP and the covered activities under the Section 6 Cooperative Agreement (Section 6 Agreement). They are not intended to be applied to other activities outside the IFP or outside of those lands covered by the IFP. While non-IFP activities in the same watersheds can affect the achievement and maintenance of suitable habitat conditions, the IFP will (within the purview of the enrolled lands and covered activities) provide the riparian forest conditions, fish passage, and other ecological functions that maintain and contribute to restoring suitable habitat conditions.

IFP Goals:

The goals of the IFP are to:

- Provide suitable stream temperatures for covered species.
    - Maintain shade, groundwater temperature, and other watershed processes controlling stream temperatures.
- Provide suitable instream substrate conditions for covered species.
    - Maintain channel-forming processes by minimizing the delivery of coarse and fine sediment to streams. Sediment delivery can be minimized, for instance, by protecting

streambank integrity, providing vegetative filtering, preventing road-associated landslides, and preventing the routing of sediment to streams.

- Provide suitable instream habitat complexity for covered species.
  - Develop riparian stand conditions that provide complex habitats, including the recruitment of large woody debris and litter to streams.
- Provide suitable habitat connectivity for covered species.
  - Eliminate existing fish passage barriers and ensure that no new barriers are created by the IFP. Within the purview of the IFP, this applies primarily to replacing existing road stream-crossing structures and constructing new stream crossings such that accessibility is restored and maintained for the covered species' life history stages that would or do use those stream reaches.

The IFP's goals are framed by the intent to meet the requirements of ESA section 6 and conserve those aspects of species habitat that can be addressed by covered activities on lands enrolled in the IFP by maintaining habitats that are currently suitable for listed species and by providing conditions that allow for the natural restoration of habitats that are potentially suitable for listed species.

Habitat Objectives:

The following habitat objectives provide measurable targets that will be the subject of studies in the first few years of the IFP to determine how well the IFP is achieving its goals, and to determine whether adjustments should be made. Because the habitat objectives are broadly defined, different studies might address issues related to each one during the life of the IFP.

- Temperature: Avoid increased temperatures in Class I streams through management of riparian timber harvest.
- Sediment: Minimize sediment delivery to streams from new roads and stream crossings; and achieve a net reduction in sediment delivery from existing roads.
- Large Woody Debris: Minimize reductions in large wood recruitment to Class I streams through management of riparian timber harvest.
- Connectivity: Provide suitable connectivity among subpopulations of covered species.

Performance Metrics:

The need to adapt management under the IFP will usually be "triggered" by physical conditions that are measurable. For effectiveness monitoring, triggers for the initial studies are based on measurement of sediment, wood, or energy (as related to water temperature) delivery rates that exceed certain thresholds and/or physical stream habitat trends. These thresholds are defined by "performance metrics" and "triggers" in Tables I.I-1 and the EMP studies outlined at the end of this section. A final check will then be made to ensure that these impacts are causally linked to implementation of the IFP management measures and covered activities, or whether they have occurred as a result of something unrelated to these activities, such as a naturally occurring landslide, fire, or flood. If this "weight-of-evidence" approach shows that covered activities are having an adverse effect upon habitat, then the relevant management commitment will be revised. For example, if improvement in roads does not reduce sediment delivery to the level specified in the IFP, measures will be developed by the AMAG to further reduce sediment delivery.

The performance metrics that trigger adaptive management responses were selected because they provide measurable factors that can be quantitatively evaluated and that relate directly to the IFP's goals (i.e., provide suitable temperatures, suitable substrate conditions, suitable instream habitat complexity, and suitable habitat connectivity), the habitat objectives related to each goal, and the management measures that address them. The performance of the IFP management measures are evaluated through execution of the IFP EMP studies and the metrics in Table I.I-1 provide the performance measures. In all cases, metrics were selected that provide relatively standard and well-accepted measures for the process being evaluated (e.g., mean weekly maximum daily water temperature (MWMT), a common water quality standard for stream temperatures; tons of road sediment delivery expressed as a percentage reduction from the baseline condition; pieces of in-channel LWD per 1,000 feet of stream).

Numeric values were then identified for each performance metric that provide specific thresholds that trigger an adaptive management response. Several factors affected selection of these threshold values. First, the value for the trigger must be measurable within the limits of achievable precision and detectability. Second, whenever possible, the values were set such that biological relevance is reasonably assured. Also, the triggers are set at values that enrollees believe they can achieve with implementation of the IFP; unrealistic or unachievable triggers are of no benefit. Taking water temperature and EMP Study 3.1 as an example, an increase in MWMT greater than 1.0°C (directly downstream of a harvest unit) is likely detectable in controlled studies, and can reasonably be expected to be large enough to cause a biological response, at least in some circumstances.

Science-based triggers derived from effectiveness monitoring initiate the adaptive management response process when the data identify a difference between the results achieved by the conservation measures and the expected results of those measures. Each trigger is formulated as a measurable parameter. Again, consistent with the Habitat Conservation Planning Handbook, some triggers require statistical significance, and some require use of experimental control areas. Control areas used in IFP study designs are those sites where no management activity would occur and that resemble the managed area in as many ways as possible, or are established by using "before and after" analysis (i.e., the control is the "before treatment" condition).

As previously noted, the IFP management measures are also subject to adaptation through consideration of information relevant to key uncertainties that may come to Idaho's attention through sources external to the structured EMP studies. For example, if future sources of information demonstrated some fundamentally different relationship between roads and landslides, or the effect of road sediment in streams, this information would be considered in the IFP's adaptive management process.

As discussed previously, triggers associated with EMP studies are included in this IFP document. In establishing the triggers, the Services and Idaho accept a level of risk associated with biological uncertainties of the IFP. However, these triggers may be adjusted at the recommendation of the Idaho AMAG, described later in this section. Beyond the triggers in this IFP and as they may be adjusted in response to recommendations from the AMAG, triggers may be modified during the timeframe of the IFP if new information derived from the EMP studies or from other new data indicates modification is appropriate. For example, a numeric trigger could be increased and therefore strengthened if it is demonstrated that the conservation being provided "is not enough" to achieve the IFP's goals and habitat objectives. A numeric trigger might also be relaxed if it is demonstrated that the triggered condition does not cause impairment of the relevant habitat measure. This allows changing a trigger to a more meaningful number rather than continually "tripping" the trigger when there is no resource concern.

The Adaptive Management Response Process

A proposal to modify a trigger may be made by either the Services or Idaho. Proposals must demonstrate a concern about the trigger based on new information and a rationale and support for a revised trigger that explains how the concern is alleviated.

Adaptive management is designed to determine if the management measures are inadequate, and defines the process for improving them to achieve the IFP's goals and objectives. If significant differences are detected between habitat performance expectations and actual results that are caused by implementation of IFP management measures, then the management measures will be changed to achieve the intended

results. Effects of non-IFP activities are not causally linked to IFP management measures and an adaptive management response is not expected of enrollees in such circumstances.

Ideally, management responses to all potential concerns would be specifically defined at the outset of the IFP in order to provide the clearest possible agreement regarding the future extent of possible changes. However, those areas that contain the least amount of conservation certainty based on the state of our existing knowledge are the very ones that are most likely to require some change because of new knowledge. They are also the areas where the appropriate management response is the most difficult to describe. Therefore, the Services and Idaho recognize that they must work in partnership to examine potential need for adaptive management responses during IFP implementation.

A management response may be required due to development of new information obtained either through IFP monitoring or as a result of other sources of evidence that come to the Services' or Idaho's attention. Management responses required by the IFP adaptive management process will be designed to improve certainty of achieving conservation goals and will be designed to solve problems in a cost-effective manner. Depending on circumstances, the appropriate level of geographic response may be as broad as the entire IFP area, or at finer scales descending through individual basins, sub-basins, watersheds, and/or specific enrollee ownerships.

Economic predictability is a fundamental incentive offered to enrollees, and management responses should include economic considerations. When management responses require an additional commitment of resources by enrollees, the parties will examine whether adjustments can be made to other IFP measures so that overall economic impact remains consistent while still achieving conservation goals.

It is important to note that adaptive management is a "two-way street." That is, information and experience obtained from research and monitoring may suggest means for achieving habitat objectives with more, or less, restrictive conservation measures. In these instances, the AMAG could propose a new management measure, metric, or trigger, and/or could reallocate conservation resources if this would cause the IFP's conservation goals to be more successfully or economically achieved.

IFP results compared to performance metrics will be summarized by IDL and reported to the Services by April 30 following the end of the reporting year. For annual metrics reporting, the report will include a discussion of management responses that will be implemented. Implementation will begin as soon as practicable, but no later than the beginning of the following operating season.

Adaptive Management Process for the Idaho Forestry Program

The Director of Idaho Department of Lands (Director) will make adaptive management decisions informed by recommendations from an Adaptive Management Advisory Group (AMAG).

Roles and Duties of the IDL Director:

The Director of IDL shall make all final decisions regarding adaptive management actions to attain the stated goals and objectives of the IFP. Upon receiving a recommendation for an adaptive management action from the AMAG, the Director will make a final decision within 120 days, taking into consideration minority or dissenting views from AMAG members. The Director may accept, reject, or modify the recommended action for any reason consistent with the maintenance of an "adequate and active" program. The Director shall issue a written decision that is based upon best available information. Relevant documentation will be included as exhibits to the decision. Copies of the decision will be provided to all members of the AMAG and published on the IDL website.

If the Director determines additional information is needed before making a decision, he/she may:

- Consult with members of the AMAG.
- Consult with members of any technical teams appointed pursuant to these provisions.
- Consult with IDL staff.
- Request assistance from outside consultants.
- Remand the recommendation back to the AMAG for further clarification of any issues. Remand of a matter to the AMAG shall stay the timeline for decision.

The Director is also responsible for the following:

- Appointment of the Chairman of the AMAG
- Final approval of the annual report to the Services summarizing adaptive management monitoring results and activities.

Roles and Duties of the Adaptive Management Advisory Group (AMAG):

The AMAG is a policy-level group consisting of the following members:

- An IDL representative, appointed by the Director of IDL
- An OSC representative, appointed by the Administrator of OSC
- An IDFG representative, appointed by the Director of IDFG
- An Enrollee representative, appointed by the Director of IDL
- An *ex officio* (non-voting) representative from NOAA, appointed by the Regional Administrator
- An *ex officio* (non-voting) representative from USFWS, appointed by the Regional Director

While the NOAA and USFWS representatives are non-voting members of the AMAG, they provide significant input regarding the role of adaptive management actions in the Services' annual "adequate and active" determination.

The AMAG is authorized to do the following:

- Identify and prioritize key uncertainties and other issues that may require application of adaptive management.
- Review appropriateness of triggers when the issue is raised by any member of the AMAG, and modify as necessary.
- Develop adaptive management work plans (5-year and annual) to address key uncertainties through literature searches, effectiveness monitoring projects, field studies, or research.
- Prepare 5-year and annual budgets for implementation of adaptive management work plans.
- Identify funding sources and assist IDL in drafting grant applications for implementation of adaptive management work plans.
- Identify and prioritize adaptive management effectiveness monitoring projects.
- Prepare directions to technical teams or contractors for any necessary technical work, including performance of literature reviews and preparation of adaptive management study designs.
- Approve adaptive management study designs prepared by technical teams and contractors.

- Develop peer review plans for study designs and study results.
- Review all study results to determine if a trigger or threshold for administrative management changes is met, or if an adaptive management response should otherwise occur.
- Prepare recommendations to Director for administrative management changes in response to adaptive management findings.
- Prepare recommendations to Director for changes to IFP terms based on adaptive management findings.

Recommendations forwarded to the Director must be approved by a majority vote of the AMAG. Dissenting voters may, at their option, prepare alternative recommendations for the Director's consideration.

- Prepare and submit to the Director for final approval by April 30 of each year a report to the Services summarizing the year's adaptive management monitoring results and activities.
- If deemed necessary by AMAG members, the AMAG may develop and document additional operating procedures for the AMAG within the first year of the IFP.

The IDL representative on the AMAG shall serve as Chairman. The duties of the Chairman shall be as follows:

- Call meetings as necessary to conduct business of the AMAG.
- Cause a summary of any discussions and actions taken at meetings to be prepared.
- Coordinate with IDL staff on oversight and administration of contracts for implementation of literature searches, effectiveness monitoring projects, field studies, or research.
- Serve as liaison to Director and technical teams.

In order to ensure an open, transparent, and objective inquiry into all issues presented to it, the following procedures will be followed by the AMAG:

- All adaptive management work plans prepared by the AMAG shall be published on the IDL website.
- All recommendations to the Director shall be published on the IDL website.
- All summaries of AMAG meetings shall be published on the IDL website.

- All items published on the IDL website shall be accompanied by a notice inviting public comment within 30 days of publication.

Decision-Making by the AMAG:

Decisions by the AMAG shall be made by majority vote, with each designated representative having one vote. With the permission of the Chairman, an agency can have additional agency staff attend an AMAG meeting, but in no case shall more than one vote be cast on an issue by each entity on the AMAG.

Any entity represented on the AMAG may propose in writing to the Chairman an adaptive management issue to be brought before the AMAG for consideration, including proposals for literature review, effectiveness monitoring studies, research, or a change in an IFP term. The AMAG shall decide within 60 days whether or not to pursue the proposed action and the priority the issue should receive. Any member aggrieved by the AMAG's decision may elevate the issue to the Director for consideration.

Timelines:

- Issues identified as high priority must be scheduled for appropriate action as soon as practicable to maintain an adequate and active program.
- Once the results of an adaptive management study are received, including results from literature reviews, effectiveness monitoring studies, or other research, the AMAG shall decide within 120 days whether a change in IFP terms should be recommended to the Director.

Adaptive Management Technical Teams

The AMAG is a policy-level group. While many members may have a high level of technical proficiency, it is nonetheless expected that there will be many issues that will require a greater level of technical review than can be effectively accomplished by the AMAG. When deemed necessary or expedient by a majority of the AMAG, the AMAG may appoint one or more adaptive management technical teams (AMTT) to carry out any necessary technical-level work. For example, it is contemplated that study designs will be prepared by an AMTT. AMTTs can also be utilized to implement a study design, to carry out literature reviews, or to perform peer reviews of the results of adaptive management studies completed by a contractor.

An AMTT may be permanent or temporary. Each member of the AMAG, including *ex officio* members, may designate one person to participate in the AMTT; provided that with the permission of the Chair, additional persons from one or more agencies may attend meetings of an AMTT, but in no case shall more than one vote be cast on an issue by each entity participating in the committee.

While members of an AMTT should strive for consensus, final decisions by an AMTT shall be made by majority vote. An AMTT decision will be reported to the AMAG in writing. Any member who does not agree with the decision made by the AMTT may prepare a separate report for the consideration of the AMAG.

- Meetings of AMTTs will be run by a chairman appointed by the Chairman of the AMAG.

Modifying the Idaho Forestry Program

The terms of the IFP may be modified as a result of an outcome of the adaptive management process.

If a modification of the agreement is recommended by the Director, all enrollees will be notified of the specifics of the change and the effective date of the change. The effective date for a change shall allow for reasonable compliance schedules for individual enrollees if requested by the Enrollee. The notice shall contain justification of any changes.

Upon approving a modification to the IFP, the Director shall notify the Services of such change. Any modification of the Section 6 Agreement shall also be reported in the annual IFP report required under ESA section 6. All modifications to the IFP are subject to the approval of the Services; such approval is assumed until the next “adequate and active” determination by the Services.

Enrollees, upon being notified of changes in the IFP due to adaptive management, will have the opportunity to voluntarily disenroll from the IFP as provided in Section I.H.2.g.

Table I.I-1 The IFP implementation framework

Effectiveness monitoring studies[2]

Specific IFP Habitat Objectives	Performance Metrics	Triggers (If…)	Management Response (Then…)
Habitat Objective: Minimize sediment delivery to streams from new roads and stream crossings, and achieve a net reduction in sediment delivery from existing roads.			
Reduce road sediment delivery to streams.	EMP Study 1.1 Number of stream crossing 50-year culverts that fail	5% rate of failure following 2 to 5-year recurrence interval storms, 10% rate of failure following 5 to 100-year storms	When directed by the Adaptive Management Response System, revise or create enhanced measures for new roads or old road upgrades.
	EMP Study 1.2 CWE Road Sediment Delivery and Erosion Source Evaluation	CWE road score that averages >30 following 2 to 5-year recurrence interval storms, and >50 following 5 to 100-year storms	When directed by the Adaptive Management Response System, revise or create enhanced measures for new roads or old road upgrades.
	EMP Study 1.3 Net percent sediment reduction from roads calculated from the baseline used in effects analysis	No net sediment decrease after five years following implementation of the IFP	When directed by the Adaptive Management Response System, revise or create enhanced measures for new roads or old road upgrades.

[2] Performance metrics and triggers will be refined by the AMAG, as appropriate.

Table I.I-1 The IFP implementation framework, continued

Specific IFP Habitat Objectives	Performance Metrics	Triggers (If…)	Management Response (Then…)
Habitat Objective: Minimize reductions in large wood recruitment to Class I streams through management of riparian timber harvest.			
Minimize impacts to large woody debris (LWD).	EMP Study 2.1 LWD loading out to 30 years (life of the IFP).	Modeled LWD loading in steelhead critical habitat stream reaches adjacent to harvest units that averages greater than 5% less than modeled wood loading under a hypothetical no-harvest scenario when effects on both sides of the subject stream reach are measured.	When directed by the Adaptive Management Response System, improve the riparian management commitments to achieve the required trend in LWD density.
Habitat Objective: Avoid increased temperatures in Class I streams through management of riparian timber harvest.			
Do not increase temperatures in Class I streams adjacent to harvest units.	EMP Study 3.1 Mean weekly maximum daily water temperature (MWMT) of Class I streams during the summer following logging treatment.	A statistically significant increase in MWMT that averages more than 1.0° C for the Class I streams studied.	When directed by the Adaptive Management Response System, improve the management commitments to prevent the increase.
Do not increase temperatures in Class I streams directly downstream from harvested Class II streams.	EMP Study 3.2 MWMT of Class I streams measured directly above and below confluence (downstream of the mixing zone) with harvested Class II streams during the summer following treatment.	A statistically significant increase in MWMT of more than 1.0° C.	When directed by the Adaptive Management Response System, improve the management commitments to prevent the increase.

Table I.I-1 The IFP implementation framework, continued

Specific IFP Habitat Objectives	Performance Metrics	Triggers (If…)	Management Response (Then…)
Habitat Objective: Provide suitable connectivity among subpopulations of covered species.			
Create an increase in the mileage and habitat area of streams occupied by fish upstream of barriers identified in IFP inventories.	EMP Study 4.1 Presence of fish at inventoried sites upstream of removed barriers.	Fish occupancy in less than 10% of the streams upstream from the removed barriers.	Examine the causes that prevent habitat occupation and adjust fish passage criteria or barrier removal requirements for application to future operations.

Changed and Unforeseen Circumstances:

A "Changed Circumstance" is a change in the circumstances affecting a covered species that can be reasonably anticipated to occur during the term of the IFP, and that is not the result of an Enrollee's activities. Changed circumstances are represented as a range that is sufficiently large that it may have a material impact on stream habitat and covered species, yet not so large as to make them unforeseeable. Circumstances less than the lowest end of the range are considered to be adequately covered by routine IFP management measures, and enrollees need not change management actions if smaller circumstances occur. Circumstances more than the upper end of the range are associated with events that are not anticipated, and are considered to be unforeseen. If unforeseen circumstances occur, Idaho will work collaboratively with the Services to develop appropriate and cost effective mitigation measures that address concerns related to covered species, their habitat, and effects upon them associated with covered activities. Funding from the Habitat Trust Fund should be available to provide mitigation for unforeseen circumstances. The management results of any unforeseen circumstances dealt with in a given year will be reported during the annual reporting process.

The IFP procedures that address changed circumstances add conservation value by reducing potential risks. This provides the Services with additional assurance that certain actions will take place that provide a level of conservation certainty given a relatively predictable but unplanned event, and it gives landowner enrollees the assurance that they will not be held accountable to fully compensate for impacts of natural events or events that are outside of their control.

Changed circumstances include the following:

1. Forest fires that are stand replacement fires with acreage greater than 300 and less than 5,000 or that affect more than 25 percent of the stream length in a 4th-level HUC watershed. "Stand replacement" is of sufficient intensity to kill 90 percent or more of the trees (i.e., a fire that would necessarily result in the need to establish a new stand).

   Forest fires in Idaho vary from low to high intensity. In most cases, low to moderate intensity fires are relatively small in size (tens to a few hundred acres), kill only some of the trees in the burn area, and do relatively little environmental damage. High intensity fires are typically stand replacing, tend to cover large areas (thousands of acres), and can cause both extensive and concentrated environmental impacts during and after the fire.

2. Flooding when the flood has a recurrence interval of between 25 and 100 years based on stream gauging station data in the watershed for 4th-level HUC watersheds or larger.

   Floods with less than 25-year recurrence intervals are likely to occur in all or part of the action area during the term of the IFP. Because historic BMPs and IFPA regulations have required drainage features to accommodate at least the 25-year flood, it is expected that floods of smaller magnitude will have little environmental impact. In contrast, floods with a recurrence interval in excess of 100 years are unlikely to occur during the 30-year life of the IFP, and are not reasonably foreseeable. Thus, floods with a recurrence interval of between 25 and 100 years are reasonable to consider as a changed circumstance. To determine if a portion of the enrolled area has experienced a 25-year or larger flood, Enrollee hydrologists will monitor floods on U.S. Geological Survey Internet sites that have real-time flow information.

3. Landslides of 500 to 5,000 cubic yards that deliver sediment to streams.

   While rates of landsliding are low throughout much of the IFP area (McGreer et. al. 1998), they can and do occur. Some of these landslides can be related to forest management activities, and many are natural. Landslides with volume of less than 500 cubic yards are considered to be small within the context of this adaptive management implementation framework, and 500 cubic yards was selected as the lower limit of the changed circumstance. Small landslides are addressed as routine management under the IFP (Hot Spot Treatments). Landslides larger than 5,000 cubic yards are very large, rare, and unforeseeable; 5,000 cubic yards was selected as the upper limit of the changed circumstance.

Landslides that occur in the covered area following IFP implementation will be monitored as landowner personnel or others discover them. This provides a mechanism for evaluating trends in landslide occurrence over time in response to implementing the IFP. For each landslide discovered, data will be collected on the dimensions of the slide, the physical setting, and potential causal factors. This information will be compiled and summarized for the Enrollees' 5-year reviews. Findings of this monitoring may identify deficient practices that may warrant improvement via the AMAG process.

Promptly after a changed circumstance is discovered, the IDL will be notified and invited to help craft a site-specific management alternative subject to the following additional procedures and criteria:

- The landowner Enrollee is responsible for preparing the plan, with assistance of the IDL. IDL will submit the plan to the Services within 60 days of observing the changed circumstance.
- A plan must be completed and agreed upon by the landowner Enrollee and the IDL, and the IDL and the Services, within 60 days of submission of the landowner's proposed plan. If the Services do not comment on the plan submitted by the IDL within 30 days of receiving it, the plan shall be implemented as proposed.
- The plan must contain the components described by the IDL.
- Implementation timing will be specified in the plan and shall be as prompt as is reasonably practicable.

Table I.I-2 Changed circumstances management response framework

Changed Circumstance	Management Response
Forest Fires	The IDL and enrollees will conduct an impact assessment, when their lands are affected, on the effect of the fire on the IFP's conservation goals and objectives. A rehabilitation plan will be developed and implemented. Examples of rehabilitation actions include grass seeding erodible slopes, expeditious tree planting, restricting ground-based equipment around streams, and enhanced skid trail and road drainage where hydrophobic soils have been created due to intense wildfire. In addition to this plan, enrollees will disclose fire salvage timber harvest plans to the IDL, and the IDL will report a summary of this information to the Services.
Flooding	The IDL and enrollees will conduct an aerial reconnaissance in the flood area as a broad screen to trigger a field inspection if there is visual evidence of flood damage to road systems. When triggered as a result of aerial observation, a road and stream crossing field inspection will be conducted in the principally affected portion of the flood-area within one operating season. Road maintenance and hot spot procedures will be used to address damage caused by the flood.
Landslides	When landslides of 500 to 5,000 cubic yards are detected, sediment delivery will be confirmed through aerial or on-the-ground investigation. Where sediment delivery has been confirmed, an on-the-ground investigation will determine the extent and magnitude of impact to stream habitat and covered species.
All	A site-specific action plan will be developed and implemented by the IDL and affected enrollees to address the changed circumstance. The plan will: - Make a determination of the causal linkage. - Identify opportunities to reduce or eliminate ongoing impacts resulting from the event.

Effectiveness Monitoring Projects (EMPs)

The IFP includes three EMPs that address each of the three watershed delivery processes of primary concern: sediment, wood, and temperature. A fourth EMP addresses IFP effects upon connectivity associated with removal of fish passage barriers. Each EMP includes specific studies designed to reduce uncertainty associated with expected outcomes resulting from implementation of the IFP management measures. The EMPs listed below are examples of how the currently identified "key uncertainties" are to be addressed.

EMP 1: Sediment - Evaluate road management effects on sediment delivery and instream response

The IFP road management measures can be expected to function well at preventing erosion during average weather conditions. Storm events, however, pose a higher risk for failure. Studies 1.1 and 1.2, which are companion studies, are designed to evaluate performance following intense storm events. Directly after a storm event, these studies will assess sediment delivery from roads for which the IFP road upgrade measures have already been implemented, including installation of 50-year culverts. This approach relies on the AMTT to identify potential study areas consisting of geographic areas that have experienced storm events that exceed the 2-year recurrence interval as potential study areas.

Study 1.1 Culvert performance

All stream crossings that have had 50-year culverts installed as per the IFP requirements will be assessed within designated study areas. The study will classify culvert function as unsuccessful if major erosion to the culvert inlet, culvert outlet, or road prism has occurred.

Performance metric:

Number of stream crossing 50-year culverts that "failed," with failure defined as major erosion of the culvert inlet, culvert outlet, or of the road prism.

Trigger:

Five percent stream crossing culvert failures following storm events in the 2- to 5-year recurrence interval range, and 10 percent culvert failures following storms in the 5- to 100-year range.

Study 1.2 Road erosion sediment delivery performance

For this study, the function of the suite of road management and erosion prevention measures required by the IFP for both new and existing roads will be assessed using the "Sediment Delivery Assessment" procedures outlined in the Forest Practices Cumulative Watershed Effects (CWE) for Idaho (IDL 2000) and summarized in Table I.I-3.

Performance metric:

Road erosion and sediment delivery performance as determined by the CWE Sediment Delivery and Erosion Source Evaluation process (CWE Road Score, Table I.I-3). Total CWE road scores range from a low of 10 (least amount of sediment delivery) to a maximum of 90 (most amount of sediment delivery). CWE defines "low" total score (i.e., low amount of sediment) as less than 31 and "moderate" total score as 31 to 50.

Table I.I-3 Sediment delivery and erosion source evaluation: roads

ROADS	A	B	C	WEIGHT	WEIGHTED SCORE
Cut Slopes	Erosion well controlled by resistant soils, rock, grass, or other means. **1**	Erosion delivering considerable sediment to ditches and/or road beds; surface sloughs and small slumps < 2 yd^3 are common. **2**	Erosion fills ditches at deposition areas; surface sloughs and small slumps < 2 yd^3 are frequent. **3**	**3**	
Fill Slopes	Erosion well controlled by resistant soils, rock, grass, slash windrows, etc. **1**	Fill slope erosion is common. **2**	Fill slope erosion is frequent. **3**	**2**	
Ditches	Little or no sign of downcutting. **1**	Downcutting occurs but never more than 6 inches deep. **2**	Downcutting common and deeper than 6 inches. **3**	**1**	
Road Surfaces	Little or no rutting or erosion of road surface. **1**	Ruts and/or rills obvious. Rills generally less than two inches deep. **2**	Rutting and/or erosion common. Rills may be more than two inches deep. **3**	**4**	

Total Road Sediment Sources Score _____

Road Delivery Multiplier				
Sediment Delivery Factor	Few signs of ditches or relief culverts delivering sediment to a stream channel or draw. **1**	Occasional signs of ditches and relief culverts delivering sediment to a stream channel or draw. **2**	Frequent signs of ditches and relief culverts delivering sediment to a stream channel or draw. **3**	

Road Delivery Multiplier _____

Total Score for Roads (Road Sediment Sources Score X Road Delivery Multiplier) = _____

Low: < 31; Moderate: 31 to 50; High: > 50

Trigger:

CWE Road Score that averages greater than 30 following storm events in the 2- to 5-year recurrence interval range, and greater than 50 following storms in the 5- to 100-year range.

Study 1.3 Net sediment delivery re-modeling

This study requires the re-measurement of actual road conditions and re-modeling of erosion and stream sediment delivery in watersheds used in the road effects analysis for this IFP. Roads in the Focused Affects Analysis (FAA) watersheds will be re-surveyed after 5 years following implementation of the road measures on those parts of watersheds included within enrolled lands. Road erosion and sediment delivery will then be re-modeled. The new estimate of road sediment delivery will be compared to the baseline amount obtained in the original road effects analysis to determine percent reduction due to implemented road measures.

Performance metric:

Net percent sediment reduction from roads calculated from the baseline used in effects analysis.

Trigger:

No net sediment decrease after five years following implementation of the IFP.

EMP 2: Wood - Large woody debris (LWD)

Study 2.1 Evaluate riparian management effects on wood loading

This initial study on LWD recruitment and in-stream wood loading will involve 1) post-harvest surveys of harvest units adjacent to Class I stream riparian protection zones (RPZs), and 2) subsequent modeling using the stand survey results to predict in-stream wood loading trends. The initial study will be based on monitoring of harvest units conducted within the first 5 years of IFP implementation. However, the study will continue at some level throughout the life of the IFP as needed to verify that initial results continue to be representative and characteristic of effects throughout the life of the IFP. The initial LWD study will be conducted within the Lolo Creek and the Potlatch River watersheds, important areas for steelhead within the Clearwater River basin. If any of the other steelhead Major Spawning Areas (MSA) in the Lower Clearwater River basin (Lapwai Creek, Big Canyon Creek, Lawyer Creek, Clear Creek) do *not* follow the general pattern of very low enrollment and timber harvest expected, (less than 2 percent of the cumulative length of the stream is adjacent to harvest units) then these MSAs could also be included in this initial LWD study.

Performance metric:

Modeled LWD loading out to 30 years (life of the IFP).

Trigger:

Modeled LWD loading in steelhead critical habitat stream reaches adjacent to harvest units that averages greater than 5 percent less than modeled wood loading under a hypothetical no-harvest scenario when effects on both sides of the subject stream reach are measured. Average effects adjacent to harvest units will be computed by weighting sample sites by stream length adjacent to the harvest units sampled.

During development of the IFP, additional investigations and LWD simulations were completed, therefore it is appropriate to include a specific adaptive management response: If average effect adjacent to harvest units is greater than 5 percent for an MSA, IDL will develop and implement a plan to reduce the effect to 5 percent in that MSA. The plan could involve changes to the riparian buffer measures for that drainage, LWD placement projects, or other approaches that IDL might propose.

For any LWD studies done outside the Lolo Creek and Lower Clearwater River steelhead populations, the trigger is the modeled LWD loading in stream reaches adjacent to harvest units that averages greater than 8.9 percent[3] less than modeled wood loading under a hypothetical no-harvest scenario when effects on both sides of the stream are measured.

Study outline: In the first 5 years of the IFP, a random selection of harvest units adjacent to Class I stream steelhead critical habitat areas within the Potlatch River and Lolo Creek watersheds will be identified for stand surveys. These watersheds are selected because of their important steelhead populations and concentration of state and private timberland. Harvest units with boundaries falling within 225 feet of Class I stream ordinary high water marks potentially provide large woody debris (LWD) recruitment and thus qualify as “adjacent stands” for purposes of this study. While a combination of pre- and post-harvest surveys would provide the best data on trees harvested within the buffer zone, pre-harvest surveys may be impractical due to the unpredictability of harvest schedules. Instead, height and DBH of the harvested trees can be extrapolated from stumps post-harvest. Both sides of the stream will be inventoried to determine the effect on LWD, irrespective of whether harvest occurred on one or both sides of the stream adjacent to harvest. Besides individual tree measurements, the surveys will include the width of the no-harvest zone (which is expected to be greater than 25 feet in some cases). A stream survey will also be conducted in the reach adjacent to harvest, recording the number of pieces of LWD (greater than 10

[3] The level of effect predicted within the Effects of the Action when potential effects out to 225 feet from streams are considered.

centimeters diameter and greater than 2 meters length) per 1000 feet of stream. The stream and stand data will then be used to predict LWD loads after 30 years for 1) a scenario of the harvest as it occurred, and 2) a hypothetical scenario in which the harvest did not occur. Predictions will be based on the same modeling procedures described in the riparian management section of Section III, Effects of the Action. Results will be finalized within the first 5 years of the IFP.

This study will fulfill several purposes. First, the study will provide more assurances in key steelhead watersheds that any effects to salmonid habitat will be small. Second, the stand surveys will further provide information on whether or not IDL and private landowners are likely to harvest significantly fewer riparian trees than the allowable limit, as suggested by the 2004 IFPA audit (McIntyre et al. 2005), and will provide more information on the subset of riparian stands most likely to be harvested during the life of the IFP. Finally, the data on riparian stand conditions, riparian harvest, and baseline wood loading will reduce the number of assumptions needed in the LWD recruitment and wood loading model described in Section III, Effects of the Action and thus reduce uncertainty about the model results.

EMP 3: Temperature - Evaluation of IFP effects on stream temperature

In the first 2 years of the IFP, initiate two temperature studies designed to assess the effect of harvest adjacent to Class I and Class II streams consistent with performance metrics and triggers as outlined in IFP studies numbered 3.1 and 3.2.

Study 3.1 Class I stream water temperature monitoring

Performance metric:

Mean weekly maximum daily water temperature (MWMT) of Class I streams during the summer following logging treatment.

Trigger:

A statistically significant increase in MWMT that averages more than 1.0° C for the Class I streams studied.

Study outline: This study requires measurement of Class I stream water temperatures, within and downstream from harvested riparian areas both before and after treatment. Stream temperatures will be measured in Class I streams adjacent to harvest units one summer before and one summer after harvest using continuous temperature recorders (recording at least every half-hour). At a minimum, four recorders will be placed: one recorder will be placed at the upstream end of the harvest unit (control); one at the downstream end of the harvest unit; and in order to examine the downstream persistence of temperature

effects, recorders will also be placed 500 feet below the downstream end of the harvest unit and 1,000 feet below the downstream end of the harvest unit. Additional temperature recorders may be placed if deemed advisable for specific circumstances. Temperature recorders should remain in place from July 1 through mid-September.

Maximum temperatures at the downstream recorders will be correlated to temperatures at the control recorder both before and after harvest to determine if harvest has resulted in significant temperature differences and also the degree of temperature recovery downstream of the harvest unit.

This study will also require measurement of riparian stand canopy density and stream shade characteristics before and after harvest of riparian areas. Riparian stand canopy density will be measured adjacent to Class I streams during a summer before harvest, and the summer after harvest. Statistical tests will be performed to determine if harvest has resulted in significant differences in canopy cover and shade.

Study 3.2 Class II stream harvest effects on temperatures of Class I streams

Performance metric:

Mean weekly maximum daily water temperature (MWMT) of Class I streams measured directly above and below confluence (downstream of the mixing zone) with harvested Class II streams, during the summer following treatment.

Trigger:

A statistically significant increase in MWMT that averages more than 1.0° C.

Study outline: This study requires measurement of water temperatures within and downstream from harvested Class II riparian areas and in downstream Class I streams both before and after harvest. Stream temperatures will be measured one summer before and one summer after harvest using continuous temperature recorders (recording at least every half-hour). Each area monitored will require a *minimum* of six temperature-recording instruments. One recorder will be placed at the upstream end of the harvest unit (control), one at the downstream end of the harvest unit, one downstream just before the Class II enters the Class I stream, one in the Class I stream shortly downstream from the Class I/Class II confluence (but far enough to allow sufficient mixing), and one approximately 500 and 1,000 feet below the confluence to examine the downstream persistence of temperature effects. Additional temperature recorders may be placed if deemed advisable for specific circumstances. Temperature recorders should remain in place from July 1 to mid-September.

Maximum daily temperatures at the downstream recorders will be correlated to temperatures at the control recorder both before and after harvest to determine if harvest has resulted in significant temperature differences and also the degree of temperature recovery downstream of the harvest unit.

This study will also require measurement of riparian stand canopy density and stream shade characteristics before and after harvest of riparian areas. Riparian stand canopy density will be measured adjacent to Class I streams during a summer before harvest, and the summer after harvest. Statistical tests will be performed to determine if harvest has resulted in significant differences in canopy cover and shade.

EMP 4: Connectivity - Evaluate effectiveness of fish passage barrier removal

Study 4.1 Fish occupancy upstream of removed barriers

Performance metric:

Presence of fish at inventoried sites upstream of removed barriers.

Trigger:

Fish occupancy in less than 10 percent of the streams upstream from the removed barriers.

Study outline: This study requires direct measurement of fish presence upstream of existing road crossing barriers (e.g., culverts). Potential study locations must be identified as barriers using the IFP fish passage identification protocols. Absence of fish upstream of potential study locations must be confirmed through inventory prior to barrier removal. Presence or absence of fish immediately below the same potential study locations should also be determined. Fish presence or absence will then be determined at locations where the barrier has been reconstructed to provide fish passage, or where the road crossing has been removed through inventories conducted 2 to 5 years following treatment of each road crossing barrier study site. Effectiveness of barrier reconstruction and removal will be examined separately so that effectiveness of the IFP fish passage criteria for culverts can be compared to effectiveness of complete road crossing and culvert barrier removal. The outcome of these comparisons could lead to 1) recommendations for improved passage criteria or implementation rigor, or 2) relaxation of the IFP requirement for fish passage based on a finding that fish are not moving into the potential habitat made available to them through road crossing barrier removal.