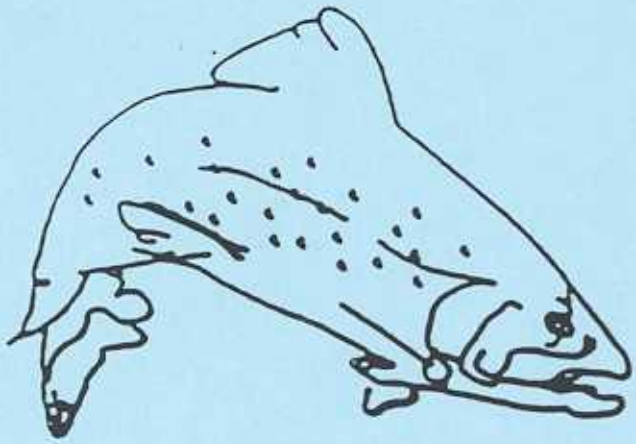


COLUMBIA RIVER BASIN

Anadromous Fish Habitat Management Policy
and
Implementation Guide

January 25, 1991

USDA Forest Service
Regions 1, 4, 6

Forest Service Policy Statement for the Columbia River Basin Anadromous Fisheries

National Forests in the Columbia River Basin have a vital role in the restoration of wild and naturally reproducing stocks of anadromous fish. The fish and wildlife agencies for Oregon, Washington, and Idaho, along with the Columbia River tribes have primary responsibility for management of anadromous fish populations. The USDA Forest Service has primary responsibility for management of fish habitat on National Forest lands. The Forest Service, in coordination and cooperation with other agencies and interested parties, will address anadromous fish habitat management in National Forest and project plans within the context of multiple-use goals and objectives.

It is the policy of the Intermountain, Northern, and Pacific Northwest Regions of the Forest Service to fully support and participate in the achievement of Columbia basin anadromous fish restoration goals. These goals are reflected in a variety of laws, documents, and plans including but not limited to: the US/Canada Pacific Salmon Interception Treaty and the Pacific Northwest Electric Power Planning and Conservation Act of 1980. It is the goal of the Forest Service that the development and implementation of Forest Plans will be consistent with Columbia River Basin anadromous fish restoration goals. It is the policy of these Forest Service Regions to provide consistent management of anadromous fish habitat on National Forest lands in the basin. In order to facilitate implementation of this policy, guidelines will be developed and documented in a policy implementation guide.

This policy statement is not intended to modify, define, limit, or otherwise affect Federally reserved water rights, those reserved rights held in trust for the various Indian Tribes by the United States, and various State fisheries and water quality management responsibilities, or limit the management authority and responsibility of the Forest Service.

John W. Mumma — JOHN W. MUMMA, Northern Region — 1/25/91 date

Robert C. Joslin — J.S. TIXIER, Intermountain Region — 1/25/91 date

John F Butruille — JOHN F. BUTRUILLE, Pacific Northwest Region — 1/25/91 date

COLUMBIA RIVER BASIN ANADROMOUS FISH HABITAT MANAGEMENT POLICY IMPLEMENTATION GUIDE

The purpose of this is to provide guidance for implementation of the Intermountain, Northern, and Pacific Northwest Regions' anadromous fish habitat management policy. These guidelines are premised on a landscape ecology view of fish habitat management, specifically, that natural production potential of fish habitat is directly influenced by the condition and function of watersheds, particularly the riparian portion of a watershed. Riparian areas play a key role in defining the quality of water, fish, and selected wildlife and plant resources. For this reason, the value of riparian areas is greatly disproportionate to the percentage of land base they occupy. In recognition of this importance, the Forest Service has afforded riparian-dependent resources preferential management over other resources in cases of conflict (FSM 2526).

From a landscape perspective, riparian areas are viewed as interconnected systems for which "systems" management is most appropriate. Consideration of the upstream/downstream and riparian/upland linkages is integral to successful management of anadromous fish habitat.

This implementation guide addresses 10 subject areas:

1. Establishing objectives for anadromous fish production capability.
2. Describing desired future conditions of riparian and aquatic habitats necessary to meet those objectives.
3. Identifying habitat inventory needs and procedures.
4. Developing a monitoring strategy.
5. Defining cumulative effects assessment procedures.
6. Identifying information and research needs.
7. Implementing projects.
8. Developing Memorandums of Understanding (MOU's) with anadromous fish management entities.
9. Coordinating with other programs and activities.
10. Describing the Basin Oversight Group.

The guidelines in this Implementation Guide will be incorporated into the Forest Service manual and handbook. Each Forest will incorporate these guidelines during project analysis and development within the management direction in their Forest Plans. As Forest Plans are implemented and monitored, the anadromous fish goals, objectives, standards, and guidelines will be continually evaluated. If existing Forest Plans are not consistent with the Policy Implementation Guide, Forests will

consider amending their Forest Plans through the National Environmental Policy Act (NEPA) process. In doing so, Forests will develop and evaluate at least one alternative consistent with the guide. The decision document will explain the rationale for the selected alternative. If the Forest Plans are not amended, rationale supporting that decision shall be documented.

To encourage rapid implementation of this policy, each Forest must develop an implementation schedule and estimates of associated staff and budget requirements. Draft Forest implementation schedules will be completed within 3 months of approval of this policy and reviewed by the Basin Oversight Group.

1. ESTABLISHING FISHERIES OBJECTIVES

A. BACKGROUND. Management objectives are ideally determined after assessing "existing" fish production capability, identifying "potential" production capability, and considering multiple-use objectives and Columbia River Basin anadromous fish restoration goals. Estimates of potential production capability are best determined by examining fish habitat conditions within pristine watersheds. Although fish habitat relationships occur at scales from large basins down to stream reaches or channel units, Forest watersheds provide a logical, practical scale for management.

B. GUIDELINES

1) Watershed Delineation. Criteria for delineation of Forest watersheds follow:

a) The objective of delineating Forest watersheds is to identify logical units for planning, implementing, and evaluating Forest management activities. As the scale at which fish production capability objectives are defined, it is highly desirable that these Forest watersheds represent logical fish production units. However, in some cases logical fish production units may be larger than practical for project-level planning, implementation, and evaluation.

b) In general, Forest watersheds will be no larger than fifth-order watersheds and no smaller than second-order watersheds. Typically, Forest watersheds will be 3,000 to 15,000 acres in size. However, there are several circumstances which would make delineation of larger or smaller units desirable. The size of Forest watersheds is often influenced by drainage density and drainage pattern.

c) In the absence of existing Forest watershed delineation schemes, established criteria (FSM 2513.2 and appropriate Regional supplements) will be used for initial delineation and numbering of Forest watersheds. These are commonly referred to as PWI or NFS watersheds.

d) Aggregating PWI/NFS watersheds to form larger units or subdivision of PWI/NFS watersheds to form smaller units may be required to meet the objectives of the policy and implementation guide and be responsive to fish habitat management issues, opportunities, and concerns. Consider aggregating or dividing PWI/NFS watersheds to delineate Forest watersheds where they are:

- Geomorphic features within a PWI/NFS watershed that result in distinct differences in watershed response to management activities or climatic events from one part of the watershed to another.
- Peculiar species or stock considerations.
- Distinct differences in management direction or legal requirements (for example, Forest watersheds in wilderness areas may be relatively larger than those in intensively managed/developed areas of a Forest).

e) When aggregating PWI/NFS watersheds to form a larger Forest watershed, the outer PWI/NFS boundaries will generally not be modified.

f) When dividing PWI/NFS watersheds to form smaller Forest watersheds, similar conventions will be applied as directed in the FSM and FSH sections cited above, specifically:

- Boundaries between units will generally be on physical watershed boundaries.
- Streams, including main stem rivers, will not be used as boundaries.

g) It is recognized that this convention may, depending on drainage pattern, result in some Forest watersheds that have "main stem segment with minor tributaries."

2) Establishment of Management Objectives. Management objectives for anadromous fish production capability in individual second- to fifth-order watersheds (hereafter "Forest watersheds") will be identified during Forest planning or Plan implementation in cooperation with interested publics and fish management entities. These objectives should be consistent with anadromous fish/habitat restoration goals for the Columbia River Basin to the extent restoration goals provide for maintenance of viable, wild or naturally reproducing, anadromous fish populations over their existing range.

a) Define objectives in terms of percent (maximum potential) fish production capability of smolts by species for each Forest watershed. (NOTE: "Maximum smolt production capability" is defined as the estimated full capability of the habitat to produce smolt. Full seeding is presumed. Production resulting from true "enhancement" projects, such as by-passes on natural barriers would not be included.)

b) Display objectives by timeframe. Timeframes to display include near term (first decade) and long term (third through fifth decades).

c) Identify existing smolt production capability and maximum smolt production capability as reference points. Document assumptions and process for calculation of "existing" and "maximum" smolt production capability.

d) A review of completed Forest Plans shows that fish production capability objectives have been established at a variety of scales, including:

- Region-wide
- Forest-wide
- Forest drainage (sixth through eighth order drainage)
- Forest watershed (second through fifth orders)

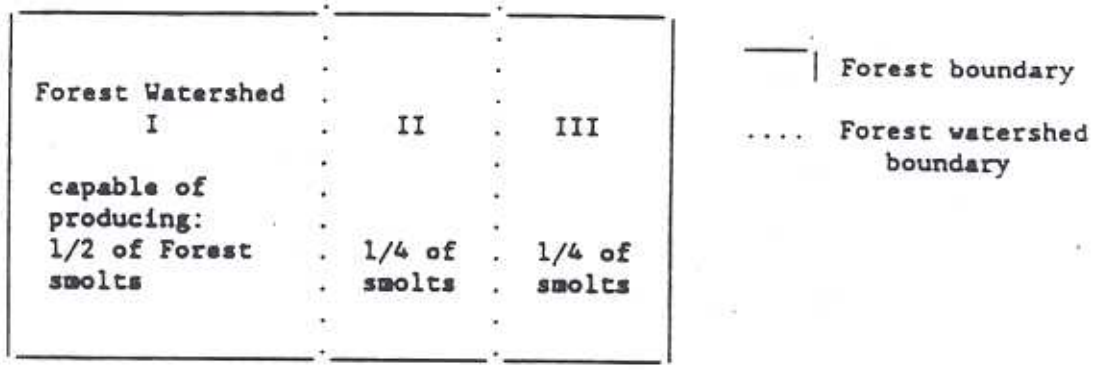
The standard for definition of production capability objectives identified by the implementation guide is the Forest watershed scale. If the existing Forest Plan establishes objectives at a broader scale, the implication is that the objective applies to each Forest watershed included in that delineation. For example, if a Forest Plan has identified a Forest-wide production objective of "attaining at least 90 percent of habitat capability," each Forest watershed is to be managed for 90-percent habitat capability.

However, Forest watershed objectives may be refined at the project implementation level so long as the way overall production objectives will be met is documented. In the simplified example illustrated in Figure 1, the Forest is composed of three Forest watersheds. Watershed I has the capability to produce half the maximum potential smolts from the Forest, while watersheds II and III each have the capability to produce one-quarter of the Forest's smolts. Because only a Forest-wide, 90-percent production objective was established, we assume the objective for each of the Forest watersheds is also 90-percent production capability (Alternative 1). However, during Forest Plan implementation, we determine that management activities in Forest watershed I will result in an 80-percent production capability. If Forest watersheds II and III can be managed for 100-percent production capability, we can still meet our Forest-wide objective of 90-percent production capability (Alternative 2). (The keys to this "flexibility" include reliable methods to predict management effects and thorough knowledge of production capability for each of the Forest watersheds. In absence of reliable, predictive methods and knowledge of production capability, the Forest-wide production objectives should be applied to each Forest watershed.)

Apparent inconsistencies among Forest Service land management plan objectives and other agency/group restoration goals will be evaluated by the Basin Oversight Group (BOG). Recommendations will be made to the Regional Forester for resolution, as discussed in section 10 of this implementation guide. In compliance with National Environmental Policy Act (NEPA) and National Forest Management Act (NFMA) requirements, resolution may include additional analysis, public involvement, and/or Plan amendment or revision.

Fisheries objectives will be revised or updated, with appropriate NEPA analysis in cooperation with Columbia River fish/habitat management entities and others, to incorporate new information and/or as a result of refinement of Columbia River Basin anadromous fish restoration plans.

Figure 1. Example of "developing" Forest Watershed Fish Production Objectives during plan implementation when only a Forest-wide production objective has been defined.



Original Fish Production Objective: "Manage Forest's anadromous fish habitats for at least 90-percent productive capability."

Alternative Strategies for Meeting that Production Objective:

Alternative		1	2	3
Watershed:	I	90%	80%	90%
	II	90%	100%	100%
	III	90%	100%	80%
Forest Production		90%	90%	90%

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2. DESCRIBING DESIRED FUTURE CONDITIONS

A. BACKGROUND.

Conceptual Introduction: An explicit description of the physical and biological characteristics of riparian and aquatic habitats believed necessary to meet Forest Plan fish production capability objectives is needed to facilitate effective management of salmon and steelhead resources on National Forest System lands. These physical and biological characteristics define the desired future conditions (DFC's). Such a description is central to measuring achievement, and/or maintenance, of habitat levels compatible with Forest Plan direction.

The description will provide a narrative and quantitative definition of the desired future condition of riparian areas and aquatic habitat in terms of Elements, Sub-elements and Numeric Values (TABLE 1). Applied as a group, they provide a general framework to judge attainment of the desired future condition "vision." The four elements are primary environmental components influencing the productive capability of anadromous fish habitats. Sub-elements represent important aspects of the elements and will be the basic habitat characteristics inventoried, monitored, and evaluated. Numeric values are quantitative estimates of habitat conditions by Sub-element believed necessary to attain a management objective for productive capability.

Numeric values are quantitative measures to be evaluated in the planning and implementation of activities within Forest watersheds. Numeric values will facilitate objective assessment of "on-the-ground" accomplishment of DFC's and will provide quantitative measures to be evaluated through monitoring. Numeric values will be developed by each Forest with the participation of other interested parties. Regional work groups may be employed in developing the initial numeric values to improve efficiency and consistency.

B. GUIDELINES.

1) Development Process. Although this implementation guide only calls for definition of DFC's for fish-bearing streams and associated riparian areas, consideration and management of total watersheds will be necessary to achieve DFC's. Important aspects of the Forest's monitoring program may be implemented in non fish-bearing streams, as it is frequently easier to identify a "problem" closer to its source. Monitoring the non fish-bearing portions of stream networks may serve as an "early warning" of avertable problems to fish-bearing streams.

The four elements identified in Table 1 will be used throughout the Columbia River Basin. One or more sub-elements will be identified for each element. Sufficient sub-elements will be selected to encompass those habitat features which are likely to limit fish production capability in the Forest watershed(s).

TABLE 1. Desired Future Condition Framework. Potential sub-elements are listed by element (1-4).*

1) Sediment/Substrate
   - Surface fines
   - Cobble embeddedness
   - Fines by depth
   - Suspended sediment/turbidity
   - Macroinvertebrate community composition

2) Water Quality/Quantity
   - Temperature
   - Dissolved oxygen
   - Instream flow (consistent with Forest objectives)
   - Miscellaneous pollutants

3) Channel Morphology
   - Inchannel large, woody material
   - Pool frequency/quality
   - Habitat composition (riffle/pool/glide)
   - Bank stability/characteristics

4) Floodplain/Riparian Vegetation
   - Potential input of large woody material
   - Ground cover (sedge/shrub/tree)
   - Vegetation community composition and condition

* This table is not intended to be a comprehensive list of all important sub-elements. It may be necessary to identify additional sub-elements to adequately describe habitat features limiting fish production capability in a specific Forest watershed.

To aggregate habitat and fish production estimates, Forests within a given sub-basin will generally use the same array of sub-elements. The Regions will coordinate selection of sub-elements with Forests based on local conditions and in consultation with interested publics, agencies, and Indian tribes.

The list of selected sub-elements will be provided to the Basin Oversight Group (BOG) for review who in turn will make recommendations to the Regional Foresters.

Initial numeric values, associated with each sub-element, will be identified by individual Forests or Regional work groups. The BOG will review numeric values for consistency with this implementation guide. A given set of numeric values may be developed on scales ranging from Region-wide, sub-basinwide, and Forest-wide, to the individual watershed.

a) Rationale and assumptions for selection of sub-elements and numeric values will identify:

- Precedent for application
- Applicability to the area
- Relative power (in other words, relationship to fish production capability)
- Measurement capability/reliability (including natural variability)
- Temporal and spatial scale at which the sub-elements will be evaluated and the numeric values applied
- Supporting research (literature citation)
- Cost effectiveness

Special attention will be given to coordination of DFC definition with State efforts to define indicators to be used in evaluating effectiveness of best management practices (BMP's) under provisions of the Clean Water Act. The DFC's will be designed to meet or exceed State water quality standards. (Note: The three Regions plan to meet with each State, provide an overview of the DFC approach, review options for evaluating effects of land management activities on anadromous fish as a beneficial use, and identify opportunities to maximize overlap between State water quality indicators and DFC's. After these meetings, the three Regions will assess the compatibility of the DFC approach with those approaches of the States.)

In recognition of the high natural variability of the sub-elements and the lack of site-specific data in some areas of the basin, the best available and applicable quantitative information will be used and referenced in development of initial numeric values. Numeric values may be expressed in terms of a numerical range or a single value with the expected variability displayed for that value.

2) Refinement/Revision Process. Given the imperfect knowledge of riparian and aquatic systems, local variation in land types, different mixes of fish stocks, and other factors, an ongoing refinement process for numeric values will be necessary. The process for refinement/revision of numeric values will include these major components:

a) It must be objective--driven by sound, locally applicable, quantitative field data and appropriate research.

b) The data should clearly indicate that field conditions are significantly different from those described by the numeric value and that attainment of the numeric value is inconsistent with the potential of a given watershed or group of watersheds.

c) The proposed numeric value modification is supported by discussion/analysis, showing the new value better indicates achievement of the DFC.

d) Refinement/revision will be documented and made available to the BOG for review.

3) Application. Departure from established numeric values may be predicted as part of the normal analysis of alternatives process or measured during/following project implementation. Predicted departure will require additional watershed/fishery analysis. This analysis should focus on identifying problem areas; determining if the activity should be redesigned, modified, moved, or dropped; identifying mitigation measures to bring the activity in line with desired conditions; and/or additional evaluation of numeric values. The analysis will be completed and documented prior to environmental analysis approval.

A process is presented in the Monitoring section of this implementation guide to provide a consistent approach to measured departure from numeric values. (See TABLE 2.)

Although the DFC approach provides a foundation and encourages "quantitative" evaluation, the use of professional judgement and assessment of risks to fish habitat will continue to be an important part of decision making. The precarious situation faced by wild, endemic populations of anadromous salmonids in the Columbia basin demands that decisions be made in the absence of quantitative information. In cases where quantitative data are incomplete or inconclusive, site specific data will be obtained in conjunction with project NEPA and to the extent the information is unavailable, the procedure provided by CEQ regulations will be follwed (see 40 CFR 1502.22.)

3. IDENTIFYING HABITAT INVENTORY NEEDS

A. **BACKGROUND**. Periodic, recurring inventories are an integral part of fish habitat management and a necessary part of project planning. They should produce comparable information within sub-basins and address the selected sub-elements. They are the foundation for effective implementation of the DFC approach. Inventories will be used to: identify existing aquatic and riparian conditions, identify factors limiting the productive capabilities of habitats, measure attainment of or progress toward DFC's, assess cumulative effects, and refine DFC numeric values:

B. **GUIDELINES**.

1) The term "habitat inventory" as used in this implementation guide is analogous to "Forest Inventory." The purpose of the inventory (in the context of the "implementation guide) is to identify existing riparian and aquatic ecosystem conditions, particularly as they relate to Forest DFC's. As inventories are completed and repeated over a number of years, the information generated by them will be particularly useful in measuring attainment of or progress toward DFC's (trend), assessing cumulative effects, and refining DFC numeric values. In this context some may have a difficult time differentiating between "inventory" and monitoring.

2) With presumed definition of fish-production capability objectives and DFC's at the Forest watershed scale, it is appropriate that habitat inventories be implemented at the same scale (that is to say, characterize entire Forest watersheds).

3) Key attributes of a desirable habitat inventory include:

- Driven by the questions that are to be addressed. Identification of management questions is the first order of business. Inventory and analysis procedures can then be developed to provide the information needed to answer those questions. In the context of these implementation guidelines, habitat inventories should identify existing riparian and aquatic ecosystem conditions as they relate to Forest DFC's. (Note: It is not our intent to limit the scope of Forest habitat inventory efforts. A Forest may expand its habitat inventory to meet objectives other than those specifically identified by the "implementation guide.)

- Quantitative in nature. Where there is an option, it is desirable for the inventory to generate quantitative estimates of habitat attributes. There are some habitat attributes that are difficult to describe in quantitative terms, such as "cover." In these cases it is desirable that an objective process for assessing qualitative features be developed, documented, and used. Some habitat attributes that can be quantitatively described, such as "sediment," exhibit great natural variability, making it difficult or extremely expensive to detect the effects of land management activities.

- Statistically valid approach. The inventory approach meets assumptions for standard statistical analyses and results in estimates with known bounds of error.

- Repeatable. Good documentation of a standardized protocol and ability to segregate/evaluate surveyor bias.

- Coordinated with other resource areas and management entities. To minimize duplication of effort with inventories being conducted by other agencies and for other resource areas, especially watershed.

- Cost efficient.

4) The only peer-reviewed approach to inventory that meets these key attributes is the Hankin and Reeves "Basin Survey" approach, (Hankin, D. G. and G.H. Reeves, 1988.) This will be used in the Columbia basin for data collection related to instream and riparian habitat characteristics. (Data may be collected using this approach for the following sub-elements, as listed by element.)

- Sediment/Substrate
  - . surface fines
  - . cobble embeddedness

- Channel Morphology
  - . inchannel large, woody material
  - . pool frequency/quality
  - . habitat composition
  - . bank stability/characteristics

- Floodplain/Riparian Vegetation
  - . potential input of large, woody material
  - . ground cover

5) Other "accepted" or "standard" methods will have to be applied for other sub-elements related to these Elements and to the Water Quality/Quantity Element.

6) In the absence of local cost data, costs associated with the Basin Survey technique should be estimated for planning purposes at $500 a mile. (This estimate is based on the Region-wide average cost for basin surveys conducted in Region 6 during 1989-1990.) Costs associated with collection of data for sub-elements that do not lend themselves to the Basin Survey approach will have to be estimated separately.

- **Stratification of Inventory Efforts.** To facilitate future extrapolation of data and to improve understanding of geomorphic influences on fish production capability, Forest inventory efforts in the Columbia basin are to be stratified by:

  - Land systems inventory (R-1, R-4)
  - Stream order
  - Channel type (Note: Data will be collected in a manner that will permit designation of channel type using a variety of classifications, such as Rosgen.)

- **Setting Inventory Priorities.** Most Forests do not have current habitat inventories and will not be able to complete inventory work in one year. Factors to consider in setting priorities for stream inventories include:

  - Sensitivity of the stocks present. (In other words, presence of TES stocks.)
  - Habitat/watershed vulnerability or sensitivity, watersheds that are particularly vulnerable or sensitive should be a high priority. Likewise, it is important some watersheds that can serve as "controls," such as those in wilderness areas, receive high priority.
  - Level of planned activity in the watershed.
  - Other agency coordination/cooperative efforts and management plans.
  - Relative importance of watershed in terms of fish production or use.
  - Representative of stratification. (All other factors being equal, you would do the inventory in an area that would provide coverage for a delineation of the stratification for which you don't have information.)
  - Size/feasibility of detecting change and managing or affecting that change. (It is more difficult to detect change in larger systems and frequently more difficult to mitigate those effects.)

- Appropriate Frequency of Inventories.

  - Inventories should be completed prior to project implementation in Forest watersheds. Forests should plan to complete initial inventory of anadromous fish streams in the Columbia basin within five years.

  - Surveys should be repeated at a maximum interval of once every 10 years. The interval for repeating the inventory should be modified to account for extreme natural events, management activities, and the sensitivity of the management issues within a Forest watershed.

- Fish Inventory Methods.

  - At the minimum, fish inventories associated with habitat inventory will identify species distribution. To the extent possible, effort should also be made to identify population attributes (including life stage composition and habitat preferences and existing production, such as number of smolt produced, summer par densities, etc.

  - Fish population inventories will be coordinated with or conducted by the States.

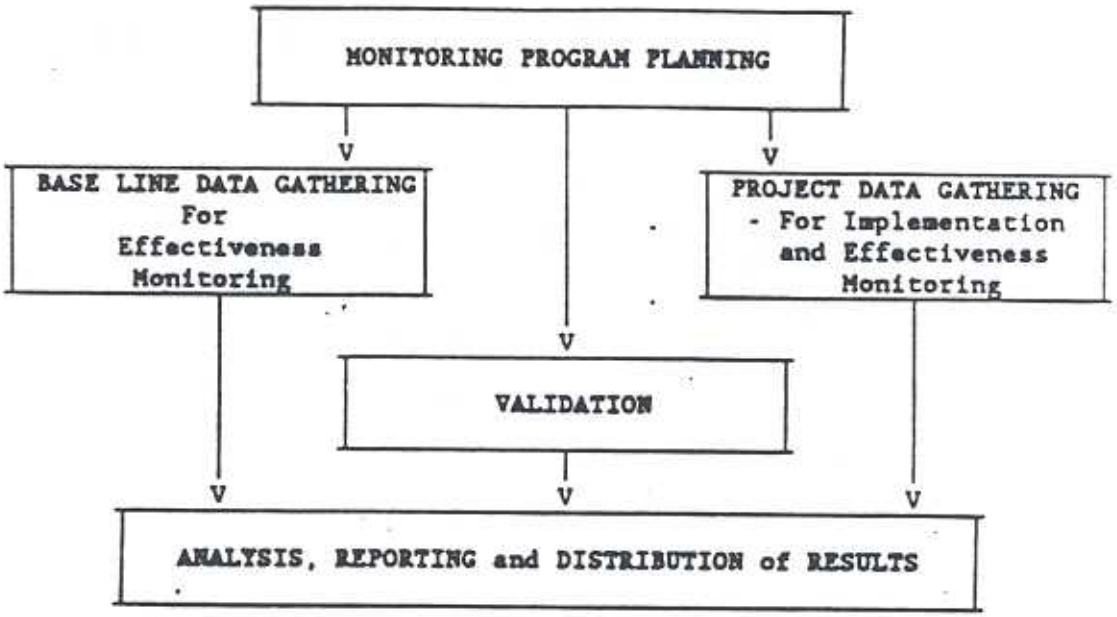
4. DEVELOPING A MONITORING STRATEGY

A. BACKGROUND. Ongoing monitoring is an integral part of fish habitat management and is required by the National Forest Management Act. Monitoring is an important component of the DFC approach and will be driven by the selected sub-elements at the watershed level. Implementation of an effective monitoring plan would:

- Support implementation of designed best management practices, activities, and prescriptions.
- Evaluate effectiveness of management tools, practices and prescriptions in achieving stated DFC numeric values and facilitate refinements.
- Document trends in aquatic/riparian habitat conditions and possible cumulative effects. -
  Produce comparable information necessary to validate or refine assumptions, coefficients, models, etc.

B. GUIDELINES. A proposed framework for Forest Plan implementation, effectiveness, and validation monitoring, to meet the intent of the policy and implementation guide, is outlined in Figure 2. In development of implementation schedules, Forests should identify a "minimum" monitoring program that will be implemented regardless of funding level and a "full implementation" program that defines the entire monitoring need. The Basin Oversight Group will review the proposed monitoring plans for adequacy and consistency with the implementation guidelines. A discussion of the primary considerations for each major element of the framework follows Figure 2.

Figure 2. Framework for Forest Plan monitoring.



1) Monitoring Program Planning. An annual, coordinated fisheries/watershed monitoring plan is to be developed and tiered to the Forest Plan monitoring program and to document:

- WHY? Specific objectives of planned monitoring activities for that year.

- WHAT? Identification of the data to be collected to achieve those objectives. (Focus on the biological and environmental attributes most likely to be affected by the management activities and most likely to be linked to fish production capability.)

- HOW? Protocol(s) to be followed in collecting and analyzing data.

- WHERE? Location of monitoring sites. Locate monitoring sites:

    1. Are representative of the geomorphic and climatic conditions found on the Forest.
    2. Are in watersheds where representative management activities are being implemented, as in control watersheds, or where there is a high risk of habitat impacts, such as high intensity of planned activities, inherently vulnerable watersheds, high fish habitat values.
    3. May serve more than one purpose.
    4. Are accessible in a cost-effective manner.

- WHEN? Timing of data collection, analysis, and reporting.

- WHO and HOW MUCH? Resources (skills and dollars) necessary to implement the monitoring plan. (Review of "adequate" monitoring plans in the Columbia River Basin suggest that average annual costs range from $100 to $350 for each anadromous fish-bearing stream mile on the Forest. There may be some watersheds in which costs will exceed this range because of problems with access, the sensitivity of the resource, magnitude of public controversy, or other reasons.)

- COOPERATORS? Relation to cooperative monitoring programs. (Coordination with State water quality and fish management agencies, tribal fish management agencies and others is necessary to improve cost efficiency and meet legal and management requirements.)

2) Base line Data Gathering. The objective of base line watershed/fisheries data gathering is to characterize the resource and determine trends in condition (relevant to DFC's). base line data are used to define reference points from which to assess the effectiveness of management activities (effectiveness monitoring) and possible cumulative effects. Note: Much of this data gathering may be accomplished via the recurring habitat inventories previously discussed. Key components to be considered for base line data gathering at the Forest watershed scale include:

- Hydrometeorological data to characterize precipitation and streamflow characteristics.
- Soil productivity data.
- Riparian/Stream Channel data.
- Physical/Chemical water quality data.
- Biological data.

3) Project Data Collection. Data are collected at the project level to determine if prescribed best management practices (BMP's) were employed (implementation monitoring) and to determine if they were effective in meeting resource management objectives (effectiveness monitoring).

Implementation monitoring is used to determine if the practices identified in the environmental analysis were incorporated into the contract and if the prescription was implemented correctly on the ground. This type of monitoring should be completed for almost all projects.

Effectiveness monitoring should be addressed at two levels. The first level addresses "on site" effectiveness and is conducted by an interdisciplinary team. The focus of this level of effectiveness monitoring is often on "near-term" effects which are readily detected on or near the site of the project. The second level addresses "off site or instream" effectiveness and may be conducted by an interdisciplinary team or a particular resource specialist. The focus of this level of effectiveness monitoring is to determine the "long-term" effects of management activities on DFC's at the Forest watershed scale. Effectiveness monitoring at these two scales may also provide some insight to the linkages between on site and instream effects.

4) **Validation.** The objective of validation monitoring is to determine if standards, criteria, and guidelines are properly defined and if predictive relationships between fish production capability and habitat conditions are valid. Validation monitoring will be used to verify assumptions about:

- Ecological processes and linkages between aquatic, riparian, and upland ecosystems ("cause and effect").

- Fish habitat requirements by species, life stage, and geomorphic setting.

Key considerations for validation monitoring include that it be:

- Generally conducted by research (Forest Service or under contract with a university or private contractor).

- Generally coordinated by the Regions.

Because of the nature of the questions being answered (wide need/application for the information), multi-agency coordination and funding should be considered.

5) **Analysis, Reporting, and Distribution of Results.** It is important that monitoring data be analyzed and reported in a manner that ensures timely use of the information to make sound resource decisions. Distribution of the results to interested publics serves the important function of reporting progress toward achievement of our management objectives. A summary of monitoring program accomplishments should be completed at least once a year and focus on:

- Interpretation of the results relative to attainment of DFC's.
- Recommendations on appropriate application of the findings.
- Documentation of costs (dollars and work force).

Forests will also:

- Define priority setting/stratification criteria.
- Identify appropriate percentages of projects for which implementation and effectiveness monitoring will be conducted to assure results are representative.
- Coordinate monitoring with other entities and agencies to the extent possible.
- Estimate associated costs and priority for incorporation in the program/planning process.

The BOG will meet to review annual program monitoring plans and summary reports for technical adequacy and consistency with the policy implementation guidelines.

When monitoring activities, identify field conditions inconsistent with established DFC numeric values. A process similar to the BMP effectiveness loop will be initiated (TABLE 2).

5. DEFINING CUMULATIVE EFFECTS ASSESSMENT

A. **BACKGROUND**. Cumulative effects analyses are needed to understand the combined influence of land, water, and fisheries management activities on fish habitat and fish production. Development of a formalized process to analyze cumulative effects will improve our ability to achieve fish habitat objectives. Such a process is needed at the basin, sub-basin, and watershed levels. The term "process" describes a framework for cumulative effects assessment. This framework will identify major components/variables, models and modeling procedures, data, and information needs.

TABLE 2. Framework for responding to trends or individual data sets that suggest departure from accomplishment of DFC's.

1. Is measured departure from one or more numeric values statistically significant?

NO --> go to 2

YES --> go to 3

2. If data is reliable and accurate, END THE PROCESS, departure is not significant or INCREASE SAMPLING intensity/frequency to improve reliability of the "non significant" prediction.

3. Do the numeric values "make sense" in context of the geomorphic/vegetative setting of the stream? (This question should be answered prior to project environmental analysis.)

YES --> go to 5

NO --> go to 4

4. After review by BOG, refine numeric values to fit aquatic/riparian habitats in that setting or document the "anomaly."

5. Will the departure prevent the Forest from attaining fish production capability objectives?

YES --> go to 6

NO --> go to 7

6. Take one or more of the following actions, as appropriate:

a. Modify/refine/discontinue the management activities.

b. Review/revise the activity schedule.

c. Initiate new activities (rehabilitation/improvement) to meet existing or revised objectives.

d. Assess necessary funding and incorporate it into the budget to accomplish the above items.

7. Document why the Forest will be able to attain objectives for fish habitat productive capability, even though one or more numeric values are not met.

The ultimate goal is a fully integrated cumulative effects process which will incorporate all land, water, and fisheries management activities and involve the full spectrum of managers, landowners, and interested parties in the Columbia River Basin. Commitment to coordinate fish and habitat management by all entities that manage fish, land, and water in the basin, is critical to attainment of this goal.

B. GUIDELINES. Within these guidelines a process to assess cumulative effects of management activities on fish habitat and fish production will be developed. The process will address three levels of assessment:

1. Watershed level: Assessment of cumulative effects at the Forest watershed level.

2. Sub-basin level: Assessment of cumulative effects at the sub-basin level.

3. Basin level: The processes at the watershed and sub-basin levels will provide information that can be aggregated to describe the combined effects of land allocations and management activities on the productive capabilities of fish habitat and actual fish production at the basin level.

The special assistant to the R-1, R-4, and R-6 Regional Foresters on Columbia River Basin issues and the Regions will take the lead in developing the process for National Forest lands at the watershed and sub-basin levels and will cooperate with other basin entities in development of a process at the basin level. The BOG will review the result.

6. IDENTIFYING INFORMATION/RESEARCH NEEDS

A. BACKGROUND. As in many resource areas, effective fisheries and fish habitat management increasingly relies on up-to-date technical information and implementation of state-of-the-art management practices. Current technical information and management practices appear to be inadequate to meet the increasing complexity associated with management of fisheries resources in the context of multiple-use management.

B. GUIDELINES. Identification and review of current research activities and an effort to prioritize information/research needs will be coordinated at the basin level among the Forest Service, Indian tribes, States, Northwest Power Planning Council, and others in conjunction with the Forest Planning process. This effort will be coordinated by the special assistant to the R-1, R-4, and R-6 Regional Foresters for Columbia River Basin issues to promote information sharing/application and efficient use of available funding and personnel in meeting information/research needs.

A preliminary attempt to organize research needs into some broad categories and to identify specific items associated with each follows. The list is intended to begin to define the broad array of needs. It is not meant to be all inclusive or to imply any particular set of priorities for accomplishment. Additional input, review, and discussion will be required to finalize and prioritize these needs.

Seven information and research needs categories are displayed. Within each category a number of action areas are listed. More specific needs will come from Regional assessments, individual Forest Plans and input from Federal, State, tribal, and private cooperators.

1) **Relationships between habitat structure and fish production.**

   - Habitat requirements of different life stages of fish and other aquatic organisms.
   - Methods to identify, predict, and mitigate impacts of sediment on fish and fish habitat.
   - Impacts of management practices on large, woody debris and debris dams as structural features of fish habitat.
   - Techniques for habitat evaluation, improvement, and restoration.
   - Influence of geomorphology on quality and distribution of habitat.
   - Historical features of aquatic habitats.
   - Methods to classify and inventory aquatic habitats.

2) **Riparian habitat issues.**

   - Classification system for riparian habitats.
   - Influence of riparian processes on channel morphology, water quality, and fish habitat structure within watersheds.
   - Relationships between riparian vegetation and aquatic and terrestrial production of fish food organisms.
   - Response of water chemistry and stream channel morphology to various management activities.

3) **Population and community processes.**

- Factors that regulate the composition, diversity, and structure of fish and invertebrate communities.
- Role of life-history stages and behavior on habitat use.
- Natural variability of community attributes.
- Composition of native fish communities.
- Impact of exotic (introduced) species. (Includes supplementation and hatchery.)
- Role of refugia in maintaining or repopulating disturbed communities.
- Winter habitat relationships.

4) **Aquatic Ecosystem Processes.**

- Production, transport, and physical and chemical characteristics of sediments.
- Distribution, transport, and dynamics of large, woody debris and organic debris dams.
- Inputs, nutritive quality, and processing of coarse and fine particulate organic materials.
- Biotic and physical factors regulating aquatic ecosystem energy flows and fish production.
- Role of streambed substrates in altering nutrient transport and uptake.
- Development, application, and evaluation of aquatic ecosystem models for predicting Forest management and other human impacts.

5) Cumulative effects of natural and human-caused events on fish habitat.

- Effects of headwater management practices on the quantity and quality of fish habitat, populations, community structure, and community dynamics in downstream waters.
- Long-term research to document natural variability of fish habitat, fish populations, and other components of aquatic ecosystems.
- Effects of large wood debris dynamics on downstream habitat and fish populations.
- Effects of sedimentation and streamflow on channel morphology and fish habitat.
- Critical linkages between physical and biological components of Forest and rangeland ecosystems at landscape (drainage basin) scales.
- Tools for predicting effects of landscape-scale changes on fish habitat.

6) Monitoring and evaluation.

- Development of measurement techniques, sampling strategies, and methods to facilitate Forest Plan implementation, effectiveness, and validation monitoring.
- Identification of monitoring strategies that provide linkages between terrestrial changes, water quality, aquatic habitat, and the aquatic community or specific organisms.
- Identification of aquatic fauna and flora that are most sensitive to habitat alteration.
- Stratification and selection of Columbia River Basin watersheds for validation monitoring.

7) Technical tools for field application.

- Limiting Factor Procedures Guide.
- Large Wood Management Guide (historical context, prescriptions, recruitment models, and so forth).
- GIS applications.

- Operational techniques to measure/quantify aquatic ecosystem complexity/biodiversity.

- Project-level "effects" assessment models.

In preparation of their implementation schedules, Forests are asked to review this list of research/information needs; rank each as "high," "moderate," or "low" priority; and identify additional important research/information needs not listed.

7. IMPLEMENTATION

A. BACKGROUND. Projects that are analyzed and implemented following this policy and implementation guide must meet NEPA requirements and be consistent with Forest Plan requirements.

B. GUIDELINES. This policy will be implemented as soon as practicable after signing. The implementation guide is intended to be a dynamic document. In consultation with interested parties, it will be reviewed annually and amended with an opportunity for public comment as necessary. Implementation of Forest Plans at the project level, within anadromous fish sub-basins, will include as part of the NEPA and NFMA processes the following steps:

Step 1. Scoping (Project Notification): Notify public, Indian tribes, and other agencies of proposed projects or activities scheduled for environmental analysis. Provide written notice of proposed projects and request for information. The notice should include a description of the project, identification of the Forest watersheds involved, known or estimated anadromous fish habitat and population conditions, and any known data or information gaps.

Information reviewed or collected in this step will help determine the issues to be evaluated and the need for additional field inventory or data collection. During this step, the geographic area(s) to be covered in the environmental analysis should be determined considering the NEPA requirements for cumulative effects analysis. This requires consideration of Forest watershed boundaries, effects of past projects, possible effects of projects in the forseeable future, and effects of other land ownership activities relative to the proposal. (See CUMULATIVE EFFECTS section.)

No further scoping is required for proposed projects for which the alternative analysis was completed before this guide was signed.

Step 2. Analysis of Alternatives: Document the following in the environmental analyses:

- Comparison and analysis of each alternative relative to achievement of Forest Plan goals, standards, and guidelines.

- Analysis of the comparative effectiveness of management tools and practices within each alternative toward achieving Forest Plan goals, standards, and guidelines. This analysis will be based on research, monitoring, modeling, and professional judgement.

Step 3. Further Analysis: In the event that direct, indirect, or cumulative effects of the proposed and past activities are projected to result in not achieving Forest Plan goals, standards, and guidelines, a more detailed watershed/fishery analysis will be made. Analysis should focus on identifying problem areas; determining if the activity should be redesigned, modified, moved, or dropped; identifying mitigation measures to bring the activity in line with desired conditions and goals and/or evaluation of numeric values. The analysis will be completed and documented prior to environmental analysis approval.

Based on the analysis, the interdisciplinary team will provide the line officer with their best professional judgement on significance of the activity on water resources and fish habitat. The decision maker will consider this and other information in arriving at a decision. Interested publics, Indian tribes, and other agencies will be involved in the further analysis and will be notified of the decision.

Step 4. Documentation: Dotument environmental analyses and decision on the proposed activity. Copies of the environmental and decision documents will be distributed to interested publics, Indian tribes, and other agencies.

Step 5. Monitoring: Complete implementation monitoring for projects as required by the Forest Plan, or as determined through individual project analysis. In addition, select representative projects/locations for effectiveness monitoring.

Step 6. Feedback Loop: Results of monitoring and findings of applicable research will be used to alter current management practices and improve future project implementation. (See MONITORING section.) Non-attainment of Forest Plan goals, standards, and guidelines will result in Forest Supervisors taking one or more of the following actions:

- Discontinuance of management practices associated with the problem.
- Implementation of new or modified practices or mitigation activities to achieve Forest Plan goals, standards, and guidelines.
- Revision of project scheduling to reduce impacts.
- Reduction of activities if activity redesign or scheduling changes cannot be accomplished.
- Increase of monitoring to better define casual factors and reevaluate existing/proposed activities.
- Reevaluation of numeric values to make sure they are/were appropriate.

The overall goal is to assure that Forest Plan fisheries goals, standards, and guidelines are attained.

8. DEVELOPING MEMORANDUMS OF UNDERSTANDING (MOU's)

A. GUIDELINES. The Regions have reviewed existing MOU's with anadromous fish management entities. The only existing MOU's are between the Regions and the State fish and wildlife management agencies. In general, nothing in the policy or implementation guide is in conflict with these MOU's.

The Regions have also entered into interagency agreements, to facilitate implementation of specific project activities (namely, with Bonneville Power Administration). Nothing in the policy or implementation guide is in conflict with these interagency agreements.

It would be desirable to clarify our working relationship with several other anadromous fish management entities. This could be accomplished through MOU's. Agencies with which MOU's will be explored will include:

- Northwest Power Planning Council
- Columbia Basin Fish and Wildlife Authority
- Indian tribes
- State water quality agencies

- Bureau of Land Management
- Interest Groups (for instance, Oregon Trout, Idaho Salmon and Steelhead Unlimited, and others)
- National Marine Fisheries Service

- Bonneville Power Administration
- USDI Fish and Wildlife Service (Ecological Services)
- Federal Energy Regulatory Commission
- Bureau of Reclamation
- U.S. Army Corp of Engineers
- Professional societies (such as American Fisheries Society)
- Universities

Forests are asked to identify additional groups with whom the Forest Service will need to formalize working relationships.

9. COORDINATION WITH OTHER PROGRAMS

A. BACKGROUND. Several State and Federal agencies, tribes, and other entities have programs which currently deal with anadromous fish production, habitat management, and water/aquatic habitat quality. Significant parallel effort exists between these programs and related efforts. Some of the major programs with which coordination would be desirable include:

- The Northwest Power Planning Council's Fish and Wildlife Program.

- Clean Water Act activities (Section 319 Non-point Source Management and Anti-degradation).

- U.S./Canada Pacific Salmon Treaty.

- State and Tribal Forest management practices programs.

- State fisheries management plans.

Improved integration and coordination of these efforts will result in substantial mutual benefit to all programs.

B. GUIDELINES. The special assistant to the R-1, R-4, and R-6 Regional Foresters on Columbia River Basin issues will take a lead role in reviewing these programs and developing lines of communication, in addition to developing strategies designed to streamline efforts and ensure the most efficient use of available funds.

10. BASIN OVERSIGHT GROUP DESCRIPTION

A. GUIDELINES. The three Regions will follow the provisions of the Federal Advisory Committee Act and Forest Service Advisory Committee procedures to establish a Basin Oversight Group (BOG). If approved, the BOG will be formed to facilitate technical development and implementation of this policy. The BOG will serve in a technical advisory capacity to the Regional Foresters of the Columbia River Basin. The following entities will be invited to participate on the BOG:

- USDA Forest Service
- Columbia River tribes
- Oregon Department of Fish and Wildlife
- Washington Department of Fisheries/Wildlife
- Idaho Fish and Game
- National Marine Fisheries Service
- USDI Fish and Wildlife Service
- Bureau of Land Management
- Other varied public interest groups

The USDA Forest Service representative, who is the special assistant to the R-1, R-4, and R-6 Regional Foresters for Columbia River Basin issues, will chair the BOG. Additional representation may be solicited to assist. This representation will usually come from agencies and tribes represented in the BOG, but may include other agencies, organizations, or publics.

The BOG will function as a technical advisory group and liaison with policy/decision makers for those represented. It will:

- Seek to maximize integration and consistency of fish and habitat management within the Columbia River Basin.
    - Review and report on progress toward implementation of the Policy.
    - Review and make recommendations to policy makers regarding products developed by Regional and Forest work groups for implementation of this policy. These include:
        - Fish production objectives
        - Desired future conditions development and revision
        - Cumulative effects framework
        - Forest implementation schedules
        - Monitoring and evaluation of annual work plans and summary reports

GLOSSARY OF TERMS AS USED IN THIS POLICY STATEMENT AND IMPLEMENTATION GUIDE

anadromous: fish species which ascend rivers from the sea for the purposes of reproduction.

basin: see Columbia River Basin.

Basin Oversight Group (BOG): an interagency group of anadromous fish management entities that serves in a technical advisory capacity to the Intermountain, Northern, and Pacific Northwest Regional Foresters in the implementation of the Columbia Basin Anadromous Fish Policy Statement.

Columbia River Basin: the lands which drain to the Columbia River.

Columbia River Basin Anadromous Fish Restoration Goals: the interim doubling and long-term restoration goals of the Northwest Power Planning Council, and the U.S./Canada Treaty chinook salmon restoration goals.

cumulative effects: the combined influence of land and water management activities on fish habitat and fish production. Assessment may occur at several levels: watershed, sub-basin, or basin. Cumulative effects are further defined in 40 CFR 1508.7.

consistent: neither to undermine nor conflict with; not necessarily exactly the same but harmonious.

desired future conditions (DFC's): an explicit description of the physical and biological characteristics of riparian and aquatic environments believed necessary to meet Forest Plan fish production capability objectives. DFC's are defined in terms of Elements, "sub-elements, and numeric values.

element: primary environmental components influencing the productive capability of anadromous fish habitats. They include: Sediment/Substrate, Water Quality/Quantity, Channel Morphology, and Floodplain/Riparian Vegetation characteristics.

fish habitat: the entire physical/chemical/biological environmental system that supports fish populations.

fish management entities: Federal, State, and tribal organizations with management responsibilities for anadromous fish or anadromous fish habitat in the Columbia River Basin.

Forest watershed: For the purposes of establishing fish objectives, second to fifth-order watersheds delineated to provide a logical and practical scale for planning and management of riparian areas and fish habitat. "Order" refers to the Strahler system, in which a first-order stream is the smallest perennial channel forming the headwaters of a small drainage system. Two first-order channels joining to form a second-order channel, two second-order channels join to form a third-order channel, and so forth.

numeric value: quantitative estimates of habitat conditions by sub-element believed necessary to attain a management objective for productive capability. For example, a numeric value for the sub-element "water temperature" may be: "Maximum temperature will be $\leq$ 61 F on any day" and/or "the average 7-day maximum temperature will be $\leq$ 58 F."

practicable: technically and economically feasible.

riparian area: a geographically delineable area with distinctive resource values and characteristics that are comprised of the aquatic and riparian ecosystems. Riparian ecosystems are those land areas with vegetation dependent on a high water table during some portion of the year.

sub-basin: subdivisions of the Columbia River Basin as delineated by the Northwest Power Planning Council in their system planning process. For example, in Idaho the Clearwater River drainage is classed as a "sub-basin."

sub-element: representative of an important aspect or way of assessing an element. For example, the sediment/substrate element can be evaluated in terms of percentage of surface fines, cobble embeddedness, and so on.