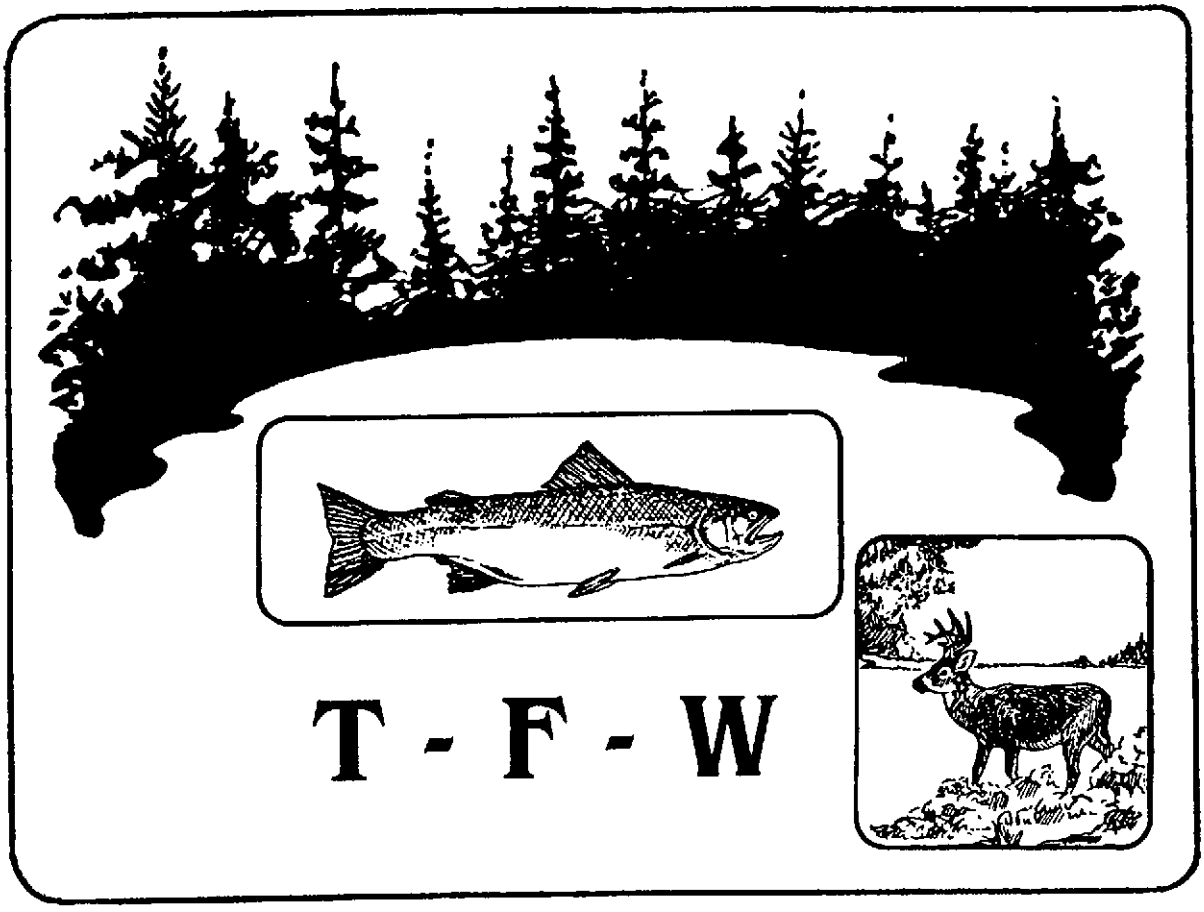
TFW-16C-89-008

Ambient Monitoring Steering Committee Workshop For the TIMBER-FISH-WILDLIFE REPORT

May 24, 25 & 26, 1989

Seattle, Washington



SEPTEMBER 1989

"Think Tank" Workshop on Evaluating Streams and Forest Practices

May 24-26, 1989
University of Washington, South Campus Center
Seattle, WA

David C. Flaherty and Associates
NW 1000 Bryant Street, Pullman, WA 99163

September 20, 1989

Executive Summary

CONTENTS

Note: A more complete account of the workshop is contained in the separate "Summary Minutes, bound at the rear of the Executive Summary.

Goals of the Workshop

Development of a "research and monitoring program that can be used effectively in forest management decision-making regarding streams and fish habitat" was set out as an overall goal for the workshop in a letter to the prospective attendees from Kate Sullivan, one of the workshop's organizers and a member of the TFW Ambient Monitoring Steering Committee. She added that the purpose of the workshop was to develop the program within a sound consideration of geomorphic and biologic systems.

Sullivan stated that the Ambient Monitoring Committee, as part of the overall TFW (Timber/Fish/Wildlife) effort, had "an immediate need for response variables and methods to measure them, and a longer term need for the cause and effect relationships between watershed conditions, biologic communities and response characteristics."

The workshop attendees, who were drawn from the professional disciplines of fishery biology, aquatic ecology, geology, geomorphology, hydrology, statistics, and systems analysis, were expected to lend their expertise and ideas as to how best fill these needs.

Sullivan also pointed out in her letter that the Ambient Monitoring Committee had concluded that some sort of stream classification methodology would be a necessary first step in order to identify hydraulically distinct stream types. "A monitoring program will then need to focus on response variables, or stream conditions that are likely to respond directly to varying levels of sediment, hydrologic regime or in-channel structures." she added.

Workshop Attendees

Tim Beechie, University of Washington
Lee Benda, University of Washington
Bob Beschta, Oregon State University
Pete Bisson, Weyerhaeuser Company
Jeff Cederholm, Washington Department of Natural Resources
Loveday Conquest, University of Washington
Jim Curry, Consultant
Bill Dietrich, University of California - Berkeley
David C. Flaherty, Consultant, Pullman, WA
Jeff Light, University of Washington
Tom Lisle, USFS, Arcata, CA
Holly Martinson, USGS, Tacoma, WA
Dale McCullough, Columbia River Basin Intertribal Fish Commission
Bob Naiman, University of Washington
John F. Orsborn, Washington State University
Bill Platts, Consultant
Dave Rosgen, Consultant, Fort Collins, CO
Tom Sibley, University of Washington
Fred Swanson, USFS, Corvallis, OR
Dave Somers, Chairman, Ambient Monitoring Steering Committee
Kate Sullivan, Weyerhaeuser Company

The group's composition was as follows: Beechie, Bisson, Cederholm, Light, McCullough, Platts, Sibley, and Somers are fishery biologists; Benda, Dietrich, Lisle, Martinson, Rosgen, Swanson, and Sullivan are geomorphologists; Beschta and Orsborn are hydrologists; Conquest is a statistician; Curry is a systems analyst; and Naiman is an aquatic ecologist.

Workshop Agenda

I. Introduction — Wed -- May 24
Management Considerations and Goals
Conceptual Stream Model

II. Stream Model Building Session — Wed., 1:00-4:30

Entire Group

Goal: Building consensus on an overall approach (Revise or start again from AMSC plan)

III. Detailed Discussion of Model Elements — Thurs., 8:30-12:00

Entire Group

Goal: More detailed discussion of model elements. Identify approaches to focus on, knowledge and lack thereof.

IV. Breakout Groups to Build Individual Model Elements — Thurs., 1:00-4:30

Groups break themselves out based on interest (cross-disciplinary encouraged)

Goals: Develop strategy required to develop successful solutions for each model element.

Identify variables to measure in current monitoring program.

V. Reweave Model from Group Discussions. Wrap-up for the Workshop, Idea-Building Session. — Fr., 8:30-12:00

Entire Group

Goals: Identify strategy for developing program to achieve management goals.

Identify research opportunities and monitoring needs

VI. Informal Sharing — Fri., 1:00-2:30

Entire Group

Highlights of the Workshop

Dave Somers, chair of the Ambient Monitoring Committee (AMC) opened the workshop with a review of the history of the timber vs. fish and wildlife agreement in Washington State. He pointed out that controversy on land use issues and environment concerns had involved such issues as riparian management, sensitive areas from the standpoint of endangered species, sediment, mass wasting, and roads.

Subsequent to lawsuits being filed by environmental groups against the state's forest land management plan, an agreement was reached between the groups and the Department of Natural Resources and the Forest Practices Board.

While this effort was going on, the Indian tribes in Washington State also were in the process of a lawsuit regarding Phase Two of the Boldt decision. Somers stated the legal question related to the theoretical legal ability of the tribes to protect fish habitat because Phase One of the Boldt decision was that the tribes had property rights to fish. The court said, "If the tribes had rights to the fish, don't they have the right to protect them from environmental degradation?" The court threw that question out but said, "We will deal with that later."

"Things were really building to a head on a lot of issues, the environmental groups trying to protect natural resources, the tribes trying to protect what they regarded as their private resources, and the state trying to manage an orderly forest practice system," Somers told the workshop group.

The TFW or Timber/Fish/Wildlife Programs emerged out of this controversy. Basically there was a six-month negotiating process where the forest industry, state, tribes, and environmental groups identified a whole series of issues and tried to explore creative solutions. A formal agreement was never signed---basically it was a gentlemen's agreement---but it did result in changes in the Forest Practices Act, particularly in the area of riparian management zones, according to Somers.

The AMC chairman emphasized that the state's Forest Practices Board is still in charge of the state's forest practices and that the arrangement with the TFW program is an informal or advisory relationship.

Somers next described the makeup of the various TFW policy levels and committees. One of the latter is CMER: the Cooperative Monitoring Evaluation, and Research Committee. CMER basically was established to guide and monitor the research programs of TFW. Somers stated CMER is made of representatives of all the interest groups. Most are technical people---biologists, people who are involved, people closer to the ground. CMER consists of six steering committees. Fisheries; Wildlife; Sediment, Hydrology and Mass Wasting, Water Quality, and Ambient Monitoring and Information Management. Ambient Monitoring, the committee that hosted the workshop, is the catch-all for the rest of the process. Most of the other committees were formed around some specific research topics that were identified, either through the agreement or immediately after the agreement.

Somers then went on to describe the Ambient Monitoring Committee's initial effort at model building. Some information are best obtained from a closely defined research program, he stated. Other kinds of general information, such as resources across the land and a general understanding of both natural and management-related processes seem to best come from a managed or monitoring-type system.

AMC is pursuing two approaches--one is field data collection, the other is implementing a monitoring scheme across the state. The monitoring effort is to be supported by a classification method. "Classification is a conceptual model of how a landscape works (by) breaking it into pieces that seem to make some sense---allowing us to make some interpretation of the landscape," he stated. "Classification will provide a framework for both determining how to monitor, where to monitor, and how to use that information. It also provides a framework for making sure that the research being done makes sense." (Monitoring is measuring stream conditions

over time. Classification is an element that hopes to help organize spatial variability expected in that data.)

Somers next explained that the information being collected by AMC and how it is collected is determined, not only by the issue being studied but also by the people that are going to use it in the existing management system. There are three categories of management. There are the Resource Managers, the on-the-ground folks that are doing forest practice applications, laying out logging plans, managing forest resources, participating in ID teams.

The Regulators are trying to enforce the forest practice regulations. They are more interested in getting information that helps them decide whether or not the regulations they have in front of them, such as the water quality standards, etc., are being met and are adequate for resource protection.

Policy Makers are the people interested in whether or not the overall program is protecting the public resources, (the) private resources and whether the management system is working. They have more of a global view.

"The committee is trying to anticipate the needs of these groups, build tools, and develop information that relates back to them and the management system," Somers concluded.

Kate Sullivan, Weyerhaeuser Company, next addressed the workshop. She began by pointing out that TFW has opened an opportunity to go beyond regulations, essentially to move into more flexible management.

"One of the things industry would like out of it, for example, is to be able to move away from hard and fast regulations to a management scheme where there is more flexibility with what is done on a site," she stated. "That's a very interesting concept that requires one additional level of technical understanding of how places work, how to make decisions, and what management tools will be needed to evaluate whether one is successful or not."

Sullivan stressed to the attendees that they had been brought to the workshop to use their experience to evaluate the AMC's proposed program, particularly the classification portion.

"If we were doing this over again, we would not call this process, 'stream classification,'" she stated. "Actually what we are going to be talking about the next two days is a watershed model. We will be talking about how we take all the pieces of this pie and put them together---such as hillslope processes, streams, how you read them, how we will relate them to fish."

The AMC member next reviewed the committee's approach to modeling a watershed. Some of the points she mentioned were:

*(We have) to have some way to describe the landscape so to find stream types---for no other reason that you can't measure every place on earth. We have to figure out where I measure so that I can stratify and say, "If I measure this place, can I characterize other places like it?"

*However, we thought that we ought to concentrate for a minute before we tried grabbing any given classification methodology. (We should consider) what we are trying to do with it. We were trying to account for what is going to cause streams to look different from place to place. We realized there were some broad overview things such as geology and climate which drive factors like what kinds of sediment and how much are available over what time frames, etc.

* It's not very useful to try to understand any single piece of this by itself. We really have to make linkages between them. What is the level of sediment mean and how do I measure the channel and see what happens? What do the watershed conditions mean to the input factors? We are taking these pieces and trying to show the relationship between them.

*Essentially, if you take a look---amid the chaos---you can find a pattern exhibited on the landscape---at varying scales. We do know that people have

come up with a variety of ways of relating things to watershed factors. One factor that has an important potential is watershed sizing. People have come up with a couple of ways to characterize stream types. Stream ordering is one way to do it. There also has been some work done on geohydraulic zones.

*Our first approach in classification would be to define mappable units. What we need for managers ultimately is for them to be able to (look at) a map and say, "This stream probably could look like this." You might use those to orient specific management practices around different kinds of streams.

*The mappable units have to be sufficient size so you can utilize them. But they have to be small and discrete enough to provide some stratification of the system---on a useful scale. There also needs to be some observable differences that carry over to the associated biological communities. The system's response to environmental changes also should be evaluated by the classification types and units.

*What we really need to start making stream data make sense (is) some way of reading the channel for the current levels of input variables (sediment, hydrologic conditions, woody debris).

*I called that whole series of variables the response variables---what kinds of things the channels would vary (by) if you changed sediment, etc.

We focused on physical stream conditions and habitat, not so much on water quality. We got very tied into the kinds of things that influence morphology---such as sediment, flow, and structures. Then we came up with response variables that are particularly sensitive to quantitative numbers if we went out and measured them.

*If you already are in a system high on the sediment level and you make a change, you will get a very different response in that system than if you make a

big change in a system that is low in sediment. One, maybe, can absorb it, the other one cannot.

*How do you relate any given watershed place, any given watershed set of conditions to the input factors that you are expecting to be occurring there? This is really fundamental to the cumulative effects question that we are grappling with.

*We can take a variety of approaches to cumulative effects. From one viewpoint, when you've monitoring, you are just staying in one place down in the channel, watching things happen, watching things go by. Ultimately, we need to be able to relate those back to some activity so we can say, "We need to change those in some way. We need to make decisions that will result in acceptable changes in the system."

*A major component of everything we do is risk assessment. How important is a change going to be and where is it going to influence? Managers eventually will be working with site evaluation tools where they will go out with checklists---or whatever---to take some real data, based on real physical site conditions and (make) some evaluation how this will influence given locations in the stream and some understanding of what the cause and effect will be.

*Ultimately, we do have to find ways that we can show the biological response to how these response variables may be changing. So that we can show, in fact, that we are having an impact on the biota or (how) we can make some changes with the different management effects.

Sullivan concluded her presentation by pointing out that it's one thing to build a conceptual watershed model so as to make this thing work but "another thing to make these tools fall out of it so they can utilize this information in some useful way," she stated. "Our task in this group is to make these management tools

(which) fall out useful, comprehendible, and (workable). We know there is a lot of knowledge gaps as to how to make some of these connections."

What's the best approach to doing this, she asked the workshop attendees? (Following Sullivan's review, the attendees launched into discussions which lasted for most of the remaining time. There were some special presentations, however, by Pete Bisson and Dave Rosgen. Excerpts from Bisson's talk are at the end of the Summary Minutes. A summary of Rosgen's comments are on page 23-25 of this report. A short video, "The Coho Puzzle," was also shown to the workshop by Jeff Cederholm.)

Discussion

What Do "Managers" Know?

The initial point of discussion revolved around the level of knowledge possessed by "managers" in the timber/fish/wildlife arena.

Sullivan described managers as the people who make the decisions on the ground. They often are generalists but trained in specific disciplines---they may be foresters, they may have (a) fishery, wildlife or forestry, specialized education. They usually work for management organizations---at either Department of Fisheries, Wildlife, DNR or Tribes.

These managers form the ID (Inter-Disciplinary) teams get together to try to decide how to manage a given timber site. Sullivan commented that the knowledge (they need) may be around but it has not been consolidated for them. "Or the knowledge may not be available," she added.

When Is Too Much, Too Much?

There has to be a good tie between what is happening geomorphologically as a result of a forest practice and what the biological result is, Sullivan told the group:

Ultimately, (the managers) are going to (have to) have decision criteria. When is too much? What's satisfactory? What's the appropriate level to manage

for? These will be difficult problems if we do indeed move toward more flexible management. It's going to put a tremendous amount of responsibility on our managers to be able to read sites and make the right decisions.

At the same time, it's going to force the regulators to pay a lot of attention to determining what the appropriate way (is) to measure the biological response and what is the goal or standard we want to set there.

A Big Model?

One person asked whether AMC was seeking to develop a large comprehensive model so that an understanding could be developed of the entire timber/fish/wildlife picture. Sullivan replied that a big comprehensive model might be a good place to finish, once it had been figured out how everything works. She then quoted Einstein:

"Things should be stated as simple as possible, but no simpler." The dilemma is--what is possible to give then (that would be) useful in describing the system but does not overdo it, the Weyerhaeuser scientist added.

Some members of the audience wanted to know if AMC had sufficient resources to achieve their desired goals. Sullivan answered, "We have some funding. Others are working on similar problems and there are opportunities for cooperative work. We also have a large volunteer work force in TFW that will collect information that will be useful in some contexts and not in others. So we have a variety of ways to get things done."

An opinion was expressed as to whether a simple model was possible. "You also have to do the complex physical side," one person said.

This latter problem might be handled by bringing in a specialist to answer the more complicated part of a process, an attendee replied.

Is a Stream Segment a Valid Concept?

This question was asked of the geomorphologists in the group. However, the discussion turned to other matters and was not answered at the time.

How Much Detail Is Needed?

Dave Rosgen addressed this question and concluded that a lot was required! He said, "The process we need to focus in on is a combination of cumulative effects, modeling, and understanding the changes of the energy supply of the watershed to the various stream types within those that will have a different and unique response to those changes."

You have to have the detailed monitoring of the unique (stream) types to show changes in particle size distribution, velocity distribution, hydraulic geometry relations, changes in the substrate composition, width/depth ratio and things in the channel that affect fisheries, Rosgen added.

Must the Model be Perfect?

Doubts as to whether a model would give the answers needed were answered by Somers. He stated, "We did embrace the concept of adaptive management---which means that you pick a model(s) that is imperfect, unprecise and you test it in a management situation. (Then) over time you refine the model(s) so there is a pathway for getting better information, and understanding. (We) need to take a long term look at how we build a information system---take what we know now and apply it in the context of that in on-going real-life management.

Signals vs. Noise

Lisle asserted that a recurring theme in the workshop discussion had been the issue of signal versus noise. "My view of the world is there are determinants in physical systems which route thing downstream that can be modeled...but there also a lot of natural variabilities which we can't account for," he stated. "We need to

assess what the signal versus the noise problem here. Is it a tractable problem? Is it merely lack of knowledge or does variability overcome us here?"

Beschta then stated, "Could the actual noise be a signal and that is what we really ought to be looking at? Not trying to get rid of it but actually understanding the variability as part of the system? Just because it is highly variable doesn't mean we want to get rid of (it). That actually may be the signal we are trying to measure, handle, and know what it means."

Classification/Mass Scale/and Specialists

A series of points were raised by Dietrich. He commented that classification may be good but I am not sure that the fish need a classification (which we might) design. "The biologists should think from the perspective of the fish (as to) what would be a good way to classify things. The fish people should be telling what the fish need from landscape characteristics and invent or devise criteria that matters to them."

His second point was that looking at maps for answers might be all right but that "getting on the ground and looking around is a lot more labor-intensive. But it may be the only place where true answers lie."

The University of California-Berkeley scientist then argued for specialists to do specialist work. He said, "I wouldn't ask someone who has just a general level education to go and worry about landscapes. I would like for people with reasonable levels of training (who have) access to (new) developments in research be the ones who are making the primary observations."

This latter question was addressed by Platts. He commented, "But you got to deal with the real world. Decision-making is an art. There is no science to it. If you come strong at it with a science approach and do not change it into an art form before it gets to a decision-maker, it fails. It will always fail."

As far as "classification" is concerned, Platts asserted that it can be a valuable tool. He stated: "If the classification system is done right it will give you where you

came from, it will give you where you are, and will give you where you are going---under different scenarios.

"That's all you have to tell the land manager. But you have to have the tools...

"The most successful thing I found in livestock grazing (management) is to go out with a series of photographs, sit down with this land manager and say, "This is what this system was at in 1940, this is what this system is today. The law dictates to you that you have to have this system looking like this, and how are you going to get there? And if you want some suggestions, I can tell you how to get there."

Rosgen later added in the workshop that people working in this area need to develop a rigor to come up with the measured field variables of the segments, reaches---whatever level is being studied. Once this is done, a fundamental database can be developed "so that we finally can focus or what are the variables that we need to look at in streams."

Hand Evidence Wanted by Process People

Dietrich emphasized that he needed convincing about the value of classification. He said, "I would like to see the evidence that classification really tells me something about rivers. I want to see the information that says, "We made this classification, we predicted this. This, indeed, is what did happen."

Platts agreed but warned that there was not time for a lengthy study of the idea of classification:

> I agree that something has to be done. But nobody is going to wait 25 years for you to get in position. You got to come out with something tomorrow to bring these decision-makers along. Whether it tested at 100 percent accuracy doesn't matter. If it's right 51 percent of the time, it will be a lot better than anything we got today.

Rosgen seconded this thinking:

Understanding the physical process is far removed from the individual that's making the decision. We've got to (cut) that gap. There is a risk associated with putting an assessment and some evaluation criteria down on how to represent the physical process. We've got to take our knowledge, put (it) into some (form with which) we can make some kind of predictions. Then give that information to a manager to make a decision.

Then we've got (to take) the responsibility, which we have not done in land management, to evaluate that decision, to monitor it for the physical processes.

Dietrich later emphasized, "But if the classification system is to be implemented state-wide or Pacific Northwest-wide, it will have to be put to use and challenged."

This question of data to back up a classification scheme surfaced repeatedly during the workshop. During one exchange Somers said," The evaluation of (a classification system) is a given, I think. But the question I'm still hearing (is) what is four percent? Anytime you classify something you are making a relative arbitrary breakout. You go to one to three percent, three to five.

"You are always going to have some portion of it that you can debate endlessly (as to) at where the breakouts actually are."

Beschta countered with, "I would like to know, out of those measured, how many fell in the one to four percent (range)? What is that distribution? That is the question that is important to me, to give me some confidence---or lack of confidence---that the A-1 is a really super classification or it's wrong. I don't know. That is the problem I have."

How Important Is Vegetation and Other Specifics?

Beschta emphasized the importance of looking at more than the specifics of a stream system. He gave the examples of vegetation and soil. He stated, "In the list of things that we need as a group to address, vegetation is mentioned but we don't give it

enough credence in regards to what it is doing out there. What we do to vegetation can make all the difference in the world.

"Also, nobody has mentioned soils. There is a lot of information (about) riparian soils that we just totally ignore."

Curry responded that vegetation does have a major role, but he wondered if it were possible to capture most of the variabilities in vegetated covers or some other important variable on a higher level than site/specific analysis. He stated:

> If in fact, we can capture most of the variabilities in vegetation through a description of the valley or the watershed, then we have grounds for focusing the model at a higher level. If in fact, all the variabilities in vegetation occur or a high percentage of it is around the specific site, then we are back into a chaotic world where we have to have ID teams out there collecting, doing detail studies and we're facing the Gramm-Rudman sort of constraints...
>
> It seems to me that for interpretative model building, one of the criteria we need to advance here, what is the minimum amount of information that we need to capture the variabilities.

Rosgen replied that if you have too many levels then the applicability of the classification scheme would be lost. But you can work it down into very smaller sub-type grades, he added.

Classification at the Stream Level Too Narrow?

Strong doubts were expressed by Benda as to the value of classification at the stream level. "It gives you a false sense of security to (classify a stream) without clear understanding of the ecosystem level, based on terms of fish as they move around," he stated. "That would give me a false sense of understanding how the system works."

He cited the example of some fishery biologists doing basin-wide studies in Oregon, and added, "I got the impression that they don't have a clear understanding

of the road, the disturbances across the basin, across the landscape with a mobile species like salmonids."

Rosgen answered by saying, "What you said is exactly the reason we need to do these segments. You can't just look at one spot here and make a decision without understanding the influences of the watershed on what you are looking at in that spot. That is the whole idea of doing it."

The concept of stream classification was challenged repeatedly during the workshop. Benda placed particular emphasis on the nature of Washington's river basins located west of the Cascades. He stated, "We don't really understand how these basins work in terms of their sediment, how they input their storage over long-time period. You suggest measuring bedload or something. (But) we don't know where the noise comes in... I don't understand how any system can be sensitive to change when we don't even understand how the westside basins work.

"If you start with model building, we might find out that things are so unknown and complex that to go down to the segment level might be too tight. Classification at the segment level might not be the tool to look at change---an environmental change.

"We might have to scale up and look at a broader landscape level. Even though classification can be used in certain things, it may not be useful to predict the sediment routing through a stream channel which, in the final analysis, will affect habitat very much."

Rosgen commented that it was not necessary to have thirty years of experience watching the stream. "It is a matter of being able to extrapolate the known data from one area of similar character to another area of the same character (where) you don't have any data," he said. "I am continually amazed that as much data as exists, how little of it is being used. It is physical-process based so you can look at changes

in the energy, changes in the supply, (and figure out) what we expect to happen on one stream type."

Benda later again advocated a basin-wide approach. He stated, "Why don't you just go in a drainage basin, look at all the streams and get an idea of the disturbance of streams, managed or unmanaged, for the entire basin? Why isn't that adequate?"

Sullivan questioned whether such an approach would show the responses of the stream variables to changes. Dietrich added that what Benda was proposing was not a procedure that was available at present. The University of California-Berkeley representative then commented, "At this point, I have a feeling that if Rosgen walks behind you, he would do the same thing you are doing, and have a slightly different score. I agree with what you are saying, but if Dave was to follow you, he is going to say things in a number where you would say it in words.

"You would have a good description how that depositional unit is causing whatever it might be, etc. He would come along and say this was a "F-3," or something. He would be doing the same exercise as you but he would distill it down to a number and put that into a form that can be used."

Rosgen later stated, "If you don't use something like the stream classification system, how can you communicate the technical complexities of river response to an enhancement structure's imposed change on streams to people who are not trained in doing those calculations? But they can look at a chart and say, 'It rates poor.'

"If we don't have some kind of classification system it will be difficult to communicate with foresters, fishery biologists, and others that don't have the time to get into the rigor of the hydraulics but still need to understand the adjustability of the streams, the predictable nature of them on which we can give them some advice."

Platts later pointed out that whatever classification systems is used, it was necessary that it take in an entire basin. He said, "Until you integrate all these

Rosgen (stream) types up, you can't manage a (fish) population that has to have the whole basin."

Are Fish Really Complex?

Following a summary by Jeff Cederholm of the many life history stages of the coho, steelhead, and cutthroat trout that inhabit the Clearwater River in western Washington, Sullivan responded that she was hearing an argument that because the life history (of these fish) is very complex and we have a variety of species and because we have a very mobile species, the geomorphic basis may be the only way to effectively classify the system.

Platts replied that fish are (considered) complex (but) "only because we don't understand (them) well enough... If we could classify our Middle Fork Salmon River and your Clearwater River down to the ecosystem level and get these responses, then these fish wouldn't seem so complex. These fish know exactly what they are doing and they do it. They have had a million years to figure it out."

Classification and Risk

Platts emphasized to the group the value of classification as a forecasting tool. He stated:

> One of the most important things classification can tell the land manager is the risk. If a manager is thinking about logging or mining or grazing one of these stream types that will never come back in our life time, he got to know about that up front. If he is screwing around with one of our Great Basin types that doesn't incise on you, you can bring back it in five or six years.
>
> He or she can take more chances because the risk is lower.
>
> Classification has to identify---ahead of time, to this decision-maker, what the tradeoffs are going to be if he or she does certain things. Another important thing that classification does---maybe it is one of the most important things, it puts risk analysis on their shoulders.

Classification Before Inventory?

The question of whether development of a classification system should precede the counting of the pebbles, etc. in a stream was answered in the affirmative by both Platts and Rosgen.

Platts: You have to inventory---after you get your classification---(to obtain) the ground truths, to make sure you are on the right track. You'll go out and inventory certain anomalies you don't know what to do with.

Rosgen: You need inventory to verify your classification, observations, and your delineations. Then you have to go to the field and get specific about those types.

The Colorado consultant later added, "Going in the field, however, after you done some of the mapping to a given type and a given site then, will help you provide further interpretation of the influence that vegetation (for example) has on that particular channel."

The Sediment Routing Problem

Considerable discussion took place over whether a classification scheme and ensuing model would be powerful enough to forecast the movement of sediment through a basin's streams. Dietrich asked, "How can you tell me a 30 acre clearcut is going to affect a third-order channel? I don't see how you can route the sediment through the classification."

Platts replied, "Classification sets up the procedure so that the model will route your sediment. The R1-R4 model will route the sediment to any critical reach you want to select.

"You classify your whole watershed. Then with the classification, you come back and determine how much sediment is coming off of every piece of land (to which) you have applied a treatment. Then the transportation model takes that down to these aquatic..."

This comment then was questioned by Dietrich, "You have another bad word there that I would challenge as to (whether) you have a functional transportation model that can take sediment off the landscape and route it through a channel. I would like to see that."

Platts' rejoinder was, "A model will not answer every question you want answered. But it will allow the land manager to better evaluate the alternatives he has to work with."

The Rosgen Stream Typing System

Considerable workshop time was devoted to a blackboard-based presentation by Dave Rosgen on his stream typing system and a discussion of its applicability to the TFW Program.

The following is a summary of some of the points made by Rosgen during projection of slides illustrating different stream types.

- When one "looks at a stream, one must examine the setting, the soils, the landforms, the climate, the ratio of bankfull width to floodplain width (or the degree of channel confinement within valleys).
- A watershed is composed of varied stream segments or reaches that have different characteristics---which are dependent on the valley slope, the confinement, the soils, the vegetation, i.e. the ecosystem.
- You can spend a lot of time trying to figure out how to undo a "restoration."
- Everybody needs to understand what the fishery biologist wants to end up with.
- Vegetation is critical to the morphology of many stream types in terms of their dimensions, their efficiency, their sediment transport capacities...
- We have to understand the response of the system, the pieces that make up the system and how they all fit together.
- Width is related to meander length, width is related to discharge, they vary by stream type.

- There is a certain balance of natural energy dissipation that has to be maintained in a given system---so that we don't knock that balance out.
- When you look at stream classification, the delineative criteria are sinuosity, gradient, soil, landform width-depth ratio, particle size...
- A very small sector of a reach can be very significant. I would not put a width or length function (?) restriction (?) on that which would limit the description of any particular reach. Where you cut it off is professional judgment---based on the purposes of your inventory.
- Conversion from willows to grasses changes the rooting depth and affects the (stream's) susceptibility to lateral adjustment.
- the flatter the gradient, the more sensitive the slope is to changes in material and the width-depth ratio. When you are out there you need to measure these things instead of guessing because they are very sensitive in terms of the measured values.
- There are about eight different meander patterns that you can choose from in subtypes when you want to define them. There are a lot of irregular meanders. There are a lot of cases where this has a real high susceptibility for one reason or another to erosion. You get a high rate at the curvature. (If) this gets far enough over, the next thing you know, you get the cutoff.
- You don't always have that nice symmetrical meander pattern---it varies, depending on the bank stability, a lot of factors.
- Know the watershed, know the history, what is going on, what's the tendency. For example, if the state comes in and says, "We have to put fish habitat structures in here," invariably they put in check structures to get plunge pools.. But what way are they going with the width-depth ratio? The wrong way! That is not the evolutionary direction of the stream..
- Process is process.

- Stream size is what I came up with as a function of width. It is measurable, easily determined, it relates to discharge. Channel patterns associated with meander geometry relates to width and because it is easier to measure, you can back-calculate discharges and things from that, given a certain hydraulic geometry by stream type. I went to this instead of (stream) order because with stream order you can have a B-2, an order 2 or an order 6 stream. Stream order did not help with the morphology...so that (?) is what I use for size as a function of bankfull width.

Does Classification Mean Preservation?

Benda raised the question as to whether the use of a stream classification system such as Rosgen's implied a philosophy of keeping streams in their present condition. He stated:

"You have an underlying philosophy that stability is good. In fact, it might not be that way at all, in terms of an ecological perspective in streams.

"You are saying, 'I have to keep the sediments, I have to keep the bank from eroding, I have to keep the flow within a certain range because I don't want the stream looking totally degraded or the banks totally wrecked. That is what many of us are saying here. I don't think (you have) a basis to say that....'

"I think we might be trying to homogenize the landscape. We see a little sedimentation, a little bank erosion, and the idea is we don't want that. It is messy and it looks bad. But erosion might be the key thing here and so you might want extreme variabilities. You might want to assess what variability means."

Rosgen's response was as follows:

We are not trying to get to homogeneity. This tells you you got nothing but heterogeneity. I am not trying to make this stream look like this or vice versa. What we are talking about is an acceleration, not that we can't live with the

increase in sediments. We do every day. There are certain streams that can tolerate a certain increase and others that can't. What we have to do is bring our observations to bear, our data where it has been collected. The goal is to tell managers---to give them some idea of the risk.

Light later added:

"As I see it, a basis of measurement (is) whether the practices are affecting the fish population. Basically, what we want to do is maintain productivity in a stream. I will argue ecologically that maybe populations are going to take nosedives on their own. I think we will want to keep a handle on that and prevent it."

Loss of Niche Diversity Critical

A pessimistic appraisal of the future of many Northwest streams was expressed by Platts:

I have watched these rivers now for thirty years---I watched them before they were logged, after they were logged, and followed them through time. And they are not coming back. They will never come back.

The reason they are not coming back is that we've lost our niche diversity. The only way you (could) build niche diversity in some of those rivers now is, (to have) a three-to five thousand-year storm---which our chances of seeing are nil. I think the South Fork of the Salmon River is going to have to get hit with at least a five thousand year storm to get its niche diversity back.

Cederholm agreed:

We are seeing that on the coast where areas once were pool-riffle, deep pools, (and) beautiful spawning ripples. (They are) now going intermittent in the summer, basically drying up in the summer because they are overloaded with sediment---cobble-sized, gravel-sized sediment.

They have lost their summer rearing (areas). The (fish) still come into spawn in the winter---what is left of the adults. But the juveniles die in the summer because the pools are drying up. They are filling up with sediment. They are getting overloaded. Like you say, it is going to take a five thousand-year storm---a major geological event to get them back to niche diversity. They are just straight riffles now.