From: [redacted]
Sent: Thursday, June 28, 2012 2:50 PM
To: Wessel, Ann (ECY)
Subject: : Formal Comment on the Proposed Dungeness Water Management Rule

Dr. Robert N. Crittenden
[redacted]

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Regarding: Formal Comment on the Proposed Dungeness Water Management Rule

Dear Ann,

Unfortunately, the comment I submitted on June 27 contained several omissions and errors in writing. I have corrected them, here. I would appreciate it, if, you would substitute this comment as my formal comment in place of my July 27 comment. Thank you.

The Instream Flow Incremental Methodology (IFIM) study that was done on the Dungeness River is one of the main pieces of research that provides the basis for the Dungeness Water Management Rule. However, that methodology has several serious weaknesses. Two of them are concerns here. In this application, it also has a dubious key assumption and there are a couple of flaws in how the sampling was done.

I will address the sampling issues, first, as they are fairly simple.

1. The observations of the river's configuration weren't random samples. They, therefore, can't be used to compute unbiased estimates of the river as a whole.

According to Dr. Hal Beecher's public presentation in Port Angeles, they didn't sample cross-sections of the Dungeness River at random but selected ones that they thought were representative. That is contrary to the principles of scientific sampling and leads to a potential bias.

The general principle involved is, that samples that were drawn at random from a population of possible samples, can be used to estimate the average characteristics of that population. In this case, as they didn't draw their samples at random from the overall river, they can't be used to provide unbiased estimates for the overall river, only for those sections of it that they considered "representative."

If one were to contrast their estimates against estimates based on samples drawn at random from the overall river, you could estimate the bias in their perception of what was "representative." However, that was not done and the configuration of the bed of the Dungeness River has gone through substantial changes since those original samples were taken, so, it is no longer possible to estimate the bias.

2. The configuration of the Dungeness River has changed considerably since those samples were taken. Consequently, they are no longer applicable even if they were when they were taken.

Those changes in the riverbed were primarily caused by a pulse of bed material that moved down the river. It destabilized the river's channel and in many locations, caused it to change its course. That pulse originated in a large mass failure in the Upper Dungeness Valley, during 1980. It is known locally as the "Gold Creek Slide." Only, in the last few years, has the resulting pulse of bed material reached the river-mouth. However, now that it has done so, the riverbed may have once again achieved a relatively stable configuration. It would now be appropriate to remeasure its cross-sections, this time, at random locations along the river. That would provide estimates that might remain reasonably accurate for a period of years. In contrast, the previous measurements probably no longer reflect current conditions in the river.

3. The optimum instream flows need to be recalculated based on new measurements, before the rule is adopted, as it has been a long time since the river's configuration was measured and there have been substantial changes during the intervening period.

Next, I will address the less serious of the two weaknesses of IFIM. That is that it doesn't model the movement of the bed-load. That is something that can only be done to a very limited degree. The approach that IFIM takes, instead, is to only predict the effects of small incremental changes that would not be expected to result in large changes in the river's configuration. However, the methodology also expects the user to observe how the configuration of the river-bed changed in response to whatever was done. The instream flow needs are, then, reassessed using the new set of cross-sections that were measured after the change was made. --- IFIM is a process of making many small changes and re-assessing after each of them. That is why it is called "incremental."

The Water Management Rule may be expected to result in relatively small changes in the discharge of the river. That meets the assumption of there being only small changes. Nevertheless, the cross-sections need to be remeasured and the instream flow needs reassessed, now, as more than twenty years have elapsed since the last cross-sections were sampled, the river's configuration has changed dramatically during those years, there has been significant water conservation during that period, as well as there having been sampling problems in the original study.

The proposed rule has a trigger-level for the re-measurement of the cross-sections, if there is a large change in the river's discharge. That is as it should be, although, one might debate what that trigger-level should be. However, in addition, there should, also, be periodic resampled, because, although, we expect that the planned changes in the river's discharge will only cause relatively small and gradual changes in the river's configuration, other factors that are not accounted for, such as large woody debris or the breaching of bank protection or dikes, can lead to abrupt unexpected changes in the river's configuration.

Now, I will address the more serious of the two weaknesses of IFIM

4. IFIM isn't a scientific method, because, it contains a qualitative element which allows its outcomes to be politically determined. Furthermore, that appears to have happened in this case.

That qualitative element is the selection of the objectives of the study and the species and age compositions of the aquatic organisms for which the flow rates are optimized.

The potential of that qualitative element to have a strong influence over the outcome of an IFIM study are well recognized. For example, Dr. Ken Bovee said in the preface to his 1986 paper (Bovee, Ken D 1986. Development and evaluation of habitat suitability criteria for use in the instream flow incremental

methodology. *Instream flow information paper no. 21*. Washington DC, National Ecology Center, Division of Wildlife and Contaminant Research, Fish and Wildlife Service, US Dept of the Interior.):

"... Experienced users realize that the important decisions relating to biological data are made outside the mechanical operation of the models, and that the outcome of the analysis hinges on assumptions and decisions made long before the models are run."

In the body of the text of that paper, he went on to discuss the importance of properly establishing the study's purpose and objectives, including avoiding any hidden objectives or agendas; and the importance of the selection of the target species and the criteria for their selection.

He also discussed those issues in his 1982 paper (Bovee, Ken D 1982. A guide to stream habitat analysis using the Instream Flow Incremental Methodology. *Instream flow information paper no. 12.*Washington DC, National Ecology Center, Division of Wildlife and Contaminant Research, Fish and Wildlife Service, US Dept of the Interior.)

Those papers, show that he was concerned about the possible use of IFIM to advance hidden agendas or objectives. He undoubtedly was well aware of the existence of intentions that might not be made public in a particular application of that methodology, because, several of them were explicitly stated in the first paper of that series (Lamb, Berton L. and Debra A. Sweetman, (eds.) 1979. Guidelines for preparing expert testimony in water management decisions relating to instream flow issues. *Instream flow information paper no. 1*. Washington DC, National Ecology Center, Division of Wildlife and Contaminant Research, Fish and Wildlife Service, US Dept of the Interior.) They included, among others, the use of the strict control of land-use, as a means for controlling water use; and the control of water rights, as a means from controlling land-use.

I have encountered a fairly widespread belief, among the residents of the Dungeness Valley, that the stated purposes and objectives of the Dungeness Water Management Rule aren't its real purposes and objectives. Many of them believe that it is intended to control land-use, development, and possibly many other aspects of human life. I, too, have reason to believe that it serves objectives other than those that are stated in the proposed rule.

I will, now, address how the IFIM study was conducted, as that sheds some light on what its real objectives may be.

At one WRIA18 meeting, I asked Mr. Brad Caldwell, who had been involved in the IFIM study, why they had focused on providing habitat primarily for Chinook Salmon. His response was that, the Washington State Department of Ecology had instructed them to maximize the instream flow requirements.

Chinook Salmon require higher flow levels than most, if not all other, salmonid species, because, they are adapted to spawning and spending much of their freshwater live in main channels. I should, also, add that, over the last few decades there has only been a very small population of Chinook in the Dungeness River System.

At some point in time, there was also another decision that was made, that was that they should maximize salmonid habitat. Common alternatives would include but are not limited to maximizing habitat for different species of fish, or for a broad range of aquatic species; achieving a balance between fish production and other beneficial uses for the water, such as irrigation for agricultural production; or maximizing other beneficial uses of the water, while still maintaining the minimum flow needed to provide necessary fish habitat.

I should add that most fisheries biologists, today, believe that freshwater habitat isn't the limiting factor in the life-cycle of most salmonid stocks. I will say more about that, later on in this comment.

The above critical decisions (that they should maximize salmonid habitat, instream flow, and focus on Chinook Salmon) don't appear to have been made within the open public process. --- That is precisely the type of issue that Dr. Bovee was concerned about, decisions based on hidden objectives or agendas that effectively determine the outcome of IFIM.

I was present at the WRIA18 meeting when the sub-committee was formed to select the species and age compositions for the IFIM study. Although, I am a PhD fisheries biometrician, have published on salmonid life histories, and had used IFIM, during the 1970s, the members of WRIA18 strongly dissuaded me from attending those sub-committee meetings. The result was that those meetings consisted primarily, if not entirely, of government employees. What I recall is that they represented the Tribe, Department of Fish and Wildlife, and possibly one or more other agencies. As a result, their deliberations and the objectives or agendas they were serving remain unknown to the public, except to the extent that they can be deduced from their actions.

The above qualitative decisions on the objectives and target species, effectively determined the outcome of the IFIM process. The other issues, such as the defects in the sampling methods, are probably of little consequence, in comparison. Nevertheless, redoing the IFIM study remains important, because, those qualitative decisions can be reconsidered, at that time. They need to be reconsidered, so that any hidden objectives and agendas that are not legitimate government objectives can be brought to light and avoided.

5. A key assumption in this application of IFIM, is that salmon are limited by freshwater habitat. However, that assumption is doubtful in general and fails to reflect the conditions in the Dungeness River system, in particular. The result is that the predicted optimum flows, from IFIM, are probably grossly out of proportion to what is necessary or needed.

Regarding the factors limiting salmon abundance, Bob Lohn, the Director of NOAA for the Northwest Region during the mid-1990s, aptly summarized the situation, when he stated that, "Most credible scientists, today, believe that the salmon crisis was caused by ocean conditions, not freshwater habitat."

During the early 1990s, I modeled a sockeye salmon stock in British Columbia (Crittenden R.N. 1994. "A model for the processes regulating recruitment in a sockeye salmon stock." *Ecological Modelling*,71: 69-84). I found that their smolt migration was the bottleneck in their life-cycle. The smolts experienced intense predation by birds and fish but larger smolts could swim faster and were better at avoiding those predators. At that time, the only other study of the full life-cycle of a salmonid stock which achieved statistical significance was the work done by William Ricker on an Oregon Coastal stock, during the 1950s. He also found that the bottleneck occurred during their smolt migration. However, he concluded that the limiting factor was the availability of hiding places, from predators, whereas, I found that their size was the limiting factor.

Other authors have postulated various other possible limiting factors. For example, some think that it may be the availability of near-shore habitat, such as eelgrass beds. However, one has to model the full life-cycle, with statistical significance, in order to demonstrate where the bottleneck occurs but very few studies have done that.

Furthermore, each salmonid stock is adapted to its specific habitat and the various stocks and species show remarkable variation in their life-cycles. Consequently, the fact that, twenty years ago, there were only two stocks for which the limiting factor had been identified and for both of them that occurred during their smolt migration; certainly doesn't demonstrate that that is when the limiting factor occurs for *all* salmonid stocks.

Nevertheless, Bob Lohn's remark about its, not being freshwater habitat, remains accurate, for he made that statement, during the salmon crisis of the 1990s and the low salmon abundance during that period clearly wasn't due to limitation of that factor. That should have been evident to many people. The reason is, that the salmon abundance was reduced in both rivers that had degraded habitat and pristine rivers. --- So, obviously their decline wasn't caused by habitat loss.

In most cases, the management policies of government agencies were what was actually limiting their abundance. I wrote three books on that issue and related topics. (Crittenden, R.N. 1992. *Salmon at Risk,*first edn. Hargrave Publishing, Carlsborg WA. Over the years that followed, that book gradually grew, as I learned more. It went through eight editions. It is now out-of-print. I also wrote two other books on closely related topics. They are *Elite Planners* which does an analysis of the interlocking directorates of the groups and corporations behind the policies that were discussed in *Salmon at Risk;* and in the year 2000, I published, *Politics of Change*, which is a history of Western though, which traces the roots of those agendas back to their origins.) As a result of having written and published around a thousand pages on this topic and related issues, I know many examples and illustrations of how the low salmon abundance was and still is the result of deliberate government policies. I will try to pick a few that tell the story as briefly as possible.

Ocean harvest was one of the main parts of the policies that caused the salmon crisis. As the agencies regulate that harvest, Mr. Lohn's statement remains literally correct, although, it is somewhat deceptive.

In particular, a NOAA study had definitively demonstrated that the West Vancouver Island fishery was the main factor that had depressed the Chinook salmon stocks of Western Washington, before the Canadian American Salmon Interception Treaty of the late 1980s and early 1990s. For that reason, the terms of that treaty specifically included closing that fishery. The effect was that the Chinook stocks in Western Washington recovered, exactly as might be expected.

Freidenburg (M.E. Fraidenburg 1989. The new politics of natural resources: Negotiating a shift towards privatization of natural resource policy making in Washington State. *The Northwest Environmental Journal. 5:211-240.*) recorded how the State Agencies and an environmental group took advantage of that knowledge to influence the beliefs and behavior of the public. Specifically, the environmental group, Long-Live-the-Kings, formed groups of local volunteers and got them to do habitat restoration projects on the rivers of the Olympic Peninsula. The members of those groups didn't know about the interception treaty, they thought that their habitat restoration projects had caused the subsequent increase in salmon abundance. --- That established a pattern that the government agencies would use again-and-again over the years that followed. That approach towards tricking the public by manipulating a part of the salmon life-cycle that the public doesn't see, was even used to influence the instream flow negotiations for the Dungeness River and to mold public opinion about those negotiations and the resulting proposed Water Management Rule.

The Canadian-American Salmon Interception Treaty came to an end, due to the refusal of the State of Alaska to stop the fishermen of the sourthern panhandle from intercepting the Fraser River Sockeye. Then, Canada re-opened the West Vancouver Island fishery. That had its expected effect, and contributed substantially to depressing the salmon stocks from Washington State. I knew Norma Jean Sands, who was the manager of that South-Alaskan fishery, as I had attended graduate school with her. So, when I met her at an American Fisheries Society meeting, I asked her why she let them catch the Canadian fish. She told me that Senator Stevens, the US Senator from Alaska, had told her to. That was why she did it. Later Senator Stevens would be one of the individuals who testified at the hearing that lead to the creation of the "salmon czar." That position eventually took form as the head of the Salmon Recovery Funding Board. That individual eventually controlled much of the funding for the Watershed Councils and WRIAs. --- These events are all interconnected and it is a complicated story.

Later, at the end of the decade of the 1990s and the opening years of the next decade, Canada unilaterally closed the West Vancouver Island fishery. As might be expected, there were good runs of salmon in Washington State. They were record runs. However it is impossible to prove that there was a causal relationship between the fisheries and those large runs, because, there were also changes in ocean condition, those years.

More recently, I attended the impact hearing on the Washington State Hatchery Management Plan at the Jefferson County Library. Only two members of the public attended, myself and another fellow. He asked his questions first and then left. Then, I asked my questions. I explained that I had written a paper in fitting the

Ricker Curve to Salmon spawner-recruit data (Crittenden, R.N. 1994. Optimum Escapement Computed using the Ricker Spawner Recruit Curve. *Fisheries Research*. 20: 215-227). That is a statistical procedure that is necessary, if one intends to do conventional scientific management of salmon. Unfortunately, with the amount and quality of data that were available at that time, the fit of that curve was rarely significant. However, with only a few more years of data, particularly from low abundance years, significance could be achieved. Then, I asked whether they were or planned to depress the salmon abundance to obtain those data. They said, Yes, they were doing that. So, I asked what rivers they were doing it on. They said that there were too many for them to remember. Finally, I asked about two specific rivers, the Samish and the Dungeness. They said, yes, they were doing that on both of them.

The principle ways they depress the salmon stocks is to allow too high a harvest, so that not enough adults return to spawn, or simply by not putting enough eggs into the spawning trays. They also do various things that reduce natural spawning. One example, is placing rootballs from large forest trees and other large woody debris in the Dungeness River, alledgedly to provide habitat. However, during large storm events they are carried downstream and as they go they plow up the riverbed. They destroy any salmon redd they go through. The residents along the river have complained about this, many times. Nevertheless, it probably makes little difference, for there are many ways by which the agencies can depress the salmon stocks.

Regarding the upper part of the Dungeness Watershed, above the hatchery, the reason that there is little spawning there, even though that part of the river is pristine and has a great deal of habitat, is that a number of years ago they racked the river at the hatchery. Their intention was to make the upper river a Coho-only river for sport fishing. When I came to Clallam County in the mid-1990s, that rack was still in the woods behind the hatchery. However, when I looked for it again, more recently, it was no longer there.

The reason that few fish still ever go above the hatchery, even though they no longer rack the river is two-fold. First their abundance is low enough that they find abundant habitat in the lower river and don't need to go any further; and Second, the fish that are raised in the hatchery are imprinted on Canyon Creek water and return to that water source. Canyon Creek is blocked off from salmon except that it provides the water supply for the hatchery. The Department has an acclamation pond in the upper river basin but they don't raise the fish in it long enough for them to imprint on that water, instead.

Nevertheless, not even a month ago, two members of a sport fishing group came by my home and told me that the employees at the hatchery had complained to them that the Tribe was instituting a program to raise salmon from the egg stage in the upper basin. They and the WDFW employees they had talked with wanted that program stopped. --- In fact, that program is something that I have been advocating for several years. I am glad that someone is finally doing it. However, they are not likely to succeed as well as they ought to, unless WDFW allows them to. There are just too many opportunities for the department or their cooperating sport fishermen to eliminate those fish.

The point that I wish to make, is that the salmon stocks in the Dungeness River System are limited by government policies, not by freshwater habitat, and even under natural conditions freshwater habitat is probably not the limiting factor in their life-cycle. In light of these considerations, the estimates from IFIM of the optimum instream flows are probably grossly out of proportion to what is necessary or needed.

Sincerely
Dr. Robert N. Crittenden
June 28, 2012