Northwest Power and Conservation Council

Fish and Wildlife Operations and Power Planning

Fish Four
July 13, 2004
Spokane, WA

Relationship between the Power Plan and the Fish and Wildlife Program

- Council updates its fish and wildlife program before revising the power plan, then

- the amended fish and wildlife program becomes part of the power plan.

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Relationship between the Power Plan and the Fish and Wildlife Program

The power plan is to set forth "a general scheme for implementing conservation measures and developing resources" with "due consideration" for, among other things, "protection, mitigation, and enhancement of fish and wildlife and related spawning grounds and habitat, including sufficient quantities and qualities of flows for successful migration, survival and propagation of anadromous fish."

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Bonneville Power Administration's Responsibilities

Bonneville is to acquire sufficient resources, consistent with the power plan to:

1. meet its contractual obligations for power supply and
2. "assist in meeting the requirements of section 4(h) of the program" – that is, the requirements of the fish and wildlife provisions and program.

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In other words (from the Act's fish and wildlife program provisions) the goal is:

- To ensure the region an "adequate, efficient, economical and reliable" power supply…
- … while at the same time allowing for operations that will adequately "protect, mitigate and enhance" fish and wildlife populations.

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Recent Context
Mainstem Amendments

- Big issue in 2001, right at the time the Council entered into the mainstem amendments -- it appeared that neither the region nor Bonneville had the resources to serve regional loads and provide operations for fish.
- As a result, Council received a number of recommendations regarding power supply, resource development, and power planning in the mainstem amendments.

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2003 Findings
Part of the F&W Amendments

- In the short-term, the region and Bonneville had sufficient resources to meet, without undue threat, both the loads that remained and fish and wildlife operations.
- Council promised that it would take a long-term look at this situation as one of the key issues in the power plan.

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What happened since 2000?

- Lost over 2,000 aMW of demand.
- Gained over 3,000 aMW of new resources.
- Went from about a 4,000 aMW deficit to over 1,000 aMW surplus.

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How the Power Plan addresses this Issue

- The region currently has enough resources to meet power supply needs for some time to come.
- With recommended actions to pursue cost-effective conservation, the region can stave off the cost of new resources and the risk to power supply for a lot longer.
- There should be ample resources to meet electricity demands and to stabilize the delivery of fish and wildlife operations.

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However, there are issues yet to be resolved

- How can we better integrate power considerations into fish and wildlife decisionmaking, and vice versa?
- How can we improve our understanding of the cost impacts and cost effectiveness of specific fish and wildlife operations?
- How can we improve our standards and procedures criteria for addressing inevitable power system emergencies in the future?

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Current Efforts to "Integrate" Fish and Power Planning

- **In Season Operations**
  - Technical Management Team (TMT)
  - Implementation Team (IT)
  - Executive Committee (EC)
- **Long-Term Planning**
  - Council's Fish and Wildlife Program and Power Plan – nowhere else

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Council's Recommendation (2003 F&W Program)

- To improve and broaden the focus of forums created to address issues surrounding fish and wildlife operations…
- in particular, to insert into those forums (that are currently focused on in-season management) a component to deal with longer-term issues.

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Recommendation
(Draft Power Plan)

Acknowledging the dynamic nature of fish and wildlife recovery plans, and the continued research efforts to improve our understanding of biological impacts of mainstem actions, a management or executive level coordination group should be assembled to address issues before the region must react to them in in-season management.

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Objectives for the Planning Forum

1. Determine where to best spend biological research money.
2. Wherever biologically appropriate, choose the least costly operation.
3. Develop a fish-and-wildlife operations curtailment plan, which can be implemented in the event of a power emergency.

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Actions
Council, BPA, Hydro Operators

- Provide analysis regarding physical impacts (river flows and reservoir elevations) and economic impacts (changes in energy production and cost) of alternative mainstem operations for fish and wildlife.
- Wherever appropriate, provide physical and economic analysis for individual components or sets of components of a F&W operation.

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Actions
Council

- Work with the Independent Economic Advisory Board (IEAB) to continue to develop and demonstrate methods to improve the cost effectiveness of the fish and wildlife operations.
- Work with fish and wildlife managers to develop a methodology to assess whether protective mainstem measures are being treated equitably. This may involve establishing some sort of a metric similar to those developed to assess power system reliability.

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Actions
Fish Managers

- Work with power planners and agencies to develop a minimum impact curtailment plan for fish-and-wildlife operations in the event of a power emergency.
- Work with power planners to assure the region that the most cost-effective measures are taken to achieve biological objectives.

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Power Planning and Fish and Wildlife Program Development

Background

The Columbia River Basin hydroelectric system is a limited resource that is unable to completely satisfy the demands of all users under all circumstances. Conflicts often arise that require policy decisions to allocate portions of this resource as equitably as possible. In particular, measures developed to aid fish and wildlife survival often diminish the generating capability of the hydroelectric system. Conversely, "optimizing[1]" the operation of the system to enhance power production can have ~~has~~ detrimental effects on fish survival.

The Council has dual responsibilities to "protect, mitigate and enhance" fish and wildlife populations (affected by the hydroelectric system) while assuring the region "an adequate, efficient, economical and reliable" power supply. Although developed at different times and under different processes, the Council has attempted to use an integrated approach in developing both its fish and wildlife program (program) and the power plan (plan). During the development of the program, physical and economic impacts of each fish and wildlife measure affecting the operation of the hydroelectric system were assessed and considered before final adoption of the program. In the current effort to produce the Fifth Northwest Power Plan, the Council assumes that measures in the program will be implemented. Strategies for new resource and conservation development incorporate the relationship between non-hydro resources and the operation of the hydroelectric system, which include measures for fish and wildlife.

It is not possible in the context of this power plan to compare on an equivalent basis the power system costs and benefits of specific fish operations or deviations from those operations with the corresponding biological costs and benefits. The Council in its fish and wildlife program has recommended that fish measures be examined for their cost-effectiveness. The program dictates that if the same biological objectives can be met at less cost, those less costly means should be pursued.

Outside of the Council, however, no clear process exists for integrated long-term planning for both fish and power. Under the Endangered Species Act (ESA), NOAA Fisheries and the U.S. Fish and Wildlife Service share the responsibility to assess the status of listed species and to develop a recovery plan, often referred to as a biological opinion. Language in the ESA specifies that economic impacts should not play a role in the development of the biological opinion. This has led to some costly measures that arguably provide marginal biological benefits. In particular, the question of summer bypass spill for juvenile migrants has been fiercely debated over the past several years.

As a practical matter, federal agencies have formed several committees through the biological opinion process to deal with in-season operational issues affecting fish and power. The Technical Management Team (TMT) consists of technical staff from both federal and non-

[1] "Optimizing" here means that energy production is maximized, limited by other than fish and wildlife constraints, such as flood control, irrigation, navigation, etc.

federal agencies that usually meet on a weekly basis to assess the operation of the hydroelectric system. Requests for variations to those operations can be made and discussed at TMT meetings. Conflicts that cannot be resolved at the technical meetings are passed on to the Implementation Team (IT), which consists of higher policy-level staff. Impasses not resolved by this group are forwarded to the Executive Committee (EC), made up of executive staff from the various participating organizations. The process of resolving conflicts in proposed hydroelectric operations can sometimes be lengthy and cumbersome.

Recommendation -- Better Integration of Planning Efforts

While the existing committee structure is intended to ~~can usually~~ solve in-season problems, no currently active process exists to address long-term planning issues. The Council recommended in its 2000 program that both in-season and annual decision-making forums be improved.[2] The program states "at present, this decision structure is insufficient to integrate fish and power considerations in a timely, objective and effective way." It goes on to recommend that the forums should broaden their focus by including "expertise in both biological and power system issues" and by directly addressing longer-term planning concerns, not just weekly and in-season issues.

It is in such a forum where the long-term physical, economic and biological impacts of a fish and wildlife operation can be openly discussed and debated. Actions identified in the program to benefit fish and wildlife "should also consider and minimize impacts to the Columbia basin hydropower system if at all possible." The program further says that the goal should be "to try to optimize both values to the greatest degree possible."

To this end, the Council reiterates its recommendation in the 2003 program to improve and broaden the focus of the forums created to address issues surrounding fish and wildlife operations, especially those related to long-term planning.

Limits on Integration

Given the high level of uncertainty surrounding the biological benefits of some fish and wildlife measures, ~~current status of biological information and considering the irresolvable task of assigning a dollar value to preserving salmon runs,~~ a total integration of power and fish-and-wildlife planning is impossible. However, that does not mean that these processes ~~must be~~are best done independently of each other. Power system planners can provide valuable information to fish and wildlife managers to aid their development of measures to improve survival. Similarly, fish and wildlife managers can provide data to power planners so that they can plan for resource mixes that minimize impacts to fish and wildlife, whenever possible.

Biologists developing a fish and wildlife program must be able to assess relationships between various physical parameters and survival. For example, river flows, water temperature, passage routes (turbines, bypass or barges), predation, ocean conditions and a host of other factors all affect survival and long-term population forecasts for salmon. Based on these relationships, biologists can make recommendations regarding those elements that can be controlled, such as

[2] "Fish and Wildlife Program," Northwest Power Planning Council, Council Document 2000-19, pp.28, and "Mainstem Amendments to the Columbia River Basin Fish and Wildlife Program," Northwest Power Planning Council, Council Document 2003-11, pp.28-29.

the operation of the hydroelectric system. Any changes to the operation of the hydroelectric system will result in differences in reservoir elevations, river flows, energy production and cost.

Using sophisticated computer models that simulate the operation of the Northwest power system, power planners can assess the impacts of any given set of fish and wildlife measures that change the operation of the hydroelectric system. For a fish and wildlife program and, in particular, for individual elements of that program, physical impacts (effects on reservoir elevations and on river flows) and economic impacts (changes in generation production and related cost) can be analyzed and provided to fish and wildlife managers.

Changes in reservoir elevations, river flows and spill are used, along with other data, by biologists to estimate fish passage survival through the system. Passage survival estimates are an important part of life-cycle models, which are used to forecast long-term fish populations. Long-term population estimates, along with their corresponding uncertainties, will determine whether certain species are well off, stable or declining. ~~So, i~~In this sense, physical analysis by power planners plays a very important role in the development of a fish and wildlife program.

Economic data should also be very important to biologists. There will always be a need to refine our understanding of the relationships between survival and changes in the physical environment. Unfortunately, there is never sufficient research money to perform all desired experiments and tests. By knowing how much individual measures in a fish and wildlife program cost, biologists will have a better idea of how to spend limited research money. Measures that are most costly and have large uncertainties surrounding their biological benefits would make the best candidates for research money.

In addition to aiding biologists to spend research money more effectively, economic data can be used to reduce the total cost of a fish and wildlife program. In cases where two different measures provide the same biological result, it makes sense to implement the least costly operation. Practically speaking such decisions are rarely simple to make because of the uncertainty surrounding biological benefits. However, just as power planners are obliged to provide an adequate power supply at the lowest cost, it seems appropriate that biologists should at least attempt to develop the least-cost program that achieves their biological objectives.

Economic impacts of fish and wildlife measures also help biologists in other ways. The biological opinion contains specific language that allows for curtailment of fish and wildlife operations in the event of a power emergency. Such an event occurred in 2001 that was severe enough to result in most bypass spill being curtailed (more on that subject in the following section). Had that event not been so severe, necessitating the need to curtail only some operations, the region would have had to scramble to determine which measures to curtail. To avoid such a situation in the future, an emergency curtailment policy should be established. Having cost and biological impacts for individual measures allows biologists to prepare such a policy and have it in place prior to a power emergency.

Appendix ? provides more background information regarding those elements of the fish and wildlife program that affect the operation of the hydroelectric system and their impacts to the power system.

Other Considerations

As the years of 2000 and 2001 unfolded, analyses by the Council and others indicated that fully implementing the 2000 Biological Opinion (BiOp) mainstem hydroelectric operations in 2001 was likely to compromise power system reliability. This was due to very dry conditions in that year and the basic state of the power supply in the Northwest and in the rest of the Western interconnected system. Allowances in the BiOp, however, permit the curtailment of fish and wildlife operations during power emergencies. The Bonneville Power Administration (Bonneville) declared a power emergency in that year based on the water supply and the lack of available generation on the market. Decisions were made to severely reduce bypass spill during the spring and summer months in order to ensure adequate supplies of power and to manage the economic impact of the high market prices. This action initiated a regional debate regarding the additional risk placed on endangered or threatened fish and what measures could be taken to avoid or reduce the likelihood of such events occurring in the future.[3]

In our society, money usually is the common denominator. The dollar value of power operations is easily quantifiable whereas the dollar value of fish recovery is much harder to quantify. This is due to the high level of uncertainty ~~, both in terms of the uncertainty~~ regarding the biological ~~impact~~ benefits of certain power system actions and the difficulty of reducing those benefits to the common denominator of dollars. ~~and the ability to compare the biological impacts with power system impacts in comparable terms.~~ There will always be significant financial incentives to deviate from prescribed fish operations when power supplies become tight and prices soar, especially if supporting biological data has a high range of uncertainty. The concern is that fish and wildlife survival may be inadvertently jeopardized for financial reasons, using the "power emergency" section of the BiOp as a surrogate to building a reliable and economic power system.

Reliability and cost are directly related. In the Northwest, electric utility planners have relied on the inherently large capacity of the hydroelectric system to keep costs low while maintaining a high level of reliability. Because the BiOp language allows for curtailment of fish and wildlife operations during emergencies, it implies that fish and wildlife measures will not be implemented at "all costs." It does not, however, imply that fish and wildlife operations can be used in lieu of developing an adequate power supply. With this in mind, it may be appropriate for the region to consider developing a metric to quantitatively assess how successful the power system is in providing operations for fish and wildlife (or conversely, a metric to assess how often those operations would be curtailed due to power emergencies).

Ultimately, an adequate power supply also adequately provides for fish and wildlife operations. Determining that we have an adequate power supply means analyzing how often that supply is insufficient. This is tabulated in a metric commonly referred to as a loss of load probability (LOLP). Perhaps a similar type of metric can be developed to assess the likelihood of failures to provide fish and wildlife operations. The Council has attempted to develop such a metric but found that the uncertainties surrounding biological benefits of fish and wildlife measures rendered it virtually impossible to assess a clear and acceptable standard. Whether a metric is developed or not, however, the Council has the responsibility to assure the region that its power

[3] See the Council's account of the events of 2000-01. [Put link or reference here.]

plan~~s~~ will provide both an adequate power supply and that it will adequately provide operations to protect fish and wildlife ~~adequately~~.