

Recommendations and Guidance for Economic Analysis in Subbasin Planning

Independent Economic Analysis Board

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Summary

Subbasin planning may need to consider two types of economic issues; 1) economic impacts, and 2) cost-effectiveness. This paper provides general guidance to help planners identify when economic analysis is required, what level of detail is appropriate, and how to conduct both types of analysis and present results.

As a practical matter, economic impact analysis may be required to address concerns of stakeholders that will be identified during the public involvement process. Subbasin strategies and projects should be designed to minimize or avoid adverse impacts.

Unavoidable negative impacts may be addressed by direct payments or other program elements that compensate those adversely affected, while beneficial impacts may provide a basis for sharing program costs with those enjoying the benefits.

Cost-effectiveness analysis is required by the Pacific Northwest Electric Power Planning and Conservation Act (the Regional Act). Planners should consider cost-effectiveness for local strategies or projects that are alternative means to the same biological objective.

Also, planners should provide information on the physical or biological benefits, and the economic costs, of all strategies or projects. This information is needed for cost-effectiveness analysis at the regional level.

Introduction

The Pacific Northwest Electric Power Planning and Conservation Act (the Regional Act), created the Northwest Power Planning Council (the Council), and directed the Council to consider fish and wildlife mitigation and enhancement on a equal basis with hydroelectric power generation in the operation of the Federal Columbia River Power System. The Fish and Wildlife Program must be consistent with an adequate, efficient, economical, and reliable power supply for the region. In particular, fish and wildlife measures must

“utilize, where equally effective alternative means of achieving the same sound biological objective exist, the alternative with the minimum economic cost.”¹

Subbasin planning is intended to achieve a comprehensive, integrated and scientifically sound fish and wildlife program through locally-developed plans, broad participation, and coordination with federal, State and local laws. A subbasin plan includes three parts: 1) an inventory of existing programs, activities and plans, 2) an assessment to determine the biological potential and opportunities for restoration, and 3) a management plan including a vision, biological objectives, and strategies.

The Council has suggested that economic considerations have a role in the planning process. *Subbasin Planning 101* states that "The management plan. . . takes into account the economic, legal and environmental issues." The *Technical Guide for Subbasin Planners* states that "The strategies, taken as a package, will represent alternatives that stakeholders should use as a tool to evaluate as part of the planning process. Economic, political, social and cultural aspects should be taken into account when evaluating the alternatives. From this evaluation, projects designed to address the strategies and the limiting factors would be proposed for funding."

The Independent Economic Analysis Board (IEAB) was chartered to assist the Council with cost-effectiveness and other economic analysis related to the Fish and Wildlife Program. The IEAB has been monitoring the progress of the subbasin planning effort, has met with planners, and has reviewed planning documents. Based on this information, the IEAB is providing this guidance to help planners deal with two economic issues that should be addressed by the subbasin planning process.

1. The identification, measurement, and planning for adverse and positive economic impacts. Public involvement will help the planners identify potential economic impacts. The planning process must be prepared to suggest strategies that will avoid or diminish adverse impacts. Adverse economic impacts may imply additional costs in the form of offsetting payments, but beneficial impacts may allow cost sharing. These costs and cost-sharing may be considerations in a cost-effectiveness analysis.
2. The cost-effectiveness of fish and wildlife strategies and programs. Cost-effectiveness analysis ensures that ratepayers will obtain the most “bang for the buck.” Cost-effectiveness analysis should be included in the subbasin planning process when alternative means of achieving the same objective are being considered.

Also, cost-effectiveness analysis will be required at the regional level to prioritize projects across subbasins. This regional analysis will not be conducted by subbasin planners. However, if specific projects are proposed, information about biological and physical benefits and costs should be collected and displayed.

¹ 16 U.S.C. § 839b(h)(6)(C)

Planning for Economic Impacts

A subbasin planning effort should be prepared to accommodate economic concerns that might derail the process. Stakeholders will be affected by the strategies proposed by subbasin plans, and the feasibility of implementing a subbasin plan will be affected by how people respond to it. Cooperation with stakeholders will be needed to develop, fund and implement a subbasin plan. Cooperation may require that strategies be implemented in a manner that will avoid stakeholder costs, and unavoidable impacts may require payments to persons who are harmed. On the other hand, economic benefits for some stakeholders might justify cost sharing, or these benefits might offset some other adverse economic effects.

Economic impacts should be scoped during the public involvement process

Stakeholders include residents of the subbasin and non-residents who are affected by subbasin strategies or projects. That is, “stakeholders” include affected business owners or workers, consumers, other resource users, or any other persons affected by the subbasin plan, regardless of where they live. Economic benefits or costs may extend far beyond the subbasin.

Adverse and beneficial economic impacts can be identified during the public involvement process. Subbasin planners should work with stakeholders to understand how fish and wildlife strategies affect their interests, and how objectives might be achieved with less adverse economic impact. At the same time, planners should recognize that stakeholder preferences will not necessarily yield cost-effective results. Alternative projects or strategies should not be rejected early in the process just because some stakeholders do not like them. Planners should evaluate a full range of alternatives for achieving fish and wildlife objectives.

The IEAB recommends that the Assessment section of each subbasin plan briefly describe the relationships between stakeholders and the potentially affected natural resources, including the economic dimension of these relationships.

A short qualitative description of economic, demographic, social and cultural conditions should be included in the assessment. This description should demonstrate concern for the human dimension of fish and wildlife planning, and should provide useful background information for consideration in the management plan.

The description should include an identification of prominent economic activities in the subbasin, connections to natural resources, and levels of related income and employment. For example, industries such as agriculture, forestry, mining, and tourism should be discussed if they might be affected. The amount of wages and salaries paid and net returns should be described if possible.² Resource uses including outdoor recreation, fishing, hunting, and gathering, as well as aesthetics and quality of life considerations

² Information might be provided by the affected industry, or data might be obtained from other sources. For example, detailed budgets for agricultural operations are produced by the Cooperative Extension Service.

should be revealed. Significant cultural relationships to natural resources should be described.

Economic linkages between the subbasin and the Pacific Northwest region should be identified. These linkages may involve economic trade or physical linkages. Economic trade includes export of products from the subbasin, and tourism. Physical linkages may include anadromous fish production, hydrology, and/or water quality. This information will help the Council consider cost-effectiveness relationships at the Regional level.

The IEAB recommends that each management plan include a general description of the adverse and beneficial economic impacts. More detailed analysis, including quantitative analysis, may be justified if specific projects are proposed.

This description should:

- 1) Identify relationships between stakeholders and the management plan. Describe how actions in the management plan will affect these interests;
- 2) Describe how actions can be implemented to minimize adverse impacts.
- 3) Describe adverse economic effects that can not be avoided;
- 4) Describe strategies for offsetting payments and/or cost-sharing, including who would be paid and the impacts on their economic incentives;
- 5) Describe impacts of management plan actions on the larger, Pacific Northwest region.

Often, adverse economic effects involve reduced productivity in agriculture or other natural resource industries. Reduced productivity means that the industry provides the same amount of output for higher cost, or less output for the same cost.

Strategy development should consider and reduce adverse stakeholder impacts while achieving beneficial improvements for fish and wildlife. Subbasin plans should include proposals to compensate those who suffer adverse economic impacts either through direct payments or countervailing benefits from other program elements. Cost-sharing with stakeholders who benefit from the plan should be included where feasible.

Knowledge of the adverse and positive effects of project alternatives on stakeholders should help the subbasin planners and decision makers craft an overall plan that includes actions to reduce the adverse economic effects. The management plan should identify groups of persons who will incur economic losses or costs, and identify groups who benefit. Where economic costs are substantial, despite efforts to mitigate for them, the management plan should include proposals to compensate those who are harmed. This could be accomplished through direct payments for land, water rights, or conservation easements, for example.

The IEAB recognizes that this guidance does not provide the detail needed to conduct quantitative analysis to support a subbasin budget. This level of detail is not required for a subbasin plan. Rather, management plan strategies should provide the level of detail needed to accommodate the economic concerns of stakeholders in a general way. If additional detail is needed, the IEAB can assist local planners with economic methods that might be applied.

Table 1 provides a table that can be used to describe adverse or beneficial economic impacts and related plans. This table and table 2 are offered as illustrations. Table formats might be modified or not used at all if the information is presented in a different, succinct format.

Cost-Effectiveness Analysis

The IEAB recommends that the management plan include a short section on cost-effectiveness analysis. This section should identify alternative projects or strategies that could achieve the same result. Cost-effectiveness analysis may be justified for these projects if the results and costs can be measured, and if the costs are large enough to justify the additional analysis.

Cost-effectiveness analysis is appropriate for alternative actions that 1) produce the same or similar type of output³, 2) have costs and output that can be measured or reasonably estimated, and 3) have costs large enough to justify the additional analysis. When specific actions or projects that meet these criteria are being considered, a reasonable attempt should be made to collect information for cost-effectiveness analysis. Some subbasin analysis and results may need to be qualitative.

Cost-effectiveness analysis can be used to compare two or more alternative projects when the projects have the same type of output. Quantitative cost-effectiveness analysis typically requires two measures: cost, and the result in terms of output. The result is usually measured in quantitative terms; fish or habitat units, for example, but the result need not be quantitative. For example, the result could be a simple affirmative (a yes or no) for meeting a goal, e.g., recovery.

There are two general types of cost-effectiveness analysis. In Type 1, the problem is to select a cost-effective set of actions or projects from many. In Type 2, the problem is to select one cost-effective action from many.

In Type 1, a number of actions that achieve progress towards an objective are available, but not all actions need be or can be implemented. The objectives may be reached with a subset of the actions, or a limited budget may preclude taking all feasible actions. In this case, the unit costs of actions should be calculated and those that achieve the objective for the least cost are, by definition, the most cost-effective.

³ “Similar” is added here because it is up to the Council, not the subbasin planners, to decide what actions might contribute to the “same purpose”. Thus, the subbasin plans should provide information about “similar” purposes to the Council to help them make such decisions.

For example, suppose a number of habitat projects have the same objective of wild steelhead recovery. If there are estimates for numbers of steelhead for each project, then the cost-effectiveness analysis should use this measure. If not, then a surrogate such as habitat units might be used.

First, the costs of each project per fish or per habitat unit should be calculated for each project being considered. These are called unit costs. Next, the projects should be arrayed in ascending order of unit costs. The cumulative cost of projects and the cumulative amount of output should be calculated as each project is added to the cost-effective set.

Finally, if there is a quantified dollar budget or a quantified objective, a cost-effectiveness decision can be made. If there is a fixed budget, projects are selected in order of increasing unit cost until the budget is exhausted. The cumulative amount of output is the most that can possibly be achieved within the limited budget. If there is a fixed objective, projects are selected until the objective is met, and the cumulative cost is the least possible cost for achieving the objective.

This description of a Type 1 analysis has presumed that the actions (projects) are independent in that the total amount of output can be calculated as the sum of all. This may not be the case if projects are interactive. If they are interactive, the amount of output or the cost for each project depends on which others are included in the mix. If this is the case, a Type 1 analysis is still possible, but the unit costs of each project taken alone are meaningless. The cost-effectiveness analysis must compare and select from a number of sets of actions. The total cost and output are calculated for each set, and the cost-effective set can be selected.

In the Type 2 cost-effectiveness problem, planners must select just one action, because selecting one action precludes any other from being selected. This type of problem occurs when a unique resource can only be used for one purpose. If it is dedicated to one use, it cannot be used for any other.

For example, a number of alternative hatchery plans for one site are being contemplated, and all would produce about the same number of fall chinook. In this case, cost-effectiveness is used to determine which hatchery plan for the site will provide the most fall chinook per dollar. The cost and output are calculated for each hatchery plan, and the cost-effectiveness decision selects that plan with the lowest unit cost.

Note that, for the Type 2 analysis, there is no issue about how multiple actions may interact, because no two actions can be taken together. However, if there is a fixed budget or production objective, there can be ambiguities about which action is the best. For example, a hatchery plan with a higher unit cost might produce more fish to meet a more important production goal, or the plan with the lowest unit cost might not meet a budget constraint. Still, the costs and production for each alternative plan should be compared where possible.

For the management plan, the cost-effectiveness section should:

- Provide measures of costs and output.
- Identify sets of actions for which cost-effectiveness analysis might apply (e.g. alternative ways of obtaining the same goal or output). For each set, describe outputs and costs in qualitative and quantitative terms, to the extent possible.
- Conduct cost-effectiveness analysis if output and cost measures are available and reasonably accurate, and if the cost of the analysis is justified by potential cost-savings.⁴
- If no accurate measures are available, describe the reasons for the lack of information. Provide a qualitative description of cost-effectiveness relationships. Describe how cost and output forecasts might be improved.

Table 2 provides a format that can be used to describe subbasin cost-effectiveness considerations.

The Council may need to prioritize projects according to their cost effectiveness for meeting regional goals and objectives, and subbasin projects may be compared to mainstem actions. Therefore, subbasin planners should provide information on biological and physical benefits and economic costs of all subbasin strategies and projects for use in cost-effectiveness analysis at the regional level.

The subbasin management plan should provide information on costs and physical or biological benefits of all proposed strategies and any specific projects. If such information can not be provided, the management plan should state why. Any additional work needed to develop cost and effectiveness data should be described.

⁴ Cost data from budgets for the proposed action should be used when available. If these data are not available, cost data might be obtained for the same or similar practices from secondary sources. For example, the Natural Resources Conservation Service keeps information on the costs of many actions that might be used for habitat restoration.

Table 1.
Table for Summarizing Economic Impact Information for Subbasin Planning

For each strategy likely to have a beneficial or adverse impact

[illegible]

Table 2.

Table for Summarizing Cost-Effectiveness Information for Subbasin Planning.

One table for each group of actions that are alternative means to accomplish the same purpose.

The purpose of these actions is: _____

Action Number (at least two)	Action Name	Measure of Accomplishment (Units)	Amount of Units Produced	If Accomplishment Cannot be Measured, Give Qualitative Description	Total Cost of the Action (Dollars)	Cost per Unit Produced (Dollars)	Selected as Part of Subbasin Plan? (Y/N)	Briefly explain rationale for selection of options whether cost-effective or not