5.2.4 Context and Intensity of Policy Directions

Throughout the section above, we have described the role of context and intensity for each environmental consequence. The following tables are offered to help understand how context and intensity work with the Policy Directions evaluated in this EIS.

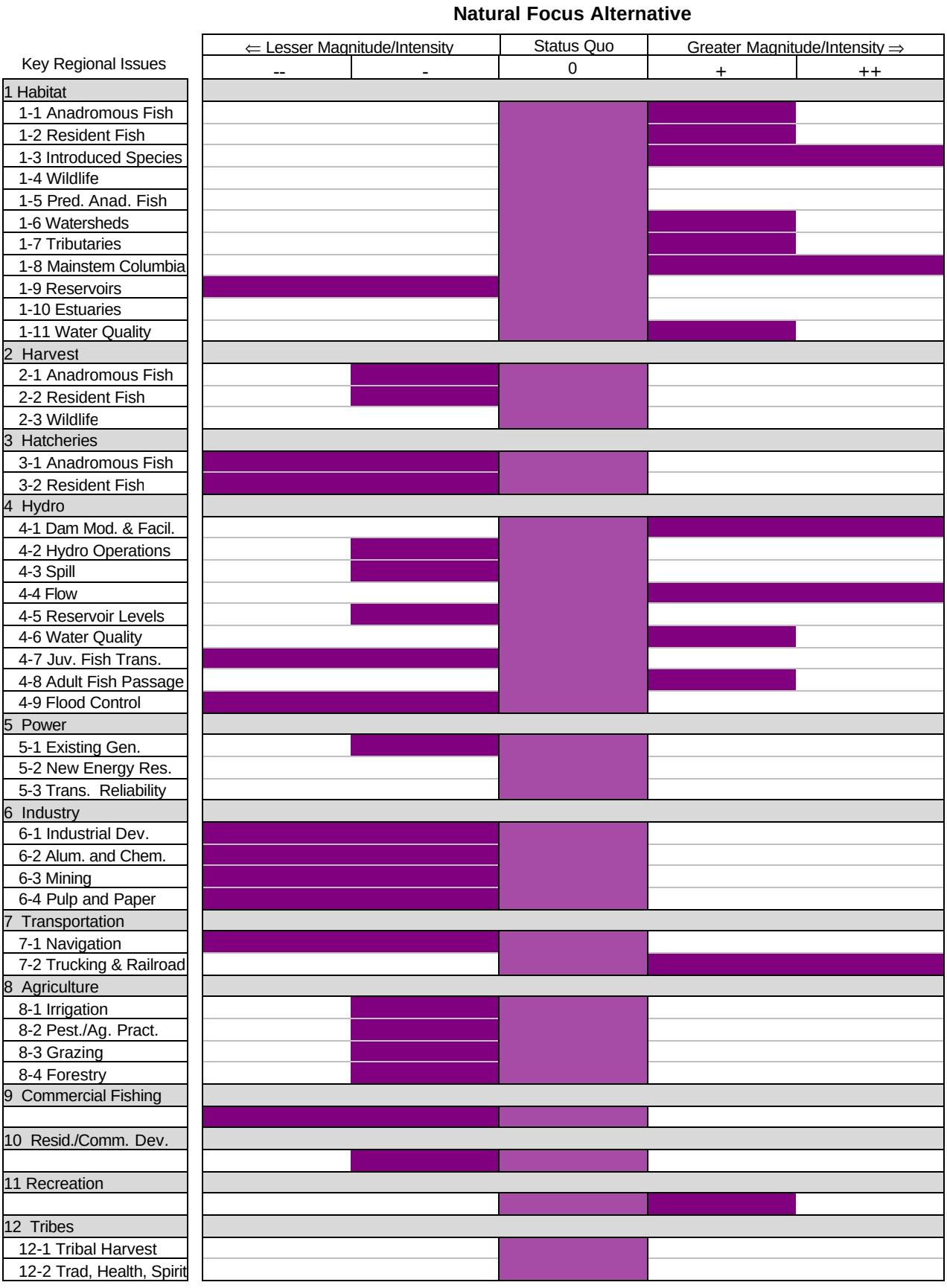
- **Context:** How each of the alternative Policy Directions varies from the Status Quo in addressing the Key Regional Issues (context).

- **Intensity:** The relative deviations in terms of the possible shift in fish and wildlife activity levels from Status Quo.

The reader should recognize that comparisons of this nature are *conceptual*: actual implementation plans for actions under each alternative have not yet been fully determined.

On an issue-by-issue basis, the alternative Policy Directions typically will overlap with Status Quo. However, they will deviate in the magnitude and intensity of activities and actions: that is, there will be more or less emphasis on individual categories of actions, depending on the Policy Direction's philosophy and focus. Deviation is expressed as the projected amount of activity or shift in policy direction as Key Regional Issues are emphasized or de-emphasized during program implementation. The portrayal of these relationships is for a visual aid and is only a qualitative judgment.

Figure 5-21: Projected Deviation of Proposed Natural Focus Policy Direction from Status Quo (No Action)[1]



[1] Deviation is expressed as the projected amount of activity or shift in Policy Direction from Status Quo to address Key Regional Issues.

Figure 5-22: Projected Deviation of Proposed Weak Stock Focus Policy Direction from Status Quo (No Action)

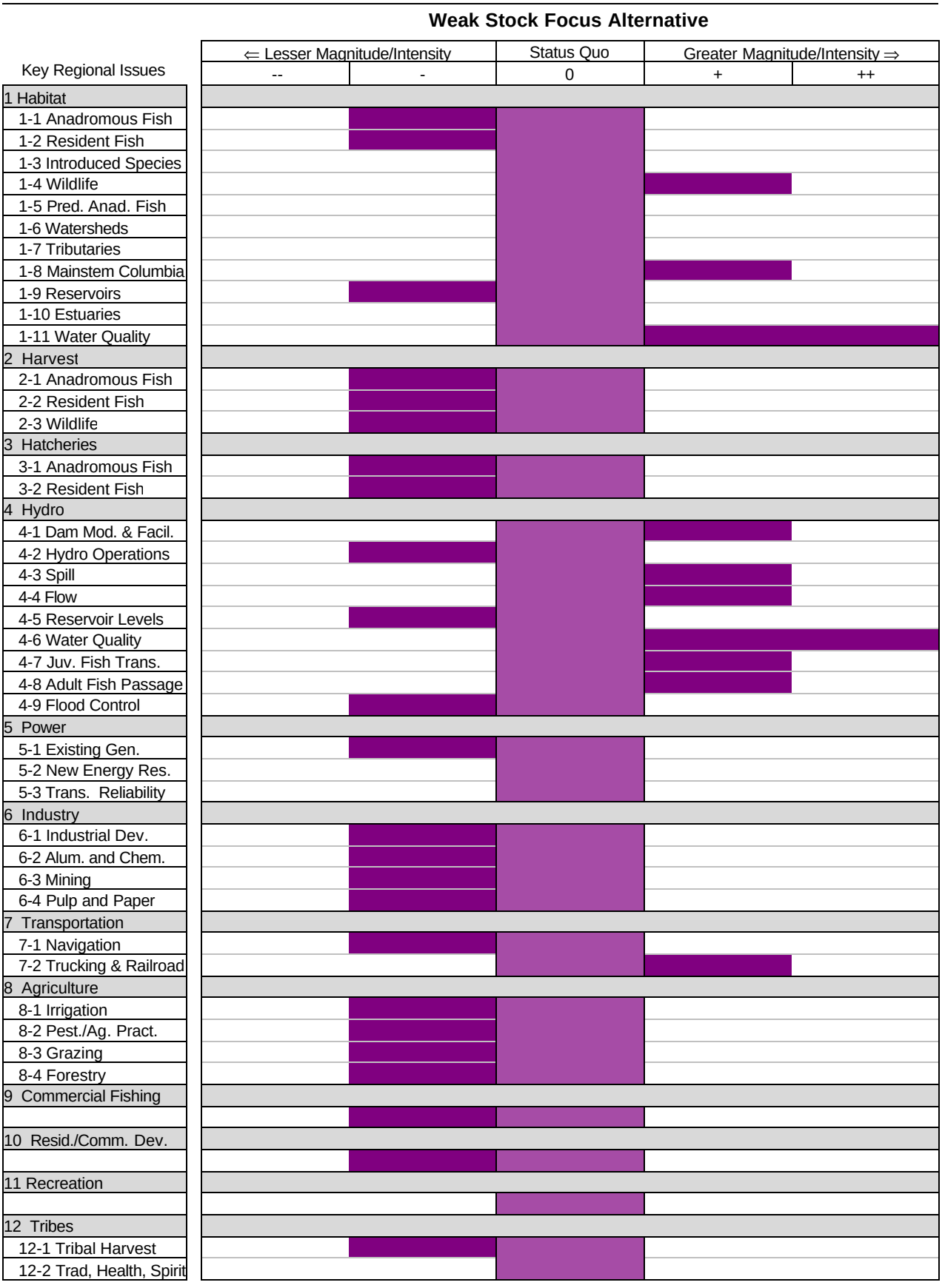


Figure 5-23: Projected Deviation of Proposed Sustainable Use Focus Policy Direction from Status Quo (No Action)

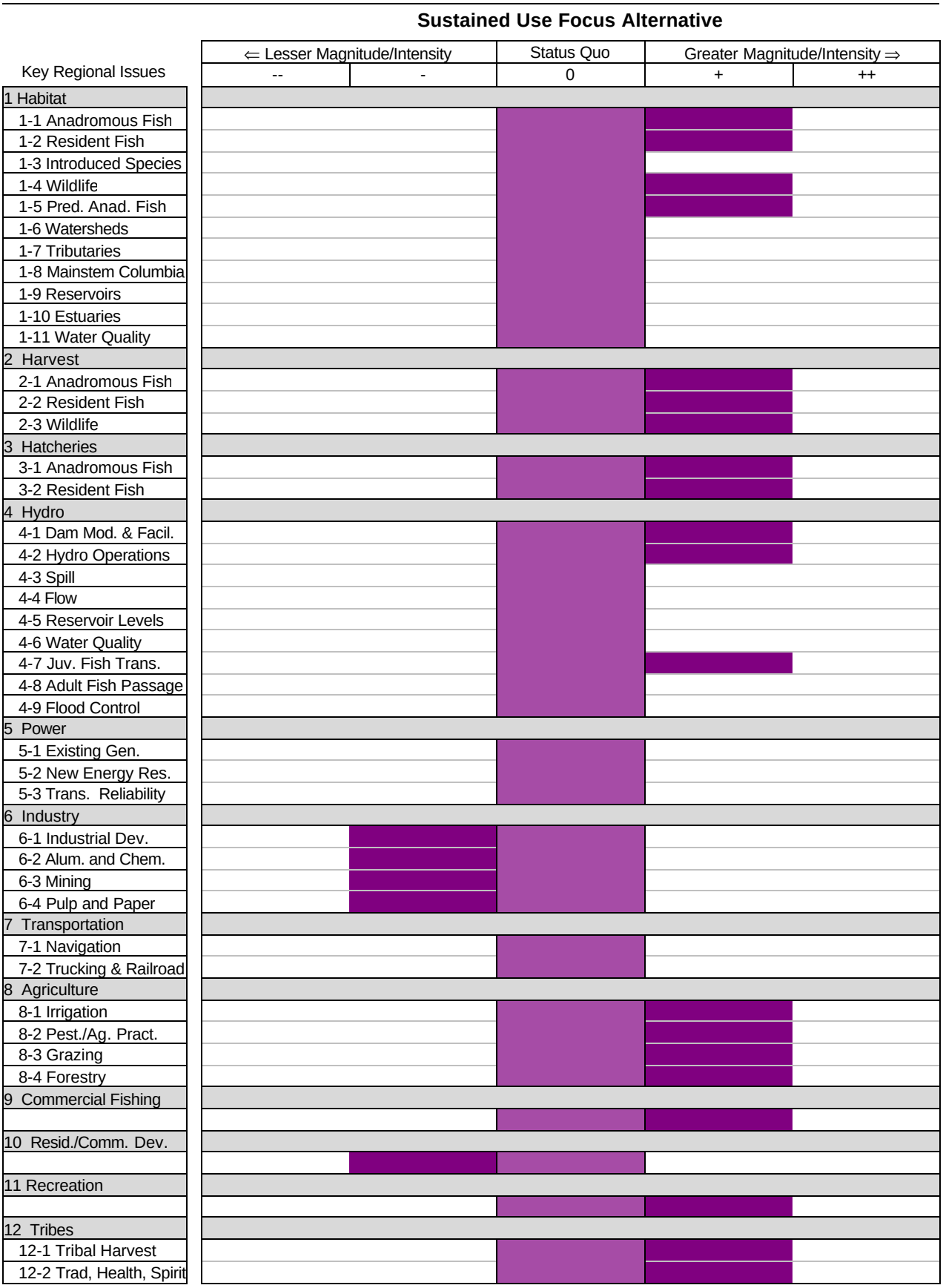


Figure 5-24: Projected Deviation of Proposed Strong Stock Focus Policy Direction from Status Quo (No Action)

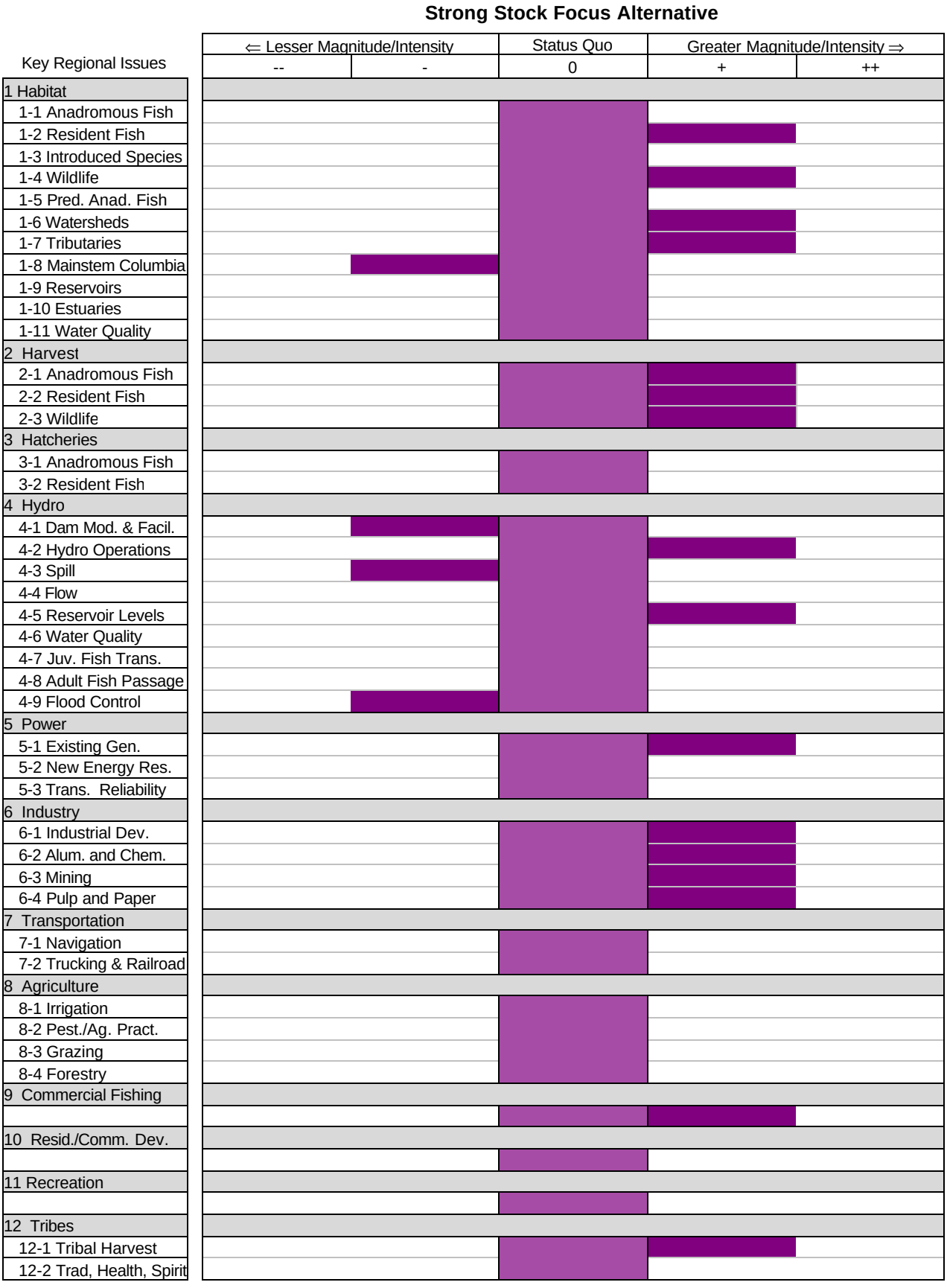
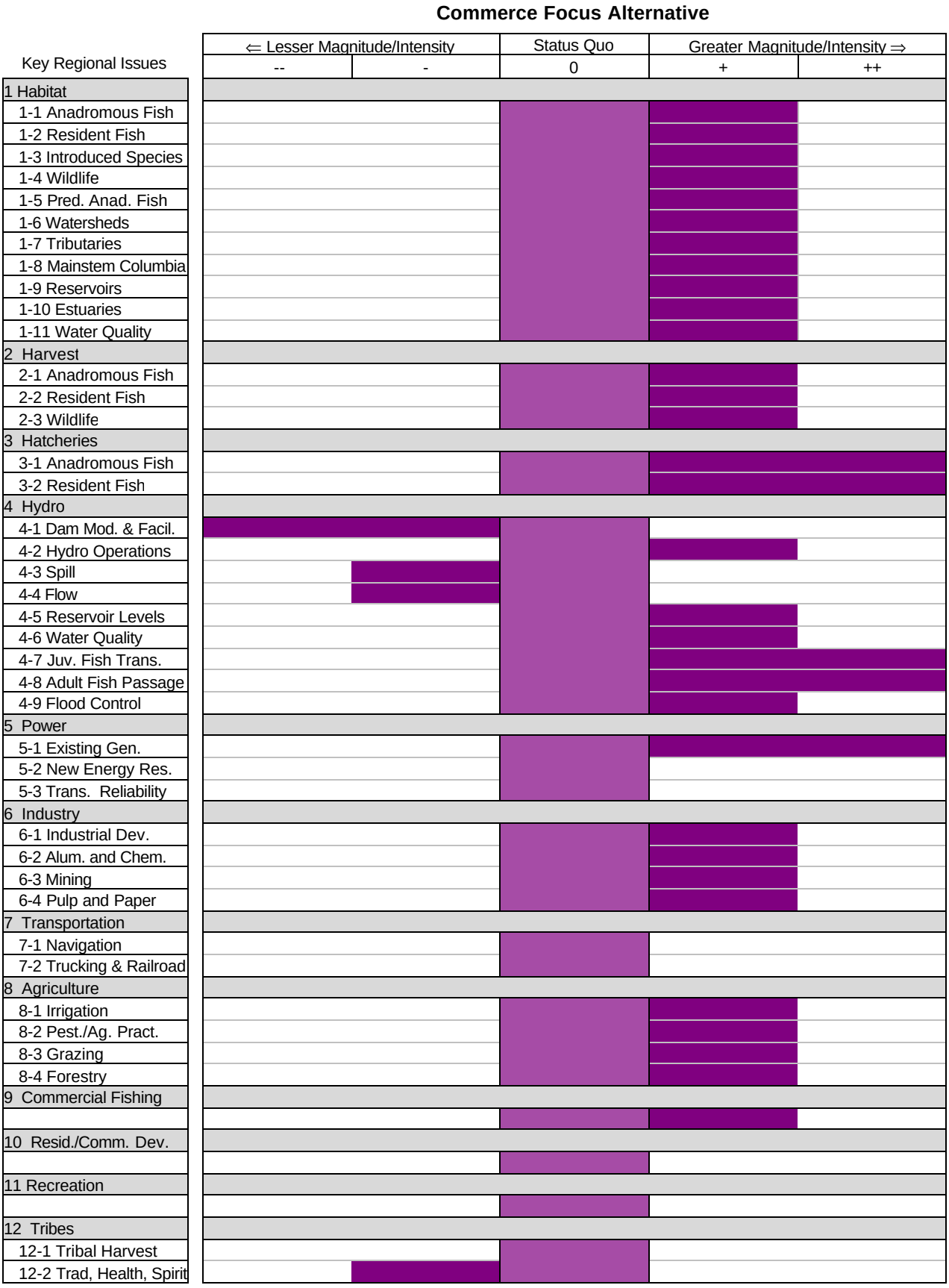


Figure 5-25: Projected Deviation of Proposed Commerce Focus Policy Direction from Status Quo (No Action)



5.3 ENVIRONMENTAL CONSEQUENCES OF POLICY DIRECTIONS

With the information from Section 5.2 in mind—the potential environmental consequences of human activities as they relate to both fish and wildlife and to socioeconomic factors—we can now turn to the environmental consequences of implementing actions as they fall under each of the five Policy Directions. These environmental consequences result from the interactions of humans, fish, and wildlife, and the implementing actions.

The Status Quo Policy Direction (the "No Action" alternative) provides the baseline against which the other Policy Directions are compared. Status Quo represents the future if current policies are not changed. This future includes, among other important attributes, increasing human population, additional urbanization, continued ocean and tribal harvest, the existing hydrosystem with currently planned improvements, and existing fish and wildlife recovery and mitigation program efforts.

Fundamental areas of environmental consequences are *air, land, water, fish and wildlife, and social and economic effects.* This section addresses the general nature of the effects in each of these fundamental areas. Each section below will provide the following:

- an illustration of the anticipated environmental effect compared to environmental conditions in the Status Quo Policy Direction; and
- a brief description of why the effect occurs in relationship to conditions under the Status Quo Policy Direction.

First, environmental conditions under each Policy Direction are compared to environmental conditions in the Status Quo Policy Direction in a graphic format. The effects illustrated in the graphics are based on long-term effects (10 years or more). Major short-term effects are noted below the tables. Short-term effects will be examined in greater detail in future project-specific tiered RODs.

Shading is used to quickly show the reader whether the Policy Direction results in *more adverse, the same, or more favorable conditions* relative to the Status Quo policy. The ratings were assigned through a modified Delphi process using a panel of experts. [35] "Adverse" "same" or "favorable" are defined with respect to a particular perspective, either that of fish and wildlife, or human. The human perspective is meant to capture the human concerns—health, economic and social—that are beyond and separate from the human interest in fish and wildlife.

Environmental conditions under the Status Quo Policy Direction are briefly described, and other Policy Directions are compared to the Status Quo. The objective of this analysis is to describe the expected environmental conditions under the possible range of

[35] Charles Alton, Roger Mann, Steve Mader, John Pizzimenti, Jean Edwards, Ben Underwood, Kathy Pierce. See List of Preparers for backgrounds.

implementing actions for the fish and wildlife recovery effort under each Policy Direction. The comparisons of the five Policy Directions to Status Quo are meant to show how the environmental consequences of each Policy Direction may differ from conditions in the Status Quo Policy Direction. This analysis *does not* try to make a value judgment on whether Status Quo or the current state of the environmental variables is good or bad.

The analysis in this DEIS is, by design, more qualitative than quantitative; this is a policy-level evaluation, not a site-specific one. Therefore, the analysis is based upon predictable *relationships* between changes to the environmental elements (land, air, water) and the consequence to fish, wildlife, and humans. The overall intent is to align the level of decisionmaking with the appropriate level of analytical detail so that the public and decisionmakers can better understand the range of potential effects at each stage of decisionmaking. Any necessary site-specific analysis will be carried out when the actual implementation actions for the chosen Policy Direction are known. This clarifying information and the decision for the site-specific projects will then be tiered to the overall Policy Direction decision, as appropriate.

The Policy Directions include the full range of reasonably foreseeable future directions for fish and wildlife policy in the region. This range includes Policy Directions that may be perceived as more favorable for fish and wildlife as well as those that may be perceived as more favorable to economic and social well-being. Therefore, for any Policy Direction, the same environmental consequences may be both beneficial and adverse, depending entirely upon whether the perspective is one of fish and wildlife or economics and social well-being. The reader is provided with a description of these trade-offs associated with each Policy Direction.

5.3.1 Source for Analysis

Over the last several years, an enormous database of environmental analysis has been created. In our analysis, we sought to maximize the use of this existing database. Some of the most important sources are the Columbia River SOR EIS, the Lower Snake River Juvenile Migration Feasibility Study, and reports from the Multi-Species Framework Process and Federal Caucus. Other important sources include each of the relevant BiOps prepared by NMFS and USFWS in the region, BPA's Business Plan EIS, and the Forest Service/BLM's ICBEMP. Many environmental documents are incorporated by reference and are listed in Section 1.3.3 and in the bibliography.

This DEIS is a compilation of recent processes, each aimed at different facet of fish and wildlife conservation and recovery efforts, with the goal of placing relevant information before the public and decisionmakers in a structured manner to facilitate analyzing it together. For example, the Columbia River SOR FEIS considered alternatives to Columbia River system hydro operations and the effect of those changes on users of the system and the environment.[36] The SOR described the effects of each alternative system

[36] USDOE/BPA, corps, and Bureau, 1995

operations by resource or subject area (e.g., air quality, water quality etc.). A more quantitative analysis of each alternative and its anticipated effects can be found in SOR Appendices A through O, separated by subject area. This analysis was instrumental in identifying the hydrosystem activities and potential effects for each subject area in this policy-level analysis. This DEIS is not designed to replace the SOR, but merely to incorporate its data in the consideration of a new Policy Direction that also includes an assessment of additional hydro-related actions outside the scope of the SOR, including habitat, harvest and hatchery actions.

The qualitative effects analysis below was provided by an informal panel of experts who are familiar with the existing database of environmental analysis. The experts reviewed the sample implementation actions, developed qualitative ratings, and met formally and informally with other experts to develop the ratings and the qualitative descriptions of how each rating was developed.

The use of multiple sources has been critical to the qualitative analysis used in this DEIS. It is recognized that comparison across the many studies and processes that have occurred in the last 10 years is somewhat ambiguous and subjective. Complexity arises because studies differ in the kinds of models and assumptions they use, e.g., different baseline conditions such as base years, biological and economic assumptions, and different hydrologic periods. We believe that the qualitative rankings will serve as a realistic if imprecise reflection of the results from these other sources.

Some environmental effects are described and labeled as "better" and "worse." These terms are equivalent to the NEPA terms "beneficial" and "adverse." They describe environmental consequences in the conventional terms as defined by NEPA. The use of these terms is not intended to place a value judgment on the outcome.

5.3.2 Natural Environment

The Policy Direction ultimately selected and implemented by the Region will cause distinct environmental effects on the natural environment. Broad categories of effects that are evaluated in this DEIS include air quality, land (land use), water, and fish and wildlife. Where possible, the environmental impacts were evaluated and described for subcategories of effects. The anticipated effects associated with each Policy Direction are discussed in the subsequent sections of this chapter.

5.3.2.1 Air Quality

The table below shows how air effects would vary across the range of Policy Directions. Constituents of major concern are carbon monoxide (CO), carbon dioxide (CO_2), nitrogen (NOx), particulate matter (PM10), and sulfur dioxide (SOx). Effects are shown, by shading, to indicate whether a given Policy Direction would tend to have effects on humans that are the same, greater, or less than, Status Quo. More air pollution is

characterized as worse in the table. Most of the effects are based on the Columbia River SOR FEIS.[37]

Table 5.3-1A: Air Effects across the Policy Directions

Effect Subcategory	Status Quo	Natural Focus	Weak Stocks	Sustained Use	Strong Stocks	Com. Focus
CO						
CO2						
NOx						
PM10						
SOx						

Summary of Effects: The table above clearly shows that air conditions would worsen under the Natural Focus, Weak Stock, and Sustained Use Policy Directions. The driving factor is that these Policy Directions would require more new thermal generation capacity to replace hydropower capacity lost by dam breaching. Increased coal generation would increase PM_{10}, CO, CO_2, SO_X and NO_X emissions. Additional combustion turbine plants would produce the same pollutants as coal, but at a rate much less per unit of energy produced because of greater efficiency (note: the reason SOx is present is that it used in the natural gas as an odor indicator). The Sustained Use Focus would modify operations enough to require some new capacity and breach only if necessary in the future. The Strong Stock and Commerce Focus Policy Directions would reduce losses of less-polluting power sources relative to existing conditions. The Commerce Focus would reduce the need for new generation capacity most of all, but CO_2 emissions might be increased somewhat by an increased level of economic activity. The Effect Area table for Air Quality below expands on this reasoning.

[37] DOE, 1995, Section 4.3

Table 5.3-1B: Air Effects across the Policy Directions (Detail)

	EFFECT AREA: AIR (POLLUTION) More pollution = worse	
Existing Conditions	Existing conditions of concern are mostly by-products of combustion engines used for transportation and thermal resources (e.g., coal and combustion turbines) used for power generation. Elements of major concern are carbon monoxide (CO), carbon dioxide (CO2), nitrogen (NOx), particulate matter (PM10), and sulfur dioxide (SOx).	
POLICY DIRECTION		
Status Quo	Relative to existing air conditions, the Status Quo Policy Direction is expected to include some increase in air pollutants associated with additional economic growth. The increase will be dampened by existing pollution abatement programs and technological improvements. New combustion turbines will be built to meet demand, causing air emissions to increase some in the long term.	
	Effect in Comparison to the Status Quo Condition:	
Natural Focus	Requires a large increase in replacement of hydropower from breaching or drawdown of up to six dams, mainly from new combustion turbines and prolonging use of existing coal facilities over Status Quo. Air pollutants would increase substantially under this Policy Direction. Increased coal generation would increase PM10, CO, CO2, SOx and NOx emissions. Additional combustion turbine plants would add to these emissions, just at a much lower rate per unit of energy. In addition, emissions would increase considerably from the new truck and train traffic needed to replace current barging. Dam deconstruction would result in more airborne particulate matter, and as reservoirs empty, dust would rise from newly exposed land. As new vegetation then covers the land, dust would decrease, so those effects would be temporary.	
Weak Stock Focus	There would be a sizable increase in replacement of hydropower depending on how many dams are breached (from 0 to 4 dams). The replacement power would noticeably increase air emissions from new combustion turbines and prolonged use of existing coal facilities over Status Quo. Increased coal generation increase PM10, CO, CO2, SO_X and NO_X emissions. Additional combustion turbine plants would add to these emissions, just at a much lower rate per unit of energy. Emissions would also increase from the increased truck/train traffic replacing barging. Deconstruction would result in more particulate matter, and as reservoirs empty, dust would rise from newly exposed land. As new vegetation then covers the land, dust would decrease, so those effects would be temporary.	
Sustained Use Focus	Air emissions may increase from operation changes, causing the need for additional combustion turbines to replace any lost peaking capability. The long-term change in air emissions could be sizable if breaching or drawdown increases the need for replacement hydropower and prolonged operation of existing thermal resources. With breaching or drawdown, effects would be like those of Weak Stock Focus.	
Strong Stock Focus	Restricts hydro operations less than under Status Quo; delays the need for replacement power and related air emissions.	
Commerce Focus	Maximizes use of existing hydro system, indefinitely delays the need for replacement resources beyond Status Quo. Regional commercial competitiveness, however, could attract new industry, increasing PM_{10} and CO_2air emissions slightly. Overall, air emissions are likely less than under Status Quo.	

5.3.2.2 Land Use

The table below shows how land uses would be affected by the Policy Directions. Land use effects include the following: quality of uplands for habitat; amount of new upland habitat; and quality and amount of riparian/wetland habitat, including streamside, shoreline, and isolated wetland areas. Effects are shown, by shading, to indicate whether a given Policy Direction would tend to have effects that are the same, greater, or less than, Status Quo, from the perspective of fish and wildlife. Reduced habitat or lower quality habitat is characterized as worse in the table.

Table 5.3-2A: Land Use Effects across the Policy Directions

Effects Subcategory	Status Quo	Natural Focus	Weak Stocks	Sustained Use	Strong Stocks	Com. Focus
Upland habitat quality						
Upland habitat amount						
Riparian/ wetland habitat quality						
Riparian/ wetland habitat amount						

Summary of Effects: The major differences across the Policy Directions would be evident in the habitat attributes of land resources. The methods, types, amounts, and results of land-based habitat maintenance and restoration would vary among the Policy Directions. All would include preservation or maintenance elements for existing, quality core habitat because they would be effective and relatively less expensive than restoration.

Natural Focus would decrease human intervention by substantially curtailing human disturbances, but benefits would be slow to accrue because natural systems would recover at an unassisted, natural rate. In some areas, especially riparian and wetland habitats, natural habitat features might not recover within the foreseeable future. The quantity of land habitat created is largest of any Policy Direction, because the most

reservoirs are breached or drawn down, thereby exposing presently inundated land habitat. However, quality in the long run may not be the best possible.

Weak Stock would emphasize terrestrial and riparian/wetland habitat for listed species, especially in the Snake River corridor, estuary, and weak stock tributary areas. Aggressive active restoration would create better habitat in those areas, but the amount would not be as great as that under Natural Focus.

Sustained Use would be ambitious in area and scope, including preservation, passive restoration, and active restoration. Due to the blending of human interaction and fish and wildlife conservation and recovery, this Policy Direction, long term, would perform more quickly than under Status Quo.

Strong Stock Focus would preserve and maintain the habitat in healthy stock areas. For salmon, mainstem Columbia stocks would be emphasized. The terrestrial habitat quality would only slightly be improved over Status Quo.

Commerce Focus would ease restrictions on private property rights and encourage more development, especially on uplands. Human use of riparian areas would not be affected much because uses tend to be already established. Habitat improvements would emphasize positive incentives, trading of development rights and mitigation credits, and cost-effective practices. In the balance between development and habitat maintenance, the extent of habitat restoration would probably be less than for the Status Quo alternative. The Effect Area table for land below expands on this reasoning.

Table 5.3-2B: Land Use Effects across the Policy Directions (Detail)

	EFFECT AREA: LAND More habitat = better	
Existing Conditions	Habitat conditions largely controlled by human influence. Use or development of some areas controlled or limited by regulation. Terrestrial habitat is spotty and is influenced by degradation by development, fragmentation, and increase in exotic species.	
POLICY DIRECTION		
Status Quo	Increased development of native habitat and agricultural land to urban or other, more developed uses. Continue trend toward fragmentation, some increase in preservation of less-disturbed areas.	
	Effect in Comparison to the Status Quo Condition:	
Natural Focus	Lost and damaged fish and wildlife habitat would gradually and naturally return. Upland and riparian habitat restored by breaching. Emphasis on passive restoration and preservation, following a natural progression of fish and wildlife recovery without a specific target species. Terrestrial/riparian restoration by ceasing human land use activities such as farming, grazing, mining, and development in or encroaching upon pristine wilderness areas. Periodic natural disturbance events would reset restoration trajectories. Overall natural habitat improvement is much greater than under Status Quo.	

Weak Stock Focus	Immediate, substantial human intervention to preserve and restore lost habitat for weak native stocks, especially in areas designated critical habitat for threatened or endangered species. Some upland and riparian habitat restored by breaching. Mostly active and some passive habitat restoration used to obtain habitat features for weak stocks. Overall, much more habitat for weak native ESA-listed species, and some habitat for non-listed species would be preserved and restored.
Sustained Use Focus	Balanced approach for listed and non-listed stocks. Intensive effort to maintain and moderate effort to restore habitat. Focus on preservation and active management of essential habitats and ecosystems for more species. Would result in some areas being saved that would be developed in Status Quo. More active management might include more land shaping, removal of obstructions and other human artifacts, and wetlands creation. Strengthen habitat protection through improved management for agriculture, forestry, livestock grazing, mining, and road building. More habitat maintained than under the Status Quo.
Strong Stock Focus	Human intervention and focus on preserving existing habitat for healthy stocks where they occur. Strong Stock habitat would not be sacrificed for weak stocks but improved where most stocks could benefit. Emphasis on preservation, maintenance, and active management. Efforts would be more focused on quality of habitat than under Status Quo but overall would not increase the amount of habitat.
Commerce Focus	Land not preserved for habitat unless benefits exceed costs. Some existing terrestrial habitat would be developed for commercial interests. Federal, regional and state programs for habitat restoration would be limited and focused on the land most valuable for species and less valuable for commercial interests. Emphasis on private, cost-effective and efficient habitat preservation and creation. Use market incentives, such as tradable mitigation credits. Increase in artificial habitat or preservation as a trade against new development. Provide incentives (start-up grants, tax breaks, etc.) and technical assistance to encourage local landowners, businesses, corporations, and trustee agencies to improve and protect wetland, riparian and terrestrial areas. The amount of fish and wildlife habitat would likely be less than under Status Quo.

5.3.2.3 Water

The table below shows how water quality, instream water amounts, and reservoir habitat for fish and wildlife would be affected by the Policy Directions. Effects are shown, by shading, to indicate whether a given Policy Direction would tend to have effects that are the same, greater, or less than, Status Quo. Creating water conditions that diminish the environment for fish and wildlife is characterized as worse in the table. Some water quality factors, such as more instream flow and dissolved oxygen, would be better for fish and wildlife. Other constituents, such as nitrogen supersaturation or sedimentation, would be worse.

Table 5.3-3A: Water Effects across the Policy Directions

Effects Subcategory	Status Quo	Natural Focus	Weak Stocks	Sustained Use	Strong Stocks	Com. Focus
Nitrogen Supersaturation						
Non-thermal Pollution						
Sedimentation[38]						
Temperature/ Dissolved Oxygen						
Instream Water Quantity						
Amount of Stream/River Habitat						
Reservoir Habitat						

Summary of Effects: The change in Policy Directions from Status Quo show gains or losses in water quality and amount of aquatic habitat. Natural Focus would attempt to achieve natural conditions by eliminating major human-made structures, pollution sources and human land uses affecting water resources. Sedimentation effects following breaching could be severe in the short term, but temporary, lasting for five to ten years. Passive, natural restoration might not achieve water quality potential over the short-to-medium term because ability to use storage to capture sediment and improve water quality would be lost. In the long term, water quality would improve over Status Quo. Artificial nitrogen supersaturation would be eliminated. Slackwater habitat would be eliminated in up to six mainstem reservoirs

Weak Stock would be similar to Natural Focus, but fewer dams would be breached and instead, improvements would emphasize Weak Stock tributaries. On the other hand, existing storage could be operated for flow and water quality purposes, so some short- and intermediate term improvements would be greater that Natural Focus.

[38] In scenarios involving a breach, the short-term effects of sedimentation could be enormous; however, over time these effects would stabilize.

Sustained Use includes no breaching in the short-term. Active restoration and reservoir management could achieve faster benefits in tributaries. Without breaching, most potential for water quality benefit on the mainstem involves operations and facility modifications. Strong Stock Focus effects would be similar to Status Quo because there would be comparable actions in water management. Commercial Focus would likely have some water quality degradation and reduced aquatic habitat quality in comparison to Status Quo.

Table 5.3-3B: Water Effects across the Policy Directions (Detail)

	EFFECT AREA: WATER (1): Nitrogen Super Nitrogen supersaturation More = worse	
Existing Conditions	Nitrogen supersaturation is caused by spill over large dams. Existing structures and operations have not been planned to minimize nitrogen supersaturation problems	
POLICY DIRECTION		
Status Quo	Nitrogen supersaturation is being managed by controlled flow and spill operations and by flip lips at spillway ogees. Some excessive voluntary spill operations for weak stocks and spring migrations may continue to cause nitrogen supersaturation problems. Unless modernization of turbines and generators is implemented, failure of the units will cause substantial nitrogen supersaturation effects, as happened at Ice Harbor in 1995-1996. Attempt to manage spill at dams to keep gas levels within federal clean water guidelines will be partially attainable except in high flow years.	
	Effect in Comparison to the Status Quo Condition:	
Natural Focus	Several dams would be breached. The closer the return to a natural river, the less nitrogen supersaturation would remain a problem. A completely natural river (no dams anywhere) would return nitrogen supersaturation levels to those that would have occurred as a result of flow dynamics experienced for the given natural structures (e.g., water falls, rapids, etc.). Those dams that remained might elevate TDG locally over Status Quo situation.	
Weak Stock Focus	The removal of some dams would eliminate saturated gas problem from those specific sites. Other dam operations, if they increased flows for weak stocks, would increase the levels of saturated gas exposure per above policies. Virtually all of the dams have been modified to minimize (not eliminate totally) the gas problem; a few remaining dams would be modified to reduce TDG.	
Sustained Use Focus	Spill and flow regimes would be balanced with local clean water standards. In-river migration would only occur during high flow years when forced spill potentially creates better in-river migration conditions. Flip lips would keep dissolved gas levels within federal clean water guidelines to the extent possible. Nitrogen supersaturation, a problem even with improvements, would not be appreciably better than under Status Quo.	
Strong Stock Focus	Healthy stocks might be less dependent on coordinated spill and flow schemes, and juvenile transportation might be used more to reduce spill further. The supersaturated gas problems would be less than under Status Quo.	
Commerce Focus	Except in instances of flood control releases or large flows, spill would be minimized with a commercial focus. Therefore, saturated gas problems would be the same or less than under Status Quo.	

	EFFECT AREA: WATER (2): Instream Water Quantity More = better
Existing Conditions	Water withdrawals, especially storage and irrigation, reduce amount of river and stream habitat. Tributaries, more arid areas, and areas upstream of Snake River dams experience the most substantial adverse effects from water storage and withdrawals.
POLICY DIRECTION	
Status Quo	There are some programs managing storage releases and acquiring water supplies from irrigation such as the 427,000 AF to augment Snake River flows. Development of new surface water irrigation is somewhat limited by state permit systems. Water conservation programs to increase efficient use of water such as irrigation management, more efficient irrigation systems, and information systems will reduce water application per acre.
	Effect in Comparison to the Status Quo Condition:
Natural Focus	Substantially reduce existing surface water withdrawal through land retirement. Improve instream flows, reduce water temperature and improve water quality relative to Status Quo. Surface water screening and irrigation management would be used on many remaining diversions. Increase water conservation. Municipal withdrawals would continue but with intense efforts to meet increased conservation standards. Remaining storage would be managed to mimic natural flow conditions.
Weak Stock Focus	Irrigation and industrial withdrawals reduced where there are direct effects on weak stocks, but emphasis on irrigation management instead of retirement. Most reduction in Snake River system and in arid tributary regions in Central/Eastern Oregon and Washington. Irrigation and other withdrawals remain about the same as Status Quo elsewhere in region. Storage in weak stock habitat would emphasize weak stocks.
Sustained Use Focus	Water withdrawals reduced primarily through management and positive incentives. Irrigation land acquisition and management targeted for multiple purposes including water supply, water quality, and habitat. Focus on irrigated lands in historical riparian zone. Elsewhere, irrigation and other withdrawals managed to reduce or avoid adverse effects. Adopt strong water conservation programs and use saved water to replenish flows. Screen withdrawals. In most areas, some flow improvements relative to Status Quo.
Strong Stock Focus	Withdrawals managed to avoid future listing of healthy stocks. Screening, positive incentives, avoid new water supply depletions to maintain healthy stocks. Overall, withdrawals about the same as Status Quo.
Commerce Focus	Irrigation, industrial and municipal water withdrawals would increase more than under Status Quo to accommodate growing population, commercial and residential needs. Cost-effective and efficient screening might be used to avoid direct mortality of listed stocks. Use of storage and flows for fish would decrease in comparison to Status Quo.

	EFFECT AREA: WATER (3): Non-thermal pollution More = worse
Existing Conditions	Non-thermal pollution problems include municipal and industrial wastewater, run-off from mines, and non-point sources such as irrigation return flows, agricultural runoff, and stormwater. Problem constituents include organic matter, fertilizers, pesticides, sediment, and a large number of metals and chemicals.

POLICY DIRECTION	
Status Quo	Increasing population and economic growth produces additional pollution, but existing and planned laws and programs, technological improvement, the characteristics of new industry and decline of old industries all combine to reduce pollution. Net effect is that pollution increases from existing levels, but rate of increase may be less than rate of population growth.
	Effect in Comparison to the Status Quo Condition:
Natural Focus	Improve water quality by eliminating sources of pollution overall. Eliminate discharges of other contaminants to meet more stringent water quality criteria. Strong new —controls on wastewater and other point and non-point sources. Increased water quality standards along with stronger enforcement. Non-thermal pollution would be better than under Status Quo.
Weak Stock Focus	Improve water quality by actively pursuing reductions in pollution that accumulate in fish tissue and by reducing discharges of other contaminants to meet water quality criteria for listed anadromous and resident fish. Increase enforcement of water quality standards for pollutants in critical habitat of weak stocks. Take more action in agricultural management and residential/ commercial development to reduce non-point sources in weak stock tributaries. Agricultural management, as well as residential/commercial treatments, would reduce use of pesticides and chemicals and reduce runoff from irrigated, dryland and grazing land. There would be a reduction in non-thermal pollution over Status Quo.
Sustained Use Focus	Manage and enforce existing water quality standards throughout region. Manage for multiple purposes including water quality. Riparian land acquisition and active restoration would reduce upslope non-point contribution. Use positive incentives, monitoring and enforcement to reduce point and non-point pollution. Overall, there would be some reduction in pollution over Status Quo due to the regionwide application of the standards and clean up efforts.
Strong Stock Focus	Manage existing water quality standards throughout region to benefit healthy stocks. Focus enforcement in areas occupied by strong stocks. Overall, slight reduction in pollutants in comparison to the Status Quo.
Commerce Focus	Manage existing water quality standards to ensure health and safety of human use and consumption. Some use of positive incentives, some additional pollution allowed, trading of pollution credits allowed to accommodate industrial growth. Pollution controls must be efficient. Non-thermal pollution may become somewhat worse than under Status Quo.

	EFFECT AREA: WATER (4) Sedimentation More = worse	
Existing Conditions	Sedimentation from erosion due to land disturbances including agriculture, grazing, and urban development. Much sediment is captured and accumulates behind existing dams.	
POLICY DIRECTION		
Status Quo	About the same as existing conditions, or gradual improvement as current water quality standards, BMPs and new TMDLs are applied across the land base. Increase in urbanization may increase sedimentation, but other changes in land use practices (conversion to tree, vine, and other permanent crops, agricultural and grazing management; practices to control sediment during construction) may provide some compensation.	

	Effect in Comparison to the Status Quo Condition:
Natural Focus	Sediment increase downstream from breached facilities for 5-10 years as accumulated reservoir sediments are flushed downstream. This effect would be temporary. Agricultural land retirement and reduction in other human uses reduces sediment loads over the long term relative to Status Quo.
Weak Stock Focus	Similar to Natural Focus, but the amount of breaching is less, and there is less land retirement. Sediment loads decline to natural rates in weak stock tributaries through active management and aggressive land retirement. Conditions improve overall relative to Status Quo.
Sustained Use Focus	No breaching in the short term. Water erosion and sedimentation reduced throughout the basin as part of balanced and more active land use management. Active spawning gravel, streambank, and riparian management may have temporary, adverse effects, but with rapid recovery of stable ground surfaces. Overall, the sedimentation may improve somewhat compared to Status Quo.
Strong Stock Focus	Strong stocks require minimal flow and spill regimes and only moderate additional land management compared to Status Quo. Therefore, sedimentation effects minor. Sedimentation would be about the same as Status Quo.
Commerce Focus	Sedimentation will increase as urbanization, agricultural and commercial development increase, but minimally would comply with water quality standards. Prime watersheds probably would improve. Sediment controls must be efficient (benefits exceed costs). The overall sedimentation may get worse than under Status Quo due to development.

	EFFECT AREA: WATER (5): Temperature/Dissolved Oxygen higher = worse	
Existing Conditions	Water temperatures and low dissolved oxygen are a seasonal problem for anadromous fish in the mainstems (Columbia and Snake) and tributaries. Mainstem problems are associated with dry years, low flows, long retention times, and warm weather. Thermal pollution from industrial discharges also contribute. Tributary problems can be more closely linked to irrigation diversion quantity and timing, low storage releases, altered channel geometry, increased solar radiation through loss of riparian and streambank shading, and irrigation return flows.	
POLICY DIRECTION		
Status Quo	About the same as existing conditions. Revised regional water quality standards and TMDLs for impaired watersheds should bring about gradual improvement. Water temperature/dissolved oxygen conditions could be affected by global warming.	
	Effect in Comparison to the Status Quo Condition	
Natural Focus	A return to a natural river, natural tributaries, land retirement and strong thermal pollution controls could gradually help recreate presettlement water temperature ranges, including normal fluctuations for the rivers affected. Upstream reservoirs (upper Columbia, upper Snake, Clearwater) would have to be managed for flow in dry years to avoid downstream problems. Less opportunity for solar heating. Fewer opportunities to control temperature through controlled releases. Overall, both temperature and dissolved oxygen would be somewhat better than under Status Quo, but conditions would be worse or not improved in very dry conditions.	

	EFFECT AREA: WATER (5): Temperature/Dissolved Oxygen higher = worse	
Weak Stock Focus	Similar to Natural Focus, but less dam breaching, with more aggressive management measures focused in weak stock areas, and more management of irrigation, as opposed to land retirement. Gains could be greatest where weak stocks are correlated with water-quality-impaired waters. Remaining storage could be used to improve conditions in very dry or hot weather. The temperature and dissolved gas problems would be improved over Status Quo in weak stock watersheds.	
Sustained Use Focus	Active balanced management tries to reduce water temperatures in many tributaries. Actions may include systemwide irrigation water management, retention and reuse of irrigation return flows, and active streambed and riparian management to increase shading at strategic reaches and habitat features little effect on mainstem in the short term. Temperature control structures or improved mixing zones on mainstem and upstream tributary facilities might help. Overall, temperature and dissolved gas would likely be about the same as Status Quo or slightly better.	
Strong Stock Focus	Techniques to cool water or manage dissolved oxygen would be implemented only if healthy stocks were harmed by existing flows, temperature or aeration. Overall, water temperatures and dissolved gas would remain about the same as Status Quo.	
Commerce Focus	Manage thermal pollution to insure health and safety of human needs and consumption. Any temperature or gas control must be cost-effective, and much would be regulatory driven. Temperature in prime watersheds might improve. Overall, temperatures and dissolved oxygen may be slightly worse than under Status Quo.	

	EFFECT AREA: WATER (6):Amount of Stream/River Habitat more = better	
Existing Conditions	Amount of stream and river habitat is a function of highly regulated river system, areas blocked by structures, and land and water use activities.	
POLICY DIRECTION		
Status Quo	About the same amount of stream and river habitat as under Existing Conditions.	
	Effect in Comparison to the Status Quo Condition	
Natural Focus	Much more stream and river habitat created by breaching or drawdown of up to six reservoirs and removal of some dams on tributaries.	
Weak Stock Focus	More stream and river habitat created by breaching of four Lower Snake reservoirs and removal of some dams on tributaries. More stream/river habitat relative to Status Quo.	
Sustained Use Focus	About the same as Status Quo because no major changes in river management, land use practices would be involved.	
Strong Stock Focus	Overall, about the same as Status Quo because actions would emphasize healthy stocks, while weaker stocks would be de-emphasized.	
Commerce Focus	About the same as or less than under Status Quo because only cost-effective actions would be taken.	

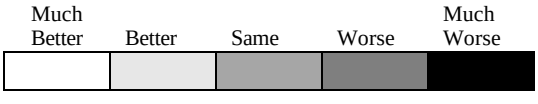
	EFFECT AREA: WATER (7): Amount of reservoir habitat more=better	
Existing Conditions	Amount of reservoir habitat is determined by dams in place and their associated storage and operations	
POLICY DIRECTION		
Status Quo	About the same amount of reservoir habitat	
	Effect in Comparison to the Status Quo Condition	
Natural Focus	Reservoir habitat lost in four Lower Snake reservoirs, and habitat substantially impaired in John Day and McNary pools.	
Weak Stock Focus	Reservoir habitat lost in four Lower Snake reservoirs.	
Sustained Use Focus	About the same as Status Quo because no major changes in reservoir habitat would occur	
Strong Stock Focus	Overall, about the same as Status Quo because no major changes in reservoir habitat would occur.	
Commerce Focus	About the same as or maybe slightly more than under Status Quo, because no major changes in reservoir habitat would occur.	

5.3.2.4 Fish and Wildlife

The table below shows how anadromous fish, reservoir fish, and other resident fish and wildlife would be affected by the Policy Directions. Effects are shown, by shading, to indicate whether a given Policy Direction would tend to have effects that are the same, greater, or less than, Status Quo from the perspective of fish and wildlife. A population increase of the identified classification of fish and wildlife characterized as better in the table.

Table 5.3-4A: Fish and Wildlife Effects across the Policy Directions

Effects Subcategory	Status Quo	Natural Focus	Weak Stocks	Sustained Use	Strong Stocks	Com. Focus
Natural Spawning Native Anadromous Fish						
Hatchery Produced Native Anadromous Fish						
Native Resident Fish						
Non-native species						
Native Wildlife						



Summary of Effects: The Status Quo assumes an increasing human population and increased pressures on native fish and wildlife. Habitat, hydro, hatcheries, and harvest would be regulated by ESA actions and other existing laws as described in Chapter 2. The Status Quo includes existing hatcheries, existing harvest regulations, a continuation of existing habitat and hydro programs, and some control of exotics and noxious weeds through existing programs.

Natural Focus would remove existing human disturbances, and turn land and water back toward an earlier, undeveloped condition. Human population growth would be kept from encroaching on the fish and wildlife habitat. Natural and Weak Stock Focus include some dam breaching, which would restore natural river conditions and recover bottomlands for habitat. Native species would benefit, but the increase in natural aquatic habitat would be detrimental to exotic and slackwater species. Hatchery production would be phased out.

Weak stock would be similar to Natural Focus, but fewer hatcheries would be eliminated, and most good habitat for non-native and slackwater species would remain in mainstem reservoirs. Most hatchery fish and native species would benefit from reduced harvest, active and passive habitat restoration, and substantial hydrosystem modifications.

The Sustained Use Focus would benefit fish and wildlife somewhat by habitat restoration and preservation, and emphasis on whole-ecosystem approach. Active and passive management would be used. Most native species would benefit. Exotic species would be actively managed, and would not do as well as in Status Quo. The Strong Stock Focus would not change much relative to Status Quo, except that some weak stocks would be lost. The Commerce Focus would reduce the amount of resources committed to fish and wildlife restoration, but some species could benefit because resources might be spent more effectively. Valuable fish and wildlife species would be supported by user fees and artificial production. The Effect Area table for fish and wildlife below expands on this reasoning.

Table 5.3-4B: Fish and Wildlife Effects across the Policy Directions (Detail)

	EFFECT AREA: FISH AND WILDLIFE (1): Natural and Hatchery Native Anadromous Fish	
Existing Conditions	Many stocks listed as threatened or endangered, few wild stocks are healthy. 80-90% of chinook supported by hatcheries.	
POLICY DIRECTION		
Status Quo	Major policies are defined by mitigation requirements, Regional Act, ESA, tribal fishing rights, international treaties. Arguably, anadromous fish populations are expected to vary erratically, driven by ocean and freshwater harvest, ocean and freshwater survival conditions, weather cycles, ESA in near term.	
	Effect in Comparison to the Status Quo Condition:	
Natural Focus	Restoration to natural land and water conditions, phase-out of hatcheries, and elimination of most harvest. Would likely recover natural spawning	

	EFFECT AREA: FISH AND WILDLIFE (1): Natural and Hatchery Native Anadromous Fish
	anadromous fish and lamprey in the long run, with several caveats. Natural conditions may not be attainable in decades or ever, harvest may not be completely controllable (other nations may continue to allow harvest), and some genetic stocks are permanently lost. Even with maximum actions, it is likely that fish populations would not approach pre-European immigration levels. However, over the long term, abundance of natural spawning fish and associated harvest should be much better than under Status Quo.
Weak Stock Focus	Weak-stock actions, including habitat improvements, harvest controls and hatchery management, would increase populations of weak native stocks. Populations would not increase to pre-European immigration levels. Natural spawning and hatchery fish would be more abundant than under Status Quo over the long term.
Sustained Use Focus	Full potential unknown; limited by existing dams and lack of spawning habitat. Population sizes vary substantially due to natural and human-caused factors. Harvest and hatcheries would be controlled to accommodate changes in population status. Less hatchery production and harvest overall. Natural and hatchery fish would increase with habitat, hatchery, and harvest improvements.
Strong Stock Focus	Run sizes similar to today's. Mainstem Columbia River stocks emphasized. Harvest and hatcheries would be driven by healthy stocks. Some weak stocks, especially in tributaries, likely to become extinct. Also applies to lamprey.
Commerce Focus	De-emphasize importance of native stocks. Some weak stocks may become extinct. Focus on producing a commercially viable salmon harvest and related industries using least-cost production, primarily hatcheries and fish farming. Mainstem species focus (fall chinook). Total run size might increase even if natural spawning runs decrease. Overall numbers similar to Status Quo.

	EFFECT AREA: FISH AND WILDLIFE (2): Native Resident Fish
Existing Conditions	Native resident fish include bull trout, redband trout, other native salmonids, sturgeon.
POLICY DIRECTION	
Status Quo	Similar to existing conditions. Some populations continue to decline
	Effect in Comparison to the Status Quo Condition:
Natural Focus	Much improvement in conditions for native species. Improvements limited by slow pace of passive restoration, historical losses, and continued presence of human disturbances.
Weak Stock Focus	Somewhat similar to Natural Focus. Native weak stocks receive special attention. Not as much restored habitat but better quality for weak stocks.
Sustained Use Focus	Emphasis remains on listed species, but non-listed native fish benefit from habitat and hydrosystem actions. Native species improve relative to Status Quo unless limited by anadromous fish weak stock requirements.
Strong Stock Focus	Healthy stocks of native species do better than under Status Quo. Overall, some weak stocks may continue to decline while healthy stocks improve.
Commerce Focus	Comparative commercial value of fish, wildlife and commercial uses will control species management. Conditions similar to Status Quo.

	EFFECT AREA: FISH AND WILDLIFE (3): Non-native Species
Existing Conditions	Non-native species include shad, striped bass, smallmouth and largemouth bass, and include other species such as introduced invertebrates.
POLICY DIRECTION	
Status Quo	Similar to existing conditions. Some exotic, often harmful populations continue to increase.
	Effect in Comparison to the Status Quo Condition:
Natural Focus	Dramatic reduction of many non-native fish species due to dam breaching. Survival conditions for introduced species decline compared to Status Quo.
Weak Stock Focus	Somewhat similar to Natural Focus. Non-native species frequently sacrificed for the needs of listed anadromous and resident species. Population less than under Status Quo.
Sustained Use Focus	Emphasis remains on listed species. Non-native fish are actively managed and reduced to benefit listed species. About the same as Status Quo.
Strong Stock Focus	Non-native fish populations might increase because reservoirs are managed for all valuable species.
Commerce Focus	Comparative commercial value of fish, wildlife and commercial uses will control species management. Some non-native species allowed or encouraged. More non-native fish than under Status Quo.

	EFFECT AREA: FISH AND WILDLIFE (4): Native Wildlife
Existing Conditions	This category includes all native wildlife. Some species are listed as threatened or endangered, others are substantially diminished in population, some have healthy populations, and some have done well in modified habitats.
POLICY DIRECTION	
Status Quo	ESA protections expected to keep most threatened and endangered species from extinction for foreseeable future. Listed species managed through federal ecosystem management policies and private initiatives. Many species adversely affected by economic growth and urbanization.
	Effect in Comparison to the Status Quo Condition:
Natural Focus	Land retirement and passive restoration would benefit many wildlife species in the long run. Human population and influences likely to decline or grow slower than in Status Quo, thus benefiting wildlife. New riparian and terrestrial habitat created from former reservoir bottoms.
Weak Stock Focus	Habitat improvements for threatened and endangered species increased. Some non-listed species helped incidental to weak stock protections. Weak populations of wildlife may receive specific benefits in terms of habitat improvement, especially if their condition is affected by the existing hydrosystem. Overall, better conditions than under Status Quo.
Sustained Use Focus	Needs of the listed species balanced against the needs of all species. More habitat, better management. Approach should benefit wildlife species more than under Status Quo.
Strong Stock Focus	Active habitat maintenance focus. Would maintain existing viable wildlife populations within socially acceptable ranges. Manage non-listed wildlife to keep existing populations strong. Overall, benefit similar to Status Quo.
Commerce Focus	Wildlife would be managed like a commodity. More user fees for hunting and fishing used to improve habitat for valuable species. Fish and wildlife measures selected for implementation based on benefit and cost analysis. Maximize the public benefit from expenditures of finite wildlife enhancement

	EFFECT AREA: FISH AND WILDLIFE (4): Native Wildlife	
	funds. Emphasize benefits and costs of artificial propagation. Benefits to wildlife would be greatest in "prime" watersheds. Increases in urbanization and industrialization would cause negative effects. Overall, emphasis on commercial interest would be about neutral to wildlife.	

5.3.3 Social and Economic Environment

This discussion is focused on commercial activities and social consequences most directly associated with fish and wildlife concerns. The shading used to indicate adverse and beneficial effects is based completely on a human perspective, exclusive of human values related to fish and wildlife populations or habitat recovery. Broad categories of effects that are evaluated in this DEIS include commerce, tribes, funding, cultural/ historical resources, and aesthetics. Where possible, the environmental effects were evaluated and described for subcategories of effects where the analysis allowed. These effects are evaluated, respectively, from the perspective of economics, tribal concerns, people who pay for fish and wildlife restoration, cultural and historical resource protection, and human aesthetic values.

5.3.3.1 Economics

The table below shows how commerce, industry, and employment would be affected by the Policy Directions. Effects are shown, by shading, to indicate whether a given Policy Direction would tend to have effects that are the same, greater, or less than Status Quo. All economic costs and benefits are from the perspective of persons affected by the industry, including owners, workers, consumers, and people who sell to each industry. Less economic cost is characterized as better in the table. Employment effects for all industries are summarized as a separate economic effect.

Table 5.3-5A: Economics Effects across the Policy Directions

Effects Subcategory	Status Quo	Natural Focus	Weak Stocks	Sustained Use	Strong Stocks	Com. Focus
Commercial Interests						
Power						
Transmission						
Transportation						
Agriculture and Forestry						
Commercial Fish Harvest						

Effects Subcategory	Status Quo	Natural Focus	Weak Stocks	Sustained Use	Strong Stocks	Com. Focus
Other industry (esp. mining, forest products, DSIs)						
Recreation						
Sport Fishing and Wildlife Harvest						
Other Recreation						
Economic Development						
Industrial, Residential & Commercial Development						
Employment						

Summary of Effects: Most long-term effects of commercial economic activities involve hydropower, transportation, agriculture, forestry, commercial fisheries and a variety of natural resource and allied industries. The Natural Focus Policy Direction would have very adverse effects on all of these industries in the long run. The Weak Stock Policy Direction has adverse effects, but not as much as Natural Focus. The Sustained Use and Strong Stock Policy Directions have beneficial effects on commercial and recreational fisheries, but effects on other industries are mixed. The Commerce Focus Policy Direction would benefit most industries. These effects are described in greater detail in the commerce table below.

Table 5.3-5B: Economics Effects across the Policy Directions (Detail)

	EFFECT AREA: COMMERCE (1): Power less = worse
Existing Conditions	Electricity losses from operations for endangered fish and other fish and wildlife operations. Power losses in FCRPS from fish and wildlife actions are currently about $160 million annually.
POLICY DIRECTION	
Status Quo	With population growth, revenues increase relative to recent conditions, as does the need for power.
	Effect in Comparison to the Status Quo Condition:
Natural Focus	Hydropower taken off-line, replaced with non-hydro power generation. Framework Alternative 1 (Lower Snake dams, John Day, McNary to natural river levels) reduced value of power by $590 million compared to Status Quo. Total costs, including deconstruction, could be around $1 billion annually. Very large adverse effects compared to Status Quo.
Weak Stock Focus	Loss of some hydro facilities due to breaching and additional limits on power generation at existing facilities. Annual power loss from breaching lower Snake River dams would be about $250 million annually compared to Status Quo. Total cost, including deconstruction, could be up to $350 million annually. Non-hydro power would become competitive sooner. Large adverse effects compared to Status Quo.
Sustained Use Focus	Limits on generation at existing facilities. Use flow, spill, drawdowns, peak efficiency turbine operation, and facility modifications to improve in-river juvenile salmon survival; avoid fluctuations caused by power peaking operations. Some hydropower losses compared to Status Quo.
Strong Stock Focus	Operations for weak stocks under Status Quo may not be needed. Some hydropower effects for operations to sustain currently productive populations. Overall, cost is less than under Status Quo.
Commerce Focus	Law of supply and demand would dictate power mix; however, hydropower would likely be increased compared to Status Quo. Reduce ineffective flow augmentation and harmful spill at hydroelectric dams. Framework Alternative 7 increased value of electricity by $250 million annually compared to Status Quo. Therefore, cost is much less than under Status Quo.

	EFFECT AREA: COMMERCE (2): Transmission more = worse
Existing Conditions	Current transmission system
POLICY DIRECTION	
Status Quo	Some increase in transmission costs to cover population growth
	Effect in Comparison to the Status Quo Condition:
Natural Focus	Major transmission improvements required after six dams are breached.
Weak Stock Focus	Major transmission improvements required after four dams are breached
Sustained Use Focus	Important transmission improvements required
Strong Stock Focus	Similar to Status Quo. Some presently planned projects deferred
Commerce Focus	Some presently planned projects deferred. Some transmission cost savings in the future.

	EFFECT AREA: COMMERCE (3): Transportation less = worse
Existing Conditions	Shallow draft navigation to Lewiston, Idaho
POLICY DIRECTION	
Status Quo	Same as existing conditions
	Effect in Comparison to the Status Quo Condition:
Natural Focus	Barging eliminated downstream to last dam breached. Other forms of transportation are more expensive, requiring new infrastructure. Other adverse effects on highways, rails, pipelines, and other transportation corridors, but population demands for new transportation also decreased. Very large adverse effects compared to Status Quo.
Weak Stock Focus	Barging eliminated downstream to last dam breached, possibly Ice Harbor. Other forms of transportation are more expensive, requiring new infrastructure. Other transportation development affected in weak stock tributaries. Large adverse effects compared to Status Quo.
Sustained Use Focus	As there would be no immediate breaching, navigational effects would be delayed, possibly indefinitely. Some increases in other transportation costs.
Strong Stock Focus	No breaching. Little effect on other transportation.
Commerce Focus	Market forces would decide future of barging versus other means of transportation; however, as the system is already in place, maintain barging and navigation. Some benefits from reservoir operations and more efficient navigation lock operations, improved dredging. Some benefits for transportation.

	EFFECT AREA: COMMERCE (4): Agriculture and Forestry less = worse
Existing Conditions	Agriculture largely controlled by world market conditions. Economics and USDA conservation programs provide positive incentives for conserving uses and practices on private grazing and farmlands. Irrigation water permits controlled by states and the Bureau. Grazing and forestry on public lands limited by multiple use, ESA, CWA and other mandates.
POLICY DIRECTION	
Status Quo	About the same as existing conditions. Gradual improvement as modern best management practices are applied to an increasingly larger land base.
	Effect in Comparison to the Status Quo Condition:
Natural Focus	Much farmland retired, and strong management incentives on remaining land increase costs and reduce productivity. Grazing and forestry cost increase, and production reduced on private lands. Uncertain to what extent costs would be paid by landowners, ratepayers, or taxpayers. Grazing and forestry on public lands largely eliminated; losses paid by users. Increased transportation costs due to loss of barging and less efficient road network. Pump/diversion modifications near breached reservoirs would be required for continued diversions. Most agricultural costs cannot be passed to consumers because prices are set in national or international markets. Very large adverse effects compared to Status Quo.
Weak Stock Focus	Similar to Natural Focus, but geographic coverage limited to weak stock habitat, and less land retirement used. Increased transportation costs higher due to loss of barging and less efficient road network. Pump/diversion modifications near breached reservoirs would be required for continued diversions. Large adverse effects compared to Status Quo.

Sustained Use Focus	Land retirement, land management, technology applied to make agricultural and forestry practices more compatible with fish and wildlife. Some land retirement used where cost-effective. Not clear to what extent costs paid by landowners, ratepayers or taxpayers. Overall, potentially similar to Status Quo.
Strong Stock Focus	Increase irrigation activity due to relaxing of restrictions, elimination of current irrigation water acquisitions in weak stock habitats. Some new agriculture near healthy stock habitat might not be allowed to develop. Allows some flexibility for compatible forestry practices. Overall, potentially similar to Status Quo.
Commerce Focus	The market will dictate the future viability of agriculture in the region. Existing irrigation maintained and increased consumptive use of Columbia Basin water allowed. Dry land and irrigated farming will increase if market forces permit. . Increased forest harvest and grazing allowed compared to Status Quo. Overall, potentially greater commercial benefits than under Status Quo.

	EFFECT AREA: COMMERCE (5): Commercial Fish Harvest less = worse
Existing Conditions	Columbia Basin salmon harvested in U.S., Canada and Alaska ocean fisheries, and in mainstem Columbia River and tributary freshwater fisheries. Harvest seasons and catch have been reduced compared to historical conditions. Commercial fishing associated industries: ocean commercial troll, ocean and in-river sport charter boat and Columbia River commercial gillnet.
POLICY DIRECTION	
Status Quo	Similar to existing conditions, but harvest may be reduced more to comply with planned ESA and Pacific Salmon Treaty actions. Increased emphasis on protecting threatened, endangered, native fish and wildlife, reducing the economic benefits to local communities, industries, gear manufacturers, etc.
	Effect in Comparison to the Status Quo Condition:
Natural Focus	Most ocean and Columbia River harvest eliminated, at least for the short term. Increase in targeted/selective harvest of known stocks, primarily in tributaries. Overall, commercial fishing much worse than under Status Quo for the short term as hatcheries are phased out. Some fishing allowed in the long term, less commercial value than under Status Quo.
Weak Stock Focus	Most ocean harvest eliminated unless weak stocks can be differentiated. Hatchery production curtailed, contributing to extreme restrictions on any commercial harvest that may further endanger weak stocks. Increase in targeted/selective harvest, but less commercial value overall compared to Status Quo.
Sustained Use Focus	Continued restrictions on any commercial harvest that may further endanger weak stocks. Possible increased harvest of other stocks as they recover. Increase in targeted/selective harvest. Direct harvest toward hatchery fish and away from healthier wild stocks. Overall, commercial value may increase relative to Status Quo.
Strong Stock Focus	Constrain commercial harvest only to the extent it interferes with naturally sustaining populations of healthy stocks. Direct harvest toward hatchery fish and away from healthier wild stocks. Overall, commercial fish value may increase relative to Status Quo.
Commerce Focus	Market will control commercial harvest techniques, limitations, and management. Losses of production from upstream areas would be offset by increased hatchery and fish farm production in the lower river and estuary.

	EFFECT AREA: COMMERCE (5): Commercial Fish Harvest less = worse	
	With fish farming and more efficient hatcheries, net economic value of fish production would increase.	

	EFFECT AREA: COMMERCE (6): Other Industry less = worse	
Existing Conditions	Mining, aluminum products, and pulp and paper industries increasingly affected by environmental requirements. Services and government sectors are being increased by environmental requirements.	
POLICY DIRECTION		
Status Quo	Continued trends to less natural resource industries and more services and government.	
	Effect in Comparison to the Status Quo Condition:	
Natural Focus	Many existing industries, especially aluminum, would be severely affected by shortage of affordable and reliable electricity. Strong incentives provided for "clean" industry, pollution abatement, and reduced development. Strong limits to new mining and most existing mining. Active and passive restoration at abandoned mine locations. Overall, effects are very adverse.	
Weak Stock Focus	Many existing industries affected by more expensive and less reliable electricity. Strong incentives for "clean" industry, pollution abatement and reduced development in weak stock watersheds. New and existing mining limited in weak stock habitats. Most mine restoration in weak stock watersheds is active. Overall effects are adverse	
Sustained Use Focus	Industries affected by more expensive and slightly less reliable electricity. Incentives for environmentally friendly industry and development. Mine site active restoration. Increase in services and government employment to implement intensive programs. Overall effects are adverse	
Strong Stock Focus	Industry would benefit from slightly more affordable and reliable power compared to Status Quo.	
Commerce Focus	River management would be tailored to needs of industrial sector; thereby, increasing industry presence. Aluminum and mineral production costs reduced.	

	EFFECT AREA: COMMERCE (7): Sport Fish & Hunting less = worse	
Existing Conditions	Sport fishing industries centered on reservoirs and rivers supported primarily by hatchery production, and on ocean and freshwater recreational fishing for salmonids. Regulation to protect threatened, endangered, native, and strong species of fish and wildlife.	
POLICY DIRECTION		
Status Quo	Similar to existing conditions, but increased emphasis on protecting threatened, endangered, native fish and wildlife, reducing the economic benefits to local communities, tourism industries, gear manufacturers, guides, etc. Inland fish and wildlife harvest and ocean sport fishing opportunities may be further reduced, with economic effect on inland and coastal communities.	

	EFFECT AREA: COMMERCE (7): Sport Fish & Hunting less = worse	
	Effect in Comparison to the Status Quo Condition:	
Natural Focus	Stop all harvest of wild fish and wildlife in the short term with substantially greater negative impacts on tourism, sport-fishing and hunting industries than under Status Quo. In long run, with much less hatchery production, anadromous fish harvest allowed for fish in excess of naturally sustaining populations. Most anadromous fish sport fishing converted to catch-and-release, sport harvest targeted at eliminating non-native species of fish and wildlife. Overall, less economic benefit compared to Status Quo.	
Weak Stock Focus	Restrict harvest that risks further endangering weak species of fish and wildlife. Manage catch to protect weak stocks by stopping all harvest of wild fish. Some catch-and-release fishing in weak stock tributaries may be feasible, off-setting some economic consequences. Overall, less economic benefit compared to Status Quo.	
Sustained Use Focus	Restrict methods that risk further degrading weak fish and wildlife species. Promote harvest of non-native species. Manage harvests for ecosystem benefits. Economic benefits to sport fishing and hunting industries may be better than under Status Quo.	
Strong Stock Focus	Constrain recreational harvest only to the extent it interferes with naturally sustaining populations of healthy fish and wildlife stocks. Support recreational fish harvest with hatchery production. Possible increase in value of sport fishing and hunting relative to Status Quo.	
Commerce Focus	Increase economical sport fishing opportunities using hatcheries. Use non-native species where demanded. Market will control recreational fish and wildlife harvest techniques, limitations and management. Fishers and hunters pay user fees to cover production and other costs. Protect fish and wildlife habitat to preserve hunting and fishing opportunities if benefits exceed costs. Overall, about the same as Status Quo.	

	EFFECT AREA: COMMERCE (8): Other Recreation less = worse	
Existing Conditions	Affected recreation includes boating on reservoirs and rivers, swimming, other water sports, and terrestrial outdoor recreation such as hiking, other use of trails, camping, and sightseeing and tourism.	
POLICY DIRECTION		
Status Quo	Outdoor recreation industry and tourism will continue to grow with the overall economy, maybe faster than the overall economy.	
	Effect in Comparison to the Status Quo Condition:	
Natural Focus	Breaching dams will cause local loss of reservoir recreation. Lost jobs and revenue until new forms of recreation are established. Floating, canoeing, and other river boating opportunities increased in the long run. Some of the formerly inundated land may be available for recreation. Some land acquired for habitat would have limited availability for outdoor recreation. Overall, fewer opportunities than under Status Quo, but many losers and winners.	
Weak Stock Focus	Similar to Natural Focus, but only in weak stock watersheds. Overall fewer opportunities than under Status Quo, but many losers and winners.	
Sustained Use Focus	Actions to assist weak stocks will consider means to accommodate recreational needs. Other outdoor recreation might benefit from land acquisitions and	

	management for habitat. Overall, about the same as Status Quo, but many losers and winners.
Strong Stock Focus	Some river recreation would benefit from less dramatic flow and spill regimes. Somewhat more opportunities than under Status Quo.
Commerce Focus	Market will dictate any change to the recreational industry. In general, increased access to land and water based outdoor recreation compared to Status Quo.

	EFFECT AREA: COMMERCE (8): Industrial, Residential & Commercial Development less = worse, from commercial perspective
Existing Conditions	Residential and commercial development largely market-driven, affected by local land use plans. ESA has some influence in plan development in special status species habitat. Habitat conservation plans are becoming more common.
POLICY DIRECTION	
Status Quo	Similar to existing conditions.
	Effect in Comparison to the Status Quo Condition:
Natural Focus	Any residential and commercial development contradictory to natural focus would be restricted. Little new development on natural or riparian lands, some development rights acquired, development in critical habitat substantially limited. Very adverse effects.
Weak Stock Focus	Any residential and commercial development threatening weak stocks would be restricted. Adverse effects.
Sustained Use Focus	Encourage and promote development more compatible with fish and wildlife habitat. About the same as Status Quo.
Strong Stock Focus	Development might increase in comparison to Status Quo, as restrictions for weak stocks would be removed. Development would be monitored to insure that healthy stocks were unaffected. Better than under Status Quo.
Commerce Focus	Market would control residential and commercial development. More growth than under Status Quo because of lower costs; less growth to the extent quality of life is reduced. Better than under Status Quo

Most employment effects are associated with breaching dams and alternative approaches to habitat restoration. Dam breaching is a significant construction activity that would create many temporary jobs. In the long term, substantial job losses result from reduced power sales; increased power, transportation and water supply costs; and loss of barging and flatwater recreation industries. In the very long run (10 to 100 years), a restored river system and fish runs would provide some compensating employment benefits. Long-run effects are believed to be negative overall.

Habitat restoration causes jobs to be lost because someone must pay for it, and passive restoration costs more jobs when land is retired or productivity reduced. Job losses would be greatest in Natural Focus because of intensity as well as focus on passive restoration. Weak Stock losses would be less because of reduced scope, but also because more active restoration would be used. Sustained Use Focus would use more active restoration. Active restoration techniques can create jobs through use of construction and services, but these gains are still offset by jobs lost as ratepayers or taxpayers have less to spend. Strong Stock focus would have a positive employment effect overall, and Commerce Policy Direction would have the most positive employment effect relative to

the Status Quo, both assuming no negative effects from environmental degradation. The Effect Area table below expands on this reasoning.

	EFFECT AREA: COMMERCE (9): Employment less = worse	
Existing Conditions	The major economic appeal of the Pacific Northwest has been inexpensive, reliable power; a controlled, functional Columbia; and environmental quality. 1996 employment in mix in 5-state region (AK, ID, MT, OR, WA) was about 3.1% farm, 2.0% forestry/fishing/farm services, 0.5% mining, 6% construction, 11.5% manufacturing, 16.1% government, 22.8% trade, 11.5% transportation/utilities/finance/insurance/real estate, and 29.5% services.	
POLICY DIRECTION		
Status Quo	Increasing employment in services, government, technology and trade. Less or stable employment in natural resource industries and manufacturing. More employment in rural areas attributable to outdoor recreation, second home development, migration from urban/suburban areas to rural towns and cities.	
	Effect in Comparison to the Status Quo Condition:	
Natural Focus	Positive effect from breaching dams and construction of new power capacity is positive but very temporary. Dam breaching, loss of hydropower, land retirement for habitat and other actions would cause enormous employment consequences. Permanent job losses from increased power costs; loss of transportation, flatwater recreation, commercial fishing, other industries, increased agricultural costs, and agricultural and grazing land retirement. New jobs created in restored fishery, river recreation and trucking/rail do not offset job losses in other sectors.	
Weak Stock Focus	Similar to Natural Focus, but losses and gains are both smaller. Agricultural and forestry losses are relatively smaller because of increased focus on active restoration, management and positive incentives.	
Sustained Use Focus	No effects through breaching. Some loss through increased power costs, increased taxes and, subsequently, reduced discretionary income. Employment benefit of new power capacity construction would come sooner than under Status Quo. Increased employment in agricultural and forestry services associated with land management. Commercial fishing effects negative initially, positive later. Overall, decreased employment in sectors where power consumers and agriculture spend and increased employment where natural resource and land management services spend. Employment effects about neutral overall.	
Strong Stock Focus	Small increase employment due to market certainty and predictability, continuation of inexpensive and reliable power, and increased spending for hatcheries. Employment effects about neutral overall.	
Commerce Focus	Economy would grow more than under Status Quo, thereby, increasing employment. More employment in hatcheries and fish farms.	

5.3.3.2 Tribes

The table below shows how tribal concerns would be affected by the Policy Directions. All tribal effects are above and beyond, and independent of, economic and social values tribal members experience in their roles in the larger society. Concern for effects include those on the ability to harvest fish, as well as on human-centered tribal concerns such as health, spirituality, and tradition. Tribal health is associated with consumption of

traditional foods such as salmon, and additional income from fishing that enables better life style and health care. Spirituality is associated with the quality and opportunities for ceremonial harvest that have religious significance, and the ability to sustain religious and cultural traditions. Traditions include ability to use traditional resources and places at traditional times in traditional ways.

Potential changes are shown, by shading, to indicate whether a given Policy Direction would tend to have effects in the identified subcategory that are the same as, greater than, or less than, existing conditions from the perspective of tribal members.

Table 5.3-6A: Tribal Effects across the Policy Directions

Effects Subcategory	Status Quo	Natural Focus	Weak Stocks	Sustained Use	Strong Stocks	Com. Focus
Fish Harvest						
Health						
Spirituality						
Tradition						

Summary of Effects: Tribal fish harvest is associated with the non-commercial realization of treaty harvest rights and historical harvest practices. Tribal health, spirituality, and tradition are all positively associated with subsistence harvest, restoration of habitat, diversity of native fish and wildlife species and recovery of lands made available for tribal use.

Natural Focus and Weak Stock provide the more diversified fish harvest and land restoration. Sustained Use Focus could provide increased harvest and utilization, but some upriver stocks, especially Snake River and other severely depressed stocks, would not recover as much. Strong Stock and Commerce Focus are designed to provide more fish through greater use of hatcheries, but some observers believe tribes would be made worse off because of changes that would be required in traditional practices (such as fishing locations defined by treaties). The Effect Area table below expands on this reasoning.

Table 5.3-6B: Tribal Effects across the Policy Directions (Detail)

	EFFECT AREA: TRIBES (1): Fish Harvest less = worse
Existing Conditions	Tribal harvest substantially reduced from historic levels. Most upriver opportunities lost.
POLICY DIRECTION	
Status Quo	Harvest and utilization opportunities expected to continue at about the same as existing conditions.
	Effect in Comparison to the Status Quo Condition:
Natural Focus	Until stocks recover, ceremonial and subsistence fishing levels only. Then, more diversified harvest would occur, but be limited to surpluses above naturally sustaining populations. Long-run effects would be beneficial as fish runs recover and return to numerous rivers.
Weak Stock Focus	Similar to Natural Focus. Tribes would adopt more selective harvest methods to avoid weak stocks. Fishing would occur as long as weak stocks were not negatively affected. Long-run effects might be beneficial (more harvest opportunities in more locations).
Sustained Use Focus	Tribal harvest would be allowed as long as weak stocks were not negatively affected. However, benefits for some tribes might be less than Natural Focus or Weak Stock because upriver stocks would not be recovered as much. Upriver stocks about the same as Status Quo, overall effects about the same as Status Quo.
Strong Stock Focus	Tribal fishing would occur as long as healthy stocks were not negatively affected. Hatchery-supplemented stocks would be used to meet mainstem and tributary tribal harvest objectives. Overall, about the same as Status Quo.
Commerce Focus	Some tribal fishing opportunities would be created with artificial production and fish farming, but some upriver opportunities are reduced. Overall, worse than under Status Quo.

	EFFECT AREA: TRIBES (2): Health, Spirituality and Tradition
Existing Conditions	Health, spirituality, and tradition impaired by loss of subsistence and ceremonial harvest, loss of wildlife, and loss of traditional lands.
POLICY DIRECTION	
Status Quo	Similar to existing conditions except spirituality and tradition further impaired by increasing non-Indian population and competition for resources.
	Effect in Comparison to the Status Quo Condition:
Natural Focus	Relative to Status Quo, tribes would benefit by increasing subsistence and ceremonial harvest and access to hunting and riverside lands once used for cultural, material, and spiritual purposes. [39]
Weak Stock Focus	Similar to Natural Focus, although certainty of fish restoration would be less than for Natural Focus. Tribes would benefit by regaining access to restored lands and resources once used for cultural, material, and spiritual purposes. Reservation employment opportunities, income and health associated with active restoration might increase.
Sustained Use Focus	Some tribes would benefit from increased utilization opportunities, especially

[39] Draft Summary, Corps, 1999a, p. 27.

	EFFECT AREA: TRIBES (2): Health, Spirituality and Tradition
	downriver. Upriver stocks may not be improved as much, but upriver fish and wildlife opportunities should increase overall. Reservation employment opportunities associated with active restoration might increase. Overall, more opportunities than under Status Quo.
Strong Stock Focus	Further loss of weak stocks would be damaging to tribal culture and well-being. However, healthy stocks would increase, and associated tribal health and well-being may also increase. Some tribes would benefit from increased fishing opportunities, especially downriver. Reservation employment opportunities associated with active restoration might increase. Overall, however, the same or slightly fewer opportunities than under Status Quo.
Commerce Focus	Tribal health and spirituality would be adversely affected by loss of traditional fishing practices and locations (defined by treaties), change in fishing techniques and increased competition from non-Indian use of resources and population growth. Worse to much worse than under Status Quo.

5.3.3.3 Costs and Funding

Concern for funding includes effects on ratepayers, who ultimately pay the costs of BPA's fish and wildlife programs), federal taxpayers, and state, tribal, and private/commercial interests who may be called on to fund fish and wildlife recovery and mitigation. The table below shows how funding would be affected by the Policy Directions. Effects are shown, by shading, to indicate whether a given Policy Direction would increase or decrease costs of fish and wildlife programs. An increase in costs is characterized as worse on this table.

Table 5.3-7A: Funding Effects across the Policy Directions

Effects Subcategory	Status Quo	Natural Focus	Weak Stocks	Sustained Use	Strong Stocks	Com. Focus
Ratepayers						
Federal Taxpayers						
States						
Private/ Commercial						

Summary of Effects: The Natural Focus Policy Direction would have the largest costs and reduce hydropower and tax revenues most. Therefore, ability to fund fish and wildlife improvements would be most uncertain. A large private or federal contribution

would be needed. Weak stock has similar but less extreme funding problems. Sustained Use Focus has costs larger than under Status Quo, but ability to fund these costs would not be much impaired relative to Status Quo. Strong Stocks would have total costs similar to Status Quo, and Commercial Focus would have less cost.

The Effect Area table below expands on this reasoning.

Table 5.3-7B: Funding Effects across the Policy Directions (Detail)

	EFFECT AREA: FUNDING (1): Ratepayers paying more = worse
Existing Conditions	Ratepayers fund approximately $250 million annually in fish and wildlife costs consisting of $100 million of direct fish and wildlife expenses, $40 million of expenses reimbursed to other agencies, and $110 million of debt service on capital investments such as hatcheries and bypass facilities.
POLICY DIRECTION	
Status Quo	Similar to existing conditions. Trend has been toward increased expenditure.
	Effect in Comparison to the Status Quo Condition:
Natural Focus	Removal of dams and habitat acquisition costs are partially paid by ratepayers, and rates go up because of need to purchase replacement power. Amount of cost passed to ratepayers likely to be limited by maximum sustainable revenue, so more costs would be passed to taxpayers. Very adverse effects on ratepayers.
Weak Stock Focus	Removal of dams and habitat acquisition costs are partially paid by ratepayers, and rates go up because of need to purchase replacement power. Additional ratepayer costs not as large as Natural Focus. Amount of cost passed to ratepayers may be limited by maximum sustainable revenue. Adverse effects on ratepayers.
Sustained Use Focus	Additional fish recovery costs paid by ratepayers. Power rates would rise, but at slower pace than Weak Stock Focus. Amount of cost passed to ratepayers could be limited by maximum sustainable revenue. Adverse effects on ratepayers.
Strong Stock Focus	Less than, or about the same as current expenditures, as weak stock costs are no longer required. Amount of cost passed to ratepayers not likely to be limited by maximum sustainable revenue. About the same as Status Quo.
Commerce Focus	Less than current expenditures. Expanding commercial sector tends to lessen burden on ratepayers. Amount of cost passed to ratepayers not limited by maximum sustainable revenue. Less ratepayer cost than under Status Quo.

	EFFECT AREA: FUNDING (2): Federal and State Taxpayers, Other State, Private and Commercial paying more = worse
Existing Conditions	Important costs are paid by federal taxpayers, and some costs are paid by State taxpayers, lottery revenues, fishing and hunting licenses, and other user fees. Private regulatory costs and value of voluntary contributions are unknown.
POLICY DIRECTION	
Status Quo	Share of costs paid by taxpayers, other state funds, licenses and user fees would remain about the same as existing conditions.

	Effect in Comparison to the Status Quo Condition:
Natural Focus	A large increase in federal funding relative to Status Quo. Share of costs and amount of costs paid by persons other–than–ratepayers probably the largest because amount of electricity generation reduced most. Regulatory costs also may be high; depends on use of regulation versus positive subsidies. Very adverse effect compared to Status Quo with respect to Federal; adverse as to others.
Weak Stock Focus	An increase in federal funding relative to Status Quo. Share of costs paid by persons other-than-ratepayers probably large, but not as large as Natural Focus. Adverse effect compared to Status Quo.
Sustained Use Focus	An increase in federal funding relative to Status Quo. Greater likelihood that the ratepayers and the region would be able to finance their share of the additional expenditures. Adverse effect compared to Status Quo.
Strong Stock Focus	A small increased financial burden on federal and state taxpayers, or a small decreased burden. About the same as Status Quo.
Commerce Focus	No additional financial burden on federal taxpayers, but State and private costs might be reduced. Cost share paid by resource users (fishers and hunters) would increase. Adverse effect compared to Status Quo with respect to non-Federal taxpayers.

5.3.3.4 Cultural/Historical Resources

The table below shows how cultural and historical resources might be affected by the Policy Directions. Cultural concerns include archaeological resources that may be exposed or hidden beneath the surface of water or land. Historical resources include historical and prehistoric and other structures built within written history. Changes are shown, by shading, to indicate whether a given Policy Direction would tend to have effects that are the same as, greater than, or less than under Status Quo. Changes that cause increased losses of cultural resources are worse. Changes that save cultural resources are better.

Table 5.3-8A: Cultural/Historical Effects across the Policy Directions

	Status Quo	**Natural Focus**	**Weak Stocks**	**Sustained Use**	**Strong Stocks**	**Com. Focus**
Cultural/ Historical Resources						

Summary of Effects: The most important sources of effects are exposure of inundated archeological sites and destruction of historical structures. The Effect Area table below expands on this reasoning.

Table 5.3-8B: Cultural/Historical Effects across the Policy Directions (Detail)

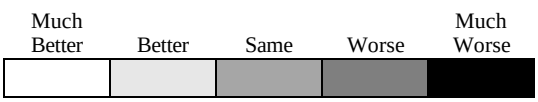
	EFFECT AREA: SOCIAL (1): Cultural/Historical Resources loss of resources = worse	
Existing Conditions	Some cultural resources have been inundated by reservoirs and buried by sediment. Many historical structures exist throughout the region.	
POLICY DIRECTION		
Status Quo	Same as existing conditions. Some loss of historical and cultural resources over time.	
	Effect in Comparison to the Status Quo Condition:	
Natural Focus	Sites that have been covered and protected by water for years would be exposed. There would be some benefit from documenting the resources, but there would be greater adverse impact on the exposed sites from vandalism. Some historical structures abandoned or removed. The effects would worse than under Status Quo.	
Weak Stock Focus	The effects would be nearly the same as for Natural Focus, except fewer reservoirs would be drawn down. The overall impact would be more adverse than under Status Quo.	
Sustained Use Focus	Similar to Status Quo. Some historical structures might be removed.	
Strong Stock Focus	Less exposure than under Status Quo, as reservoirs would remain more constant.	
Commerce Focus	There would likely be less exposure of inundated cultural sites than under Status Quo, as dramatic flow and spill regimes would be abandoned.	

5.3.3.5 Aesthetics

The table below shows how aesthetics might be affected by the Policy Directions. Aesthetics includes the difficult-to-measure natural elements of the Pacific Northwest (other than air quality) that bring pleasure to the lives of its inhabitants. Changes are shown, by shading, to indicate whether a given Policy Direction would tend to have effects that are the same as, greater than, or less than under Status Quo. Diminished aesthetics are characterized as worse.

Table 5.3-9A: Aesthetics Effects across the Policy Directions

	Status Quo	Natural Focus	Weak Stocks	Sustained Use	Strong Stocks	Com. Focus
Aesthetics						



Summary of Effects: The most important sources of effects are visibility of naturally appearing landscapes and exposure of reservoir bottoms. The Effect Area table below expands on this reasoning.

Table 5.3-9B: Aesthetic Effects across the Policy Directions (Detail)

	EFFECT AREA: SOCIAL (2): Aesthetics (More natural features = better)	
Existing Conditions	Aesthetics is a value judgment that differs by person. Aesthetic resources for some persons include natural features, native vegetation, and wildlife. For others, aesthetic resources may be reservoirs, developed land, or farms. Most people prefer appearance of clean air and water. Air quality effects were covered in a previous table.	
POLICY DIRECTION		
Status Quo	Same as existing conditions, except more developed land.	
	Effect in Comparison to the Status Quo Condition:	
Natural Focus	Riverbeds exposed until re-vegetated. Eventually re-establishing a free-flowing river. Limited access by humans, less economic activity such as logging. More land in wild vegetation, more recovery to natural state. Fewer developed features. Much better than under Status Quo.	
Weak Stock Focus	Riverbeds exposed until re-vegetated. Some re-establishment of free-flowing river. More land in wild and native vegetation, more restoration to natural state, less development and access in weak stock watersheds. Better than under Status Quo.	
Sustained Use Focus	Little exposure of reservoir bottoms, but maybe more than under Status Quo. More land in native vegetation. About the same as Status Quo.	
Strong Stock Focus	About the same urbanization and development. About the same as Status Quo.	
Commerce Focus	Increased urbanization and industrialization would typically result in negative visual effects. Adverse effects compared to Status Quo.	

5.4 ENVIRONMENTAL CONSEQUENCES OF RESERVE OPTIONS

Just as certain potential actions within the scope of this DEIS would have been considered unreasonable 5-10 years ago, actions currently dismissed as unreasonable may become viable 5-10 years from now. Such actions, representing the more extreme approaches to the fish and wildlife recovery, are characterized in this DEIS as Reserve Options (please see Chapter 4). Undoubtedly, fish and wildlife policy will adjust to accommodate the advancement of science or a material change in circumstances. The Reserve Options may provide future decisionmakers with the ability to extend or intensify a Policy Direction to fit future circumstances. For example, these sharply divergent actions could be implemented in response to a drastically lower regional priority for fish and wildlife recovery; the successful recovery of a listed species of fish and wildlife; or the continued collapse and further listings of fish and wildlife due to unsatisfactory recovery efforts.

Extreme measures at a given point in time are usually imprudent measures, and fish and wildlife policy is no exception to this rule. However, the relationship methodology provides the analytical flexibility to assess, at least preliminarily, the range of actions and degree of the impacts associated with extreme circumstances. As demonstrated in Table

5.4-1, these extreme actions produce some unwanted and unexpected results under existing circumstances.

For example, the Reserve Options RO-1 through RO-6 push the concept or theme of the Natural Focus Policy Direction to extremes. These Options would include the following actions:

- Restore pre-dam habitat (RO-1) and/or preserve all existing habitat (RO-2).
- Ban all harvest (RO-3).
- No hatcheries (RO-4).
- Operate the existing hydrosystem entirely for fish and wildlife (RO-5) or breach/remove all of the mainstem dams (RO-6).

Reserve Options RO-7 through RO-12 push the theme of a more extreme Commerce Focus Policy Direction. These Options would include the following actions:

- Restore habitat only if most cost-effective (RO-7), or maximize commercial use of habitat resources (RO-8).
- Allow unrestricted harvest (RO-9).
- Maximize artificial production (RO-10).
- Operate existing hydrosystem entirely for commercial purposes (RO-11), or build new dams if cost-effective (RO-12).

The following is an illustration of the possible long-term environmental consequences of these extreme measures compared to Status Quo. Keep in mind that in the short-term, certain impacts could be extraordinary; however, the long-term impacts would be the objective of a future decisionmaker and, therefore, are the basis for the assessments in Table 5.4-1.

Table 5.4-1: Comparison of the Main Sets of Reserve Options Against Baseline Conditions* and Summary of Effects

Effect Category	***Status Quo****	***Reserve Options 1-6 Extending Natural Focus***	***Reserve Options 7-12 Extending Commerce Focus***
NATURAL ENVIRONMENT			
Land Habitat Upland			
Riparian/Wetland			
Water Habitat: Nitrogen Supersaturation			
In-Stream Water Quality			
Non-Thermal Pollution			
Sedimentation			
Temperature/Dissolved Gas			
Amount of River Habitat			
Reservoir Habitat			
Fish & Wildlife Anadromous Fish			
Resident Fish			
Wildlife			
Air Quality			
SOCIAL and ECONOMIC			
Commerce Commercial Interests			
Recreation (including fishing & hunting)			
Economic Development			
Tribes Fishing Harvest			
Health, Spirituality, & Tradition			
Costs and Funding			
Cultural/Historical Resources			
Aesthetics			

* Status Quo = Baseline conditions. For more information on existing conditions, please see Section 2.4.

	EFFECT AREA: LAND More habitat = better	
Reserve Options	**Effect in Comparison to the Status Quo Condition:**	
Reserve Options (1-6) Extending Natural Focus	In the short term, riparian habitat would be eliminated as river boundaries change due to breaching. New riparian habitat would gradually and naturally re-establish along new river banks. Emphasis on passive restoration and preservation following a natural progression of fish and wildlife recovery without a specific target species. Terrestrial/riparian restoration by ceasing human land-use activities such as farming, grazing, mining, and development in or encroaching upon pristine wilderness areas. Periodic natural disturbance events would reset restoration trajectories. Overall natural habitat improvement is much greater than under Status Quo	
Reserve Options (7-12) Extending Commerce Focus	Land not preserved for habitat unless benefits exceed costs. Some existing terrestrial habitat would be developed for commercial interests. Federal, regional and state programs for habitat restoration would be limited and focused on the land most valuable for species and less valuable for commercial interests. Emphasis on private, cost-effective, and efficient habitat preservation and creation. Use market incentives, such as tradable mitigation credits. Increase in artificial habitat or preservation as a trade against new development. Provide incentives (start-up grants, tax breaks, etc.) and technical assistance to encourage local landowners, businesses, corporations, and trustee agencies to improve and protect wetland, riparian and terrestrial areas. The amount of fish and wildlife habitat would likely be less than under Status Quo.	

	EFFECT AREA: WATER (1): Nitrogen Super Nitrogen supersaturation More = worse	
Reserve Options	**Effect in Comparison to the Status Quo Condition:**	
Reserve Options (1-6) Extending Natural Focus	Several dams would be breached. The closer the return to a natural river, the less nitrogen supersaturation would remain a problem. A completely natural river (no dams anywhere) would return nitrogen supersaturation levels to those that would have occurred as a result of flow dynamics experienced for the given natural structures (e.g., water falls, rapids, etc.). Those dams that remained might elevate TDG locally per Status Quo situation.	
Reserve Options (7-12) Extending Commerce Focus	Except in instances of flood control releases or large flows, spill would be minimized with a commercial focus. Therefore, saturated gas problems would be the same or less than under Status Quo.	

	EFFECT AREA: WATER (2): In-Stream Water Quantity More = better	
Reserve Options	**Effect in Comparison to the Status Quo Condition:**	
Reserve Options (1-6) Extending Natural Focus	Substantially reduce existing surface water withdrawal through land retirement. Improve instream flows, reduce water temperature, and improve water quality relative to Status Quo. Surface water screening and irrigation management would be used on many remaining diversions. Increase water conservation. Municipal withdrawals would continue, but with intense efforts to meet increased conservation standards. Remaining storage would be managed to mimic natural flow conditions. In the short term, sedimentation could significantly impair downstream river quality.	

	EFFECT AREA: WATER (2): In-Stream Water Quantity More = better
Reserve Options (7-12) Extending Commerce Focus	Irrigation, industrial, and municipal water withdrawals would increase more than under Status Quo to accommodate growing population, commercial, and residential needs. Cost-effective and efficient screening might be used to avoid direct mortality of listed stocks. Non-thermal pollution levels are likely to increase (see below). Use of storage and flows for fish would decrease in comparison to Status Quo.

	EFFECT AREA: WATER (3): Non-thermal pollution More = worse
Reserve Options	**Effect in Comparison to the Status Quo Condition:**
Reserve Options (1-6) Extending Natural Focus	Improve water quality by eliminating sources of pollution overall. Eliminate discharges of other contaminants to meet more stringent water quality criteria. Strong new controls on wastewater and other point and non-point sources. Increased water quality standards along with stronger enforcement. Drafting reservoirs or breaching dams could stir up contaminants, which would be adverse for humans, fish, and wildlife in the short term. In the long term, however, on-thermal pollution would be less than under Status Quo.
Reserve Options (7-12) Extending Commerce Focus	Existing water quality standards may be eased. Emphasize voluntary compliance rather than regulation. Some use of positive incentives, some additional pollution allowed, trading of pollution credits allowed to accommodate industrial growth. Pollution controls must be efficient. Non-thermal pollution may become somewhat worse than under Status Quo.

	EFFECT AREA: WATER (4) Sedimentation More = worse
Reserve Options	**Effect in Comparison to the Status Quo Condition:**
Reserve Options (1-6) Extending Natural Focus	Sediment increase downstream from breached facilities for 5-10 years as accumulated reservoir sediments are flushed downstream. Agricultural land retirement and reduction in other human uses reduces sediment loads over the long term relative to Status Quo.
Reserve Options (7-12) Extending Commerce Focus	Sedimentation will increase as urbanization, agricultural and commercial development increase, but minimally would comply with water quality standards. Prime watersheds probably would improve. Sediment controls must be efficient (benefits exceed costs). The overall sedimentation may get worse than under Status Quo due to development.

	EFFECT AREA: WATER (5): Temperature/Dissolved Oxygen higher = worse
Reserve Options	**Effect in Comparison to the Status Quo Condition:**
Reserve Options (1-6) Extending Natural Focus	A return to a natural river, natural tributaries, land retirement and strong thermal pollution controls could gradually help recreate presettlement water temperature ranges, including normal fluctuations for the rivers affected. Upstream reservoirs (upper Columbia, upper Snake, Clearwater) would have to be managed for flow in dry years to avoid downstream problems. Less opportunity for solar heating. Fewer opportunities to control temperature through controlled releases. Overall, both temperature and dissolved oxygen would be somewhat better than under

	EFFECT AREA: WATER (5): Temperature/Dissolved Oxygen higher = worse	
	Status Quo, but conditions would be worse or not improved in very dry conditions.	
Reserve Options (7-12) Extending Commerce Focus	Manage thermal pollution to insure health and safety of human needs and consumption. Any temperature or gas control must be cost-effective, and much would be regulatory driven. Temperature in prime watersheds might improve. Overall, temperatures and dissolved oxygen may be slightly worse than under Status Quo. If more dams are built, more reservoirs would be created, which would likely increase water temperature.	

	EFFECT AREA: WATER (6):Amount of Stream/River Habitat more = better	
Reserve Options	**Effect in Comparison to the Status Quo Condition:**	
Reserve Options (1-6) Extending Natural Focus	Much more stream and river habitat created by breaching or drawdown of up to six reservoirs and removal of some dams on tributaries.	
Reserve Options (7-12) Extending Commerce Focus	About the same as or less than under Status Quo because only cost-effective actions would be taken. Also, if more dams were built, some river habitat would be converted to reservoir habitat.	

	EFFECT AREA: WATER (7): Amount of reservoir habitat more=better	
Reserve Options	**Effect in Comparison to the Status Quo Condition:**	
Reserve Options (1-6) Extending Natural Focus	Reservoir habitat would be eliminated as storage dams are breached. If all dams were removed, reservoir habitat would be limited to that created by natural reservoirs. Amount of reservoir habitat would be much less than under Status Quo.	
Reserve Options (7-12) Extending Commerce Focus	The existing reservoir system would be preserved for commercial purposes. If more dams are built (if cost-effective), more reservoir habitat would be created. The amount of habitat would be the same or more than the Status Quo.	

	EFFECT AREA: FISH AND WILDLIFE (1): Anadromous Fish More = better	
Reserve Options	**Effect in Comparison to the Status Quo Condition:**	
Reserve Options (1-6) Extending Natural Focus	Restoration to natural land and water conditions, and elimination of all harvest. Would likely recover natural spawning anadromous fish and lamprey in the long run, with several caveats. Natural conditions may not be attainable in decades or ever, and harvest may not be completely controllable (other nations may continue to allow harvest). Because hatcheries would be completely eliminated, the abundance of anadromous fish (natural and hatchery populations combined) would dramatically decrease in the short run, and some populations might become so small that they cannot recover. Even with maximum actions, it is unlikely that fish populations would approach pre-European immigration levels. However,	

	EFFECT AREA: FISH AND WILDLIFE (1): Anadromous Fish More = better	
	over the long term, abundance of natural spawning fish should be better than under Status Quo.	
Reserve Options (7-12) Extending Commerce Focus	De-emphasize importance of native stocks. Some weak stocks may become extinct. Focus on producing a commercially viable salmon harvest and related industries using least-cost production, primarily hatcheries and fish farming. Mainstem species focus (fall chinook). Total run size might increase even if natural spawning runs decrease. Overall numbers less than under Status Quo.	
	EFFECT AREA: FISH AND WILDLIFE (2): Resident Fish More = better	
Reserve Options	**Effect in Comparison to the Status Quo Condition:**	
Reserve Options (1-6) Extending Natural Focus	Restoration to natural land and water conditions, phase-out of hatcheries, and elimination of most harvest. As more dams are breached, less habitat will be available for resident fish and some populations would be completely lost. There is an inherent tradeoff between preserving anadromous fish and preserving resident fish. Even if the existing hydrosystem is operated entirely for fish and wildlife, resident fish would likely be sacrificed in favor of anadromous fish. Those naturally spawning resident fish that are able to survive in a free-flowing river may increase in the long run as habitat improvements are made. But the total resident fish population (naturally spawning plus hatchery fish) would be dramatically reduced in the short run as hatcheries are eliminated. In the long term, as the river returns toward pre-European settlement conditions, resident fish populations would be much less than under Status Quo.	
Reserve Options (7-12) Extending Commerce Focus	De-emphasize importance of native stocks. Some weak stocks may become extinct. Focus on maintaining resident fish harvest for recreation using least-cost production, primarily hatcheries supported by recreation fees. Overall numbers similar to Status Quo.	
	EFFECT AREA: FISH AND WILDLIFE (3): Wildlife More = better	
Reserve Options	**Effect in Comparison to the Status Quo Condition:**	
Reserve Options (1-6) Extending Natural Focus	The goal of extending the Natural Focus Policy Direction is not to increase particular species, but rather to let the river and the land return to natural balance. Some species may benefit from these conditions, while others may not. Passive restoration to natural land conditions and elimination of harvest would likely increase native wildlife populations. However, non-native species may also benefit from an increase in available habitat, and may out-compete native species. Species dependent upon reservoir habitat would decrease as this habitat is eliminated (as storage dams are breached). Over the long term, abundance of wildlife should be much better than under Status Quo.	
Reserve Options (7-12) Extending Commerce Focus	De-emphasize importance of native populations. Some weak populations may become extinct. Focus on managing wildlife for fee-based recreation (i.e. hunting, zoos, nature parks) or other purposes (food or clothing production), assuming fees or sales are sufficient to cover the costs of management. Wildlife habitat would become more scarce. Overall numbers less than under Status Quo.	

	EFFECT AREA: AIR QUALITY More pollution = worse
Reserve Options	**Effect in Comparison to the Status Quo Condition:**
Reserve Options (1-6) Extending Natural Focus	Requires a large increase in replacement of hydropower from breaching or drawdown of up to six dams, mainly from new combustion turbines and prolonging use of existing coal facilities over Status Quo. Air pollutants would increase substantially under this Policy Direction. Increased coal generation would dramatically increase PM10, CO, CO2, SOX and NOX emissions. Additional combustion turbine plants would produce NOX and CO2 (but much less than coal because of their greater efficiency) and some PM10. In addition, emissions would increase considerably from the new truck and train traffic needed to replace current barging. Dam deconstruction would result in more airborne particulate matter, and as reservoirs empty, dust would rise from newly exposed land. As new vegetation then covers the land, dust would decrease, so those effects would be temporary.
Reserve Options (7-12) Extending Commerce Focus	Maximizes use of existing hydro system, indefinitely delays the need for replacement resources beyond Status Quo. Regional commercial competitiveness, however, could attract new industry, increasing PM_{10} and CO_2air emissions slightly. More dams could be built if cost-effective. Overall, air emissions are likely less than under Status Quo.

	EFFECT AREA: COMMERCE : Commercial Interests less = worse
Reserve Options	**Effect in Comparison to the Status Quo Condition:**
Reserve Options (1-6) Extending Natural Focus	Hydropower taken off-line, replaced with non-hydro power generation. Commercial activity would dramatically decrease from current levels, as electricity costs go up and. Very large adverse effects compared to Status Quo.
Reserve Options (7-12) Extending Commerce Focus	Law of supply and demand would dictate power mix; however, hydropower generation would likely be increased compared to Status Quo. New dams could be built, if cost-effective. Industry-friendly approach to air- and water-quality standards would likely result in lower costs of compliance. Commercial interests would likely prosper and expand more than under Status Quo.

	EFFECT AREA: COMMERCE : Recreation (including fishing & hunting) less = worse
Reserve Options	**Effect in Comparison to the Status Quo Condition:**
Reserve Options (1-6) Extending Natural Focus	Harvest of both fish and wildlife would be banned. Reservoir recreation (boating, waterskiing) would be greatly diminished as storage dams are breached, and most other recreation would be restricted so that riparian, wetland, and upland areas can return to pre-dam conditions. In the long term, tourism and recreation may increase as natural rivers are restored, but access to these sites would be restricted. Recreation opportunities would be much less than Status Quo.
Reserve Options (7-12) Extending Commerce Focus	Because unrestricted harvest would be allowed, fishing and hunting opportunities would dramatically increase in the short term. An absence of regulation may result in some populations being harvested to extinction. Recreation resources (hiking trails, lakes) would be managed on a fee-for-service basis through user fees and licenses, with prices reflecting the costs of maintaining those resources.

	For fishing and hunting, the costs for sustaining those populations targeted for harvest (through production hatcheries, habitat enhancement, etc.) would be borne by user groups. Over the long term, recreation would likely be more expensive, and less accessible to users, than under Status Quo.

	EFFECT AREA: COMMERCE : Economic Development less = worse
Reserve Options	**Effect in Comparison to the Status Quo Condition:**
Reserve Options (1-6) Extending Natural Focus	Economic development would be restricted, and in some cases relocated, as existing habitat is protected and pre-dam habitat is restored. Very large adverse effects compared to Status Quo.
Reserve Options (7-12) Extending Commerce Focus	Economic development would be largely unrestricted, compared to Status Quo, and electricity costs would be less. Therefore, more development would be expected.

	EFFECT AREA: TRIBES (1): Fish Harvest less = worse
Reserve Options	**Effect in Comparison to the Status Quo Condition:**
Reserve Options (1-6) Extending Natural Focus	No harvest. Very large adverse effects compared to Status Quo.
Reserve Options (7-12) Extending Commerce Focus	Lifting of restrictions on harvest would increase tribal harvest opportunities in the short term. In the long term, populations targeted for harvest might be diminished. Costs associated with maintaining harvest opportunities would be borne by tribes as well as other user groups. Like other fish and wildlife resource managers, tribes could generate income by offering harvest opportunities to the public on a fee-for-service basis. Overall, worse than under Status Quo.

	EFFECT AREA: TRIBES (2): Health, Spirituality and Tradition
Reserve Options	**Effect in Comparison to the Status Quo Condition:**
Reserve Options (1-6) Extending Natural Focus	Relative to Status Quo, tribes would benefit by increasing subsistence and ceremonial harvest and access to hunting and riverside lands once used for cultural, material, and spiritual purposes. [40]
Reserve Options (7-12) Extending Commerce Focus	Tribal health and spirituality would be adversely affected by loss of traditional fishing practices and locations (defined by treaties), change in fishing techniques and increased competition from non-Indian use of resources and population growth. Worse to much worse than under Status Quo.

[40] Draft Summary, Corps, 1999a, p. 27.

	EFFECT AREA: SOCIAL (1): Costs and Funding paying more = worse	
Reserve Options	**Effect in Comparison to the Status Quo Condition:**	
Reserve Options (1-6) Extending Natural Focus	Removing additional dams and increased habitat acquisition will further deplete the hydro-system and dramatically increase energy costs.	
Reserve Options (7-12) Extending Commerce Focus	Maximizing hydro-operations would drop energy costs for the region even further. However, the cost to compensate for the heavy toll of such practices on fish and wildlife would allay much of the cost savings. Overall costs would decrease, but the environmental impact would be substantial.	

	EFFECT AREA: SOCIAL (1): Cultural/Historical Resources loss of resources = worse	
Reserve Options	**Effect in Comparison to the Status Quo Condition:**	
Reserve Options (1-6) Extending Natural Focus	Sites that have been covered and protected by water for years would be exposed. Access to these sites would be restricted, which would result in less vandalism, but also less use and enjoyment of the sites. Overall, the effects would be about the same as Status Quo.	
Reserve Options (7-12) Extending Commerce Focus	There would likely be less exposure of inundated cultural sites than under Status Quo, as flow and spill regimes would be abandoned. However, restrictions on economic development would be eased, so it is likely that development would proceed in culturally sensitive areas. Also, funding for cultural resource protection would be cut back or eliminated. The effects on cultural resources would be worse than under Status Quo.	

	EFFECT AREA: SOCIAL (2): Aesthetics (More natural features = better)	
Reserve Options	**Effect in Comparison to the Status Quo Condition:**	
Reserve Options (1-6) Extending Natural Focus	Riverbeds exposed until re-vegetated. Eventually re-establishing a free-flowing river. Limited access by humans, less economic activity such as logging. More land in wild vegetation, more recovery to natural state. Less developed features. Much better than under Status Quo in the long term; worse than under Status Quo in the short term.	
Reserve Options (7-12) Extending Commerce Focus	Increased urbanization and industrialization would typically result in negative visual effects. Adverse effects compared to Status Quo.	