

sites identified in the Corps' April, 2002, letter do not provide PCEs for proposed and designated critical habitat.

Indirect effects are analyzed in section 6.2.2 of this Opinion. The effects analysis from NMFS' 2002 Opinion addresses the newly-proposed PCEs. This is because the essential features addressed in the 2002 Opinion (*i.e.*, substrate, water quality, food, riparian vegetation, and safe passage conditions) are encompassed by these new PCEs. The analysis for physical indicators such as bathymetry and salinity illustrated that the potential effects from the Project are limited in nature and not anticipated to affect critical habitat to any appreciable degree.

In addressing potential impacts critical habitat from the Project, NMFS also recognizes that the adaptive management process identified in the 2002 Opinion will be an essential tool to respond to new information generated from Project monitoring. This mechanism provides the ability to add future conservation measures to the Project if new information suggests that effects to habitat might diminish its value in a way that would affect species recovery.

8. CUMULATIVE EFFECTS

8.1 Introduction

Cumulative effects are defined in 50 C.F.R. part 402.02 as “those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation.” The action area of the proposed action under consideration encompasses the Lower Columbia River (from Bonneville Dam downstream to the upper end of the estuary at RM 40), estuary (RM 40 to RM 3), and river mouth (RM 3 to the deep water disposal site).

The Project area is currently a disturbed estuarine ecosystem altered by previous dredging to establish the navigation channel, disposal of dredged material, diking and filling, sewage and industrial discharges, water withdrawal, and flow regulation, to highlight a few of the anthropogenic activities that have occurred over the last 100 years. Future Federal actions, including the ongoing operation of hydropower systems, hatcheries, fisheries, and land management activities are being (or will be) reviewed through separate Section 7 consultation processes and are not considered cumulative effects.

State, Tribal, and local government actions are likely to be in the form of legislation, administrative rules, or policy initiatives. Government and private actions may include changes in land and water use patterns, including ownership and intensity, any of which could affect ESA-listed salmonids or their habitats. Even actions that are already authorized are subject to political, legislative, and fiscal uncertainties. These realities, added to the geographic scope of the action area, which encompasses numerous government entities exercising various authorities and many private land holdings, make any analysis of cumulative effects difficult. This section identifies representative actions and ongoing state and Tribal fish and habitat restoration plans that, based on currently available information, are reasonably certain to occur. It also identifies, to the extent currently possible, existing goals, objectives, and proposed plans by state and Tribal governments. However, NMFS is unable to determine at this point in time whether such

proposed plans will in fact result in specific actions which will subsequently lead to cumulative effects.

8.2 State Actions

Each state in the Columbia River Basin administers the allocation of water resources within its borders. Water resource development has slowed in recent years. Most arable lands have already been developed, the increasingly diversified regional economy has decreased demand, and there are increased environmental protections. If, however, substantial new water developments occur, cumulative adverse effects to ESA-listed salmonids are likely. NMFS cooperates with the state water resource management agencies in assessing water resource needs in the Columbia River Basin. Through restrictions in new water developments, vigorous water markets may develop to allow existing developed supplies to be applied to the highest and best use. Interested parties have applied substantial pressure, including ongoing litigation, on the state water resource management agencies to reduce or eliminate restrictions on water development. It is, therefore, impossible to predict the outcomes of these efforts with any reasonable certainty.

In the past, each Columbia River Basin state's economy depended on natural resources, with intense resource extraction. Changes in the states' economies have occurred in the last decade and are likely to continue, with less large-scale resource extraction, more targeted extraction, and significant growth in other economic sectors. Growth in new businesses, primarily in the technology sector, is creating urbanization pressures and increased demands for buildable land, electricity, water supplies, waste-disposal sites, and other infrastructure.

Economic diversification has contributed to population growth and movement in all four states, a trend likely to continue for the next few decades. Such population trends will result in greater overall and localized demands for electricity, water, and buildable land in and near the action area; will affect water quality directly and indirectly; and will increase the need for transportation, communication, and other infrastructure. The impacts associated with these economic and population demands will probably affect habitat features such as water quality and quantity, which are important to the survival and recovery of the ESA-listed salmonids. The overall effect will be negative, unless carefully planned for and mitigated.

Some of the state programs described above are designed to address impacts to habitat features. Oregon also has a statewide, land-use planning program that sets goals for growth management and natural resource protection. Washington State enacted a Growth Management Act to help communities plan for growth and address the effects of growth on the natural environment. If the programs continue, they may help lessen the potential for the adverse effects discussed above.

In July 2000, the governors of Idaho, Montana, Oregon, and Washington released their "Recommendation for the Protection and Restoration of Fish in the Columbia River Basin," with the stated goal of "protection and restoration of salmonids and other aquatic species to sustainable and harvest able levels meeting the requirements of the ESA, the Clean Water Act, the Northwest Power Act and Tribal rights under treaties and executive orders while taking into

account the need to preserve a sound economy in the Pacific Northwest.” The recommendations include the following general actions related to the Lower Columbia River:

Habitat Reforms

- Designate priority watersheds for salmon and steelhead.
- Provide local watershed planning assistance and develop the priority plans by October 1, 2002, and for all Columbia River basin watersheds by 2005.
- Integrate Federal, state, and regional planning processes with the Northwest Power Planning Council’s amended Fish and Wildlife Program.
- Cooperate with Federal, Tribal, and local governments to implement the National Estuary Program for the Lower Columbia River estuary, including creation of salmon sanctuaries.

Funding and Accountability

- Seek funding assistance for existing activities designed to improve ecosystem health and fish and wildlife health and protection.
- Work regionally to create a standardized and accessible information system to document regional recovery progress.

If these recommendations are implemented by the states individually and collectively, they should have beneficial effects on ESA-listed salmonids and their habitats.

8.2.1 Oregon

Most future actions by the state of Oregon are described in the Oregon Plan for Salmon and Watershed measures, which include the following programs designed to benefit salmon and watershed health in the Lower Columbia River:

- Oregon Department of Agriculture water quality management plans.
- Oregon Department of Environmental Quality development of Total Maximum Daily Loads (TMDLs) in targeted basins; implementation of water quality standards.
- Oregon Watershed Enhancement Board funding programs for watershed enhancement programs, and land and water acquisitions.
- Oregon Department of Fish and Wildlife (ODFW) and Oregon Water Resources Department (OWRD) programs to enhance flow restoration.
- OWRD programs to diminish over-appropriation of water sources.
- ODFW and Oregon Department of Transportation programs to improve fish passage; culvert improvements/replacements.
- Oregon Division of State Lands and Oregon Parks Department programs to improve habitat health on state-owned lands.
- State agencies funding local and private habitat initiatives; technical assistance for establishing riparian corridors; and TMDLs.

If the foregoing programs are implemented, they may improve habitat features considered important for ESA-listed salmonids. The Oregon Plan also identifies private and public cooperative programs for improving the environment for ESA-listed salmonids. The success and effects of such programs will depend on the continued interest and cooperation of the parties.

8.2.2 Washington

The state of Washington has various strategies and programs designed to improve the habitat of ESA-listed salmonids and assist in recovery planning. Washington's 1998 Salmon Recovery Planning Act provided the framework for developing watershed restoration projects and established a funding mechanism for local habitat restoration projects. It also created the Governor's Salmon Recovery Office to coordinate and assist in the development of salmon recovery plans. Washington's "Statewide Strategy to Recover Salmon," for example, is designed to improve watersheds.

The Watershed Planning Act, also passed in 1998, encourages voluntary planning by local governments, citizens, and Tribes for water supply and use, water quality, and habitat at the Water Resource Inventory Area or multi-Water Resource Inventory Area level. Grants are made available to conduct assessments of water resources and to develop goals and objectives for future water resources management. The Salmon Recovery Funding Act established a board to localize salmon funding. The board will deliver funds for salmon recovery projects and activities based on a science-driven, competitive process. These efforts, if developed into actual programs, should help improve habitat for ESA-listed salmonids.

Washington's Department of Fish and Wildlife and Tribal co-managers have been implementing the Wild Stock Recovery Initiative since 1992. The co-managers are completing comprehensive species management plans that examine limiting factors and identify needed habitat activities. The plans also concentrate on actions in the harvest and hatchery areas, including comprehensive hatchery planning. The Department and some western Washington treaty Tribes have also adopted a wild salmonid policy to provide general policy guidance to managers on fish harvest, hatchery operations, and habitat protection and restoration measures to better protect wild salmon runs.

Washington State's Forest and Fish Plan were promulgated as administrative rules. The rules are designed to establish criteria for non-federal and private forest activities that will improve environmental conditions for ESA-listed salmonids. The Washington legislature may amend the Shoreline Management Act, giving options to local governments for complying with endangered species requirements in marine areas.

The state of Washington also established the Lower Columbia Fish Recovery Board to begin drafting recovery plans for the lower Columbia region. The future impacts of the board's efforts will depend on legislative and fiscal support. The Washington Department of Transportation is considering changing its construction and maintenance programs to diminish effects on stream areas and to improve fish passage. The program may qualify for a limit under NMFS' 4(d) rule to conserve ESA-listed salmonids.

Water quality improvements will be proposed through development of TMDLs. The state of Washington is under a court order to develop TMDL management plans on each of its 303(d) water-quality-listed streams. It has developed a schedule that is updated yearly; the schedule outlines the priority and timing of TMDL plan development.

Washington State closed the mainstem Columbia River to new water rights appropriations in 1995. All applications for new water withdrawals are being denied based on the need to address ESA issues. The state established and funds a program to lease or buy water rights for instream flow purposes. This program was started in 2000 and is in the preliminary stages of public information and identification of potential acquisitions. These water programs, if carried out over the long term, should improve water quantity and quality in the state.

The Lower Recovery Fish Recovery Board (2004) recently issued a subbasin plan, *Lower Columbia Salmon Recovery and Fish & Wildlife Subbasin Plan*. The goal of the plan is to have Washington Lower Columbia salmon and steelhead recovered to healthy, harvestable levels that will sustain productive recreational, commercial, and Tribal fisheries. The plan outlines an adaptive management approach over the next 25 years. The subbasin plan is designed to integrate new information on successes of recovery actions, as well as on threats to salmon and steelhead, so that future work can be tailored to support salmon recovery efforts.

As with Oregon's state initiatives, Washington's programs are likely to benefit ESA-listed salmonids if they are implemented and sustained.

8.3 Local Actions

Local governments will be faced with similar and more direct pressures from population growth and movement. There will be demands for development in rural areas, as well as increased demands for water, municipal infrastructure, and other resources. The reaction of local governments to growth and population pressure is difficult to assess without certainty in policy and funding. However, future development in Oregon will be governed for the foreseeable future by Oregon's statewide land use planning program, and Washington's will be governed by its Growth Management Act, both of which address issues of natural resource protections.

Increased industrialization associated with regional economic trends and growth patterns may also have the potential to result in additional dredging around dock facilities, alteration and loss of riparian areas, increased pollution, alteration and loss of shallow water habitat, and potential additional dredging for deeper access channels to enable ports to compete with other west coast port facilities. Because there is little consistency among local governments regarding current ways of dealing with land use and environmental issues, both positive and negative effects on ESA-listed salmonids and their habitats from other development caused by regional and national growth trends will probably be scattered throughout the action area.

In Oregon and Washington, most local governments are considering ordinances to address effects on aquatic and fish habitat from different land uses. The programs are part of state planning structures. Some local government programs, if submitted, may qualify for a limit under NMFS' 4(d) rule and/or a Section 10 HCP process which is designed to conserve ESA-listed salmonids. Local governments may also participate in regional watershed health programs, although political will and funding will determine participation and, therefore the effect of such actions on ESA-listed salmonids.

LCREP is also completing a subbasin plan, the *Mainstem Lower Columbia River and Columbia River Estuary Subbasin Plan*, for the lower Columbia River and Oregon tributaries. The LCREP

subbasin plan is consistent with the LCFRB's document in that it provides strategies and recommendations for actions that result in fish and wildlife resources and their habitats maintained at healthy levels and clean, safe water that is available for people, fish, and wildlife.

In addition, the Corps is working with the Pacific Northwest National Laboratory, the LCREP, and a number of other interested partners to develop the *Columbia River Estuary Conceptual Model project*

(<https://www.nwp.usace.army.mil/Pm/LCR/docs/CREConceptmodel/START.htm>). The project's purpose is to develop an integrated conceptual ecosystem model of the lower Columbia River and estuary. This model is intended to provide a technical basis for restoration planning, monitoring, and research needs identification.

8.4 Tribal Actions

Tribal governments will participate in cooperative efforts involving watershed and basin planning designed to improve aquatic and fish habitat. The earlier discussion of the effects of economic diversification and growth applies also to Tribal government actions. Tribal governments have to apply and sustain comprehensive and beneficial natural resource programs such as the ones described below, to areas under their jurisdiction to have measurable positive effects on ESA-listed salmonids and their habitats.

One Tribal program illustrates future Tribal actions that should have such positive effects. The *Wy-Kan-Ush-Mi Wa-Kish-Wit*, or "Spirit of the Salmon" plan is a joint restoration plan for anadromous fish in the Columbia River basin prepared by the Nez Perce, Umatilla, Warm Springs and Yakama Tribes. It provides a framework for restoring anadromous fish stocks, specifically salmon, Pacific lamprey (eels), and white sturgeon in upriver areas above Bonneville Dam. The plan's objectives related to the estuary are as follows:

- Protect the remaining wetlands and intertidal areas in the estuary upon which anadromous fish are particularly dependent.
- Undertake an immediate assessment of remaining and potential estuary habitat.
- Protect existing estuary habitat complexity.
- Evaluate and condition additional proposals for hydroelectric and water withdrawal developments, navigation projects, and shoreline developments on the basis of their impact on estuarine ecology.
- Identify and implement opportunities to reclaim former wetland areas by breaching existing dikes and levees.
- Reestablish sustained peaking flows that drive critical river and estuarine processes.

The plan emphasizes strategies and principles that rely on natural production and healthy river systems. The plan's technical recommendations cover hydroelectric operations on the mainstem Columbia and Snake rivers; habitat protection and rehabilitation in the basin above Bonneville Dam, in the Columbia estuary, and in the Pacific ocean; fish production and hatchery reforms; and in river and ocean harvests. Overall, future implementation of the Spirit of the Salmon plan should have positive cumulative effects on ESA-listed salmonids and their habitats.

The Nez Perce, Warm Spring, Umatilla, and Yakama Tribal governments are now seeking to implement this plan and salmon restoration in conjunction with the states, other Tribes, and the Federal government, as well as in cooperation with their neighbors throughout the basin's local watersheds and with other citizens of the Northwest.

8.5 Private Actions

The effects of private actions are the most uncertain. Private landowners may convert their lands from current uses, or they may intensify or diminish those uses. Individual landowners may voluntarily initiate actions to improve environmental conditions, or they may abandon or resist any improvement efforts. Their actions may be compelled by new laws, or they may result from growth and economic pressures. Changes in ownership patterns will have unknown impacts. Whether any of these private actions will occur is highly unpredictable, and the effects are even more so.

There are a number of private environmental groups working in the Lower Columbia River on conserving and restoring ecosystem functions that benefit salmonids. Those groups include the North American Joint Waterfowl Plan, Ducks Unlimited, Sea Resources, the Columbia Land Trust, and the Columbia River Estuary Study Task force. As independent organizations, each environmental group has its own charter and therefore function independently. However, these groups are coordinating their work through LCREP's science workgroup. Overall, their actions should have positive cumulative effects on ESA-listed salmonids and their habitats.

8.6 Cumulative Effects Summary

Non-Federal actions are likely to continue to affect ESA-listed salmonids. The cumulative effects of non-Federal actions in the action area that are reasonably certain to occur are difficult to analyze, considering the broad geographic landscape covered by this Opinion, the geographic and political variation in the action area, the uncertainties associated with state, Tribal, and local government and private actions, and ongoing changes to the region's economy. Many negative effects, such as impacts to fish habitat from continued urbanization, water extraction, and water quality alterations, are reasonably certain to occur. However, state, Tribal, and local governments have developed plans and initiatives to benefit ESA-listed salmonids. LCREP's CCMP is another important tool currently being used to coordinate organizations as they conduct habitat conservation, restoration, and recovery actions that benefit anadromous fish. Although state, Tribal and local governments have developed plans and initiatives to benefit listed salmon and steelhead, they must be applied and sustained in a comprehensive manner before NMFS can consider them "reasonably foreseeable" in its analysis of cumulative effects. However, the data and information generated from the above identified ESA-listed salmonid plan actions can be incorporated into the Project's adaptive management process to help guide future management of the Project.