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HOUSE COMMITTEE ON RESOURCES
SUBCOMMITTEE ON WATER AND POWER
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"Electricity Costs and Salmon: Finding the Balance"

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Members of Congress and distinguished guests, I am pleased to provide this statement addressing U.S. Army Corps of Engineers (Corps) activities to protect and restore Columbia River Basin salmon and steelhead stocks listed under the Endangered Species Act. The Corps appreciates the support of Congress and the Northwest delegation for salmon activities. The federal agencies continue to have good news to report on these ongoing efforts.

The Corps and Bureau of Reclamation operate the Federal Columbia River Power System (FCRPS) dams in concert with Bonneville Power Administration (BPA) which markets power produced at the dams. Congress authorized the dams in the system for multiple purposes; we operate to provide these purposes along with our operation for protection of fish.

The hydropower system, while a critical part of our efforts, is just one part of the salmon life-cycle. The federal agencies, tribes, states, and local interests are also making habitat improvements, better managing hatcheries and harvest and continuing predator control efforts. We have made much progress in hydro improvements, and we realize that further gains at the dams for adult and juvenile fish survival will be measured in small increments. We continue to look for hydropower system improvements that make biological and economic sense. We note that further investing in improvements to the other H's —habitat, hatchery, and harvest—could bring bigger dividends.

The Corps works in partnership with the other federal agencies in the region, and with a variety of technical and policy input from tribes, states, and others; salmon protection and recovery is very much a regional effort. Currently, in response to a court order, we are also engaged with Bureau of Reclamation, BPA, National Oceanic and Atmospheric Administration (NOAA) Fisheries Service, seven tribes and four states in an intensive collaboration effort. Our goal is to design a plan for the next ten years or so for a federal approach to salmon protection and recovery in the Columbia River Basin.

Adult Fish Passage and Survival at the dams

Adult fish ladders at the dams provide good passage survival for adult fish returning up river to spawning areas. All of the eight Corps lower Columbia and Snake river dams have at least one adult fish ladder. Over the years we have made many improvements to the adult passage facilities, such as providing better "attraction" flows and current efforts to reduce stress to adult fish that are sampled for research.

Through research we now know that adult survival on a per project basis is about 98 percent for each "evolutionarily significant unit," or ESU, of listed salmon and steelhead migrating past the dams. In its 2004 biological opinion on FCRPS operations NOAA Fisheries compared these survival results to a rate of mortality that might occur if the reservoirs and dams were not present and concluded that "adult survival through the FCRPS is similar to survival under unimpounded conditions in the Snake and Columbia Rivers."

In recent years, technology for monitoring adult passage has improved, allowing us to better monitor adult passage patterns, timing and other fish behavior at the dams. For example, we now have adult Passive Integrated Transponder, or PIT, monitoring capability at Bonneville, McNary, Ice Harbor and Lower Granite dams. As a result of these improvements, we are able to make operational adjustments at several dams to better optimize conditions for adult migration.

While the news on adult passage is very good, we need to continue to focus on a few aspects of adult passage and research. Continued progress means maintaining certain features such as auxiliary water supply systems for the fishways. Continued funding for operation and maintenance of fish facilities along with the BPA shared costs will be essential to further progress of salmon protection and recovery.

One concern we are addressing is “fallback,” where adult fish travel back through the dam after exiting the ladder above the dam. We know that fish can “fall back” over spillways, through juvenile passage systems, or through turbines at the dams. The rates of fallback vary among species, individual dams, and with operating conditions. This is normal behavior for fish moving through the Columbia River, that is, fish move up and down various reaches before returning to natal streams or hatchery of origin. However, it is important that we minimize any adverse effects of downstream adult fish passage at the dams. For example, fallback at the spillways may cause injury and delay, resulting in reduced number of adults to spawning areas. The Corps looks for operational strategies that avoid fallback, such as prioritizing power production at the Second Powerhouse at Bonneville Dam before using the First Powerhouse where there is increased fallback through the spillway.

Pinnipeds

Sea lion predation is another concern for adult fish migrating past Bonneville Dam in the spring.

Since the early 2000’s, the Corps has observed a spring migration of sea lions to the area below Bonneville Dam, nearly 140 miles from the Columbia River estuary . Generally arriving in mid- to late-February, the predominantly male California sea lions feed on adult salmon, steelhead and other anadromous fish returning upriver to spawn. The sea lions return to Southern California for mating season in late May and June. The amount of fish eaten by sea lions (and other pinnipeds, namely, Stellar sea lions and harbor seals) increased from 0.4 percent (1,010 fish) of the total spring salmon run in 2002 to 3.4 percent in 2005 (2,920 fish). Corps staff observations estimated that some 50 to 60 fish were eaten per day by the sea lions near the dam in 2005. Preliminary data for 2006 indicate about 2.5 percent of the spring salmon run, or around 2,700 fish, were consumed by the sea lions. The estimated number of pinnipeds for 2003, 2004 and 2005 was 111, 105 and 87, respectively. The 2006 estimate is 85. The average number observed on a given day was 21 in 2005 and 27 in 2006.

In cooperation with NOAA Fisheries and the Oregon and Washington fish and wildlife departments, we use a variety of harassment techniques – above-water pyrotechnics, underwater acoustics and others – to discourage the sea lions.

In 2004, for the first time, a sea lion went into a fish ladder at Bonneville Dam. In 2005, several sea lions entered the ladders and one of them, named C404, showed up in the fish counting windows. To address this problem we installed Sea Lion Exclusion Devices, or SLEDs, in the ladder entrances. The Corps worked with other regional state and federal agencies to design, install and test the SLEDs for use in early 2006. The SLEDs consist of individual gates at the entrances to the dam fishways meant to exclude pinnipeds but allow fish passage. For the most part the SLEDs have proved effective, although C404 managed to get past them at the beginning of the season.

Each gate is between 10 and 15 feet wide and 30 to 36 feet tall, and weighs over 10,000 pounds. They can be installed at the beginning of the sea lion “season” and removed when the sea lions go back to California.

We will continue to work with our federal and state partners to address the sea lion issue.

Juvenile Fish Passage

The bulk of investment in fish passage at the eight lower Columbia and Snake river dams over the past several decades has been for improved juvenile fish passage, mostly aimed at avoiding passage through the powerhouse turbines. There are three primary non-turbine juvenile passage routes at the dams: screened juvenile bypass systems; spill passage; and transport, where fish are collected at the bypass systems for transport by barge or truck from one of the four “collector” dams (Lower Granite, Little Goose, Lower Monumental and McNary).

The Corps installed screened juvenile bypass systems at seven of the eight dams during the 1980s and early 1990s. Following extensive biological evaluations, many of these facilities have undergone significant improvements. In the mid-1990s we began to implement spill to improve juvenile passage through the lower Snake and Columbia river dams. The combination of screened bypass systems and spill greatly improved juvenile survival past the dams for most populations.

NOAA Fisheries data (see bar chart) indicates that survival for spring and summer Chinook traveling in-river has improved to the point that it is now comparable to that of the 1960s when there were only four dams in the lower Columbia and Snake rivers. Survival through the hydro system in recent years ranges from 30 to 60 percent depending on water conditions and other factors. In-river migrants pass the dams by means of the juvenile bypass systems, or through the dam spillways or turbines.

At the four collector dams , juvenile salmon and steelhead collected in the bypass systems can be transferred into specially designed barges and trucks for transport past the remaining dams, to a release point downstream of Bonneville Dam. The survival rate for transported fish is about 98 percent to point of release, although ongoing research is attempting to determine any delayed effects after the fish are released downstream from Bonneville Dam and whether these effects can be minimized. The Corps has operated a juvenile fish transportation program since the 1970s, to reduce the number of dams and reservoirs juvenile fish must negotiate in their migration to the ocean .

Surface bypass systems and Removable Spillway Weirs (RSWs)

Recent efforts to further improve in-river survival for juvenile fish have focused on surface oriented passage. Most juvenile salmon tend to stay in the upper 10 to 20 feet of the water column as they migrate downstream to the ocean. When approaching the dams, juvenile fish need to dive to depths of 50 to 60 feet to find passage routes such as a spillway opening or a juvenile bypass channel. For several years, engineers and biologists have been pursuing new technologies that would provide more surface-oriented, less stressful, passage routes for juvenile fish.

One of the new surface passage technologies is a removable spillway weir (RSW), or “fish slide,” that fits inside a dam spillway and allows juvenile fish to pass near the water surface under lower accelerations and lower pressures. It has the potential to improve juvenile fish survival, save money (through decreasing spill, allowing more power generation), and improve water quality (by reducing gas supersaturation). As water is spilled over the weir, juvenile salmon and steelhead are carried over a raised spillway crest, similar to a waterslide. In tests of an RSW installed at Lower Granite Dam on the Snake River, juvenile fish that used the slide survived at similar or better rates than through a conventional spillway – about 94 to 98 percent survival depending on test conditions – and had reduced delay above the dam so that they were less susceptible to predators. While the slide attracted about the same number of fish, only about one-fifth as much water was spilled. A fish slide installed at Ice Harbor Dam in early 2005 delivered good test results that year with 97-99 percent survival. Lower Monumental Dam will have an RSW by 2007 and Little Goose Dam is scheduled for RSW installation by 2009. We also expect to have a prototype weir at McNary dam by 2009.

At Bonneville Dam on the lower Columbia River, a Corner Collector has been constructed at the Second Powerhouse to provide another type of surface passage. The ice and trash chute at the powerhouse was modified for safer passage, and a 2,800-foot long transport channel and 500-foot long outfall channel were constructed. Tests in 2004 and 2005 indicate a survival rate of nearly 100 percent for spring Chinook, steelhead and fall Chinook through the Corner Collector, and a 94 - 99 percent survival rate, depending on the species, through all passage routes combined at this dam. At The Dalles Dam, a spill wall was completed in 2004, designed to move juvenile fish more quickly and safely downstream once they passed through the spillway with a two to four percent survival improvement. Surface passage systems and improvements are planned for all four of the lower Columbia River dams within the next several years.

Spill and Transport

Besides making improvements at the dams, we provide operations to aid juvenile migration, such as spill, transport, flow augmentation (release of water from upstream storage dams) and cold water releases (to moderate temperatures in the river). When spill for fish is provided, water is routed through spillway openings rather than through turbines to generate power, or rather than being used for other purposes. Under biological opinions from NOAA Fisheries, the Corps has provided spill and juvenile fish transportation in a combination designed and modified to provide an optimum mix for getting the best return of adult fish.

A complicating factor in operating for improved fish survival is that studies show various salmon species respond differently to different strategies. For example, the timing of fish migration and species of fish may make a difference as to whether the fish would fare better traveling in-river or in a transport barge. And there is more information available for some stocks of fish than for others.

Spring Spill

Each year the Corps provides spring spill for fish at all eight lower Columbia and Snake river dams beginning in early April. In 2006, as an adaptive management action based on data from transport operations research, the Corps proposed to maximize transportation of juvenile fish in late spring to improve adult return numbers. This would require curtailing spill at the collector projects. However, a court order for 2006 operations directed full spring spill be provided. We are continuing research to gather more information on this issue.

Summer Spill

Prior to 2005, the Corps did not spill at the four transport collector projects in summer, so that we could maximize transport of juvenile Snake River fall Chinook.

In 2005, in response to a court order, the Corps provided additional summer spill and less transport of fish. The Corps used the opportunity to do additional research on fish passage survival including performance of the removable spillway weirs at Lower Granite and Ice Harbor dams. Results, as summarized in an “after action report,” indicate that “juvenile fish left in the river during the spill operation showed high rates of survival at the dams through the Snake River and McNary dams with survival ranging from 86 percent to 96 percent based on the results from the radio tracking studies.”

The best available scientific information now indicates summer transport “neither helps nor harms” Snake River fall Chinook. Our current program for summer operations is to achieve a goal of optimum adult returns through two objectives: 1) manage spill and powerhouse operations at all eight dams for optimum juvenile fish survival past the dams and 2) spill and bypass collection at the collector projects to achieve a “spread-the-risk” distribution of about 50 percent transported juvenile fish and 50 percent in-river migrants.

Avian Predation: Caspian Terns and Cormorants

Caspian terns and cormorants consume large numbers of juvenile salmon and are a major cause of mortality of ESA-listed fish. The program to redistribute Caspian terns from Rice Island in the Columbia River Estuary to East Sand Island nearer to the ocean has yielded good results. The intent of the redistribution was to shift the terns’ diets away from mostly salmon and toward a wider variety of fish. Caspian tern predation on juvenile salmonids in the Columbia River estuary has been reduced from a range of 7 to15 million in 1999 to about 3.6 million in 2005 by moving these birds downstream nearer the ocean where they feed less heavily on juvenile salmon and steelhead. A Tern Management Final Environmental Impact Statement jointly prepared by several agencies recommends that two-thirds of the Caspian terns be further redistributed across alternate sites in Oregon and California.

The agencies are now considering management actions to address a greatly increased population of double-crested cormorants in the Columbia River estuary. The population increased from around 100 birds in 1989 to about 12,500 breeding pairs in 2005 nesting on East Sand Island. Although salmonids make up only about 5 percent of their diet, the cormorants consumed an estimated 6.4 million of these juvenile fish in 2005.

Funding of Corps fish programs

The Corps implements a total annual program of about $140 million for capital improvements for fish passage and operation and maintenance of fish facilities.

Construction of fish facilities and improvements to these facilities, and associated analysis and overhead, is funded by Congressional appropriations in the Columbia River Fish Mitigation (CRFM) project. BPA reimburses the U.S. Treasury for the “power share” of the expenses using ratepayer funds. For Columbia River Basin salmon and steelhead capital expenditures, this averages about 80 percent of the total. The power share of operations for fish and maintenance of fish facilities is direct-funded by BPA; Congressional appropriations provide the 20 percent matching funds. In 2006, $33 million was direct funded for this purpose. In 2006, the Corps was appropriated about $11 million for this purpose.

The CRFM project was initiated in 1988 to focus efforts on improving fish passage systems at the eight lower Columbia and Snake river dams, as part of the continuing mitigation for construction of the dams. Many successful improvements to dam fish passage have been made since, and many more are being studied and implemented. The estimate to complete this project is approximately $1.6 billion; by the end of FY05 about $1 billion had been spent.

The Corps has completed numerous individual projects under CRFM. These include major improvements to the juvenile fish bypass systems at seven dams such as extended length bypass screens; juvenile fish monitoring capability at Bonneville, John Day and Ice Harbor dams; Removable Spillway Weir surface passage at Lower Granite and Ice Harbor dams; Bonneville Dam Second Powerhouse Corner Collector for juvenile fish passage; adult Passive Integrated Transponder (PIT) tag detection facilities at several dams; and spillway flow deflectors at most dams. Considerable research on fish passage has also been completed, as well as evaluation of long term configuration and operation options such as the Lower Snake River Juvenile Salmon Migration Study which looked at breaching the four lower Snake River dams.

About $40 million annually is expended for operation and maintenance of juvenile and adult passage systems, and operation of the Juvenile Fish Transportation Program. Operation and maintenance is critical for providing reliable adult and juvenile passage.

Summary

Thank you for the opportunity to provide an update on the progress we have made for fish survival and recovery in recent years. The dams in the Columbia River Basin provide many benefits to the region, including flood control, navigation and power, but there are trade-offs. As the Federal stewards of these benefits, we recognize our tremendous responsibility to continue to work with the region to find a way forward that is good for the fish and for people. We believe the current life-cycle approach to salmon protection and recovery, with a region-wide effort to address habitat, hatcheries, harvest and hydropower impacts, is the best approach for bringing these fish back to sustainability. The Corps will continue to do its part, and work with you, the relevant Federal agencies and entities, and with the region to find the best balance and provide the best results.