State of Washington
DEPARTMENT OF FISH AND WILDLIFE

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April 23, 1998

The Honorable William M. Daley
Secretary of Commerce
Washington 98504-0002

Dear Secretary Daley:

On behalf of the commercial salmon fishing industry in Washington State, I am requesting that you declare that there is a commercial fishery failure because of a fishery resource disaster as provided for in section 312 (a) of the Magnuson-Stevens Fishery Conservation and Management Act (PL 94-265).

The economic future of the commercial salmon fisheries in our state has been severely damaged by floods in the winters of 1995-96 and 1996-1997. Washington and the Pacific Northwest experienced record flooding in three major flood events during the winter of 1995-96, which severely affected salmon survival. This was followed in the 1996-97 season by an additional two major flood events. In December 1996 and again in March 1997, this state was especially hard hit by winter storms; and my office issued emergency proclamations covering virtually the entire state. Washington State experienced record levels of run-off, and the flooding was particularly devastating in the streams draining into the Puget Sound basin. At the same time that the floods were causing severe property damage to homes and businesses, they also damaged the future production of salmon.

Winter flooding kills the eggs spawned by chinook, coho, chum, pink and sockeye salmon in our Northwest streams and rivers. After the eggs are deposited by adult salmon, they normally spend many weeks incubating within the gravel of the streambed. The flooding made it impossible for some adult salmon even to spawn, and washed away many of the already deposited eggs before they had a chance to hatch. The salmon stocks in Washington have been depressed for several years as a result of poor ocean conditions; the flooding of the past two years simply exacerbates the problem. Attached is a more detailed accounting of the damages compiled by the Washington Department of Fish and Wildlife.

Because of the flooding, Congress appropriated $3,500,000 in the June 1997 Supplemental Appropriation bill to continue a salmon fishing buyback program in Washington State as authorized by section 312(a) of the Magnuson-Stevens Fishery Conservation and Management

Act. The State of Washington requests that these funds be made available to continue a license buyback program for commercial salmon fisheries in Puget Sound, Coastal Washington and the Columbia River . The necessary state matching funds have been appropriated for the program.

The Washington Department of Fish and Wildlife and the U.S. Department of Commerce have collaborated to administer two previous salmon license buyback programs. The success of these two programs has provided badly needed financial help to those who chose to be bought out, reducing competition for those who remained in the fisheries and reducing the harvest capacity of the fishing fleet. The Department of Fish and Wildlife stands ready to assist with the administration of this additional round of salmon license buyback.

Thank you for your consideration of this request. If you would like additional information, please do not hesitate to ask.

Sincerely,

Gary Locke
Governor

Enclosure
cc: Senator Slade Gorton
Senator Patty Murray
Representative Rick White
Representative Jack Metcalf
Representative Linda Smith
Representative Doc Hastings
Representative George R. Nethercutt,
Representative Norman D. Dicks
Representative Jim McDermott
Representative Jennifer Dunn.
Representative Adam Smith

FLOODS OF WINTER AND SPRING 1995/96 AND THEIR IMPACTS TO SALMONIDS

Bill Tweit
Fish Management Program
Washington Department of Fish and Wildlife

What was the extent of the flooding?

The flood events of winter 1995/96 were the worst on record for salmonids, as their cumulative effects were felt over three events and across most of the state. The first event, on 28-30 November, affected Puget Sound, Strait of Juan de Fuca, Wenatchee and Chelan rivers. A month later, on 29-30 December, streams in the Willapa, Satsop and Skokomish drainages had record flood levels. The third event, occurring another month later, on 7-9 February, had widespread effects from the Puyallup river and the Chehalis river east along the Columbia through the Yakima basin to the southwest corner of the state. The list of watersheds that had record high gauge readings this winter includes the Willapa, Chehalis, Elwha, Skokomish, Nisqually, Puyallup, Green, Snohomish, Skagit, Lewis, Cowlitz, White Salmon, Yakima, Chelan, and Wenatchee. This list will probably grow as the U.S. Geological Survey estimates readings for the gauges that were damaged.

Then, for an encore, a spring flood of unprecedented proportions struck on April 22-24, sending Puget Sound and southwest Washington rivers to unseasonably high levels. The Chehalis River overflowed its banks for several days.

What methods are being used for assessing damage to salmonids?

Impacts to Natural Stocks

Our most direct assessments will come from juvenile production monitoring stations located throughout the state. Many of these stations were established by WDFW to monitor natural production on a long-term basis. Others are operated by tribal programs, or are part of short-term evaluation projects. They will all yield information on flood impacts on production.

1) sockeye fry and chinook smolts from Cedar River
2) chinook and coho smolts from Skagit River
3) coho smolts from Deschutes River (South Puget Sound)
4) coho, steelhead and cutthroat smolts from Big Beef Creek and nearby tributaries (Hood Canal)
5) coho, steelhead and cutthroat smolts from the mainstem Chehalis river, and Bingham, Blooms, Beaver and Salmon creeks (Grays Harbor)
6) coho, steelhead and cutthroat smolts from Forks Creek (Willapa)
7) spring chinook smolts from Tucannon River (southeast Washington)
8) sockeye smolts on Lake Osoyoos, spring chinook smolts on Chiwawa and

Chewach rivers (upper Columbia)
9) rainbow trout population estimates, spring chinook snorkel surveys in the Yakima basin
10) North Puget Sound estuary surveys of pink and chum smolt abundance

Regional habitat and fisheries biologists have conducted habitat damage assessments in their areas. They observed channel changes, mass wastings, and damage to spawning areas. Resident trout spawning surveys will be used in some watersheds to determine losses to those populations.

The April flood damaged many of these research facilities and forced almost all of them to cease smolt counting operations for two or more days. This loss of data comes at an unfortunate time, as late April is in the middle of the smolt outmigration period for many salmonids.

Impacts To Hatchery Stocks

Almost a million pre-smolts were lost from WDFW hatcheries in Puget Sound, including 376,000 coho, 275,000 steelhead and 305,000 chinook. There was additional loss from tribal hatcheries. In the Columbia River over two million pre-smolts were lost. The majority (1,275,000) were coho, but 805,000 chinook were also missing. These losses will reduce the buffer that hatchery fish provide in large quota-driven mixed stock fisheries such as the West Coast Vancouver Island troll fishery, which may increase Canadian interceptions of Washington natural stocks. Damage to WDFW hatcheries totalled almost four million dollars.

What are the probable effects to salmonids?

Our preliminary estimates of impacts from this flood are based on studies of two recent flood events (January 1990 and November 1994) and from flow-related patterns of survival observed at our long-term monitoring projects. Examples of the types of impacts on natural salmonid populations that can be directly attributed to major flood events are:

- A dramatic decline in egg to smolt survival for chinook spawners in the Skagit River. Under average conditions, the survival rate has ranged from 10-20%. Following the 1990 flood, the rate was about 1% (Figure 1).
- Coho smolt production declined in the Deschutes River when the major spawning area was devastated by a mass wasting event in 1990. The smolt production had ranged from 54,000 to 133,000 for 12 years prior to the flood event. For the three years following the flood event, production has ranged from 11,000 to 57,000 smolts.
- Coho smolt production in the Clearwater river (Queets drainage) is inversely proportional to the severity of the winter high flows during incubation (Figure 2)
- The survival from egg to fry for 1995 brood Cedar River sockeye (about 2/3 of the

production has been measured to-date) will be the poorest on record.

- Very low numbers of coho fry were observed in the spring of 1995 in North Hood Canal tributaries following the winter flood, even though the number of adult spawners represented a considerable increase over previous years.

Based on these studies, it appears that salmonid populations are often most vulnerable to flood impacts during the incubation stage. Thus, we expect that many of the natural populations of chinook, coho, chum, sockeye and pink salmon and native char in the flooded areas will suffer severe short-term effects, as these floods occurred after spawning of these stocks. Steelhead and resident trout populations may have been less affected by the winter floods, due to their later spawning times. The April flood may have caused incubation mortality, as eggs are most vulnerable to disturbance during the two week period following fertilization. Much steelhead and rainbow spawning activity occurs in April.

Undoubtedly, mortality of older life stages occurred, but our relative lack of direct observations of that category of mortality make it difficult to predict. Summer steelhead adults were present throughout much of the Columbia River watershed during the winter floods, and they possibly suffered some mortality. Juvenile steelhead, rainbow, coho, chinook, cutthroat and native char were rearing in many areas impacted by flood events and, undoubtedly, flood impacts killed some of them. Additionally, species that use salmonid fry as a food resource will be impacted. Salmonid fry are often one of the first food items available in abundance in the spring, and they probably play a very important nutritive role. Other food resources probably suffered short-term declines as well. Scouring floods are usually responsible for declines in invertebrate population levels and declines in ambient levels of nutrients. The same physical forces that damage salmon eggs also kill invertebrates, scour algae and flush out nutrients.

A major short-term effect will be dramatic increases in the proportion that hatchery stocks comprise of some runs, as the hatchery fish did not suffer the same level of mortality. For instance, the Lake Washington sockeye run has been entirely natural until recently. Following this winter, the 1995 brood will be primarily hatchery origin, maybe as high as 90%.

We are less certain about the long-term effects of these floods, as we have very few direct observations of flood-related declines in productivity that last longer than a year or two. The Deschutes River is one example of a longer-term impact, as the mass wasting event in 1990 damaged most of the spawning areas causing a multi-year decline in the coho stock. Skagit River chinook have suffered a sharp decline in productivity that is correlated with an increased frequency of flood events in the watershed. Research is underway to determine whether the decline is due to flood impacts on incubation, or some other factor. Particularly severe flood events can have long-term effects on invertebrate populations, especially in reaches that were lacking complexity and structure prior to the flood event.

Flood events can provide some long-term benefits to salmonid populations, particularly in

drainages that have not been altered by major flood control projects. These include cleaning and loosening of gravels that have become heavily sedimented or consolidated, altering channel morphology to re-establish complexity, and reconnecting flood plain areas to main channel. In some studies, exotic species have suffered higher flood-related mortalities than native species, probably because they have not developed similar adaptations to floods. However, floods may be responsible for increasing the range of exotic species as the introduction of exotic species into off-channel habitat has been ascribed to flood events.

Why are flood impacts more deleterious than formerly?

Salmonids and floods have coexisted in the northwest for centuries, so what makes this event so damaging? Several factors have changed in recent times, all of which potentially decrease the ability of salmonid populations to "weather" flood events.

- The morphology of many river channels has been altered, generally by reducing the complexity of the habitat. In an unaltered state, flood waters spill out of the channel into floodplain areas, dissipating the energy of the flood. Where channels have been altered by floodplain "protection" measures such as channel straightening, diking or bank armoring, a higher proportion of flood waters remain in the channel where much of their energy is directed into bedload movement and scouring. This results in increased mortalities of incubating eggs. These activities also deny juvenile salmonids rearing in the channel access to the refuge areas formerly available in the floodplain; these areas are used as sanctuaries until the floodwaters recede. The impediments to juveniles seeking off-channel refuge also serve to increase the rate of stranding of the juveniles that do find off-channel areas. Humans have removed much of the large woody debris from the river channels. This debris helped to stabilize the streambed and increase channel complexity, lessening the scouring impacts of flooding. It also provided refuge areas in turbulent waters.

- The hydrological cycle of most watersheds has been altered as well. Most human impacts to watersheds tend to diminish the storage capacity of a watershed, resulting in higher winter flows and lower summer flows. This probably results in increased frequency and/or intensity of flood events.

- Salmon are now harvested at higher rates than in previous centuries. By choosing to harvest the portion of the population that functions as "flood insurance", we lower spawning escapements and leave fewer individuals to rebuild the population after a flood.

- A higher proportion of salmonid populations are at depressed or critical levels than formerly. As a general rule, the smaller a population is, the less resilient it is to large-scale impacts such as flooding. Thus, the increased number of depressed stocks leads

to increased probability of local extinctions following widespread impacts, which slows rebuilding.

- Body size of both chinook and coho has apparently declined. Smaller fish spawn in smaller substrate and dig shallower redds; it is likely that their eggs are more susceptible to scouring impacts. This may be more troublesome for chinook as they spawn primarily in mainstem rivers.

How will the fish management agencies respond?

In the near future, agency responses will be directed towards conservation measures to rebuild impacted populations. These measures will be based on measurements of loss of productivity from field studies conducted this spring and next spring. This information will be incorporated into forecasts of abundance, which are the basis for regulating fisheries. Coho fisheries will be reduced in 1997 and 1998, chinook fisheries in 1998 and 1999, pink fisheries in 1987, chum fisheries in 1998 and 1999, and sockeye fisheries in 1999. If impacts are as severe as currently feared, then harvest impacts will have to be reduced to minimal levels for chinook stocks statewide, some Puget Sound and coastal natural coho stocks, Lake Washington sockeye, and Puget Sound pink and chum salmon. Hopefully, steelhead fisheries will not have similar constraints; their complex age structure may help buffer the effects of this last winter.

In order to maintain long-term stock productivity, agency responses will have to be directed towards habitat: both for maintaining instream habitat complexity and managing the upland areas for increased rates of retention. Maintaining or increasing instream complexity is essential to the survival of diverse fish and invertebrate communities as they are exposed to severe flood conditions. Managing retention rates in watersheds will be a great challenge, as it will require halting or reversing many of the human activities that currently have the effect of increasing runoff.