Idaho Department of Fish and Game Response to the Northwest Power Planning Council's Request for the Mainstem Plan Recommendations for Fish and Wildlife Program Amendments Council Document 2001-4 (Dated March 14, 2001)

June 14, 2001

These comments by the Idaho Department of Fish and Game (IDFG) are in response to the Northwest Power Planning Council's (Council) request (Document 2001-4) on March 14, 2001 for recommendations for elements of a mainstem plan to be adopted for the Columbia and Snake rivers as an amendment to the Council's 2000 *Columbia River Basin Fish and Wildlife Program* (Program).

The Council's 2000 Program recognizes that significant losses of anadromous and resident fish and wildlife have occurred due to hydrosystem development and operation, and that "to be consistent with the Power Act, these losses establish the underlying basis for population objectives for the program as a whole". Specific short-term and long-term biological objectives for anadromous and resident fish and wildlife are established in the 2000 Program to mitigate fish and wildlife losses in the long-term. The Council has requested comment on long-term mainstem operations. However, because decisions by federal agencies regarding the long-term configuration of the hydrosystem have been deferred for at least eight years and the Council will amend the Program within five years, our recommendations are primarily focussed on meeting short-term mitigation objectives of the 2000 Program. We emphasize that our short-term mainstem recommendations for the Program will not meet mitigation requirements of the Pacific Northwest Electric Power Planning and Conservation Act (Power Act). In the long-term, major hydrosystem reconfiguration, possibly including breaching of dams, as identified by federal agencies (NMFS 2000) may be necessary to meet both Endangered Species Act (ESA) and Power Act requirements. The Council's proposed research, monitoring, and evaluation plan as described in Section 9 of the 2000 Program (NPPC 2000) will provide critical information to monitor progress towards meeting short-term objectives of the mainstem plan, and will assist NMFS and the region with long-term decisions to meet requirements under ESA and the Power Act.

We first address the four guidelines (Document 2001-4) with respect to short-term and long-term Program needs to restore fish and wildlife populations under the Power Act. Then we identify recommendations already submitted by the State of Idaho to the National Marine Fisheries Service (NMFS) on the Draft Biological Opinion, which are applicable to the Program's short-term planning period identified by the Council. The primary focus of these IDFG comments is on needs of Snake River anadromous salmonids.

1. Consistency with the basinwide provisions in the Council's program, especially the role of the mainstem plan in a multi-species, habitat-based program

The Council asked for parties submitting recommendations to consider how to implement this general direction [of framework elements, including vision, biological objectives, habitat and hydrosystem strategies and underlying scientific principles] as the Council moves into the more specific elements of the program. In other words, how do more specific objectives and measures for the mainstem fit into a multi-species, habitat-based program? The Council suggests that parties consider and recommend objectives for the types of habitat conditions and ecological functions needed for adequate spawning, rearing and migration in the mainstem for the various fish and wildlife populations and communities that use this area of the river for all or parts of their life cycle. Parties should then consider evaluating whether actions and operations currently taking place will allow for these conditions, and if not recommend changes in operations and other measures needed to achieve these habitat objectives. If sufficient information does not exist to support recommendations for objectives and measures for mainstem habitat conditions, parties should recommend objectives and measures for the types of research and analysis necessary to develop the necessary information.

IDFG supports the basic vision and framework elements of the Program, and agrees with the concept that the mainstem is habitat (though highly altered) for spawning, rearing and migration of anadromous salmonids and other fish species, and as well as for wildlife. Natural mainstem river habitat should serve as a baseline to assess current habitat conditions and ecological functions. IDFG believes that "adequacy of habitat and ecological functions" for anadromous salmonids is best expressed by the populations' survival associated with this habitat, and that this survival must reflect direct and indirect effects (i.e., returning adults/spawner or smolt-to-adult survival rate), and protect biological diversity for different life history strategies. Ecological templates provided by the Independent Scientific Group's (2000) "Return the River" provide a strong programmatic basis for the normative concept for mainstem habitat. The U.S. Fish and Wildlife Service's (USFWS 1999) draft Coordination Act Report, prepared as part of the Corps Lower Snake River Juvenile Salmon Migration Feasibility Study, provides additional, relevant descriptions of probable habitat response in the Lower Snake River mainstem and future ecological functions specific to the major hydrosystem alternatives.

IDFG is concerned by the language in the Council request (Document 2001-4), which states that "[t]he hydrosystem objectives contained in the mainstem plan also should provide guidance to the Council's subbasin planning process, establishing for the subbasin planners the expectations of the program for mainstem survival of fish that spawn in tributaries but rear and migrate through the mainstem." If subbasin plans are driven by an inadequate mainstem plan, whose habitat cannot meet ecological requirements of the species and necessary survival from smolt-to-adult return, then restoration objectives under the Power Act will not be met. The Council's statement (above) seems to be counter to the portion of the Program's primary mainstem strategy which indicates the mainstem plans should "[p]rovide adequate levels of survival to support fish population recovery based in subbasin plans." The latter interpretation is more likely to lead to ESA recovery and Power Act restoration objectives, and better meets the Program's concept for normative mainstem habitat.

The actions and operations currently taking place under the Biological Opinions and the Program do not allow for adequate habitat and ecological functions for upriver anadromous salmonids in the mainstem habitat (State of Idaho 2000a). For example, PATH (Plan for Analyzing and Testing Hypotheses) estimated that a two to three-fold improvement in life cycle survival was necessary to meet ESA recovery standards for Snake River spring/summer chinook, primarily in the smolt-to-adult life stage (Peters and Marmorek 2000; State of Idaho 2000a). As discussed in sections 3 and 4 below, IDFG

concludes it is unlikely that short-term measures and current hydrosystem configuration will meet habitat, ecological function or population survival objectives for either the Council's Program or the ESA. IDFG recommendations for short-term (5-year) Program measures follow the response to the Council's fourth guideline.

2. Power supply considerations

The Council asked for parties submitting recommendations to consider (a) what are the appropriate operations for the hydrosystem to meet both the needs of fish and wildlife and the power supply needs of the region; (b) what other actions the Council might consider recommending to resolve the region's power supply problems, as part of a larger review of the current power plan; and (c) how should the Council evaluate the power supply impacts of proposed operations and on what basis will the Council be able to reach the necessary conclusion that it is adopting a fish and wildlife program that truly does protect, mitigate and enhance fish and wildlife while continuing to assure the region an adequate, efficient, economical and reliable power supply.

IDFG incorporates by reference the [June 1, 2001 DRAFT] comments of the region's fish and wildlife agencies through Columbia Basin Fish and Wildlife Authority (CBFWA 2001) in response to this guideline.

3. The relationship of the mainstem plan of the fish and wildlife program to the recently released biological opinions on hydropower operations

The Council parties focus attention on (1) analyzing whether the operations specified in the biological opinions satisfy the multi-species fish and wildlife mitigation requirements and the power supply standards in Section 4(h) of the Northwest Power Act, including the mitigation objectives for anadromous fish, resident fish and wildlife described in the 2000 Fish and Wildlife Program; (2) if not, what changes in these opinions should the program recommend to the federal agencies to satisfy the Power Act and fish and wildlife program without becoming inconsistent with the Endangered Species Act; and (3) where the opinions allow for flexibility and adaptive management in implementation, what recommendations should the program contain to assist the federal parties in implementing these opinions so as to meet the Power Act and program requirements as well.

NMFS concluded that the hydropower actions of the Reasonable and Prudent Action (RPA) in the Biological Opinion (BiOp) were insufficient alone to avoid jeopardy to listed Snake River anadromous salmonids (NMFS 2000). The BiOp RPA recommended off-site mitigation and population performance standards to determine whether the combination of off-site and hydro actions would be successful in recovering listed populations.

IDFG has previously commented that the proposed operations in the BiOp likely will not be sufficient to recover Snake River salmon and steelhead populations (State of Idaho 2000a). In addition, IDFG believes it is unlikely that the (unspecified) off-site mitigation actions proposed in the RPA will be effective in avoiding jeopardy for these populations, in part because the actions do not address major limiting factors (Schaller et al. 1999; State of Idaho 2000a). Survival rate declines for listed Snake River spring/summer chinook populations occurred primarily in the smolt-to-adult stage, rather than in the spawner-to-smolt stage (Petrosky et al. in press; State of Idaho 2000).

The Council's Program mainstem actions are generally similar to those proposed under the BiOp RPA, so IDFG believes it is also unlikely that Power Act mitigation objectives will be met in the short-term for upriver anadromous salmonids. However, all available scientific analyses indicate that, in the short-term, the proposed mainstem actions and resulting improvements to smolt-to-adult survival will help moderate extinction risk, will increase the frequency of rebuilding opportunities, and will increase the frequency of harvestable hatchery surpluses, but are unlikely to provide the magnitude of survival benefits necessary to secure recovery.

Focusing on a mainstem plan that serves as the key foundation to support Program objectives is appropriate. This is in contrast to the federal FCRPS BiOp approach (NMFS 2000) of trying to shift needed survival elements for smolt-to-adult survival to other life stages.

Analytical risk assessments by PATH and by NMFS CRI (Cumulative Risk Initiative) indicate that mainstem options that include breaching of the four Lower Snake River dams are most likely to recover listed Snake River populations, and are least risky across a broad range of uncertainties (Budy 2001; State of Idaho 2000a; NMFS 2000). Alternatively, the hydrosystem actions in the BiOp RPA and the Council's Program are less likely to lead to recovery and have higher risk (Budy 2001; State of Idaho 2000; NMFS 2000). Because the restoration mandate under the Power Act is broader than under the ESA recovery objectives, these analytical findings have profound implications to both short-term and long-term program planning for Snake River anadromous salmonids. IDFG recommends that the Council specifically acknowledge these long-term challenges in the amended mainstem plan.

IDFG interprets the Power Act requirements for fish and wildlife protection and restoration to be greater than those required under ESA, particularly as defined in the Program vision statement:

> *The vision for this program is a Columbia River ecosystem that sustains an abundant, productive, and diverse community of fish and wildlife, mitigating across the basin for the adverse effects to fish and wildlife caused by the development and operation of the hydrosystem and providing the benefits from fish and wildlife valued by the people of the region. This ecosystem provides abundant opportunities for tribal trust and treaty right harvest and for non-tribal harvest and the conditions that allow for the recovery of the fish and wildlife affected by the operation of the hydrosystem and listed under the Endangered Species Act.*

IDFG proposes that the Council recommend to the federal parties that mainstem hydrosystem options adopted under the federal biological opinions and recovery plans to meet ESA requirements, should also be adequate to meet the Program vision statement and requirements of the Power Act, providing benefits from fish and wildlife valued by people of the region. Attainment of the Program vision statement, including the restoration of salmon and steelhead fisheries for the people of Idaho, is also consistent

with the IDFG policy as described in IDFG (1998) and the 2001-2006 Fisheries Management Plan (IDFG 2001a).

The Governors of Idaho, Montana, Oregon and Washington (Four Governors 2000) stated that a key element of a regional approach to recovery of salmonids and other aquatic species is the performance standards. This is relevant to the Council's mainstem planning process as well as other regional recovery forums. The creation and use of performance standards will be critical both in terms of allowing the Council and region to move forward with specific strategies and actions, and in measuring their success in achieving the desired environmental and biological improvements. Three criteria can ensure that performance standards are used appropriately. Performance standards must be: (1) grounded in the best available science; (2) reasonably attainable; and (3) implemented in a manner that coordinates the short-, mid- and long-term actions that are necessary to improve overall salmon recovery (Four Governors 2000).

Risk assessment is critical to ESA and the Council's decision-making processes. There will always be ecological and scientific uncertainty. The key to objective risk assessment is determining how to best meet the biological needs of the fish in the face of these uncertainties (State of Idaho 2000a). There should be clear recognition that the lack of a decision, or delay, is actually a conscious decision that the uncertainties are too great to act on, and the at-risk populations can survive the delay and still retain enough inherent productivity and diversity to remain poised for recovery. To moderate the risk this approach should be coupled with aggressive actions in other areas that can be agreed on, recognizing the greatest uncertainty may actually be whether stocks can persist until all the questions are answered (State of Idaho 2000a). There are several important scientific steps that must be taken to determine biologically defensible recovery strategies:

1. Determine extinction risk and survival and recovery standards for jeopardy;
2. Determine the amount of survival improvements needed to avoid extinction and meet survival and recovery standards;
3. Determine fish mortality and allocate among life stages;
4. Determine the amount of discretionary mortality above the natural baseline;
5. Assess management opportunities to address this discretionary mortality;
6. Select a suite of management actions that are likely to provide the necessary survival improvements; and
7. Develop an aggressive monitoring and evaluation plan to assess effectiveness within the context of environmental variability.

4. Long-term objectives and strategies for the mainstem

The 2000 Fish and Wildlife Program included a long-term vision and a recognition, in the hydrosystem strategies, that the region may be in need of long-term and broadly-focused planning regarding the current constraints on system operations, especially water management, that may limit our ability to satisfy the various purposes and benefits people in the region want from the river. This revision of the fish and wildlife program presents an opportunity for participating parties to think about the mainstem and hydrosystem over a longer planning horizon--twenty or fifty years--as well as recommending shorter-term objectives and measures. Parties might consider topics such as flood control needs and requirements; possible changes in the limitations on the purposes of managing water under the Columbia River Treaty; the requirements, opportunities and challenges of considering broader habitat needs in the

mainstem, such as mainstem spawning and rearing habitat, estuary and plume impacts; and the regions long-term energy and capacity power system needs in the context of a radically changing energy industry, the structure of which may have important implications for fish and wildlife.

The Program defines a primary strategy for Hydrosystem Passage and Operations in Section 6 as follows:

> *"Provide conditions within the hydrosystem for adult and juvenile fish that most closely approximate the natural physical and biological conditions, provide adequate levels of survival to support fish population recovery based in subbasin plans, support expression of life history diversity, and assure that flow and spill operations are optimized to produce the greatest biological benefits with the least adverse effects on resident fish while assuring an adequate, efficient, economical, and reliable power supply."*

As a long-term primary strategy, the Council's vision encompasses the key elements to support rebuilding and recovery of a diversity of anadromous fish populations. However, this year in particular highlights the conflict in the Council's dual visions for reliable power supply and fish and wildlife needs. The long-term challenge is to make implementation of the two visions more complementary. IDFG recommends that the Council adopt more specific language that explicitly recognizes that the inherent, short-term conflict between hydrosystem operations and meeting biological requirements for anadromous fish heightens with poor runoff conditions. The regional fish and wildlife agencies, through the Columbia Basin Fish and Wildlife Authority (CBFWA), point out that "the power and fish crisis this year have exposed glaring deficiencies in the Council's Program and in the region's efforts to restore and recover fish and wildlife in the Columbia River Basin" [CBFWA 2001 **draft letter**]. The Council's long-term planning should recognize the challenge faced by the Region and the Council that the Program likely remains inadequate in the short-term to promote recovery and restoration of upriver anadromous salmonid populations; adequacy of the region's short-term power supply is questionable; and the conflict between the two currently heightens with poor natural runoff conditions.

<u>Strategy: Provide conditions within the hydrosystem for adult and juvenile fish that most closely approximate the natural physical and biological conditions.</u>

The Program lists 9 elements under this portion (Hydrosystem Passage and Operations) of the primary strategy (NPPC 2000). IDFG commends and supports the Council for recognizing in the first element (Protect Biological Diversity) that survival in the natural river should be the baseline against which to measure the effectiveness of other passage methods. IDFG recommends that the Council also explicitly recognize that both direct and delayed components of hydrosystem mortality must be considered and addressed.

IDFG recommends the following modification to the seventh element, In-river Migration and Transportation. The statement "…the Council, while seeking to improve in-river conditions, recognizes that there are survival benefits from transportation of migrating

juvenile salmon" should reflect that *benefits are relative and occur only under certain conditions*. The smolt-to-adult return rates (SARs) of transported smolts are (1) insufficient for recovery; and (2) not consistently greater than SARs of smolts that migrated through the hydrosystem via a combination of turbine and spill routes (State of Idaho 2000a). Because juvenile fish transportation does not always provide benefits over migration through an unnatural river system (the hydrosystem), the burden of proof in the third bullet is inappropriately placed. The Council should place the burden of proof on research to demonstrate that salmon survival (to returning adult, SAR) would be greater for transportation than in-river for specific conditions before recommending transportation as a long-term mitigation strategy. IDFG recommends that the Council should strive to improve in-river migration conditions sufficiently to meet biological requirements of anadromous salmonids, so that removing juvenile fish from their habitat for transportation is not needed.

Although the Council defines juvenile fish transportation as a "transitional" strategy, this non-normative, "interim" strategy has been the primary hydrosystem mitigation measure employed for Snake River populations for the past quarter century. There has been little demonstrable success at meeting the Program vision.

<u>Strategy: Provide adequate levels of survival to support fish population recovery based in subbasin plans.</u>

IDFG agrees in general with this portion of the primary strategy, but recommends that the Council explicitly recognize the dominance of the mainstem and out-of-subbasin influences as primary limiting factors for upriver anadromous salmonids. The draft Salmon Subbasin Summary (Section 4.4.2) summarizes evidence that the declines in life cycle survival for Snake River stocks coincided with hydrosystem development and operation (Schaller et al. 1999), and that survival declines occurred primarily in the smolt-to-adult stage, rather than in the spawner-to-smolt stage (Petrosky et al., in press). The overall survival decline is consistent primarily with hydrosystem impacts and poorer ocean (out-of-subbasin factors) rather than large-scale impacts within the subbasins between the 1960s and present.

IDFG recommends that the Council adopt survival objectives for the mainstem plan in terms of smolt-to-adult survival rates (SAR), sufficient to recover listed populations and meet the Power Act restoration goals and Program vision statement. Provisionally, for Snake River spring/summer chinook, PATH (Plan for Analyzing and Testing Hypotheses) estimated that SARs needed to average about 4% (range 2%-6% on a consistent basis) in order to meet ESA recovery goals (Marmorek et al. 1998; IDFG 1998). Recent SARs have rarely been as high as 2% for these stocks (Petrosky et al. in press; Marmorek et al. 1998), and consequently the populations have declined most generations (State of Idaho 2000a).

IDFG recommends that the Council adopt the concept into the mainstem plan that SARs of upriver stocks need to be improved relative to those of downriver stocks. Life-cycle survival of Snake River spring/summer chinook populations has averaged only 1/3 that of

similar downriver stocks, which originate above fewer dams, since completion of the hydrosystem (Figure 1) (Deriso et al. 1996; Schaller et al. 1999; IDFG 2001b). The survival gap widens in years of poor flow and spill, and narrows in high runoff years (Figure 1) (State of Idaho 2000a; IDFG 2001b).

Strategy: Assure that flow and spill operations are optimized to produce the greatest biological benefits with the least adverse effects on resident fish while assuring an adequate, efficient, economical, and reliable power supply.

The Council should explicitly recognize that under recent operation of the hydropower system, and specifically in below average water years, that flow and spill operations have not been optimized for anadromous fish. Benefits from these two key mitigation measures, with the current configuration of the hydrosystem, have been inadequate to maintain the upriver populations, and have failed to promote recovery under ESA or restoration under the Power Act. However, incremental benefits from flow augmentation and spill provide an important buffer to help moderate the risk evident at low flows during the smolt migration (Figure 2).

Our scientific analyses indicate considerable risk at low and average spring flows under the current hydrosystem configuration (State of Idaho 2000a). Prior to FCRPS completion, Snake River populations were productive under a range of natural runoff and environmental conditions, even after development of the upper Snake River storage projects (State of Idaho 2000a). Since FCRPS completion, when Snake River flow during the spring smolt migration has averaged less than 100 kcfs, the Snake River spring/summer populations have decreased on average each generation (Figure 2). Positive population growth, on average, has occurred only when spring outmigration flows have exceeded 100 kcfs, due to high natural runoff conditions (Figure 2). Snake River spring flow targets for the BiOp range from 85 to 100 kcfs, depending on runoff volume forecast, which recent, historic evidence indicates is inadequate on average to sustain Snake River populations. Such patterns imply that the Program's ability to achieve the biological objectives under the current strategy is very questionable for upriver populations, specifically for Snake River spring/summer chinook. If populations are declining under all but exceptional conditions, the balancing act implied in this portion of the primary strategy cannot recover or restore these populations.

Recommended Short-term (5-Year) Measures

Seabird Predation Measures Associated with Mainstem Operations

Terns and gulls consume salmonid smolts at Columbia and Snake River dams, and at other locations and times in the Columbia River. IDFG suggests it is appropriate for the Council to consider, as an element of its mainstem plan, improving inriver smolt survival by reducing unnatural levels of seabird predation.

In 2000, Caspian terns and double-crested cormorants nesting on improved habitat on East Sand Island consumed approximately 12 million juvenile salmonids, or about 18% of the spring smolt migration (IDFG 2001c), including upwards of 1 million ESA-listed fish. With increased bird populations and reduced numbers of juvenile fish expected in the 2001 migration, impacts could be dramatically higher, effectively eliminating the temporary savings achieved by relocating nesting birds from the upper estuary. Without overall predation reduction, this situation may be repeated in the future. Near-term action to reduce avian predation levels is consistent within the framework of near-term mainstem actions to improve smolt to adult survival. Restoring "balance" in the river ecosystem is consistent with the Council's vision statement. Such efforts should be neutral to the region's power supplies.

Our opinion is that bird predation can be effectively reduced to conservation levels of 5% or less in a few years. This measure would assist conservation of virtually all populations of anadromous fish in the Columbia River. Considering the disparity between the status of the birds and the fish, unnatural concentrations of nesting seabirds need to be dispersed outside the Columbia Basin, for overall Columbia River population reduction, within the next two years regardless of the availability of suitable nesting sites elsewhere.

A short-term plan for reducing the entire impact of seabird predation on smolts to conservation levels of 5% or less based on true impact assessments should be developed immediately and implemented in 2002. Planning and implementation should not allow predation to increase. As a function of planning, the Council should consider the full scope of predation on juvenile salmonids from abundant avian species, compared to historical conditions.

As an element for reducing avian predation, preparations for nesting sites outside the Columbia River migration corridor should proceed as quickly as possible, but must not be allowed to delay dispersal of enhanced seabird populations. We believe delays in implementing a meaningful dispersal program will allow bird populations to increase, resulting in ever-increasing needs for, and resistance to, alternate sites.

Mainstem Operations

The State of Idaho (2000b) supplemental comments on the July 27, 2000 draft Biological Opinion recommended a number of specific measures that are applicable to the Council's Program over the next 5-year planning period. The supplemental comments focused on the one and five year implementation planning schedules identified in the draft BiOp and assumed the current configuration of the lower Snake River dams during this management timeframe. We address the entire life cycle of Snake River salmon and steelhead, with emphasis on manageable factors most significantly limiting survival and recovery. Idaho's goal for this time period is to provide optimal survival conditions for wild Snake River salmon and steelhead within the context of operational lower Snake River dams. The key measures specific to the mainstem are presented within the context of our previous comments regarding uncertainty of long-term Program goals and

recovery being achieved. The body of the measures is attached as Appendix A (State of Idaho 2000b).

Reducing direct and delayed mortality associated with migration through the hydropower system is central to recovering wild salmon and steelhead in the Snake River (State of Idaho 2000b). Idaho recommends interim strategies that are consistent with the "normative" river approach while remaining balanced with other societal interests. This approach requires a commitment to making the river a friendlier environment for juvenile and adult migration and then allowing as many fish as ecologically prudent to remain in the river to migrate naturally.

Key, short-term measures from Appendix A, most applicable to a mainstem plan to achieve a more normative river are highlighted below:

Flood Control Operations: Idaho strongly endorses a reassessment of flood control operations. Flood control management should be modified to reduce the level of responsibility for Brownlee and Dworshak projects (i.e., allow these reservoirs to remain as full as possible until smolt migration begins). Flood control operations should be managed so that releases coincide as closely as possible with fish migration (i.e., reserve as much of the flood control draft as possible until after April 3). Flood control operations should be managed in real-time to optimize benefits to migrating fish while meeting minimum flood control responsibilities. These specific actions should accompany a general review of system flood control operations through which the Corps determines whether current flood control operations are based on outdated criteria and methods. This action should have a high priority.

Snake River Reservoir Operations: As an interim measure, the action agencies should utilize flood control releases and other available storage from Dworshak and Brownlee reservoirs as necessary to achieve a flow objective of 100 kcfs at Lower Granite Dam during the spring migration period when migrants are present. This measure is premised on shifts in flood control operations at Brownlee and Dworshak. The action agencies also should manage existing flow augmentation volumes (approximately 1.9 maf) for summer migrants subordinate to flow augmentation operations during the spring migration period. Finally, they should use Brownlee storage first and Dworshak storage later in the summer migration season to moderate water temperature in the lower Snake River, reduce adverse impacts to juvenile fall chinook rearing in the lower Clearwater River, and extend recreational benefits on Dworshak Reservoir.

The BiOp and Program should provide that Brownlee and Dworshak reservoirs will be managed with priority assigned to refill by June 20, subject to flow augmentation operations in the lower Snake River during the spring migration period, as described above.

Over the long-term, the region's objective should be to phase out the flow objective approach at dams for both spring and summer migrants as long-term measures are developed to address water velocity and temperature concerns.

The action agencies should also develop Integrated Rule Curves (IRC) for operations at federal reservoirs. The IRCs should be used as a management tool to optimize the beneficial uses of flood control, irrigation, recreation, water quality and quantity, resident fish and wildlife and anadromous fish.

Dworshak Reservoir Operations: Dworshak reservoir releases should occur after juvenile fall chinook in the Clearwater River have reached a size that ensures they are ready to migrate. NMFS should continue to use size criteria—and should consider additional criteria indicating readiness to migrate—as decision factors in determining when to call for flow augmentation from the Dworshak Project.

Juvenile Fish Transportation: All smolts collected at Lower Granite, Little Goose, and Lower Monumental dams should be transported during the spring migration period, except as required for research. This recommendation assumes, and is contingent upon, the implementation of the spill recommendations set forth in comments below. Smolt transportation from McNary Dam should be implemented during the summer migration period. Every effort should be made to reduce holding time of fish during all phases of collection and transportation operations.

Release of Transported Fish from the New Bonneville Second Powerhouse Juvenile Bypass Outfall,Timing of Juvenile Releases: Evaluating strategies to increase the survival of smolts after release is an important undertaking. NMFS should remain aware of existing research suggesting that holding fish during their migration increases their stress levels. The stress of prolonged holding could counteract the benefits of strategies that require holding the fish for substantial periods in order to time their release with tides or other factors.

Adult PIT Tag Detectors: Idaho supports the installation of adult PIT tag detectors at projects that do not currently have them.

Juvenile Fish Passage Strategy, Spillway Passage: Spillway passage is the preferred passage method for juvenile fish. The project operations should be based on the principle of maximizing the survival of those fish that migrate in-river. This does not mean, however, that current spillway passage is ideal. As discussed below, NMFS and the Council should call for improvements in spillway operations, including but not limited to installation of new deflectors, removable spillway weirs, and training walls.

The mainstem projects should be operated to maximize spillway passage at all dams for all spring migrants. Specifically, the action agencies should implement 24-hour spill to 120/125 percent total dissolved gas (TDG) at all mainstem dams during the spring migration period except during drought conditions at collector projects. The action agencies should reduce the frequency and magnitude of gas supersaturation by dam modification (modified spillway and stilling basins, *etc.*). For summer migrants, the action agencies should develop and implement spill tests to determine if overall survival can be improved by providing a safer dam passage route for in-river migrants. The action

agencies should also monitor and evaluate direct and delayed biological effects of spill programs on juveniles and adults.

Adult Passage: Idaho has two specific comments relating to adult migration conditions. First, the upstream exit of the adult fish ladder at the Bonneville Second Powerhouse extends into the reservoir above the project. This extension appears to be effective at reducing adult fallback at Bonneville Dam. The Corps should investigate the benefits of extending the ladders at other projects and implement the ladder extensions if benefits are shown. An extended adult fish ladder may be particularly valuable at McNary Dam. Second, we emphasize the need to improve adult fish counting accuracy. NMFS and the Council should call for visual – as opposed to video – counts. The video counts tend to increase counting error.

Water Quality: Idaho supports the construction of structural improvements to the mainstem projects to reduce TDG levels during the migration periods. These structures will assist the Corps in achieving the long-term water quality goal of 110 percent TDG while permitting optimum in-river migration conditions to be provided through spill and other measures. The long-term TDG goal cannot be met without physical modifications to the dams *beyond those that are presently underway*. Therefore, NMFS and the Council should give a high priority to installing state-of-the-art spillway deflectors and other structures needed to reduce TDG levels resulting from spill.

General Comment: The BiOp and Program call for intensive research of literally dozens of different aspects of juvenile and adult fish passage at the mainstem projects. It is essential, as this massive research program goes forward, that the action agencies to not degrade the quality of migration conditions for in-river migrating fish (*e.g.*, water velocity, temperature, spillway passage, etc.).

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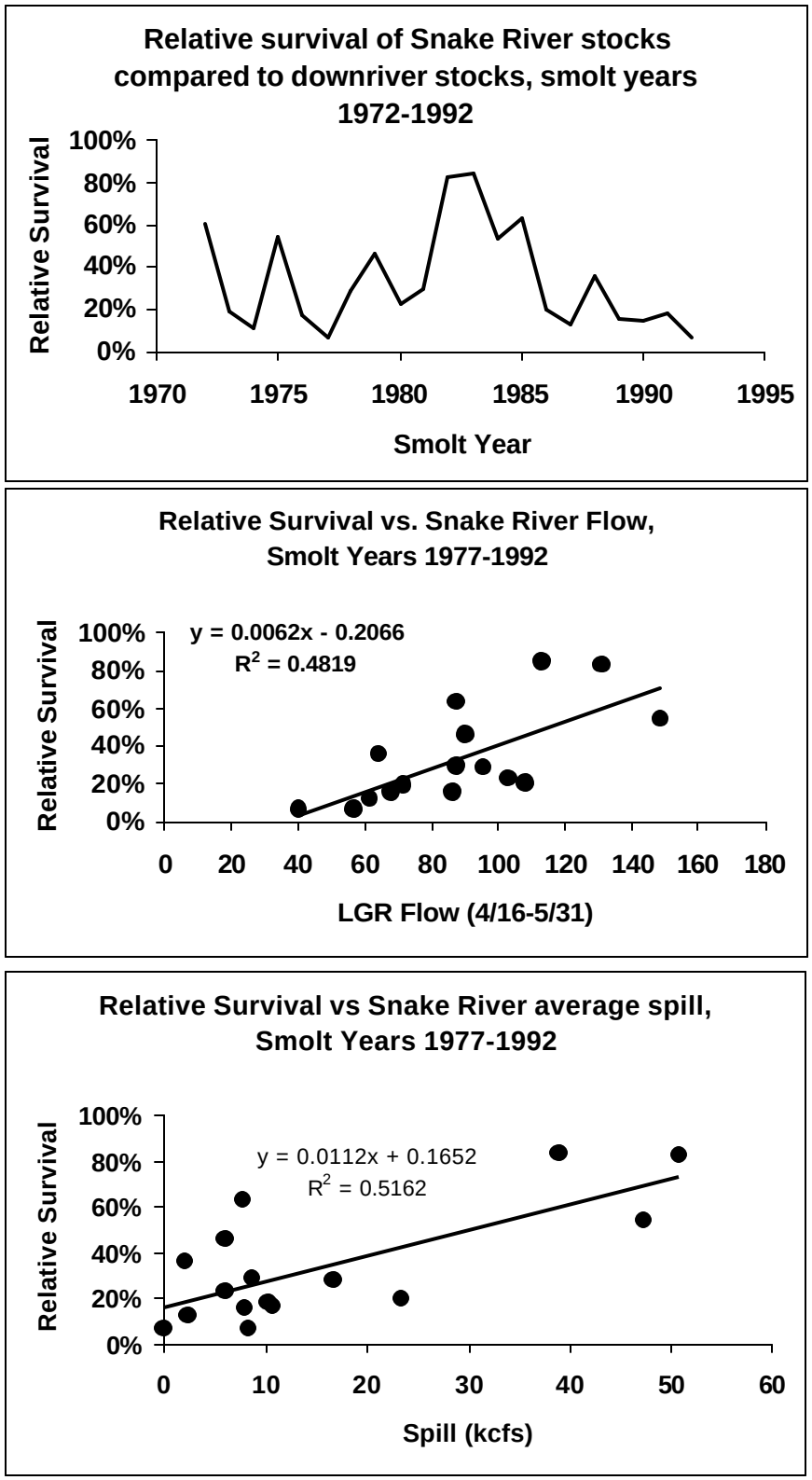

Figure 1. Relative survival ($e^{-\mu}$) of Snake River spring/summer chinook stocks compared to downriver stocks, smolt migration years 1972-1992 (upper panel); and relationship of relative survival to Snake River flow (middle panel) and spill (lower panel) conditions, smolt years 1977-1992 (IDFG 2001).

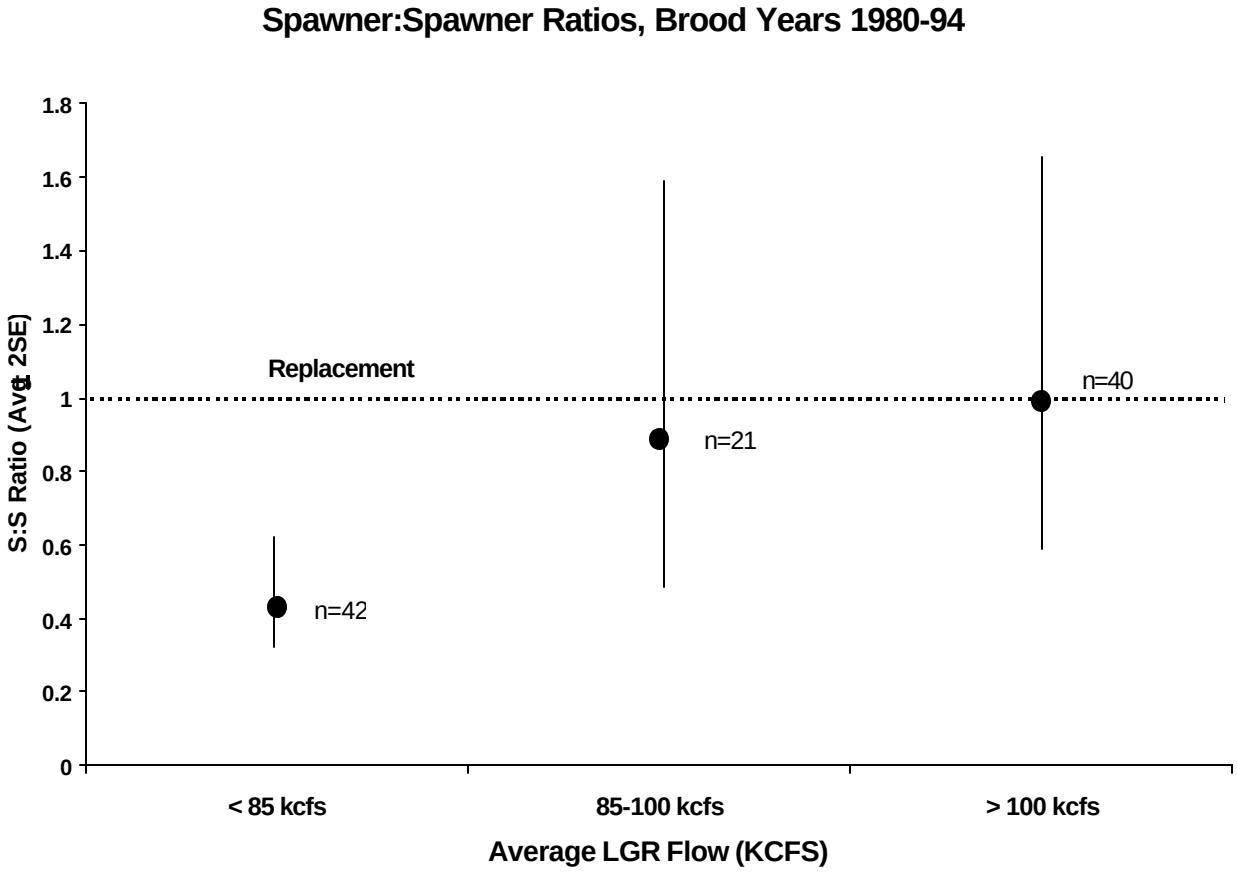

Figure 2. Average spawner to spawner ratio ± 2SE (natural log transformation) for seven index stocks of Snake River spring/summer chinook, brood years 1980-1994 (smolt years 1982-1996), compared to average springtime flow categories at Lower Granite Dam (LGR). 1995 BiOp flow targets are 85-100 kcfs, which are associated with returns averaging less than replacement. The populations increase when S:S > 1 and decrease when S:S < 1. Sample sizes (n) represent years and individual stocks combined. (State of Idaho 2000).

Appendix A
State of Idaho (2000b) Supplemental Comments on Draft Biological Opinion: Part III Comments Regarding Hydropower System Measures

This section focuses on the one and five year implementation planning schedules identified in the draft BiOp and assumes lower Snake River dams will be operational during this management timeframe. We address the entire life cycle of Snake River salmon and steelhead, with emphasis on manageable factors most significantly limiting survival and recovery. Idaho's goal for this time period is to provide optimal survival conditions for wild Snake River salmon and steelhead within the context of operational lower Snake River dams.

Reducing direct and delayed mortality associated with migration through the hydropower system is central to recovering wild salmon and steelhead in the Snake River. Idaho recommends interim strategies that are consistent with the "normative" river approach while remaining balanced with other societal interests. This approach requires a commitment to making the river a friendlier environment for juvenile and adult migration, and then allowing as many fish as ecologically prudent to remain in the river to migrate naturally.

Section 9.6.1.1.7, Page 9-39, Enhanced Operation and Maintenance of Fish Passage Facilities: Idaho agrees with the BiOp's statement at page 9-39 that "Fish passage facilities for both juvenile and adult salmon and steelhead are the backbone of a long-term engineering and technical commitment to fish passage survival." We also agree with NMFS' assessment that the budget of the U.S. Army Corps of Engineers ("Corps") for operations and maintenance of fish passage facilities has remained nearly static and has failed to meet growing needs.

The Corps' current budget is inadequate to address the needed repairs. We cannot overstate our concern that the failure of a single aging structure or machine could have catastrophic consequences for the listed species. The auxiliary water pumps for the fish ladders are a case in point. Many of these pumps, which provide the water needed to keep the adult fish ladders working, are quite old. For instance, electric motors drive 2,500 cfs fish pumps. They are almost fifty years old, and nothing like them has been built for over 20 years. Spare parts for these and other motors are becoming difficult and, in some cases, impossible to find. The impacts of a pump failure would be severe. Yet, the Corps has not secured the funding needed to replace these pumps. The auxiliary pumps are only one example of a broader problem with funding for long-deferred operations and maintenance needs. This problem deserves a higher priority within the Corps' budget process.

The Corps' budget is also inadequate to meet the growing list of needed improvements. The BiOp contains several dozen specific items, which range from removable spillway weirs to adult fish ladder improvements to minimum gap runners. These structures and facilities will require a substantial increase in the level of funding if they are to be installed soon enough to assist in the region's efforts to arrest the decline of the listed

stocks. Our experience has been that new structures and facilities can be delayed literally for years, even decades, due to funding and procedural obstacles. The long-delayed improvements to the juvenile fish passage facilities at Lower Granite Dam illustrate this point. It is imperative that NMFS, the Corps and the Bonneville Power Administration ("BPA") work together with the region to expedite funding and implementation of needed improvements to the mainstem dams.

Section 9.6.1.2.3, Page 9-47, Flood Control Operations: Idaho strongly endorses NMFS' call for a reassessment of flood control operations. Flood control management should be modified to reduce the level of responsibility for Brownlee and Dworshak projects (i.e., allow these reservoirs to remain as full as possible until smolt migration begins). Flood control operations should be managed so that releases coincide as closely as possible with fish migration (i.e., reserve as much of the flood control draft as possible until after April 3). Flood control operations should be managed in real-time to optimize benefits to migrating fish while meeting minimum flood control responsibilities. These specific actions should accompany a general review of system flood control operations through which the Corps determines whether current flood control operations are based on outdated criteria and methods. This action should have a high priority.

The BiOp's discussion of flood control misses an important aspect of the issue—namely, the effect of the current estimate of the standard project flood (maximum expected flood) on the construction of fish passage facilities at the lower Snake River projects. The standard project flood for the lower Snake River projects is 800 kcfs. The largest outflow in the past 30 years was 310 kcfs. Upstream storage developed since the standard project flood estimate was calculated renders that figure obsolete. Yet, the Corps has not been willing to modify this estimate. This is an important issue because lowering the estimate of the standard project flood could substantially reduce the cost of installing removable spillway weirs at the projects and allow them to be permanent rather than removable structures. Reassessment of the standard project flood estimate should be coordinated with reassessment of flood control operations at Dworshak and Brownlee reservoirs designed to enhance flows during the spring migration period.

Sections 9.6.1.2.3 through 9.6.1.2.4, Pages 9-45 through 9-49, Snake River Reservoir Operations: As an interim measure, the action agencies should utilize flood control releases and other available[1] storage from Dworshak and Brownlee reservoirs as necessary to achieve a flow objective of 100 kcfs at Lower Granite Dam during the spring migration period when migrants are present. This measure is premised on shifts in flood control operations at Brownlee and Dworshak. The action agencies also should manage existing flow augmentation volumes (approximately 1.9 maf) for summer migrants subordinate to flow augmentation operations during the spring migration period.[2] Finally, they should use Brownlee storage first and Dworshak storage later in

[1] Determined annually based on specific reservoir management measures contained in the RPA.

[2] The draft BiOp prioritizes flow augmentation for summer migrants at the expense of spring migrants. Available data does not support this priority. 1) Juveniles from three of the four Snake River ESUs migrate during spring (spring/summer chinook, sockeye and steelhead), whereas juveniles from only one Snake River ESU migrate during summer (fall chinook). 2) Based on survival and abundance trends, Snake River fall chinook are less imperiled than Snake River spring/summer chinook, steelhead and sockeye,

the summer migration season to moderate water temperature in the lower Snake River, reduce adverse impacts to juvenile fall chinook rearing in the lower Clearwater River, and extend recreational benefits on Dworshak Reservoir.

The BiOp should provide that Brownlee and Dworshak reservoirs will be managed with priority assigned to refill by June 20, subject to flow augmentation operations in the lower Snake River during the spring migration period, as described above.

Over the long-term, NMFS' objective should be to phase out the flow objective approach at dams for both spring and summer migrants as long-term measures are developed to address water velocity and temperature concerns.

The action agencies should also develop Integrated Rule Curves (IRC) for operations at federal reservoirs. The IRCs should be used as a management tool to optimize the beneficial uses of flood control, irrigation, recreation, water quality and quantity, resident fish and wildlife and anadromous fish.

Section 9.6.1.2.3, Page 9-47, Mitigating Resident Fish Effects of Dworshak Operations: Flood control releases at Dworshak Dam can have significant effects on the reservoir fishery. For instance, flood control releases in 1997 resulted in a large portion of the reservoir's population of kokanee being washed into the Clearwater River. Idaho supports the installation of a strobe light array in front of the powerhouse as well as other behavioral guidance facilities at Dworshak Dam to reduce the number of resident fish flushed out of the reservoir. Research has indicated that strobe lights cause fish to avoid the powerhouse area and, thereby, avoid entrainment. This measure should be funded out of the resident fish or project operations budget, not the Columbia River Fish Mitigation Fund.

Section 9.6.1.2.6, Page 9-54, Dworshak Reservoir Operations: Dworshak reservoir releases should occur after juvenile fall chinook in the Clearwater River have reached a size that ensures they are ready to migrate. NMFS should continue to use size criteria—and should consider additional criteria indicating readiness to migrate—as decision factors in determining when to call for flow augmentation from the Dworshak Project.

Section 9.6.1.2.6, Page 9-54, Dworshak Hatchery and Reservoir Operations: The Corps should provide an additional water supply for the Dworshak Hatchery through an additional or enlarged line from the reservoir. Much of the hatchery water supply

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particularly at the population level. 3) There is a statistically significant, positive relationship between flow and spawner-to-spawner ratios for wild Snake River spring/summer chinook (IDFG 2000; State of Idaho 2000; NMFS 2000), whereas this relationship has not been evaluated for fall chinook. Similarly, Snake River steelhead SARs are correlated with water travel time (Marmorek et al. 1998; NMFS 2000). 4) NMFS bases their summer priority on reservoir reach survival studies that use timed releases of hatchery fish to evaluate survival through a section of the river based on various flows. This approach has several important design and analysis flaws (see Idaho's Comments, September 29, 2000, Part I, Exhibit 4) and also cannot address the cumulative effect of delayed migration, altered timing of ocean entry, and loss of energy reserves that can only be encompassed through evaluations of adult returns (IDFG 1999; Dreher et al. 2000).

currently comes from the North Fork of the Clearwater River, which is affected by cold water releases from Dworshak Dam. This cold water tends to retard the growth of the fish being reared at the hatchery. Small steelhead tend to have lower survival and to residualize in the lower Snake River reservoirs, which can lead to increased predation on subyearling fall chinook. This problem can be avoided by installing a new or enlarged line from the reservoir and by using water heaters to ensure that the water supplied to the hatchery is the proper temperature.

Section 9.6.1.3, Page 9-58, Juvenile Fish Transportation: All smolts collected at Lower Granite, Little Goose, and Lower Monumental dams should be transported during the spring migration period, except as required for research. This recommendation assumes, and is contingent upon, the implementation of the spill recommendations set forth in comments on Section 9.6.1.4, page 9-64. Smolt transportation from McNary Dam should be implemented during the summer migration period. Every effort should be made to reduce holding time of fish during all phases of collection and transportation operations.

Section 9.6.1.3.3, Page 9-61, Separation of Chinook and Steelhead During Transport: Idaho supports the installation of facilities for separating smaller salmon from larger steelhead and hatchery salmon. The Lower Granite Juvenile Fish Facility does not have size separation. As the new size separation technology currently under development becomes available, it should be installed promptly at Lower Granite. Size separators at Little Goose, Lower Monumental, and McNary should then be retrofitted with the new size separators, with priority assigned to Little Goose.

Section 9.6.1.3.3, Page 9-62, Release of Transported Fish from the New Bonneville Second Powerhouse Juvenile Bypass Outfall,Timing of Juvenile Releases: Evaluating strategies to increase the survival of smolts after release is an important undertaking. NMFS should remain aware of existing research suggesting that holding fish during their migration increases their stress levels. The stress of prolonged holding could counteract the benefits of strategies that require holding the fish for substantial periods in order to time their release with tides or other factors.

Section 9.6.1.3.4, Page 9-62, Adult PIT Tag Detectors: Idaho supports the installation of adult PIT tag detectors at projects that do not currently have them.

Section 9.6.1.3.4, Page 9-63, Improvements to the Transportation System: Among the improvements the Corps should consider are: replacing the two World War II-vintage fish barges, developing smaller barges or self-propelled vessels to extend the barging season, and replacing separators with better facilities as they are developed. The Corps may also want to consider purchasing new trucks that are not corroded by the saline water used to transport smolts.

Section 9.6.1.4, Page 9-64, Juvenile Fish Passage Strategy, Spillway Passage: NMFS is correct that spillway passage is the preferred passage method for juvenile fish. The project operations should be based on the principle of maximizing the survival of those fish that migrate in-river. This does not mean, however, that current spillway passage is

ideal. As discussed below, NMFS should call for improvements in spillway operations, including but not limited to installation of new deflectors, removable spillway weirs, and training walls.

The mainstem projects should be operated to maximize spillway passage at all dams for all spring migrants. Specifically, the action agencies should implement 24-hour spill to 120/125 percent total dissolved gas (TDG) at all mainstem dams during the spring migration period except during drought conditions at collector projects. The action agencies should reduce the frequency and magnitude of gas supersaturation by dam modification (modified spillway and stilling basins, *etc.*). For summer migrants, the action agencies should develop and implement spill tests to determine if overall survival can be improved by providing a safer dam passage route for in-river migrants. The action agencies should also monitor and evaluate direct and delayed biological effects of spill programs on juveniles and adults. Strong adult returns in 2001 are anticipated. This gives the agencies a good opportunity to use returning adults to evaluate effects of full summer spill program on adult passage and survival.

<u>Section 9.6.1.4, Page 9-64, Juvenile Fish Passage Strategy, Surface Bypass and Surface Collection</u>: The Corps should aggressively pursue surface bypass systems, including the behavioral guidance systems ("BGS") and removable spillway weirs ("RSW"). Both concepts are promising. They offer an unusual opportunity to improve project survival while at the same time curtailing spill. The RSW approach will likely provide better conditions than current spillway passage because it eliminates the fifty feet of pressure and high velocity spill plume that the fish currently experience. RSWs could also reduce fallback and gas supersaturation problems.

Tests of surface bypass collection at Lower Granite indicate that fish guidance efficiencies of these facilities is not as high as had been hoped. Testing should continue, but it now appears that surface bypass collection may not solve passage problems at the mainstem dams. This should lead to additional emphasis on the BGS/RSW approach.

The long-term strategy for fish passage should adopt a normative approach that addresses water velocity, temperature and dam passage issues by striving to re-create natural ecosystem and fish behavioral processes as best possible within societal constraints. Examples of such a approach include: (1) developing fish guidance systems that allow unimpeded fish movement in a non-stressful setting (e.g., strobe, acoustic and velocity technologies); (2) continuing to pursue surface-oriented spillway passage technologies that provide for at least 80% passage of smolts via spillways; and (3) investigating technologies to improve reservoir passage conditions, such as an engineered migration channel beside the river and in-river venturi structures to enhance water velocity. These technologies should be explored and their biological benefits, risks and uncertainties identified to inform long-term recovery decisions.

<u>Section 9.6.1.4, Page 9-64, Turbine Passage</u>: A Minimum Gap Runner ("MGR") is designed to eliminate almost all gaps fish could enter when the hydropower generating turbine is operating. This is done by making the blades longer than those of traditional

Kaplan blades and milling out notches in the hub for the longer corners to fit into when the blades are tilted at a steep angle. The MGR is an efficient blade for power generation.

A conceptual design for MGRs was developed by the Turbine Working Group, a regional group of technical experts working together on the Advanced Hydro Turbine System Program (AHTS). This group was created in 1994 by the U.S. Dept. of Energy (DOE), Electric Power Research Institute (EPRI), and the Hydropower Research Foundation. The Corps Hydroelectric Design Center developed the design requirements and the design was adopted and incorporated into the powerhouse major rehabilitation program by the Corps Portland District. Voith Hydro built the prototype under contract to the Corps.

Under present conditions, estimates of fish survival through the turbine passage route vary from 89 to 94 percent. There are predictions of 1 percent to 4 percent improvement of survival. Even a 1 percent increase multiplied over eight Columbia-Snake dams would be significant. At a 4 percent improvement, survival rates with MGRs could range from 93 to 98 percent. These figures are only for direct mortality and survival.

The first MGR installed at a Corps project on the Columbia-Snake system is at Bonneville's first powerhouse. The new design MGRs cost more than a standard design, but in some cases increased power generation may offset some of the additional costs. Testing of the MGR at Bonneville Dam began November 11, 1999, and concluded January 1, 2000. Forty fish per day were released into the new MGR turbine chamber, forty into one of the old turbine chambers, and forty into the tailrace that did not go through a turbine. The study produced twenty-four survival estimates, one for each of the two turbines at four operating conditions with three release points. Fish were released to pass near the hub, at the mid-blade region, and near the blade tip. The fish were picked up in the water after the test and put into a tank for 48 hours to check for delayed mortality.

Preliminary analyses indicate that fish passed through the MGR had better survival overall than through the conventional unit. Overall injury rates among turbine-passed fish were low for both units, 1.5 percent and 2.5 percent for the MGR and Kaplan unit, respectively. Survival rates of fish passed near the hub were high (97 percent or greater) for both units. Survival rates of fish passed through the mid-blade region ranged from 95 to 97 percent and did not differ between units. At all four power levels, the MGR showed better survival than the conventional units for fish that passed near the blade tip. Survivals for blade tip-released fish ranged from 90.8 to 95.6 percent for the conventional Kaplan and from 93.8 percent to 97.5 percent for the MGR.

The Turbine Passage Survival Program is a three-year program to investigate short-term and long-term improvements to juvenile passage through the turbine. The entire turbine environment is being studied. The project study plan was developed in coordination with related activities underway by other organizations (Public Utility Districts, DOE, Electric

Power Research Institute, and BPA) to eliminate duplication, reduce cost and enhance the effectiveness of the Corps' turbine program.

Idaho strongly supports continued research and testing of MGR turbines, with the goal of installation at all dams, including the four lower Snake River dam projects. Congress should continue to fund this program. The cost of replacing existing turbines with MGRs should not be charged to the Columbia River Fish Mitigation Program.

Section 9.6.1.4.2, Page 66, John Day Dam: John Day Dam is the only Corps mainstem dam that has skeleton bays. A behavioral guidance system could be constructed to lead to a new bypass channel through one of the skeleton bays. NMFS should examine the feasibility and benefits of such a system.

Section 9.6.1.4.2, Page 68, Lower Monumental Dam: Idaho supports modifying the Lower Monumental bypass outfall. We recognize that implementation of BGS/RSW will take at least several years. Therefore, it is important to continue to improve aspects of the existing system where benefits can be gained in the interim.

Section 9.6.1.4.4, Page 9-75, Turbine Unit Operations: Operating turbines within one percent of peak efficiency maximizes fish survival, makes more efficient use of water for power generation, and reduces wear and tear on the turbines. NMFS correctly directs the Corps and the BPA to operate the turbines for optimum fish survival.

Section 9.6.1.4.5, Page 9-80, McNary Dam: Although the debris problem at McNary Dam has been partially resolved, additional work is needed. Debris on the screens and in other parts of the juvenile collection system is a particular concern when fish are being transported at the project. Clogs in loading lines have caused problems and some fish loss. The rotary dewatering screen concept should be developed to determine whether it would be effective in addressing this problem. A debris boom should also be constructed at McNary Dam.

Section 9.6.1.4.5, Page 9-81, Extended Length Screens at Lower Monumental Dam: Idaho is not convinced that extended length screens should be installed at Lower Monumental Dam. Installation of extended length screens should be deferred pending additional studies of their potentially deleterious effects on fish passage, including impingement of lamprey.

Section 9.6.1.4.5, Page 9-81, Lower Granite Dam: Idaho supports continued testing of the RSW facility at Lower Granite Dam. This testing should not be permitted to degrade conditions for in-river migrating fish.

Modification of the Lower Granite Dam fish facility should be a high priority. The facilities should be upgraded to a standard equivalent to the facilities at Little Goose Dam. The modification should include converting the 10-inch orifices from the bulkhead slots to the collection tunnel into 12-inch orifices. The collection tunnel should be widened from 6 feet to 9 feet so the plumes from the orifices do not hit the far side wall.

The tunnel should be mined out to daylight though the powerhouse wall to eliminate the 65-foot downwell and pressurized pipe. The pressured pipe that now goes to the juvenile fish collection facility should be replaced with a non-pressurized flume similar to the one at Little Goose Dam. A size separator should be installed so wild chinook and sockeye could be separated from larger steelhead and hatchery chinook. The raceways should be modified to provide better distribution of inflow and reduce raceway jumping. Idaho is particularly concerned that the facilities cause increased stress and delayed mortality of smolts. Because Lower Granite Dam is the first dam encountered by the migrating fish and because the entire migration must pass this project, these improvements should be moved near the top of the priority list.

Section 9.6.1.4.6, Page 9-82, Spillway Passage Research: This action should be given a relatively low priority. If studies are conducted, they should focus on adult returns.

Section 9.6.1.4.6, Page 9-83, High Volume Outfalls: The Corps should plan for high-volume outfalls, particularly at the Lower Columbia River dams. These outfalls are likely to be necessary to avoid high-volume dewatering.

Section 9.6.1.6, Page 9-90, Adult Passage: Idaho agrees with NMFS' recommendations to improve adult migration conditions set forth in this section. Idaho has two specific comments. First, the upstream exit of the adult fish ladder at the Bonneville Second Powerhouse extends into the reservoir above the project. This extension appears to be effective at reducing adult fallback at Bonneville Dam. The Corps should investigate the benefits of extending the ladders at other projects and implement the ladder extensions if benefits are shown. An extended adult fish ladder may be particularly valuable at McNary Dam. Second, the BiOp at page 9-94 correctly emphasizes the need to improve adult fish counting accuracy. NMFS should call for visual – as opposed to video – counts. The video counts tend to increase counting error.

Section 9.6.1.6.2, Page 9-93, Adult Fallback at Ice Harbor and McNary Juvenile Fish Facilities: The Corps should install a denil fish ladder to permit adults to escape from these facilities with minimal handling.

Section 9.6.1.6.4, Page 9-95, Reliability Enhancement: As noted above, this measure identifies a real problem. Pumps, valves, and other components of the fish facilities are getting old and wearing out. The Corps needs to be ready to replace these facilities *before* they break. The action agencies need to allocate substantial funding to rebuild fishway pumps. If one pump fails, then the other two would have to work harder and be at greater risk of failure. Any failure by all pumps could be catastrophic.

Section 9.6.1.6, Page 9-96, The Dalles East Ladder: The east ladder at The Dalles was designed with a gravity auxiliary water supply. North Wasco Public Utility District filed for a FERC permit and installed a turbine on the water supply. An alternative source of water is needed to avoid problems in the event the turbine goes down during the fish passage season.

Section 9.6.1.7, Page 9-98, Water Quality: Idaho supports the construction of structural improvements to the mainstem projects to reduce TDG levels during the migration periods. These structures will assist the Corps in achieving the long-term water quality goal of 110 percent TDG while permitting optimum in-river migration conditions to be provided through spill and other measures. We agree strongly with the statement at page 9-98 that the long-term TDG goal cannot be met without physical modifications to the dams *beyond those that are presently underway*. Therefore, NMFS should give a high priority to installing state-of-the-art spillway deflectors and other structures needed to reduce TDG levels resulting from spill.

The radius design spillway deflectors installed at Ice Harbor Dam in the late 1990s reflect the current state-of-the-art design and are a substantial improvement over the older flat spillway deflectors. With the radius design, water coming down the face of the spillway is more gently turned to skate across the surface of the tailrace. This reduces the deep entrainment of gases and, thus, lowers TDG levels. The position of the deflectors is also important. If they are too low, they permit water to plunge to depth. If they are too high, air can be pulled under the shooting flow, causing more supersaturation. Detailed hydraulic modeling was conducted at Ice Harbor Dam to ensure that the deflectors were constructed in the correct position to minimize TDG.

The improvements in deflector design developed at Ice Harbor Dam should be incorporated into new deflectors at the other mainstem projects. This will mean continuing detailed studies to convert the old-style deflectors to the new radius design deflectors.

NMFS should also call for the construction of deflectors in the end bays at dams that do not currently have them. Many of the dams do not have deflectors in one or two spillway bays at either end of the spillway. Studies at dams without deflectors in the end bays show that water with entrained air from the non-deflector bays is drawn under the outflow of the deflector bays. The result is that non-deflector bays cause conditions that reduce the effectiveness of the deflectors in adjacent bays, thus reducing the overall level of TDG control at the projects. A decision not to construct end bay deflectors was made in the 1970s because it was thought that end bay deflectors might adversely affect passage conditions at the adult fish ladder entrances. Since then, careful hydraulic modeling has indicated that installing training walls between the end bays and the rest of the spillway and locating the deflector at a slightly deeper level provides good adult passage conditions. Follow-up studies with radio tagged adult salmon and steelhead have confirmed that deflectors in end bays do not interfere with adult passage.

It is important to expedite the installation of deflectors in all spillway bays that do not currently have them and to modify the old deflectors to the current design. Idaho's support for new deflectors applies to all dams where they are not currently installed. In addition to this general recommendation, Idaho has the following specific observations:

- Page 9-67, McNary Dam: The focus at McNary Dam should be on spillway passage. The spillway deflectors are the old-style flat design.

They should be replaced with radius design deflectors. The end bays should be equipped with deflectors. Results of model studies at Ice Harbor Dam indicate that gas control at McNary Dam can be increased.

- Page 9-68, Lower Monumental Dam: The spillway deflectors at Lower Monumental Dam were constructed in the 1970s and are the flat design. They should be replaced with the current design. Guide or training walls may also be necessary. The absence of deflectors in the end bays causes an erosion problem in the stilling basin, which provides an additional reason to install new deflectors there. The elevation of the deflectors should also be modified.

- Page 9-68, Little Goose Dam: Like Lower Monumental Dam, Little Goose Dam has only six old-style deflectors. They should be modified and end bay deflectors should be installed.

- Page 9-71, Lower Granite Dam: High levels of spill at Lower Granite Dam can affect adult fish passage. End bay deflectors would help address this problem.

General Comment: The BiOp calls for intensive research of literally dozens of different aspects of juvenile and adult fish passage at the mainstem projects. It is essential, as this massive research program goes forward, that the action agencies to not degrade the quality of migration conditions for in-river migrating fish (*e.g.*, water velocity, temperature, spillway passage, etc.).