

8.0 CONCLUSIONS

8.1 APPROACH

The analysis in the preceding sections of this Opinion forms the basis for conclusions as to whether the proposed action, the ongoing operation of the FCRPS, and the USBR projects identified in Table 1.1 satisfy the standards of ESA Section 7(a)(2). To do so, the Action Agencies must ensure that their proposed action is not likely to jeopardize the continued existence of any listed species or destroy or adversely modify the designated critical habitat of such species. Section 4.0 of this Opinion defines the biological requirements and the current range-wide status of each of the 13 listed salmonid species. Section 5.0 evaluates the relevance of the environmental baseline to each species' current status. Section 6.0 details the likely effects of the proposed action, on individuals of the species in the action area and on the listed population as a whole, across its range and life cycle and on designated critical habitat. Section 7.0 considers the cumulative effects of relevant non-Federal actions reasonably certain to occur within the action area. On the basis of this information and analysis, NOAA Fisheries draws its conclusions about the effects of the FCRPS and the USBR projects on the likelihood of both the survival and recovery of the 12 listed and one proposed species of Columbia River salmonids, as well as the effects on critical habitat.

8.1.1 Jeopardy Analysis

As discussed in Section 1.2.5 of this Opinion, NOAA Fisheries must now determine whether any reductions of the species' productivity, numbers, or distribution caused by the proposed action reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of the listed species or result in the destruction or adverse modification of critical habitat. Where the analysis in Section 6.0 indicates that there are not likely to be any net adverse effects to the ESU from the proposed action, NOAA Fisheries' conclusion will necessarily be that the action is not likely to jeopardize the ESU's continued existence. A reduction in the likelihood of both survival and recovery cannot occur if there is no net reduction in the productivity, numbers or distribution of that ESU, consistent with the regulatory definition of "jeopardize the continued existence" (50 CFR § 402.02). Similarly, for the critical habitat determination, if there is no net adverse alteration of any essential features of critical habitat, there can be no adverse modification of that habitat. Although there may be no net adverse effect to an ESU or its habitat, NOAA Fisheries nevertheless reviews the factors relevant to the "appreciable reduction" and "adverse modification" determinations for that ESU to provide the full context for this analysis.

The information available to NOAA Fisheries for this determination is both quantitative and qualitative. For some species, such as SR spring/summer chinook salmon, the available information includes substantial quantitative data based on empirical observations. For other species, such as SR sockeye salmon and several lower river ESUs, the available information is largely qualitative, based on the best professional judgment of knowledgeable scientists. Despite an increasing trend toward a more quantitative understanding of the critical life signs for these fish, critical uncertainties limit NOAA Fisheries' ability to project future conditions and effects.

As a result, no absolute numerical indices are available for any of these stocks on which NOAA Fisheries can base determinations about jeopardy or the adverse modification of critical habitat (the Section 7(a)(2) standards). Ultimately, for all 13 ESUs, NOAA Fisheries' conclusions are qualitative judgments based on the best quantitative and qualitative information available for each species.

As described in Section 1.2.5 and Section 6.0, NOAA Fisheries considers effects of an action on an ESU by first considering effects on individual populations, then on major population groups identified by Technical Recovery Teams (TRTs), and finally on the ESU as a whole. Effects on populations and major population groups were described in Section 6.0. In judging whether a reduction in the numbers, productivity, or distribution of an ESU constitutes an appreciable reduction in the likelihood of the ESU's survival and recovery, NOAA Fisheries considers the following factors:

Number of Major Population Groups in ESU. ESUs with only one or two major population groups are more likely than ESUs with several major population groups to be reliant on individual populations for recovery or even continued survival (e.g., in the face of major catastrophic events). The smaller the number of major population groups in an ESU, the more likely that a reduction in numbers, productivity, or distribution of one or more groups would constitute an appreciable reduction in the ESU's likelihood of survival and recovery.

Proportion of Major Population Groups with Reduced Numbers, Productivity, or Distribution. The higher the percentage of major population groups in an ESU with a reduction in numbers, productivity, or distribution, the more likely this would constitute an appreciable reduction in the ESU's likelihood of survival and recovery. Conversely, the smaller the proportion of groups with an adverse effect, the less likely there would be an appreciable reduction.

Magnitude of the Reduction for Affected Major Population Group(s). A large reduction in numbers, productivity, or distribution for the affected population group(s) would be more likely than a small reduction to constitute an appreciable reduction in the ESU's likelihood of survival and recovery. As described in Section 6.0, in determining the magnitude of the reduction, it is relevant to consider the relative timing of adverse and beneficial components of the proposed action.

Range-wide Status of the ESU. An endangered ESU would presumably have less capacity for reduction in numbers, productivity, or distribution than a threatened ESU. Similarly, an endangered or threatened ESU that has been declining significantly in recent years would have less capacity for reduction in numbers, productivity, or distribution than an ESU with an increasing population trend. Therefore, it is more likely that a reduction will be considered 'appreciable' for endangered than for threatened ESUs and for declining rather than relatively stable or increasing ESUs.

If the beneficial effects of some components of the proposed action will be delayed relative to the proposed action's adverse effects, NOAA Fisheries must consider the status and viability of the population during the lag period. There would be an appreciable reduction in the likelihood

of survival and recovery if population abundance or productivity were too low during the lag period to respond to later beneficial effects.

Status of ESU in the Action Area (Environmental Baseline). The extent to which an ESU's biological requirements are not being fully met within the action area is relevant to that ESU's capacity to tolerate additional similar adverse effects. The extent of the action area relative to the range-wide distribution of the ESU is also relevant. The greater the proportion of the range of the ESU represented by the action area, the more significant is the status of the ESU within the range to the "appreciable reduction" determination. In summary, NOAA Fisheries would be more likely to conclude that a reduction in numbers, productivity, or distribution is an appreciable reduction in the likelihood of both survival and recovery if the status of the ESU in the action area is poor relative to its biological requirements and if the action area represents a significant proportion of the ESU's range.

Impact of Cumulative Effects on Status of ESU in the Action Area. NOAA Fisheries must consider the influence of non-Federal actions that are reasonably certain to occur in the action area. The key question is whether inclusion of cumulative effects modifies the characterization of the status of an ESU in the action area.

Uncertainty. Available science is unable to resolve significant uncertainty in all parts of this analysis. NOAA Fisheries must identify and acknowledge the full range of scientific uncertainty in reaching its final conclusion. Where scientific gaps remain, NOAA Fisheries is expected to provide the benefit of the doubt to the listed species (ESA Section 7 Consultation Handbook, p. 1-6). A key question is whether or not the uncertainty is greater in the analysis of the presumed positive effects of non-hydro mitigation actions compared to presumed negative effects of hydro operations, or if the level uncertainty is comparable. If there is greater uncertainty in the positive considerations in the analysis than in the negative considerations, it may be reasonable to give greater weight to the conclusion that a reduction in ESU status represents an appreciable reduction.

8.1.2 Analysis of Adverse Modification of Critical Habitat

[**NOTE:** A very recent decision by the 9th Circuit Court of Appeals in the case of *Gifford Pinchot Task Force v. U.S. Fish & Wildlife Service*, No. 03-35279 (9th Cir. August 6, 2004) invalidates the critical habitat analysis in several Fish & Wildlife Service biological opinions that applied the regulatory definition of "destruction or adverse modification", 50 CFR § 402.02, which the court found to be unlawful. In light of this decision, NOAA Fisheries requires additional time to consider the implications of this holding for the proper application in this opinion of the statutory requirement that an action not destroy or adversely modify designated critical habitat. For that reason, an analysis of the effect of this proposed action on designated critical habitat is not attempted in this draft opinion.]

8.1.3 Summary of Conclusions for All ESUs

Conclusions for the 13 ESUs are summarized in Table 8.1. Details regarding those conclusions are discussed in Sections 8.2 through 8.14.

Table 8.1. Summary of conclusions.

ESU	ESU Net Effect - Change in Numbers, Reproduction, or Distribution?	ESU Jeopardy Determination - Appreciable Reduction in Likelihood of Survival and Recovery?	ESU Adverse Modification Determination
SR Spring/Summer Chinook	Reduce (short-term)	No Jeopardy	Not addressed pending review of recent Court decisions
SR Fall Chinook	Reduce	No Jeopardy	Not addressed pending review of recent Court decisions
UCR Spring Chinook	Reduce (short-term)	No Jeopardy	N/A
LCR Chinook	Reduce (short-term)	No Jeopardy	N/A
UWR Chinook	No Change	No Jeopardy	N/A
SR Steelhead	No Change	No Jeopardy	N/A
UCR Steelhead	Reduce (short-term)	No Jeopardy	N/A
MCR Steelhead	Reduce (short-term)	No Jeopardy	N/A
UWR Steelhead	No Change	No Jeopardy	N/A
LCR Steelhead	No Change	No Jeopardy	N/A
CR Chum	Reduce (short-term)	No Jeopardy	N/A
LCR Coho	No Change	No Jeopardy	N/A
SR Sockeye	Reduce (short-term)	No Jeopardy	Not addressed pending review of recent Court decisions

8.1.4 Supplemental Consultations for USBR Projects in Occupied Habitat

As part of the UPA, and consistent with the action proposed for the 2000 BiOp and its resulting RPA, these conclusions also apply to the effects of 19 USBR projects that all have effects on the mainstem of the Columbia River. For many of these projects the mainstem effects are the only effects on the affected ESUs (e.g. the Montana, Columbia Basin and Chief Joseph projects). There are other USBR irrigation projects, located in watersheds inhabited by listed salmonids, that also may affect the ESUs' spawning and egg-to-smolt life stages: the Okanogan, Yakima, Umatilla, Crescent Lake, Deschutes, Wapinitia, The Dalles, Tualatin and Lewiston Orchards projects. The 2000 BiOp, RPA Action 30, called for supplemental consultations during which

USBR would provide further detail about these projects and their tributary effects in supplemental biological assessments. NOAA Fisheries would then consider those effects, as well as any further information about the mainstem effects of those projects, and provide supplemental biological opinions for each such project. Since 2000, NOAA Fisheries and USBR have completed a supplemental consultation for the Umatilla Irrigation Project. The USBR now proposes in its UPA, Appendix C, to continue with supplemental consultations for the remainder of these projects. Most of these supplemental consultations are now underway. The conclusions in this Opinion for these USBR projects, therefore, will be further refined by these supplemental consultations.

8.2 SR SPRING/SUMMER CHINOOK SALMON

After reviewing the current status of SR spring/summer chinook salmon, the environmental baseline for the action area, the effects of the proposed actions, and cumulative effects in the action area, it is NOAA Fisheries' opinion that the proposed action is not likely to jeopardize the continued existence of this species.

Magnitude of Reduction(s): The net combination of proposed hydro operations, hydro configuration changes, and non-hydro mitigation actions reduce numbers and productivity by a "Low" amount for the five major population groups in this ESU (Section 6.0) initially. Beneficial actions that are phased in during the term of the proposed action are expected to reduce the negative effects to no change by 2010-2014.

Number of Major Population Groups: The presence of five major population groups in this ESU (Section 4.0) makes it is less likely that any single group is significant for this ESU's survival and recovery, compared to ESUs with fewer major population groups.

Proportion of Major Population Groups Reduced: The net combination of proposed hydro operations, hydro configuration changes, and non-hydro mitigation actions reduce numbers and productivity by a "Low" amount for all five major population groups in this ESU (Section 6.0) initially. Beneficial actions such as configuration changes and non-hydro actions that are phased in during the term of the proposed action are expected to reduce the negative effects to no change by 2010-2014.

Range-wide Status of the ESU: As described in Section 4.0, this ESU is a threatened species. The BRT reported that, through 2001, most populations experienced long-term declines, but short-term trends were positive for many populations. Dam counts and preliminary spawner surveys also indicate higher than average abundance in 2002 and 2003. The recent 10-year average is approximately twice the previous 10-year average for combined hatchery and wild adults passing Lower Granite Dam. The BRT concluded that the natural component of the ESU had moderately high risk for the abundance and productivity VSP categories and comparatively lower risk for spatial structure and diversity. The June 14, 2004 status review and proposed listing determinations for salmon and steelhead indicated that SR spring/summer chinook salmon artificial production programs provide benefits to ESU abundance, spatial structure, and diversity but have neutral or uncertain effects on ESU productivity. Collectively, hatchery programs do

not substantially reduce the long-term extinction risk of the ESU. However, the existing safety net program is effective at reducing the short-term risk of extinction (see Section 6.3.2.3).

Status of the ESU in the Action Area (Environmental Baseline): Since all of the fish in this ESU pass through at least part of the action area, the status of the ESU in the action area is essentially the same as the range-wide status of the ESU described in Section 4.0. Adult passage at existing dams is effective. However, as described in Section 5.0, the construction of the hydro system has severely degraded the habitat in the migratory corridor of this ESU, and the existing structures and facilities result in high levels of mortality for juvenile fish migrating towards the ocean. In general, habitat-related biological requirements of juveniles are not being fully met in the action area. The significant baseline effects of FCRPS and USBR dams and water management along with mainstem harvest rates (up to 2% non-treaty and 15% treaty Indian fisheries) are key factors influencing ESU status in the action area.

Beginning in the 1980s, and especially in the last decade, the Action Agencies have made a series of structural and operational improvements at FCRPS projects and, in many cases, these modifications have significantly improved the survival of juvenile fish within this ESU during their passage through the hydro system. Although the existence of the dams continues to be a major limiting factor for this ESU, it is clear that, without these recent improvements, the survival of juvenile fish through the FCRPS would be much worse than it is today.

Cumulative Effects: As described in Section 7.0, known projects properly considered as cumulative effects are not expected to significantly affect the status of this ESU in addition to the environmental baseline.

Uncertainty: Direct adult and juvenile survival rates through FCRPS projects are known with relative certainty for SR spring/summer chinook salmon. These estimates represent a combination of discretionary annual operations and the environmental baseline (i.e., existence and non-discretionary hydro operations). The ability to distinguish between juvenile survival associated with discretionary annual operations and environmental baseline conditions is uncertain because of the inability to describe the limits of some areas of discretion quantitatively, and the difficulty defining and modeling a reference operation that maximizes the survival of listed fish. The average post-Bonneville differential survival of transported juveniles (D) relative to non-transported juveniles is fairly well known for this ESU, based on large sample sizes in recent years. The magnitude of latent mortality of in-river migrants, including any differences in this measure between the reference and proposed operation, is highly uncertain. Survival of adults through the hydro system under the proposed action is relatively certain.

There are no quantitative estimates of the effect of the proposed hydro action on this ESU below Bonneville Dam. While specific effects of hydro operations on estuary and plume habitat are uncertain, the relatively small difference in spring flows and lack of a difference in water quality between the reference and proposed operations are fairly certain.

Estimates of the improvements expected from the continued and expanded pikeminnow program are uncertain, but NOAA Fisheries accounted for this uncertainty by estimating only a Low survival improvement (Section 6.3.2.4). Estimates of the improvements expected from the avian

predation program are uncertain for this ESU because of the possibility that implementation may face procedural impediments, as described in Section 6.3.2.1, but the impact was only considered Low in the net effects analysis. No improvement was assumed in the net effects analysis from estuarine habitat restoration (0), reflecting the uncertainty associated with effects of the proposed action on this ESU.

Summary: There is a mix of high and low risk considerations for the SR spring/summer chinook ESU, both range-wide and in the action area. High mortality in the action area, caused largely by effects of the FCRPS and USBR projects and water management that are included in the hydro portion of the environmental baseline represented by the reference operation, indicates relatively high risk. However, recent adult returns indicate reduced range-wide risk, at least in the short term, and some tolerance for additional short-term risk. While the net reduction will be “Low” early in the term of the proposed action, beneficial actions will reduce the effect to no change and perhaps to a net improvement by 2010 and beyond. Strong returns of adults during the past four years suggest that the next few brood cycles will also be strong. It is highly unlikely that this ESU will go extinct in the near future because of the large numbers of recent spawners, and therefore the lag in achieving beneficial effects will not have serious consequences. For these reasons, the proposed action is not likely to appreciably reduce the likelihood of survival and recovery of the ESU.

Critical Habitat: [NOTE: A very recent decision by the 9th Circuit Court of Appeals in the case of *Gifford Pinchot Task Force v. U.S. Fish & Wildlife Service*, No. 03-35279 (9th Cir. August 6, 2004) invalidates the critical habitat analysis in several Fish & Wildlife Service biological opinions that applied the regulatory definition of “destruction or adverse modification”, 50 CFR § 402.02, which the court found to be unlawful. In light of this decision, NOAA Fisheries requires additional time to consider the implications of this holding for the proper application in this opinion of the statutory requirement that an action not destroy or adversely modify designated critical habitat. For that reason, an analysis of the effect of this proposed action on designated critical habitat is not attempted in this draft opinion.]

8.3 SR FALL CHINOOK SALMON

After reviewing the current status of SR fall chinook salmon, the environmental baseline for the action area, the effects of the proposed actions, and cumulative effects in the action area, it is NOAA Fisheries’ opinion that the proposed action is not likely to jeopardize the continued existence of this species.

Magnitude of Reduction(s): The combination of proposed hydro operations, hydro configuration changes, and non-hydro mitigation actions reduce numbers and productivity by a “Medium” amount for the single extant population in this ESU (Section 6.0) initially. Beneficial actions that are phased in during the term of the proposed action are expected to reduce the negative effects to no change by 2010-2014.

Number of Major Population Groups: There is only one population and therefore one major population group in this ESU (Section 4.0), which makes it significant for this ESU’s survival and recovery.

Proportion of Major Population Groups Reduced: The combination of discretionary hydro operations, hydro configuration changes, and off-site actions reduce numbers, productivity, and distribution of the single extant population in this ESU initially. Beneficial actions that are phased in during the term of the proposed action are expected to reduce the negative effects to no change by 2010-2014.

Range-wide Status of the ESU: As described in Section 4.0, this ESU is a threatened species. The BRT reported that, through 2001, the natural component of this ESU had experienced long-term declines, but the short-term trend was positive. Dam counts and preliminary spawner surveys also indicate higher than average abundance in 2002 and 2003. In fact, the four years 2001-2003 have resulted in the highest naturally produced returns to areas above Lower Granite Dam since the early 1960s, shortly after access to spawning areas above Hells Canyon was lost (Section 4.0). The BRT was concerned that overall abundance of natural spawners has been low, in spite of recent improvements. The BRT concluded that the natural component of the ESU had moderately high risk for all VSP categories. The June 14, 2004 status review and proposed listing determinations for salmon and steelhead indicated that SR fall chinook salmon artificial production programs provide slight benefits to ESU abundance, spatial structure, and diversity but have neutral or uncertain effects on ESU productivity. Overall, hatchery programs collectively do not substantially reduce the extinction risk of the ESU in-total.

Status of the ESU in the Action Area (Environmental Baseline): Since all of the fish in this ESU pass through at least part of the action area, the status of the ESU in the action area is essentially the same as the range-wide status of the ESU described in Section 4.0. Adult passage at existing dams is effective. However, as described in Section 5.0, the construction of the hydro system has severely degraded the habitat in the migratory corridor of this ESU, resulting in high levels of mortality for juvenile fish migrating towards the ocean. In general, habitat-related biological requirements of juveniles are not being fully met in the action area. The significant baseline effects of FCRPS and USBR dams and water management along with mainstem harvest rates (up to 8% non-treaty and 23% treaty Indian fisheries) are key factors influencing ESU status in the action area.

Beginning in the 1980s, and especially in the last decade, the Action Agencies have made a series of structural and operational improvements at FCRPS projects and, in many cases, these modifications have significantly improved the survival of juvenile fish within this ESU during their passage through the hydro system. Although the existence of the dams continues to be major limiting factor for this ESU, it is clear that, without these recent improvements, the survival of juvenile fish through the FCRPS would be much worse than it is today.

Cumulative Effects: As described in Section 7.0, known projects properly considered as cumulative effects are not expected to significantly affect the status of this ESU in addition to the environmental baseline.

Uncertainty: Direct adult survival rates through the FCRPS are known with relative certainty. As described in Sections 5.0 and 6.0, the survival of juveniles through the FCRPS, especially the effects of FCRPS passage or transport on survival below Bonneville Dam, are poorly known. As

described in 6.4.1, there is also uncertainty regarding the life history strategy followed by SR fall chinook. Empirical information regarding survival rates is available only for the subyearling migration strategy, but recent information suggests that a significant portion of returning adults emigrated as yearlings. In addition, there is uncertainty regarding the survival of juveniles through the FCROPS. For instance, Williams *et al.* (2004) state that “no empirical evidence exists to suggest that transportation either harms or helps fall chinook salmon.” Nevertheless, NOAA Fisheries continues to believe that maximizing transportation of fall chinook is the best method of insuring their survival and recovery until more definitive information can be gathered. Accordingly, the reference operation (as described in Appendix D) calls on the Action Agencies to continue the current efforts to maximize fall chinook collection and transportation.

The survival estimates described herein represent a combination of the proposed hydro operation and the environmental baseline (i.e., existence of the hydro system and non-discretionary hydro operations). The ability to distinguish between juvenile survival associated with discretionary annual operations and environmental baseline conditions is uncertain because of the inability to describe the limits of some areas of discretion quantitatively and the difficulty defining and modeling a reference operation that maximizes the survival of listed fish.

There are few estimates of the effects of configuration improvements on subyearling chinook, so benefits of RSWs and other passage improvements are inferred from other ESUs. There are also no quantitative estimates of the effect of the proposed action on this ESU below Bonneville Dam. While specific effects of hydro operations on estuary and plume habitat are uncertain, the relatively large difference in summer flows and lack of a difference in water quality between the reference and proposed operations are fairly certain.

Estimates of the improvements expected from the continued and expanded pikeminnow program are uncertain, but NOAA Fisheries accounted for this uncertainty by estimating only a Low survival improvement (Section 6.3.2.4). Estimates of the improvements expected from the avian predation program are uncertain for this ESU, as described in Section 6.3.2.1, but the impact was only considered Low in the net effects analysis. There was uncertainty associated with effects of the estuary improvement actions on this ESU. The determination that three artificial propagation measures will increase the viability of the ESU by a Low amount is also uncertain.

Summary: In general, there is high risk for the SR fall chinook ESU, both range-wide and in the action area. Significant risk factors include the presence of only one extant population in the ESU and the high mortality rate in the action area, caused largely by effects of the FCRPS and USBR projects and water management that are included in the hydro portion of the environmental baseline represented by the reference operation. One factor that indicates at least a short-term reduction in risk is the record adult return numbers in the last four years. These returns are encouraging and signal at least a short-term improvement in the range-wide trend. The main consideration in determining if the proposed action constitutes an appreciable reduction in the likelihood of survival and recovery is the degree to which the proposed action poses an additional risk to the ESU.

There was no difference in adult survival expected as a result of the proposed action. Because there is a high degree of uncertainty in the juvenile SR fall chinook modeling analysis, especially

in the effects of transportation, only the effect on in-river migrants was estimated. Initially, in-river survival is expected to be lower than survival under the reference operation, with that difference constituting a “Medium” impact. However, by 2010 various hydro improvements and non-hydro mitigation actions are expected to result in equivalent survival under the reference operation and the proposed action. There is uncertainty both in the estimation of the negative effects of the proposed action (difference relative to the reference operation) and in the estimation of beneficial effects (ability of non-hydro mitigation to eliminate that difference over time). Although impacts on transported fish were not estimated, it is important to note that a large proportion of juveniles are transported and there is virtually no difference in the impact of the proposed action on transported fish, compared to the impact of the reference operation on transported fish.

The question of whether the difference in juvenile survival during the first few years of the proposed action represents an appreciable reduction in the likelihood of survival and recovery is largely influenced by the recent trend in adult abundance. Strong returns of adults during the past four years suggest that the next few brood cycles will also be strong. It is highly unlikely that this ESU will go extinct in the near future because of these large numbers of recent spawners. Also, although NOAA Fisheries’ notice of proposed listings concluded that current hatchery operations do not substantially reduce extinction risk, ongoing hatchery programs do help to reduce concerns of extinction in the immediate future. In summary, it appears that the proposed action will not appreciably reduce the likelihood of survival of the ESU.

Critical Habitat: [NOTE: A very recent decision by the 9th Circuit Court of Appeals in the case of *Gifford Pinchot Task Force v. U.S. Fish & Wildlife Service*, No. 03-35279 (9th Cir. August 6, 2004) invalidates the critical habitat analysis in several Fish & Wildlife Service biological opinions that applied the regulatory definition of “destruction or adverse modification”, 50 CFR § 402.02, which the court found to be unlawful. In light of this decision, NOAA Fisheries requires additional time to consider the implications of this holding for the proper application in this opinion of the statutory requirement that an action not destroy or adversely modify designated critical habitat. For that reason, an analysis of the effect of this proposed action on designated critical habitat is not attempted in this draft opinion.]

8.4 UCR SPRING CHINOOK SALMON

After reviewing the current status of UCR spring chinook salmon, the environmental baseline for the action area, the effects of the proposed actions, and cumulative effects in the action area, it is NOAA Fisheries’ opinion that the proposed action is not likely to jeopardize the continued existence of this species.

Magnitude of Reduction(s): The combination of proposed hydro operations, hydro configuration changes, and non-hydro mitigation actions reduce numbers, productivity, and distribution by a “Medium” amount for all populations and for the single major population group (Section 6.0) initially. Beneficial actions that are phased in during the term of the proposed action reduce the negative effects to no change, and perhaps an improvement, by 2010.

Number of Major Population Groups: There is only one major population group, which is composed of three extant populations, in this ESU (Section 4.0), and that means that its viability is significant for this ESU's survival and recovery.

Proportion of Major Population Groups Reduced: The combination of proposed hydro operations, hydro configuration changes, and non-hydro mitigation actions reduce numbers, productivity, and distribution of the single major population group in this ESU initially (Section 6.0). Beneficial actions that are phased in during the term of the proposed action reduce the negative effects to no change, and perhaps an improvement, by 2010.

Range-wide Status of the ESU: As described in Section 4.0, this ESU is an endangered species. The BRT reported that, through 2001, most populations experienced both long-term and short-term declines, but abundance was high in 2001 for all populations. This recent development has continued. Dam counts and preliminary spawner surveys also indicate higher than average abundance in 2002 and 2003. The BRT expressed strong concern regarding risk to the natural component of the ESU with respect to the abundance and productivity VSP categories and comparatively less concern for spatial structure and diversity. The June 14, 2004 status review and proposed listing determinations for salmon and steelhead indicated that UCR spring chinook salmon artificial production programs provide benefits to ESU abundance, have no effect on spatial structure, provide benefits relative to preservation of diversity in some instances, and have uncertain effects on ESU productivity. Overall, hatchery programs collectively do not substantially reduce the extinction risk of the ESU in-total.

Status of the ESU in the Action Area (Environmental Baseline): Since all of the fish in this ESU pass through at least part of the action area, the status of the ESU in the action area is essentially the same as the range-wide status of the ESU described in Section 4.0. Adult passage at existing dams is effective. However, as described in Section 5.0, the construction of the hydro system has severely degraded the habitat in the migratory corridor of this ESU, resulting in high levels of mortality for juvenile fish migrating towards the ocean. In general, habitat-related biological requirements of juveniles are not being fully met in the action area. The significant baseline effects of FCRPS and USBR dams and water management, coupled with baseline effects of FERC projects in the mid-Columbia River along with mainstem harvest rates (up to 2% non-treaty and 15% treaty Indian fisheries) are key factors influencing ESU status in the action area.

Beginning in the 1980s, and especially in the last decade, the Action Agencies have made a series of structural and operational improvements at FCRPS projects and, in many cases, these modifications have significantly improved the survival of juvenile fish within this ESU during their passage through the hydro system. Although the existence of the dams continues to be major limiting factor for this ESU, it is clear that, without these recent improvements, the survival of juvenile fish through the FCRPS would be much worse than it is today.

Cumulative Effects: As described in Section 7.0, known projects properly considered as cumulative effects are not expected to significantly affect the status of this ESU in addition to the environmental baseline.

Uncertainty: Direct juvenile survival rates through FCRPS projects are uncertain for UCR spring chinook but are known with relative certainty for SR spring/summer chinook salmon, which are closely related in timing and biological requirements. These estimates represent a combination of discretionary annual operations and the environmental baseline (the existence of FCRPS and USBR projects and non-discretionary hydro operations). The ability to distinguish between juvenile survival associated with discretionary annual operations and environmental baseline conditions is uncertain because of the inability to describe the limits of some areas of discretion quantitatively and because of difficulty defining and modeling a reference operation that maximizes the survival of listed fish. The magnitude of latent mortality of in-river migrants, including any differences in this measure between the reference and proposed operation, is highly uncertain. Survival of adults through the hydro system under the proposed action is relatively certain.

There are no quantitative estimates of the effect of the proposed hydro action on this ESU below Bonneville Dam. While specific effects of hydro operations on estuary and plume habitat are uncertain, the relatively small difference in spring flows and lack of a difference in water quality between the reference and proposed operations are fairly certain.

Estimates of the improvements expected from the continued and expanded pikeminnow program are uncertain, but NOAA Fisheries accounted for this uncertainty by estimating only a Low survival improvement (Section 6.3.2.4). Estimates of the improvements expected from the avian predation program are uncertain for this ESU, as described in Section 6.3.2.1, but the impact was only considered Low in the net effects analysis. Virtually no improvement was assumed in the net effects analysis from estuarine habitat restoration (VL), reflecting the uncertainty associated with effects of the proposed action on this ESU. Uncertainty associated with tributary habitat improvements was reflected in a Low-to-Medium rating.

Summary: Most factors indicate high risk for the UCR spring chinook ESU, both range-wide and in the action area. Because there is only a single major population group, and because of the poor range-wide and action-area status caused largely by effects of the FCRPS and USBR projects and water management that are included in the hydro portion of the environmental baseline represented by the reference operation, tolerance for additional risk to this ESU is low. The main consideration in determining if the reduced numbers, productivity, and distribution of this ESU constitute an appreciable reduction in the likelihood of survival and recovery is the degree to which the proposed action poses an additional risk to the ESU.

While the net reduction will be “Medium” early in the term of the proposed action, beneficial actions will reduce the effect to no change and perhaps to a net improvement by 2010. Strong returns of adults during the past four years suggest that the next few brood cycles will also be strong. It is highly unlikely that this ESU will go extinct in the near future because of the large numbers of recent spawners, and therefore the lag in achieving beneficial effects will not have serious consequences. For these reasons, the proposed action is not likely to appreciably reduce the likelihood of survival and recovery of the ESU.

8.5 UWR CHINOOK SALMON

After reviewing the current status of UWR chinook salmon, the environmental baseline for the action area, the effects of the proposed actions, and cumulative effects in the action area, it is NOAA Fisheries' opinion that the proposed action is not likely to jeopardize the continued existence of this species .

Magnitude of Reduction(s): The combination of proposed hydro operations, hydro configuration changes, and non-hydro mitigation actions is not likely to reduce numbers, productivity, diversity, or the distribution of the single major population group (Section 6.0) and may result in an improvement.

Number of Major Population Groups: There is only one major population group, which is composed of seven extant populations, in this ESU (Section 4.0), and that means its viability is significant for this ESU's survival and recovery.

Proportion of Major Population Groups Reduced: The combination of proposed hydro operations, hydro configuration changes, and non-hydro mitigation actions is not likely to reduce numbers, productivity, diversity, or the distribution of the single major population group (Section 6.0).

Range-wide Status of the ESU: As described in Section 4.0, this ESU is a threatened species. The BRT reported that it is very difficult to determine trends in abundance and productivity for the natural component of the ESU, because there are no direct estimates of natural-origin spawner abundance. The BRT concluded that the natural component of the ESU had moderately high risk for all four VSP categories. The June 14, 2004 status review and proposed listing determinations for salmon and steelhead indicated that UWR chinook salmon artificial production programs provide slight benefits to ESU abundance and spatial structure but have neutral or uncertain effects on ESU productivity and diversity. Collectively, hatchery programs do not substantially reduce the extinction risk of the ESU in-total.

Status of ESU in the Action Area (Environmental Baseline): Since all of the fish in this ESU pass through at least part of the action area, the status of the ESU in the action area is essentially the same as the range-wide status of the ESU described in Section 4.0. However, as described in Section 5.0, in general, habitat-related biological requirements of juveniles are not being fully met in the action area. The significant baseline effects of FCRPS and USBR water management along with mainstem harvest rates (up to about 15% non-Indian fishery) are key factors influencing ESU status in the action area.

Cumulative Effects: As described in Section 7.0, known projects properly considered as cumulative effects are not expected to significantly affect the status of this ESU in addition to the environmental baseline.

Uncertainty: There are no quantitative estimates of the effect of the proposed action on this ESU. While specific effects of hydro operations on estuary and plume habitat are uncertain, the relatively small difference in spring flows and lack of a difference in water quality between the

reference and proposed operations are fairly certain. Estimates of the improvements expected from the avian predation program are uncertain for this ESU. Virtually no improvement was assumed in the net effects analysis from estuarine habitat restoration (VL), reflecting the uncertainty associated with effects of the proposed action on this ESU.

Summary: Because no net reduction in numbers, reproduction, or distribution is expected as a result of the combination of proposed hydro and off-site actions, there will be no appreciable reduction in the likelihood of survival and recovery.

8.6 LCR CHINOOK SALMON

After reviewing the current status of LCR chinook salmon, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects in the action area, it is NOAA Fisheries' opinion that the proposed action is not likely to jeopardize the continued existence of this species.

Magnitude of Reduction(s): The combination of proposed hydro operations, hydro configuration changes, and non-hydro mitigation actions initially reduce numbers, productivity, and distribution by a "Very Low to Low" amount for five major population groups, but by the end of the proposed action period there is no change to an improvement for all major population groups.

Number of Major Population Groups: The presence of six extant major population groups in this ESU (Section 4.0) means that it is less likely that any single group is significant for this ESU's survival and recovery, compared to ESUs with fewer major population groups.

Proportion of Major Population Groups Reduced: The combination of proposed hydro operations, hydro configuration changes, and non-hydro mitigation actions reduce numbers, productivity, and distribution of five of the six extant major population groups initially (Section 6.0), but by the end of the proposed action period there is no change to an improvement for all major population groups.

Range-wide Status of ESU: As described in Section 4.0, this ESU is a threatened species. The BRT reported that most populations have exhibited pronounced increases in abundance and productivity in recent years, although the abundance of naturally-produced spawners is uncertain. Despite recent improvements, long-term trends are below replacement for the majority of populations in the ESU. The BRT concluded that the natural component of the ESU had moderately high risk for all VSP categories. The June 14, 2004 status review and proposed listing determinations for salmon and steelhead indicated that LCR chinook salmon artificial production programs provide slight benefits to ESU abundance, spatial structure, and diversity, but have neutral or uncertain effects on ESU productivity. Overall, hatchery programs collectively do not substantially reduce the extinction risk of the ESU in-total.

Status of the ESU in the Action Area (Environmental Baseline): Since all of the fish in this ESU pass through at least part of the action area, the status of the ESU in the action area is essentially the same as the range-wide status of the ESU described in Section 4.0. Adult passage

at Bonneville Dam for two MPGs is effective. However, as described in Section 5.0, the construction of the hydro system has severely degraded the habitat in the migratory corridor of this ESU, resulting in high levels of mortality for juvenile fish migrating toward the ocean. In general, habitat-related biological requirements of juveniles are not being fully met in the action area. The significant baseline effects of FCRPS and USBR dams and water management along with mainstem harvest rates (up to about 12% in the non-Indian fishery for early fall-run fish [tules]) are key factors influencing ESU status in the action area.

Beginning in the 1980s, and especially in the last decade, the Action Agencies have made a series of structural and operational improvements at FCRPS projects, including Bonneville Dam, and, in many cases, these modifications have significantly improved the survival of juvenile fish within this ESU during their passage through the hydro system. Although the existence of the dams continues to be a major limiting factor for this ESU, it is clear that, without these recent improvements, the survival of juvenile fish through the FCRPS would be much worse than it is today.

Cumulative Effects: As described in Section 7.0, known projects properly considered as cumulative effects are not expected to significantly affect the status of this ESU in addition to the environmental baseline.

Uncertainty: Direct juvenile survival rates through the Bonneville project for the two affected major population groups are uncertain for LCR chinook, because direct estimates are not available. LCR chinook juveniles migrate as subyearlings, so the closest ESU for which estimates are available is the SR fall chinook ESU. SR fall chinook survival estimates are also uncertain, as described in Section 8.3, and these fish pass through Bonneville pool and dam at a much larger size than LCR chinook, so their survival rate may be higher. These SR fall chinook estimates represent the effects of a combination of discretionary annual operations and the environmental baseline (i.e., existence of the FCRPS and USBR projects and non-discretionary hydro operations). The ability to distinguish between juvenile survival associated with discretionary annual hydro operations and environmental baseline conditions is uncertain because of the inability to describe the limits of some areas of discretion quantitatively and because of difficulty defining and modeling a reference operation that maximizes the survival of listed fish. The magnitude of latent mortality of the component of the ESU that migrates through Bonneville pool and dam, including any differences in this measure between the reference and proposed operation, is highly uncertain.

There are no quantitative estimates of the effect of the proposed hydro action on this ESU below Bonneville Dam. While specific effects of hydro operations on estuary and plume habitat are uncertain, the relatively small difference in spring and fall flows and lack of a difference in water quality between the reference and proposed operations are fairly certain. Estimates of the improvements expected from the continued and expanded pikeminnow program for two major population groups that originate above Bonneville Dam are uncertain, but NOAA Fisheries accounted for this uncertainty by estimating only a Low survival improvement (Section 6.3.2.4). Estimates of the improvements expected from the avian predation program are uncertain for this ESU, as described in Section 6.3.2.1, but the impact was only considered non-existent or Low,

depending upon major population group, in the net effects analysis. Uncertainty was associated with estimation of the estuarine habitat restoration effects on this ESU.

Summary: There is a mix of high and low risk considerations for the LCR chinook ESU, both range-wide and in the action area. Because biological requirements are not being fully met in the action area, caused largely by effects of the FCRPS and USBR projects and water management that are included in the hydro portion of the environmental baseline represented by the reference operation, tolerance for additional risk to this ESU is low. The main consideration in determining if the reduced numbers, productivity, and distribution of this ESU constitute an appreciable reduction in the likelihood of survival and recovery is the degree to which the proposed action poses an additional risk to the ESU. No additional risk is likely by the end of the term of the proposed action for any major population groups. However, five of the six major population groups are expected to experience a 0 to Low reduction initially as a result of reduced summer flows and the impact on shallow-water habitat in the estuary. Because of the pronounced increases in abundance and productivity of this ESU in recent years, it is unlikely that the delay in implementing estuary restoration projects will significantly increase the risk of extinction of the ESU as a whole during the lag period. Because of the small effect and its short duration, the proposed action is not likely to appreciably reduce the likelihood of survival and recovery of this ESU.

8.7 SR STEELHEAD

After reviewing the current status of SR steelhead, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects in the action area, it is NOAA Fisheries' opinion that the proposed action is not likely to jeopardize the continued existence of this species.

Magnitude of Reduction(s): The combination of proposed hydro operations, hydro configuration changes, and non-hydro mitigation actions is not likely to reduce the numbers, productivity, or distribution of any of the six major population groups (Section 6.0)

Number of Major Population Groups: The presence of six major population groups in this ESU (Section 4.0) means that it is less likely that any single group is significant for this ESU's survival and recovery, compared to ESUs with fewer major population groups.

Proportion of Major Population Groups Reduced: The combination of proposed hydro operations, hydro configuration changes, and non-hydro mitigation actions is not likely to reduce the numbers, productivity, or distribution of any of the six major population groups (Section 6.0).

Range-wide Status of the ESU: As described in Section 4.0, this ESU is a threatened species. The BRT reported that, through 2001, available census information indicated mixed trends in abundance and productivity. The BRT concluded that the natural component of the ESU had moderately high risk for the abundance, diversity, and productivity VSP categories and comparatively lower risk for spatial structure. The June 14, 2004 status review and proposed listing determinations for salmon and steelhead indicated that SR steelhead artificial production programs provide slight benefits to ESU abundance and spatial structure but have neutral or

uncertain effects on ESU productivity and diversity. Overall, hatchery programs collectively do not substantially reduce the extinction risk of the ESU in-total.

Status of the ESU in the Action Area (Environmental Baseline): Since all of the fish in this ESU pass through at least part of the action area, the status of the ESU in the action area is essentially the same as the range-wide status of the ESU described in Section 4.0. Adult passage at existing dams is effective. However, as described in Section 5.0, the construction of the hydro system has severely degraded the habitat in the migratory corridor of this ESU, resulting in high levels of mortality for juvenile fish migrating towards the ocean. In general, habitat-related biological requirements of juveniles are not being fully met in the action area. The significant baseline effects of FCRPS and USBR dams and water management along with mainstem harvest rates (up to about 2% in the non-treaty and 15% in the treaty Indian fisheries) are key factors influencing ESU status in the action area.

Beginning in the 1980s, and especially in the last decade, the Action Agencies have made a series of structural and operational improvements at FCRPS projects and, in many cases, these modifications have significantly improved the survival of juvenile fish within this ESU during their passage through the hydro system. Although the existence of the dams continues to be a major limiting factor for this ESU, it is clear that, without these recent improvements, the survival of juvenile fish through the FCRPS would be much worse than it is today.

Cumulative Effects: As described in Section 7.0, known projects properly considered as cumulative effects are not expected to significantly affect the status of this ESU in addition to the environmental baseline.

Uncertainty: Direct juvenile survival rates through FCRPS projects are known with relative certainty for SR steelhead. These estimates represent a combination of discretionary annual operations and the environmental baseline (i.e., existence of the FCRPS and USBR projects and non-discretionary hydro operations). The ability to distinguish between juvenile survival associated with discretionary annual operations and environmental baseline conditions is uncertain because of the inability to describe the limits of some areas of discretion quantitatively and because of difficulty defining and modeling a reference operation that maximizes the survival of listed fish. The average post-Bonneville differential survival of transported juveniles, relative to non-transported juveniles (D), is fairly well-known for this ESU, based on large sample sizes in recent years. The magnitude of latent mortality of in-river migrants, including any differences in this measure between the reference and proposed operation, is highly uncertain. Survival of adults through the hydro system under the proposed action is relatively certain.

There are no quantitative estimates of the effect of the proposed hydro action on this ESU below Bonneville Dam. While specific effects of hydro operations on estuary and plume habitat are uncertain, the relatively small difference in spring flows and lack of a difference in water quality between the reference and proposed operations are fairly certain. Estimates of the improvements expected from the continued and expanded pikeminnow program are uncertain, but NOAA Fisheries accounted for this uncertainty by estimating only a Low survival

improvement (Section 6.3.2.4). Estimates of the improvements expected from the avian predation program and estuary habitat improvements are relatively uncertain for this ESU.

Summary: Because no net reduction in numbers, reproduction, or distribution is expected as a result of the combination of proposed hydro and off-site actions, there will be no appreciable reduction in the likelihood of survival and recovery.

8.8 UCR STEELHEAD

After reviewing the current status of UCR steelhead, the environmental baseline for the action area, the effects of the proposed actions, and cumulative effects in the action area, it is NOAA Fisheries' opinion that the proposed action is not likely to jeopardize the continued existence of this species.

Magnitude of Reduction(s): The combination of proposed hydro operations, hydro configuration changes, and non-hydro mitigation actions reduce numbers, productivity, and distribution of the single major population group in this ESU by a Medium amount initially (Section 6.0). Beneficial actions that are phased in during the term of the proposed action reduce the negative effects to no change by 2010.

Number of Major Population Groups: There is only one major population group, composed of four extant populations, in this ESU (Section 4.0), which means that its viability is significant for this ESU's survival and recovery.

Proportion of Major Population Groups Reduced: The combination of proposed hydro operations, hydro configuration changes, and non-hydro mitigation actions reduce numbers, productivity, and distribution of the single major population group in this ESU initially (Section 6.0). Beneficial actions that are phased in during the term of the proposed action reduce the negative effects to no change by 2010, so no populations are affected at that point.

Range-wide Status of the ESU: As described in Section 4.0, this ESU is an endangered species, although the June 14, 2004 status review and proposed listing determination has proposed redesignation to threatened status. The BRT reported that, through 2001, most populations experienced long-term declines, but abundance was high in 2001 for all populations. Dam counts and preliminary spawner surveys also indicate higher than average abundance in 2002 and 2003. The BRT found high risk to the natural component of the ESU with respect to the productivity VSP category but comparatively lower risk for the other VSP categories. The June 14, 2004 status review and proposed listing determinations for salmon and steelhead indicated that UCR steelhead artificial production programs provide benefits to ESU abundance and spatial structure but have neutral or uncertain effects on ESU productivity and diversity. Overall, hatchery programs collectively mitigate the immediacy of extinction risk of the ESU in-total in the short term, but the contribution of these programs in the foreseeable future is uncertain.

Status of the ESU in the Action Area (Environmental Baseline): Since all of the fish in this ESU pass through at least part of the action area, the status of the ESU in the action area is essentially the same as the range-wide status of the ESU described in Section 4.0. Adult passage

at existing dams is effective. However, as described in Section 5.0, the construction of the hydro system has severely degraded the habitat in the migratory corridor of this ESU, resulting in high levels of mortality for juvenile fish migrating towards the ocean. In general, habitat-related biological requirements of juveniles are not being fully met in the action area. The significant baseline effects of FCRPS and USBR dams and water management, coupled with baseline effects of FERC projects in the mid-Columbia River along with mainstem harvest rates (up to almost 11% in the non-treaty and 4.5% in the treaty Indian fisheries) are key factors influencing ESU status in the action area.

Beginning in the 1980s, and especially in the last decade, the Action Agencies have made a series of structural and operational improvements at FCRPS projects and, in many cases, these modifications have significantly improved the survival of juvenile fish within this ESU during their passage through the hydro system. Although the existence of the dams continues to be major limiting factor for this ESU, it is clear that, without these recent improvements, the survival of juvenile fish through the FCRPS would be much worse than it is today.

Cumulative Effects: As described in Section 7.0, known projects properly considered as cumulative effects are not expected to significantly affect the status of this ESU in addition to the environmental baseline.

Uncertainty: Direct juvenile survival rates through FCRPS projects are uncertain for UCR steelhead but are known with relative certainty for SR steelhead, which are closely related in timing and biological requirements. These estimates represent a combination of discretionary annual operations and the environmental baseline (i.e., existence of FCRPS and USBR projects and non-discretionary hydro operations). The ability to distinguish between juvenile survival associated with discretionary annual operations and environmental baseline conditions is uncertain because of the inability to describe the limits of some areas of discretion quantitatively and because of difficulty defining and modeling a reference operation that maximizes the survival of listed fish. The magnitude of latent mortality of in-river migrants, including any differences in this measure between the reference and proposed operation, is highly uncertain. Survival of adults through the hydro system under the proposed action is relatively certain.

There are no quantitative estimates of the effect of the proposed action on this ESU below Bonneville Dam. While specific effects of hydro operations on estuary and plume habitat are uncertain, the relatively small difference in spring flows and lack of a difference in water quality between the reference and proposed operations are fairly certain. Estimates of the improvements expected from the continued and expanded pikeminnow program are uncertain, but NOAA Fisheries accounted for this uncertainty by estimating only a Low survival improvement (Section 6.3.2.4). Estimates of the improvements expected from the avian predation program and tributary habitat improvements are uncertain for this ESU, as described in Section 6.3.2.1.

Summary: Although its status has been improving recently, most factors indicate high risk for the UCR steelhead, both range-wide and in the action area. Because of the single major population group and poor action-area status, caused largely by effects of the FCRPS and USBR projects and water management that are included in the hydro portion of the environmental baseline represented by the reference operation, tolerance for additional risk to this ESU is low.

The main consideration in determining if the reduced numbers, productivity, and distribution of this ESU constitute an appreciable reduction in the likelihood of survival and recovery is the degree to which the proposed action poses an additional risk to the ESU. While, initially, the net reduction will be “Medium,” over the term of the proposed action beneficial actions will reduce the effect to no change and perhaps to a net improvement. Strong returns of adults during the past four years suggest that the next few brood cycles will also be strong. It is highly unlikely that this ESU will go extinct in the near future because of these large numbers of recent spawners, and therefore, the lag in achieving beneficial effects will not have serious consequences. For these reasons, the proposed action is not likely to appreciably reduce the likelihood of survival and recovery of the ESU.

8.9 MCR STEELHEAD

After reviewing the current status of MCR steelhead, the environmental baseline for the action area, the effects of the proposed actions, and cumulative effects in the action area, it is NOAA Fisheries’ opinion that the proposed action is not likely to jeopardize the continued existence of this species.

Magnitude of Reduction(s): The combination of proposed hydro operations, hydro configuration changes, and non-hydro mitigation actions reduce numbers, productivity, and distribution of two of the five extant major population groups by a Medium amount initially (Section 6.0), but by the end of the proposed action period there is no change to an improvement for all major population groups.

Number of Major Population Groups: The presence of five major population groups in this ESU (Section 4.0) means that it is less likely that any single group is significant for this ESU’s survival and recovery, compared to ESUs with fewer major population groups.

Proportion of Major Population Groups Reduced: The combination of proposed hydro operations, hydro configuration changes, and non-hydro mitigation actions reduce numbers, productivity, and distribution of two of the five extant major population groups initially (Section 6.0), but by the end of the proposed action period there is no change to an improvement for all major population groups.

Range-wide Status of ESU: As described in Section 4.0, this ESU is a threatened species. The BRT reported that, through 2001, most populations experienced long-term declines and positive short-term trends. The BRT concluded that the natural component of the ESU had moderate risk for all VSP categories, with the greatest relative risk attributed to the ESU abundance category. The June 14, 2004 status review and proposed listing determinations for salmon and steelhead indicated that MCR steelhead artificial production programs provide slight benefits to ESU abundance, a negligible contribution to spatial structure, and neutral or uncertain effects on ESU productivity and diversity. Overall, hatchery programs collectively do not substantially reduce the extinction risk of the ESU in-total.

Status of ESU in the Action Area (Environmental Baseline): Since all of the fish in this ESU pass through at least part of the action area, the status of the ESU in the action area is essentially

the same as the range-wide status of the ESU described in Section 4.0. Adult passage at existing dams is effective. However, as described in Section 5.0, the construction of the hydro system has severely degraded the habitat in the migratory corridor of this ESU, resulting in high levels of mortality for juvenile fish migrating toward the ocean. In general, habitat-related biological requirements of juveniles are not being fully met in the action area. The significant baseline effects of FCRPS and USBR dams and water management along with mainstem harvest rates (up to almost 2% in the non-treaty and 15% in the treaty Indian fisheries) are key factors influencing ESU status in the action area.

Beginning in the 1980s, and especially in the last decade, the Action Agencies have made a series of structural and operational improvements at FCRPS projects and, in many cases, these modifications have significantly improved the survival of juvenile fish within this ESU during their passage through the hydro system. Although the existence of the dams continues to be major limiting factor for this ESU, it is clear that, without these recent improvements, the survival of juvenile fish through the FCRPS would be much worse than it is today.

Cumulative Effects: As described in Section 7.0, known projects properly considered as cumulative effects are not expected to significantly affect the status of this ESU in addition to the environmental baseline.

Uncertainty: Direct juvenile survival rates through FCRPS projects are uncertain for MCR steelhead but are known with relative certainty for SR steelhead, which are closely related in timing and biological requirements. These SR steelhead survival estimates represent a combination of discretionary annual operations and the environmental baseline (i.e., existence of the FCRPS and USBR projects and non-discretionary hydro operations). The ability to distinguish between juvenile survival associated with discretionary annual operations and environmental baseline conditions is uncertain because of the inability to describe the limits of some areas of discretion quantitatively, and because of difficulty defining and modeling a reference operation that maximizes the survival of listed fish. The magnitude of latent mortality of in-river migrants, including any differences in this measure between the reference and proposed operation, is highly uncertain. Survival of adults through the hydro system under the proposed action is relatively certain.

There are no quantitative estimates of the effect of the proposed action on this ESU below Bonneville Dam. While specific effects of hydro operations on estuary and plume habitat are uncertain, the relatively small difference in spring flows and lack of a difference in water quality between the reference and proposed operations are fairly certain. Estimates of the improvements expected from the continued and expanded pikeminnow program are uncertain, but NOAA Fisheries accounted for this uncertainty by estimating only a Low survival improvement (Section 6.3.2.4). Estimates of the improvements expected from the avian predation program are uncertain for this ESU, as described in Section 6.3.2.1. Improvements from the John Day habitat projects are very uncertain, so were not counted towards the net effects analysis.

Summary: There is a mix of high- and low-risk considerations for the MCR steelhead ESU, both range-wide and in the action area. Because of the poor status in the action area, caused largely by effects of the FCRPS and USBR projects and water management that are included in

the hydro portion of the environmental baseline represented by the reference operation, tolerance for additional risk to this ESU is low. The main consideration in determining if the reduced numbers, productivity, and distribution of this ESU constitute an appreciable reduction in the likelihood of survival and recovery is the degree to which the proposed action poses an additional risk to the ESU. No additional risk is likely by the end of the term of the proposed action for any major population groups. However, two of the five major population groups are expected to experience a Medium reduction initially. Because of the pronounced increases in abundance and productivity of this ESU in recent years, it is unlikely that the delay in implementing the avian predator reduction project will significantly increase the risk of extinction of the ESU as a whole during the lag period. Because of the short duration of the net reduction and its restriction to two of the five major population groups, the proposed action is not likely to appreciably reduce the likelihood of survival and recovery of this ESU.

8.10 UWR STEELHEAD

After reviewing the current status of UWR steelhead, the environmental baseline for the action area, the effects of the proposed actions, and cumulative effects in the action area, it is NOAA Fisheries' opinion that the proposed action is not likely to jeopardize the continued existence of this species.

Magnitude of Reduction(s): The combination of proposed hydro operations, hydro configuration changes, and non-hydro mitigation actions is not likely to reduce numbers, productivity, diversity, or the distribution of the single major population group (Section 6.0).

Number of Major Population Groups: There is only one major population group, composed of seven extant populations, in this ESU (Section 4.0), which means that its viability is significant for this ESU's survival and recovery.

Proportion of Major Population Groups Reduced: The combination of proposed hydro operations, hydro configuration changes, and non-hydro mitigation actions is not likely to reduce numbers, productivity, diversity, or the distribution of the single major population group (Section 6.0).

Range-wide Status of the ESU: As described in Section 4.0, this ESU is a threatened species. The BRT reported that the ESU experienced significant increases in adult returns in recent years, but all populations in the ESU experienced long-term declines. The BRT concluded that the natural component of the ESU had moderate risk for all VSP categories.

Status of the ESU in the Action Area (Environmental Baseline): Since all of the fish in this ESU pass through at least part of the action area, the status of the ESU in the action area is essentially the same as the range-wide status of the ESU described in Section 4.0. However, as described in Section 5.0, in general, habitat-related biological requirements of juveniles are not being fully met in the action area. The significant baseline effects of FCRPS and USBR water management is a key factor influencing ESU status in the action area.

Cumulative Effects: As described in Section 7.0, known projects properly considered as cumulative effects are not expected to significantly affect the status of this ESU in addition to the environmental baseline.

Uncertainty: There are no quantitative estimates of the effect of the proposed action on this ESU. While specific effects of hydro operations on estuary and plume habitat are uncertain, the relatively small difference in spring flows and lack of a difference in water quality between the reference and proposed operations are fairly certain. Estimates of effects of off-site improvements were uncertain for this ESU.

Summary: Because no net reduction in numbers, reproduction, or distribution is expected as a result of the combination of proposed hydro and off-site actions, there can be no appreciable reduction in the likelihood of survival and recovery.

8.11 LCR STEELHEAD

After reviewing the current status of LCR steelhead, the environmental baseline for the action area, the effects of the proposed actions, and cumulative effects in the action area, it is NOAA Fisheries' opinion that the proposed action is not likely to jeopardize the continued existence of this species.

Magnitude of Reduction(s): The combination of proposed hydro operations, hydro configuration changes, and non-hydro mitigation actions is not likely to reduce numbers, productivity, diversity, or the distribution of any of the four major population groups (Section 6.0).

Number of Major Population Groups: The presence of four major population groups in this ESU (Section 4.0) means that it is less likely that any single group is significant for this ESU's survival and recovery, compared to ESUs with fewer major population groups.

Proportion of Major Population Groups Reduced: The combination of proposed hydro operations, hydro configuration changes, and non-hydro mitigation actions is not likely to reduce numbers, productivity, diversity, or the distribution of any of the four major population groups (Section 6.0).

Range-wide Status of the ESU: As described in Section 4.0, this ESU is a threatened species. The BRT reported that, in spite of recent increases in abundance in recent years, most populations have experienced both long-term and short-term declines. The BRT concluded that the natural component of the ESU had moderate risk for each of the VSP categories. The June 14, 2004 status review and proposed listing determinations for salmon and steelhead indicated that LCR steelhead artificial production programs provide slight benefits to ESU abundance, spatial structure, and diversity but have neutral or uncertain effects on ESU productivity. Collectively, hatchery programs do not substantially reduce the extinction risk of the ESU in-total.

Status of the ESU in the Action Area (Environmental Baseline): Since all of the fish in this ESU pass through at least part of the action area, the status of the ESU in the action area is

essentially the same as the range-wide status of the ESU described in Section 4.0. Adult passage at Bonneville Dam for two MPGs is effective. However, as described in Section 5.0, the construction of the hydro system has severely degraded the habitat in the migratory corridor of this ESU, resulting in high levels of mortality for juvenile fish migrating towards the ocean. In general, habitat-related biological requirements of juveniles are not being fully met in the action area. The significant baseline effects of FCRPS and USBR dams and water management is a key factor influencing ESU status in the action area.

Beginning in the 1980s, and especially in the last decade, the Action Agencies have made a series of structural and operational improvements at FCRPS projects, including Bonneville, and, in many cases, these modifications have significantly improved the survival of juvenile fish within this ESU during their passage through the hydro system. Although the existence of the dams continues to be major limiting factor for this ESU, it is clear that, without these recent improvements, the survival of juvenile fish through the FCRPS would be much worse than it is today.

Cumulative Effects: As described in Section 7.0, known projects properly considered as cumulative effects are not expected to significantly affect the status of this ESU in addition to the environmental baseline.

Uncertainty: Direct juvenile survival rates through the Bonneville project are uncertain for LCR steelhead but are known with relative certainty for SR steelhead, which are closely related in migration timing and biological requirements. These SR steelhead survival estimates represent the effects of a combination of discretionary annual operations and the environmental baseline (i.e., existence of the FCRPS and USBR projects and non-discretionary hydro operations). The ability to distinguish between juvenile survival associated with discretionary annual operations and environmental baseline conditions is uncertain because of the inability to describe the limits of some areas of discretion quantitatively and because of difficulty defining and modeling a reference operation that maximizes the survival of listed fish. The magnitude of latent mortality of the component of the ESU that migrates through Bonneville pool and dam, including any differences in this measure between the reference and proposed operation, is highly uncertain. Survival of adults past the Bonneville project under proposed action is relatively certain.

There are no quantitative estimates of the effect of the proposed action on this ESU below Bonneville Dam. While specific effects of hydro operations on estuary and plume habitat are uncertain, the relatively small difference in spring flows and lack of a difference in water quality between the reference and proposed operations are fairly certain. Estimates of the improvements expected from the continued and expanded pikeminnow program for the major population groups above Bonneville Dam are uncertain, but NOAA Fisheries accounted for this uncertainty by estimating only a Low survival improvement (Section 6.3.2.4). Estimates of the improvements expected from the avian predation program are uncertain for this ESU, as described in Section 6.3.2.1. There was also uncertainty in the estimate of the effects of estuarine habitat restoration.

Summary: Because no net reduction in numbers, reproduction, or distribution is expected as a result of the combination of proposed hydro and off-site actions, there can be no appreciable reduction in the likelihood of survival and recovery.

8.12 CR CHUM SALMON

After reviewing the current status of CR chum salmon, the environmental baseline for the action area, the effects of the proposed actions, and cumulative effects in the action area, it is NOAA Fisheries' opinion that the proposed action is not likely to jeopardize the continued existence of this species.

Magnitude of Reduction(s): Assuming that there is an extant population above Bonneville Dam, proposed hydro operations and hydro configuration changes would reduce the abundance, productivity, and distribution of one of the three extant major population groups by a Low amount initially (Section 6.0), but by the end of the proposed action period, there would be no change or a possible improvement for all major population groups.

Number of Major Population Groups: The presence of only three major population groups in this ESU (Section 4.0) means that it is likely that the viability of each population group is significant for this ESU's survival and recovery.

Proportion of Major Population Groups Reduced: Assuming there are extant populations above Bonneville Dam proposed hydro operations and hydro configuration changes would reduce the abundance, productivity, and distribution of one of the three extant major population groups by a Low amount initially (Section 6.0), but by the end of the proposed action period, there would be no change or a possible improvement for all major population groups.

Range-wide Status of the ESU: As described in Section 4.0, this ESU is a threatened species. The BRT reported that, through 2002, long- and short-term productivity trends for ESU populations were at or below replacement. However, abundance increased dramatically in 2002. The BRT concluded that the natural component of the ESU had high risk for all of the VSP categories, particularly for ESU spatial structure and diversity. The June 14, 2004 status review and proposed listing determinations for salmon and steelhead indicated that recently initiated CR chum salmon artificial production programs provide slight benefits to ESU abundance and spatial structure but have neutral or uncertain effects on ESU productivity and diversity. Collectively, hatchery programs do not substantially reduce the extinction risk of the ESU in-total.

Status of ESU in the Action Area (Environmental Baseline): Since all of the fish in this ESU pass through at least part of the action area, the status of the ESU in the action area is essentially the same as the range-wide status of the ESU described in Section 4.0. Adult passage at Bonneville Dam for one MPG may be effective, but FCRPS flow management can limit the amount of and access to spawning habitat just below Bonneville Dam. However, as described in Section 5.0, the construction of the hydro system has severely degraded the habitat in the migratory corridor of this ESU, resulting in high levels of mortality for juvenile fish migrating towards the ocean. In general, habitat-related biological requirements of juveniles are not being

fully met in the action area. The significant baseline effects of FCRPS and USBR dams and water management along with mainstem harvest rates (up to 5% for the non-Indian fishery) are key factors influencing ESU status in the action area.

Beginning in the 1980s, and especially in the last decade, the Action Agencies have made a series of structural and operational improvements at FCRPS projects, including Bonneville, and, in many cases, these modifications have significantly improved the survival of juvenile fish within this ESU during their passage through the hydro system. The existence of the dams, which has inundated spawning habitat for one of the major population groups, continues to be a major limiting factor for this ESU. However, without the recent improvements in flow management, the survival of juvenile fish through the FCRPS would be considerably reduced from what it is today.

Cumulative Effects: As described in Section 7.0, known projects properly considered as cumulative effects are not expected to significantly affect the status of this ESU in addition to the environmental baseline.

Uncertainty: There are no quantitative estimates of the effect of the proposed action on this ESU. If there is an extant population in the Gorge major population group, fish that migrate through Bonneville pool and dam as juveniles and adults may experience mortality within the range estimated for other ESUs, but this assumption is very uncertain. While specific effects of hydro operations on mainstem spawning habitat and estuary and plume rearing habitat are uncertain, the relatively small difference between the reference and proposed operations for winter spawning and incubation flows, spring migration flows, and water quality are fairly certain. Estimates of the improvements expected from the continued and expanded pikeminnow program are uncertain for the single major population group that may still spawn above Bonneville Dam, but NOAA Fisheries accounted for this uncertainty by estimating only a Low survival improvement (Section 6.3.2.4). There was also uncertainty in the estimate of the effects of estuarine habitat restoration.

Summary: There is a mix of high- and low-risk considerations for the CR chum salmon ESU, both range-wide and in the action area. Because of the poor status in the action area, caused largely by effects of the FCRPS and USBR projects and water management that are included in the hydro portion of the environmental baseline represented by the reference operation, tolerance for additional risk to this ESU is low. The main consideration in determining if the reduced numbers, productivity, and distribution of this ESU constitute an appreciable reduction in the likelihood of survival and recovery is the degree to which the proposed action poses an additional risk to the ESU. No additional risk is likely by the end of the term of the proposed action for any major population groups. However, one of the three major population groups is expected to experience a Low reduction initially. Because of the pronounced increases in abundance and productivity of this ESU in recent years, it is unlikely that the delay in implementing the estuarine habitat projects will significantly increase the risk of extinction of the ESU as a whole during the lag period. Because of the short duration of the net reduction and its restriction to two of the three major population groups, the proposed action is not likely to appreciably reduce the likelihood of survival and recovery of this ESU.

8.13 SR SOCKEYE SALMON

After reviewing the current status of SR sockeye salmon, the environmental baseline for the action area, the effects of the proposed actions, and cumulative effects in the action area, it is NOAA Fisheries' opinion that the proposed action is not likely to jeopardize the continued existence of this species.

Magnitude of Reduction(s): The combination of proposed hydro operations, hydro configuration changes, and non-hydro mitigation actions reduces numbers, productivity, and distribution by a Low amount for the single extant population in this ESU (Section 6.0) initially, but by the end of the proposed action period there is no change.

Number of Major Population Groups: There is only one extant population in this ESU (Section 4.0), which means that its viability is significant for this ESU's survival and recovery.

Proportion of Major Population Groups Reduced: The combination of proposed hydro operations, hydro configuration changes, and non-hydro mitigation actions reduces numbers, productivity, and distribution for the single extant population in this ESU (Section 6.0) initially, but by the end of the proposed action period there is no change.

Range-wide Status of the ESU: As described in Section 4.0, this ESU is an endangered species. Only 16 naturally-produced adults have returned to Redfish Lake since the ESU was listed in 1991. The BRT found extremely high risk in all four VSP categories. The June 14, 2004 status review and proposed listing determinations for salmon and steelhead indicated that the SR sockeye salmon captive broodstock artificial production program has prevented extinction of the ESU but has not mitigated the BRT's assessment of extreme risk in all four VSP categories.

Status of ESU in the Action Area (Environmental Baseline): Since all of the fish in this ESU pass through at least part of the action area, the status of the ESU in the action area is essentially the same as the range-wide status of the ESU described in Section 4.0. Adult passage at existing dams is effective. However, as described in Section 5.0, the construction of the hydro system has severely degraded the habitat in the migratory corridor of this ESU, resulting in high levels of mortality for juvenile fish migrating towards the ocean. In general, habitat-related biological requirements of juveniles are not being fully met in the action area. The significant baseline effects of FCRPS and USBR dams and water management along with mainstem harvest rates (up to 8% in both the non-Indian and the treaty Indian fisheries) are key factors influencing ESU status in the action area.

Beginning in the 1980s, and especially in the last decade, the Action Agencies have made a series of structural and operational improvements at FCRPS projects and, in many cases, these modifications have significantly improved the survival of juvenile fish within this ESU during their passage through the hydro system. Although the existence of the dams continues to be major limiting factor for this ESU, it is clear that, without these recent improvements, the survival of juvenile fish through the FCRPS would be much worse than it is today.

Cumulative Effects: As described in Section 7.0, known projects properly considered as cumulative effects are not expected to significantly affect the status of this ESU in addition to the environmental baseline.

Uncertainty: There are no quantitative estimates of the effect of the proposed action on this ESU. Direct juvenile survival rates through FCRPS projects are assumed to be somewhat lower than the survival rates of SR spring/summer Chinook and SR steelhead. This assumption is very uncertain. The SR spring/summer chinook and SR steelhead survival estimates represent a combination of discretionary annual operations and the environmental baseline (i.e., existence of the FCRPS and USBR projects and non-discretionary operations). The ability to distinguish between juvenile survival associated with discretionary annual operations and environmental baseline conditions is uncertain because of the inability to describe the limits of some areas of discretion quantitatively and because of difficulty defining and modeling a reference operation that maximizes the survival of listed fish. The average post-Bonneville differential survival of transported SR sockeye juveniles, relative to non-transported juveniles (D), and the magnitude of latent mortality of in-river migrants, including any differences in this measure between the reference and proposed operation, is unknown. Survival of adults through the hydro system under the proposed action is relatively certain.

Estimates of the improvements expected from the continued and expanded pikeminnow program are uncertain, but NOAA Fisheries accounted for this uncertainty by estimating only a Low survival improvement (Section 6.3.2.4). Estimates of the improvements expected from the avian predation program are uncertain for this ESU, as described in Section 6.3.2.1, but the impact was only considered Low in the net effects analysis. Virtually no improvement was assumed in the net effects analysis from estuarine habitat restoration (VL), reflecting the uncertainty associated with effects of the proposed action on this ESU. The determination that three artificial propagation measures will increase the viability of the ESU in the short term by a High amount is also uncertain.

Summary: There is an extremely high risk for the SR sockeye salmon ESU, both range-wide and in the action area. Tolerance for additional risk to this ESU is very low. The main consideration in determining if the reduced numbers, productivity, and distribution of this ESU constitute an appreciable reduction in the likelihood of survival and recovery is the degree to which the proposed action poses an additional risk to the ESU. Initially, in-river survival is expected to be lower than survival under the reference operation, with that difference constituting a “Low” impact. However, by 2010 various hydro improvements and non-hydro mitigation actions are expected to result in equivalent survival under the reference operation and the proposed action. There is uncertainty both in the estimation of the negative effects of the proposed action (difference relative to the reference operation) and in the estimation of beneficial effects (ability of non-hydro mitigation to eliminate that difference over time).

The question of whether the difference in juvenile survival during the first few years of the proposed action represents an appreciable reduction in the likelihood of survival and recovery is largely influenced by the current status of the population, which is dependent upon the captive rearing program. This safety-net program was initiated as a short-term emergency measure a decade ago and is credited with preventing extinction of the ESU to date. It is likely that

continuation of this program, as proposed in the UPA, will continue to prevent extinction over the short term. Additional hydro improvements between 2010 and 2014 will further reduce the risk that hydro effects greater than those of the reference operation remain. For these reasons, it appears that the proposed action will not appreciably reduce the likelihood of survival of the ESU.

Critical Habitat: [NOTE: A very recent decision by the 9th Circuit Court of Appeals in the case of *Gifford Pinchot Task Force v. U.S. Fish & Wildlife Service*, No. 03-35279 (9th Cir. August 6, 2004) invalidates the critical habitat analysis in several Fish & Wildlife Service biological opinions that applied the regulatory definition of “destruction or adverse modification”, 50 CFR § 402.02, which the court found to be unlawful. In light of this decision, NOAA Fisheries requires additional time to consider the implications of this holding for the proper application in this opinion of the statutory requirement that an action not destroy or adversely modify designated critical habitat. For that reason, an analysis of the effect of this proposed action on designated critical habitat is not attempted in this draft opinion.]

8.14 LCR COHO SALMON

After reviewing the current status of LCR coho salmon, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects in the action area, it is NOAA Fisheries’ opinion that discretionary hydro operations are not likely to jeopardize the continued existence of this species.

Magnitude of Reduction(s): The combination of proposed hydro operations, hydro configuration changes, and non-hydro mitigation actions is not likely to reduce numbers, productivity, diversity, or the distribution of any of the four major population groups (Section 6.0).

Number of Major Population Groups: The presence of only three major population groups in this ESU (Section 4.0) means that it is likely that the viability of each population group is significant for this ESU’s survival and recovery.

Proportion of Major Population Groups Reduced: The combination of proposed hydro operations, hydro configuration changes, and non-hydro mitigation actions is not likely to reduce numbers, productivity, diversity, or the distribution of any of the four major population groups (Section 6.0).

Range-wide ESU Status of ESU: As described in Section 4.0, this ESU has been proposed as a threatened species. The BRT reported that the two populations with appreciable natural productivity experienced increased returns in 2000 and 2001 but continue to have low abundance and productivity. The BRT concluded that the natural component of the ESU had extremely high risks in all VSP categories. The June 14, 2004 status review and proposed listing determinations for salmon and steelhead indicated that LCR coho salmon artificial production programs reduce risks to ESU abundance and spatial structure, pose risks to ESU diversity, and have uncertain effects on ESU productivity. Overall, hatchery programs collectively mitigate the immediacy of ESU extinction but do not substantially reduce the extinction risk of the ESU in-total in the foreseeable future.

Status of the ESU in the Action Area (Environmental Baseline): Since all of the fish in this ESU pass through at least part of the action area, the status of the ESU in the action area is essentially the same as the range-wide status of the ESU described in Section 4.0. Adult passage at Bonneville Dam for one MPG is effective. However, as described in Section 5.0, the construction of the hydro system has severely degraded the habitat in the migratory corridor of this ESU, resulting in high levels of mortality for juvenile fish migrating towards the ocean. In general, habitat-related biological requirements of juveniles are not being fully met in the action area. The significant baseline effects of FCRPS and USBR dams and water management along with mainstem harvest rates (up to 6.4% in the non-Indian fishery) are key factors influencing ESU status in the action area.

Beginning in the 1980s, and especially in the last decade, the Action Agencies have made a series of structural and operational improvements at FCRPS projects, including Bonneville, and, in many cases, these modifications have significantly improved the survival of juvenile fish within this ESU during their passage through the hydro system. Although the existence of the dams continues to be major limiting factor for this ESU, it is clear that, without these recent improvements, the survival of juvenile fish through the FCRPS would be much worse than it is today.

Cumulative Effects: As described in Section 7.0, known projects properly considered as cumulative effects are not expected to significantly affect the status of this ESU in addition to the environmental baseline.

Uncertainty: There are no quantitative estimates of the effect of the proposed action on this ESU. For the few hatchery-origin populations that migrate through Bonneville pool and dam, direct juvenile survival rates are assumed to be similar to the survival rate of other yearling spring migrants (SR spring/summer Chinook salmon and SR steelhead). This assumption is very uncertain. The SR spring/summer chinook and SR steelhead survival estimates represent a combination of discretionary annual operations and the environmental baseline (i.e., existence of the FCRPS and USBR projects and non-discretionary hydro operations). The ability to distinguish between juvenile survival associated with discretionary annual operations and environmental baseline conditions is uncertain because of the inability to describe the limits of some areas of discretion quantitatively and because of difficulty defining and modeling a reference operation that maximizes the survival of listed fish. The magnitude of latent mortality of in-river migrants, including any differences in this measure between the reference and proposed operation, is unknown. Survival of adults through the hydro system under the proposed action is relatively certain.

There are no quantitative estimates of the effect of the proposed action on this ESU below Bonneville Dam. While specific effects of hydro operations on estuary and plume habitat are uncertain, the relatively small difference in spring flows and lack of a difference in water quality between the reference and proposed operations are fairly certain. Estimates of the improvements expected from the continued and expanded pikeminnow program are uncertain for the one major population group above Bonneville Dam, but NOAA Fisheries accounted for this uncertainty by estimating only a Low survival improvement (Section 6.3.2.4). Estimates of the improvements

expected from the avian predation program and estuarine habitat restoration are uncertain for this ESU.

Summary: Because no net reduction in numbers, reproduction, or distribution is expected as a result of the combination of proposed hydro and off-site actions, there will be no appreciable reduction in the likelihood of survival and recovery.