List of NMFS/USFWS Biological Opinion Required Actions with Associated Action Agencies Planned Projects

05-Jun-01

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
1	1	NMFS	9.4.1	The Action Agencies, coordinating with NMFS and USFWS, shall annually develop 1- and 5-year plans to implement specific measures in hydro, habitat, hatcheries, harvest, research, monitoring, and evaluation needed to meet and evaluate the performance stand	*Under Development*		
2	2	NMFS	9.4.2 - Hydrosystem Plan	The Action Agencies shall coordinate development and implementation of the hydro portion of the 1- and 5-year implementation plans through the Regional Forum, chaired by NMFS.	*Under Development*		
3	3	NMFS	9.4.2 - Hydrosystem Plan	The Action Agencies, coordinating through the Technical Management Team, shall develop and implement a 1- and 5-year water management plan and in-season action plans for the operation of the FCRPS.	63	Annual Water Management Plan (1-WMP)	Hydro
4	4	NMFS	9.4.2 - Hydrosystem Plan	The Action Agencies, coordinating through the System Configuration Team, shall annually develop and implement a 1- and 5-year capital investment plan for the configuration of the FCRPS projects.	*Under Development*		

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
5	5	NMFS	9.4.2 - Hydrosystem Plan	The Action Agencies, coordinating through the Water Quality Team, shall annually develop a 1- and 5-year water quality plan for operation and configuration measures at FCRPS projects.	70	Water Quality Plan, 1-Year	Hydro
					71	Water Quality Plan, 5-Year	Hydro
6	6	NMFS	9.4.2 - Hydrosystem Plan	The Corps and BPA, through the annual planning process, shall develop and implement 1- and 5-year operations and maintenance (O&M) plans and budgets that enhance the capability to operate and maintain fish facilities at FCRPS projects for listed salmonid	61	Fish Passage Plan (FPP)	Hydro
					62	One and Five-Year Operations and Maintenance Plan and Budget	Hydro
7	7	NMFS	9.4.2 - Hydrosystem Plan	The Action Agencies, with assistance from NMFS and USFWS, shall annually develop 1- and 5-year plans for habitat measures that provide offsite mitigation.	*Under Development*		
8	8	NMFS	9.4.2 - Hydrosystem Plan	The Action Agencies, with assistance from NMFS and USFWS, shall annually develop 1- and 5-year plans for hatchery and harvest measures that provide offsite mitigation.	*Under Development*		
9	9	NMFS	9.4.2 - Hydrosystem Plan	The Action Agencies, with assistance from NMFS and USFWS, shall annually develop 1- and 5- year plans for research, monitoring, and evaluation to further develop and to determine the effectiveness of the suite of actions in this RPA.	*Under Development*		

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
10	10	NMFS	9.4.2.10 - Rceovery Planning	The Action Agencies shall work with NMFS and others to promptly incorporate the results of recovery planning into annual Fish and Wildlife Program implementation funding, including support for incorporation of the results into the NWPPC's Fish and Wildlif	*Under Development*		
11	11	NMFS	9.4.2.11 - Anticipated Actions	By September 30, 2001, the Action Agencies shall develop procedures for carrying out actions that could not be anticipated in the planning process, but that are necessary or prudent to achieve the performance standards.	61	Fish Passage Plan (FPP)	Hydro
12	12	NMFS	9.4.2.12 - Approval of Plans	The Action Agencies shall coordinate with NMFS and USFWS in the review of the 1- and 5-year plans to facilitate timely review and approval as part of the annual decision process.	*Under Development*		
13	13	NMFS	9.4.2.13 - Annual Progress Reports	The Action Agencies shall issue annual reports to NMFS and USFWS on progress toward achieving the performance standards set out in this biological opinion, including comprehensive cumulative reviews in years 3, 5, and 8.	*Under Development*		
14	14	NMFS	9.6.1 - Hydro	The Action Agencies shall operate FCRPS dams and reservoirs with the intent of meeting the flow objectives (Table 9.6-1) on both a seasonal and weekly average basis for the benefit of migrating juvenile salmon.	63	Annual Water Management Plan (1-WMP)	Hydro
15	15	NMFS	9.6.1 - Hydro	The Action Agencies shall operate the FCRPS to provide flows to support chum salmon spawning in the Ives Island area below Bonneville Dam.	63	Annual Water Management Plan (1-WMP)	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
16	16	NMFS	9.6.1 - Hydro	The Action Agencies shall operate the FCRPS to provide access for chum salmon spawning in Hamilton and Hardy creeks.	63	Annual Water Management Plan (1-WMP)	Hydro
17	17	NMFS	9.6.1 - Hydro	The Action Agencies shall coordinate with NMFS, USFWS, and the states and Tribes in preseason planning and in-season management of flow and spill operations. This coordination shall occur in the Technical Management Team process (see Section 9.4.2.2).	63	Annual Water Management Plan (1-WMP)	Hydro
18	18	NMFS	9.6.1 - Hydro	The Action Agencies shall operate the FCRPS during the fall and winter months in a manner that achieves refill to April 10 flood control elevations, while meeting project and system minimum flow and flood control constraints before April 10. During the s	63	Annual Water Management Plan (1-WMP)	Hydro
19	19	NMFS	9.6.1 - Hydro	The Action Agencies shall operate specific FCRPS projects as follows:	63	Annual Water Management Plan (1-WMP)	Hydro
					70	Water Quality Plan, 1-Year	Hydro
					71	Water Quality Plan, 5-Year	Hydro
					527	Ensure that Hungry Horse refills in a timely manner without spill that causes excessive TDG	Hydro
20	20	NMFS	9.6.1 - Hydro	The Corps shall operate the lower Snake River reservoirs within 1 foot of MOP from approximately April 3 until small numbers of juvenile migrants are present and shall operate the John Day pool within a 1½-foot range of the minimum level that provides ir	63	Annual Water Management Plan (1-WMP)	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
21	21	NMFS	9.6.1 - Hydro	The Corps shall routinely identify opportunities to shift system flood control evacuation volumes from Brownlee and Dworshak reservoirs to Lake Roosevelt and identify such opportunities for the Technical Management Team. The Corps shall implement flood c	63	Annual Water Management Plan (1-WMP)	Hydro
22	22	NMFS	9.6.1 - Hydro	The Corps and BOR shall implement VARQ flood control operations, as defined by the Corps (1999d), at Libby by October 1, 2001, and at Hungry Horse by January 1, 2001. By February 1, 2001, the Corps shall develop a schedule to complete all disclosures, NE	69	VARQ Flood Control Operation	Hydro
23	23	NMFS	9.6.1 - Hydro	BOR shall operate Banks Lake at an elevation 5 feet from full during August by reducing the volume of water pumped from Lake Roosevelt into Banks Lake by about 130 kaf during this time.	*Under Development*		
24	24	NMFS	9.6.1 - Hydro	BPA and the Corps shall continue to request and negotiate agreements to annually provide 1 Maf of Treaty storage from January through April 15, release the water during the migration season, and seek additional storage amounts.	63	Annual Water Management Plan (1-WMP)	Hydro
					528	Annual Report on Treaty Canadian Water Storage	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
25	25	NMFS	9.6.1 - Hydro	BPA and the Corps shall continue to request, and negotiate with BC Hydro for storage of water in non-Treaty storage space during the spring for subsequent release in July and August for flow enhancement, as long as operations forecasts indicate that water	63	Annual Water Management Plan (1-WMP)	Hydro
					529	Annual Report on Non-Treaty Canadian Water Storage	Hydro
26	26	NMFS	9.6.1 - Hydro	BPA and the Corps shall continue to evaluate, request, and negotiate with BC Hydro the shaping and release of water behind Canadian Treaty storage projects in addition to the non-Treaty storage water previously discussed during July and August.	63	Annual Water Management Plan (1-WMP)	Hydro
					530	Annual Report Additional Canadian Water Storage and Shaping	Hydro
27	27	NMFS	9.6.1 - Hydro	Before entering into any agreement to commit currently uncontracted water or storage space in any of its reservoirs covered by this biological opinion to any other use than salmon flow augmentation, BOR shall consult with NMFS under ESA Section 7(a)(2).	76	Agreements for uncontracted water or storage space at Bureau reservoirs	Hydro
28	28	NMFS	9.6.1 - Hydro	BOR shall pursue water conservation improvements at its projects and shall use all mechanisms available to it under state and Federal law to ensure that a reasonable portion of any water conserved will benefit listed species.	65	BOR Water Conservation Improvements	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
29	29	NMFS	9.6.1 - Hydro	Within 2 years from the date this opinion is signed, BOR shall provide NMFS with a detailed progress report addressing possible instances where BOR-supplied water within the Columbia River basin is being used without apparent BOR authorization to irrigate	66	Report on Unauthorized Use of BOR Water	Hydro
30	30	NMFS	9.6.1 - Hydro	For those BOR projects located in the Columbia River and its tributaries downstream from Chief Joseph Dam (Table 9.6-2), BOR shall, as appropriate, work with NMFS in a timely manner to complete supplemental, project-specific consultations. These suppleme	77	Site specific consultations for BOR projects located downstream from Chief Joseph Dam	Hydro
31	31	NMFS	9.6.1 - Hydro	BOR shall assess the likely environmental effects of operating Banks Lake up to 10 feet down from full pool during August. The assessment and NEPA compliance work shall be completed by June 2002 to determine future operations at this project by the summe	68	Banks Lake Drawdown Study	Hydro
32	32	NMFS	9.6.1 - Hydro	The Action Agencies shall acquire water for instream use from BOR's Upper Snake River basin projects and Idaho Power Company's Hells Canyon Complex during the spring and summer flow augmentation periods to improve the likelihood of achieving spring and su	67	Water Acquisition from Reclamation's Upper Snake River Basin Projects	Hydro
33	33	NMFS	9.6.1 - Hydro	The Corps, in coordination with USFWS, shall design and implement appropriate repairs and modifications to provide water supply temperatures for the Dworshak National Fish Hatchery that are conducive to fish health and growth, while allowing variable disc	78	Modify water supply to the Dworshak NFH while maintaining discharges of Dworshak cold water	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
34	34	NMFS	9.6.1 - Hydro	The Action Agencies shall evaluate potential benefits to adult Snake River steelhead and fall chinook salmon passage by drafting Dworshak Reservoir to elevation 1,500 feet in September. An evaluation of the temperature effects and adult migration behavio	55	Adult Temperature Evaluation	Hydro
35	35	NMFS	9.6.1 - Hydro	The Corps shall develop and conduct a detailed feasibility analysis of modifying current system flood control operations to benefit the Columbia River ecosystem, including salmon. The Corps shall consult with all interested state, Federal, Tribal, and Ca	75	John Day Surface Bypass/Removable Spillway Weir/Flow Deflectors	Hydro
					79	Feasibilty analysis of flood operations to benefit Columbia River ecosystem and salmon.	Hydro
36	36	NMFS	9.6.1 - Hydro	By October 1, 2002, the Corps shall develop and, if feasible, implement a revised storage reservation diagram for Libby Reservoir that replaces the existing fall draft to a fixed end-of-December elevation. One option is to evaluate variable drafts based	80	Develop, and implement a revised storage plan for Libby reservoir	Hydro
37	37	NMFS	9.6.1 - Hydro	BOR shall investigate the attraction of listed salmon and steelhead into wasteways and natural streams receiving waste water from the Columbia Basin Project. If listed fish are found to be attracted into these channels, BOR shall work with NMFS to identi	81	Investigate attraction of listed fish into wasteways from the Columbia Basin Project	Hydro
38	38	NMFS	9.6.1 - Hydro	By March 1, 2002, BOR shall install screens meeting NMFS' screen criteria at the canal intakes to the Burbank No. 2 and Burbank No. 3 pump plants. BOR shall connect the Burbank No. 3 intake canal to Burbank Slough to provide juvenile fish egress. BOR sh	82	BOR shall install screens at the canal intakes to Burbank #2 and #3 pump plants.	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
39	39	NMFS	9.6.1 - Hydro	BOR shall evaluate the water quality characteristics of each point of surface return flows from the Columbia Basin Project to the Columbia River and estimate the effects these return flows may have on listed fish in the Columbia River and in the wasteways	83	Investigate water quality of each point of return flows from the Columbia Basin Project	Hydro
40	40	NMFS	9.6.1 - Hydro	The Corps shall continue to transport all non-research juvenile salmonids collected at the Snake River collector projects. The Corps and BPA shall continue to implement voluntary spill at all three Snake River collector projects when seasonal average flo	63	Annual Water Management Plan (1-WMP)	Hydro
41	41	NMFS	9.6.1 - Hydro	The Corps and BPA shall continue (pending results of the McNary Transport Evaluation) to bypass juvenile spring migrants collected at McNary Dam and shall provide the spring spill levels described for that project.	63	Annual Water Management Plan (1-WMP)	Hydro
42	42	NMFS	9.6.1 - Hydro	The Corps and BPA shall operate the collector projects to maximize collection and transportation during the summer migration (i.e., no voluntary spill except as NMFS deems necessary for approved research).	63	Annual Water Management Plan (1-WMP)	Hydro
43	43	NMFS	9.6.1 - Hydro	The Corps shall not initiate collection of subyearling fall chinook for transportation at McNary Dam until inriver migratory conditions are deteriorating (i.e., no longer spring-like).	63	Annual Water Management Plan (1-WMP)	Hydro
44	44	NMFS	9.6.1 - Hydro	The Corps shall extend the period of barge transportation from the lower Snake River dams and McNary to further reduce reliance on trucking.	*Under Development*		

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
45	45	NMFS	9.6.1 - Hydro	By the end of 2001, the Corps shall develop, in coordination with NMFS and the other Federal, state, and Tribal salmon managers, a McNary Dam transportation evaluation study plan specifically focusing on the response of UCR spring chinook and steelhead to	536	Juvenile Salmon Transportation Evaluations	Hydro
46	46	NMFS	9.6.1 - Hydro	The Corps and BPA, in coordination with NMFS through the annual planning process, shall evaluate transport to inriver return ratios for wild SR yearling chinook salmon and steelhead. In addition, the Corps and BPA shall also evaluate the effects of trans	536	Juvenile Salmon Transportation Evaluations	Hydro
47	47	NMFS	9.6.1 - Hydro	During all transport evaluations, the Corps and BPA, in coordination with NMFS through the annual planning process, shall include an evaluation of delayed mortality (D) of transported versus inriver migrating juvenile anadromous salmonids.	12	Delayed Mortality of Juveniles with Differential Migration Histories	Hydro
					22	Evaluation of Transportation Strategies	Hydro
					536	Juvenile Salmon Transportation Evaluations	Hydro
48	48	NMFS	9.6.1 - Hydro	The Corps and BPA shall evaluate the effects of prior transport as smolts on the homing of adults.	*Under Development*		
49	49	NMFS	9.6.1 - Hydro	The Corps shall evaluate strategies to enhance post-release survival of transported fish; examples of such strategies include timing releases so that fish arrival at the estuary corresponds to minimal interactions with predators and maximum availability o	22	Evaluation of Transportation Strategies	Hydro
					536	Juvenile Salmon Transportation Evaluations	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
50	50	NMFS	9.6.1 - Hydro	BPA and the Corps shall install necessary adult PIT-tag detectors at appropriate FCRPS projects before the expected return of adult salmon from the 2001 juvenile outmigration.	50	Adult Pit Tag Monitoring @ Bonneville, The Dalles , and John Day	Hydro
					51	McNary Adult Pit Tag Program	Hydro
51	51	NMFS	9.6.1 - Hydro	If results of Snake River studies indicate that survival of juvenile salmon and steelhead collected and transported during any segment of the juvenile migration (i.e., before May 1) is no better than the survival of juvenile salmon that migrate inriver, t	*Under Development*		
52	52	NMFS	9.6.1 - Hydro	The Corps shall identify and implement improvements to the transportation program.	22	Evaluation of Transportation Strategies	Hydro
					536	Juvenile Salmon Transportation Evaluations	Hydro
53	53	NMFS	9.6.1 - Hydro	The Corps shall evaluate and implement structural and operational alternatives to improve juvenile transportation at the collector dams.	18	Lower Snake River Juvenile Bypass System Improvements	Hydro
					20	Separator Evaluation	Hydro
					26	Little Goose Pit-Tag System Modification	Hydro
					63	Annual Water Management Plan (1-WMP)	Hydro
54	54	NMFS	9.6.1 - Hydro	The Corps and BPA shall implement an annual spill program, consistent with the spill volumes and TDG limits identified in Table 9.6-3, at all mainstem Snake and Columbia River FCRPS projects as part of the annual planning effort to achieve the juvenile sa	63	Annual Water Management Plan (1-WMP)	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
55	55	NMFS	9.6.1 - Hydro	To improve the future flexibility of the transmission system, BPA's Transmission Business Line shall initiate planning and design necessary to construct a Schultz-Hanford 500-kV line or an equivalent project, with a planned schedule for implementation by	532	Schultz-Hanford Transmission Reinforcement	Hydro
56	56	NMFS	9.6.1 - Hydro	BPA's Transmission Business Line shall continue efforts to evaluate, plan, design, and construct a joint transmission project to upgrade the west-of-Hatwai cutplane and improve the transfer limitations from Montana.	531	Columbia Falls Reinforcement	Hydro
					533	West Of Hatwaii Transmission Reinforcement	Hydro
57	57	NMFS	9.6.1 - Hydro	BPA's Transmission Business Line shall continue to evaluate strategically located generation additions and other transmission system improvements and report progress to NMFS annually. BPA's Transmission Business Line shall also limit future reservations	534	Report on new non-hydro generation resources	Hydro
58	58	NMFS	9.6.1 - Hydro	The Corps and BPA, in coordination with the Fish Passage Operations and Maintenance Coordination Team (FPOM), shall operate all turbine units at FCRPS dams for optimum fish passage survival. Methods to achieve this objective shall include, but are not li	61	Fish Passage Plan (FPP)	Hydro
					63	Annual Water Management Plan (1-WMP)	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
59	59	NMFS	9.6.1 - Hydro	The Action Agencies, in coordination with the Regional Forum, shall determine the appropriate operating range of turbines equipped with minimum gap runners (MGRs) to increase survival of juvenile migrants passing through these new turbine designs.	23	Turbine Passage Survival Program	Hydro
60	60	NMFS	9.6.1 - Hydro	The Corps and BPA shall evaluate adult fallback and juvenile fish passage under daytime spill to the gas cap at Bonneville Dam in 2002 and 2003, after deflector optimization improvements allow for increased spill above current levels. Research results wi	41	Bonneville Adult Fallback	Hydro
61	61	NMFS	9.6.1 - Hydro	The Corps shall complete the ongoing prototype powerhouse system surface collection evaluations at Bonneville First Powerhouse in 2000. The Corps shall compare the prototype with screened bypass systems and, if warranted, design and construct permanent f	7	Bonneville 1st Powerhouse Surface Bypass (Deep Slot)	Hydro
62	62	NMFS	9.6.1 - Hydro	The Corps shall complete Bonneville First Powerhouse prototype evaluations of extended submerged intake and gatewell vertical barrier screens, including an assessment of fry passage.	8	Bonneville 1st Powerhouse FGE Improvements	Hydro
63	63	NMFS	9.6.1 - Hydro	The Corps shall complete the design of debris removal facilities for the Bonneville First Powerhouse forebay.	8	Bonneville 1st Powerhouse FGE Improvements	Hydro
64	64	NMFS	9.6.1 - Hydro	The Corps shall continue the investigation of minimum gap runners at the Bonneville First Powerhouse.	23	Turbine Passage Survival Program	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
65	65	NMFS	9.6.1 - Hydro	The Corps shall complete Bonneville Second Powerhouse post-construction evaluation of the new juvenile fish bypass outfall and address design and operational refinements as warranted.	3	Bonneville 2nd Powerhouse JBS Improvements	Hydro
66	66	NMFS	9.6.1 - Hydro	The Corps shall continue design development and construction of a Bonneville Second Powerhouse permanent corner collector at the existing sluice chute, pending results of high-flow outfall investigations. The Corps shall construct new facilities if, and	6	Bonneville 2nd Powerhouse Surface Bypass (corner collector)	Hydro
67	67	NMFS	9.6.1 - Hydro	The Corps shall continue Bonneville Second Powerhouse investigations of measures to improve intake screen fish guidance efficiency and safe passage through the gatewell environment. This work shall include an assessment of fry passage.	9	Bonneville 2nd Powerhouse FGE Improvements	Hydro
68	68	NMFS	9.6.1 - Hydro	The Corps and BPA shall continue spill and passage survival studies at The Dalles Dam in 2001. Research results shall be considered, in consultation with NMFS through the annual planning process, to assess the need for additional changes in spill to furt	*Under Development*		
69	69	NMFS	9.6.1 - Hydro	The Corps shall continue design development and 2001 prototype testing of upper turbine intake occlusion devices at The Dalles, with a goal of increased non-turbine passage rates through either the sluiceway or the spillway. The Corps shall install occlu	2	The Dalles Surface Bypass Studies	Hydro
					32	Dalles Project Survival Study	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
70	70	NMFS	9.6.1 - Hydro	The Corps shall continue biological and engineering investigations and design of a composite ice and trash sluiceway outfall relocation and adult ladder auxiliary water system at The Dalles Dam and shall construct such devices as warranted.	38	The Dalles Sluice Outfall and Auxiliary Adult Water Supply	Hydro
71	71	NMFS	9.6.1 - Hydro	The Corps and BPA shall continue investigation of 24-hour spill at John Day Dam in 2001. Research results will be considered, in consultation with NMFS through the annual planning process, to determine implementation of daytime spill to further improve j	74	John Day Spill/Survival Studies	Hydro
72	72	NMFS	9.6.1 - Hydro	The Corps shall continue design development of a prototype RSW and extended deflector for testing at John Day in 2002. The Corps should synthesize evaluation results, determine the fish survival benefits of one or more RSWs or a skeleton bay surface bypa	75	John Day Surface Bypass/Removable Spillway Weir/Flow Deflectors	Hydro
73	73	NMFS	9.6.1 - Hydro	The Corps shall continue John Day prototype development and investigations of extended submerged intake screens, gatewell vertical barrier screens, and, if necessary, orifices to optimize guidance and safe passage through the system, including a gatewell	36	John Day Extended Length Screens	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
74	74	NMFS	9.6.1 - Hydro	The Corps shall continue evaluations to assess the need for improvements of the existing intake screens, gatewell vertical barrier screen cleaning system, and bypass facilities (including debris containment and removal systems, separation, sampling, loadi	17	McNary Extended Submerged Bar Screens	Hydro
					27	McNary Cylindrical Dewatering Prototype Evaluations	Hydro
					28	McNary Juvenile Fish Facility Debris	Hydro
					37	McNary outfall evaluation	Hydro
75	75	NMFS	9.6.1 - Hydro	The Corps shall investigate a surface bypass RSW at McNary Dam, based on prototype results at other locations, and shall install the unit in multiple spillway bays, as warranted.	84	Investigate surface bypass RWSW at McNary Dam & install the unit in multiple spillways as warranted	Hydro
76	76	NMFS	9.6.1 - Hydro	The Corps shall investigate, design, and construct, as warranted, a new juvenile bypass outfall at Lower Monumental Dam. Investigations shall be conducted in conjunction with spillway deflector and spill pattern optimization studies.	25	Lower Monumental Juvenile Bypass System Outfall	Hydro
					33	Lower Monumental Gas Fast Track Deflectors	Hydro
77	77	NMFS	9.6.1 - Hydro	The Corps shall investigate surface bypass (e.g., RSW) at Lower Monumental Dam, based on prototype results at other locations, and install in multiple spillway bays, as warranted.	85	Investigate surface bypass RWSW at Lower Monumental Dam and install the unit in multiple spillways	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
78	78	NMFS	9.6.1 - Hydro	The Corps shall initiate design development and testing of extended submerged intake screens and vertical barrier screens at Lower Monumental Dam and construct units as warranted.	16	Lower Monumental Extended Submerged Bar Screens	Hydro
79	79	NMFS	9.6.1 - Hydro	The Corps shall conduct a post-construction evaluation of the new debris containment boom at Little Goose to monitor populations and behavior of aquatic predators when debris accumulates at the log boom.	29	Little Goose Trash Boom	Hydro
80	80	NMFS	9.6.1 - Hydro	The Corps shall continue the design development, fabrication/deployment, and testing of a prototype RSW at Lower Granite, in conjunction with the existing prototype powerhouse occlusion devices, including the forebay behavioral guidance structure (BGS) an	13	Lower Granite Surface Bypass and Collection	Hydro
81	81	NMFS	9.6.1 - Hydro	The Corps shall complete design for new juvenile bypass facilities at Lower Granite Dam, including enlarged orifices and bypass gallery, open-channel flow bypass, improved separator for juvenile separation by size, and improved fish distribution flumes an	20	Separator Evaluation	Hydro
					24	Lower Granite Juvenile Bypass System	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
82	82	NMFS	9.6.1 - Hydro	The Action Agencies, in coordination with NMFS through the annual planning process, shall investigate the spillway passage survival of juvenile salmonids at appropriate FCRPS dams. These investigations shall assess the effect of spill patterns and per-bay	10	Bonneville Juvenile Fish Bypass Studies	Hydro
					30	Ice Harbor Spillway Survival Study	Hydro
					31	McNary Spillway Survival Study	Hydro
					74	John Day Spill/Survival Studies	Hydro
83	83	NMFS	9.6.1 - Hydro	The Action Agencies, in coordination with NMFS through the annual planning process, shall evaluate the effect of spill duration and volume on spillway effectiveness (percent of total project passage via spill), spill efficiency (fish per unit flow), foreb	10	Bonneville Juvenile Fish Bypass Studies	Hydro
					30	Ice Harbor Spillway Survival Study	Hydro
					31	McNary Spillway Survival Study	Hydro
					74	John Day Spill/Survival Studies	Hydro
84	84	NMFS	9.6.1 - Hydro	The Corps shall continue high-flow outfall investigations to determine whether it is appropriate to modify bypass outfall criteria in the context of high-discharge bypass discharges.	6	Bonneville 2nd Powerhouse Surface Bypass (corner collector)	Hydro
85	85	NMFS	9.6.1 - Hydro	The Corps shall continue to develop and evaluate improved fish-tracking technologies and computational fluid dynamics (numerical modeling). The ability to integrate these technologies and fluid dynamics shall be assessed as a potentially improved means o	13	Lower Granite Surface Bypass and Collection	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
86	86	NMFS	9.6.1 - Hydro	The Corps shall continue to investigate a way to increase entry rates of fish approaching surface bypass/collector entrances.	2	The Dalles Surface Bypass Studies	Hydro
					6	Bonneville 2nd Powerhouse Surface Bypass (corner collector)	Hydro
					7	Bonneville 1st Powerhouse Surface Bypass (Deep Slot)	Hydro
					13	Lower Granite Surface Bypass and Collection	Hydro
					75	John Day Surface Bypass/Removable Spillway Weir/Flow Deflectors	Hydro
87	87	NMFS	9.6.1 - Hydro	The Corps and BPA shall assess less-intrusive, PIT-tag interrogation methods at FCRPS juvenile bypass systems with interrogation sites, including McNary, John Day, and Bonneville dams. The Corps and BPA shall also assess providing a similar detection cap	26	Little Goose Pit-Tag System Modification	Hydro
88	88	NMFS	9.6.1 - Hydro	The Corps and BPA, in coordination with the Fish Facility Design Review Work Group and the Fish Passage Improvement Through Turbines Technical Work Group, shall continue the program to improve turbine survival of juvenile and adult salmonids.	23	Turbine Passage Survival Program	Hydro
89	89	NMFS	9.6.1 - Hydro	The Action Agencies shall investigate hydraulic and behavioral aspects of turbine passage by juvenile steelhead and salmon through turbines to develop biologically based turbine design and operating criteria. The Corps shall submit a report to NMFS stati	23	Turbine Passage Survival Program	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
90	90	NMFS	9.6.1 - Hydro	The Action Agencies shall examine the effects of draft tubes and powerhouse tailraces on the survival of fish passing through turbines.	23	Turbine Passage Survival Program	Hydro
					60	Adult PIT tag monitoring- Snake River projects	Hydro
91	91	NMFS	9.6.1 - Hydro	The Action Agencies shall remove all unnecessary obstructions in the higher velocity areas of the intake-to-draft tube sections of the turbine units.	23	Turbine Passage Survival Program	Hydro
92	92	NMFS	9.6.1 - Hydro	The Action Agencies shall consider all state-of-the-art turbine design technology to decrease fish injury and mortality before the implementation of any future turbine rehabilitation program (including any major repair programs, the ongoing rehabilitation	86	Consider turbine design technology to decrease fish injury at The Dalles & Ice Harbor	Hydro
93	93	NMFS	9.6.1 - Hydro	The Action Agencies shall determine the number of adults passed through turbines, then, if warranted, investigate the survival of adult salmonid passage through turbines (including steelhead kelts).	23	Turbine Passage Survival Program	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
94	94	NMFS	9.6.1 - Hydro	The Corps shall continue to evaluate the need for improvements of the existing intake screens, gatewell vertical barrier screens' cleaning system, and bypass facilities (including debris containment and removal systems, separation, sampling, loading, and	14	Little Goose Extended Submerged Bar Screens	Hydro
					15	Lower Granite Extended Submerged Bar Screens	Hydro
					16	Lower Monumental Extended Submerged Bar Screens	Hydro
					18	Lower Snake River Juvenile Bypass System Improvements	Hydro
					26	Little Goose Pit-Tag System Modification	Hydro
					27	McNary Cylindrical Dewatering Prototype Evaluations	Hydro
95	95	NMFS	9.6.1 - Hydro	The Corps shall complete investigations of improved wet separator designs in 2002. The Corps shall design and construct a new wet separator at McNary, Lower Monumental, and Little Goose dams, as warranted.	20	Separator Evaluation	Hydro
96	96	NMFS	9.6.1 - Hydro	The Corps shall complete the extended submerged intake screen systemwide letter report and implement recommended improvements.	14	Little Goose Extended Submerged Bar Screens	Hydro
					17	McNary Extended Submerged Bar Screens	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
97	97	NMFS	9.6.1 - Hydro	By January 2002, the Action Agencies shall develop an analysis that compares the relative passage survival benefits of an extended-length, intake screen bypass system, a surface-collection bypass system, and hybrid alternatives at Bonneville First Powerho	4	Bonneville 1st Powerhouse JBS Improvements	Hydro
					7	Bonneville 1st Powerhouse Surface Bypass (Deep Slot)	Hydro
					8	Bonneville 1st Powerhouse FGE Improvements	Hydro
					15	Lower Granite Extended Submerged Bar Screens	Hydro
98	98	NMFS	9.6.1 - Hydro	By January 2003, the Action Agencies shall develop an analysis that compares the relative passage survival benefits of replacing existing standard-length intake screens with extended-length screens at the John Day Dam powerhouse to surface collection at o	36	John Day Extended Length Screens	Hydro
					75	John Day Surface Bypass/Removable Spillway Weir/Flow Deflectors	Hydro
99	99	NMFS	9.6.1 - Hydro	By January, 2003, the Action Agencies shall develop an analysis that compares the relative passage survival benefits of replacing existing standard-length intake screens with extended-length screens at the Lower Monumental Dam powerhouse turbines to a rem	13	Lower Granite Surface Bypass and Collection	Hydro
					16	Lower Monumental Extended Submerged Bar Screens	Hydro
					526	By January 2003, develop an analysis on ESBS's vs. RSW's at Lower Monumental	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
100	100	NMFS	9.6.1 - Hydro	The Action Agencies shall continue to implement and study methods to reduce the loss of juvenile salmonids to predacious fishes in the lower Columbia and lower Snake rivers. This effort will include continuation and improvement of the ongoing Northern Pi	87	Salmonid predation studies as required	Hydro
101	101	NMFS	9.6.1 - Hydro	The Corps, in coordination with the NMFS Regional Forum process, shall implement and maintain effective means of discouraging avian predation (e.g., water spray, avian predator lines) at all forebay, tailrace, and bypass outfall locations where avian pred	87	Salmonid predation studies as required	Hydro
102	102	NMFS	9.6.1 - Hydro	The Action Agencies, in coordination with the Caspian Tern Working Group, shall continue to conduct studies (including migrational behavior) to evaluate avian predation of juvenile salmonids in the FCRPS reservoirs above Bonneville Dam. If warranted and	87	Salmonid predation studies as required	Hydro
103	103	NMFS	9.6.1 - Hydro	The Action Agencies shall quantify the extent of predation by white pelicans on juvenile salmon in the McNary pool and tailrace. A study plan shall be submitted to NMFS by September 30, 2001, detailing the study objectives, methods, and schedule. Based	87	Salmonid predation studies as required	Hydro
104	104	NMFS	9.6.1 - Hydro	The Action Agencies shall recover PIT-tag information from predacious bird colonies and evaluate trends, including hatchery-to-hatchery and hatchery-to-wild depredation ratios.	87	Salmonid predation studies as required	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
105	105	NMFS	9.6.1 - Hydro	The Action Agencies shall develop a pilot study to assess the feasibility of enhancing the function of ecological communities to reduce predation losses and increase survival in reservoirs and the estuary.	21	Juvenile Salmon Temperature Studies	Hydro
106	106	NMFS	9.6.1 - Hydro	The Action Agencies, in coordination with NMFS, shall investigate marine mammal predation in the tailrace of Bonneville Dam. A study plan shall be submitted to NMFS by June 30, 2001, detailing the study objectives, methods, and schedule.	58	Marine mammal predation @Bonneville tailrace	Hydro
107	107	NMFS	9.6.1 - Hydro	The Action Agencies shall conduct a comprehensive evaluation to assess survival of adult salmonids migrating upstream and factors contributing to unaccounted losses.	*Under Development*		
108	108	NMFS	9.6.1 - Hydro	The Corps and BPA shall conduct a comprehensive evaluation to investigate the causes of headburn in adult salmonids and shall implement corrective measures, as warranted.	59	Investigate adult headburn	Hydro
109	109	NMFS	9.6.1 - Hydro	The Corps shall initiate an adult steelhead downstream migrant (kelt) assessment program to determine the magnitude of passage, the contribution to population diversity and growth, and potential actions to provide safe passage.	53	Kelt Studies	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
110	110	NMFS	9.6.1 - Hydro	The Corps shall use information from previous and ongoing investigations regarding the problem of adult steelhead holding and jumping in the fish ladders at John Day Dam, develop a proposed course of action, and implement it, as warranted.	44	John Day Salmonid Holding and Jumping Project	Hydro
111	111	NMFS	9.6.1 - Hydro	The Corps shall investigate and enumerate fallback of upstream migrant salmonids through turbine intakes at all lower Snake and lower Columbia River dams. The Corps shall implement corrective measures to reduce turbine mortality, as warranted.	23	Turbine Passage Survival Program	Hydro
112	112	NMFS	9.6.1 - Hydro	The Corps shall investigate ways to provide egress to adult fish that have fallen back into juvenile collection galleries and primary dewatering facilities at Ice Harbor and McNary dams. The Corps shall either install structural, or implement operational	40	McNary/Ice Harbor Adult Fallback Project	Hydro
113	113	NMFS	9.6.1 - Hydro	The Corps shall investigate measures to reduce adult steelhead and salmon fallback and mortality through the Bonneville Dam spillway. A final report shall be submitted to NMFS stating the findings of these investigations and recommending corrective measu	41	Bonneville Adult Fallback	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
114	114	NMFS	9.6.1 - Hydro	The Corps shall examine existing fish-ladder water temperature and adult radio-telemetry data to determine whether observed temperature differences in fishways adversely affect fish passage time and holding behavior. If non-uniform temperatures are found	45	John Day Ladder Temperature Project	Hydro
					54	Fish Ladder Temperature Evaluation	Hydro
					55	Adult Temperature Evaluation	Hydro
115	115	NMFS	9.6.1 - Hydro	The Corps and BPA shall conduct a comprehensive depth and temperature investigation to characterize direct mortality sources at an FCRPS project considered to have high unaccountable adult losses (either from counts and/or previous adult evaluations).	55	Adult Temperature Evaluation	Hydro
116	116	NMFS	9.6.1 - Hydro	The Corps shall investigate adult fish delay and fallback at ladder junction pools and implement remedies to reduce this problem, as warranted.	44	John Day Salmonid Holding and Jumping Project	Hydro
					55	Adult Temperature Evaluation	Hydro
					56	Adult Fish Transition Pool Evaluations	Hydro
117	117	NMFS	9.6.1 - Hydro	The Corps shall evaluate adult count station facilities and rehabilitate where necessary at all projects to either minimize delay of adults or minimize counting difficulties that reduce count accuracy.	*Under Development*		

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
118	118	NMFS	9.6.1 - Hydro	The Corps shall develop and implement a program to better assess and enumerate indirect prespawning mortality of adult upstream-migrating fish. Such mortality may be due to, or exacerbated by, passage through the FCRPS hydro projects. If measures are id	*Under Development*		
119	119	NMFS	9.6.1 - Hydro	The Corps shall ensure that alterations to fish ladders and adult passage facilities to accommodate Pacific lamprey passage do not adversely affect salmonid passage timing and success.	57	Adult Lamprey Passage	Hydro
120	120	NMFS	9.6.1 - Hydro	The Corps shall develop improved operations for adult fishway main entrances at FCRPS dams so that the best possible attraction conditions are provided for adult migrants, both at the four Columbia River hydro projects and the four lower Snake hydro proje	42	Bonneville 2nd Powerhouse Adult Fishway Auxiliary Water Supply	Hydro
121	121	NMFS	9.6.1 - Hydro	The Corps shall develop and maintain an auxiliary water-supply, emergency-parts inventory for all adult fishways where determined necessary, in coordination with NMFS.	62	One and Five-Year Operations and Maintenance Plan and Budget	Hydro
122	122	NMFS	9.6.1 - Hydro	The Corps shall continue design development and, subsequently, construct an emergency auxiliary water supply system at The Dalles Dam's east ladder.	38	The Dalles Sluice Outfall and Auxiliary Adult Water Supply	Hydro
123	123	NMFS	9.6.1 - Hydro	The Corps shall continue to investigate alternatives to dewater adult auxiliary water system floor diffusers for inspection at The Dalles adult fishway powerhouse collection channel. The Corps shall implement design and construction of needed changes, as	39	The Dalles Adult Entrance Channel Dewatering Modifications	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
124	124	NMFS	9.6.1 - Hydro	The Corps shall investigate methods to provide additional emergency auxiliary water to The Dalles Dam north fishway when the normal auxiliary water supply is interrupted.	*Under Development*		
125	125	NMFS	9.6.1 - Hydro	The Corps shall develop and implement an automated monitoring and alarm system at appropriate FCRPS projects, as determined in the NMFS Regional Forum, to monitor changes in head differential remotely between the primary auxiliary water supply conduits/ch	*Under Development*		
126	126	NMFS	9.6.1 - Hydro	The Corps shall initiate an investigation and prepare a report on the Bonneville First Powerhouse Bradford Island and Cascade Island adult fishway auxiliary water system by the end of 2001. In the report, the Corps shall identify measures that will impro	*Under Development*		
127	127	NMFS	9.6.1 - Hydro	The Corps shall continue its investigation of the Bonneville Second Powerhouse adult fishway auxiliary water system and shall identify measures to satisfactorily address emergency backup auxiliary water needs.	42	Bonneville 2nd Powerhouse Adult Fishway Auxiliary Water Supply	Hydro
128	128	NMFS	9.6.1 - Hydro	The Corps shall initiate an engineering study to evaluate existing limitations relating to its inability to satisfy fish passage plan operating criteria at the John Day Dam north shore ladder.	43	John Day North Shore - Adult Fishway Auxiliary Water Supply	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
129	129	NMFS	9.6.1 - Hydro	The Corps shall complete adult fishway auxiliary water supply evaluations at each lower Snake River hydro project and implement corrective measures as warranted.	46	Lower Granite Adult Fishway Auxiliary Water Supply Project	Hydro
					47	Lower Monumental Adult Fishway Auxiliary Water Supply Project	Hydro
					48	Little Goose Adult Fishway Auxiliary Water Supply Project	Hydro
					49	Ice Harbor Adult Fishway Auxiliary Water Supply Project	Hydro
130	130	NMFS	9.6.1 - Hydro	The Corps shall complete its DGAS by April 2001. The results of this study will be used to guide future studies and decisions about implementation of some long-term structural measures to reduce TDG.	70	Water Quality Plan, 1-Year	Hydro
131	131	NMFS	9.6.1 - Hydro	The Action Agencies shall monitor the effects of TDG. This annual program shall include physical and biological monitoring and shall be developed and implemented in consultation with the Water Quality Team and the Mid-Columbia PUDs' monitoring programs.	70	Water Quality Plan, 1-Year	Hydro
132	132	NMFS	9.6.1 - Hydro	The Action Agencies shall develop a plan to conduct a systematic review and evaluation of the TDG fixed monitoring stations in the forebays of all the mainstem Columbia and Snake river dams (including the Camas/Washougal monitor). The evaluation plan sha	70	Water Quality Plan, 1-Year	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
133	133	NMFS	9.6.1 - Hydro	As part of DGAS, the Corps shall complete development of a TDG model to be used as a river operations management tool by spring 2001. Once a model is developed, the applications and results shall be coordinated through the Water Quality Team. The Corps	71	Water Quality Plan, 5-Year	Hydro
134	134	NMFS	9.6.1 - Hydro	The Corps shall continue the spillway deflector optimization program at each FCRPS project and implement it, as warranted. The Corps and BPA shall conduct physical and biological evaluations to ensure optimum gas abatement and fish passage conditions. I	33	Lower Monumental Gas Fast Track Deflectors	Hydro
					34	Little Goose Gas Fast Track Deflectors	Hydro
					35	McNary Gas Fast Track Deflectors	Hydro
					72	Bonneville Gas Fast Track	Hydro
					73	The Dallles Gas Fast Track	Hydro
					75	John Day Surface Bypass/Removable Spillway Weir/Flow Deflectors	Hydro
135	135	NMFS	9.6.1 - Hydro	The Corps shall include evaluations of divider walls at each FCRPS project in the spillway deflector optimization program. Design development and construction of divider walls would begin only after coordination within the annual planning process, and on	33	Lower Monumental Gas Fast Track Deflectors	Hydro
					34	Little Goose Gas Fast Track Deflectors	Hydro
					35	McNary Gas Fast Track Deflectors	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
136	136	NMFS	9.6.1 - Hydro	The Corps shall continue to develop and construct spillway deflectors at Chief Joseph Dam by 2004 to minimize TDG levels associated with system spill.	88	COE to develop and construct spillway deflectors at Chief Joseph Dam to minimize TDG.	Hydro
137	137	NMFS	9.6.1 - Hydro	The Corps shall investigate TDG abatement options at Libby Dam, including the installation of spillway deflectors and/or additional turbine units. The Corps shall construct gas abatement improvements at Libby on the Kootenai River, as warranted, to reduc	89	Investigate TDG abatement at Libby Dam and installation of spillway deflectors /additional turbines	Hydro
138	138	NMFS	9.6.1 - Hydro	The Corps shall continue to investigate RSWs, in conjunction with extended spillway deflectors, as a means of optimizing safe spillway passage of adult steelhead kelts and juvenile migrants.	13	Lower Granite Surface Bypass and Collection	Hydro
					75	John Day Surface Bypass/Removable Spillway Weir/Flow Deflectors	Hydro
139	139	NMFS	9.6.1 - Hydro	The Corps shall investigate TDG abatement options at Dworshak Dam and implement options, as warranted, in coordination with the annual planning process.	90	COE to investigate TDG abatement at Dworshak Dam and implement options as warranted.	Hydro
140	140	NMFS	9.6.1 - Hydro	The Corps shall design the spillway Number 1 (end bay) deflector at John Day Dam, and implement as warranted, in coordination with the annual planning process.	75	John Day Surface Bypass/Removable Spillway Weir/Flow Deflectors	Hydro
141	141	NMFS	9.6.1 - Hydro	The Action Agencies shall evaluate juvenile fish condition due to disease in relation to high temperature impacts during critical migration periods. This evaluation should include monitoring summer migrants at lower Columbia and lower Snake river dams to	21	Juvenile Salmon Temperature Studies	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
142	142	NMFS	9.6.1 - Hydro	The Corps shall work through the regional forum process to identify and implement measures to address juvenile fish mortality associated with high summer temperatures at McNary Dam. As a starting point, the Corps shall assemble and analyze the temperatur	21	Juvenile Salmon Temperature Studies	Hydro
143	143	NMFS	9.6.1 - Hydro	By June 30, 2001, the Action Agencies shall develop and coordinate with NMFS and EPA on a plan to model the water temperature effects of alternative Snake River operations. The modeling plan shall include a temperature data collection strategy developed	21	Juvenile Salmon Temperature Studies	Hydro
144	144	NMFS	9.6.1 - Hydro	The Corps, in coordination with the Regional Forum, shall maintain juvenile and adult fish facilities within identified criteria and operate FCRPS projects within operational guidelines contained in the Corps' Fish Passage Plan. The Corps shall coordinat	61	Fish Passage Plan (FPP)	Hydro
145	145	NMFS	9.6.1 - Hydro	The Corps shall develop and implement preventative maintenance programs for fish passage facilities that ensure long-term reliability, thereby minimizing repair costs.	62	One and Five-Year Operations and Maintenance Plan and Budget	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
146	146	NMFS	9.6.1 - Hydro	The Corps shall address debris-handling needs and continue to assess more efficient and effective debris-handling techniques to ensure that the performance of both new and old fish passage facilities will not be compromised.	1	Bonneville Automated Trashracks	Hydro
					5	Bonneville 2nd Powerhouse Gatewell Debris Removal	Hydro
					27	McNary Cylindrical Dewatering Prototype Evaluations	Hydro
					36	John Day Extended Length Screens	Hydro
					62	One and Five-Year Operations and Maintenance Plan and Budget	Hydro
147	147	NMFS	9.6.1 - Hydro	As a contingency plan, the Corps (in cooperation with other Federal agencies) shall develop a project management plan to reevaluate more intensive hydropower-related actions (including breaching) for the four lower Snake River dams. The project managemen	*Under Development*		
148	148	NMFS	9.6.1 - Hydro	The Corps shall conduct detailed engineering and design work for improvements recommended in the general reevaluation report and supplemental environmental impact statement described in the preceding action. The Corps shall seek funding to allow initiati	*Under Development*		

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
149	149	NMFS	9.6.2 - Habitat	BOR shall initiate programs in three priority subbasins (identified in the Conceptual Recovery Plan) per year over 5 years, in coordination with NMFS, FWS, the states and others, to address all flow, passage, and screening problems in each subbasin over 1	147	Mainstem, Middle Fork, John Day habitat work	Habitat
					150	Umatilla Habitat Improvement -CTUIR	Habitat
					156	Model Watershed Studies - Lemhi River Basin	Habitat
					161	Upper Salmon River Anadromous Fish Passage	Habitat
					162	Oregon Fish Screens Project	Habitat
					163	Idaho Fish Screening Improvement	Habitat
					177	Juvenile Screens & Traps Walla Walla Basin	Habitat
					178	Anadromous Fish Passage Walla Walla Basin	Habitat
					179	Methow River Valley Irrigation District	Habitat
					197	Gravel Push-Up Dam Removal Lower John Day N Fork River	Habitat
					198	Irrigation & Riparian Improvement, John Day River	Habitat
					199	Assess Salmonid Habitat, Walla Walla Watershed	Habitat
					220	Restore Salmon River (Challis area)	Habitat
					222	Salmon Creek Enhancement -Chumstick Creek Northroad	Habitat
					247	Walla Walla River Fish Passage	Habitat
					283	Lemhi Subbasin High Priority Subbasin Enhancement	Habitat
					284	Lemhi Subbasin High Priority Subbasin Enhancement	Habitat

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
149	149	NMFS	9.6.2 - Habitat	BOR shall initiate programs in three priority subbasins (identified in the Conceptual Recovery Plan) per year over 5 years, in coordination with NMFS, FWS, the states and others, to address all flow, passage, and screening problems in each subbasin over 1	285	Lemhi Subbasin High Priority Subbasin Enhancement	Habitat
					286	Methow Subbasin High Priority Subbasin Enhancement	Habitat
					287	Methow Subbasin High Priority Subbasin Enhancement	Habitat
					288	Methow Subbasin High Priority Subbasin Enhancement	Habitat
					289	Upper John Day High Priority Subbasin Enhancement	Habitat
					290	Upper John Day High Priority Subbasin Enhancement	Habitat
					291	Upper John Day High Priority Subbasin Enhancement	Habitat
					292	Middle Fork John Day High Priority Subbasin Enhancement	Habitat
					293	Middle Fork John Day High Priority Subbasin Enhancement	Habitat
					294	Middle Fork John Day High Priority Subbasin Enhancement	Habitat
					295	Entiat High Priority Subbasin Enhancement	Habitat
					296	Entiat High Priority Subbasin Enhancement	Habitat
					297	Entiat High Priority Subbasin Enhancement	Habitat
					298	McKenzie High Priority Subbasin Enhancement	Habitat

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
149	149	NMFS	9.6.2 - Habitat	BOR shall initiate programs in three priority subbasins (identified in the Conceptual Recovery Plan) per year over 5 years, in coordination with NMFS, FWS, the states and others, to address all flow, passage, and screening problems in each subbasin over 1	299	McKenzie High Priority Subbasin Enhancement	Habitat
					300	McKenzie High Priority Subbasin Enhancement	Habitat
					301	Upper Salmon High Priority Subbasin Enhancement	Habitat
					302	Upper Salmon High Priority Subbasin Enhancement	Habitat
					303	Upper Salmon High Priority Subbasin Enhancement	Habitat
					304	Middle Fork Clearwater High Priority Subbasin Enhancement	Habitat
					305	Middle Fork Clearwater High Priority Subbasin Enhancement	Habitat
					306	Middle Fork Clearwater High Priority Subbasin Enhancement	Habitat
					307	North Fork John Day High Priority Subbasin Enhancement	Habitat
					308	North Fork John Day High Priority Subbasin Enhancement	Habitat
					309	North Fork John Day High Priority Subbasin Enhancement	Habitat
					310	Wenatchee High Priority Subbasin Enhancement	Habitat
					311	Wenatchee High Priority Subbasin Enhancement	Habitat
					312	Wenatchee High Priority Subbasin Enhancement	Habitat
					313	Clackamas High Priority Subbasin Enhancement	Habitat
					314	Clackamas High Priority Subbasin Enhancement	Habitat

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
149	149	NMFS	9.6.2 - Habitat	BOR shall initiate programs in three priority subbasins (identified in the Conceptual Recovery Plan) per year over 5 years, in coordination with NMFS, FWS, the states and others, to address all flow, passage, and screening problems in each subbasin over 1	315	Clackamas High Priority Subbasin Enhancement	Habitat
					316	North Fork Santiam High Priority Subbasin Enhancement	Habitat
					317	North Fork Santiam High Priority Subbasin Enhancement	Habitat
					318	North Fork Santiam High Priority Subbasin Enhancement	Habitat
					319	Upper Cowlitz High Priority Subbasin Enhancement	Habitat
					320	Upper Cowlitz High Priority Subbasin Enhancement	Habitat
					321	Upper Cowlitz High Priority Subbasin Enhancement	Habitat
					322	Lewis River High Priority Subbasin Enhancement	Habitat
					323	Lewis River High Priority Subbasin Enhancement	Habitat
					324	Lewis River High Priority Subbasin Enhancement	Habitat
					325	Little Salmon High Priority Subbasin Enhancement	Habitat
					326	Little Salmon High Priority Subbasin Enhancement	Habitat
					327	Little Salmon High Priority Subbasin Enhancement	Habitat
					328	Lower-Willamette-Clackamas High Priority Subbasin Enhancement	Habitat
					329	Lower-Willamette-Clackamas High Priority Subbasin Enhancement	Habitat
					330	Lower-Willamette-Clackamas High Priority Subbasin Enhancement	Habitat

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
150	150	NMFS	9.6.2 - Habitat	In subbasins with listed salmon and steelhead, BPA shall fund protection of currently productive non-Federal habitat, especially if at risk of being degraded, in accordance with criteria and priorities BPA and NMFS will develop by June 1, 2001.	141	Agriculture incentive program partnerships	Habitat
					143	Subbasin Plans	Habitat
					147	Mainstem, Middle Fork, John Day habitat work	Habitat
					148	Joseph Creek & Grande Ronde River habitat work	Habitat
					150	Umatilla Habitat Improvement -CTUIR	Habitat
					151	Umatilla Habitat Improvement -ODFW	Habitat
					158	Lower Yakima Valley Riparian/Wetlands Restoration	Habitat
					160	Fifteenmile Creek Habitat Improvement	Habitat
					167	Tucannon Stream And Riparian Restoration	Habitat
					168	PATAHA CREEK STREAM & CROPLAND RESTORATION	Habitat
					169	Grande Ronde Model Watershed Habitat Projects	Habitat
					171	Trout Creek Operation & Maintenance	Habitat
					174	Salmon River Habitat Enhancement & O&M	Habitat
					175	Umatilla River Riparian - Squaw Creek Wildlife Project	Habitat
					176	Upper Salmon River Diversion Canal Consolidation	Habitat
					179	Methow River Valley Irrigation District	Habitat
					180	Satus Creek Watershed Restoration	Habitat
					181	Walla Walla River Basin Fish Habitat Enhancement	Habitat

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
150	150	NMFS	9.6.2 - Habitat	In subbasins with listed salmon and steelhead, BPA shall fund protection of currently productive non-Federal habitat, especially if at risk of being degraded, in accordance with criteria and priorities BPA and NMFS will develop by June 1, 2001.	186	N.E. Oregon Wildlife Project - Helm Tract (NPT)	Habitat
					187	CTUIR-Grande Ronde Watershed -McIntyre Road/Mccoy Creek	Habitat
					190	Wallowa County/Nez Perce Salmon Habitat Recovery Plan	Habitat
					194	Cottonwood Creek Riparian Enhancement -Wallowa Basin	Habitat
					195	Water Quality Monitoring - Grande Ronde Basin	Habitat
					200	Hood River Fish Habitat	Habitat
					201	Acquisition Of Pine Creek Ranch	Habitat
					207	McIntyre Road Relocation - Union County	Habitat
					209	Grouse Creek Culvert Replacement	Habitat
					212	Bakeoven Riparian Assessment	Habitat
					223	Union County Technical Engineering Assistance	Habitat
					224	Wallowa County Technical Engineering Assistance	Habitat
					225	Water Temperature Manipulation & Data Sharing Software	Habitat
					228	Grande Ronde - Union SWCD Channel/Road Restoration	Habitat
					229	Grande Ronde - Union SWCD Riparian & Upland Restoration	Habitat
					230	Alpine Meadows Trout Creek Restation	Habitat

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
150	150	NMFS	9.6.2 - Habitat	In subbasins with listed salmon and steelhead, BPA shall fund protection of currently productive non-Federal habitat, especially if at risk of being degraded, in accordance with criteria and priorities BPA and NMFS will develop by June 1, 2001.	231	Wallowa County Gauging Station	Habitat
					232	Hagedorn Rd Relocation/Stream Restoration	Habitat
					233	Grande Ronde Technical Engineering Assistance	Habitat
					235	Wallowa County Direct Seeding	Habitat
					236	Crow Cr Star Thistle Containment & Riparian Enhancement	Habitat
					243	Acquire Oxbow Ranch on the Middle Fork John Day River	Habitat
					244	Wildlife Mitigation Sites Oregon, Wenaha Wildlife Area additions	Habitat
					245	Wildlife Mitigation Sites Oregon, Ladd Marsh Wildlife Area	Habitat
					246	Enhance North Fork John Day River	Habitat
					255	Conservation Reserve Incentive	Habitat
					256	McCoy Cr Alta Cunha Ranches Instream Restoration	Habitat
					258	Asotin Watershed Grazing Biological Plan	Habitat
					259	Holliday Conservation Easement	Habitat
					270	Address Passage, Screening and Flow Problems in NMFS identified high priority subbasins	Habitat
					271	Address Screening Problems	Habitat
					272	Address Flow Problems	Habitat

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
151	151	NMFS	9.6.2 - Habitat	BPA shall, in coordination with NMFS, experiment with innovative ways to increase tributary flows by, for example, establishing a water brokerage. BPA will begin these experiments as soon as possible and submit a report evaluating their efficacy at the e	142	Water Acquisition Program	Habitat
					147	Mainstem, Middle Fork, John Day habitat work	Habitat
					150	Umatilla Habitat Improvement -CTUIR	Habitat
					179	Methow River Valley Irrigation District	Habitat
					213	15 Mile Creek Water Right Acquisition	Habitat
					270	Address Passage, Screening and Flow Problems in NMFS identified high priority subbasins	Habitat
					272	Address Flow Problems	Habitat

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
152	152	NMFS	9.6.2 - Habitat	The Action Agencies shall coordinate their efforts and support offsite habitat enhancement measures undertaken by other Federal agencies, states, Tribes, and local governments by the following: (See RPA)	141	Agriculture incentive program partnerships	Habitat
					151	Umatilla Habitat Improvement -ODFW	Habitat
					153	Annual Work Plan - Columbia Basin F & W Foundation	Habitat
					154	Hungry Horse Mitigation/Habitat Flathead Basin	Habitat
					155	Grand Ronde Model Watershed Development	Habitat
					156	Model Watershed Studies - Lemhi River Basin	Habitat
					159	RED RIVER RESTORATION (LITTLE PONDEROSA RANCH)	Habitat
					167	Tucannon Stream And Riparian Restoration	Habitat
					168	PATAHA CREEK STREAM & CROPLAND RESTORATION	Habitat
					170	Wallowa Basin Project Planning	Habitat
					171	Trout Creek Operation & Maintenance	Habitat
					175	Umatilla River Riparian - Squaw Creek Wildlife Project	Habitat
					176	Upper Salmon River Diversion Canal Consolidation	Habitat
					180	Satus Creek Watershed Restoration	Habitat
					181	Walla Walla River Basin Fish Habitat Enhancement	Habitat
					182	North Fork John Day dredge tailing restoration	Habitat
					197	Gravel Push-Up Dam Removal Lower John Day N Fork River	Habitat

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
152	152	NMFS	9.6.2 - Habitat	The Action Agencies shall coordinate their efforts and support offsite habitat enhancement measures undertaken by other Federal agencies, states, Tribes, and local governments by the following: (See RPA)	198	Irrigation & Riparian Improvement, John Day River	Habitat
					202	Implement Trout Cr Watershed Enhancement	Habitat
					205	Establish Safe Access Tributaries - Yakima Basin	Habitat
					212	Bakeoven Riparian Assessment	Habitat
					214	PINE HOLLOW WATERSHED ENHANCEMENT	Habitat
					215	Ahtanum Creek Watershed Assessment	Habitat
					216	Restore Anadromous Fish Habitat - Little Canyon Cr	Habitat
					217	Restore Anadromous Fish Habitat - Nichols Canyon	Habitat
					221	PATAHA WATERSHED PROJECT PLANNING & IMPLEMENTATION	Habitat
					270	Address Passage, Screening and Flow Problems in NMFS identified high priority subbasins	Habitat
					271	Address Screening Problems	Habitat
					272	Address Flow Problems	Habitat

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
153	153	NMFS	9.6.2 - Habitat	BPA shall, working with agricultural incentive programs such as the Conservation Reserve Enhancement Program, negotiate and fund long-term protection for 100 miles of riparian buffers per year in accordance with criteria BPA and NMFS will develop by June	141	Agriculture incentive program partnerships	Habitat
					148	Joseph Creek & Grande Ronde River habitat work	Habitat
					155	Grand Ronde Model Watershed Development	Habitat
					170	Wallowa Basin Project Planning	Habitat
					240	TRAINING SUPPORT TO NRCS/WILDLAND HYDROLOGY	Habitat
					246	Enhance North Fork John Day River	Habitat
					255	Conservation Reserve Incentive	Habitat
					270	Address Passage, Screening and Flow Problems in NMFS identified high priority subbasins	Habitat
					271	Address Screening Problems	Habitat
					272	Address Flow Problems	Habitat

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
154	154	NMFS	9.6.2 - Habitat	BPA shall work with the NWPPC to ensure development and updating of subbasin assessments and plans; match state and local funding for coordinated development of watershed assessments and plans; and help fund technical support for subbasin and watershed pl	143	Subbasin Plans	Habitat
					151	Umatilla Habitat Improvement -ODFW	Habitat
					153	Annual Work Plan - Columbia Basin F & W Foundation	Habitat
					154	Hungry Horse Mitigation/Habitat Flathead Basin	Habitat
					157	Life Studies Of Spring Chinook-Grande Ronde River	Habitat
					159	RED RIVER RESTORATION (LITTLE PONDEROSA RANCH)	Habitat
					165	Asotin Cr Habitat -Spring Chinook, Summer Steelhead	Habitat
					167	Tucannon Stream And Riparian Restoration	Habitat
					168	PATAHA CREEK STREAM & CROPLAND RESTORATION	Habitat
					171	Trout Creek Operation & Maintenance	Habitat
					175	Umatilla River Riparian - Squaw Creek Wildlife Project	Habitat
					176	Upper Salmon River Diversion Canal Consolidation	Habitat
					180	Satus Creek Watershed Restoration	Habitat
					181	Walla Walla River Basin Fish Habitat Enhancement	Habitat
					182	North Fork John Day dredge tailing restoration	Habitat

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
154	154	NMFS	9.6.2 - Habitat	BPA shall work with the NWPPC to ensure development and updating of subbasin assessments and plans; match state and local funding for coordinated development of watershed assessments and plans; and help fund technical support for subbasin and watershed pl	183	PROTECT AND RESTORE LOLO CREEK WATERSHED	Habitat
					184	Protecting & Restoring Squaw/Papose Creek Watersheds	Habitat
					185	Restore McComas Meadows	Habitat
					188	Clearwater Focus Watershed	Habitat
					191	Yakima Basin Side ChannelsS	Habitat
					192	Toppenish/Simcoe Instream Flow Restoration	Habitat
					193	O'Hara Watershed Restoration, Clearwater Basin	Habitat
					196	Columbia Basin Bulletin	Habitat
					199	Assess Salmonid Habitat, Walla Walla Watershed	Habitat
					202	Implement Trout Cr Watershed Enhancement	Habitat
					203	Implement Wy-Kan-Ush-Mi Wa-Kish-Wit Watershed plan	Habitat
					204	Upper Toppenish Creek Watershed Restoratio	Habitat
					205	Establish Safe Access Tributaries - Yakima Basin	Habitat
					212	Bakeoven Riparian Assessment	Habitat
					214	PINE HOLLOW WATERSHED ENHANCEMENT	Habitat
					215	Ahtanum Creek Watershed Assessment	Habitat
					216	Restore Anadromous Fish Habitat - Little Canyon Cr	Habitat
					217	Restore Anadromous Fish Habitat - Nichols Canyon	Habitat

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
154	154	NMFS	9.6.2 - Habitat	BPA shall work with the NWPPC to ensure development and updating of subbasin assessments and plans; match state and local funding for coordinated development of watershed assessments and plans; and help fund technical support for subbasin and watershed pl	218	Protecting & Restoring Big Canyon Creek Watershed	Habitat
					219	Rehabilitate Lapwai Creek	Habitat
					220	Restore Salmon River (Challis area)	Habitat
					221	PATAHA WATERSHED PROJECT PLANNING & IMPLEMENTATION	Habitat
					238	Water Right Acquisition Program	Habitat
					241	Rock Cr Watshed Assessment /Restoration	Habitat
					246	Enhance North Fork John Day River	Habitat
					248	Protect N Lochsa Face Analysis Area	Habitat
					249	Rehabilitate Newsome Creek - Clearwater Basin	Habitat
					250	Protect And Restore Mill Creek Watershed	Habitat
					260	GIS for Subbasin Assessment	Habitat
					270	Address Passage, Screening and Flow Problems in NMFS identified high priority subbasins	Habitat
					271	Address Screening Problems	Habitat
					272	Address Flow Problems	Habitat
155	155	NMFS	9.6.2 - Habitat	BPA, working with BOR, the Corps, EPA, and USGS, shall develop a program to 1) identify mainstem habitat sampling reaches, survey conditions, describe cause-and-effect relationships, and identify research needs; 2) develop improvement plans for all mainst	211	Salmon Spawning Below Lower Columbia Dams - ODFW	Habitat

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
156	156	NMFS	9.6.2 - Habitat	The Action Agencies and NMFS shall study the feasibility (including both biological benefits and ecological risks) of habitat modification to improve spawning conditions for chum salmon in the Ives Island area.	*Under Development*		
157	157	NMFS	9.6.2 - Habitat	BPA shall fund actions to improve and restore tributary and mainstem habitat for CR chum salmon in the reach between The Dalles Dam and the mouth of the Columbia River.	211	Salmon Spawning Below Lower Columbia Dams - ODFW	Habitat
					242	Evaluate Factors Limiting Columbia R Chum Salmon	Habitat
158	158	NMFS	9.6.2 - Habitat	During 2001, the Corps and BPA shall seek funding and develop an action plan to rapidly inventory estuarine habitat, model physical and biological features of the historical lower river and estuary, identify limiting biological and physical factors in the	*Under Development*		
159	159	NMFS	9.6.2 - Habitat	BPA and the Corps, working with LCREP and NMFS, shall develop a plan addressing the habitat needs of salmon and steelhead in the estuary.	262	Estuary Habitat Restoration and Research	Habitat
160	160	NMFS	9.6.2 - Habitat	The Corps and BPA, working with LCREP, shall develop and implement an estuary restoration program with a goal of protecting and enhancing 10,000 acres of tidal wetlands and other key habitats over 10 years, beginning in 2001, to rebuild productivity for l	262	Estuary Habitat Restoration and Research	Habitat

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
161	161	NMFS	9.6.2 - Habitat	Between 2001 and 2010, the Corps and BPA shall fund a monitoring and research program acceptable to NMFS and closely coordinated with the LCREP monitoring and research efforts (Management Plan Action 28) to address the estuary objectives of this biologica	262	Estuary Habitat Restoration and Research	Habitat
162	162	NMFS	9.6.2 - Habitat	During 2000, BPA, working with NMFS, shall continue to develop a conceptual model of the relationship between estuarine conditions and salmon population structure and resilience. The model will highlight the relationship among hydropower, water managemen	*Under Development*		
163	163	NMFS	9.6.2 - Habitat	The Action Agencies and NMFS, in conjunction with the Habitat Coordination Team, will develop a compliance monitoring program for inclusion in the first 1- and 5-year plans.	*Under Development*		
164	164	NMFS	9.6.3 - Harvest	The Action Agencies shall work with NMFS, USFWS, and Tribal and state fishery management agencies in a multiyear program to develop, test, and deploy selective fishing methods and gear that enable fisheries to target nonlisted fish while holding incident	125	Implement Selective Fishery Development Program	Harvest
					132	EVALUATE LIVE CAPTURE SELECTIVE HARVEST METHODS	Harvest
					133	Begin Gear Efficacy Testing between Bonneville and McNary Dam	Harvest
					135	NMFS NET EXCHANGE PROGRAM	Harvest
					139	Select Area Fishery Evaluation	Harvest

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
165	165	NMFS	9.6.3 - Harvest	The Action Agencies shall work with NMFS, USFWS, Tribal and state fishery managers, and the relevant Pacific Salmon Commission and Pacific Fishery Management Council (PFMC) technical committees to develop and implement methods and analytical procedures (	125	Implement Selective Fishery Development Program	Harvest
					127	Model refinement Project	Harvest
					135	NMFS NET EXCHANGE PROGRAM	Harvest
					136	Enhanced Fishery Sampling Development Project	Harvest
					138	Fishery Management Reform Project	Harvest
166	166	NMFS	9.6.3 - Harvest	The Action Agencies shall work with NMFS, USFWS, the Pacific States Marine Fisheries Commission, and Tribal and state fishery management agencies to implement and/or enable changes in catch sampling programs and data recovery systems, including any requir	125	Implement Selective Fishery Development Program	Harvest
					126	Revise sampling schemes & fishery/stock data systems	Harvest
167	167	NMFS	9.6.3 - Harvest	The Action Agencies shall work with NMFS, USFWS, and Tribal and state fishery management agencies to develop improved methods for estimating incidental mortalities in fisheries, with particular emphasis on selective fisheries in the Columbia River basin,	125	Implement Selective Fishery Development Program	Harvest
					134	Develop a Research Plan to Address Incidental Mortality in Fisheries	Harvest

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
168	168	NMFS	9.6.3 - Harvest	The Action Agencies shall work with NMFS, USFWS, and Tribal and state fishery management agencies to develop methods for crediting harvest reforms, and the survival benefits they produce, toward FCRPS offsite mitigation responsibilities. A crediting appr	125	Implement Selective Fishery Development Program	Harvest
					137	Crediting Project	Harvest
169	169	NMFS	9.6.4 - Artificial Propagation	The Action Agencies shall fund the development of NMFS-approved HGMPs for implementation, including plans for monitoring and revising them as necessary as new information becomes available. HGMPs have to be completed first for the facilities and programs	92	Develop HGMPs	Hatchery
					93	Implement high-priority reforms identified in HGMPs	Hatchery
					94	Implement remaining reforms identified in HGMPs	Hatchery
					153	Annual Work Plan - Columbia Basin F & W Foundation	Habitat
170	170	NMFS	9.6.4 - Artificial Propagation	Using new authorizations and appropriations and/or BPA funds as necessary and appropriate, the Corps, working with USFWS, shall oversee the design and construction of capital modifications identified as necessary in the HGMP planning process for Lower Sna	92	Develop HGMPs	Hatchery
					93	Implement high-priority reforms identified in HGMPs	Hatchery
					94	Implement remaining reforms identified in HGMPs	Hatchery

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
171	171	NMFS	9.6.4 - Artificial Propagation	BOR shall implement the reforms identified in the HGMP planning process for the Grand Coulee mitigation anadromous fish hatchery programs, beginning immediately following completion of the relevant (NMFS approved) HGMPs and completing the work as expediti	92	Develop HGMPs	Hatchery
					93	Implement high-priority reforms identified in HGMPs	Hatchery
					94	Implement remaining reforms identified in HGMPs	Hatchery
172	172	NMFS	9.6.4 - Artificial Propagation	The Corps shall implement the reforms identified in the HGMP planning process for the Corp's Columbia River basin mitigation anadromous fish hatchery programs, beginning immediately after the relevant HGMPs are completed and are approved by NMFS. The wor	*Under Development*		
173	173	NMFS	9.6.4 - Artificial Propagation	BPA shall implement the reforms identified in the HGMP planning process for Federal and Federally funded hatcheries, beginning immediately after the relevant HGMPs are completed and approved by NMFS. The work shall be completed as expeditiously as possib	92	Develop HGMPs	Hatchery
					93	Implement high-priority reforms identified in HGMPs	Hatchery
					94	Implement remaining reforms identified in HGMPs	Hatchery

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
174	174	NMFS	9.6.4 - Artificial Propagation	Working through regional prioritization processes to the extent feasible and in coordination with NMFS, BPA shall collaborate with the regional, state, Tribal, and Federal fish managers and the Pacific States Marine Fisheries Commission to enable the deve	91	Comprehensive Marking Plan	Hatchery
175	174.1	NMFS	9.6.4 - Artificial Propagation	1. Develop a comprehensive marking strategy for all salmon and steelhead artificial production programs in the Columbia River basin by the end of 2001.	*Under Development*		
176	174.2	NMFS	9.6.4 - Artificial Propagation	2. Provide funding by March 1, 2001, to begin marking all spring chinook salmon that are currently released unmarked from Federal or Federally funded hatcheries.	*Under Development*		
177	174.3	NMFS	9.6.4 - Artificial Propagation	3. Provide funding, beginning in FY 2002, to implement the Action Agencies' share of the comprehensive marking plan for production not addressed in (2) above.	*Under Development*		
178	174.4	NMFS	9.6.4 - Artificial Propagation	4. Obtain funding contributions as appropriate for additional sampling efforts and specific experiments to determine relative distribution and timing of hatchery and natural spawners.	*Under Development*		

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
179	175	NMFS	9.6.4 - Artificial Propagation	BPA shall, in coordination with NMFS, USFWS, and the relevant state and Tribal comanagers, fund the four-step planning process described above as quickly as possible and, if so determined by that process, implement safety-net projects as quickly as possib	95	Safety Net Program	Hatchery
					97	CAPTIVE BROODSTOCK ARTIFICIAL PROPAGATION	Hatchery
					98	TUCANNON RIVER SPRING CHINOOK CAPTIVE BROODSTOCK	Hatchery
					99	REDFISH LAKE SOCKEYE REARING AND TRAPPING	Hatchery
					100	REDFISH LAKE SOCKEYE BROODSTOCK REARING/RESEARCH	Hatchery
					101	IDAHO CHINOOK SALMON CAPTIVE REARING	Hatchery
					102	CAPTIVE SALMONID BROODSTOCK TECHNOLOGY DEMO	Hatchery
					103	MANCHESTER SPRING CHINOOK CAPTIVE BROOD	Hatchery
					104	NE OREGON HATCHERY MASTER PLAN - NEZ PERCE	Hatchery
					105	NE OREGON OUTPLANTING FACILITIES PLAN - ODFW	Hatchery
					106	PITTSBURG LANDING ACCLIMATION FACILITY - SNAKE R	Hatchery
					108	NEZ PERCE TRIBAL HATCHERY	Hatchery

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
179	175	NMFS	9.6.4 - Artificial Propagation	BPA shall, in coordination with NMFS, USFWS, and the relevant state and Tribal comanagers, fund the four-step planning process described above as quickly as possible and, if so determined by that process, implement safety-net projects as quickly as possib	109	JOHNSON CREEK ARTIFICIAL PROPAGATION ENHANCEMENT	Hatchery
					112	GRANDE RONDE SUPPLEMENTATION FACILITIES- O&M -NPT	Hatchery
					113	GRANDE RONDE SUPPLEMENTATION - O&M - CTUIR	Hatchery
					114	GRANDE RONDE CAPTIVE BROOD O&M / M&E	Hatchery
					117	GENETIC ANALYSES OF COLUMBIA & SNAKE SOCKEYE	Hatchery
180	176	NMFS	9.6.4 - Artificial Propagation	BPA shall, in coordination with NMFS, USFWS, and the relevant state and Tribal comanagers, fund the development of HGMPs for the Grande Ronde and Tucannon spring/summer chinook safety-net programs.	95	Safety Net Program	Hatchery
					157	Life Studies Of Spring Chinook-Grande Ronde River	Habitat
181	177	NMFS	9.6.4 - Artificial Propagation	In 2002, BPA shall begin to implement and sustain NMFS-approved, safety-net projects.	95	Safety Net Program	Hatchery
182	178	NMFS	9.6.4 - Artificial Propagation	BPA shall commit to a process whereby funds can be made quickly available for funding the planning and implementation of additional safety-net projects for high-risk salmon and steelhead populations NMFS identified during the term of this biological opini	95	Safety Net Program	Hatchery

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
183	179	NMFS	9.6.5 - Research Monitoring and Evaluation	The Action Agencies and NMFS shall work with affected parties to establish regional priorities within the congressional appropriations processes to set and provide the appropriate level of FCRPS funding to develop recovery goals for listed salmon ESUs in	*Under Development*		
184	180	NMFS	9.6.5 - Research Monitoring and Evaluation	The Action Agencies and NMFS shall work within regional prioritization and congressional appropriation processes to establish and provide the level of FCRPS funding to develop and implement a basinwide hierarchical monitoring program. This program shall	111	NEZ PERCE MASTER CONTRACT	Hatchery
					116	GENETIC M&E PROGRAM FOR SALMON & STEELHEAD	Hatchery
					157	Life Studies Of Spring Chinook-Grande Ronde River	Habitat
185	181	NMFS	9.6.5 - Research Monitoring and Evaluation	The Action Agencies and NMFS shall work within regional prioritization and congressional appropriations processes to establish and provide the appropriate level of FCRPS funding for a program to acquire and digitize aerial or satellite imagery of the enti	536	Juvenile Salmon Transportation Evaluations	Hydro
186	182	NMFS	9.6.5 - Research Monitoring and Evaluation	The Action Agencies and NMFS shall work within regional priorities and congressional appropriations processes to establish and provide the appropriate level of FCRPS funding for studies to determine the reproductive success of hatchery fish relative to wi	536	Juvenile Salmon Transportation Evaluations	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
187	183	NMFS	9.6.5 - Research Monitoring and Evaluation	Initiate at least three tier 3 studies (each necessarily comprising several sites) within each ESU (a single action may affect more than one ESU). In addition, at least two studies focusing on each major management action must take place within the Colum	*Under Development*		
188	184	NMFS	9.6.5 - Research Monitoring and Evaluation	The Action Agencies and NMFS shall work within regional prioritization and congressional appropriation processes to establish and provide the appropriate level of FCRPS funding for a hatchery research, monitoring, and evaluation program consisting of stud	108	NEZ PERCE TRIBAL HATCHERY	Hatchery
					115	NEZ PERCE TRIBAL HATCHERY CONTRUCTION	Hatchery
					118	THE NATURES (NATURAL REARING ENHANCEMENT SYSTEMS)	Hatchery
					119	YAKIMA HATCHERY - CONSTRUCTION	Hatchery
					121	YAKIMA/KLICKITAT FISHERIES PROGRAM	Hatchery
					122	YKFP - OPERATIONS AND MAINTENANCE	Hatchery
					123	NEZ PERCE TRIBAL HATCHERY MONITORING AND EVALUATIO	Hatchery
189	185	NMFS	9.6.5 - Research Monitoring and Evaluation	The Action Agencies shall continue to fund and expand, as appropriate, fish marking and recapturing programs aimed at defining juvenile migrant survival for both transported and nontransported migrants and adult returns for both groups. These studies sha	12	Delayed Mortality of Juveniles with Differential Migration Histories	Hydro
					536	Juvenile Salmon Transportation Evaluations	Hydro

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
190	186	NMFS	9.6.5 - Research Monitoring and Evaluation	The Action Agencies and NMFS shall work within the annual planning and congressional appropriation processes to establish and provide the appropriate level of FCRPS funding for comparative evaluations of the behavior and survival of transported and downst	12	Delayed Mortality of Juveniles with Differential Migration Histories	Hydro
191	187	NMFS	9.6.5 - Research Monitoring and Evaluation	The Action Agencies and NMFS shall work within the annual planning and congressional appropriation processes to establish and provide the appropriate level of FCRPS funding for studies and analyses to evaluate relationships between ocean entry timing and	*Under Development*		
192	188	NMFS	9.6.5 - Research Monitoring and Evaluation	The Action Agencies and NMFS shall work within the annual planning and congressional appropriation processes to establish and provide the appropriate level of FCRPS funding for studies of PIT-tagged wild stocks from the lower river streams. The studies s	*Under Development*		
193	189	NMFS	9.6.5 - Research Monitoring and Evaluation	The Action Agencies and NMFS shall work within the annual planning and congressional appropriation processes to establish and provide the appropriate level of FCRPS funding for studies to investigate the causes of discrepancies in adult return rates for j	12	Delayed Mortality of Juveniles with Differential Migration Histories	Hydro
194	190	NMFS	9.6.5 - Research Monitoring and Evaluation	The Action Agencies shall continue to fund studies that monitor survival, growth, and other early life history attributes of Snake River wild juvenile fall chinook.	120	POST RELEASE SURVIVAL OF FALL CHINOOK IN SNAKE R	Hatchery
					124	ASSESS CHINOOK RESTORATION (SNAKE RIVER BASIN)	Hatchery

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
195	191	NMFS	9.6.5 - Research Monitoring and Evaluation	The Action Agencies shall continue to implement adult salmonid counting programs at FCRPS dams, but shall improve the reporting of these counts.	536	Juvenile Salmon Transportation Evaluations	Hydro
196	192	NMFS	9.6.5 - Research Monitoring and Evaluation	As set out in Action 50 (Section 9.6.1.3.4), BPA and the Corps shall install necessary adult PIT-tag detectors at appropriate FCRPS projects before the expected return of adult salmon from the 2001 juvenile outmigration. These adult PIT-tag detectors sha	50	Adult Pit Tag Monitoring @ Bonneville, The Dalles , and John Day	Hydro
197	193	NMFS	9.6.5 - Research Monitoring and Evaluation	The Action Agencies shall investigate state-of-the-art, novel fish detection and tagging techniques for use, if warranted, in long-term research, monitoring, and evaluation efforts.	*Under Development*		
198	194	NMFS	9.6.5 - Research Monitoring and Evaluation	The Action Agencies and NMFS shall work within the annual planning and congressional appropriation processes to establish and provide the appropriate level of FCRPS funding for studies to develop a physical model of the lower Columbia River and plume. Th	*Under Development*		
199	195	NMFS	9.6.5 - Research Monitoring and Evaluation	The Action Agencies shall investigate and partition the causes of mortality below Bonneville Dam after juvenile salmonid passage through the FCRPS.	536	Juvenile Salmon Transportation Evaluations	Hydro
200	196	NMFS	9.6.5 - Research Monitoring and Evaluation	The Action Agencies and NMFS shall work within the annual planning and congressional appropriation processes to establish and provide the appropriate level of FCRPS funding for studies to develop an understanding of juvenile and adult salmon use of the Co	*Under Development*		

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
201	197	NMFS	9.6.5 - Research Monitoring and Evaluation	The Action Agencies and NMFS shall work within the annual planning and congressional appropriation processes to establish and provide the appropriate level of FCRPS funding for studies to develop an understanding of juvenile and adult salmon use of the Co	*Under Development*		
202	198	NMFS	9.6.5 - Research Monitoring and Evaluation	The Action Agencies, in coordination with NMFS, USFWS, and other Federal agencies, NWPPC, states, and Tribes, shall develop a common data management system for fish populations, water quality, and habitat data.	*Under Development*		
203	199	NMFS	9.6.5 - Research Monitoring and Evaluation	The Action Agencies shall implement the specific research/monitoring actions outlined in Appendix H.	21	Juvenile Salmon Temperature Studies	Hydro
204	RA900	RA	9.6.1.4.5 and 9.6.1.4.6.	Research to determine the relative survival of migrating juvenile salmonids passing through the spillway of The Dalles Dam.	*Under Development*		
205	RA946	RA	9.6.1.3.3 and 9.6.5.3.5.1.	Research to assess the migration timing and relative survival of transported and inriver juvenile chinook salmon migrating volitionally from Bonneville Dam to the mouth of the Columbia River.	*Under Development*		
206	RA994	RA	9.6.1.2.6, 9.6.1.6.2, and 9.6.1.7.2.	Research to assess the passage success of migrating adult salmonids at the eight dams and reservoirs on the lower Columbia and the lower Snake rivers, to evaluate specific flow and spill conditions, and to evaluate measures to improve adult anadromous fis	*Under Development*		

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
207	RA996	RA	9.6.1.4.5.	Research to monitor the effects of the juvenile fish bypass system at Ice Harbor Dam on the Snake River in Washington.	*Under Development*		
208	RA1036	RA	9.6.1.2.1, 9.6.1.2.6, 9.6.1.3.3, 9.6.1.5.2, 9.6.1.7.2, 9.6.2.1, and 9.6.5.3.5.	Research to document the growth, migration timing, survival, and SARs for wild juvenile fall chinook salmon migrating from the Snake River to the mouth of the Columbia River.	*Under Development*		
209	RA1058	RA	9.6.1.6.2.	Research designed to monitor and evaluate adult returns of hatchery-origin fall chinook salmon released as juveniles above Lower Granite Dam on the Snake River.	*Under Development*		
210	RA1130	RA	9.6.1.4.5 and 9.6.1.4.6.	Research to determine the movement, distribution, and passage behavior of radio-tagged juvenile salmonids at Bonneville, The Dalles, and John Day dams on the lower Columbia River.	*Under Development*		
211	RA1136	RA	9.6.1.3.3, 9.6.1.3.4, and 9.6.1.4.6.	Research to compare the biological and physiological indices of wild and hatchery juvenile fish exposed to stress from bypass, collection, and transportation at the dams on the lower Snake and Columbia rivers.	*Under Development*		
212	RA1193	RA	9.6.1 and 9.6.5.3.5.1.	Research to produce information on migrational characteristics of Columbia and Snake river basin salmon and steelhead.	*Under Development*		

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
213	RA1194	RA	9.6.1.3.3, 9.6.1.3.4, and 9.6.5.3.5.2.	Research to develop and evaluate adult PIT-tag interrogation systems for future installation at mainstem FCRPS facilities on the lower Columbia and Snake rivers.	*Under Development*		
214	RA1212-1	RA	9.6.1.4.5, 9.6.1.4.6, and 9.6.5.3.5.1.	Study 1 will provide up-to-date survival estimates of juvenile salmonids as they migrate past McNary Dam.	*Under Development*		
215	RA1212-2	RA	9.6.1.4.5, 9.6.1.4.6, and 9.6.5.3.5.1.	Study 2 will identify specific trouble areas in the juvenile fish bypass system at Lower Monumental Dam.	*Under Development*		
216	RA1212-3	RA	9.6.1.4.5, 9.6.1.4.6, and 9.6.5.3.5.1.	Study 3 will compare the performance of juvenile salmonids tagged with sham radio-transmitters with the performance of juvenile salmonids PIT-tagged at Lower Granite Dam.	*Under Development*		
217	RA1212-4	RA	9.6.1.4.5, 9.6.1.4.6, and 9.6.5.3.5.1.	Study 4 will determine the tailrace residence times and behavior of radio-tagged hatchery chinook salmon under various operational conditions at Lower Monumental Dam and will identify spill conditions that maximize fish passage efficiency at Ice Harbor Da	*Under Development*		
218	RA 1224	RA	9.6.1.6.2 and 9.6.5.3.5.2.	Research to evaluate the conversion rates (i.e., survival through the FCRPS), travel times, and passage routes of adult steelhead that have spawned (kelts) and are emigrating past hydroelectric facilities on their migration back to the ocean.	*Under Development*		

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
219	RA1240	RA	9.6.1.4.5 and 9.6.1.4.6.	Research to provide fishery managers with detailed information on the response of outmigrating juvenile anadromous salmon to operation of a prototype surface bypass structure (removable spillway weir) at Lower Granite Dam.	*Under Development*		
220	RA1241	RA	9.6.1.4.5 and 9.6.5.3.5.1.	Studies to provide fishery managers with data on the timing, passage, and survival of outmigrating juvenile salmonids in relation to the operations of John Day, The Dalles, and Bonneville dams.	*Under Development*		
221	RA1242	RA	9.6.1.3.3 and 9.6.5.3.5.1.	Research to evaluate inriver migration survival versus transportation survival from Lower Granite Dam to below Bonneville Dam.	*Under Development*		
222	RA1243	RA	9.6.1.4.5.	Research to evaluate juvenile fish survival through the Ice Harbor Dam spillway on the Snake River.	*Under Development*		
223	RA1244	RA	9.6.1.4.5 and 9.6.5.3.5.1.	Six research studies to evaluate juvenile fish collection/bypass facilities at selected Snake and Columbia river FCRPS dams	*Under Development*		
224	RA2000	RA	9.6.1.6.2 and 9.6.5.3.5.2.	Research at several mainstem FCRPS dams (Lower Granite, Little Goose, Lower Monumental, and McNary dams) to identify and enumerate adult steelhead kelts that pass through associated juvenile fish bypass facilities by using mark-recapture methods.	*Under Development*		

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
225	RA2001	RA	9.6.1.2.1, 9.6.1.2.3, and 9.6.5.3.3.	Research to collect relevant information for lower Columbia River fall chinook and chum salmon so that recommendations can be made for configuration and operation of the FCRPS to protect and/or enhance mainstem spawning populations.	*Under Development*		
226	RA2002	RA	9.6.1.4.5.	Research to evaluate modifications to the juvenile fish PIT-tag diversion systems at Lower Granite and Little Goose dams on the Snake River.	*Under Development*		
227	RA2003	RA	9.6.1.3.3 and 9.6.1.3.4.	Research to compare SARs of marked yearling and subyearling chinook salmon and steelhead juveniles transported from McNary Dam to below Bonneville Dam with the SARs of marked inriver migrating juveniles of these species released into the tailrace of McNar	*Under Development*		
228	RA2004	RA	9.6.5.3.6.	Research to identify empirically the benefit to juvenile salmon of tidal freshwater and oligohaline transition zones in the Columbia River estuary.	*Under Development*		
229	RA2005	RA	9.6.1.4.5 and 9.6.1.5.2.	Research to quantify the abundance of potential predators before and after a trash boom is installed in the forebay of Little Goose Dam.	*Under Development*		
230	RA2006	RA	9.6.1.5.1, 9.6.1.5.2, 9.6.1.5.3, and 9.7.1.5.	Research designed to evaluate the large-scale predation patterns of northern pikeminnow on juvenile salmonids and American shad (BPA project 9007800).	*Under Development*		

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
231	RA2007	RA	9.6.1.2.6, 9.6.1.6.2, and 9.6.1.7.2.	Research on the energy expenditure of upstream migrating adult salmon and steelhead in the Columbia and Snake rivers, for assessing the potential influence of delay, fallback, water temperature, and dam operations (e.g., spill) on migration energetics and	*Under Development*		
232	FWS8(1)(a)	FWS	8 - Sturgeon - Water Storage	Regulate flows to maximize probability of allowing significant sturgeon recruitment.	*Under Development*		
233	FWS8(1)(b)	FWS	8 - Sturgeon - Water Storage	Develop a schedule for NEPA compliance and Canadian coordination necessary to implement VarQ at Libby dam.	*Under Development*		
234	FWS8(1)(c)	FWS	8 - Sturgeon - Water Storage	During water year 2001, store water volumes based on tiered approach	*Under Development*		
235	FWS8(1)(d)	FWS	8 - Sturgeon - Water Storage	Store water under VarQ at Libby dam and supply water volumes from May-July based on tiered volumes.	*Under Development*		
236	FWS8(1)(e)	FWS	8 - Sturgeon - Water Storage	Seek opportunities to reduce the second peak flow created by July/August salmon flow through Kootenay Lake, perhaps via a Libby-Arrow water exchange. Consummate exchange agreements by October 2001.	*Under Development*		
237	FWS8(1)(f)	FWS	8 - Sturgeon - Water Storage	Support equitable portion of ongoing Kootenay Lake fertilization program.	172	Lake Pend Oreille Kokanee Mitigation Research	Habitat
238	FWS8(1)(g)	FWS	8 - Sturgeon - Water Storage	Seek timely input and concurrence on Columbia River Treaty, IJC Orders, and all other decision-making processes involving transboundary waters.	*Under Development*		

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
239	FWS8(1)(h)	FWS	8 - Sturgeon - Water Storage	Evaluate feasibility of variable December 31 flood control target of 2411 feet at Libby Dam. Adopt target if feasible.	*Under Development*		
240	FWS8(1)(i)	FWS	8 - Sturgeon - Water Storage	Revisit volume forecast procedure in the Kootenai River above and below Libby Dam. If feasible implement new forecast procedure.	*Under Development*		
241	FWS8(2)(a)1	FWS	8 - Sturgeon - Increased Release Capacity at Libby	Conduct spillway test	*Under Development*		
242	FWS8(2)(a)2	FWS	8 - Sturgeon - Increased Release Capacity at Libby	If channel capacity study determines that structural floodplain encroachment may constrain increased release capacities at Libby, include remedies to restore the capacity, means available, and the schedule.	172	Lake Pend Oreille Kokanee Mitigation Research	Habitat
243	FWS8(2)(a)3	FWS	8 - Sturgeon - Increased Release Capacity at Libby	Begin use of existing spillway within the constraints determined in 2(a)1 and 2(a)2.	*Under Development*		
244	FWS8(2)(a)4	FWS	8 - Sturgeon - Increased Release Capacity at Libby	Spillway option only considered viable if VarQ or a comparable flood control/storage procedure is in effect at Libby Dam.	*Under Development*		
245	FWS8(2)(a)5	FWS	8 - Sturgeon - Increased Release Capacity at Libby	If, by 12/30/01, >= 5kcfs cannot be routinely spilled w/i the 110 % TDG cap, or flood control/storage procedure has not been adopted, immediately begin NEPA & other processes to have another turbine or spillway flow deflectors operational by spring 2004.	*Under Development*		

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
246	FWS8(2)(a)6	FWS	8 - Sturgeon - Increased Release Capacity at Libby	Action agencies will seek means to release an additional 5,000 cfs at Libby Dam for sturgeon.	*Under Development*		
247	FWS8(2)(a)7	FWS	8 - Sturgeon - Increased Release Capacity at Libby	Action agencies reinitiate consultation if at any point it is determined any of the increased release increments (total 10,000 cfs) are not achievable.	*Under Development*		
248	FWS8(2)(a)8	FWS	8 - Sturgeon - Increased Release Capacity at Libby	Determine the effectiveness of increased flows in improving sturgeon recruitment and any adverse effects to bull trout below Libby Dam.	152	Kootenai River Fisheries Investigation	Habitat
					239	Protect Wigwam R Bull Trout-Koocanusa Reservoir	Habitat
249	FWS8(2)(a)9	FWS	8 - Sturgeon - Increased Release Capacity at Libby	If, as a result of increased releases, in any year during the 10-year life of this BO, a new year class of at least 20 naturally recruited yearling or older sturgeon is documented, reinitiate consultation before proceeding with any additional facilities o	152	Kootenai River Fisheries Investigation	Habitat
					239	Protect Wigwam R Bull Trout-Koocanusa Reservoir	Habitat
250	FWS8(2)(b)	FWS	8 - Sturgeon - Increased Release Capacity at Libby	Provide interim and final monitoring reports of biological results, volumes, flows, etc.to allow adaptive management	152	Kootenai River Fisheries Investigation	Habitat
251	FWS8(2)(c)	FWS	8 - Sturgeon - Increased Release Capacity at Libby	Action agencies shall fulfill the operational guidelines provided by the Service.	*Under Development*		

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
252	FWS8(2)(d)	FWS	8 - Sturgeon - Increased Release Capacity at Libby	The action agencies shall seek redundancy in transformers at Libby Dam to assure that sturgeon flows can be released.	*Under Development*		
253	FWS8(3)(a)	FWS	8 - Sturgeon - Flood Stage Constraints	Evaluate flood levels and public safety concerns along the banks of the Kootenai River below Libby Dam, and the feasibility of increasing releases above any channel capacity constraints. Provide a report to the Service.	*Under Development*		
254	FWS8(3)(b)	FWS	8 - Sturgeon - Flood Stage Constraints	Seek means to restore, maintain, or enhance levees throughout the Kootenai Valley to the greater of the Corps' 84-99 1961 specs or adequate to contain 100-yr event per Libby authorization. In interim, limit flows to Bonners Ferry levee elev. of 1764 ft.	*Under Development*		
255	FWS8(3)(c)	FWS	8 - Sturgeon - Flood Stage Constraints	Action agencies shall quantify the effects of groundwater seepage associated with the magnitude and duration of sturgeon flows on crops and identify feasible remedies.	*Under Development*		
256	FWS8(3)(d)	FWS	8 - Sturgeon - Flood Stage Constraints	Design and conduct studies necessary to determine the indirect effects of Libby dam operations on sturgeon recruitment and mortality.	*Under Development*		
257	FWS8(3)(e)	FWS	8 - Sturgeon - Flood Stage Constraints	Action agencies shall report on the effects of load following on levee integrity throughout the Kootenai Valley.	*Under Development*		
258	FWS8(3)f)	FWS	8 - Sturgeon - Flood Stage Constraints	The action agencies shall limit daily load following.	*Under Development*		

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
259	FWS8(3)(g)	FWS	8 - Sturgeon - Flood Stage Constraints	During sturgeon recruitment flow periods, allow local inflow to supplement Libby Dam releases to the maximum extent feasible, while assuring public safety by monitoring water levels throughout the relevant areas of the basin.	*Under Development*		
260	FWS8(3)(h)	FWS	8 - Sturgeon - Flood Stage Constraints	Continue to monitor water temperature profiles in the south end of Lake Koocanusa.	*Under Development*		
261	FWS8(3)(i)	FWS	8 - Sturgeon - Flood Stage Constraints	By 12/1/02 complete an evaluaion and report on any changes in depth, water velocity and substrate in the vicinity of Bonner Ferry which have occurred since Libby Dam became operational.	*Under Development*		
262	FWS8(3)(j)	FWS	8 - Sturgeon - Flood Stage Constraints	If habitat changes are documented in 3(i) the above report should be expanded to include all feasible remedies to restore substrate, water velocities, and depths. A feasibility report shall be submitted to the Service.	*Under Development*		
263	FWS8(4)(a)	FWS	8 - Sturgeon - Conservation Aquaculture	The action agencies shall continue to maintain the preservation stocking program.	190	Wallowa County/Nez Perce Salmon Habitat Recovery Plan	Habitat
264	FWS8(4)(b)	FWS	8 - Sturgeon - Conservation Aquaculture	The action agencies shall maintain the current levels of monitoring associated with all stages of natural recruitment and the preservation stocking program.	190	Wallowa County/Nez Perce Salmon Habitat Recovery Plan	Habitat
265	FWS10.1	FWS	10 - Bull Trout - General	The action agencies shall develop one and five-year implementation and funding plans to implement the measures in this opinion.	*Under Development*		

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
266	FWS10(2)	FWS	10 - Bull Trout - General	Coordinate annual plan with Service and NMFS in sufficient time to allow review and discussion prior to implementation.	*Under Development*		
267	FWS10(3)	FWS	10 - Bull Trout - General	Participate in developing interdepartmental MOA	*Under Development*		
268	FWS10(4)	FWS	10 - Bull Trout - General	Coordinate annual implementation through IT or TMT.	*Under Development*		
269	FWS10(5)	FWS	10 - Bull Trout - General	Coordinate in-season water management operations through TMT.	*Under Development*		
270	FWS10(6)	FWS	10 - Bull Trout - General	Implement adaptive management approach for designing and implementing actions for improving survival of sturgeon and bull trout.	*Under Development*		
271	FWS10(7)	FWS	10 - Bull Trout - General	The action agencies shall develop a plan to model water temperature effects of alternative operations.	*Under Development*		
272	FWS10(8)	FWS	10 - Bull Trout - General	Initiate research to determine the upstream and downstream passage requirements of bull trout at FCRPS dams in the Columbia River basin.	*Under Development*		
273	FWS10.A.1(1)	FWS	10 - Bull Trout - Upper Columbia	Implement operational constraints at Libby Dam to minimize the adverse effects of rapid and severe river flow fluctuations on bull trout. Conduct studies to monitor the adequacy of the constraints.	*Under Development*		

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
274	FWS10.A.1(2)	FWS	10 - Bull Trout - Upper Columbia	Implement operational constraints at Hungry Horse Dam to minimize the adverse effects of rapid and severe river flow fluctuations on bull trout. Conduct studies to monitor the adequacy of the constraints.	154	Hungry Horse Mitigation/Habitat Flathead Basin	Habitat
275	FWS10.A.1(3)	FWS	10 - Bull Trout - Upper Columbia	Evaluate the feasibility of reestablishing bull trout passage at Albeni Falls Dam.	*Under Development*		
276	FWS10.A.1(4)	FWS	10 - Bull Trout - Upper Columbia	Continue lake winter elevation study to promote kokanee spawning /recruitment along the shore of Lake Pend Oreille.	171	Trout Creek Operation & Maintenance	Habitat
277	FWS10.A.2(1)	FWS	10 - Bull Trout - Lower Columbia	Determine the extent of bull trout use of the Lower Columbia River affected by the FCRPS.	*Under Development*		
278	FWS10.A.2(2)	FWS	10 - Bull Trout - Lower Columbia	Appropriate measures shall be developed to ensure upstream and downstream passage for bull trout is not impeded if it is determined that there is a significant bull trout population in the Lower Columbia River affected by the FCRPS.	*Under Development*		
279	FWS10.A.2(3)	FWS	10 - Bull Trout - Lower Columbia	Conduct a study to determine the effect of flow fluctuations on stranding or entrapment of bull trout or their prey in FCRPS reservoirs if it is determined that there is a significant bull trout population in the Lower Columbia River affected by the FCRPS	*Under Development*		

Ref Nbr	BO Action	Biological Opinion Source		Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
280	FWS10.A.2(4)	FWS	10 - Bull Trout - Lower Columbia	Make operational and structural changes to reduce uncontrolled spill and high levels of dissolved gas at Lower Columbia River dams if it is .determined that there is a significant bull trout population in the Lower Columbia River affected by the FCRPS.	*Under Development*		
281	FWS10.A.3(1)	FWS	10 - Bull Trout - Lower Snake and Clearwater	Determine the presence and use of the mainstem Snake River by bull trout. Implement monitoring and studies to provide critical information on bull trout distribution, timing, and usage of the lower Snake River dams and reservoirs. Implement additional me	535	Water Quality Effects on Bull Trout Survival Near Hydro-projects	Hydro
					537	Bull Trout Distribution, Timing, and Usage of the Lower Snake River Reservoirs	Hydro
282	FWS10.A.3(2)	FWS	10 - Bull Trout - Lower Snake and Clearwater	Implement monitoring and studies to provide information on bull trout entrainment and distribution, timing, and usage of Dworshak reservoir.	538	Dworshak Reservoir Bull Trout Distribution to North Fork of the Clearwater River	Hydro
283	FWS11(1)	FWS		Develop performance standards for bull trout.	*Under Development*		
284	FWS11(2)	FWS		Develop priority list of FCRPS dams to determine upstream and downstream passage needs of bull trout.	*Under Development*		
285	FWS11(3)	FWS		Based on the priority list in 11(2), initiate research to determine the upstream and downstream passage needs of bull trout at FCRPS dams.	*Under Development*		
286	FWS11(4)	FWS		Based on research in 11(3), implement measures needed for bull trout passage at FCRPS dams.	*Under Development*		

Ref Nbr	BO Action	Biological Opinion Source	Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
287	FWS11(5)	FWS	Develop a priority list of FCRPS dams for evaluation to determine the extent of bull trout entrainment.	149	IDFG Dworshak Hydroacoustics (Resident fish studies)	Habitat
288	FWS11(6)	FWS	Based on the priority list in 11(5), the action agencies shall assess the extent of bull trout entrainment.	149	IDFG Dworshak Hydroacoustics (Resident fish studies)	Habitat
289	FWS11.A.1(la)	FWS	During water year 2001, seek means to store and release water to provide for bull trout base flow and ramping volumes at Libby Dam.	*Under Development*		
290	FWS11.A.1(lb)	FWS	Provide 6,000 cfs minimum flow for bull trout during July and August if Koocanusa elevations are below salmon guidelines and salmon augmentation will not occur.	*Under Development*		
291	FWS11.A.1(lc)	FWS	Provide an annual operational schedule each year with surface elevation and monthly discharge information for Libby Dam.	*Under Development*		
292	FWS11.A.1(2a)	FWS	Provide same schedule as (1LA.1(lc) for Hungry Horse.	*Under Development*		
293	FWS1LA.1(3a)	FWS	Conduct feasibility study for reestablishment of two-way passage of bull trout at Albeni Falls Dam.	*Under Development*		
294	FWS11.A.1(3b)	FWS	Based on results of the feasibility study (11.A.1(3a), consult on the decision to establish passage. Seek appropriations for construction of the facility.	*Under Development*		

Ref Nbr	BO Action	Biological Opinion Source	Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
295	FWS11A.1(3c)	FWS	Evaluate and report on total dissolved gas downstream of Albeni Falls Dam.	*Under Development*		
296	FWS11.A.1(4a)	FWS	Continue lake winter elevation study on Lake Pend Oreille for next 6 years. In 2001 draft to 2051 and in 2002 maintain elevation at 2055.	*Under Development*		
297	FWS11A.1(4b)	FWS	Secure independent scientific review of the appropriate duration to maintaining winter lake elevations. Provide recommendations for fall/winter operations 2003-06.	*Under Development*		
298	FWS11A.1(4c)	FWS	Provide recommendations for winter lake elevations post 2006.	*Under Development*		
299	FWS11A.1(4d)	FWS	Annually evaluate Lake Pend Oreille monitoring results and make adjustments.	171	Trout Creek Operation & Maintenance	Habitat
300	FWS11.A.2(la)	FWS	Include bull trout in species to be counted and recorded at Bonneville, The Dalles, John Day and McNary dams.	*Under Development*		
301	FWS11A.2(lb)	FWS	Record occurrence of bull trout in the smolt monitoring facilities at Lower Columbia River dams.	*Under Development*		
302	FWS11.A.2(lc)	FWS	Include observations of bull trout captured in field activities funded by the action agencies and report.	*Under Development*		
303	FWS11.A.2(ld)	FWS	Estimate annual population size of bull trout migrating to and from the Lower Columbia River reservoirs, and develop abundance trends over time.	*Under Development*		

Ref Nbr	BO Action	Biological Opinion Source	Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
304	FWS11.A.2(le)	FWS	Determine the movement of bull trout from the Hood River and other tributaries into Bonneville Dam reservoir.	*Under Development*		
305	FWS11.A.2(lf)	FWS	Evaluate the potential habitat use of the White Salmon River subsequent to the removal of Condit Dam.	*Under Development*		
306	FWS11.A.2(lg)	FWS	Evaluate re-establishment of fluvial bull trout in the Klickitat River.	*Under Development*		
307	FWS11.A.2(2a)2	FWS	If substantial BT use the lower Columbia R. reservoirs or attempt to pass FCRPS dams, then determine the effect of fluctuating flows and river/reservoir elevations on stranding or entrapment of bull trout and other life related to their prey base.	*Under Development*		
308	FWS1 1.A.2(2b)	FWS	If substancial numbers of BT use the lower Columbia R. reservoirs or attempt to pass FCRPS dams, then determine use and suitability of bull trout habitat for all life history stages in the Lower Columbia River.	*Under Development*		
309	FWS1 1.A.2(2c)	FWS	If substantial numbers of BT use the lower Columbia R. reservoirs or attempt to pass FCRPS dams, then include USFWS, ODFW, WDFW, IDFG, and MDFWP whenever appropriate in development of research/study plans for bull trout.	*Under Development*		

Ref Nbr	BO Action	Biological Opinion Source	Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
310	FWS11.A.2(3a)	FWS	If substantial BT use the lower Columbia R. reservoirs or attempt to pass FCRPS dams, then investigate structural/operational measures to reduce TDG production at lower Columbia R. dams. Implement measures ASAP in coordination w/ USFWS.	*Under Development*		
311	FWS11.A.3(la)	FWS	Immediately implement a program to record the occurrence of bull trout in the smolt monitoring facilities at the Lower Snake River dams.	*Under Development*		
312	FWS11.A.3(lb)	FWS	Immediately include bull trout in the species to be counted at Lower Granite, Little Goose, Lower Monumental, and Ice harbor dams.	*Under Development*		
313	FWS11.A.3(lc)	FWS	Immediately expand the fish counting period to record year-around at Lower Monumental and Little Goose dams for 3 consecutive years. Add counting at adjacent dams if warranted.	*Under Development*		
314	FWS11.A.3(ld)	FWS	Investigate the presence and use of the maistem by bull trout migrating from the Tucannon River.	*Under Development*		
315	FWS11.A.3(le)	FWS	Service will review timing and usage data and develop recommendations to minimize bull trout take during any facility modifications.	*Under Development*		
316	FWS11.A.3(lf)	FWS	Estimate annual population size of bull trout migrating to and from the Lower Snake River Reservoirs and develop abundance trends over time.	199	Assess Salmonid Habitat, Walla Walla Watershed	Habitat

Ref Nbr	BO Action	Biological Opinion Source	Biological Opinion Action Description	Project ID	ProjectTitle	H-Sector
317	FWS11.A.3(2a)	FWS	Estimate annual population size of bull trout migrating to and from Dworshak Reservoir and develop abundance trends over time.	149	IDFG Dworshak Hydroacoustics (Resident fish studies)	Habitat