Appendix D

User Guide

Table of Contents

List of Tables

List of Figures

Appendix D – User Guide

1 Data sources used for HSRG Analysis

The HSRG analysis was based on information describing the quality and quantity of habitat used by salmon and steelhead populations, fish passage survival through the mainstem Snake and Columbia Rivers, hatchery program operations, and the harvest of natural and hatchery adults. The data and information was consolidated to form a picture of the Basin's "current condition". This information came from reports, analyses by the managers, and conversations with knowledgeable individuals. The HSRG analysis examined a total of 241 natural populations in Columbia River Basin (Table 1). Sixty-eight of these populations were integrated with a hatchery release in the current condition. The analysis examined an additional 110 segregated hatchery programs for a total of 351 populations/programs examined for the current condition. The HSRG "Solution" recommended that 19 segregated programs be eliminated, 10 new segregated harvest programs be created, two integrated programs be eliminated, and 24 new integrated programs be created for a total of 342 population/ programs examined.

Sources of information used in the analysis by population or by population group are described in the next sections. Data sources are organized by Habitat (the Beverton-Holt survival function parameters for productivity and capacity), Hatcheries (broodstock, in-hatchery survival, program recruits per spawner, etc), Fish Passage Survival in Mainstem (juvenile and adult passage survival in Snake and Columbia rivers), and Harvest (harvest rates on natural and hatchery adults in marine, Lower Columbia, Upper Columbia, and terminal fisheries).

The specific assumptions used in the analysis were entered into the AHA spreadsheet application described in more detail in Appendix C. The use of the application is described in Section 2.2 of this appendix. An example of assumptions used and their expected effects on outcome is shown in Table 2.

1.1 Habitat

Habitat information comprised population specific estimates of the Beverton-Holt parameters for productivity (density-independent survival in the environment) and capacity (maximum number of individuals that could be supported by the habitat). These parameters apply to the complete life cycle and include assumptions for juvenile and adult fish passage survival and ocean survival. Productivity and capacity are independent of harvest effects and effects of loss due to fitness on the population.

Habitat data was from a variety of sources and are listed by population in Table 3. Much of the information was from analyses contained in the Northwest Power and Conservation Council's watershed plans, which were completed in 2005. Some information was provided by managers based on a B-H production function fit to observed data. Information for Idaho Chinook populations was based on an analysis of tributary habitat potential for salmon described in Budy and Schaller (2007), NOAA recovery planning documents for steelhead and Chinook, and discussions with managers. In a few cases, productivity and

capacity were approximated due to lack of information about a particular population.

Table 1. Salmon and steelhead populations by type for the Columbia River Basin used in the HSRG analysis for the current condition and HSRG Solution.

	Current Condition					HSRG Solution				
Evolutionarily Significant Unit or population group	No. Natural populations with integrated hatchery	No. Natural Populations without hatchery	Total Natural Populations	No. Segregated Populations	Total Populations	No. Natural populations with integrated hatchery	No. Natural Populations without hatchery	Total Natural Populations	No. Segregated Populations	Total Populations
Lower Columbia River Chinook	6	25	31	13	44	13	25	38	13	51
Upper Willamette River Chinook	5	4	9	1	10	7	24	31	15	46
Deschutes River Summer/Fall-run Chinook	0	1	1	0	1	7	3	10	4	14
Upper Columbia River Summer/Fall-run Chinook	6	4	10	7	17	5	5	10	3	13
Middle Columbia River Spring-run Chinook	5	5	10	2	12	0	1	1	0	1
Upper Columbia River Spring-run Chinook	4	3	7	2	9	6	1	7	2	9
Snake River Fall-run Chinook	1	0	1	0	1	1	0	1	0	1
Snake River Spring/Summer-run Chinook	10	28	38	12	50	5	4	9	1	10
Columbia River Chum	2	15	17	0	17	9	8	17	0	17
Lower Columbia River Coho	4	25	29	17	46	4	1	5	2	7
Upper Columbia Coho	4	1	5	2	7	7	22	29	15	44
Snake River Sockeye	1	0	1	0	1	1	0	1	0	1
Wenatchee River Sockeye	1	0	1	0	1	1	0	1	0	1
Southwest Washington Steelhead	0	7	7	6	13	6	21	27	17	44
Lower Columbia River Steelhead	8	13	21	18	39	0	7	7	6	13
Upper Willamette River Steelhead	0	5	5	5	10	12	9	21	12	33
Middle Columbia River Steelhead	2	15	17	6	23	3	1	4	3	7
Upper Columbia River Steelhead	3	1	4	2	6	3	14	17	3	20
Snake River Basin Steelhead	6	21	27	17	44	0	5	5	5	10
Total All ESUs	68	173	241	110	351	90	151	241	101	342

Table 2. List of assumptions for the HSRG Solution for Elochoman coho.

Hatchery Program:	**Elochoman Coho**		
Assumptions			
Habitat based Natural Production	Population Designation	Primary	
	Adult Productivity	3.7	
	Adult Capacity	1,315	
	Smolt Productivity	71	
	Smolt Capacity	25,000	
Hydro System and Marine Survival	Juvenile Passage Survival	1.00	
	Ocean Survival	0.052	
	Adult Passage	1.00	
	Total SAR	0.052	
		Natural	Hatchery
Harvest Rates	Marine	0.100	0.180
	Lower Mainstem	0.050	0.200
	Upper Mainstem		
	Terminal	0.020	0.100
	Total Exploitation Rate	0.162	0.410
Hatchery Program	pNOB-Goal	50%	
	pHOS-Goal	25%	
	Program Purpose	Harvest	
	Program Type	Integrated	
	Local Broodstock	150	
	Imported Broodstock	0	
	Smolts/Spawner	1,000	
	Smolt Release	146,000	
	% HOR to Hatchery	95%	
	Weir Factor	90%	
	Recruits/Spawner	20.0	
	Fitness Floor	0.5	
	Rel. Reprod. Success	0.8	
Expected Outcome		With Hatchery	Without Hatchery
Long-term Average	NOR Escapement	677	427
	HOR Escapement	127	117
	Total Harvest	1,517	83
	Surplus at Hatchery	1,892	

Table 3. Habitat assumptions used in the HSRG analysis of Columbia River populations and data sources.

Subbasin	Population Name	Population Designation	Prod	Capacity	Data source
Lower Columbia River Chinook					
Big Creek	Big Creek Fall Chinook (Tules)	Stabilizing	3.00	300	No information provided - used rough approximation
Chinook River	Chinook River Fall Chinook	Stabilizing	1.50	100	No information provided - used rough approximation
Clatskanie	Clatskanie Fall Chinook	Primary	44.00	290	ODFW provided from B-H fit to observed data.
Columbia Gorge	Gorge Tributaries Fall Chinook (Tules- Oregon)	Stabilizing	1.50	100	No information provided - used rough approximation
Cowlitz	Upper Cowlitz Spring Chinook	Primary	2.40	6,530	Tacoma Power Dam relicensing analysis, EDT assessment
Cowlitz	Toutle Fall Chinook	Stabilizing	3.10	6,748	Columbia River recovery planning, based on EDT assessment
Cowlitz	Coweeman Fall Chinook	Primary	4.33	2,376	Columbia River recovery planning, based on EDT assessment
Cowlitz	Lower Cowlitz Fall Chinook	Contributing	5.90	12,448	Tacoma Power Dam relicensing analysis, EDT assessment
Elochoman	Elochoman Fall Chinook	Primary	3.80	2,112	Columbia River recovery planning, based on EDT assessment
Grays	Grays Fall Chinook	Primary	3.70	662	Columbia River recovery planning, based on EDT assessment
Hood	Hood Spring Chinook	Primary	1.21	1,779	Columbia River recovery planning, based on EDT assessment
Hood	Hood Fall Chinook	Stabilizing	1.47	4,227	Columbia River recovery planning, based on EDT assessment
Kalama	Kalama Spring Chinook	Primary	1.76	945	Columbia River recovery planning, based on EDT assessment
Kalama	Kalama Fall Chinook	Primary	3.90	2,102	Columbia River recovery planning, based on EDT assessment
Lewis	EF Lewis Fall Chinook (Tule)	Primary	2.84	4,690	Columbia River recovery planning, based on EDT assessment
Lewis	NF Lewis Spring Chinook	Primary	4.70	2,069	Columbia River recovery planning, based on EDT assessment
Lewis	NF Lewis Fall Chinook (Lower River Brights)	Primary	18.74	21,049	Columbia River recovery planning, based on EDT assessment
Little White Salmon	Little White Salmon Fall Chinook (Tule)	Stabilizing	1.50	500	No information provided - used rough approximation
Lower Columbia	LC Tribs Fall Chinook (Tules-Oregon)	Stabilizing	3.00	300	No information provided - used rough approximation
Mill-Aber-Germ	Mill-Aber-Germ Fall Chinook	Contributing	4.37	1,837	Columbia River recovery planning, based on EDT assessment
Sandy	Sandy Spring Chinook	Primary	4.80	2,549	City of Portland Water District HCP, EDT assessment
Sandy	Sandy Fall Chinook (Late)	Primary	5.00	7,097	City of Portland Water District HCP, EDT assessment
Sandy	Sandy Fall Chinook (Early)	Stabilizing	5.26	7,646	City of Portland Water District HCP, EDT assessment
Scappoose	Scappoose Fall Chinook	Stabilizing	3.00	300	No information provided - used rough approximation

Subbasin	Population Name	Population Designation	Prod	Capacity	Data source
Washougal	Washougal Fall Chinook	Primary	3.80	2,378	Columbia River recovery planning, based on EDT assessment
White Salmon	White Salmon Spring Chinook	Contributing	0.00	0	Based on current condition and no fish passage at Condit Dam
White Salmon	White Salmon Fall Chinook (Tule)	Contributing	6.08	1,172	Columbia River recovery planning, based on EDT assessment
Willamette	Clackamas Fall Chinook	Contributing	1.99	933	Columbia River recovery planning, based on EDT assessment
Wind	Wind Spring Chinook	Stabilizing	2.88	196	Columbia River recovery planning, based on EDT assessment
Wind	Wind Fall Chinook (Tule)	Stabilizing	4.54	692	Columbia River recovery planning, based on EDT assessment
Youngs Bay	Youngs Bay Tribs Fall Chinook	Stabilizing	3.00	300	No information provided - used rough approximation
Upper Willamette River Chinook					
Willamette	MF Willamette Spring Chinook	Contributing	1.10	1,800	ODFW provided from B-H fit to observed data.
Willamette	Molalla Spring Chinook	Stabilizing	1.10	100	ODFW provided from B-H fit to observed data.
Willamette	Calapooia Spring Chinook	Stabilizing	1.50	100	No information provided - used rough approximation
Willamette	Coast Fork Spring Chinook	Stabilizing	1.50	100	No information provided - used rough approximation
Willamette	Upper Willamette Fall Chinook (Non-Native)	N/A	1.50	100	No information provided - used rough approximation
Willamette	North Santiam Spring Chinook	Primary	2.00	1,000	ODFW provided from B-H fit to observed data.
Willamette	South Santiam Spring Chinook	Contributing	3.00	2,500	ODFW provided from B-H fit to observed data.
Willamette	Clackamas Spring Chinook	Primary	3.62	3,003	Columbia River recovery planning, based on EDT assessment
Willamette	McKenzie Spring Chinook	Primary	4.50	8,000	ODFW provided from B-H fit to observed data.
Deschutes River Summer/Fall-run Chinook					
Deschutes	Deschutes Fall Chinook	Primary	5.75	29,411	Columbia River recovery planning, based on EDT assessment
Upper Columbia River Summer/Fall-run Chinook					
Entiat	Entiat Summer-Fall Chinook (Late Run)	Stabilizing	1.69	300	Columbia River recovery planning, based on EDT assessment
Mid Columbia Mainstem	Hanford Fall Chinook (Priest Rapids Upriver Brights)	Primary	9.00	150,000	WDFW provided recent year run size information and approximated B-H parameters to be consistent with observations
Klickitat	Klickitat Fall Chinook	Stabilizing	5.40	5,356	Columbia River recovery planning, based on EDT assessment
Methow	Methow Summer Chinook	Stabilizing	1.76	1,531	Columbia River recovery planning, based on EDT assessment
Okanogan	Okanogan-Similkameen Summer Chinook	Primary	6.00	10,000	Colville Tribes provided recent year run size and approximated B-H parameters to be consistent with observations
Umatilla	Umatilla Fall Chinook	Contributing	2.00	6,000	CTUIR provided recent year run size information and approximated B-H parameters to be consistent with observations
Upper Columbia	Upper Middle Columbia Mainstem Summer Chinook	Stabilizing	5.00	6,000	No information provided - used rough approximation

Subbasin	Population Name	Population Designation	Prod	Capacity	Data source
Mainstem					
Wenatchee	Wenatchee Summer Chinook	Primary	4.25	13,360	Columbia River recovery planning, based on EDT assessment
Yakima	Marion Drain Fall Chinook	Contributing	2.08	448	Columbia River recovery planning, based on EDT assessment
Yakima	Yakima Fall Chinook	Contributing	3.29	14,989	Columbia River recovery planning, based on EDT assessment
Middle Columbia River Spring-run Chinook					
Deschutes	Deschutes Spring Chinook	Primary	4.70	1,530	Columbia River recovery planning, based on EDT assessment
John Day	MF John Day Spring Chinook	Primary	3.50	1,500	Columbia River recovery planning, based on EDT assessment
John Day	Upper Mainstem John Day Spring Chinook	Contributing	4.00	1,500	Columbia River recovery planning, based on EDT assessment
John Day	NF John Day Spring Chinook	Primary	5.20	3,000	Columbia River recovery planning, based on EDT assessment
Klickitat	Klickitat Spring Chinook	Primary	6.50	1,271	Columbia River recovery planning, based on EDT assessment
Umatilla	Umatilla Spring Chinook	Contributing	2.42	942	Columbia River recovery planning, based on EDT assessment
Walla Walla	Walla Walla Spring Chinook	Contributing	4.00	443	Columbia River recovery planning, based on EDT assessment
Yakima	Naches Spring Chinook	Primary	2.61	2,121	Columbia River recovery planning, based on EDT assessment
Yakima	Upper Yakima Spring Chinook	Primary	3.28	5,292	Columbia River recovery planning, based on EDT assessment
Yakima	American Spring Chinook	Primary	3.89	418	Columbia River recovery planning, based on EDT assessment
Upper Columbia River Spring-run Chinook					
Entiat	Entiat Spring Chinook	Primary	1.97	344	Columbia River recovery planning, based on EDT assessment
Methow	Methow (Methow-Chewuch) Spring Chinook	Primary	1.92	900	Columbia River recovery planning, based on EDT assessment
Methow	Methow (Twisp) Spring Chinook	Primary	1.92	240	Columbia River recovery planning, based on EDT assessment
Okanogan	Okanogan Spring Chinook	Stabilizing	0.90	253	Columbia River recovery planning, based on EDT assessment
Wenatchee	Wenatchee (Nason) Spring Chinook	Primary	2.78	371	Columbia River recovery planning, based on EDT assessment
Wenatchee	Wenatchee (White) Spring Chinook	Primary	4.80	253	Columbia River recovery planning, based on EDT assessment
Wenatchee	Wenatchee (Chiwawa) Spring Chinook	Primary	5.04	598	Columbia River recovery planning, based on EDT assessment
Snake River Fall-run Chinook					
Snake Hells Canyon	Snake Hells Canyon Fall Chinook	Primary	2.95	7,125	WDFW and NOAA provided recent year run size information and approximated B-H parameters to be consistent with observations
Snake River Spring/Summer-run Chinook					
Asotin	Asotin Spring-Summer Chinook	Stabilizing	2.30	467	Columbia River recovery planning, based on EDT assessment

Subbasin	Population Name	Population Designation	Prod	Capacity	Data source
Clearwater	Lochsa Spring Chinook	Stabilizing	1.30	940	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses
Clearwater	Lower Selway Spring Chinook	Contributing	1.30	400	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Clearwater	Upper Selway Spring Chinook	Primary	1.30	600	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Clearwater	South Fork Clearwater Spring Chinook	Stabilizing	1.30	1,875	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Clearwater	South Fork Clearwater_Newsome Creek Spring Chinook	Contributing	1.30	625	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Clearwater	Lolo Creek Spring Chinook	Primary	1.30	1,500	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Clearwater	Lower Clearwater Spring Chinook	Stabilizing	1.30	250	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Grande Ronde	Upper Grande RondeSpring Chinook	Stabilizing	1.00	300	Columbia River recovery planning, EDT assessment adjusted following discussions with managers
Grande Ronde	Catherine Creek Spring Chinook	Primary	2.50	500	Columbia River recovery planning, EDT assessment adjusted following discussions with managers
Grande Ronde	Lookingglass Creek Spring Chinook	Stabilizing	3.00	200	Columbia River recovery planning, EDT assessment adjusted following discussions with managers
Grande Ronde	Lostine Spring Chinook	Primary	3.65	1,300	Columbia River recovery planning, EDT assessment adjusted following discussions with managers
Imnaha	Imnaha Spring-Summer Chinook	Primary	4.00	1,500	ODFW provided recent year run size information and approximated B-H parameters to be consistent with observations
Grande Ronde	Wenaha Spring Chinook	Primary	5.20	488	Columbia River recovery planning, based on EDT assessment
Grande Ronde	Minam Spring Chinook)	Primary	5.70	338	Columbia River recovery planning, based on EDT assessment
Salmon	Camas Creek Spring Chinook	Primary	1.25	750	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	Loon Creek Spring Chinook	Primary	1.30	800	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	Marsh Creek Spring Chinook	Primary	1.30	650	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	Middle Fork_Lower Mainstem Spring-Summer Chinook	Contributing	1.50	750	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	Middle Fork_Upper Mainstem Spring-Summer Chinook	Primary	1.50	1,000	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	Big Creek Spring Chinook	Primary	1.60	1,700	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	Sulphur Creek Spring Chinook	Primary	1.80	360	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	Chamberlain Creek Spring Chinook	Primary	2.00	1,000	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	Bear Valley Spring Chinook	Primary	2.50	1,400	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	Little Salmon Spring-Summer Chinook	Stabilizing	1.30	1,250	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	EF-SF Johnson Creek Summer Chinook	Primary	1.45	1,700	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.

Subbasin	Population Name	Population Designation	Prod	Capacity	Data source
Salmon	Secesh Spring Chinook	Primary	1.62	1,350	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	SF Salmon Summer Chinook	Primary	3.00	2,150	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Tucannon	Tucannon Spring Chinook	Primary	2.20	550	Columbia River recovery planning, based on EDT assessment
Salmon R	Panther Creek Spring Chinook (Extirpated)	Stabilizing	0.10	1,200	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	Lemhi River Spring Chinook	Primary	1.31	3,900	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	Yankee Fork Spring Chinook	Stabilizing	1.45	600	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	East Fork Salmon River Spring-Summer Chinook	Contributing	1.46	1,500	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	Lower Salmon Mainstem Spring Chinook	Contributing	1.50	2,000	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	Valley Spring Chinook	Contributing	1.55	800	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	NF Salmon River Spring Chinook	Contributing	1.60	550	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	Pahsimeroi Summer Chinook	Primary	1.70	3,200	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	Upper Salmon Mainstem Spring Chinook	Primary	1.80	2,000	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Columbia River Chum					
Columbia Estuary	Big Creek Chum	Contributing	1.50	100	No information provided - used rough approximation
Columbia Estuary	Clatskanie Creek Chum	Contributing	1.50	100	No information provided - used rough approximation
Columbia Estuary	Youngs Bay Tribs Chum	Primary	1.50	1,000	No information provided - used rough approximation
Columbia Estuary	Mill-Aber-Germ Chum	Primary	1.91	1,275	Columbia River recovery planning, based on EDT assessment
Columbia Estuary	Columbia Estuary Tribs Chum (Sea Resources)	Stabilizing	2.50	450	Columbia River recovery planning, based on EDT assessment
Columbia Gorge	Gorge Tributaries Chum (Lower Gorge)	Contributing	1.50	100	No information provided - used rough approximation
Columbia Gorge	Gorge Tributaries Chum (Upper Gorge)	Contributing	1.50	100	No information provided - used rough approximation
Cowlitz	Cowlitz Chum	Contributing	1.60	7,038	Columbia River recovery planning, based on EDT assessment
Elochoman	Elochoman Chum	Primary	2.00	3,360	Columbia River recovery planning, based on EDT assessment
Grays	Grays-Chinook River Chum	Primary	2.50	1,569	Columbia River recovery planning, based on EDT assessment
Kalama	Kalama Chum	Contributing	1.50	1,000	No information provided - used rough approximation
Lewis	Lewis Chum	Primary	2.50	12,860	Columbia River recovery planning, based on EDT assessment
Lower Columbia	Salmon Creek Chum	Stabilizing	1.50	1,000	No information provided - used rough approximation
Sandy	Sandy Chum	Primary	1.50	1,000	No information provided - used rough approximation

Subbasin	Population Name	Population Designation	Prod	Capacity	Data source
Washougal	Washougal Chum	Primary	3.00	2,783	Columbia River recovery planning, based on EDT assessment
Washougal	Duncan Creek Chum	Primary	3.70	1,925	Columbia River recovery planning, based on EDT assessment
Willamette	Clackamas Chum	Contributing	1.50	100	No information provided - used rough approximation
Lower Columbia River Coho					
Columbia Estuary	Gnat Creek Coho	Stabilizing	1.50	100	No information provided - used rough approximation
Columbia Estuary	Chinook River Coho	Stabilizing	3.70	100	Columbia River recovery planning, based on EDT assessment
Columbia Estuary	Clatskanie Coho (Late-Type N)	Stabilizing	4.00	400	No information provided - used rough approximation
Columbia Estuary	Scappoose Coho	Primary	4.00	400	No information provided - used rough approximation
Columbia Estuary	Youngs Bay Tribs Coho	Stabilizing	4.00	400	No information provided - used rough approximation
Columbia Estuary	Mill-Aber-Germ Coho (Type N)	Contributing	4.71	2,596	Columbia River recovery planning, based on EDT assessment
Columbia Estuary	Big Creek Coho	Primary	5.00	500	No information provided - used rough approximation
Columbia Gorge	Columbia Gorge Tributaries Coho (Oregon)	Stabilizing	1.50	100	No information provided - used rough approximation
Columbia Gorge	Columbia Gorge Tributaries Coho (WA)	Stabilizing	3.20	138	Columbia River recovery planning, based on EDT assessment
Cowlitz	Toutle Coho (Early-Type S Natural)	Primary	2.17	7,349	Columbia River recovery planning, based on EDT assessment
Cowlitz	Coweeman Coho (Type N)	Primary	3.37	2,665	Columbia River recovery planning, based on EDT assessment
Cowlitz	Lower Cowlitz Coho (Type N)	Primary	3.60	5,297	Tacoma Power Dam relicensing analysis, EDT assessment
Cowlitz	Cowlitz Upper Cowlitz Coho	Stabilizing	6.00	30,000	Tacoma Power Dam relicensing analysis, EDT assessment
Elochoman	Elochoman Coho (Late- Type N)	Primary	3.70	1,315	Columbia River recovery planning, based on EDT assessment
Fifteenmile	Fifteenmile Creek Coho	Stabilizing	1.50	100	No information provided - used rough approximation
Grays	Grays Coho (Late-Type N)	Primary	3.84	1,623	Columbia River recovery planning, based on EDT assessment
Hood	Hood Coho	Contributing	1.50	100	No information provided - used rough approximation
Kalama	Kalama Coho (Natural)	Contributing	3.79	658	Columbia River recovery planning, based on EDT assessment
Klickitat	Klickitat Coho	Stabilizing	2.40	1,172	Columbia River recovery planning, based on EDT assessment
Lewis	NF Lewis Coho (Early-Type S)	Stabilizing	4.70	14,545	Columbia River recovery planning, based on EDT assessment
Lewis	NF Lewis Coho (Late-Type N)	Contributing	5.20	2,913	Columbia River recovery planning, based on EDT assessment
Lewis	EF Lewis Coho	Primary	5.28	2,956	Columbia River recovery planning, based on EDT assessment
Sandy	Sandy Coho	Primary	6.09	13,665	City of Portland Water District HCP, EDT assessment

Subbasin	Population Name	Population Designation	Prod	Capacity	Data source
Washougal	Washougal Coho	Contributing	2.39	1,584	Columbia River recovery planning, based on EDT assessment
White Salmon	White Salmon Coho (Early- Type S)	Contributing	3.70	646	Columbia River recovery planning, based on EDT assessment
Willamette	Upper Willamette Tribs coho	Stabilizing	1.50	100	No information provided - used rough approximation
Willamette	Lower Willamette Tribs Coho	Stabilizing	1.64	584	City of Portland watershed planning, EDT assessment
Willamette	Lower Clackamas Coho	Stabilizing	1.80	704	Columbia River recovery planning, based on EDT assessment
Willamette	Upper Clackamas Coho	Primary	4.70	2,202	Columbia River recovery planning, based on EDT assessment
Upper Columbia Coho					
Clearwater	Clearwater Coho	Stabilizing	1.50	1,000	No information provided - used rough approximation
Methow	Methow Coho	Stabilizing	1.38	1,514	Columbia River recovery planning, based on EDT assessment
Umatilla	Umatilla Coho	Stabilizing	0.44	1,939	Columbia River recovery planning, based on EDT assessment
Wenatchee	Wenatchee Coho	Stabilizing	1.49	2,093	Columbia River recovery planning, based on EDT assessment
Yakima	Upper Yakima-Naches Coho	Stabilizing	1.80	3,185	Columbia River recovery planning, based on EDT assessment
Snake River Sockeye					
Salmon River	Redfish Lake Sockeye	Primary	0.14	10,000	Based on IDFG data for egg to smolt and smolt to adult survival.
Wenatchee River Sockeye					
Wenatchee	Wenatchee Sockeye	Primary	10.00	15,000	WDFW provided recent year run size information and approximated B-H parameters to be consistent with observations
Southwest Washington Steelhead					
Big Creek	Big Creek Winter Steelhead (Late)	Stabilizing	4.00	100	No information provided - used rough approximation
Clatskanie	Clatskanie Winter Steelhead (Late)	Stabilizing	4.00	250	ODFW provided from B-H fit to observed data.
Elochoman	Elochoman Winter Steelhead (Late)	Contributing	7.49	515	Columbia River recovery planning, based on EDT assessment
Gnat Creek	Gnat Creek Winter Steelhead (Late)	Stabilizing	4.00	25	ODFW provided from B-H fit to observed data.
Grays	Grays Winter Steelhead (Late)	Primary	4.89	1,126	Columbia River recovery planning, based on EDT assessment
Mill-Aber-Germ	Mill-Aber-Germ Winter Steelhead (Late)	Primary	5.06	691	Columbia River recovery planning, based on EDT assessment
Young Bay Tribs	Youngs Bay Tribs Winter Steelhead (Late)	Stabilizing	3.00	200	ODFW provided from B-H fit to observed data.
Lower Columbia River Steelhead					
Columbia Gorge	Upper Gorge Tributaries Winter Steelhead (Late)	Contributing	3.00	250	No information provided - used rough approximation
Coweeman	Coweeman Winter Steelhead (Late)	Primary	3.34	609	Columbia River recovery planning, based on EDT assessment

Subbasin	Population Name	Population Designation	Prod	Capacity	Data source
Cowlitz	Lower Cowlitz Winter Steelhead (Late)	Contributing	2.80	866	Tacoma Power Dam relicensing analysis, EDT assessment
Cowlitz	Upper Cowlitz Winter Steelhead (Late)	Contributing	3.17	2,657	Tacoma Power Dam relicensing analysis, EDT assessment
Hood	Hood Summer Steelhead	Primary	2.00	600	Columbia River recovery planning, based on EDT assessment
Hood	Hood Winter Steelhead	Primary	2.00	2,345	Columbia River recovery planning, based on EDT assessment
Kalama	Kalama Winter Steelhead (Late)	Primary	3.04	564	Columbia River recovery planning, based on EDT assessment
Kalama	Kalama Summer Steelhead	Primary	3.23	857	Columbia River recovery planning, based on EDT assessment
Lewis	EF Lewis Summer Steelhead	Primary	3.00	700	Columbia River recovery planning, based on EDT assessment
Lewis	NF Lewis Winter Steelhead (Late)	Contributing	3.49	405	Columbia River recovery planning, based on EDT assessment
Lewis	EF Lewis Winter Steelhead (Late)	Primary	4.37	605	Columbia River recovery planning, based on EDT assessment
Lewis	NF Lewis Summer Steelhead	Stabilizing	5.30	367	Columbia River recovery planning, based on EDT assessment
Sandy	Sandy Winter Steelhead (Late)	Primary	3.00	2,500	City of Portland Water District HCP, EDT assessment
Toutle	NF Toutle Winter Steelhead (Late)	Primary	2.79	963	Columbia River recovery planning, based on EDT assessment
Toutle	SF Toutle Winter Steelhead (Late)	Primary	3.58	1,038	Columbia River recovery planning, based on EDT assessment
Washougal	Salmon Creek Winter Steelhead (Late)	Stabilizing	2.40	64	Columbia River recovery planning, based on EDT assessment
Washougal	Washougal Winter Steelhead (Late)	Contributing	3.87	552	Columbia River recovery planning, based on EDT assessment
Washougal	Washougal Summer Steelhead	Primary	4.27	585	Columbia River recovery planning, based on EDT assessment
Willamette	Lower Clackamas Winter Steelhead (Late)	Primary	3.10	1,134	Columbia River recovery planning, based on EDT assessment
Willamette	Upper Clackamas Winter Steelhead (Late)	Primary	10.10	3,345	Columbia River recovery planning, based on EDT assessment
Wind	Wind Summer Steelhead	Primary	4.80	1,877	Columbia River recovery planning, based on EDT assessment
Upper Willamette River Steelhead					
Willamette	Westside Tribs Winter Steelhead (Late)	Stabilizing	2.00	250	ODFW provided from B-H fit to observed data.
Willamette	Calapooia Winter Steelhead(Late)	Contributing	4.33	756	ODFW provided from B-H fit to observed data.
Willamette	Molalla Winter Steelhead	Primary	5.34	1,970	ODFW provided from B-H fit to observed data.
Willamette	North Santiam Winter Steelhead (Late)	Primary	6.96	3,783	ODFW provided from B-H fit to observed data.
Willamette	South Santiam Winter Steelhead	Primary	7.00	3,800	ODFW provided from B-H fit to observed data.
Middle Columbia River Steelhead					
Big White Salmon	White Salmon Summer-Winter Steelhead	Stabilizing	3.92	25	Columbia River recovery planning, based on EDT assessment

Subbasin	Population Name	Population Designation	Prod	Capacity	Data source
Deschutes	Westside Tributaries Summer Steelhead	Primary	1.99	1,766	ODFW provided from B-H fit to observed data.
Deschutes	Eastside Tributaries Summer Steelhead	Primary	4.11	6,055	ODFW provided from B-H fit to observed data.
Fifteenmile Creek	Fifteenmile Creek Winter Steelhead	Primary	2.23	1,577	Columbia River recovery planning, based on EDT assessment
John Day	South Fork Summer Steelhead	Contributing	3.27	625	ODFW provided from B-H fit to observed data.
John Day	Upper Mainstem Summer Steelhead	Contributing	3.40	1,270	ODFW provided from B-H fit to observed data.
John Day	North Fork Summer Steelhead	Primary	3.82	3,925	ODFW provided from B-H fit to observed data.
John Day	Middle Fork Summer Steelhead	Primary	3.89	1,712	ODFW provided from B-H fit to observed data.
John Day	Lower Mainstem Summer Steelhead	Primary	4.83	4,293	ODFW provided from B-H fit to observed data.
Klickitat	Klickitat Summer-Winter Steelhead	Primary	6.26	3,615	Columbia River recovery planning, based on EDT assessment
Walla Walla	Touchet Summer Steelhead	Primary	1.72	691	Columbia River recovery planning, based on EDT assessment
Umatilla	Umatilla Summer Steelhead	Primary	1.91	4,230	Columbia River recovery planning, based on EDT assessment
Walla Walla	Walla Walla Summer Steelhead	Primary	1.84	2,180	Columbia River recovery planning, based on EDT assessment
Yakima	Upper Yakima Summer Steelhead	Contributing	1.32	1,750	Columbia River recovery planning, based on EDT assessment
Yakima	Naches Summer Steelhead	Primary	1.66	2,056	Columbia River recovery planning, based on EDT assessment
Yakima	Toppenish Summer Steelhead	Contributing	3.89	1,082	Columbia River recovery planning, based on EDT assessment
Yakima	Satus Summer Steelhead	Primary	4.28	1,247	Columbia River recovery planning, based on EDT assessment
Upper Columbia River Steelhead					
Entiat	Entiat Summer Steelhead	Primary	0.90	170	Columbia River recovery planning, based on EDT assessment
Methow	Methow Summer Steelhead	Primary	1.25	1,962	Columbia River recovery planning, based on EDT assessment
Okanogan	Okanogan Summer Steelhead	Primary	1.65	126	Columbia River recovery planning, based on EDT assessment
Wenatchee	Wenatchee Summer Steelhead	Primary	2.25	765	Columbia River recovery planning, based on EDT assessment
Snake River Basin Steelhead					
Asotin	Asotin Summer Steelhead (A-run)	Contributing	2.50	1,400	Columbia River recovery planning, based on EDT assessment
Clearwater	SF Clearwater Summer Steelhead (B-Run)	Stabilizing	1.50	350	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Clearwater	SF Clearwater_Crooked River Summer Steelhead (B-Run)	Contributing	1.50	400	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Clearwater	Lolo Summer Steelhead (A+B-Run)	Contributing	2.00	200	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Clearwater	Lochsa Summer Steelhead (B-Run)	Primary	2.50	2,000	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.

Subbasin	Population Name	Population Designation	Prod	Capacity	Data source
Clearwater	Selway Summer Steelhead (B-Run)	Primary	2.50	2,500	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Clearwater	Lower Clearwater Summer Steelhead (A-Run)	Primary	5.21	1,430	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Grande Ronde	Upper Grande Ronde Summer Steelhead	Primary	1.80	3,665	Columbia River recovery planning, EDT assessment adjusted following discussions with managers
Grande Ronde	Wallowa Summer Steelhead	Primary	2.89	2,000	Columbia River recovery planning, EDT assessment adjusted following discussions with managers
Grande Ronde	Joseph Summer Steelhead	Primary	3.00	3,500	Columbia River recovery planning, EDT assessment adjusted following discussions with managers
Grande Ronde	Lower Grande Ronde Summer Steelhead	Primary	3.90	1,951	Columbia River recovery planning, EDT assessment adjusted following discussions with managers
Imnaha	Little Sheep Summer Steelhead	Contributing	3.00	200	ODFW provided recent year run size information and approximated B-H parameters to be consistent with observations
Imnaha	Imnaha Summer Steelhead	Primary	3.00	1,800	ODFW provided recent year run size information and approximated B-H parameters to be consistent with observations
Salmon	East Fork Salmon Summer Steelhead	Primary	1.50	1,048	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	Upper Salmon Summer Steelhead (A-Run)	Stabilizing	1.50	1,283	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	Pahsimeroi Summer Steelhead (A-Run)	Contributing	1.65	1,029	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	Lemhi Summer Steelhead (A-Run)	Primary	1.80	1,139	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	Panther Creek Summer Steelhead (A-Run)	Stabilizing	2.00	428	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	Lower Middle Fork Salmon Summer Steelhead (B-Run)	Primary	2.50	1,587	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	Upper Middle Fork Salmon Summer Steelhead (B-Run)	Primary	2.50	1,667	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	South Fork Summer Steelhead (B-Run)	Primary	3.00	1,115	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	Secesh Summer Steelhead (B-Run)	Primary	3.00	342	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	Chamberlain Summer Steelhead (A-Run)	Primary	3.00	399	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	North Fork Salmon Summer Steelhead (A-Run)	Primary	3.00	226	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Salmon	Little Salmon Summer Steelhead (A-Run)	Stabilizing	3.60	474	IDFG and NOAA provided approximate B-H parameters based on recovery planning analyses.
Snake Hells Canyon	Snake Hells Canyon Summer Steelhead	Stabilizing	2.00	500	No information provided - used rough approximation
Tucannon	Tucannon Summer Steelhead	Primary	1.80	275	Columbia River recovery planning, based on EDT assessment

1.2 Hatcheries

The HSRG analysis examined 110 segregated[1] salmon and steelhead hatchery programs for the current condition (Table 1). As a result of the analysis, the HSRG recommended that 19 segregated programs be eliminated, and four new segregated harvest programs and six new "stepping stone" programs[2] should be created. An additional 68 currently existing integrated programs[3] were analyzed. The HSRG recommended eliminating two integrated programs and creating an additional 24 integrated programs, some of which were to replace poorly segregated programs.

Hatchery information used in the analysis was from a variety of sources specific to each program including Hatchery Genetic Management Plans (HGMP), Artificial Production and Evaluation reports (APRE), Annual Operating Plans for fish production programs (AOP), annual M&E reports, hatchery brood year data tables, and conversations with hatchery managers. Some hatchery programs had undergone considerable modifications since their HGMP document was published. The analysis in all cases used the most recent information available for broodstock source, program size and release strategies. Survival data for hatchery programs (reported as number of recruits per hatchery broodstock spawner and post-release survival) were not as current because of the lag in data analysis. The analysis tried to compensate for this lag by asking the managers for their perspective on the more recent survival trends.

Although HGMPs varied in completeness, comprehensive HGMPs included information on a wide range of parameters including:

- Hatchery type (Segregated/Integrated)
- Broodstock target (number of fish) and hatchery/natural composition in the broodstock
- Broodstock collection procedures
- Contribution of hatchery fish to natural escapement
- Proportion of broodstock imported and/or exported
- Smolt release size and life stage
- Hatchery survival by life stage
- Hatchery return rates
- Hatchery stray rates

Hatchery programs and data sources are listed in Table 4. Program type, purpose, the number of adults used for broodstock, the program release, date of the HGMP/APRE report, and agency responsible are shown for each program.

[1] A hatchery program was considered to be segregated if the management intent was to create a distinct population reproductively isolated from naturally spawning populations.
[2] Stepping stone programs are harvest programs that use broodstock from an integrated program in the same basin.
[3] A hatchery program was considered to be integrated if the management intent was to create a composite hatchery/natural population for which the dominant selective pressure was the natural environment.

Table 4 continued. Salmon and steelhead hatchery programs used in the HSRG analysis for the current condition and HSRG Solution. New programs recommended by the HSRG are marked in bold.

Table 4. Salmon and steelhead hatchery programs used in the HSRG analysis for the current condition and HSRG Solution. New programs recommended by the HSRG are marked in bold.

Subbasin	Population/Program	Population Designation[4]	Agency[5]	Current Condition			HSRG Solution			HGMP or APRE Date
				Type[6]	Purpose	Release (1,000)	Type	Purpose	Release (1,000)	
Lower Columbia River Chinook										
Big Creek	Big Creek Fall Chinook (Tules-Hatchery)	N/A	ODFW	Seg	Harv	5,826.6	Seg	Harv	5,826.6	October-05
Columbia Estuary	Deep River Spring Chinook (Cowlitz-Merwin-Grays-Hatchery)	N/A	WDFW	Seg	Harv	362.3	Seg	Harv	362.3	August-04
Columbia Gorge	Spring Creek Fall Chinook (Tules-Hatchery)	Stabilizing	USFWS	Seg	Harv	15,044.9	Seg	Harv	15,044.9	May-04
Cowlitz	Lower Cowlitz Fall Chinook	Contributing	WDFW	Int	Harv	4,807.4	Int	Harv	4,370.4	August-05
Cowlitz	Upper Cowlitz Spring Chinook	Primary	WDFW	Int	Harv	1,263.6	None	None	-	August-05
Cowlitz	**Upper Cowlitz Spring Chinook (Hatchery)**	N/A	WDFW	NA	NA	-	Seg	Harv	1,263.6	
Cowlitz	**Toutle Fall Chinook**	Stabilizing	WDFW	None	None	-	Int	Harv	1,561.4	August-04
Cowlitz	Toutle Fall Chinook (Hatchery)	N/A	WDFW	Seg	Harv	2,500.4	NA	Harv	-	August-04
Elochoman	Elochoman Fall Chinook	Primary	WDFW	Int	Harv	2,072.1	Int	Cons	188.4	August-04
Grays	**Grays Fall Chinook**	Primary	WDFW	None	None	-	Int	Cons	94.2	
Hood	Hood Spring Chinook	Primary	ODFW	Int	Cons	125.9	Int	Cons	147.0	June-00
Kalama	Kalama Spring Chinook	Primary	WDFW	Int	Harv	501.3	None	None	-	August-04

[4] Primary, Contributing, and Stabilizing refer to the population designation of the natural population. Designation does not apply (NA) to segregated hatchery programs.
[5] Agency abbreviations: CTC – Confederated Tribes Colville; CTUIR – Confederated Tribes Umatilla Indian Reservation; CTWS – Confederated Tribes of Warm Springs; IDFG – Idaho Fish and Game; NOAA – National Oceans and Atmospheric Administration; NPT – Nez Perce Tribe; ODFW – Oregon Department Fish and Wildlife; USFWS – U.S. Fish and Wildlife Service; WDFW – Washington Department Fish and Wildlife; YN – Yakama Nation
[6] Program types are: Integrated (Int), Segregated (Seg), None (natural population that does not have a program under scenario) and Not Applicable (NA – segregated programs with no release under scenario).

Table 4 continued. Salmon and steelhead hatchery programs used in the HSRG analysis for the current condition and HSRG Solution. New programs recommended by the HSRG are marked in bold.

Subbasin	Population/Program	Population Designation[4]	Agency[5]	Current Condition			HSRG Solution			HGMP or APRE Date
				Type[6]	Purpose	Release (1,000)	Type	Purpose	Release (1,000)	
Kalama	**Kalama Spring Chinook (Hatchery)**	N/A	WDFW	NA	Harv	-	Seg	Harv	501.3	
Kalama	Kalama Fall Chinook (Hatchery)	N/A	WDFW	Seg	Harv	5,040.0	Seg	Harv	5,040.0	August-04
Lewis	NF Lewis Spring Chinook (Hatchery)	N/A	WDFW	Seg	Harv	1,351.4	Seg	Harv	1,188.0	August-04
Little White Salmon	Little White Salmon Fall Chinook (URB-Hatchery)	N/A	USFWS	Seg	Harv	2,007.2	Seg	Harv	2,007.2	May-04
Little White Salmon	Little White Salmon Spring Chinook (Hatchery)	N/A	USFWS	Seg	Harv	1,005.2	Seg	Harv	1,005.2	May-04
Lower Columbia	Bonneville Fall Chinook (Hatchery)	N/A	ODFW	Seg	Harv	4,493.1	Seg	Harv	4,493.1	September-05
Mill-Aber-Germ	**Mill-Aber-Germ Fall Chinook (Hatchery)**	N/A	USFWS	NA	Harv	-	Seg	Harv	1,023.8	
Sandy	Sandy Spring Chinook	Primary	ODFW	Int	Harv	300.5	Int	Harv	300.7	February-06
Washougal	**Washougal Fall Chinook**	Primary	WDFW	None	None	-	Int	Harv	1,123.2	
Washougal	Washougal Fall Chinook (Hatchery)	N/A	WDFW	Seg	Harv	4,002.6	Seg	Harv	919.0	August-04
Wind	Wind Spring Chinook (Hatchery)	N/A	USFWS	Seg	Harv	1,145.0	Seg	Harv	1,404.4	May-04
Youngs Bay	Youngs Bay Fall Chinook (Rogue Brights-CEDC SAFE-Hatchery)	N/A	ODFW	Seg	Harv	1,174.1	Seg	Harv	3,342.9	September-05
Youngs Bay	Youngs Bay Spring Chinook (CEDC SAFE-Willamette-Hatchery)	N/A	ODFW	Seg	Harv	850.1	Seg	Harv	850.1	September-05
Upper Willamette River Chinook										
Willamette	MF Willamette Spring Chinook	Contributing	ODFW	Int	Both	1,256.6	Int	Both	1,256.6	December-03
Willamette	McKenzie Spring Chinook	Primary	ODFW	Int	Both	1,265.6	Int	Both	1,265.6	November-03
Willamette	Molalla Spring Chinook	Stabilizing	ODFW	Int	Both	99.1	Int	Both	99.1	February-04

Table 4 continued. Salmon and steelhead hatchery programs used in the HSRG analysis for the current condition and HSRG Solution. New programs recommended by the HSRG are marked in bold.

Subbasin	Population/Program	Population Designation[4]	Agency[5]	Current Condition			HSRG Solution			HGMP or APRE Date
				Type[6]	Purpose	Release (1,000)	Type	Purpose	Release (1,000)	
Willamette	North Santiam Spring Chinook	Primary	ODFW	Int	Harv	752.2	Int	Harv	752.2	February-04
Willamette	South Santiam Spring Chinook	Contributing	ODFW	Int	Harv	1,123.2	Int	Harv	1,022.3	February-04
Willamette	Clackamas Spring Chinook(Hatchery)	N/A	ODFW	Seg	Harv	1,077.8	Seg	Harv	1,077.8	October-04
Upper Columbia River Summer/Fall-run Chinook										
Klickitat	Klickitat Fall Chinook (URB-Hatchery)	N/A	YN	Seg	Harv	3,867.2	Seg	Harv	3,436.0	June-05
Methow	Methow Summer Chinook (Wells Hatchery)	N/A	WDFW	Seg	Both	340.8	Seg	Both	340.8	August-05
Mid Columbia Mainstem	Columbia Lower Middle Hanford Fall Chinook (Priest Rapids Upriver Brights)	Primary	WDFW	Int	Harv	6,691.2	Int	Harv	10,218.5	August-05
Mid Columbia Mainstem	Columbia Lower Middle Columbia Fall Chinook (URB-Ringold-Hatchery)	N/A	WDFW	Seg	Harv	3,499.5	NA	Harv	-	June-05
Okanogan	Okanogan-Similkameen Summer Chinook	Primary	WDFW	Int	Both	574.1	Int	Both	911.2	September-05
Umatilla	Umatilla Fall Chinook	Contributing	CTUIR/ODFW	Int	Both	399.2	Int	Both	478.9	January-00
Umatilla	Umatilla Fall Chinook (Hatchery)	N/A	CTUIR/ODFW	Seg	Harv	648.0	Seg	Harv	411.5	
Upper Columbia Mainstem	**Upper Middle Columbia Mainstem Summer Chinook**	Stabilizing	WDFW	None	None	-	Int	Both	803.0	
Upper Columbia Mainstem	Upper Middle Columbia Summer Chinook (Wells Hatchery)	N/A	WDFW	Seg	Harv	803.0	NA	Harv	-	August-05
Upper Columbia Mainstem	Mainstem Summer Chinook (Turtle Rock-Hatchery)	N/A	WDFW	Seg	Harv	1,277.9	Seg	Harv	600.4	September-05
Wenatchee	Wenatchee Summer Chinook	Primary	WDFW	Int	Both	737.1	Int	Both	737.1	September-05
Yakima	Yakima Fall Chinook	Contributing	YN	Int	Harv	346.6	Int	Harv	2,010.1	May-04

Table 4 continued. Salmon and steelhead hatchery programs used in the HSRG analysis for the current condition and HSRG Solution. New programs recommended by the HSRG are marked in bold.

Subbasin	Population/Program	Population Designation[4]	Agency[5]	Current Condition			HSRG Solution			HGMP or APRE Date
				Type[6]	Purpose	Release (1,000)	Type	Purpose	Release (1,000)	
Yakima	Marion Drain Fall Chinook	Contributing	YN	Int	Cons	20.5	Int	Cons	20.5	July-05
Yakima	Yakima Fall Chinook (Little White Salmon-Hatchery)	N/A	USFWS	Seg	Harv	1,701.0	NA	Harv	-	
Middle Columbia River Spring-run Chinook										
Deschutes	Deschutes Spring Chinook	Primary	USFWS/CTWS	Int	Harv	746.9	Int	Harv	746.9	August-04
Deschutes	Deschutes Spring Chinook (Round Butte-Hatchery)	N/A	ODFW	Seg	Harv	320.6	Seg	Harv	320.6	March-04
Klickitat	Klickitat Spring Chinook	Primary	YN	Int	Both	831.2	Int	Both	800.8	August-04
Mid Columbia Mainstem	Mainstem Columbia Spring Chinook (Ringold Via LWS-Hatchery)	N/A	WDFW	Seg	Harv	487.1	Seg	Harv	486.8	May-05
Umatilla	Umatilla Spring Chinook	Contributing	CTUIR	Int	Both	925.2	Int	Cons	277.6	May-04
Umatilla	**Umatilla Spring Chinook (Stepping Stone Hatchery)**	N/A	CTUIR	NA	Harv	-	Seg	Harv	562.2	
Walla Walla	Walla Walla Spring Chinook	Contributing	CTUIR/USFWS	Int	Cons	249.5	Int	Cons	198.5	May-05
Yakima	Upper Yakima Spring Chinook	Primary	YN	Int	Both	810.7	Int	Both	810.7	July-05
Upper Columbia River Spring-run Chinook										
Methow	Methow (Methow-Chewuch) Spring Chinook	Primary	WDFW	Int	Cons	359.1	Int	Cons	359.1	August-05
Methow	Methow (Twisp) Spring Chinook	Primary	WDFW	Int	Cons	183.0	Int	Cons	183.0	August-05
Methow	Methow Spring Chinook (Winthrop Hatchery)	N/A	USFWS	Seg	Both	601.5	Seg	Both	601.5	August-05
Okanogan	**Okanogan Spring Chinook**	Stabilizing	CTC	None	None	-	Int	Cons	53.9	February-04
Wenatchee	Wenatchee (Chiwawa) Spring Chinook	Primary	WDFW	Int	Cons	351.5	Int	Cons	149.1	September-05

Table 4 continued. Salmon and steelhead hatchery programs used in the HSRG analysis for the current condition and HSRG Solution. New programs recommended by the HSRG are marked in bold.

Subbasin	Population/Program	Population Designation[4]	Agency[5]	Current Condition			HSRG Solution			HGMP or APRE Date
				Type[6]	Purpose	Release (1,000)	Type	Purpose	Release (1,000)	
Wenatchee	Wenatchee (White) Spring Chinook	Primary	WDFW	Int	Cons	65.9	Int	Cons	149.1	September-05
Wenatchee	**Wenatchee (Nason) Spring Chinook**	Primary	WDFW	None	None	-	Int	Cons	149.1	September-05
Wenatchee	Wenatchee Spring Chinook (Leavenworth NFH)-Hatchery	N/A	USFWS	Seg	Harv	1,650.2	Seg	Harv	1,650.2	August-05
Snake River Fall-run Chinook										
Snake Hells Canyon	Snake Hells Canyon Fall Chinook	Primary	WDFW/NPT	Int	Both	5,802.7	Int	Both	5,802.7	August-05
Snake River Spring/Summer-run Chinook										
Clearwater	Lower Selway Spring Chinook	Contributing	NPT	Int	Both	429.8	Int	Both	429.8	September-02
Clearwater	South Fork Clearwater_Newsome Creek Spring Chinook	Contributing	IDFG	Int	Both	75.4	Int	Both	75.3	September-02
Clearwater	Lolo Creek Spring Chinook	Primary	NPT	Int	Both	148.8	Int	Both	99.7	September-02
Clearwater	Lochsa Spring Chinook (Hatchery)	N/A	IDFG	Seg	Harv	700.8	Seg	Harv	700.8	September-02
Clearwater	Lower Selway Spring Chinook (Hatchery)	N/A	NPT	Seg	Harv	300.3	Seg	Harv	300.3	September-02
Clearwater	Upper Selway Spring Chinook (Hatchery)	N/A	NPT	Seg	Harv	300.3	Seg	Harv	300.3	September-02
Clearwater	South Fork Clearwater Spring Chinook (Hatchery)	N/A	IDFG	Seg	Harv	1,100.0	Seg	Harv	1,100.0	September-02
Clearwater	Middle Fork Clearwater Spring Chinook (Kooskia-Hatchery)	N/A	USFWS	Seg	Harv	600.7	Seg	Harv	600.7	October-02
Clearwater	NF Clearwater Spring Chinook (Dworshak-Hatchery)	N/A	USFWS	Seg	Harv	1,051.1	Seg	Harv	1,051.1	September-02
Clearwater	Lower Mainstem_Spring Chinook (NPTH-Hatchery)	N/A	NPT	Seg	Harv	124.6	Seg	Harv	124.6	
Grande Ronde	Lostine Spring Chinook	Primary	ODFW/NPT	Int	Cons	249.5	Int	Cons	249.5	December-02
Grande Ronde	Catherine Creek Spring Chinook	Primary	ODFW	Int	Cons	130.0	Int	Cons	75.6	December-02

Table 4 continued. Salmon and steelhead hatchery programs used in the HSRG analysis for the current condition and HSRG Solution. New programs recommended by the HSRG are marked in bold.

Subbasin	Population/Program	Population Designation[4]	Agency[5]	Current Condition			HSRG Solution			HGMP or APRE Date
				Type[6]	Purpose	Release (1,000)	Type	Purpose	Release (1,000)	
Grande Ronde	Lookingglass Creek Spring Chinook	Stabilizing	ODFW	Int	Both	249.5	Int	Both	325.1	
Grande Ronde	Upper Grande Ronde Spring Chinook	Stabilizing	ODFW/CTUIR	Int	Cons	251.0	Int	Cons	251.0	December-02
Imnaha	Imnaha Spring-Summer Chinook	Primary	ODFW	Int	Both	359.2	Int	Cons	113.4	December-02
Imnaha	**Imnaha Spring-Summer Chinook (Stepping Stone Hatchery)**	N/A	ODFW	NA	Harv	-	Seg	Harv	246.2	
Salmon	EF-SF Johnson Creek Summer Chinook	Primary	NPT/IDFG	Int	Both	101.8	Int	Both	101.8	November-04
Salmon	**SF Salmon Summer Chinook**	Primary	IDFG	None	None	-	Int	Cons	253.8	
Salmon	**Pahsimeroi Summer Chinook**	Primary	IDFG	None	None	-	Int	Cons	285.0	November-04
Salmon	**Upper Salmon Mainstem Spring Chinook**	Primary	IDFG	None	None	-	Int	Cons	197.4	September-02
Salmon	Little Salmon Spring Chinook (Rapid River-Hatchery)	N/A	IDFG	Seg	Harv	2,736.6	Seg	Harv	2,736.6	November-04
Salmon	SF Salmon Summer Chinook (McCall-Hatchery)	N/A	IDFG	Seg	Harv	1,060.9	Seg	Harv	752.9	September-02
Salmon	Pahsimeroi Summer Chinook (Pahsimeroi Hatchery)	N/A	IDFG	Seg	Harv	999.4	Seg	Harv	1,045.0	
Salmon	Upper Salmon Mainstem Spring Chinook (Sawtooth Hatchery)	N/A	IDFG	Seg	Harv	1,034.9	Seg	Harv	1,223.0	September-02
Snake Hells Canyon	Snake Hells Canyon Spring Chinook (Oxbow Hatchery)	N/A	ODFW/IDFG	Seg	Harv	299.5	Seg	Harv	299.5	November-04
Tucannon	Tucannon Spring Chinook	Primary	WDFW	Int	Cons	132.6	Int	Cons	163.4	August-05
Columbia River Chum										
Columbia Estuary	**Columbia Estuary_Chum (Sea Resources)**	Stabilizing	WDFW	None	None	-	Int	Cons	64.0	
Columbia Estuary	**Mill-Aber-Germ Chum**	Primary	WDFW	None	None	-	Int	Cons	61.4	

Table 4 continued. Salmon and steelhead hatchery programs used in the HSRG analysis for the current condition and HSRG Solution. New programs recommended by the HSRG are marked in bold.

Subbasin	Population/Program	Population Designation[4]	Agency[5]	Current Condition			HSRG Solution			HGMP or APRE Date
				Type[6]	Purpose	Release (1,000)	Type	Purpose	Release (1,000)	
Columbia Estuary	**Youngs Bay Tribs Chum**	Primary	ODFW	None	None	-	Int	Cons	96.1	
Elochoman	**Elochoman Chum**	Primary	WDFW	None	None	-	Int	Cons	182.0	
Grays	Grays-Chinook River Chum	Primary	WDFW	Int	Cons	200.1	Int	Cons	115.3	June-04
Lewis	**Lewis Chum**	Primary	WDFW	None	None	-	Int	Cons	256.4	
Sandy	**Sandy Chum**	Primary	ODFW	None	None	-	Int	Cons	96.1	
Washougal	Duncan Creek Chum	Primary	WDFW	Int	Cons	99.9	Int	Cons	99.9	August-04
Washougal	**Washougal Chum**	Primary	WDFW	None	None	-	Int	Cons	217.9	
Lower Columbia River Coho										
Columbia Estuary	Bernie Creek Coho (Late-Type N-FFA)	N/A	WDFW	Seg	Harv	16.5	Seg	Harv	16.5	August-04
Columbia Estuary	Big Creek Coho (Hatchery)	N/A	ODFW	Seg	Harv	582.1	Seg	Harv	582.1	August-05
Columbia Estuary	Deep River Coho (Early-Type S-Grays-Hatchery)	N/A	WDFW	Seg	Harv	401.3	Seg	Harv	441.0	August-04
Columbia Estuary	Youngs Bay Coho (Bonneville-Sandy-Hatchery)	N/A	ODFW	Seg	Harv	1,726.2	Seg	Harv	2,701.9	September-05
Cowlitz	Cowlitz Upper Cowlitz Coho	Contributing	WDFW	Int	Harv	238.8	Int	Both	501.3	April-05
Cowlitz	**Lower Cowlitz Coho (Type N)**	Primary	WDFW	None	None	-	Int	Harv	850.0	April-05
Cowlitz	**Toutle Coho (Early-Type S)**	Primary	WDFW	None	None	-	Int	Harv	560.3	August-04
Cowlitz	Lower Cowlitz Coho (Type N Hatchery)	N/A	WDFW	Seg	Harv	3,223.4	Seg	Harv	840.5	August-04
Cowlitz	Toutle Coho (Early-Type S Hatchery)	N/A	WDFW	Seg	Harv	801.3	NA	Harv	-	August-04

Table 4 continued. Salmon and steelhead hatchery programs used in the HSRG analysis for the current condition and HSRG Solution. New programs recommended by the HSRG are marked in bold.

Subbasin	Population/Program	Population Designation[4]	Agency[5]	Current Condition			HSRG Solution			HGMP or APRE Date
				Type[6]	Purpose	Release (1,000)	Type	Purpose	Release (1,000)	
Elochoman	Elochoman Coho (Late- Type N)	Primary	WDFW	Int	Both	496.1	Int	Both	146.5	August-04
Elochoman	Elochoman Coho (Early- Type S Hatchery)	N/A	WDFW	Seg	Harv	415.0	Seg	Harv	1,201.1	August-04
Grays	**Grays Coho (Late-Type N)**	Primary	WDFW	None	None	-	Int	Both	155.9	
Grays	Grays Coho (Early-Type S-Hatchery)	N/A	WDFW	Seg	Harv	150.4	NA	Harv	-	August-04
Kalama	Kalama Coho (Early- Type S)	N/A	WDFW	Seg	Harv	353.1	Seg	Harv	353.1	April-04
Kalama	Kalama Coho (Late- Type N)	N/A	WDFW	Seg	Harv	350.8	Seg	Harv	350.8	April-04
Klickitat	Klickitat Coho (Lewis-Hatchery)	NA	WDFW	Seg	Harv	1,238.6	Seg	Harv	1,052.3	August-04
Klickitat	Klickitat Coho (Washougal-Hatchery)	NA	WDFW	Seg	Harv	2,461.9	NA	Harv	-	August-04
Lewis	NF Lewis Coho (Late-Type N)	Contributing	WDFW	Int	Harv	40.0	Int	Cons	231.6	August-04
Lewis	NF Lewis Coho (Early-Type S Hatchery)	N/A	WDFW	Seg	Harv	880.0	Seg	Harv	115.8	August-04
Lewis	NF Lewis Coho (Late-Type N Hatchery)	N/A	WDFW	Seg	Harv	815.1	NA	Harv	-	August-04
Little White Salmon	**Little White Coho (Hatchery)**	N/A	USFWS	NA	Harv	-	Seg	None	1,059.1	May-04
Lower Columbia River	Bonneville Coho (Hatchery)	N/A	ODFW	Seg	Harv	1,247.7	Seg	Harv	750.5	September-05
Sandy	Sandy Coho (Hatchery)	N/A	ODFW	Seg	Harv	700.1	Seg	None	700.1	August-06
Washougal	Washougal Coho	Contributing	WDFW	Int	Harv	497.9	Int	Both	231.6	August-04
Washougal	**Washougal Coho (Stepping Stone Hatchery)**	N/A	WDFW	NA	Harv	-	Seg	Harv	280.2	
Willamette	Clackamas-Eagle Creek Coho (Hatchery)	NA	USFWS	Seg	Harv	349.1	Seg	Harv	349.1	May-04

Table 4 continued. Salmon and steelhead hatchery programs used in the HSRG analysis for the current condition and HSRG Solution. New programs recommended by the HSRG are marked in bold.

Subbasin	Population/Program	Population Designation[4]	Agency[5]	Current Condition			HSRG Solution			HGMP or APRE Date
				Type[6]	Purpose	Release (1,000)	Type	Purpose	Release (1,000)	
Upper Columbia Coho										
Clearwater	Clearwater Coho	Stabilizing	USFWS/ NPT	Int	Cons	833.9	Int	Cons	830.1	May-04
Methow	Methow Coho	Stabilizing	YN	Int	Cons	495.4	Int	Cons	495.4	December-99
Umatilla	Umatilla Coho (Bonneville-Cascade-Oxbow-Hatchery)	NA	ODFW/C TUIR	Seg	Harv	1,530.0	Seg	Harv	1,530.0	May-06
Wenatchee	Wenatchee Coho	Stabilizing	YN	Int	Cons	1,048.0	Int	Cons	1,048.0	May-04
Yakima	Upper Yakima-Naches Coho	Stabilizing	YN	Int	Both	452.1	Int	Both	452.1	May-04
Yakima	Yakima Coho (Hatchery)	N/A	YN	Seg	Both	427.9	Seg	Both	427.9	May-04
Snake River Sockeye										
Salmon	Redfish Lake Sockeye	Primary	IDFG/NO AA	Int	Cons	151.7	Int	Cons	750.8	November-04
Wenatchee River Sockeye										
Wenatchee	Wenatchee Sockeye	Primary	WDFW	Int	Cons	211.7	Int	Cons	211.7	August-05
Southwest Washington Steelhead										
Big Creek	Big Creek Winter Steelhead (Hatchery)	NA	ODFW	Seg	Harv	60.0	Seg	Harv	60.0	January-05
Elochoman	Elochoman Summer Steelhead (Merwin-Hatchery)	NA	WDFW	Seg	Harv	30.9	Seg	Harv	30.9	May-05
Elochoman	Elochoman Winter Steelhead (Early-Hatchery)	NA	WDFW	Seg	Harv	90.7	Seg	Harv	90.7	August-04
Gnat Creek	Gnat Creek Winter Steelhead (Hatchery)	NA	ODFW	Seg	Harv	40.0	Seg	Harv	40.0	January-05
Grays	Grays Winter Steelhead (Early-Elochoman-Hatchery)	NA	WDFW	Seg	Harv	40.0	Seg	Harv	40.0	August-04
Young Bay Tribs	Youngs Bay Tribs Winter Steelhead (Hatchery)	NA	ODFW	Seg	Harv	60.0	Seg	Harv	60.0	January-05

Table 4 continued. Salmon and steelhead hatchery programs used in the HSRG analysis for the current condition and HSRG Solution. New programs recommended by the HSRG are marked in bold.

Subbasin	Population/Program	Population Designation[4]	Agency[5]	Current Condition			HSRG Solution			HGMP or APRE Date
				Type[6]	Purpose	Release (1,000)	Type	Purpose	Release (1,000)	
Lower Columbia River Steelhead										
Coweeman	Coweeman Winter Steelhead (Early Elochoman-Hatchery)	NA	WDFW	Seg	Harv	20.2	Seg	None	20.2	August-04
Cowlitz	Lower Cowlitz Winter Steelhead (Late)	Contributing	WDFW	Int	Both	288.7	Int	Both	288.7	August-05
Cowlitz	Upper Cowlitz Winter Steelhead (Late)	Contributing	WDFW	Int	Both	199.1	Int	Both	99.3	August-05
Cowlitz	Lower Cowlitz Summer Steelhead (Skamania-Hatchery)	NA	WDFW	Seg	Harv	549.2	Seg	Harv	549.2	August-05
Cowlitz	Lower Cowlitz Winter Steelhead (Early-Hatchery)	NA	WDFW	Seg	Harv	302.4	Seg	Harv	302.4	August-05
Hood	Hood Summer Steelhead	Primary	ODFW	Int	Cons	31.4	Int	Cons	31.4	June-00
Hood	Hood Winter Steelhead	Primary	ODFW	Int	Cons	49.2	Int	Cons	49.2	July-00
Hood	Hood Summer Steelhead (Santiam-Hatchery)	NA	ODFW	Seg	Harv	31.5	NA	Harv	-	July-00
Kalama	Kalama Summer Steelhead	Primary	WDFW	Int	Cons	30.5	Int	Cons	86.7	April-04
Kalama	Kalama Winter Steelhead (Late)	Primary	WDFW	Int	Harv	45.2	Int	Harv	99.7	August-04
Kalama	Kalama Summer Steelhead (Skamania-Hatchery)	NA	WDFW	Seg	Harv	30.7	NA	Harv	-	April-04
Kalama	Kalama Winter Steelhead (Early-Hatchery)	NA	WDFW	Seg	Harv	45.8	NA	Harv	-	August-04
Lewis	**EF Lewis Summer Steelhead**	Primary	WDFW	None	None	-	Int	Harv	40.7	August-04
Lewis	**EF Lewis Winter Steelhead (Late)**	Primary	WDFW	None	None	-	Int	Both	40.3	August-04
Lewis	EF Lewis Summer Steelhead (Skamania-Hatchery)	NA	WDFW	Seg	Harv	24.7	NA	Harv	-	August-04
Lewis	EF Lewis Winter Steelhead (Skamania-Hatchery)	NA	WDFW	Seg	Harv	90.7	NA	Harv	-	August-04

Table 4 continued. Salmon and steelhead hatchery programs used in the HSRG analysis for the current condition and HSRG Solution. New programs recommended by the HSRG are marked in bold.

Subbasin	Population/Program	Population Designation[4]	Agency[5]	Current Condition			HSRG Solution			HGMP or APRE Date
				Type[6]	Purpose	Release (1,000)	Type	Purpose	Release (1,000)	
Lewis	NF Lewis Summer Steelhead (Merwin-Hatchery)	NA	WDFW	Seg	Harv	284.8	Seg	Harv	284.8	August-04
Lewis	NF Lewis Winter Steelhead (Merwin-Hatchery)	NA	WDFW	Seg	Harv	100.2	Seg	Harv	100.2	August-04
Sandy	Sandy Winter Steelhead (Late)	Primary	ODFW	Int	Harv	159.9	Int	Harv	159.9	March-02
Sandy	Sandy Summer Steelhead (South Santiam-Hatchery)	NA	ODFW	Seg	Harv	75.0	Seg	Harv	75.0	July-06
Toutle	**NF Toutle Winter Steelhead (Late)**	Primary	WDFW	None	None	-	Int	Harv	142.2	
Toutle	NF Toutle Summer Steelhead (Hatchery)	NA	WDFW	Seg	Harv	24.7	NA	Harv	-	April-04
Toutle	SF Toutle Summer Steelhead (Hatchery)	NA	WDFW	Seg	Harv	24.7	Seg	Harv	23.9	May-05
Washougal	**Washougal Summer Steelhead**	Primary	WDFW	None	None	-	Int	Harv	100.4	
Washougal	Salmon Creek Winter Steelhead (Skamania-Hatchery)	NA	WDFW	Seg	Harv	24.7	Seg	Harv	24.7	August-04
Washougal	Washougal Summer Steelhead (Skamania-Hatchery)	NA	WDFW	Seg	Harv	60.3	Seg	Harv	28.7	August-04
Washougal	Washougal Winter Steelhead (Early-Skamania-Hatchery)	NA	WDFW	Seg	Harv	59.4	Seg	Harv	63.0	August-04
Willamette	Lower Clackamas Winter Steelhead (Late)	Primary	ODFW	Int	Harv	164.9	Int	Harv	80.4	October-01
Willamette	Clackamas Summer Steelhead (Hatchery)	NA	ODFW	Seg	Harv	174.8	Seg	Harv	174.8	June-06
Willamette	Clackamas-Eagle Creek Winter Steelhead (Early-Hatchery)	NA	USFWS	Seg	Harv	151.0	Seg	Harv	151.0	May-04
Upper Willamette River Steelhead										
Willamette	MF Willamette Summer Steelhead (S.Santiam-Hatchery)	NA	ODFW	Seg	Harv	114.5	Seg	Harv	114.5	October-04
Willamette	Mainstem Willamette Summer Steelhead (S.Santiam-Hatchery)	NA	ODFW	Seg	Harv	51.2	Seg	Harv	51.2	October-04

Table 4 continued. Salmon and steelhead hatchery programs used in the HSRG analysis for the current condition and HSRG Solution. New programs recommended by the HSRG are marked in bold.

Subbasin	Population/Program	Population Designation[4]	Agency[5]	Current Condition			HSRG Solution			HGMP or APRE Date
				Type[6]	Purpose	Release (1,000)	Type	Purpose	Release (1,000)	
Willamette	McKenzie Summer Steelhead (S.Santiam-Hatchery)	NA	ODFW	Seg	Harv	123.5	Seg	Harv	123.5	October-04
Willamette	North Santiam Summer Steelhead (S. Santiam Hatchery)	NA	ODFW	Seg	Harv	161.1	Seg	Harv	161.1	October-04
Willamette	South Santiam Summer Steelhead (Hatchery)	NA	ODFW	Seg	Harv	144.1	Seg	Harv	144.1	October-04
Middle Columbia River Steelhead										
Big White Salmon	White Salmon Summer Steelhead (Skamania-Hatchery)	NA	WDFW	Seg	Harv	20.1	NA	Harv	-	August-04
Big White Salmon	White Salmon Winter Steelhead (Skamania-Hatchery)	NA	WDFW	Seg	Harv	19.8	NA	Harv	-	August-04
Deschutes	Deschutes Summer Steelhead (Round Butte-Hatchery)	NA	ODFW	Seg	Harv	162.1	Seg	None	162.1	March-04
Klickitat	**Klickitat Summer-Winter Steelhead**	Primary	YN	None	None	-	Int	Both	120.4	
Klickitat	Klickitat Summer Steelhead (Skamania-Hatchery)	NA	WDFW	Seg	Harv	100.5	NA	Harv	-	August-04
Umatilla	Umatilla Summer Steelhead	Primary	CTUIR/ODFW	Int	Both	149.9	Int	Harv	149.9	July-05
Walla Walla	Touchet Summer Steelhead	Primary	WDFW	Int	Cons	49.2	Int	Cons	49.2	July-05
Walla Walla	Walla Walla Summer Steelhead (Lyons Ferry-Hatchery)	NA	WDFW	Seg	Harv	100.2	Seg	Harv	100.2	July-05
Walla Walla	Touchet Summer Steelhead (Lyons Ferry-Hatchery)	NA	WDFW	Seg	Harv	84.4	Seg	Harv	21.1	July-05
Upper Columbia River Steelhead										
Methow	Methow Summer Steelhead	Primary	USFW	Int	Both	420.1	Int	Both	100.2	August-05
Methow	**Methow Summer Steelhead (Stepping Stone Hatchery)**	NA	USFW	NA	Harv	-	Seg	Harv	319.8	
Mid Columbia Mainstem	Middle Columbia Mainstem_Ringold Summer Steelhead (Wells Hatchery)	NA	WDFW	Seg	Harv	171.1	Seg	Harv	171.1	May-05
Okanogan	Okanogan Summer Steelhead	Primary	CCT/WDFW	Int	Cons	20.0	Int	Both	199.9	August-05

Table 4 continued. Salmon and steelhead hatchery programs used in the HSRG analysis for the current condition and HSRG Solution. New programs recommended by the HSRG are marked in bold.

Subbasin	Population/Program	Population Designation[4]	Agency[5]	Current Condition			HSRG Solution			HGMP or APRE Date
				Type[6]	Purpose	Release (1,000)	Type	Purpose	Release (1,000)	
Okanogan	Okanogan Summer Steelhead (Wells-Hatchery)	NA	WDFW	Seg	Harv	138.9	NA	Harv	-	
Wenatchee	Wenatchee Summer Steelhead	Primary	WDFW	Int	Both	401.0	Int	Both	100.1	August-05
Wenatchee	**Wenatchee Summer Steelhead (Stepping Stone Hatchery)**	NA	WDFW	NA	Harv	-	Seg	Harv	300.7	
Snake River Basin Steelhead										
Clearwater	SF Clearwater Summer Steelhead (B-Run)	Stabilizing	USFWS	Int	Harv	399.8	Int	Harv	248.3	September-02
Clearwater	SF Clearwater_Crooked River Summer Steelhead (B-Run)	Contributing	USFWS	Int	Harv	84.2	Int	Harv	123.9	September-02
Clearwater	Lolo Summer Steelhead (A+B-Run)	Contributing	IDFG	Int	Cons	49.7	Int	Cons	49.4	
Clearwater	SF Clearwater Summer Steelhead (B-Run Hatchery)	N/A	IDFG	Seg	Harv	911.3	Seg	Harv	911.3	
Clearwater	NF Clearwater Summer Steelhead (B-Run-Hatchery)	N/A	IDFG	Seg	Harv	1,199.3	Seg	Harv	1,199.3	
Clearwater	Lower Clearwater Summer Steelhead (B-Run-Hatchery)	N/A	IDFG	Seg	Harv	298.0	Seg	Harv	298.0	September-02
Grande Ronde	Wallowa Summer Steelhead (Hatchery)	NA	ODFW	Seg	Harv	799.3	Seg	Harv	799.3	September-02
Grande Ronde	Cottonwood Creek Summer Steelhead (Wallowa-Lyons Ferry-Hatchery)	NA	WDFW	Seg	Harv	160.1	Seg	Harv	160.1	July-05
Imnaha	Little Sheep Summer Steelhead	Contributing	ODFW	Int	Both	212.3	Int	Both	87.7	May-02
Imnaha	**Little Sheep Summer Steelhead (Stepping Stone Hatchery)**	NA	ODFW	NA	Harv	-	Seg	Harv	126.3	
Lower Snake	Snake Lower Summer Steelhead (Lyons Ferry-Hatchery)	NA	WDFW	Seg	Harv	60.6	Seg	Harv	60.6	July-05
Salmon	East Fork Salmon Summer Steelhead	Primary	IDFG	Int	Cons	49.5	Int	Cons	100.1	September-02
Salmon	Little Salmon Summer Steelhead (A-Run-Pahsimeroi-Oxbow-Hatchery)	N/A	IDFG	Seg	Harv	645.0	Seg	Harv	645.0	September-02

Table 4 continued. Salmon and steelhead hatchery programs used in the HSRG analysis for the current condition and HSRG Solution. New programs recommended by the HSRG are marked in bold.

Subbasin	Population/Program	Population Designation[4]	Agency[5]	Current Condition			HSRG Solution			HGMP or APRE Date
				Type[6]	Purpose	Release (1,000)	Type	Purpose	Release (1,000)	
Salmon	Little Salmon Summer Steelhead (B-Run-Dworshak-Hatchery)	N/A	IDFG/USFWS	Seg	Harv	316.3	Seg	Harv	316.3	
Salmon	Lemhi Summer Steelhead (A-Run-Pahsimeroi Hatchery)	N/A	IDFG	Seg	Harv	119.7	Seg	Harv	119.7	September-02
Salmon	Pahsimeroi Summer Steelhead (A-Run-Pahsimeroi-Hatchery)	N/A	IDFG	Seg	Harv	1,086.8	Seg	Harv	1,081.3	September-02
Salmon	East Fork Salmon Summer Steelhead (B-Run Dworshak-Hatchery)	N/A	IDFG/USFWS	Seg	Harv	324.8	Seg	Harv	324.8	September-02
Salmon	East Fork Salmon Summer Steelhead (A-Run Pahsimeroi-Hatchery)	N/A	IDFG	Seg	Harv	180.5	Seg	Harv	180.5	September-02
Salmon	Upper Salmon Summer Steelhead (A-Run Sawtooth-Pahsimeroi-Hatchery)	N/A	IDFG	Seg	Harv	1,284.6	Seg	Harv	1,284.6	September-02
Salmon	Upper Salmon Summer Steelhead (B-Run Dworshak-Hatchery)	N/A	IDFG/USFWS	Seg	Harv	250.3	Seg	Harv	250.3	September-02
Salmon	Upper Salmon Summer Steelhead (Upper Salmon B-Run-Hatchery)	N/A	IDFG	Seg	Harv	59.2	Seg	Harv	134.6	September-02
Snake Hells Canyon	Snake Hells Canyon Summer Steelhead (Oxbow-Hatchery)	NA	ODFW/IDFG	Seg	Harv	525.4	Seg	Harv	525.4	November-04
Tucannon	Tucannon Summer Steelhead	Primary	WDFW	Int	Cons	50.9	Int	Cons	50.9	July-05
Tucannon	Tucannon Summer Steelhead (Lyons Ferry-Hatchery)	NA	WDFW	Seg	Harv	100.7	NA	Harv	-	July-05

1.3 Fish passage survival in mainstem

Fish passage survival information comprised of subbasin and species/run specific estimates of survival rates of juveniles and adults through the Snake and Columbia rivers hydroelectric system. Passage survival used in the analysis is from juveniles entering the mainstem of the Columbia or Snake rivers to the Bonneville Dam tailrace and from adults passing Bonneville Dam to adults entering the subbasin. The HSRG analysis for the current condition used information provided by the managers and from analyses developed for the 2008 Federal Columbia River Power System biological opinion (NMFS 2008). The HSRG Solution included improvements in juvenile fish passage survival predicted by computer simulation using the COMPASS model and summarized in the 2008 FCRPS Biological Opinion (NMFS 2008). Juvenile survival assumptions included in-river and transported migration routes and appropriate delayed affects of transported juveniles. Results from the COMPASS model were not available for all ESUs or life history types. In these cases either the analysis made no assumptions for improved survival or the analysis approximated possible improvements in juvenile fish passage survival by multiplying the relative adjustment reported from the COMPASS model for a similar population group. For example, NMFS (2008) made no predictions for Snake River Fall Chinook, however, the HSRG analysis thought a 5 percent multiplier on juvenile passage survival was reasonable to evaluate if improved fish passage survival affected recommendations for this population. Improvements in fish passage survival for Upper Columbia summer Chinook were based on predicted improvements reported for Upper Columbia spring Chinook. Compass simulation runs were completed for Snake River steelhead and predict no effect on fish passage survival.

Fish passage survival rates used in the HSRG analysis for populations upstream of Bonneville Dam are listed in Table 5.

Table 5. Salmon and steelhead fish passage assumptions used in the HSRG analysis for the current condition and HSRG Solution.

Subbasin	Number Dams	Current		HSRG Solution		
		Out-migration Survival	Adult Upstream Survival	Out-migration Survival	Adult Upstream Survival	Smolt-Adult adjustment
Lower Columbia River Chinook						
Columbia Gorge (Upper)	1	0.85	0.98	0.85	0.98	1.00
Hood - Fall run	1	0.85	0.98	0.85	0.98	1.00
Hood - Spring run	1	0.95	0.98	0.95	0.98	1.00
Little White Salmon - Fall run	1	0.85	0.98	0.85	0.98	1.00
Little White Salmon - Spring run	1	0.95	0.98	0.95	0.98	1.00
White Salmon - Fall run	1	0.85	0.98	0.85	0.98	1.00
White Salmon - Spring run	1	0.95	0.98	0.95	0.98	1.00
Wind - Fall run	1	0.85	0.98	0.85	0.98	1.00
Wind - Spring run	1	0.95	0.98	0.95	0.98	1.00
Deschutes River Summer/Fall-run Chinook						
Deschutes	2	0.72	0.96	0.72	0.94	1.00
Upper Columbia River Summer/Fall-run Chinook						
Klickitat	1	0.85	0.98	0.84	0.97	1.00
Umatilla	3	0.61	0.89	0.61	0.89	1.00
Mid-Columbia Mainstem	4	0.52	0.91	0.52	0.91	1.00
Yakima	4	0.52	0.91	0.52	0.91	1.00
Wenatchee	7	0.37	0.87	0.40	0.87	1.09
Entiat	8	0.32	0.85	0.35	0.85	1.10
Upper Columbia Mainstem	8	0.32	0.85	0.35	0.85	1.10
Methow	9	0.27	0.83	0.30	0.83	1.10
Okanogan	9	0.27	0.83	0.30	0.83	1.10
Middle Columbia River Spring-run Chinook						
Klickitat	1	0.95	0.98	0.95	0.98	1.00
Deschutes	2	0.82	0.96	0.82	0.96	1.00
John Day	3	0.74	0.94	0.74	0.94	1.00
Umatilla	3	0.74	0.92	0.74	0.92	1.00
Mid-Columbia Mainstem	4	0.67	0.87	0.67	0.87	1.00
Walla Walla	4	0.67	0.90	0.67	0.90	1.00
Yakima	4	0.67	0.87	0.67	0.87	1.00
Upper Columbia River Spring-run Chinook						
Wenatchee	7	0.55	0.87	0.60	0.87	1.09
Entiat	8	0.51	0.85	0.56	0.85	1.10
Methow	9	0.49	0.83	0.53	0.83	1.10
Okanogan	9	0.49	0.83	0.53	0.83	1.10
Snake River Fall-run Chinook						
Snake Hells Canyon	8	0.27	0.78	0.28	0.78	1.05
Snake River Spring/Summer-run Chinook						
Tucannon	6	0.44	0.86	0.45	0.86	1.05
Asotin	8	0.34	0.82	0.35	0.82	1.05

Subbasin	Number Dams	Current		HSRG Solution		
		Out-migration Survival	Adult Upstream Survival	Out-migration Survival	Adult Upstream Survival	Smolt-Adult adjustment
Clearwater	8	0.34	0.82	0.35	0.82	1.05
Grande Ronde	8	0.34	0.82	0.35	0.82	1.05
Imnaha	8	0.34	0.82	0.35	0.82	1.05
Salmon	8	0.34	0.82	0.35	0.82	1.05
Snake Hells Canyon	8	0.34	0.82	0.35	0.82	1.05
Columbia River Chum						
Columbia Gorge (Upper)	1	0.85	0.97	0.85	0.97	1.00
Lower Columbia River Coho						
Columbia Upper Gorge Tributaries	1	0.90	0.90	0.97	0.90	1.00
Fifteenmile Creek	1	0.90	0.97	0.82	0.97	1.00
Hood	1	0.90	0.97	0.82	0.97	1.00
Klickitat	1	0.90	0.97	0.90	0.97	1.00
Little White Salmon	1	0.90	0.97	0.97	0.97	1.00
White Salmon	1	0.90	0.97	0.90	0.97	1.00
Upper Columbia Coho						
Umatilla	3	0.74	0.92	0.74	0.92	1.00
Yakima	4	0.67	0.92	0.67	0.92	1.00
Wenatchee	7	0.55	0.87	0.60	0.87	1.09
Methow	9	0.49	0.83	0. 54	0.83	1.10
Clearwater	8	0.52	0.85	0.55	0.85	1.05
Snake River Sockeye						
Salmon	8	0.34	0.54	0.36	0.54	1.05
Wenatchee River Sockeye						
Wenatchee	7	0.41	0.73	0.44	0.73	1.09
Lower Columbia River Steelhead						
Columbia Upper Gorge Tributaries	1	0.97	0.97	0.97	0.97	1.00
Hood	1	0.97	0.97	0.97	0.97	1.00
Wind	1	0.97	0.97	0.97	0.97	1.00
Middle Columbia River Steelhead						
Fifteenmile Creek	1	0.97	0.97	0.97	0.97	1.00
Klickitat	1	0.97	0.97	0.97	0.97	1.00
White Salmon	1	0.97	0.97	0.97	0.97	1.00
Deschutes	2	0.72	0.97	0.76	0.97	1.05
John Day	3	0.70	0.91	0.76	0.91	1.08
Umatilla	3	0.70	0.94	0.76	0.94	1.08
Walla Walla	4	0.47	0.89	0.52	0.89	1.10
Yakima	4	0.47	0.91	0.52	0.91	1.10
Upper Columbia River Steelhead						
Wenatchee	7	0.35	0.87	0.43	0.87	1.23
Entiat	8	0.33	0.85	0.41	0.85	1.23
Methow	9	0.32	0.83	0.40	0.83	1.23
Okanogan	9	0.32	0.83	0.40	0.83	1.23

Subbasin	Number Dams	Current		HSRG Solution		
		Out-migration Survival	Adult Upstream Survival	Out-migration Survival	Adult Upstream Survival	Smolt-Adult adjustment
Snake River Basin Steelhead						
Tucannon	6	0.59	0.89	0.59	0.89	1.00
Asotin	8	0.49	0.83	0.49	0.83	1.00
Clearwater - A-Run	8	0.49	0.77	0.49	0.77	1.00
Clearwater - B-Run	8	0.49	0.77	0.49	0.77	1.00
Grande Ronde	8	0.49	0.78	0.49	0.78	1.00
Imnaha	8	0.49	0.89	0.49	0.89	1.00
Salmon - A-Run	8	0.49	0.77	0.49	0.77	1.00
Salmon - B-Run	8	0.49	0.77	0.49	0.77	1.00
Snake Hells Canyon	8	0.49	0.77	0.49	0.77	1.00

1.4 Harvest

Harvest information used in the analysis was the estimated harvest rates for four major fisheries (defined by harvest area[7]) for natural-origin and hatchery-origin adults. Mark-selective fisheries were the difference in harvest rates between natural and hatchery-origin fish.

Harvest rates were based on major stock groups with the exception of terminal areas, which were population specific. Data sources for harvest were from annual reports produced by the Joint Columbia River Management Staff of the Oregon Department of Fish and Wildlife (ODFW) and Washington Department of Fish and Wildlife (WDFW), NOAA biological opinions describing maximum allowable harvest impacts, state guidelines, and *US v. Oregon* agreements. The analysis used average run size to determine harvest rates for stock groups that were abundance driven. Managers also may have provided population specific harvest rates based on an analysis of coded-wire tags recovered in fisheries.

Harvest rates used in the analysis are summarized in the following sections by major harvest group. Each section begins with an overview of rates and sources of information for the current condition and is followed by a description of harvest rates that were used for the HSRG Solution.

Lower Columbia River Tule Fall Chinook

The impact rate limit on lower Columbia River Tule fall Chinook has varied in recent years. The analysis was based on the recent year average combined harvest impact of approximately 50 percent. Most of the harvest is in the ocean and lower Columbia River mainstem. Terminal rates varied from 0 – 25 percent

[7] Harvest areas in the analysis are: marine, lower Columbia River mainstem downstream of Bonneville Dam, upper Columbia River mainstem upstream of Bonneville Dam to McNary Dam, and terminal areas defined as the Columbia mainstem upstream of McNary Dam, the Snake River mainstem, and within the subbasins.

among populations. Ocean, mainstem and terminal fisheries are not mark-selective in the current condition.

The HSRG Solution modified harvest rates to include mark –selective fisheries in Washington and Oregon marine areas, the Columbia River mainstem, and terminal areas. The analysis assumed a 20 percent marine non-selective harvest rate in Canadian and Alaskan waters and a 20 percent selective harvest rate on hatchery fish in Washington and Oregon marine waters (2:1 selective differential). In the mainstem Columbia River, the HSRG assumed a 20 percent selective harvest rate on hatchery fish and a 5:1 selective differential.

Lower Columbia River Spring Chinook

This stock group has a moderately high ocean harvest rate of approximately 30 percent. All mainstem and terminal fisheries are mark-selective for hatchery fish. Harvest impacts on unmarked natural fish are from incidental non-landed mortality (5 percent). The harvest rates assumed for the terminal areas were provided by the managers and ranged from 30 – 50 percent on marked hatchery fish and 5 percent incidental mortality on unmarked natural-origin Chinook.

The HSRG Solution assumed no changes to harvest rates.

Willamette River Spring Chinook

The stock group has an ocean harvest rate of approximately 10 percent. Mainstem Columbia and Willamette tributary fisheries have a total allowable impact limit of 15 percent on unmarked natural-origin fish. All mainstem and terminal fisheries are mark-selective for hatchery fish. The harvest rates assumed for the terminal areas were provided by ODFW and were 20 percent on marked hatchery fish and 2 percent incidental mortality on unmarked natural-origin Chinook.

The HSRG Solution assumed no changes to harvest rates.

Middle and Upper Columbia Spring Chinook

The HSRG analysis assumed a nominal one percent ocean impact to account for the few recoveries reported in the coded-wire tag database. In-river fisheries are managed on a sliding scale based on abundance of returning adults. The HSRG analysis is based on recent year averages. The Lower Columbia River harvest is selective for marked hatchery adults. Harvest on marked hatchery adults was assumed to be 8 percent and a maximum 2 percent allowable impact (non-landed mortality) was assumed on unmarked natural-origin adults. Upper Columbia River harvest is a non-selective treaty fishery with an assumed harvest rate of 8 percent on hatchery and natural-origin adults. Terminal area fisheries included non-selective treaty and mark-selective sport fisheries. Harvest rates ranged from 0 – 42 percent on hatchery-origin spring Chinook in the Wenatchee River. Terminal harvest rates were provided by the managers.

The HSRG Solution assumed no changes to harvest rates.

Upper Columbia Bright Fall Chinook

Harvest rates for this stock group were based on recent year averages provided by the Columbia River Joint Staff Technical Advisory Committee. None of the

fisheries are mark-selective. Ocean harvest rates used in the analysis were approximately 40 percent for all populations. Lower Columbia River harvest rates ranged from 6 – 8 percent depending on the population. The Yakama Nation provided Lower Columbia River harvest rate information for Klickitat fall Chinook that was closer to 18 percent. The Upper Columbia harvest rate on this group was assumed to be 16 percent. Terminal area harvest rates were provided by the managers and ranged from 3 to 30 percent.

The HSRG Solution assumed no changes to harvest rates.

Upper Columbia Summer Chinook

Harvest rates for this population group were based on recent year averages provided by the Columbia River Joint Staff Technical Advisory Committee. None of the fisheries are mark-selective. The ocean rate used in the analysis was 43 percent for all populations. Lower Columbia River harvest rates were assumed to be 5 percent. The Upper Columbia harvest rate on this group was assumed to be 10 percent. Terminal harvest (including the mainstem Columbia River harvest upstream of McNary Dam) was 1 – 15 percent.

The HSRG Solution harvest rates for the ocean and upper Columbia River were based on the recently signed US-Canada Treaty and the *U.S. v. Oregon* agreement. Rates in the ocean were decreased to 40 percent and the upper Columbia River harvest rate increased to 23 percent. The HSRG Solution recommended implementing a mark-selective fishery in the Lower Columbia River with a 2 percent rate on unmarked natural-origin adults and 9 percent on marked hatchery-origin adults. The HSRG Solution included mark-selective fisheries in the terminal areas.

Snake River Bright Fall Chinook

Harvest rates for this population were provided by NOAA. Ocean harvest rates were 31 percent, Lower Columbia River rates 6 percent, and upper Columbia River rates were 16 percent. Total exploitation rate on this population was assumed to be 47.5percent.

The HSRG Solution assumed no changes to harvest rates. The HSRG recommended implementing a mark-selective fishery in the Snake River and assumed a 2 percent incidental mortality on unmarked natural-origin fish and a 20 percent harvest rate on marked hatchery-origin fish.

Snake River Spring/Summer Chinook

The HSRG analysis assumed a nominal one percent ocean impact to account for the few recoveries reported in the coded-wire tag database. In-river fisheries are managed on a sliding scale based on abundance of returning adults. The HSRG analysis is based on recent year averages. The Lower Columbia River harvest is selective for marked hatchery adults. Harvest on marked hatchery adults was assumed to be 8 percent and a maximum allowable impact (non-landed mortality) on unmarked adults of 2 percent. Upper Columbia River harvest is a non-selective treaty fishery with an assumed harvest rate of 8 percent. Terminal area fisheries included non-selective treaty and selective sport fisheries. Harvest rates ranged from 30 – 50 percent on hatchery-origin adults and 0 – 10 percent on

natural-origin adults depending on the population. Terminal harvest rates were provided by the managers.

The HSRG Solution assumed no changes to harvest rates in the ocean, lower river and upper river fisheries. The HSRG recommended higher terminal harvest rates on marked hatchery-origin adults on several populations.

Columbia River Chum

Harvest of chum salmon is incidental, occurring primarily in the lower Columbia River commercial coho fishery. Sport harvest of chum in the Columbia River and tributaries has been closed since 1992 in Oregon and 1995 in Washington. The analysis assumed that chum salmon are not harvested in the ocean or in the Columbia River above Bonneville Dam. Fishery managers set a 5 percent maximum incidental harvest mortality on Columbia River chum. Recent harvest rates are reported to have averaged about 1.6 percent annually. The HSRG analysis assumed a 2 percent incidental harvest impact on chum.

The HSRG Solution assumed no changes to harvest rates.

Columbia River Coho

Harvest on Columbia River coho is selective in the ocean and Lower Columbia fisheries. Conclusive information on harvest rates on marked hatchery-origin adults and unmarked natural-origin adults was not available to the HSRG. Observed ocean and mainstem combined harvest impacts on natural-origin coho have ranged from 11 – 20 percent. The HSRG analysis assumed a 15 percent combined harvest rate. Harvest rates on marked hatchery-origin coho are less clear. Analysis of a coded-wire tag datasets for a few double index tagged populations suggested a much higher differential in harvest rates than used in the analysis (WDFW unpublished information). The analysis used a combined (ocean and mainstem) harvest impact of 35 percent on marked coho. Terminal area harvest rates were provided by the managers and ranged from 2 percent on natural-origin adults to over 90 percent in the commercial gillnet fishery on hatchery-origin adults returning to Youngs Bay net pens.

The HSRG Solution assumed an increased selective harvest on marked hatchery coho in ocean and lower Columbia River fisheries. The ocean harvest rate on unmarked natural-origin fish increased slightly associated with the increase in selective harvest on marked-hatchery-origin adults. Lower Columbia fisheries were assumed to be more selective on marked hatchery adults, resulting in a decrease in harvest rate on natural-origin adults and an increase in harvest rate on hatchery-origin adults. The combined ocean and mainstem harvest impact on natural-origin fish was assumed to remain unchanged at 15 percent and to increase to 55 percent on marked hatchery-origin fish.

Snake River Sockeye

Harvest on Snake River sockeye was based on the recent year incidental impact of three percent in Columbia mainstem fisheries. Recent year impacts were described in the annual Joint Staff reports.

The HSRG Solution assumed no changes to harvest rates.

Wenatchee River Sockeye

Harvest on Wenatchee River sockeye was based on the recent year incidental impact of three percent in Columbia mainstem fisheries. Recent year impacts were described in the annual Joint Staff reports. The occasional terminal fishery was considered to be so infrequent that it was not included in the analysis.

The HSRG Solution assumed no changes to harvest rates.

Columbia River Winter Steelhead

This population group included winter steelhead in the Lower Columbia, Willamette River, and Columbia Gorge. The HSRG analysis assumed a nominal one percent ocean impact to account for the few recoveries of steelhead in ocean fisheries. Allowable impacts on natural-origin steelhead in the mainstem Columbia River have ranged from 2 – 6 percent. The HSRG analysis assumed a 4 percent incidental harvest rate in the lower Columbia on natural-origin steelhead. Terminal fisheries are mark-selective for hatchery-origin adults. Terminal area harvest rates were provided by the managers and ranged from 30 – 80 percent on hatchery-origin adults and less than 10 percent incidental mortality on natural-origin adults.

The HSRG Solution assumed no changes to harvest rates.

Lower Columbia River Summer Steelhead

This population group included mostly hatchery-origin summer steelhead in the Lower Columbia and Willamette River. Natural-origin summer steelhead return to the Kalama, Lewis, Washougal, Hood and Wind rivers. The HSRG analysis assumed a nominal 0.5 percent ocean impact to account for the few recoveries of steelhead in ocean fisheries. Recent NOAA biological opinions for natural-origin steelhead have allowed a 2 percent harvest impact during the summer period and 2 percent in the fall period for a total harvest impact of 4 percent in the lower Columbia River. These impacts are non-landed mortality as all fisheries are mark-selective for hatchery fish. The analysis assumed a 10 percent harvest rate in the upper Columbia River on populations upstream of Bonneville Dam. This harvest rate was provided by managers based on PIT recoveries at Bonneville Dam and in the subbasin. Terminal area harvest rates were provided by the managers and ranged from 30 – 80 percent on hatchery-origin adults and less than 10 percent incidental mortality on natural-origin adults.

The HSRG Solution assumed no changes to harvest rates.

Middle and Upper Columbia River Summer Steelhead

This population group included populations in the Middle Columbia Steelhead DPS and the Upper Columbia Steelhead DPS. The HSRG analysis assumed a nominal 0.5 percent ocean impact to account for the few recoveries of steelhead in ocean fisheries. The analysis assumed a 1 percent incidental harvest rate on natural-origin adults in the lower Columbia River fishery and a 4 percent harvest rate on marked hatchery-origin adults. The analysis used an 8 percent harvest rate in the upper Columbia River on hatchery-origin adults and a 4 percent harvest rate on natural-origin adults. These rates were based on recent year averages and allowable impacts described in NOAA biological opinions.

Terminal area harvest rates were provided by the managers and ranged from 30 – 80 percent on hatchery-origin adults and less than 10 percent incidental mortality on natural-origin adults. The exception was the Klickitat River where the terminal steelhead fishery includes a tribal harvest with a harvest rate of approximately 30 percent (YN unpublished data).

The HSRG Solution assumed no changes to harvest rates in the lower Columbia or upper Columbia fisheries. The HSRG recommended higher terminal harvest rates on hatchery-origin adults in several subbasins.

Snake River Basin Steelhead

This population group included A-run and B-run steelhead returning to subbasins in Washington, Oregon and Idaho. The HSRG analysis assumed a nominal one percent ocean impact to account for the few recoveries of steelhead in ocean fisheries. The analysis assumed a one percent incidental harvest rate on natural-origin adults in the lower Columbia River fishery and a 4 percent harvest rate on marked hatchery-origin adults. Slightly higher rates were used for Lyons Ferry hatchery steelhead based on information provided by WDFW. For A-run steelhead the analysis used an 8 percent harvest rate in the upper Columbia River on hatchery-origin adults and a 4 percent harvest rate on natural-origin adults. For B-run steelhead the analysis used a 14 percent harvest rate in the upper Columbia on hatchery-origin and natural-origin adults (non-selective). These rates were based on recent year averages and allowable impacts described in NOAA biological opinions. Terminal fisheries are mark-selective for hatchery-origin adults. Terminal area harvest rates were provided by the managers and approximately 60 percent on hatchery-origin adults and 3 percent incidental mortality on natural-origin adults.

The HSRG Solution assumed no changes to harvest rates in the lower Columbia or upper Columbia fisheries. The HSRG recommended higher terminal harvest rates on hatchery-origin adults in several subbasins.

2 Information management

Information management consists of storing and retrieving information used in the analysis from the project web site (ww.hatcheryreform.us) and running analyses with the offline All H Analyzer (AHA) application. The next two sections describe the online web site application and how to run the offline AHA application.

2.1 Web Site User Guide

This user's guide explains how to use the All H Analyzer (AHA v. 13) data management tools accessible from the Hatchery Reform website (www.hatcheryreform.us). The website tools allow hatchery managers, agency personnel, planners, and members of the public to **obtain the offline AHA application and datasets necessary to review and update an AHA analysis.**

The AHA tool is used to evaluate management strategies for salmon and steelhead populations in the Pacific Northwest. This guide does not address in detail use of the AHA tool. That information may be found in Section 2.2 of this User's Guide.

2.1.1 Background

The AHA tool has been used by the HSRG to organize information and evaluate the effects of hatchery operations, harvest, mainstem passage survival (hydropower) and habitat conditions on populations of salmon and steelhead in the Columbia Basin, as well as to develop recommendations to better achieve goals identified by managers.

The Columbia River Hatchery Reform System-wide Report details the results of the HSRG review of all salmonid hatcheries and hatchery programs in the U.S. portion of the Columbia River Basin. It contains a description of principles and recommendations advocated by the HSRG and a discussion of how to analyze a hatchery program to determine the "best" solution for achieving conservation and harvest goals. This Hatchery Reform Project website is one of the recommendations that grew out of the HSRG review.

2.1.2 Who may use the hatchery reform website?

Portions of the hatchery reform website, including population data files, global datasets, the AHA tool, and supporting documentation, are available to all users. Uploading new population datasets and global datasets is restricted to users with administrative privileges.

2.1.3 How to get help with the website

Users may obtain help with the site by contacting the Hatchery Reform webmaster.

2.1.4 The AHA Tool

The All-H Analyzer tool (AHA v. 13) is a stand-alone Microsoft Excel-based desktop application which **can be downloaded for free on this website.** The

All-H Analyzer refers to the four "Hs" which comprise the main influences on salmonid populations in the Columbia River Basin: habitat, harvest, hatcheries, and passage through hydroelectric dams. The tool contains calculations and summary graphics of salmon fisheries characteristics based on:

- Habitat patterns
- Harvest patterns
- Hydroelectric dam operation patterns
- Hatchery operations

AHA estimates reflect a measure of hatchery influence on natural populations that is a function of both the percent hatchery-origin spawners in the natural escapement and the percent of natural-origin broodstock incorporated into the hatchery program (Appendix C, System-wide Report).

The purpose of the AHA tool is to allow managers to explore the implications of alternative ways of balancing hatcheries, harvest, habitat, and hydrosystem constraints. This tool is not used to make decisions nor is it used to judge the "correctness" of management policies. Rather, it illustrates the implications of alternative ways of balancing the four "Hs" so that informed decisions can be made. AHA should not be viewed as a "new" tool to predict habitat, harvest or hydroelectric system effects on salmonid populations; it really is a platform for integration of existing analyses. It is a relatively simple aid to regional decision-making which can rapidly explore the potential impacts of a variety of detailed scenarios relating to one or more "Hs".

2.1.5 Data Sets

The AHA tool uses the file types shown in Table 6.

Table 6. AHA application file types

File Type	Suffix	Format	Contents
Hatchery/Population Data	*.rol	text	Data for multiple scenarios for a hatchery program/natural population
Stray Matrix File	*.smx	xml	Global data that describes stray rates of hatchery adults
Habitat Pattern Dataset File	*.hab	xml	Global habitat data
Harvest Pattern Dataset File	*.hrv	xml	Global harvest data
Hydro Pattern Dataset File	*.hyd	xml	Global hydroelectric operation data

The hatchery/population dataset contains data from all Columbia basin populations and hatchery programs for the selected species. The dataset contains a six-scenario "6-pack". The first scenario of the 6-pack is always the current condition and the sixth scenario is always the historic condition. The user has options to load the open slots with scenario information available from the web

site. Population/Hatchery datasets are discussed further in the next section of this guide.

The global datasets contain data that describe the following:

- Stray Matrix - Assumed stray rates of hatchery adult populations
- Habitat - Productivity/capacity inputs
- Harvest - Harvest rates
- Hydro - Mainstem passage and ocean survival of juveniles and adults

2.1.6 Step-by-Step Guide to the Hatchery Reform Website Data Tools

Note: Users *do not* need to login to download Data Sets, the AHA tool, or supporting documentation. Users *must* have login credentials to upload datasets to the central database.

Accessing the Tools Page:

Home>Analytical Tools>AHA v.13

On the Home page, click the **Analytical Tools tab** then select **AHA v.13** from the dropdown menu. This will bring the user to the **"All-H" Analyzer Tools Page** which provides access to the central database to allow the user to download AHA datasets (Figure 1). Credentialed users (administrators) may download and upload datasets.

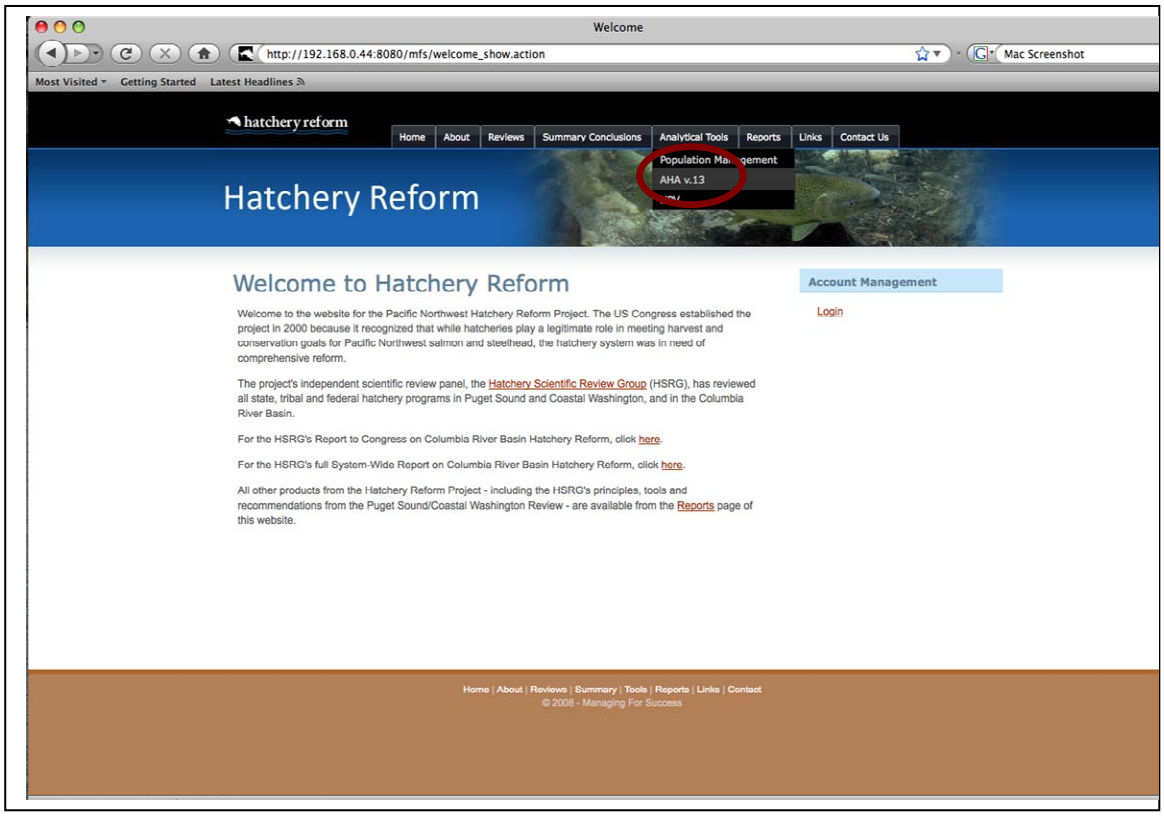


Figure 1. Hatchery Reform Website Home Page.

Using the AHA v. 13 Tools: Tasks for All Users

Links on the AHA Tools Page allow all users to download files required to begin a new AHA session or update global data for an existing AHA session. For administrators, the tools page provides links to upload the latest global datasets and AHA scenarios contained in a hatchery/population file.

Getting Started Wizard

The **Getting Started** link allows AHA users to download a complete file package in *.zip format (Figure 2). The package contains current versions of the datasets listed in Table 1, the AHA application, and the supporting documentation needed to start an AHA session. The process is completed in 3 steps:

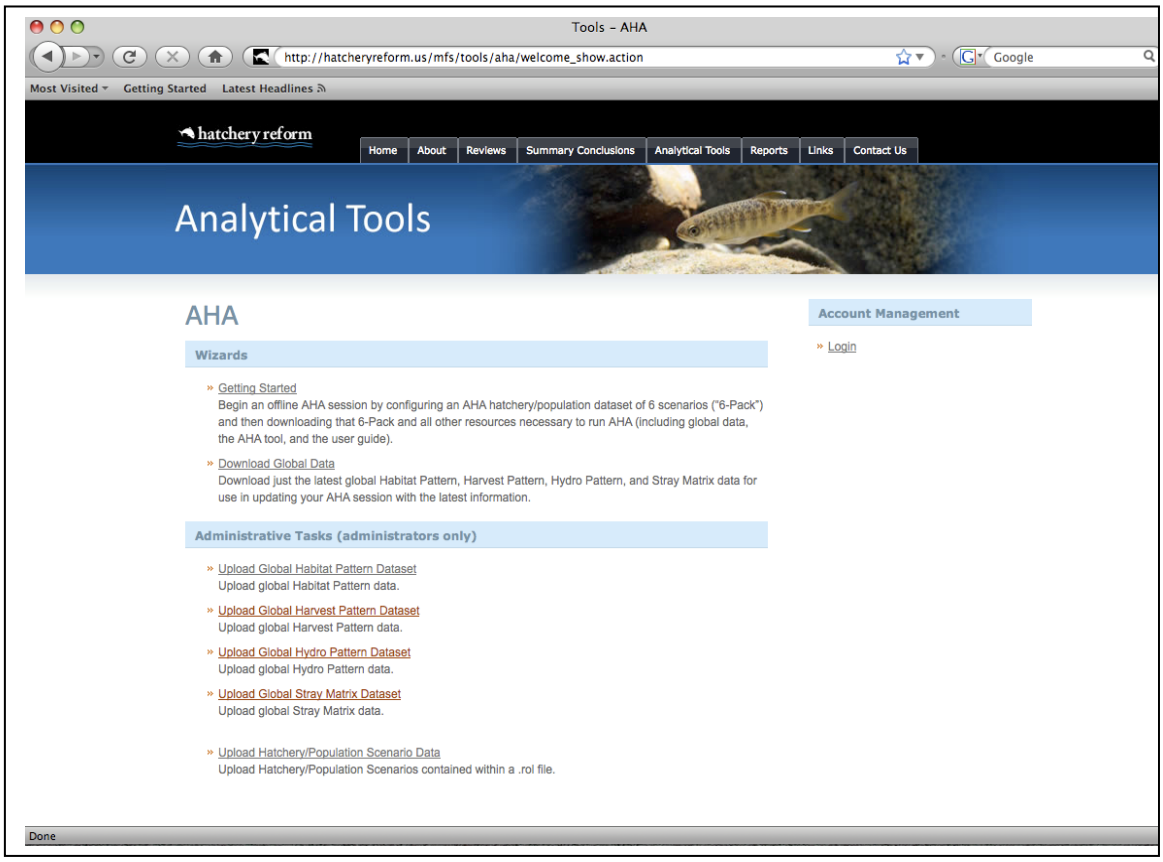


Figure 2. Getting Started Wizard.

Getting Started>Step 1 of 3: Choose Species

Select the species from the box on the left (Figure 3); then click **Continue** to proceed to Step 2 of 3.

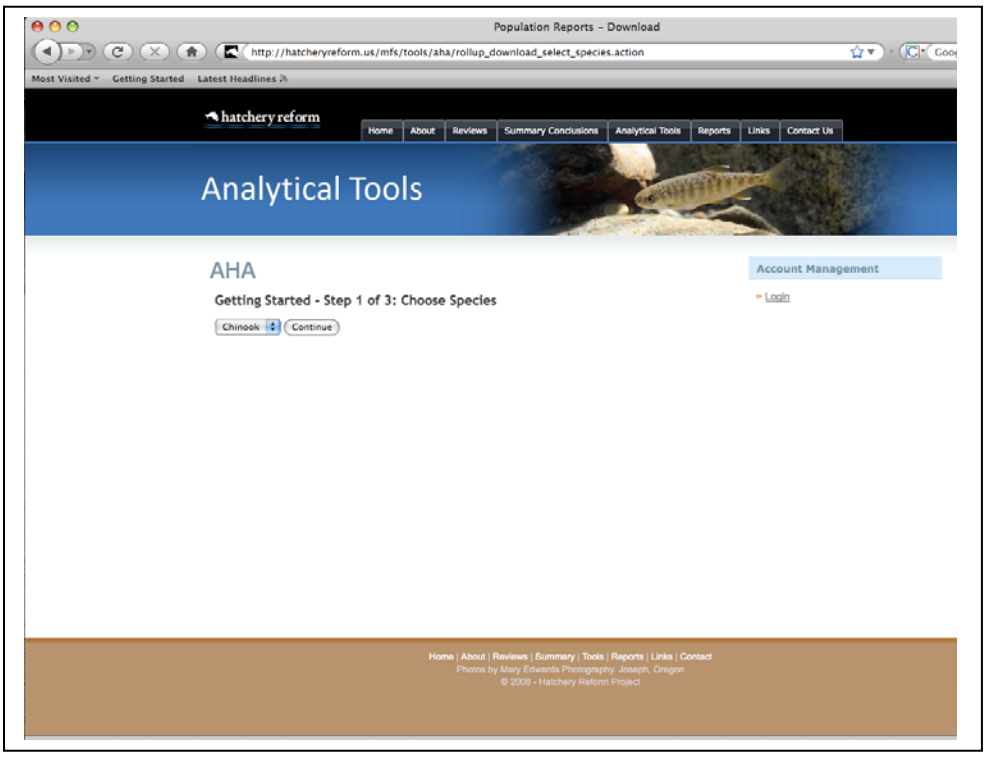


Figure 3. Select species.

>Step 2 of 3: Configure 6-pack

The six scenarios contained in a hatchery/population file are referred to as a "**6-pack**." Four scenarios are selected by the user from dropdown menus associated with slots 2 through 5. As mentioned previously, slot 1 is always the current condition and slot 6 is always the historic condition. The choices associated with slots 2 through 5 are either specifically or generically named scenarios (Figure 4). Scenarios with an assigned name, e.g. "HSRG Sol", indicate a scenario with specific assumptions representing an analytical solution. The user may also download a working scenario with inputs for one of the scenarios (e.g., multiple copies of the current scenario). A user can edit inputs for any scenario in a dataset, however most users may want to retain the information for a particular scenario and create a new scenario to evaluate different strategies.

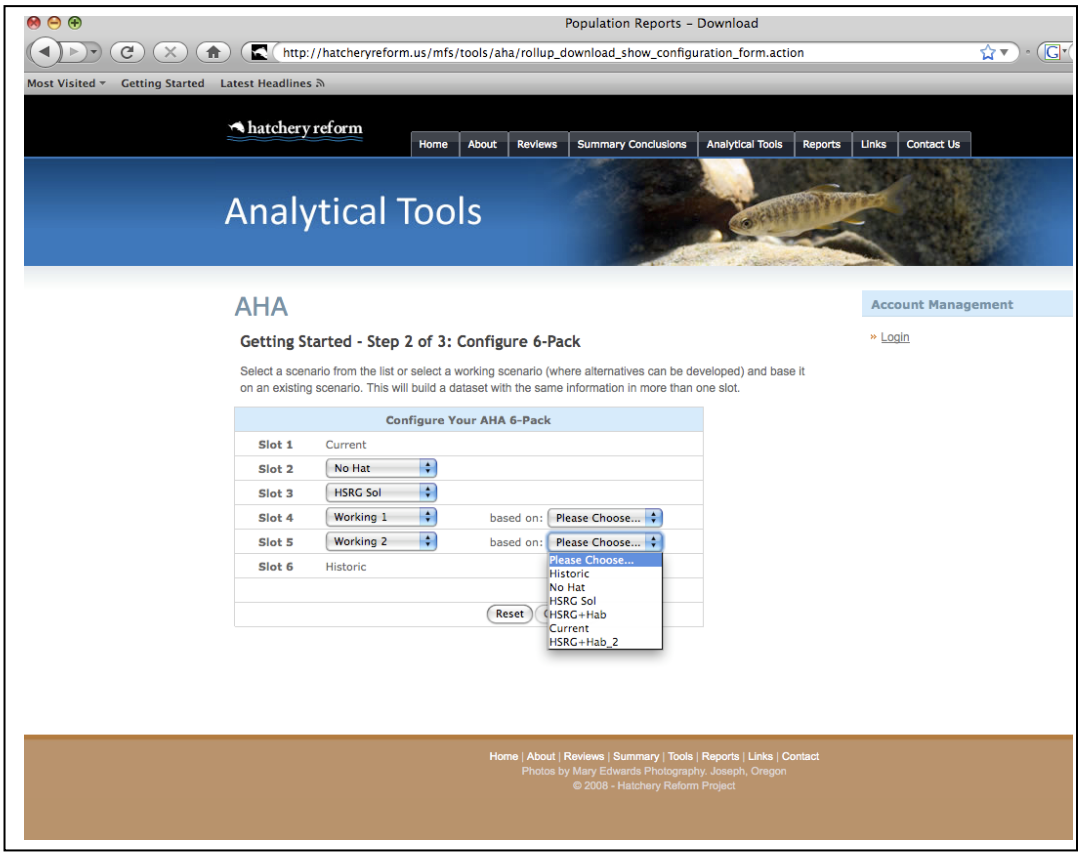


Figure 4. Select four of six scenarios to download.

Selecting a generic scenario will produce a second column to the right of the first column. From the dropdown menu, the user is prompted to select the base scenario. This base scenario defines the starting conditions for the user when working with the editable scenario.

Note that all slots *must* be filled and that entries must be *unique.*

Here is an example of producing a scenario 6-pack. The user has made the following selections for the selectable slots shown in Figure 5:

Slot 1: This is always the Current scenario. The user may not select another scenario.

Slot 2: "No Hat" scenario was selected by user. This scenario represents a specific scenario in the database.

Slot 3: The user has selected the HSRG Sol scenario. This scenario represents a specific scenario in the database.

Slot 4: The user has selected a "working" scenario based on the HSRG+Hab Scenario.

Slot 5: The user has selected a "working" scenario based on the Current Scenario (Slot 1).

Slot 6: This is always the Historic scenario. The user may not select another scenario.

After each slot is filled, the user clicks the button marked Continue on the lower left of the panel to proceed to Step 3 of 3.

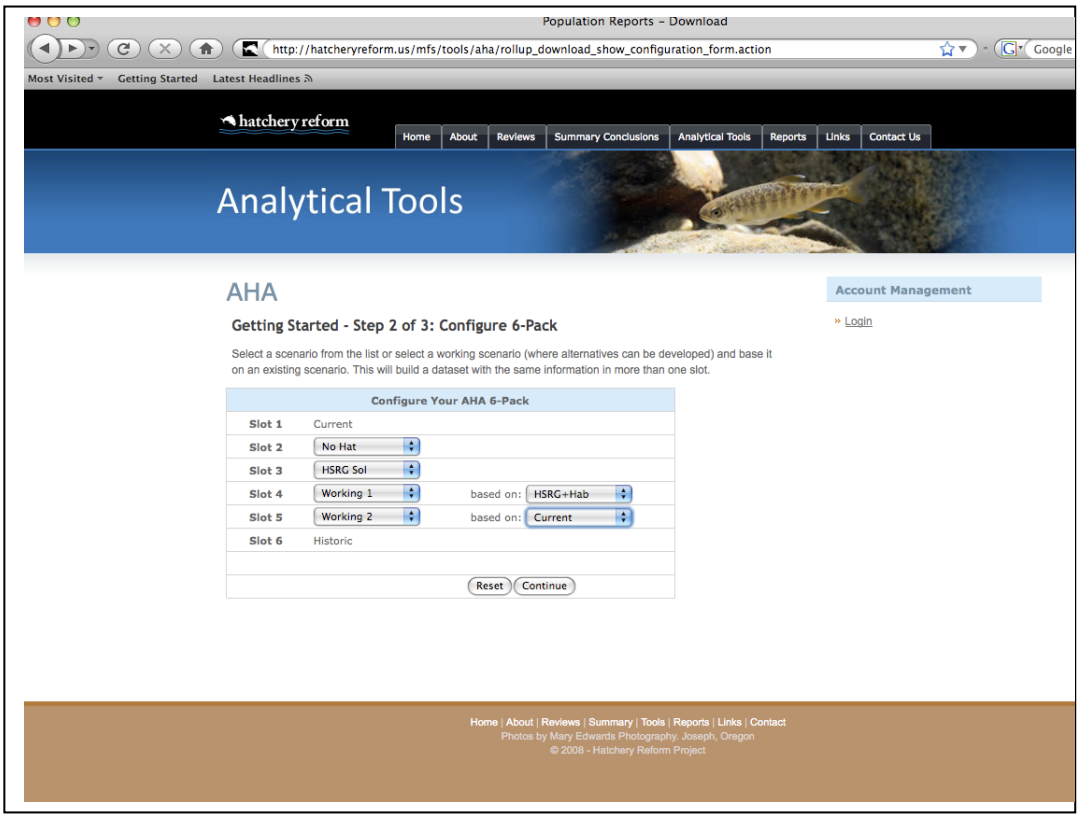


Figure 5. Fully configured 6-pack.

>>Step 3 of 3: Download

Through a link on the **Download** page, the user can access the configured AHA dataset (6-pack) package (Figure 6). The package contains the following:

- Scenarios specified on the Configure 6-pack page in a hatchery/population file.
- Four global datasets
- The AHA application
- Supporting documentation

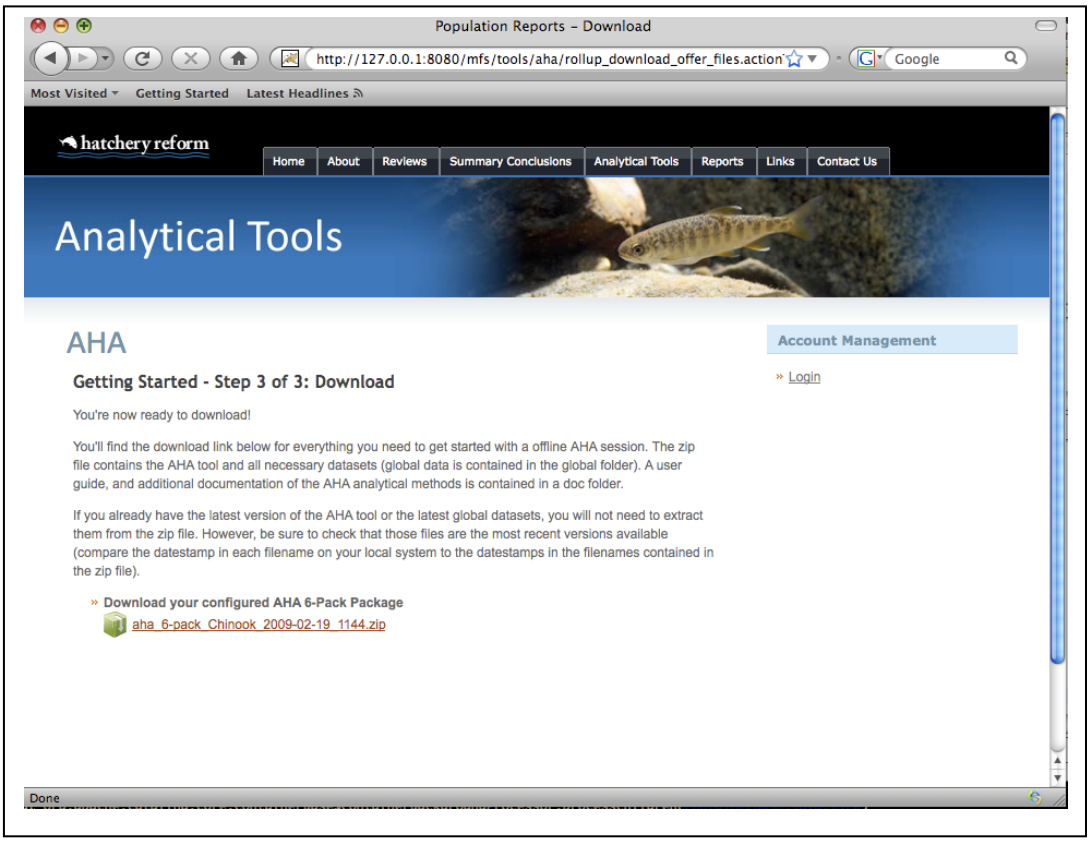


Figure 6. Click link to download zip file.

Download Global Data Wizard

Tools>Download Global Datasets>choose data sets

Choosing this link allows the user to download the current global data sets. Downloading the current global datasets allows the user to update an existing AHA session. From the main **Tools** page, select **Download Global Datasets** (Figure 7). The new page will have links for **Stray Matrix**, **Habitat Patterns**, **Harvest Patterns**, and **Hydro Patterns** (Figure 8). Click on any of the links to download the current global data set to your hard drive.

Note that the filenames are date-stamped, allowing the user to determine if global datasets used in their AHA session are outdated

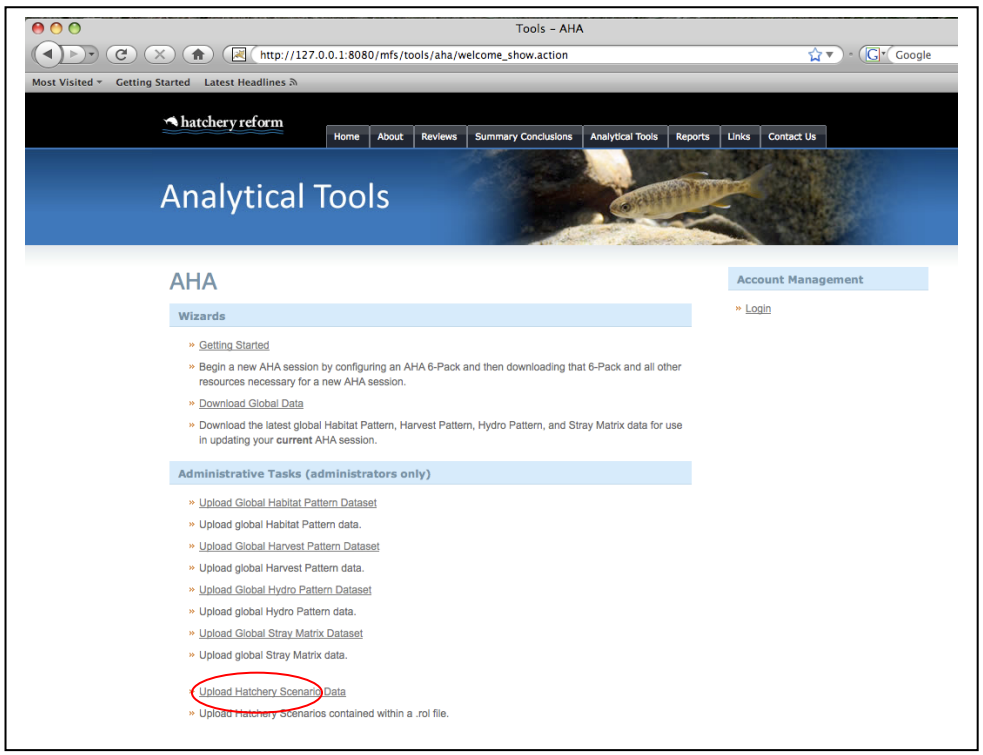


Figure 7. Global Data Download Wizard.

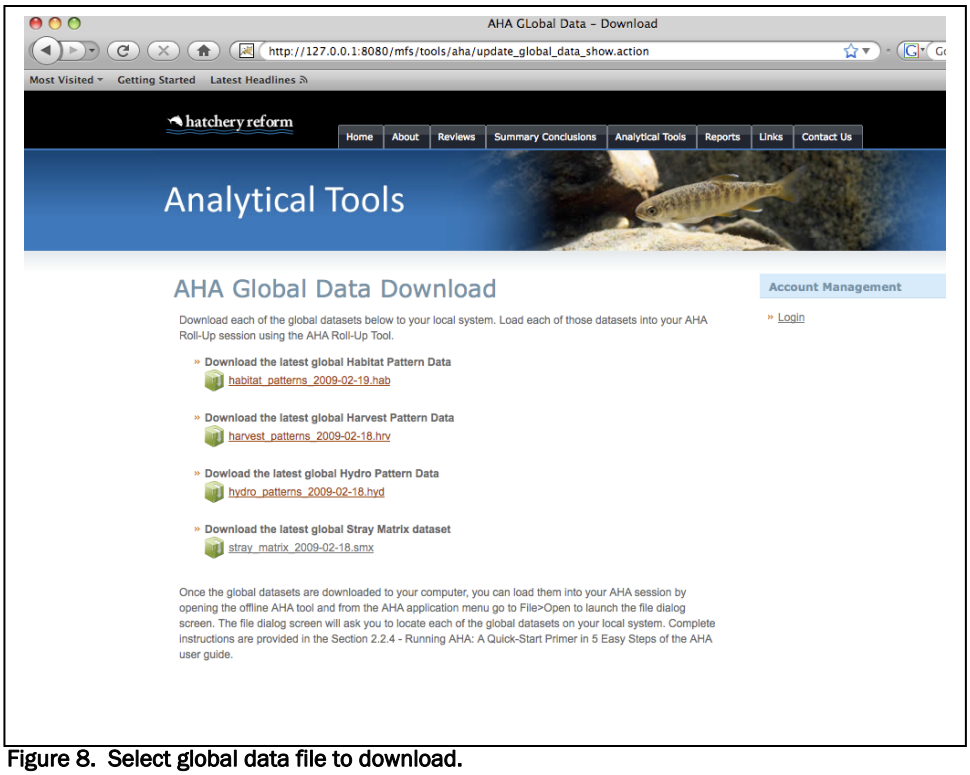


Figure 8. Select global data file to download.

Using the AHA Tools: Tasks for Administrative Users

This section outlines the procedure for uploading datasets to the central database. These activities are for administrators only. Administrators must have login credentials to use the upload tools.

Note that uploading any dataset *will replace* the existing dataset in the system.

Logging In

Any website page>Account Management>Login

On any of the website pages, click on the Login button below the Accounts Management heading (Figure 9). The Login page appears. Enter your name and password in the provided boxes and click on Login (Figure 10).

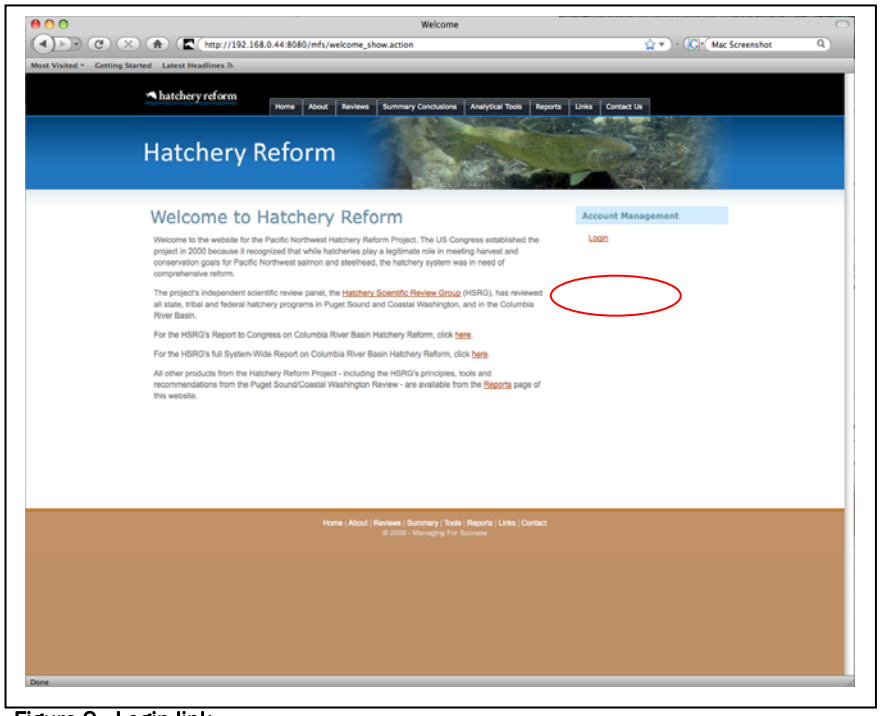


Figure 9. Login link.

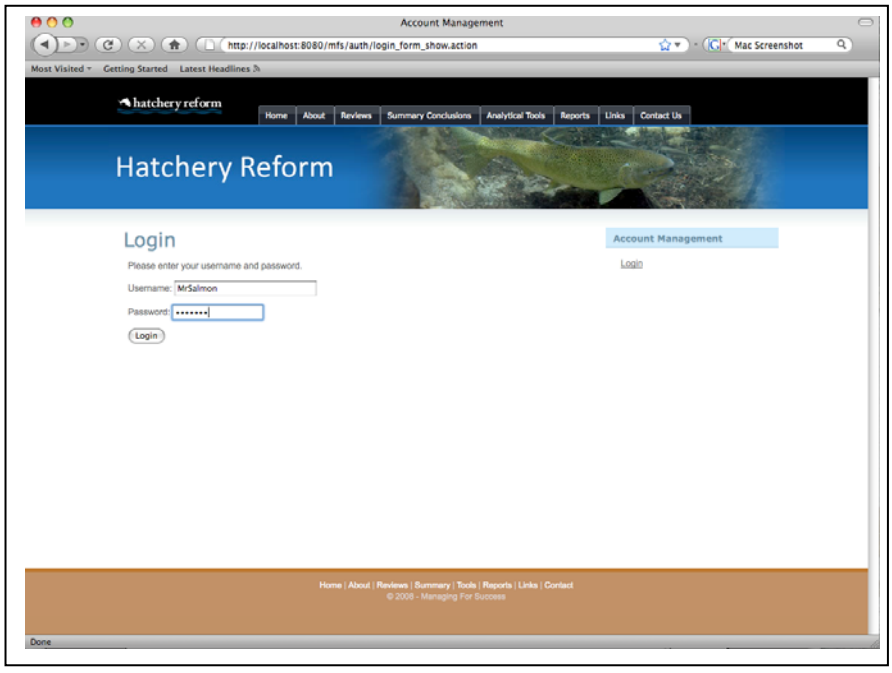


Figure 10. Enter username and password.

Under the heading "Administrative Tasks (administrators only)", there are 5 links which may be used to upload files to the remote database:

- Upload Global Habitat Pattern Dataset
- Upload Global Harvest Pattern Dataset
- Upload Global Hydro Pattern Dataset
- Upload Stray Matrix Dataset
- Upload Hatchery Scenario Data

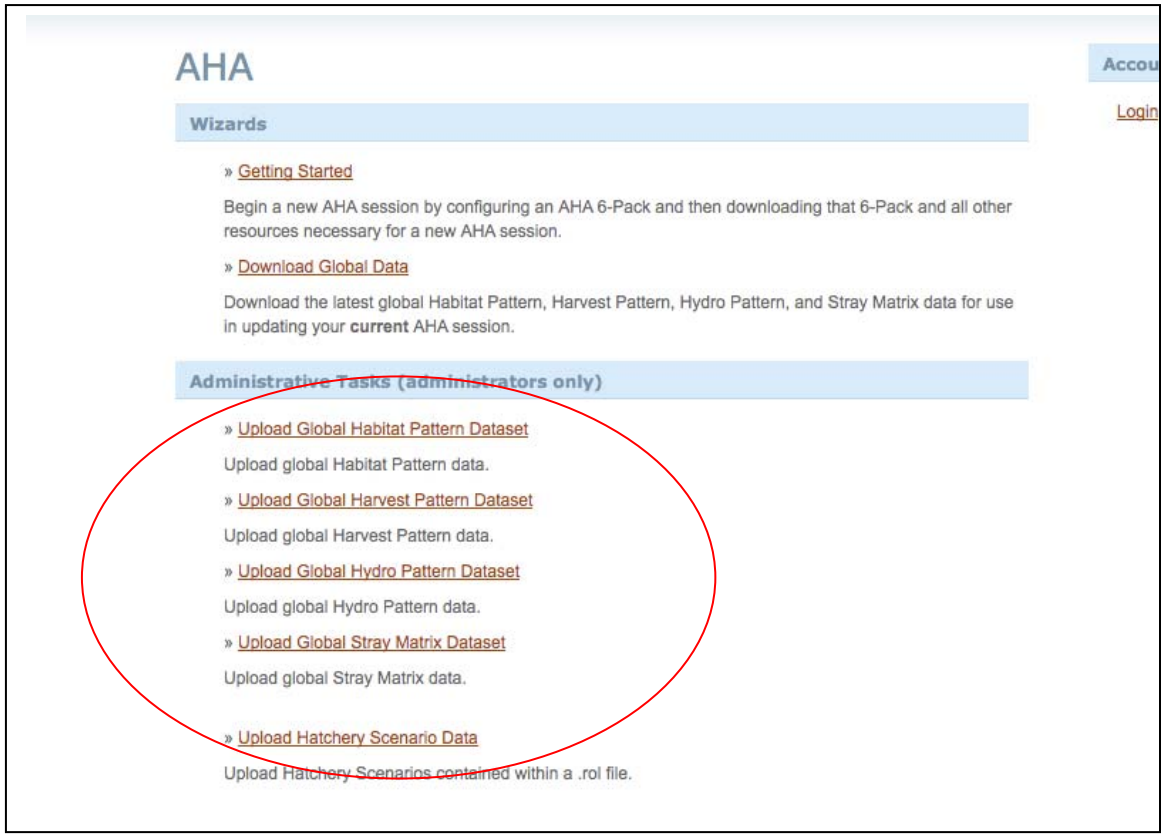


Figure 11. Administrative Tasks links.

The first four links allow the user to upload global datasets; the last link allows the user to upload an AHA hatchery/population file. **Note that uploading a global dataset will replace the current dataset in the central database.**

Upload Global Data

To upload global datasets:

1. Select type dataset to upload. A page similar to Figure 12 will load.
2. Browse to the location of global dataset.
3. Click Upload
4. Use the same procedure to upload any of the four global datasets.

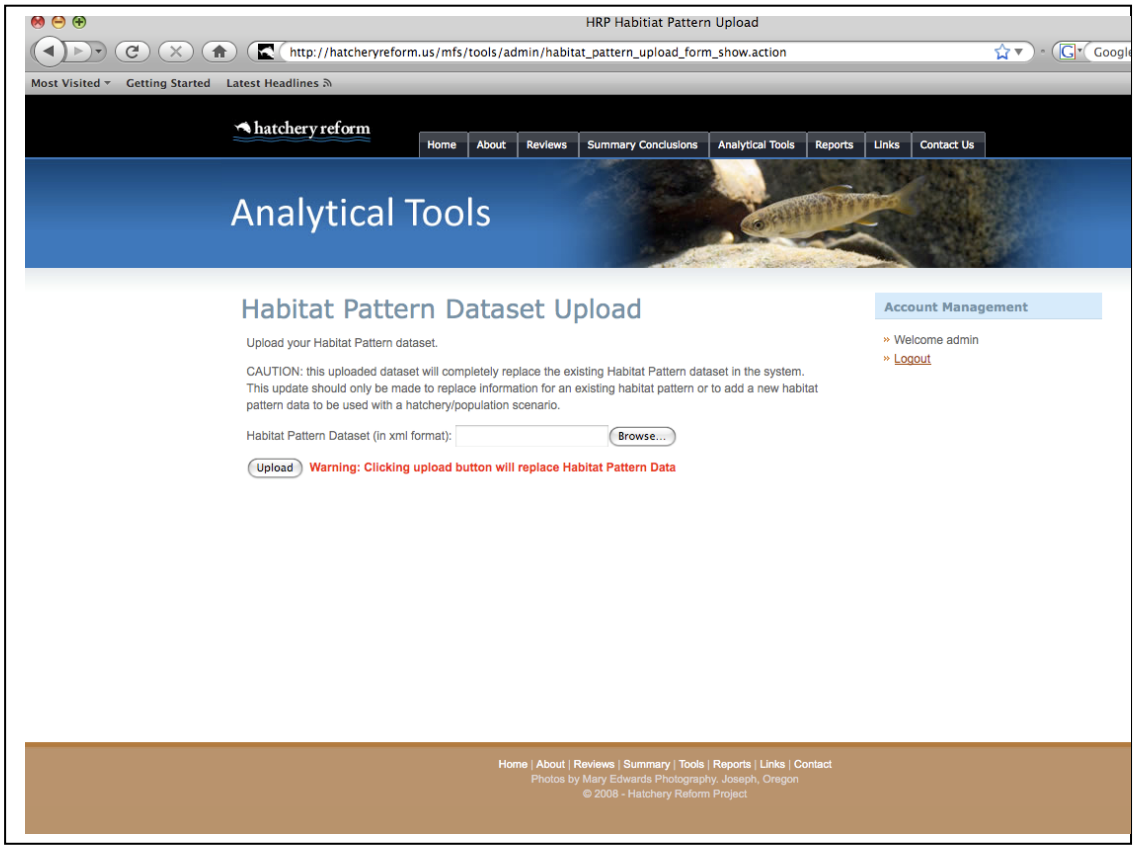


Figure 12. Select global dataset to upload.

A confirmation page with a unique dataset ID will appear after a successful upload. The dataset ID is referenced by the AHA scenarios to ensure scenarios are based on the current global datasets. The significance of referencing a correct dataset ID is discussed in the following section.

Upload Hatchery/Population Scenario Data

To upload hatchery/population scenario data:

1. From the Analytical Tools page, click the Upload Hatchery Scenario link.
2. Browse to the scenario 6-pack file.
3. Click Upload.
4. If the global dataset IDs in the hatchery/population file match those of the global datasets, the user is then prompted to specify which scenarios in the dataset to upload (Figure 13).
5. Note: If the global dataset IDs in the hatchery/population file do not match the current global dataset IDs, an error message similar to that shown in Figure 14 will be displayed. Synchronization of dataset IDs is discussed in the next section.
6. After selecting scenarios to upload, click Upload. A confirmation page will appear indicating a successful upload.

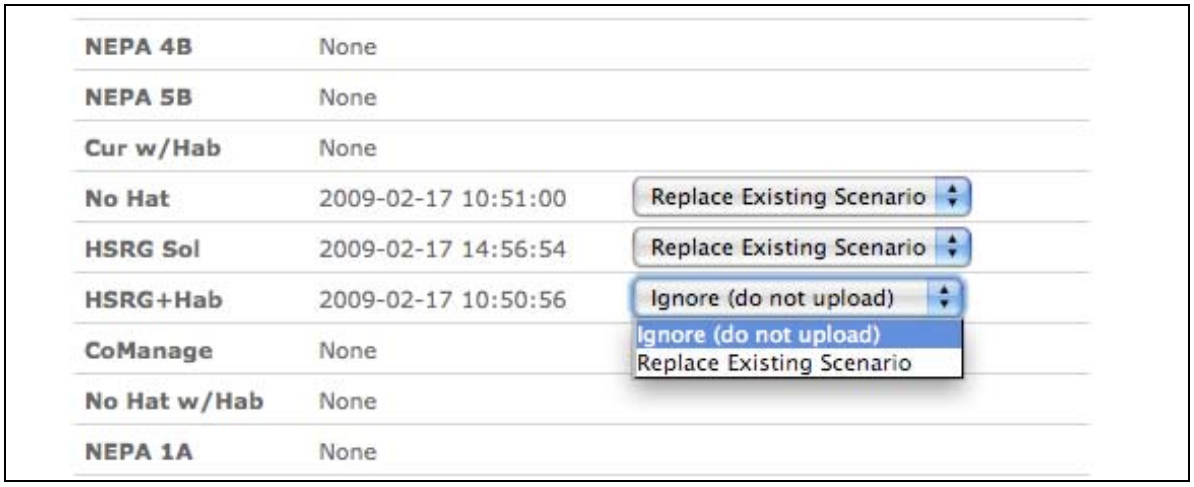


Figure 13. Select scenarios to upload.

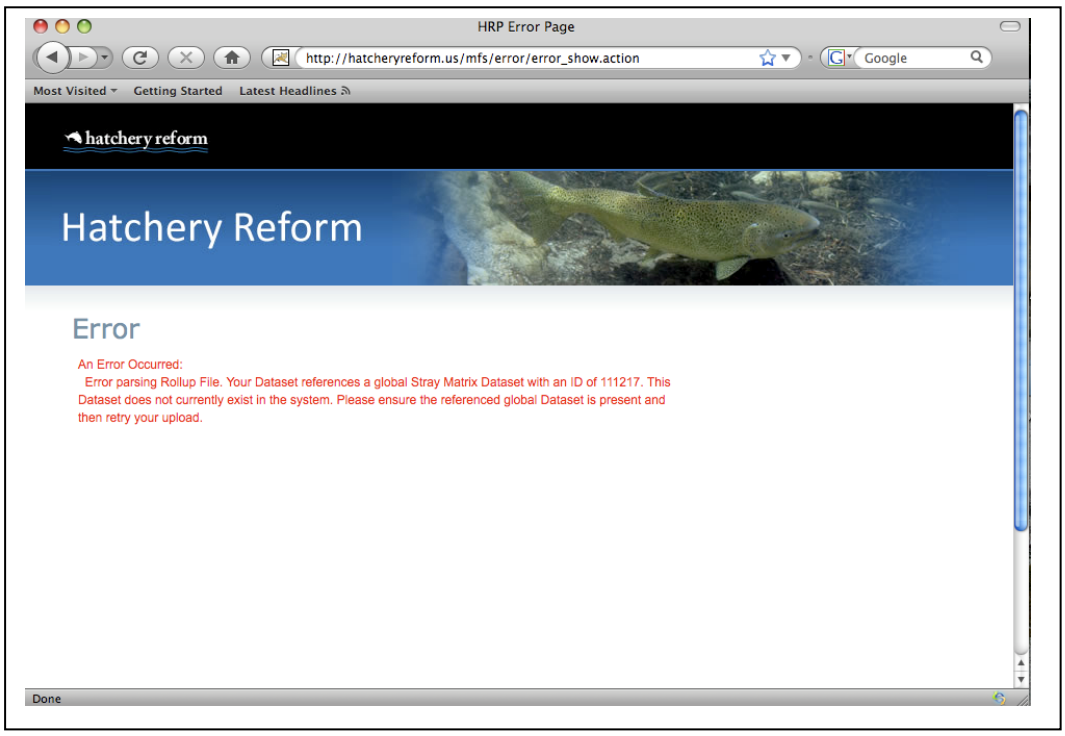


Figure 14. Error message caused by unsynchronized global dataset IDs.

Synchronizing Global Dataset IDs

As mentioned previously, an upload error is generated if pattern dataset IDs in the hatchery/population file do not match the respective IDs in each of the current global datasets. The user must synchronize the pattern IDs in the hatchery/population file with the current pattern datasets using one of the two methods outlined below:

- Method 1: If the scenarios are intended to be based on **the global datasets currently in the central database**, the user should update the local global datasets on their computer and synchronize the hatchery/population file following this procedure:

1. Download the current global datasets from the hatchery reform website.
2. Open a new offline AHA session.
3. Load the downloaded datasets into the AHA tool. (This procedure is discussed in detail in the AHA User's Manual, Section 2.2.4, Appendix D of the System-Wide Report.
4. Reload the hatchery/population file into AHA. The AHA tool will automatically update the patterns IDs in the file.
5. Re-save the hatchery/population dataset to be uploaded.

6. Upload the hatchery/population file following steps 1-5, Upload Hatchery Scenario Data.

❖ Method 2: If the scenarios are based on **global datasets newer than those currently in the central database**, the user should first update the global datasets in the central database and synchronize the scenario file following the procedure outlined below:

1. Upload the new global datasets used in the AHA session.
2. Download those same global datasets from the website. A new pattern ID will be generated indicating the global datasets originated from the central database.
3. Load the downloaded global datasets into the user's current AHA session.
4. Resave the hatchery/population dataset to be uploaded.
5. Follow steps 1-5, Upload Hatchery Scenario Data.

Population Management Tools

This section discusses the population management tools accessible from the Hatchery Reform website. All users are able to view population data. Users with login credentials are permitted to add and modify populations.

The population management tools allow users to add new populations, view and edit existing populations, and disable (but not delete) populations. In addition, users may view a population modification history table. Users should be aware that once a population is added or modified additional data synchronization is required using the offline AHA tool.

To access the population tools, select the Population Management link from the Analytical Tools tab:

Analytical Tools > Population Management

A page similar to that shown in Figure 15 will load.

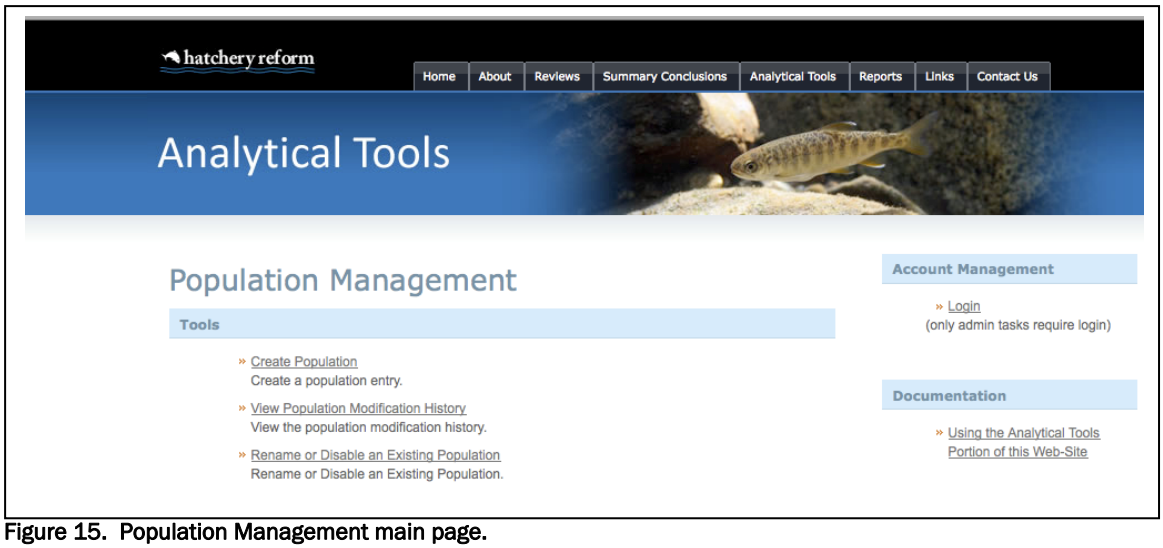


Figure 15. Population Management main page.

Create Population

To create a new population, click the Create Population link from the Population Management main page. The user will be prompted to login if they haven't already done so. A page similar to that shown in Figure 16 will load.

The user is required to provide the following information:

- **Population Name** – Enter the name of the new population. The mythical salmon population Sullivan's Gulch Chinook is shown as an example in Figure 2.
- **User Name** – The user is required to enter their name in this field. This information is necessary to identify to person posting the data as Hatchery Reform website login accounts may have several individual users.
- **Explanation** – The user should enter a brief description of the new population in this field. The description may contain up to 1024 characters.

Once the fields are complete, click Continue.

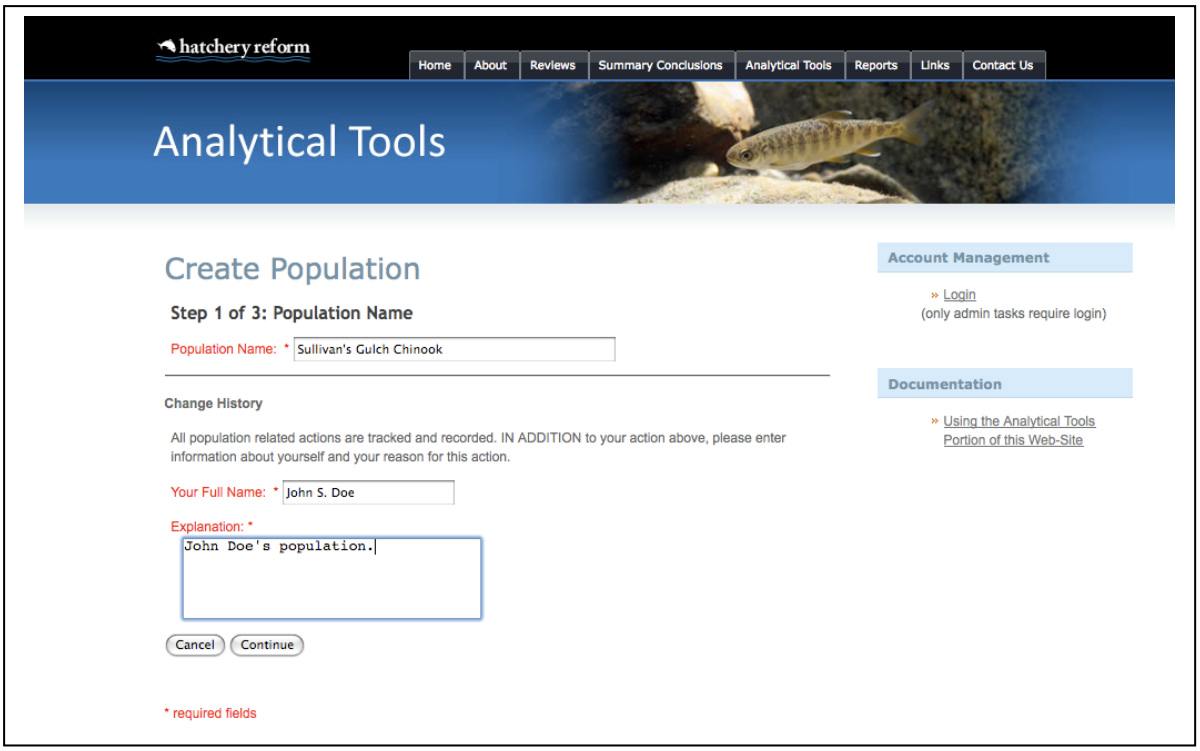


Figure 16. Step 1 of 3, enter required data.

In the second step, the user is prompted to confirm that the submitted data are correct. This is shown in Figure 17. If the information is correct, click Continue and a page indicating success will load (Figure 18). Note that a unique identifier is generated for the new population.

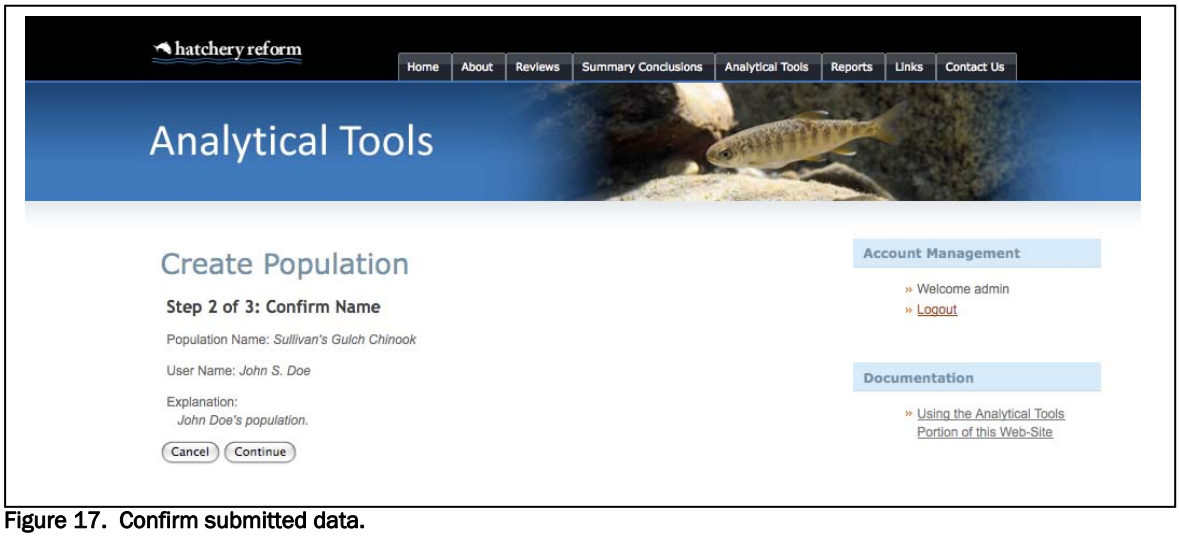


Figure 17. Confirm submitted data.

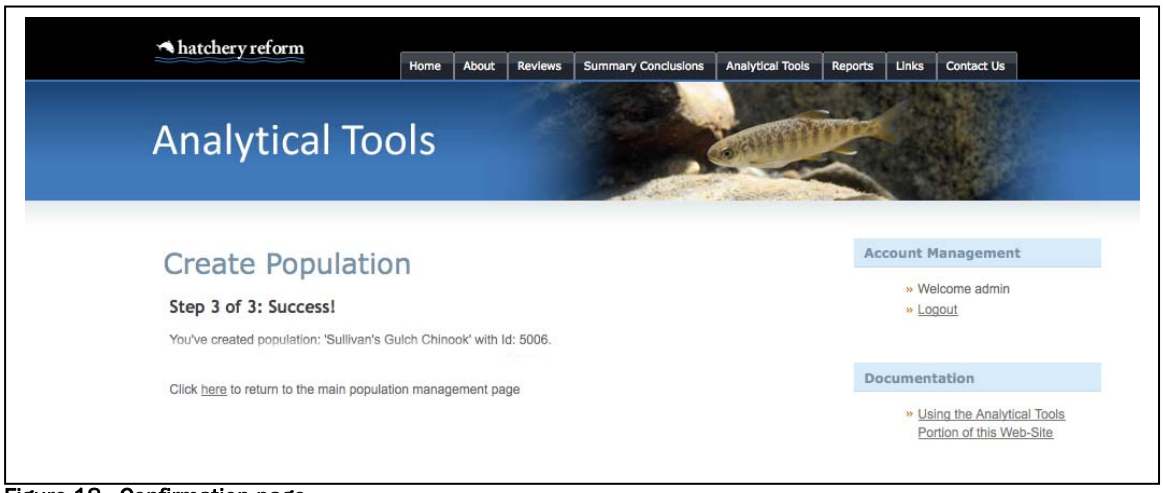


Figure 18. Confirmation page.

View Population Modification History

The View History table lists modification actions for all populations. Users may view the table without logging in.

To access the View History Table, click the link on the Population Management Tools main page (Figure 15). A page similar to that shown in Figure 19 will load.

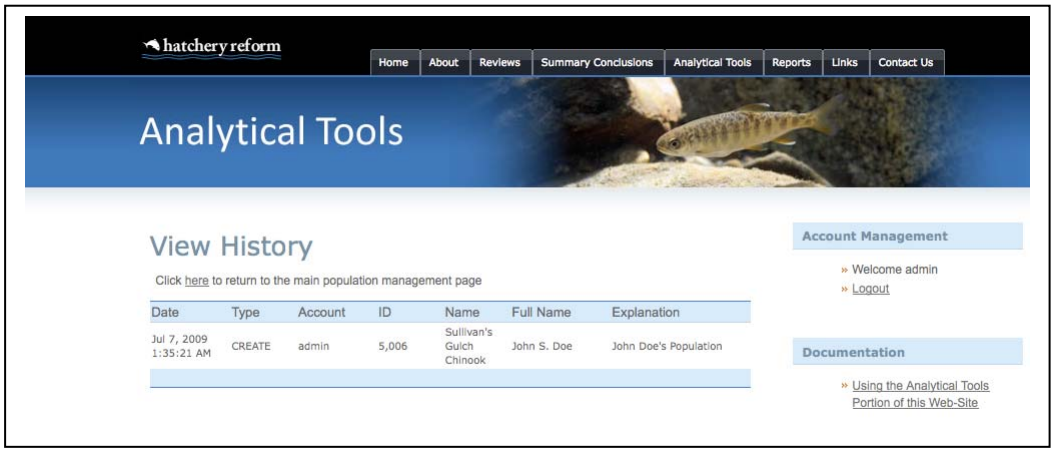


Figure 19. Population Modification History page.

The table has seven columns:

- **Date** – The date and time the modification was made.
- **Type** – The type of modification. Possible values are CREATE, RENAME, and DISABLE.
- **Account** – The login account used to access the Hatchery Reform website tools.
- **ID** – The unique identifier assigned to the modification event.
- **Name** – The population name.
- **Full Name** – The person responsible for the modification.
- **Explanation** – Explanatory notes.

Modify an Existing Population

To view enabled populations in the Hatchery Reform database, click on the Rename or Disable an Existing Population link found on the Population Management main page (Figure 15). A page similar to that shown in Figure 20 will load.

Users with login credentials are permitted to edit the population name or disable the population entirely. To rename an existing population, click on the Rename link in the Action column next to the population to be modified. The example shown in Figures 21 through 23 renames the Sullivan's Gulch population from "Chinook" to Coho".

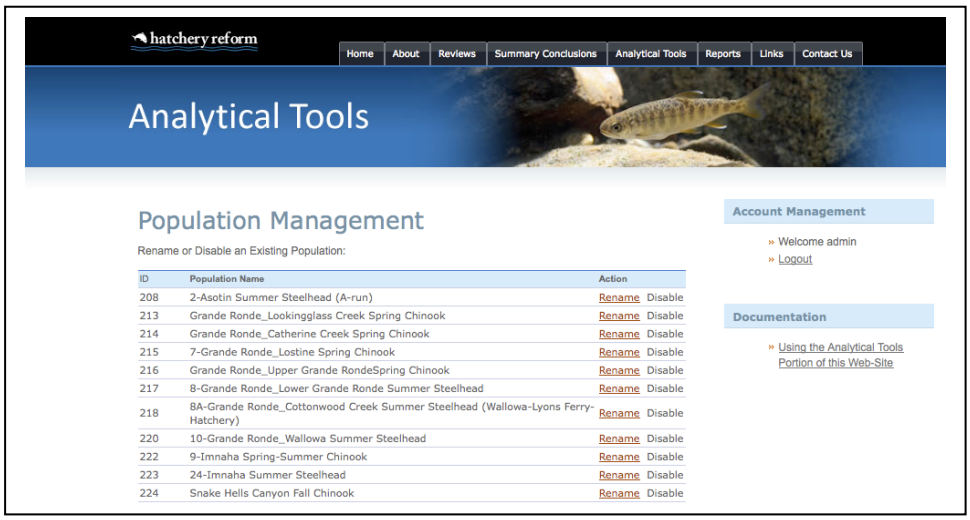


Figure 20. Step 1, rename population.

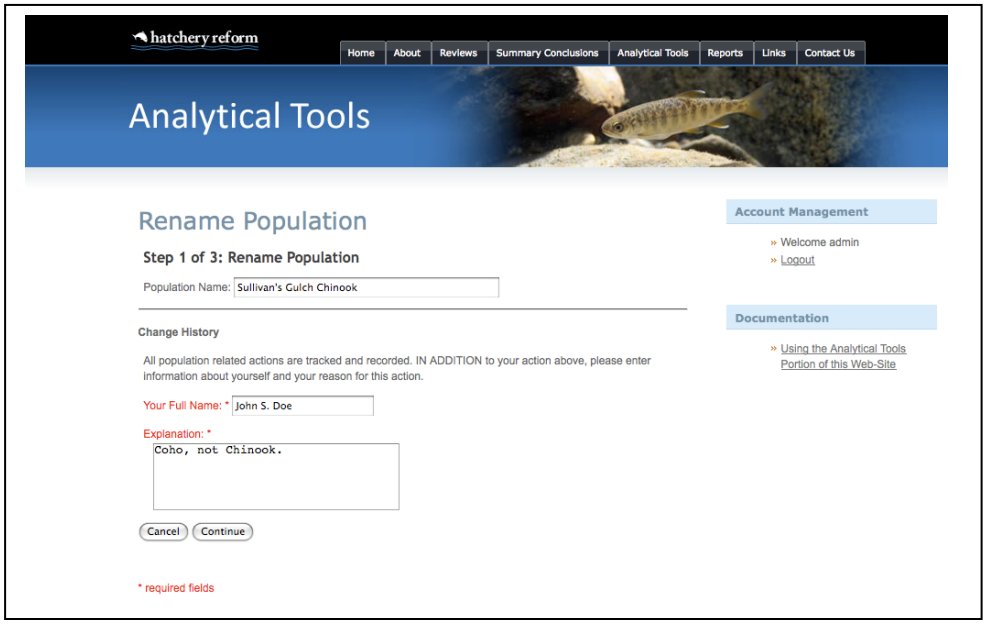


Figure 21. Step 1, rename population.

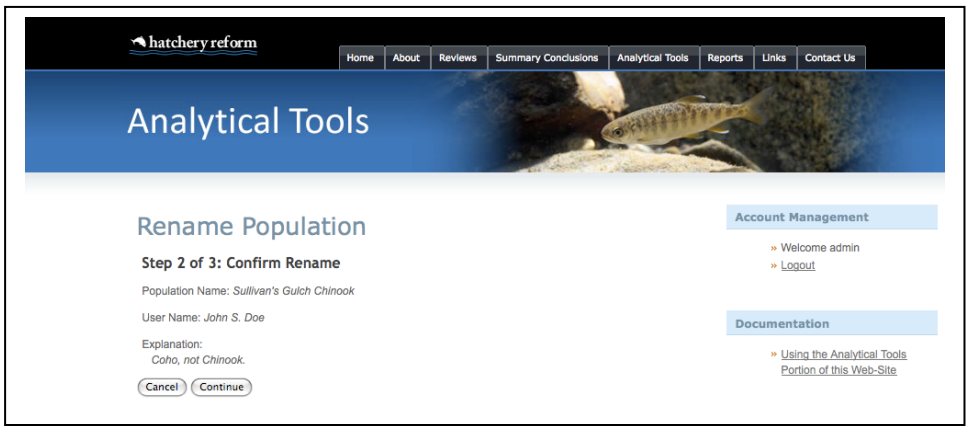


Figure 22. Step 2, confirm edits.

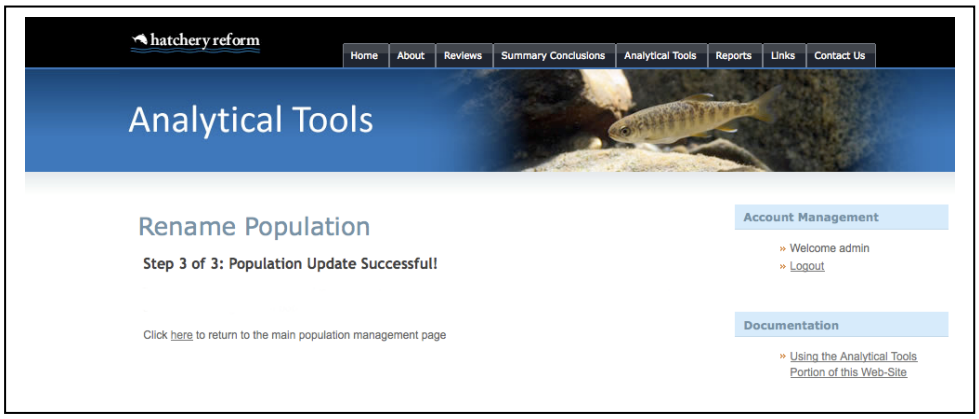


Figure 23. Step 3, confirmation page.

To disable a population, click the Disable link next to the population name in the main page table. If the Disable links are grayed out, additional steps are required as population cannot be disabled until all datasets that reference it are first edited.

To delete references to the population, the user must edit each file that references that population using the offline AHA tool. These files will include one or more of the pattern datasets, as well as a population-hatchery data file (formerly called a rollup file). Once the population references are deleted, the files must be uploaded using the HRP website upload tools. After a successful upload, the disable link become active, and the population can then be disabled. Note that disabling a population removes it from the table on the main page but does not delete it from the underlying data tables.

2.2 Offline All H Analyzer User Guide

2.2.1 Introduction

The "All H Analyzer" (AHA) program is the primary tool used to evaluate strategy options for hatcheries, habitat, harvest, and hydroelectric system out-of-basin survival (hydro, estuary, and ocean) for a single population and across multiple populations. This user guide was developed for AHA Version 13.0 (December 2008) (Figure 24).

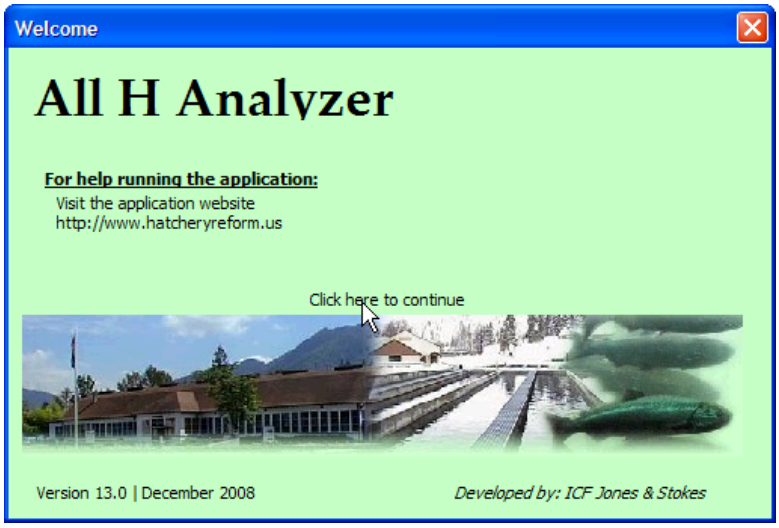


Figure 24. AHA open screen providing version number and contact information.

AHA was developed by Washington State fishery co-managers to facilitate the discussion of strategy options to restore and to manage salmon populations in the Pacific Northwest. AHA allows managers to explore the implications of balancing habitat restoration, hatchery practices, harvest, and hydroelectric dam operations in different ways, while simultaneously modeling the multiple interactions among populations given the manipulations of the Hs.

AHA should not be viewed as a new model, but rather as an application for combining information from observations and from existing models. The program makes relatively few new assumptions; rather, it brings together the results of other models such as EDT or stock recruit models for habitat, SIMPASS for Columbia River hydroelectric passage, and others. It does not replace these other models, but instead relies on them to provide inputs to the analysis. The inputs are relatively simple, so it is fast and easy to use, while focusing on the important elements of regional decision making regarding the four Hs.

Who Will Use AHA

AHA is intended primarily for technical users evaluating strategies for a single population and across multiple populations.

What Users Should Know

Users should have a familiarity with the previous generation of this program: the single population AHA application (program versions 1 through 12). More information about AHA is available at the Hatchery Reform web site (http://www.hatcheryreform.us).

What Software and Hardware Will Be Needed

AHA was programmed in Microsoft Excel Visual Basic for Applications (Excel VBA). It requires Microsoft Office 2000, 2003, or 2007. We have observed that AHA will perform calculations two to three times faster under Excel 2000 or 2003 compared to Excel 2007. The difference in overall calculation speed can be quite significant, depending on the speed of a computer's CPU and the number of populations in the analysis. It is possible to install Excel 2003 concurrently with Excel 2007 if faster performance is desired. The screens in AHA were designed for a resolution of 1280 x 1024. However, other resolutions will also work by adjusting the Zoom setting in Excel to see more of the page. The zoom can be set in any active program window using the keystrokes Control + "[" (Ctrl +]) or Control + "]" (Ctrl +]).

What Data Needed

When using the program for the first time, AHA will require five files in order to use all functions available in the program. All five of these files are available on the Hatchery Reform web site: http://www.hatcheryreform.us. Instructions for downloading these files were described previously in Section 2.1 of this appendix.

Files required for all AHA sessions:

Species multiple population file (*.rol file format). Note: multiple single-population *.aha[8] files from the previous generation of the program can also be used.

Global pattern and stray matrix files are required for the first AHA session after downloading the application. Specifically these files are:

- Stray matrix file (*.smx file format)
- Hydro pattern file (*.hyd file format)
- Harvest pattern file (*.hrv file format)
- Habitat pattern file (*.hab file format)

Once a stray matrix file and the three types of pattern files listed below have been loaded, they will not need to be loaded again to use the features of the program. We recommend loading periodic updates from files available at the Hatchery Reform website.

[8] The single population dataset is created from a previous version of the AHA application, or by saving an AHA Rollup session into single population files (see Saving Files later in this User Guide). Single population datasets have a *.aha extension.

Datasets for multiple populations are created from an AHA session and contain information for all populations.

2.2.2 Before Beginning

To download the AHA program, go to the Hatchery Reform web site (http://www.hatcheryreform.us). AHA is constructed in Microsoft Excel. Installing AHA is nothing more than unzipping the application file (AHA_V13.xls) to a location on your local hard drive. AHA dataset files can be in the same location as the application or in a separate location. These files should be stored in a location where they will be easily accessible later so they may be loaded into the application.

Launching the AHA Program

We recommend closing other files within a given instance of Excel before running AHA. Other Excel workbook files may be run concurrently with AHA, but for best performance they should be in separate instances of the Excel application. In other words, if an Excel workbook is open and the user wants to keep it open, simply launch a second instance of the Excel program in a separate window and use the open menu item from that second instance to open AHA. This should avoid most conflicts that could occur from macros running in AHA or other Excel workbooks.

Open AHA program by double clicking the AHA_V13.xls file or by opening the file via Excel.

Macro Security Levels in Excel

If the Excel 2003 macro security level is set to medium, a security message will appear when the AHA application is opened. This message will ask if the user would like to enable macros in the file. The AHA program will not work if macros are not enabled, so select "Enable Macros". If a message requesting to enable macros does not appear, then the security settings may be set at High or Very high. If so, at the top of Excel 2003's menu bar, go to Tools→ Macros→ Security and set the level to Medium in Excel 2003. Next close AHA and then reopen the application. The message asking to enable macros should appear.

If using Excel 2007, a security message will appear immediately below the Ribbon in Excel; click "Options" to enable content. If the security message does not appear, go to Developer → Macro Security and set the level to "Disable all Macros with Notification". Next close AHA and then reopen the application. The message asking to enable macros should appear.

Opening AHA

The application opens to the AHA welcome page, also called the Landing Page under the View menu option (Figure 25). This view includes populations filtering options which allow you to filter the population list by ESU, Region, or Species (more on this later).

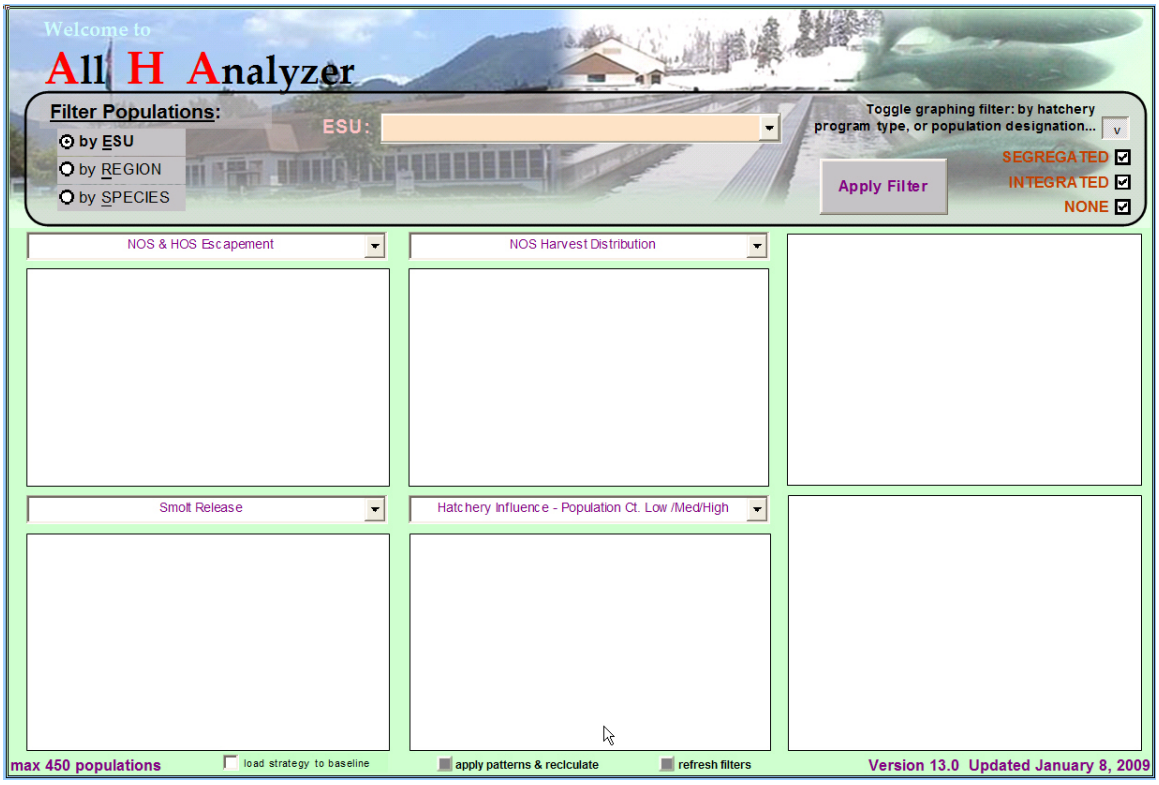
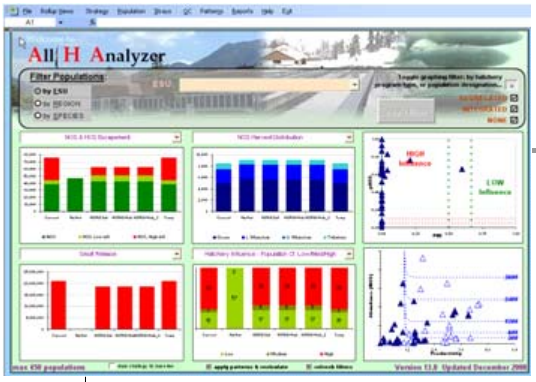


Figure 25. AHA Landing Page.

2.2.3 Application Map

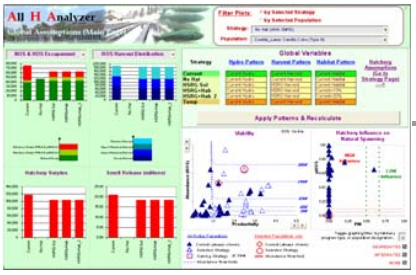
Four screens make-up the core AHA application (Figure 26). AHA always opens with the landing page and depending on the user's need, the user can either go directly to the Population Page to scroll through the populations and view/edit each individually, remain on the Landing Page to set the filters and view results combined for all populations, navigate to the Global Page to manage patterns to affect multiple populations, or navigate to the Strategy Page to manage populations and view/edit hatchery and stray information. The order of these steps is entirely up to the user.

Navigation between the screens is by the menu bar at the top of the application. Note that the menu bar appears under the "Add-Ins" Ribbon in Excel 2007.



Landing Page

View Population summaries
Filter populations for ESU, Region, Subbasin, or Species

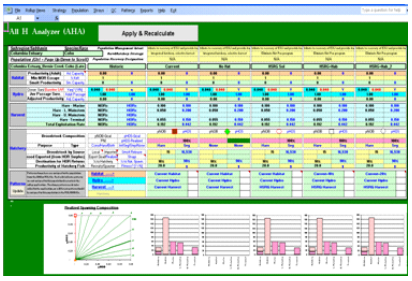


Global Page

Select and manage global patterns

Strategy Page

View and edit hatchery information
View and edit population list
Apply stray assumptions



Population Page

View and edit all H information for a single population

Hatchery Component
View/edit hatchery inputs
Natural Component
View/edit natural inputs
Fitness Component
View fitness inputs

Figure 26. AHA application map.

2.2.4 *Running AHA: A Quick-Start Primer in 5 Easy Steps.*

A Quick-Start overview has been provided to help users get started without having to read the entire user guide. These five steps are sufficient to get started to the point the information can be viewed/edited and a dataset can be saved. The user is strongly encouraged to review the entire guide once he/she is comfortable with the application basics.

Step 1. Go to the Hatchery Reform web site to download data files.

The website is accessible from the offline application file menu (Figure 27):

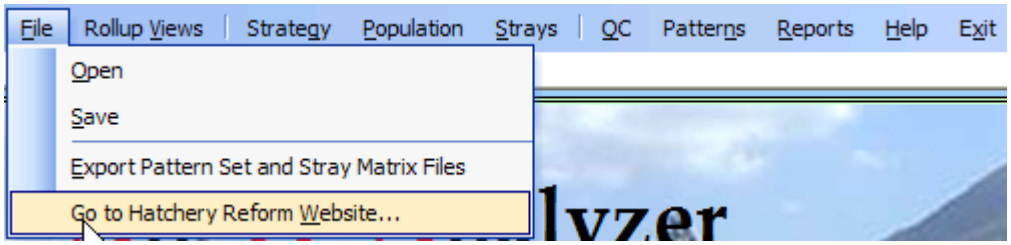


Figure 27. Navigation to the application online web site.

Microsoft Internet Explorer Version 4 or later must be installed to use this feature.

Or go to http://www.hatcheryreform.us

Follow the instructions on the website and in Section 2.0 of this appendix to download the following five file types:

- Species population files (*.rol file format), for one or more species. These files contain all available population data for a given species (Chinook, Coho, Chum, Steelhead, and Sockeye).
- Stray matrix file (*.smx file format)
- Hydro pattern file (*.hyd file format)
- Harvest pattern file (*.hrv file format)
- Habitat pattern file (*.hab file format)

Step 2. Open the files in AHA.

From the application file menu to go to **File > Open** (Figure 28).

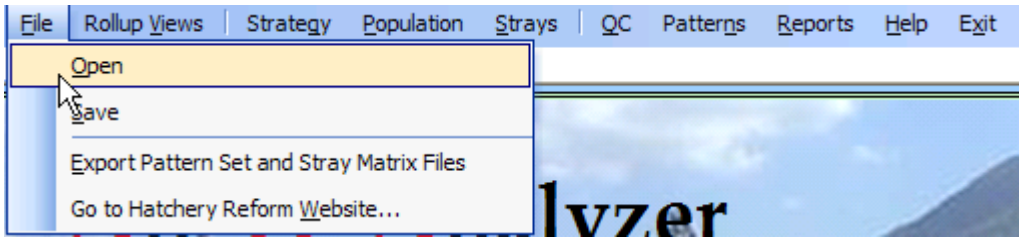


Figure 28. Navigation to File>Open to load data into the offline application.

The file dialog box will appear to locate files to load (Figure 29).

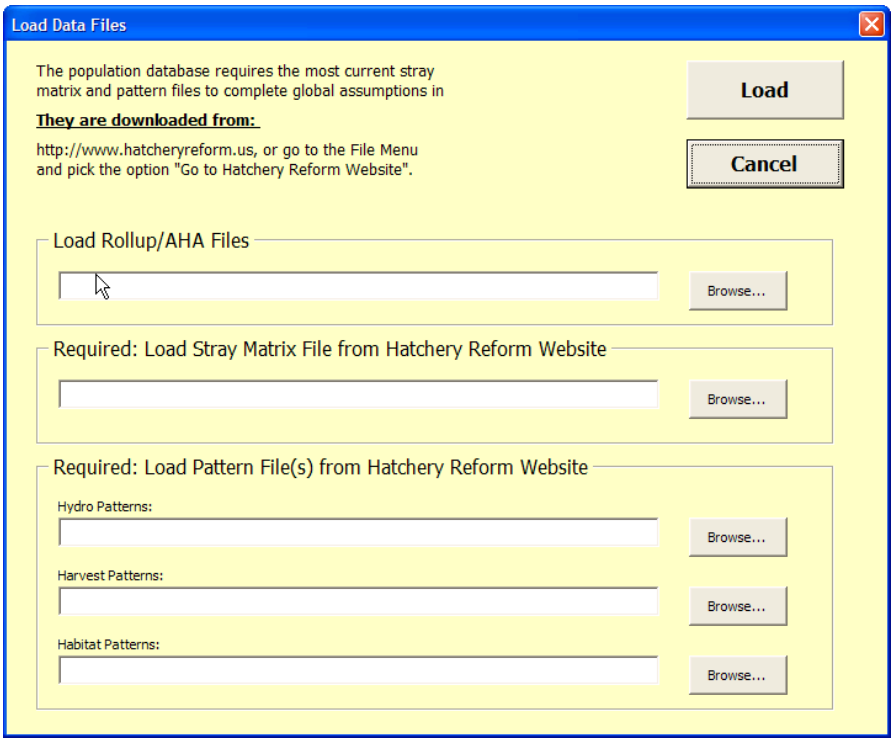


Figure 29 The file dialog box to load files into the offline application.

Next, browse to the location of the *.rol file that has just downloaded (Figure 30).

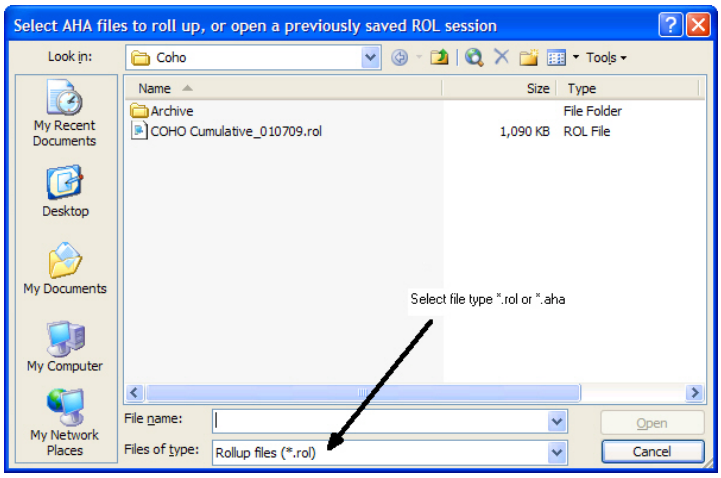


Figure 30. Locate file dialog box.

Now do the same for the Stray matrix and Pattern files (Figure 31):

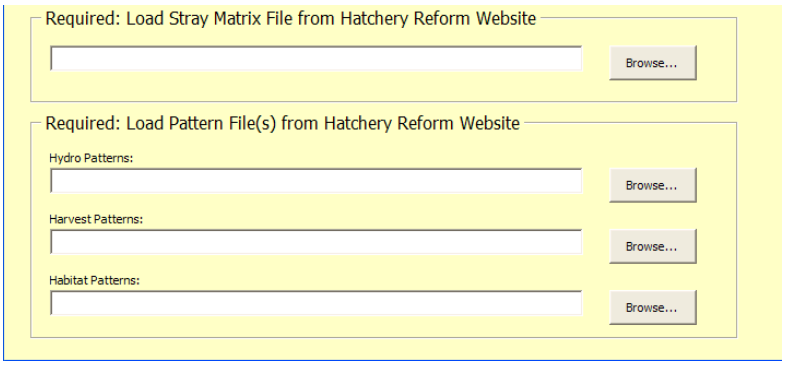


Figure 31. Portion of dialog box to locate stray and pattern files.

The dialog box should be completed with file information for the corresponding data sources (Figure 32).

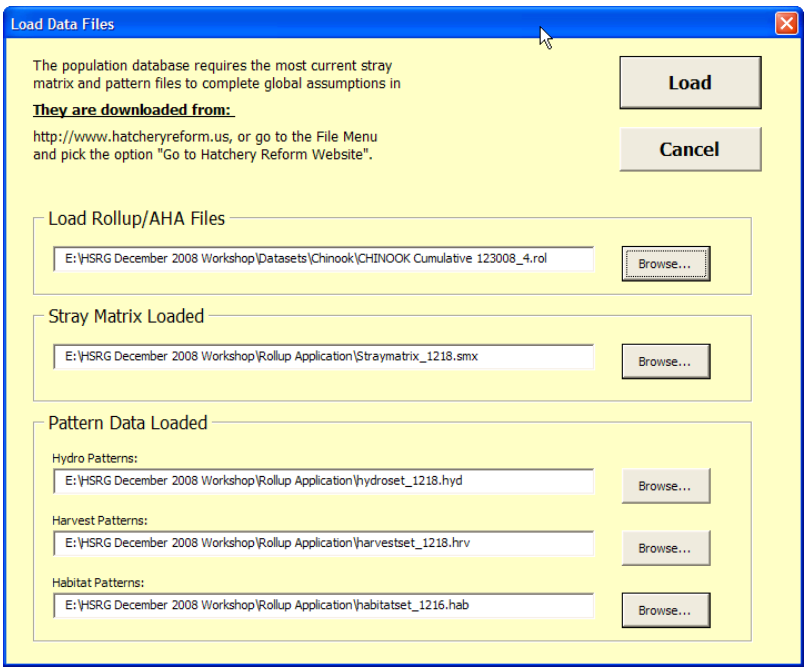


Figure 32. Completed file dialog box ready to load files.

The selected data is now ready to load into AHA.

Click the "Load" button at the top of Figure D-9 to begin loading the files. The status bar at the bottom-left of the AHA window will update as the load progresses.

Step 3. View the data summary and Filter Populations on the Landing Page

Once data is loaded, the Welcome Page/Landing Page will look something like this Figure 33 with charts filled with data.

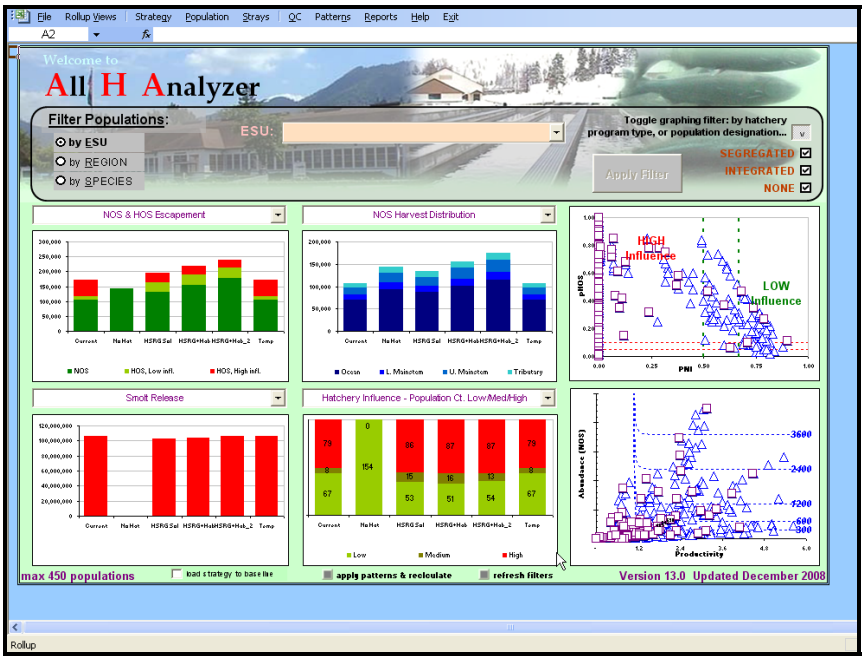


Figure 33. The AHA offline application with data loaded.

A summary of some of the important data contained in the *.rol file loaded now show in the data windowpanes. The data view can be configured to the user's liking, by simply selecting the chart caption from one of the corresponding four dropdown menus on the page Welcome/Landing page (Figure 34).

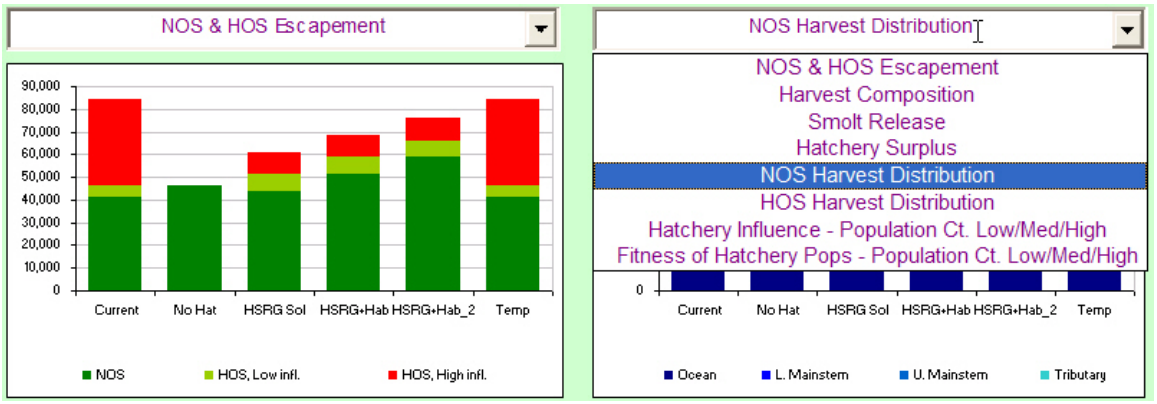


Figure 34. Dropdown menu choices for charts on Welcome/Landing page.

Filter Populations by Region or ESU

ESU and Region values from the dataset are listed in the dropdown menus at the top of the landing page (Figure 35). First, Select from the radio buttons to filter populations by ESU, Region, or Species. Once filter choices are complete then click the "Apply Filter" button next to the filter dropdowns.

Select an ESU to filter

Select a Province and Subbasin to filter

Select a Species/Race to filter

Figure 35. Filter populations in a dataset.

Step 4. View and Edit Single Populations (Legacy AHA view)

The Single population AHA viewer is nearly identical to the previous generation of AHA, the functions of which have been integrated into this version of AHA. The main difference in the interface is that values in output cells update on an apply command, via the **"Apply & Recalculate"** button at the top of the screen. This will update and save to memory all data associated with this population.

Navigation to the single-population view from the menu bar can be from either the Rollup Views menu item or the Population menu item (Figure 36).

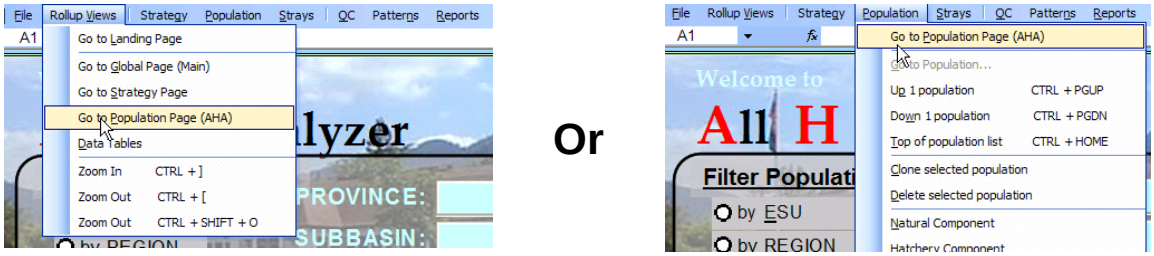


Figure 36. Navigation pathways to the AHA single population view.

The single-population AHA view will display (Figure 37) for the first population in the dataset. Note the population name in the upper left hand corner of the screen. See Section 2.2.5 for more information about the Population screen.

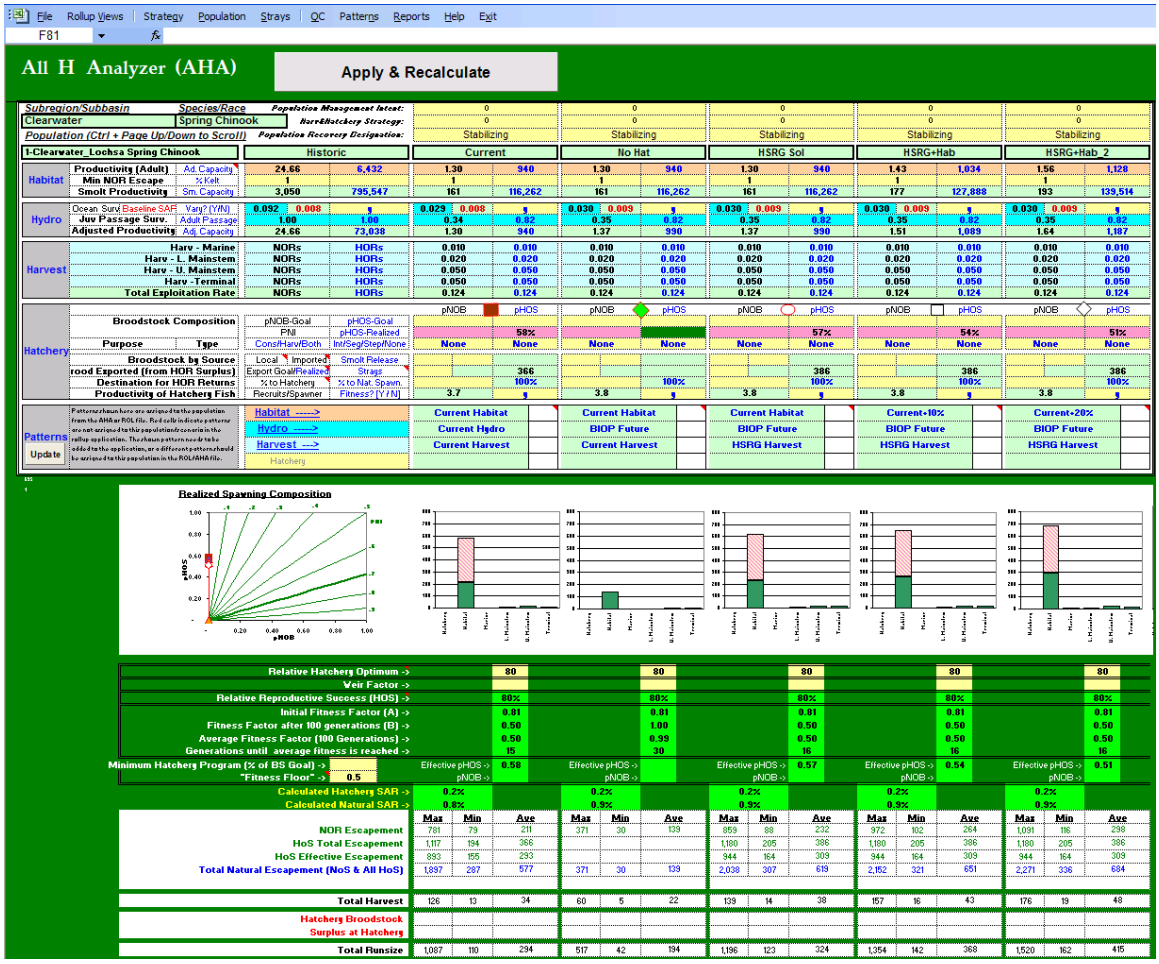


Figure 37. The single population AHA view.

VERY IMPORTANT: *BEFORE* MOVING TO A DIFFERENT POPULATION OR ANOTHER SCREEN, FIRST CLICK THE "**APPLY & RECALCULATE"** BUTTON AT THE TOP OF THE SCREEN TO SAVE EDITS TO MEMORY.

To move among populations use Ctrl + {Page Up/Page Down} to go up or down the list of populations in this (or any other) view.

To apply edits to other populations via the stray matrix in the rollup, go to the "Redistribute Strays" menu option under the Strays menu (Figure 38).

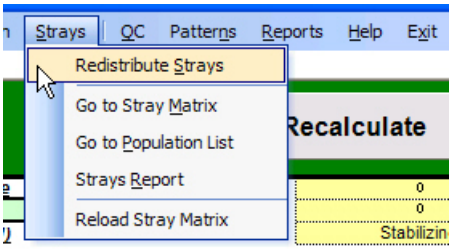


Figure 38. Navigation to the Strays menu item.

To review the hatchery component of the selected population, from the menu bar go to the Hatchery Component menu item (Figure 39).

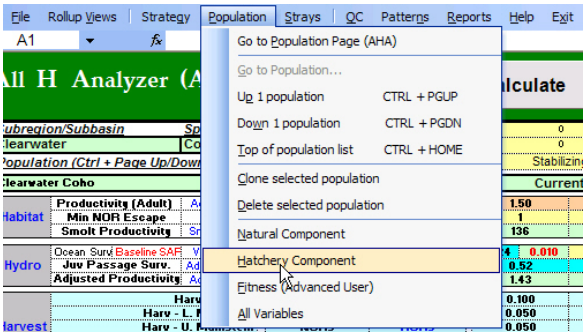


Figure 39. Navigation to the Hatchery Component menu item.

This will display the Hatchery Component "QC" view, which displays input variables for the hatchery program. Users will recognize these inputs from the previous generation of AHA (Figure 40).

QC / Batch Editor, by stock

Reset One Value | Reset All Values | Clear QC

Apply to Rollup | Quick Recalculate

Selected Population: (Ctrl + Page Up/Down to Scroll)

1-Tucannon Spring Chinook

Wizard: Hatchery Component

Refresh Table -->

Variable ID	AHA Variable	Strategy ---> / ID --->	Current 23	No Hat 13	HSRG Sol 14	HSRG+Hab 15	HSRG+Hab_2 24	Historic 12
1	Hatchery Program Size							
241	NOR Broodstock Ave		45	0	55	55	55	0
231	HOR Broodstock Ave		44	0	55	55	55	0
64	Primary Program Broodstock-Local		90	0	110	110	110	0
251	Primary Program Smolt Release		132,556	0	163,350	163,350	163,350	0
130	Planned # of Smolts released		133,650	0	163,350	163,350	163,350	0
254	Export Realized		0	0	0	0	0	0
299	Number of Juveniles Exported (rollup only)		0	0	0	0	0	
1	Survival of HORs in Hatchery							
151	Percent Hatchery Release 1		100%	100%	100%	100%	100%	0%
295	Percent Hatchery Release 2		0%	0%	0%	0%	0%	
41	HOR in Hatchery Eggs/Female		3,600	3,600	3,600	3,600	3,600	0
45	HOR in Hatchery Percent Females		50%	50%	50%	50%	50%	0%
42	HOR in Hatchery Female Prespawning Surv.		1.00	1.00	1.00	1.00	1.00	0.00
273	Eggs per Spawner		1800	1800	1800	1800	1800	
160	Percent Eggs culled release 1		0%	0%	0%	0%	0%	0%
161	Percent Eggs culled release 2		0%	0%	0%	0%	0%	0%
43	HOR in Hatchery Fry to Smolt Surv. Rel 1		0.825	0.825	0.825	0.825	0.825	0.000
44	HOR in Hatchery Fry to Smolt Surv. Rel 2		0.900	0.900	0.900	0.900	0.900	0.000
54	HOR Recruits/spawner Rel 1		3.0	3.0	3.0	3.0	3.0	0.0
55	HOR Recruits/spawner Rel 2		3.0	3.0	3.0	3.0	3.0	0.0
1	Survival of HORs in Nature (relative to NORs)							
1	Post Release Juveniles							
237	HOR Post Release Smolt to Spawner- Relative Surv		0.184	0.184	0.184	0.184	0.184	0.000
53	HOR Post Release Smolt to Spawner - Comp. Factor		1.00	1.00	1.00	1.00	1.00	0.00
1	Returning Adults							
46	HOR in Nature Spawn Effectiveness		0.80	0.80	0.80	0.80	0.80	0.00
52	HOR in Nature Spawner to Egg - Rel. Prod		0.80	0.80	0.80	0.80	0.80	0.00
51	HOR in Nature Spawner to Egg - Comp. Factor		1.00	1.00	1.00	1.00	1.00	0.00
48	HOR in Nature Egg to Smolt - Rel. Prod		1.00	1.00	1.00	1.00	1.00	0.00
47	HOR in Nature Egg to Smolt - Comp. Factor		1.00	1.00	1.00	1.00	1.00	0.00
50	HOR in Nature Smolt to Spawner- Rel. Prod		1.00	1.00	1.00	1.00	1.00	0.00
49	HOR in Nature Smolt to Spawner - Comp. Factor		1.00	1.00	1.00	1.00	1.00	0.00

Figure 40. The Hatchery Component screen for a single population.

Values in yellow cells can be edited, green cells are calculated values and cannot be edited. Changes made to variables in this view can be recalculated for the selected population by clicking "Quick Recalculate" at the top of the screen, or applied to the population in memory by pressing the "Apply to Rollup" button.

VERY IMPORTANT: The "Quick Recalculate" button does not save edits to memory. Use the "Apply to Rollup" button to save edits before leaving this screen or moving to a new population.

Now that the AHA results have been reviewed, it is time to SAVE the work.

Step 5: The most important step. SAVE population data.

From the menu bar go to the **File > Save** and a dialog screen will open with save options (Figure 41).

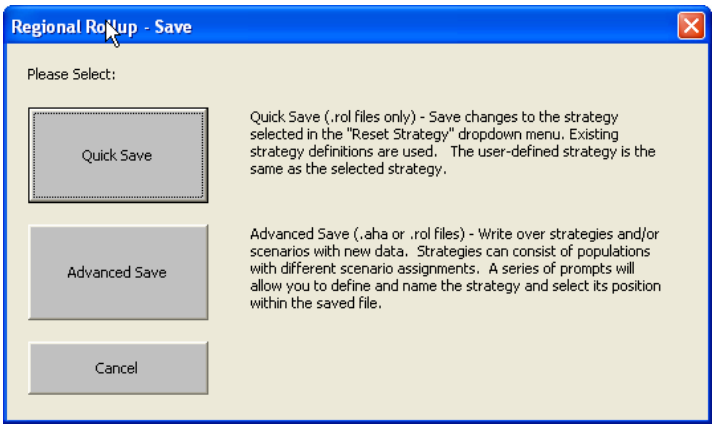


Figure 41. File save options.

"Quick Save" is what will be used in most cases. This will simply save the data and any changes made. "Advanced Save" is used if the user wants to save *.aha files, or save a user-defined strategy, overwriting an existing strategy in the dataset. This will be discussed in more detail the next section describing advanced features of the application.

On clicking "Quick Save" a traditional Windows "Save As" dialog will open (Figure 42).

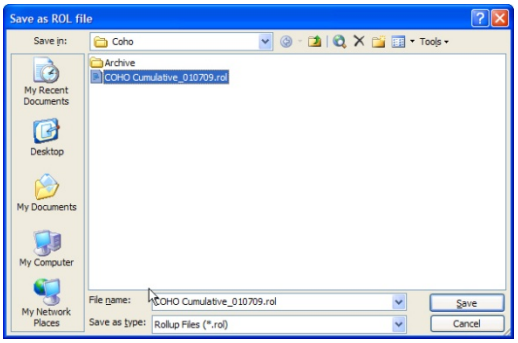


Figure 42. The Windows "Save As" dialog screen to save a *.rol file.

Choose the location of the file to save. Click "Save" and after a period of time (5 – 60 seconds depending on the number of populations), a message will pop up asking the user to complete the save (Figure 43).

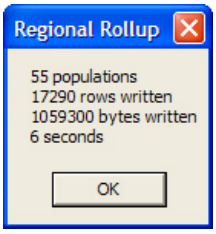


Figure 43. Confirmation message to complete the *.rol save.

Congratulations! A rollup file that can be used in a later AHA session or uploaded to the Hatchery Reform website has been successfully loaded/edited and saved.

Finally, before closing the AHA application, the AHA application (Function Key - F12 opens the "Save As" dialog within Excel) should be saved to retain the global pattern and stray matrix data. This information is saved with the AHA application and not the just saved *.rol file. Saving the AHA application means the next time the application is opened, only the *.rol file will need to be loaded because the global data are already stored with the application (Figure 44).

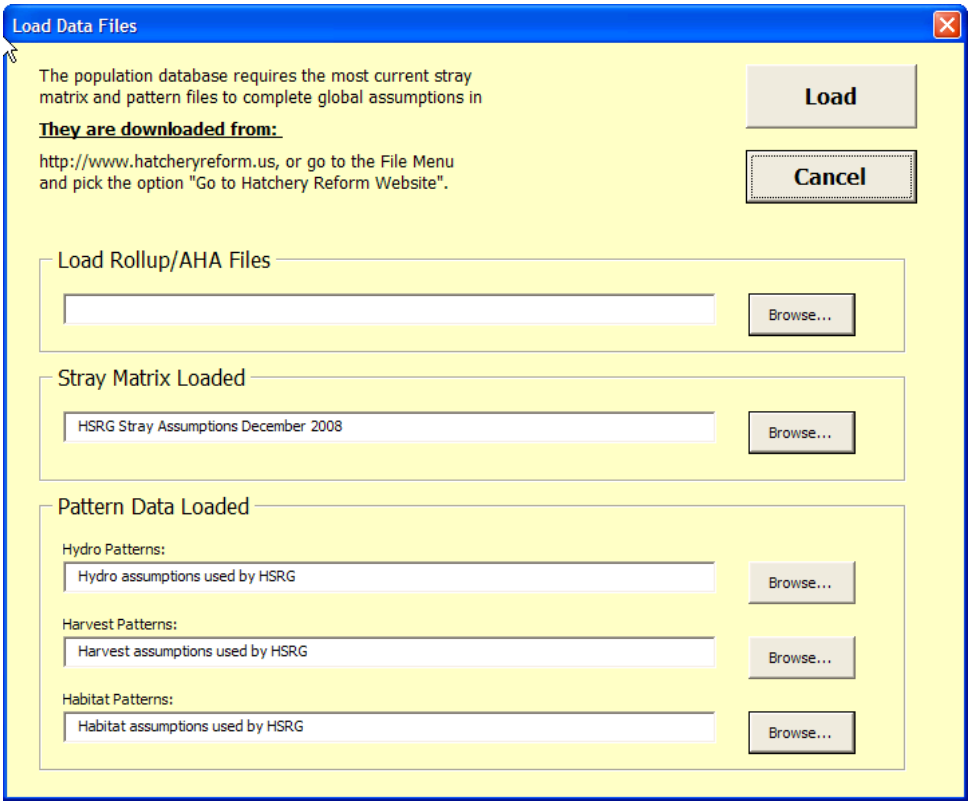


Figure 44. The Load Files dialog screen with stray matrix and pattern data loaded from a previous AHA session.

2.2.5 ADVANCED Features of the AHA Application

In this section, more details about the topics covered in the quick start will be discussed and other important features of the AHA program will be described.

The AHA menu bar

AHA contains several different views, all of which are accessed from the navigation menu bar at the top of the screen. Note that the menu bar appears under the "Add-Ins" Ribbon in Excel 2007.

Zoom controls for adjusting the viewing area

To adjust the size of the viewing area in any screen, use the **Ctrl + "["** {left bracket} to reduce zoom value (zoom out), or **Ctrl + "]"** {right bracket} to increase zoom value (zoom in). To zoom to 100 percent, use the key combination **Ctrl + Shift + "O"**.

Loading a Dataset

This is always the first step when running AHA. Population files (*.aha) are single-population data files (as generated from the single-population AHA tool), while *.rol files contain multiple population data files. A *.rol file can contain up to 450 distinct populations. These files are organized by species (Chinook, coho, steelhead, sockeye, and chum).

The rollup application requires loading the population data contained in these files into memory before beginning to use the analysis tools. If the application Excel file (Function key F12 opens the Save As… dialog within Excel) is saved during an active AHA session, it may appear that data is still loaded from the last AHA session. However, the data is not saved in memory and functions within AHA will not be available to the user. The reason for this is that the AHA application stores population data in memory during a session, rather than through cells and formulas on worksheets.

Therefore, it is very important to use AHA similarly to any other application: Open the data files (*.rol or *.aha) when beginning an AHA session, and even more important—Save the data files (*.rol or *.aha) before closing an AHA session.

From the File menu, choose "Open" to locate the data files (Figure 45).

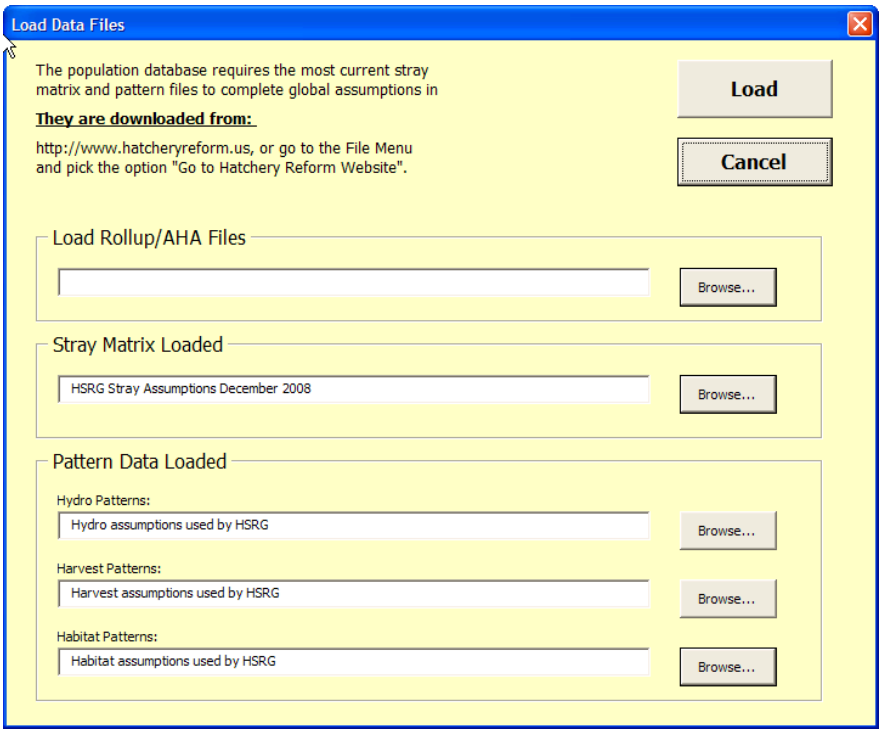


Figure 45. File > Open: Load Data Files menu

The first frame at the top of Figure 45 specifies the filename of the *.rol (or *.aha) file to load. This is the population data that AHA stores in memory and must be saved (**File > Save** from the AHA menu bar) before closing AHA to preserve changes made in a session.

Observe the other frames in Figure 45 labeled "Stray Matrix Loaded" and "Pattern Data Loaded". These refer to Global data assumptions. If Global data was loaded into a saved version of the application in an earlier session, the data will remain loaded for later use. Loading and management of Stray Matrix and pattern data will be discussed in more detail later.

Click the "Browse" button within the frame to select the file from a traditional file explorer dialog as shown in Figure 46.

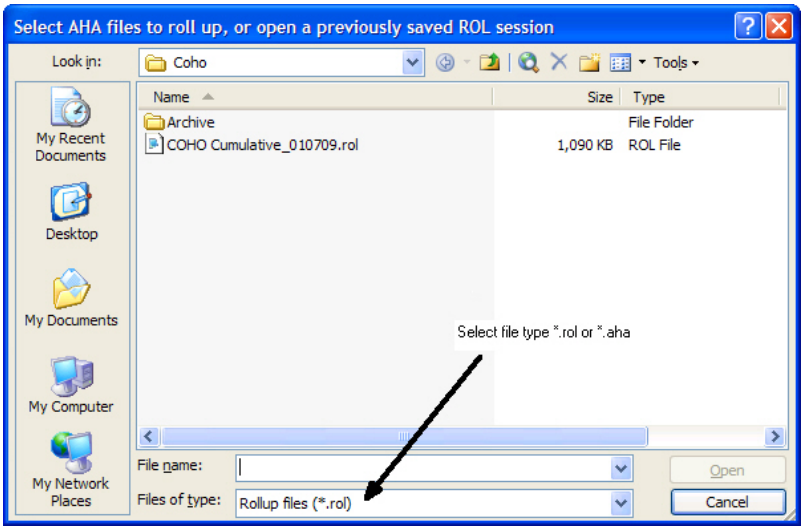


Figure 46. Data directory with *.rol file highlighted.

Select the file type to show the *.rol or *.aha files and then click on "Open". Only one *.rol file can be loaded into the application at a given time. Multiple *.aha files representing different populations can be loaded into the rollup at the same time; however, these population datasets must all have the same scenarios or they will not load.

The Excel status bar at the lower left is programmed to provide update messages during loading of data files. Depending on the number of populations in the data files and the speed of the computer's CPU, these could take up to a minute to load (longer in Excel 2007). The application is reading the population list, distributing hatchery strays among populations, and calculating model outputs during this time. Once the files are loaded, charts will appear in the Landing Page data window panes, as shown in Figure 47.

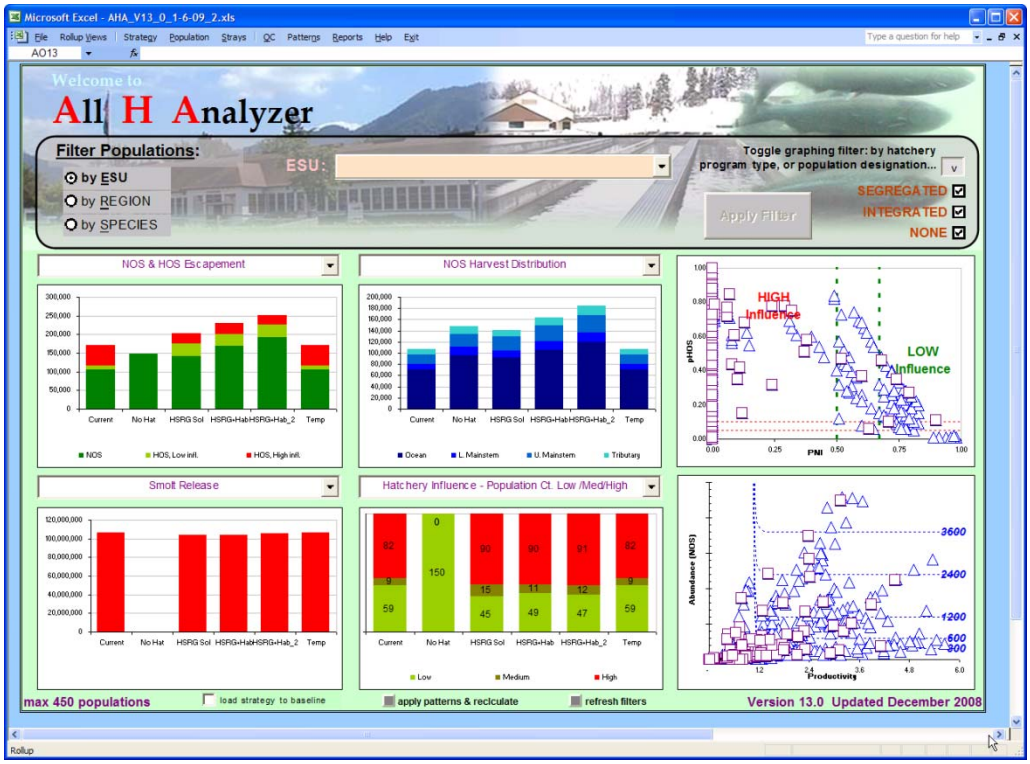


Figure 47. The AHA Landing Page with population data summary.

Loading AHA files

AHA also has the ability to load and save *.aha files created from the previous generation of the AHA program. However, the Hatchery Reform website does not contain *.aha files. This feature is useful if the user wants to examine assumptions created using the previous versions of AHA. Files loaded in as *.aha files can be saved out as *.rol files for combining with other *.rol datasets or upload to the Hatchery Reform website. Saving files will be discussed in more detail later.

To open *.aha files, go to **File > Open>Browse**, and pick *.aha from the file type dropdown menu.

Reloading a Dataset

Clicking **Open** during an AHA session (data loaded into memory) will bring up a different form asking the user to either start over with a new dataset (dumps data in memory and you will be prompted to load in a new datasets) or to add population data to the dataset in memory (Figure 48). The ability to add populations to the dataset is to allow the user to bring in new populations. An error will result if a population already exists in the dataset in memory.

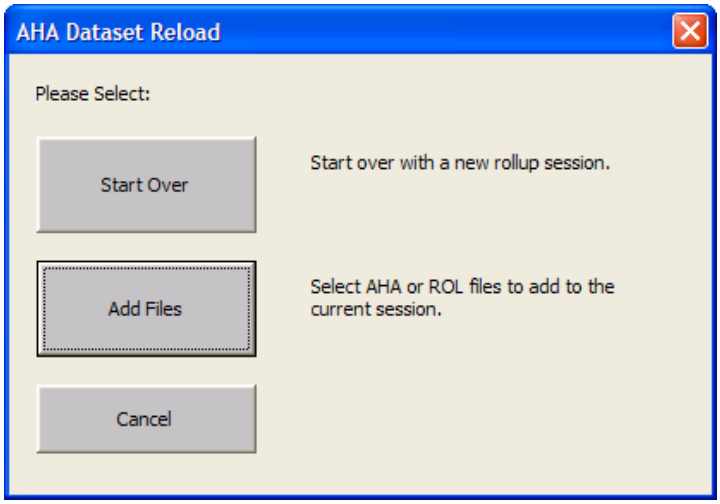


Figure 48. Dataset reload/add files options.

Welcome Screen/Landing Page - Summary Charts

The Welcome screen shows summary bar charts for all populations for a variety of model outputs. Information shown in the charts can be changed using the drop-downs above each chart. The green portion of the natural escapement charts represent the number of natural-origin adults in the escapement, the yellow portion shows the number of integrated hatchery adults in the escapement, and the red section displays the number of segregated hatchery-origin adults in the escapement.

Filtering a Dataset by ESU or Region

By default, all populations are included in the charts. If desired, populations can be filtered by ESU, Province/Region/Subbasin, or by Species from the landing Page (Figure 49). Select the filter using one of three radio buttons to the left and then select the desired filter values in the dropdown menu(s). Finally, click the "Apply Filter" button to run the filters. This will roll up the populations by the criteria you specified. The bar charts on the Welcome screen and Strategy screen will only show information for the filtered populations. Hatchery strays from all loaded populations are still included in the analysis. In other words, the effects of straying are not excluded by the filters. To remove the filter select "All" from the filter options and click "Apply Filter."

Figure 49. Filtering populations in AHA.

In addition to the bar charts, the Welcome screen shows scatter plots for each population in the rollup. The top chart shows population Proportionate Natural Influence (PNI) versus proportion of hatchery-origin spawners in the total spawning population (pHOS). The bottom chart shows population productivity (including fitness loss and harvest rates) versus population natural spawning abundance. These charts can also be filtered by population designation (Primary,

Contributing, and Stabilizing) or by population type (Segregated hatchery, Integrated natural and hatchery, and None [natural]) using the check boxes to the right (Figure 50). To toggle between population designation and population type filters, click the **"V"** button above the checkboxes. The charts will update instantly upon toggling of the checkbox values. These filters do not affect the bar charts or the population list in the Strategy page.

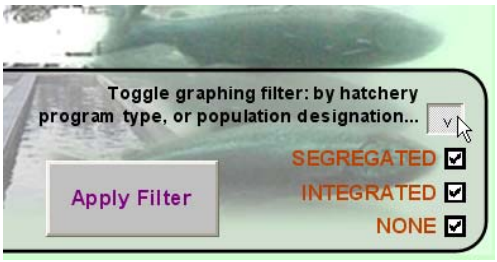


Figure 50. Scatter plots filtering options.

The filtering features can be accessed from any page view by choosing **Strategy > Filter Populations…** from the menu bar.

Global Page (Main Screen) - Setting Global Assumptions and Viewing Output

By clicking on **Rollup Views > Go to Global Page**… in the menu bar, AHA will take the user to the Global Page. This screen is to view and manage global pattern data for hydro, harvest and habitat assumptions and the results of the AHA analysis for the specified species and region across five different management strategies (Figure 51). Edits made to a pattern from this screen or others are automatically saved into memory.

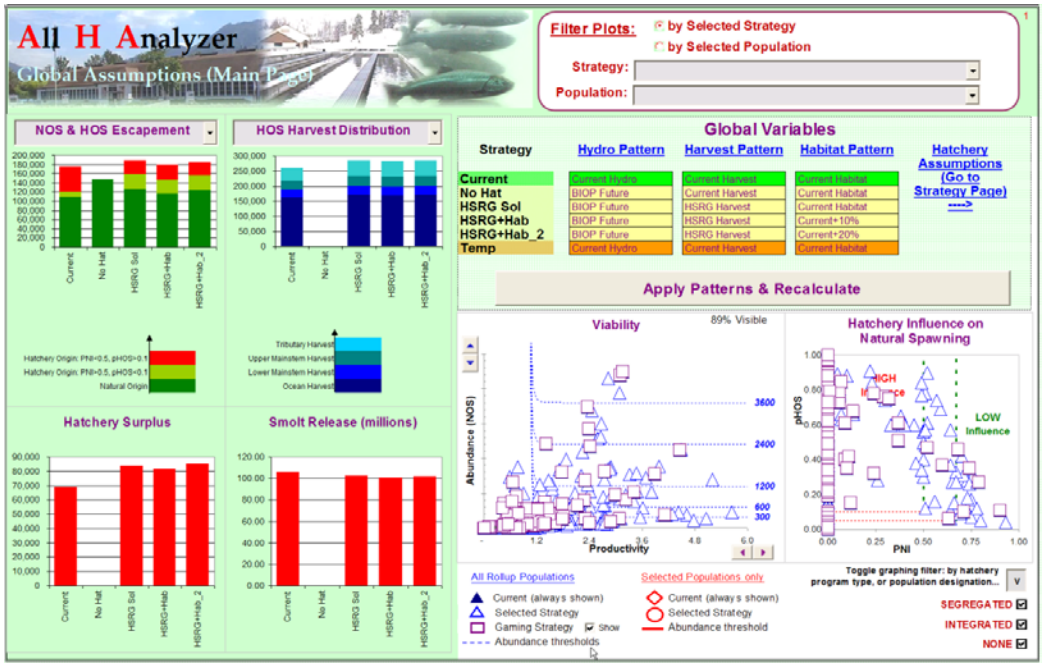


Figure 51. Main screen and global pattern assumptions.

The tool components shown on the Main screen (Figure 51) include the following items:

Output Summaries. There are four bar charts and two scatter plots on this page, the four bar charts are Escapement (NOS or NOS & HOS), Harvest Distribution (either NOS or HOS), Hatchery Surplus, and Smolt Release. Each of these charts displays the results by alternative. The two scatter plots in the lower right hand of the Main page show Viability and Hatchery Influence on Natural Spawning (Figure 52). Populations shown in all these charts are affected by filters set from the Welcome/Landing page previously described.

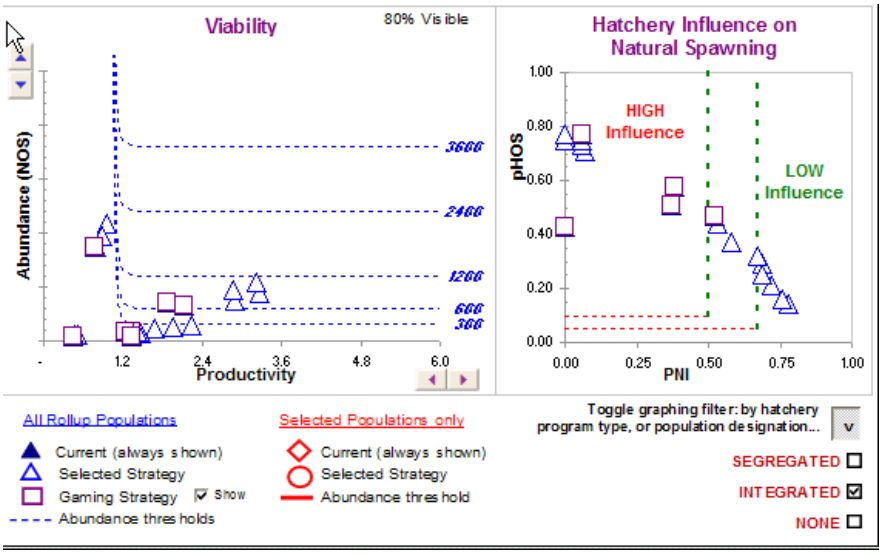


Figure 52. Scatter plots of population viability and hatchery influence.

There are two ways to identify points in Viability and Hatchery Influence scatter plots:

a. Click on a point of interest in either scatter plot. The corresponding population and scenario will appear at the top of the page in the filter drop-downs.

b. Use the dropdown menu to find the population of interest (Figure 53). The red markers will highlight the corresponding population points in the graphs below. There are two markers for each population—one to indicate the "Current" strategy and the second to indicate the strategy shown in the Strategy dropdown menu.

Figure 53. Dropdown menu options to find a data point of interest in the scatter plots by strategy and/or population

Filtering the Scatter Plots by Strategy or Population. The data in these plots can be filtered by strategy or by individual population. This will reduce the clutter and focus on plotted values for a single population across strategies (to compare among strategies) or for multiple populations for a particular strategy (to compare current against a strategy for multiple populations). First select the appropriate radio button at the upper right-hand corner of the active window. Second select either a strategy or population from the dropdown menu. To return to the original view select "ALL" in the dropdown menu.

Review Global Assumptions and Pattern Assignments

Setting Global Variables. Strategies include assumptions for global variables (Figure 54). These variables may either be specific to a particular population or to multiple populations of a similar species or race. Global variables (also called patterns) are for mainstem, estuary, and ocean survival (Hydro, Harvest, and Habitat). Clicking on the hyperlinks at the top of each list (**Hydro Pattern**, **Harvest Pattern**, or **Habitat Pattern**) will take the user to the corresponding pattern assumptions that can be edited for each population loaded in the *.rol file. AHA then allows the user to define/edit the patterns which affect the individual populations (this will take the user to a new screen).

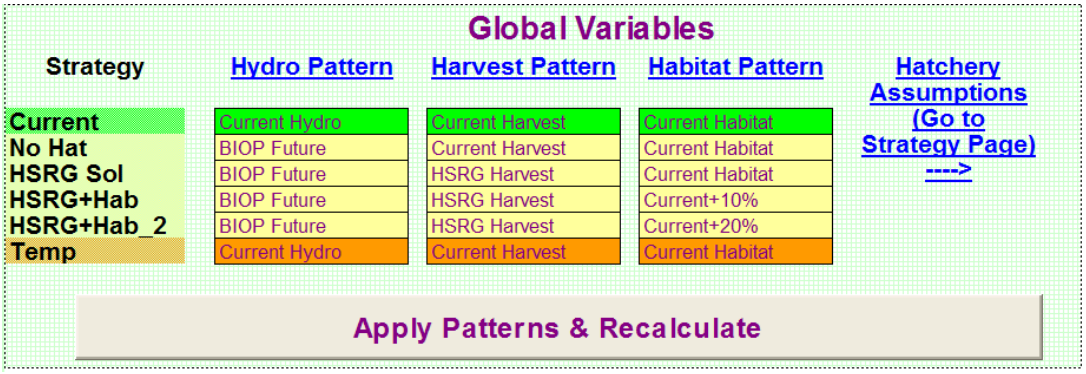


Figure 54. Global Pattern settings are shown for six strategies.

Hatchery variables are shown on the Strategy Page, accessible by the link at right.

A list of patterns we are using in AHA is shown in Figure 55, listed by Strategy (Strategies are analogous to scenarios from the single-population AHA program). Pattern settings shown here were saved in the *.rol file, and they reference the patterns just loaded into AHA from the Hatchery Reform web site.

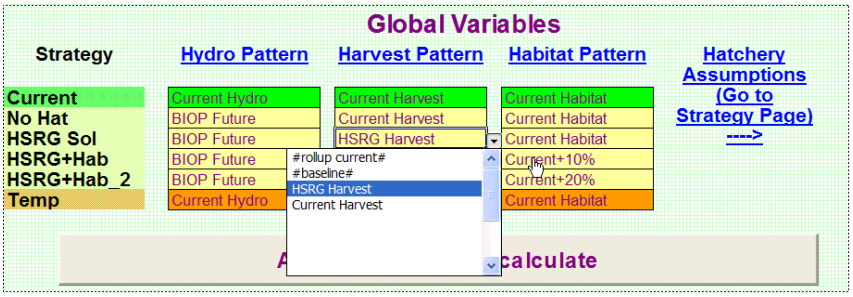


Figure 55. Setting global variables for a particular "H" and strategy. Pre-defined patterns may be selected for all populations by using the drop-down menu associated with each strategy and "H" (Hydro, Harvest, and Habitat).

Pattern editing will be discussed in detail later, but for now click on each of the hyperlinks to get an idea of the information contained in patterns.

To change pattern assignments for a given strategy, click on one of the pattern cells (Figure 55). A dropdown menu arrow will appear to the right. Clicking on this arrow will list the patterns currently available under the corresponding 'H'. These are the patterns just downloaded from the Hatchery Reform website. Empty drop-downs ("##") use assumptions in the AHA Rollup dataset.

Pattern files can be saved from one instance of the AHA and loaded into another. This is important for sharing datasets between users. Alternatively, the entire AHA application may be sent along with the population datasets.

There is one big 'H' that has not been addressed yet: hatcheries. As can be seen, hatcheries are not listed under the global variables here, instead there is a link to the Hatchery Assumptions (a.k.a. the Strategy Page); that's where we will go next.

Strategy Page – Defining Individual Population Characteristics

The Strategy Page is one of the locations where individual population level variables can be modified; many of the hatchery assumptions are set here (Figure 56).

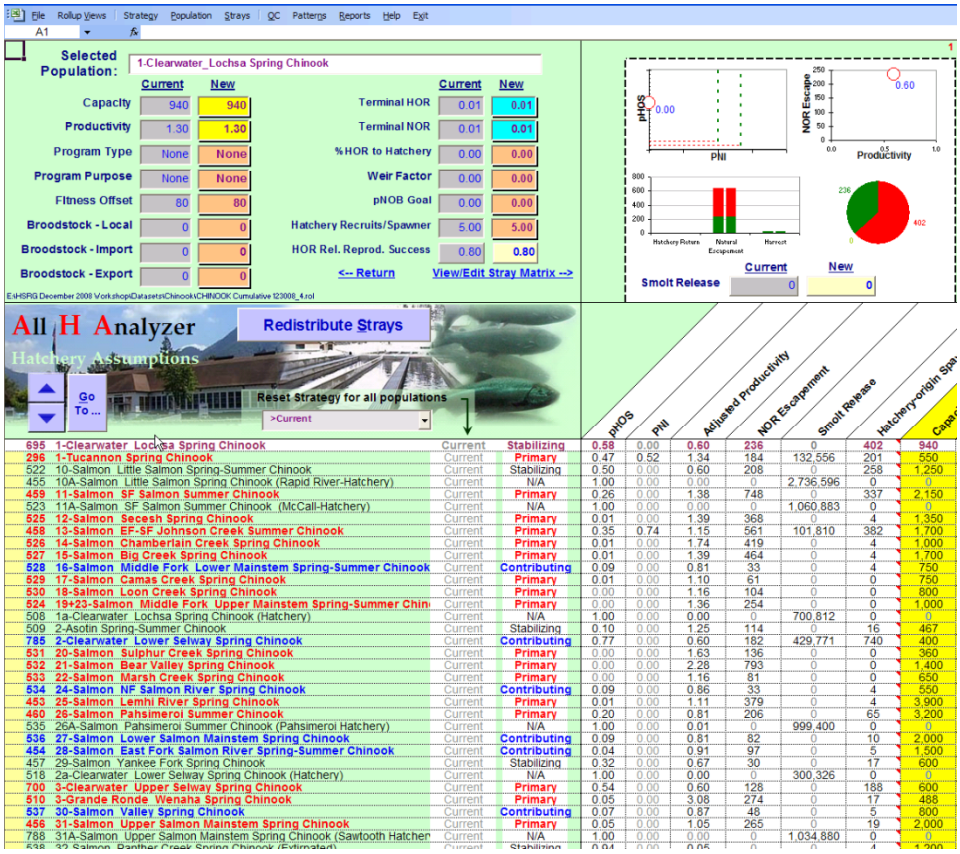


Figure 56. The AHA Strategy Builder screen. Model results and edits to population inputs can be made through this screen for a specific strategy.

The **Strategy Page** may be reached from the Global Page as previously illustrated, but access will probably most often be from the menu bar. The tool components shown on this page include population inputs, managing strategies, managing strays, and managing populations.

Input Population Parameters

The Strategy page can be used to set the variables listed in Table 7 for a particular population.

Table 7. User Defined Population Level Variables

Capacity	Fitness Offset	Terminal Harvest rates on HOR
Productivity	Broodstock-Local	Terminal Harvest rates on NOR
Program Type	Broodstock-Import	% HOR to Hatchery
Program Purpose	Broodstock-Export	Weir Factor
pNOB Goal	HOR Rel. Reprod Success	Hatchery Recruits/Spawner

To change a variable, click in the text box under the "New" heading and type in a value. Next change the focus of the sheet by clicking somewhere else on the page. After making edits to a population the user must click on the "Redistribute Strays" in order to see the effects of the edit on other populations.

To change the population focus click on the row of the population and then click "Go To" to jump to the population. A user can also navigate through the populations by using the up and down arrows next to the "Go To" button. Edits made to a population are saved in memory.

Creating Strategies

Users can use strategies defined in the *.rol file, or create their own strategies on the strategy page, by choosing different scenario settings between populations under a user-defined strategy. This strategy exists outside of the traditional "6-pack" of AHA scenarios. It is a virtual strategy, that is not defined as one of the standard strategies (NEPA, HSRG, etc.) until it is saved under "Advanced Save" discussed in the next section.

Selecting a Strategy to Edit. Alternate management strategies can be selected by using the drop-down menu at the top. Also, combinations of different strategies can be selected by clicking on the strategy cell to the right of the population name and then selecting a new strategy.

Click on the "Redistribute Strays" to see the effects of edits on other populations.

WARNING: By changing strategies for individual populations (drop-down to the right of the population), the user automatically enters the "New Strategy" mode (Figure 57). The font color for the population strategies will change from gray to black. A new strategy which is comprised of assumptions from different strategies is now being created.

695	1-Clearwater_Lochsa Spring Chinook	Current	Stabilizing	0.58	0.00	0.60	236	0	402
296	1-Tucannon Spring Chinook	Current	Primary	0.47	0.52	1.34	184	132,556	201
522	10-Salmon_Little Salmon Spring-Summer Chinook	No Hat	Stabilizing	0.50	0.00	0.60	209	0	258
455	10A-Salmon_Little Salmon Spring Chinook (Rapid River-Hatchery)	Current	N/A	1.00	0.00	0.00	0	2,736,596	0
459	11-Salmon_SF Salmon Summer Chinook	HSRG Sol	Primary	0.25	0.54	1.82	937	253,800	395
523	11A-Salmon_SF Salmon Summer Chinook_(McCall-Hatchery)	Current	N/A	1.00	0.00	0.00	0	1,060,883	0
525	12-Salmon_Secesh Spring Chinook	HSRG+Hab	Primary	0.01	0.00	1.36	351	0	5
459	13-Salmon_EF-SF Johnson Creek Summer Chinook	Current	Primary	0.35	0.74	1.15	561	101,810	382
526	14-Salmon_Chamberlain Creek Spring Chinook	Current	Primary	0.01	0.00	1.74	419	0	4
527	15-Salmon_Big Creek Spring Chinook	Current	Primary	0.01	0.00	1.39	464	0	4
528	16-Salmon_Middle Fork_Lower Mainstem Spring-Summer Chinook	Current	Contributing	0.09	0.00	0.81	33	0	4
529	17-Salmon_Camas Creek Spring Chinook	Current	Primary	0.01	0.00	1.10	61	0	0
530	18-Salmon_Loon Creek Spring Chinook	Current	Primary	0.00	0.00	1.16	104	0	0
524	19+23-Salmon_Middle Fork_Upper Mainstem Spring-Summer Chin	Current	Primary	0.00	0.00	1.36	254	0	0
508	1a-Clearwater_Lochsa Spring Chinook (Hatchery)	Current	N/A	1.00	0.00	0.00	0	700,812	0

Figure 57. Changing the Scenario value for a single population toggles the user-defined strategy feature.

Hatchery Origin Spawners. To view the identity and number of hatchery-origin natural spawners from outside populations and from this population (internal strays), click on the cell of the recipient population for the "Hatchery Origin Spawners" column. A comment box displaying this information will open near the upper right-hand corner of the active window.

Chart views for a Population. In the upper right-hand corner of the screen, the Strategy Builder shows the change in viability and hatchery influence on natural spawning for a specific strategy compared to the current situation. The strategy, the estimated hatchery return, the natural escapement, and the harvest for the current condition are also shown. Last, a pie chart for natural populations indicates the number of natural-origin and hatchery-origin spawners in the natural escapement.

Copying Strategies

The user may wish to use a current or working strategy as a baseline for a new working strategy in AHA. To do this, go to the menu bar: **Strategy > Copy**. The Copy Strategy screen shown in Figure 58 will appear.

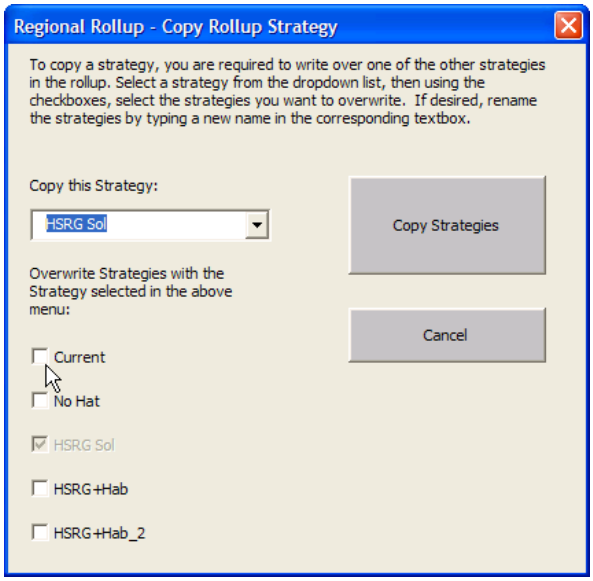


Figure 58. The Copy Strategy screen.

From the dropdown menu, the user simply picks the strategy in the dataset that he/she wants to copy and use as the baseline for other strategies. Then check the boxes to be copied over.

WARNING: Proceeding this way will overwrite the data in those strategies.

Also, note that all the data associated with the population will be copied, but the IDs and names of the strategy will not change.

Renaming Strategies

Renaming strategies is done through a separate menu, which opens through the menu bar: **Strategy > Rename**. Here strategies can be given temporary names, for the purpose of data reporting (Figure 59). The names given to strategies here are not applied to datasets on upload to the Hatchery Reform website.

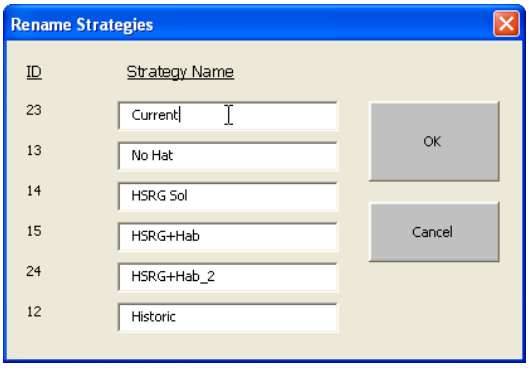


Figure 59. Renaming a strategy in an AHA dataset.

Cloning a Population

Cloning a population is the preferred method to add a population to an existing AHA dataset. This ensures the new population has all the necessary parameters and the user can select a population with parameters that are most similar to the new population. For best results, cloning a population should be done from the Strategy Page. But, it can be done from any view in AHA. Go to **Population > Clone Selected Population** in the menu bar. A new population ID and name can be assigned here (Figure 60). Make sure that the population ID or name does not already exist in the population list (**Strays > Population List**). After creating the new population the user will need to go to the stray matrix and add straying assumptions if applicable for the new population (see Stray Matrix).

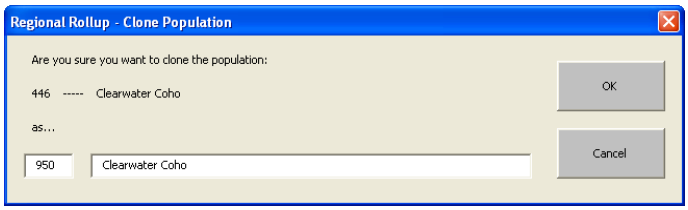


Figure 60. Cloning a population in an AHA dataset.

Deleting a Population

Population not used in the analysis can be deleted from the dataset. To delete a population go to **Population > Delete Selected Population.** Again, this can be done from any view in AHA, but it is advised to do this from the strategy page as it provides a list of all populations in the dataset. A message confirming whether the user really wants to do this will pop up (Figure 61).

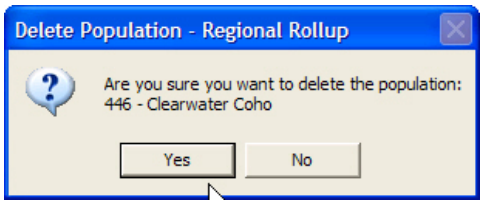
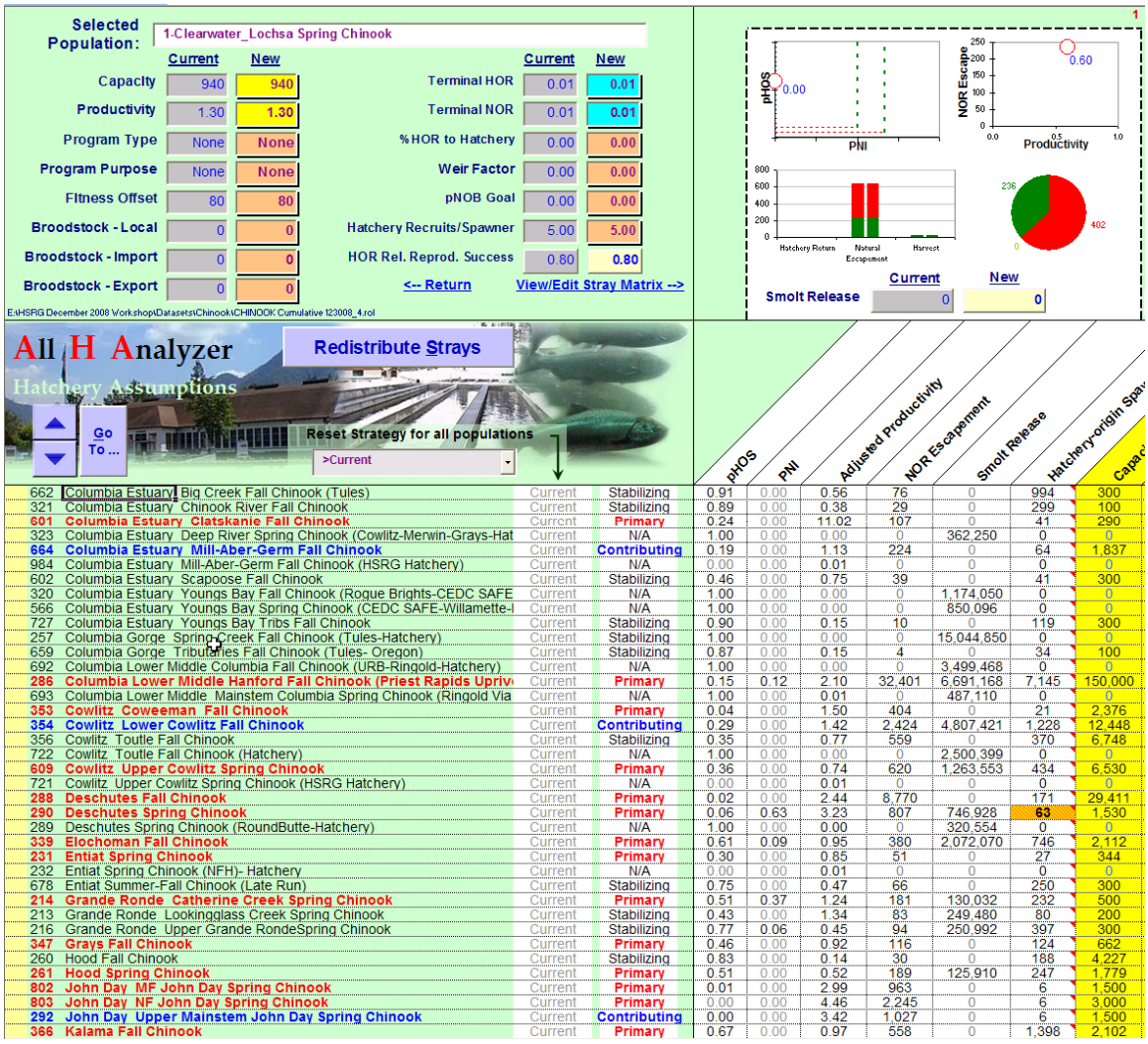


Figure 61. Confirmation message before deleting a population from the AHA dataset.

WARNING: This cannot be undone. Make sure that the dataset is backed up.

Example: Using the Strategy Page

In the Strategy Page example shown in Figure 62, a dataset that "rolls up" the Chinook populations in the Columbia River was loaded into AHA. A table of population data reads on the lower half of the screen. The scrollbar can be used to view columns in the table hidden off the current view.



				pHOS	PNI	Adjusted Productivity	NOR Escapement	Smolt Release	Hatchery-origin Spawners	Capacity
662	Columbia Estuary Big Creek Fall Chinook (Tules)	Current	Stabilizing	0.91	0.00	0.56	76	0	994	300
321	Columbia Estuary Chinook River Fall Chinook	Current	Stabilizing	0.89	0.00	0.38	29	0	299	100
601	Columbia Estuary Clatskanie Fall Chinook	Current	Primary	0.24	0.00	11.02	107	0	41	290
323	Columbia Estuary Deep River Spring Chinook (Cowlitz-Merwin-Grays-Hat	Current	N/A	1.00	0.00	0.00	0	362,250	0	0
664	Columbia Estuary Mill-Aber-Germ Fall Chinook	Current	Contributing	0.19	0.00	1.13	224	0	64	1,837
984	Columbia Estuary Mill-Aber-Germ Fall Chinook (HSRG Hatchery)	Current	N/A	0.00	0.00	0.01	0	0	0	0
602	Columbia Estuary Scapoose Fall Chinook	Current	Stabilizing	0.46	0.00	0.75	39	0	41	300
320	Columbia Estuary Youngs Bay Fall Chinook (Rogue Brights-CEDC SAFE	Current	N/A	1.00	0.00	0.00	0	1,174,050	0	0
566	Columbia Estuary Youngs Bay Spring Chinook (CEDC SAFE-Willamette-I	Current	N/A	1.00	0.00	0.00	0	850,096	0	0
727	Columbia Estuary Youngs Bay Tribs Fall Chinook	Current	Stabilizing	0.90	0.00	0.15	10	0	119	300
257	Columbia Gorge Spring Creek Fall Chinook (Tules-Hatchery)	Current	Stabilizing	1.00	0.00	0.00	0	15,044,850	0	0
659	Columbia Gorge Tributaries Fall Chinook (Tules- Oregon)	Current	Stabilizing	0.87	0.00	0.15	4	0	34	100
692	Columbia Lower Middle Columbia Fall Chinook (URB-Ringold-Hatchery)	Current	N/A	1.00	0.00	0.00	0	3,499,468	0	0
286	Columbia Lower Middle Hanford Fall Chinook (Priest Rapids Upriv	Current	Primary	0.15	0.12	2.10	32,401	6,691,168	7,145	150,000
693	Columbia Lower Middle Mainstem Columbia Spring Chinook (Ringold Via	Current	N/A	1.00	0.00	0.01	0	487,110	0	0
353	Cowlitz Coweeman Fall Chinook	Current	Primary	0.04	0.00	1.50	404	0	21	2,376
354	Cowlitz Lower Cowlitz Fall Chinook	Current	Contributing	0.29	0.00	1.42	2,424	4,807,421	1,228	12,448
356	Cowlitz Toutle Fall Chinook	Current	Stabilizing	0.35	0.00	0.77	559	0	370	6,748
722	Cowlitz Toutle Fall Chinook (Hatchery)	Current	N/A	1.00	0.00	0.00	0	2,500,399	0	0
609	Cowlitz Upper Cowlitz Spring Chinook	Current	Primary	0.36	0.00	0.74	620	1,263,553	434	6,530
721	Cowlitz Upper Cowlitz Spring Chinook (HSRG Hatchery)	Current	N/A	0.00	0.00	0.01	0	0	0	0
288	Deschutes Fall Chinook	Current	Primary	0.02	0.00	2.44	8,770	0	171	29,411
290	Deschutes Spring Chinook	Current	Primary	0.06	0.63	3.23	807	746,928	63	1,530
289	Deschutes Spring Chinook (RoundButte-Hatchery)	Current	N/A	1.00	0.00	0.00	0	320,554	0	0
339	Elochoman Fall Chinook	Current	Primary	0.61	0.09	0.95	380	2,072,070	746	2,112
231	Entiat Spring Chinook	Current	Primary	0.30	0.00	0.85	51	0	27	344
232	Entiat Spring Chinook (NFH)- Hatchery	Current	N/A	0.00	0.00	0.01	0	0	0	0
678	Entiat Summer-Fall Chinook (Late Run)	Current	Stabilizing	0.75	0.00	0.47	66	0	250	300
214	Grande Ronde Catherine Creek Spring Chinook	Current	Primary	0.51	0.37	1.24	181	130,032	232	500
213	Grande Ronde Lookingglass Creek Spring Chinook	Current	Stabilizing	0.43	0.00	1.34	83	249,480	80	200
216	Grande Ronde Upper Grande RondeSpring Chinook	Current	Stabilizing	0.77	0.06	0.45	94	250,992	397	300
347	Grays Fall Chinook	Current	Primary	0.46	0.00	0.92	116	0	124	662
260	Hood Fall Chinook	Current	Stabilizing	0.83	0.00	0.14	30	0	188	4,227
261	Hood Spring Chinook	Current	Primary	0.51	0.00	0.52	189	125,910	247	1,779
802	John Day MF John Day Spring Chinook	Current	Primary	0.01	0.00	2.99	963	0	6	1,500
803	John Day NF John Day Spring Chinook	Current	Primary	0.00	0.00	4.46	2,245	0	6	3,000
292	John Day Upper Mainstem John Day Spring Chinook	Current	Contributing	0.00	0.00	3.42	1,027	0	6	1,500
366	Kalama Fall Chinook	Current	Primary	0.67	0.00	0.97	558	0	1,398	2,102

Figure 62. Strategy Page with Chinook dataset loaded.

Assume for the moment that the user is interested in managing fish straying into the Big Creek Chinook population. A table of values appears in the lower-right quadrant of the screen. Under the column labeled Hatchery-origin Spawners, there is a column of values in commented cells. The comments are hidden until one of the cells in Figure 62 is clicked. Click the cell that corresponds to Columbia Estuary Big Creek Fall Chinook and the comment is displayed in the upper-right quadrant of the screen (Figure 63).

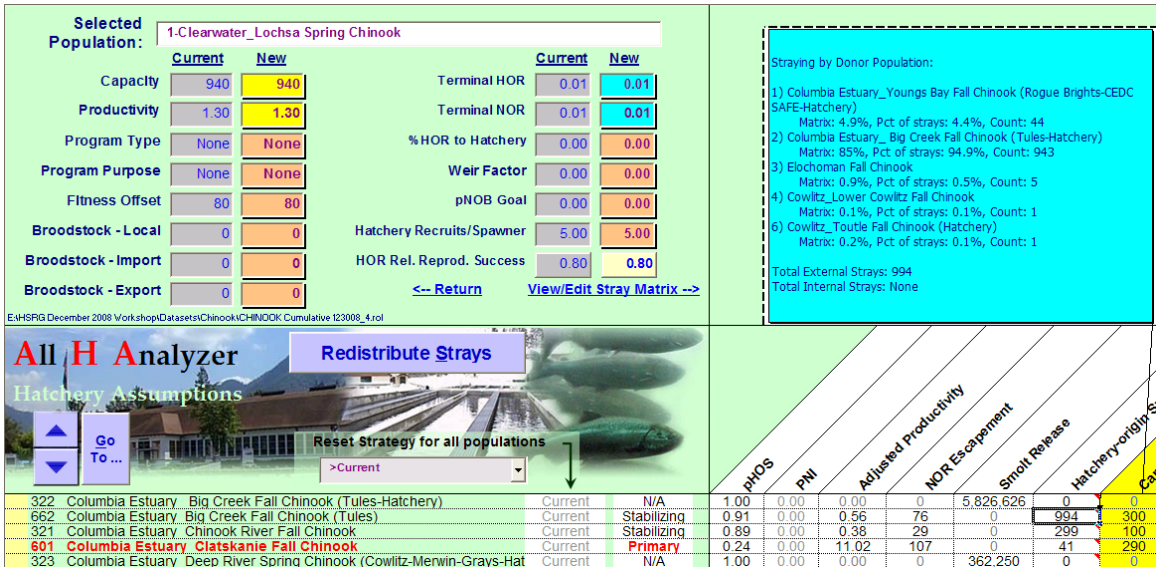


Figure 63. Chinook dataset with Stray information shown

From the information contained in the comment box, it can be seen that there are six populations straying into the natural Big Creek Fall Chinook population. A total of 943 fish straying into this population appear to originate from the Big Creek Fall Chinook hatchery. That population is shown directly above the natural Big Creek Fall Chinook population.

There are several ways to navigate between populations. By clicking on the arrow keys to go up or down the list, the user can navigate to a population anywhere on the population row. Highlight the row and click the "GoTo" button to jump to that population, or use the keyboard shortcuts:

- Control + {Page Up} to go up one in the list,
- Control + {Page Down} to go down one in the list.

After selecting the Big Creek Fall Chinook hatchery, edits can be made to this population that may affect the number of strays to the previously reviewed natural population. Specifically, changing the program size by editing broodstock abundance (smolt release is calculated from broodstock and in-hatchery survival inputs), changing terminal harvest, changing percent HOR recovered at the hatchery, etc. To accept edits made to a program, click anywhere outside of the cell.

Notice that the gray box to the left of the orange box is the Current condition. This value may also change to the new value depending on what was selected for the Strategy dropdown menu. Figure 63 shows the Current condition strategy selected, changing this to a different strategy will keep the first column the Current condition and the New column will be the strategy edits.

The last step to evaluate the effect of edits is to click "Redistribute Strays". Once the calculation is finished, the results of any edits to the hatchery program on the number of strays to the natural population of Fall Chinook in Big Creek can be seen.

Note that only the input cells shown at the top of Figure 63 under "New" can be edited. The values shown to the immediate right of each population are results and input values to the far right cannot be edited from this screen (go to the Population Screen to edit these values).

AHA Population Page – Viewing/Editing Assumptions Across all Strategies

The Single population AHA viewer is nearly identical to the previous generation of AHA, the functions of which have been integrated into this version with a few minor modifications.

Individual management strategies can be compared for a single population by going to the Population Screen. Navigation to the single-population view from the menu bar can be from either the Rollup Views menu item or the Population menu item (Figure 64).

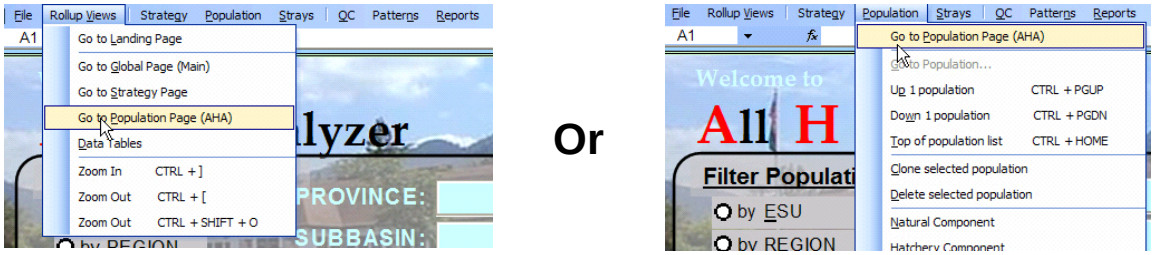


Figure 64. Navigation pathways to the AHA single population view.

All input cells on the Population screen are yellow and calculated cells are in other colors (Figure 65). Non-input cells are protected to prevent inadvertent modification of formulas.

To update the calculated cells with the new inputs, click the "Apply & Recalculate" button at the top of the screen.

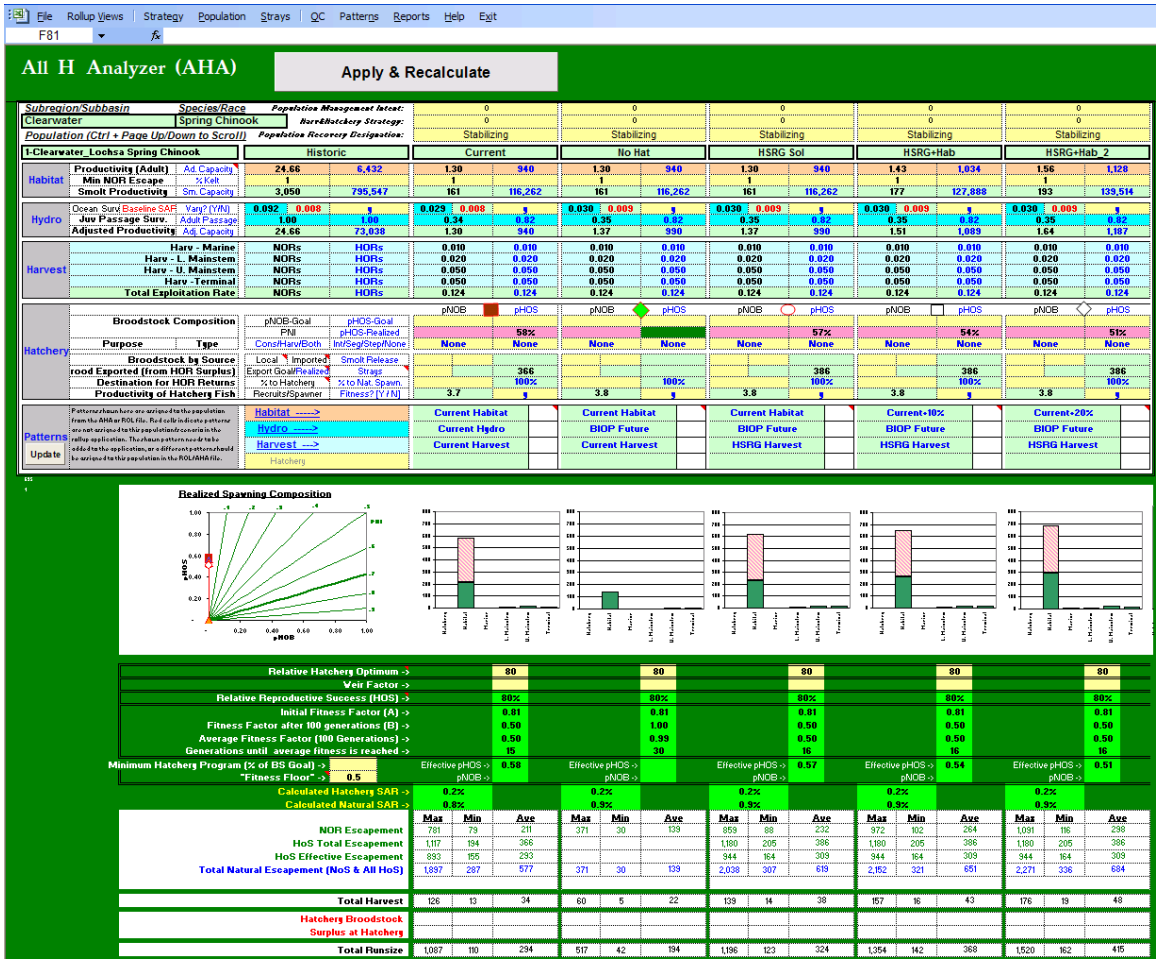


Figure 65. The AHA Population screen. This screen shows the inputs and outputs for a specific population for all strategies.

Population Page layout

There are two levels of input: 1) a basic operating level and 2) an advanced, or detailed, level. Most users will be operating at the basic level and that is shown on the Population page. Additional parameters can be edited on these other pages specific to the hatchery program, natural population and fitness interactions. Changing these parameters should be approached cautiously.

The Population page is intended to be a self-contained "one-page" summary of the inputs and outputs for six strategies for a single population. Each strategy section has two columns in the spreadsheet. The columns continue vertically through both the input and output panels.

More information for a particular population is available by going to the menu bar item under Population to access input screens for the natural component, hatchery component and fitness (Figure 66).

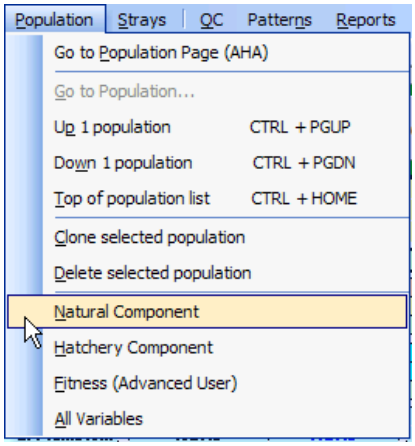


Figure 66. Navigating to additional input screens for a population.

- *Natural Component* – Contains the NOR survival data used by the application to compute the abundance of natural-origin fish and the make-up of the composite hatchery/natural population in future generations.
- *Hatchery Component* – Contains hatchery program inputs and HOR relative survival in nature. This information is used by the application to compute the in-hatchery survival and relative survival of hatchery fish in nature.
- *Fitness* – Contains fitness input parameters and equations used to calculate fitness loss for the composite population. These inputs cannot be edited in the standard version of AHA.

Inputs

The input panel on the Population page is divided horizontally into four sections corresponding to each of the four H's (Figure 65). Information about the population is shown in the upper left hand corner.

Habitat This section describes the natural environment. In many cases, the inputs to this section come from an analysis of habitat condition.

Productivity and Capacity: Productivity and capacity are parameters of a Beverton-Holt production function. Productivity is the density independent survival rate of the species in the environment measured as return/spawner over the entire life history. This is the maximum possible survival without competition or density effects. Capacity is the maximum number of individuals that could be supported by the habitat. This is the asymptote of the production function. These inputs are for the population over the entire life history and can come from EDT or be derived independently.

Smolt Productivity and Capacity: These are calculated values based on the life cycle values entered above. Smolt productivity and capacity removes the effect of out of subbasin conditions. Productivity is smolts per spawner and capacity is the subbasin habitat smolt capacity.

Minimum NOR Escapement: The minimum natural-origin escapement is used if there is an escapement goal established for the population. In cases where there is not a minimum escapement goal, this parameter is set to a value of 1-- it should not be left blank.

Percent Kelts: For steelhead, the proportion of repeat spawners (kelts) can be specified. For other species, this parameter is left blank

Hydro This section could also be labeled "Out-of-Subbasin Effects". This is where a specific survival rate through the hydroelectric system is supplied as well as the Smolt to Adult Return rate (SAR). Hydro survival can be an estimate from a fish passage model such as SIMPASS or CRiSP. SAR is the survival of smolts leaving the subbasin divided by the resulting adults back to the mouth of the subbasin before harvest.

SAR is divided into juvenile passage in the mainstem, ocean survival, and adult passage survival in the mainstem.

Vary? (Y/N): This factor accounts for a measure of environmental variability. Random variability is attached to the marine component of the SAR input based on published patterns of variation in ocean survival conditions.

Adjusted Productivity/Capacity: These are calculated from the baseline production factors and the information under the Hydro section. So that conditions outside the subbasin can be manipulated in AHA, the spreadsheet recalculates baseline productivity and capacity to reflect a change in conditions outside the subbasin relative to what was used for the baseline calculation of productivity and capacity. For example, an increase in passage survival reflecting a specific change in the operations of the dams results in an increase in the overall productivity and capacity of the population[9]. This becomes clearer by spending a few minutes spent changing conditions in the Hydro section and seeing how it changes the Adjusted Productivity and Capacity in the Habitat section.

Harvest. Harvest inputs are obtained from analysis of coded wire tags or from harvest analysis models. Separate harvest inputs can be provided for natural-origin fish (NORs) and hatchery origin fish (HORs).

Harvest Rates: Harvest rate is the fishing mortality imposed at a specific location. Location is treated very generally: 1) marine, 2) Lower Columbia River, 3) Upper Columbia River, and 4) terminal area upstream of McNary Dam and within the subbasin. Separate rates can be provided for natural- (NORs) and hatchery- origin (HORs) fish to account for differential harvest of natural and hatchery adults.

Total Exploitation Rate: Exploitation rate is the total mortality imposed on fish by harvest in terms of adult equivalents at spawning. This is a calculated field in AHA that is based on the harvest rates provided.

Hatchery. Because of the lack of independent hatchery models similar to those available for the other H's, AHA devotes more attention to the details of hatchery

[9] Note that capacity is related to productivity such that an increase in productivity (density-independent survival) increases capacity as well.

operations. Indeed, many applications of AHA involve questions of how hatcheries could be managed to achieve management goals in the context of the other Hs.

Broodstock composition: The goals for pNOB and pHOS refer to the intended proportion of hatchery broodstock comprised of natural-origin fish in each generation (pNOB) and the proportion of the natural spawning population comprised of hatchery- origin returns (pHOS). Note that actual pHOS is calculated based on harvest, number of hatchery fish spawning in nature, and the size of natural population.

PNI/pHOS Realized: Regardless of the intent or goal of the program, the actual values for PNI and pHOS will depend on the size of the hatchery program and the return of natural-origin fish to the system. These calculated cells provide the resulting PNI and pHOS for the population and strategy of interest.

Broodstock by Source: This is the number of adult fish that are spawned in the hatchery (males and females). Broodstock imported from outside the system can also be indicated as number of adults imported. The total broodstock is the sum of local and imported fish.

Program Release: The total number of fish released is a calculated field based on number of broodstock, eggs/female, percent females, egg to fry, and fry to release survival rates in the hatchery. The factors that go into computing the smolt release are found on the Hatchery Component page.

Brood Exported (from HOR surplus): This refers to the realized and target broodstock export values.

Strays: The influx of hatchery fish from other populations is included in the AHA calculations. The number shown here represents the number of strays from other populations entering the subbasin. The source of these strays can be reviewed from the Strategy page described previously.

Destination for HOR returns: This refers to the percentage of hatchery-origin fish (HORs) recovered at the hatchery. The number of fish straying to the natural population is calculated as 1-the proportion entering the hatchery.

Recruits/Spawner: This factor for hatchery fish is analogous to the productivity value entered above for the natural population. It is the survival rate from spawner to adult. It is usually computed from coded wire tag data or other hatchery information.

Fitness: This is simply a toggle to apply or ignore the fitness calculations in the analysis.

Patterns: While making edits on the population page, changes to one or more working patterns may need to be preserved. To apply changes to patterns for a single population using values modified on the Population Page, choose the desired pattern to update by clicking on the pattern name and choosing it from the dropdown list. Then type a "Y" in the cell next to the chosen name. Once the pattern choices have been made, click the "Update" button at the far left of the view. Note: only type "Y" to modify patterns under one of the scenario columns (Figure 67).

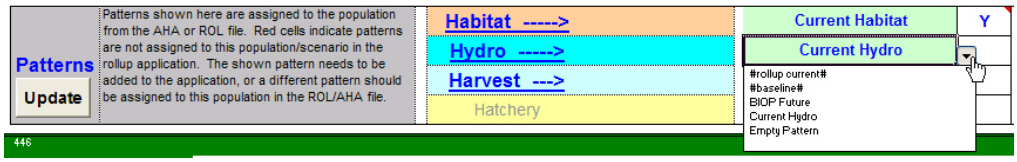


Figure 67. Modifying pattern assignments from the AHA single population screen.

Output

The results of the AHA computations are summarized in figures on the lower three panels of the Population sheet. Generation by generation results for each scenario can be found in the Scenario pages.

Realized Spawning Composition This chart (Figure 68) plots the realized proportion of hatchery fish in the natural population (pHOS) against the proportion of natural-origin broodstock in the hatchery broodstock (pNOB). These numbers are calculated in the input section and were discussed above. Note that each scenario has a distinctive marker. The marker is shown in the hatchery input section between the pNOB and pHOS labels. The results of each scenario are plotted on the chart so that the change in the spawning composition across scenarios can be examined.

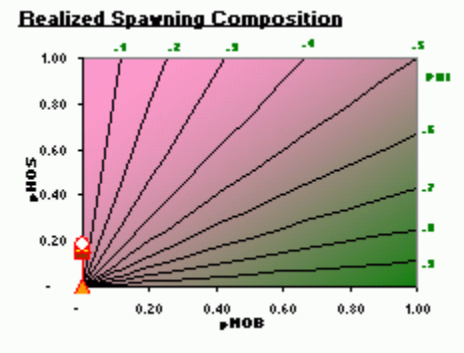


Figure 68. AHA output chart comparing the proportion of hatchery origin fish in the naturally spawning component (pHOS) and the proportion of natural origin fish in the hatchery broodstock (pNOB). PNI is the proportionate natural influence in the program and is represented by lines through the chart.

This chart also shows the Proportionate Natural Influence (PNI). PNI is a function of the proportion of natural spawners that are of hatchery-origin (pHOS) and the proportion of the hatchery broodstock that are of natural-origin. PNI increases with decreasing pHOS and increasing pNOB.

The chart has a color pattern to indicate the degree of hatchery and natural influence on the population. Increasing levels of natural-origin fish in the hatchery broodstock (pNOB) trend toward the green areas of the chart representing less hatchery influence, while increasing levels of hatchery origin fish on the spawning ground tend toward the pink areas representing more hatchery influence.

Adult Return Composition. This chart (Figure 69) provides for each scenario the number and composition of fish produced by the natural population and hatchery program for marine, upper mainstem, lower mainstem, and terminal harvest. It also shows the number and composition of hatchery and natural spawners in columns labeled “Hatchery” and “Habitat,” respectively.

Composition of the fish in each category is indicated by the color coding explained in the caption to Figure 60.

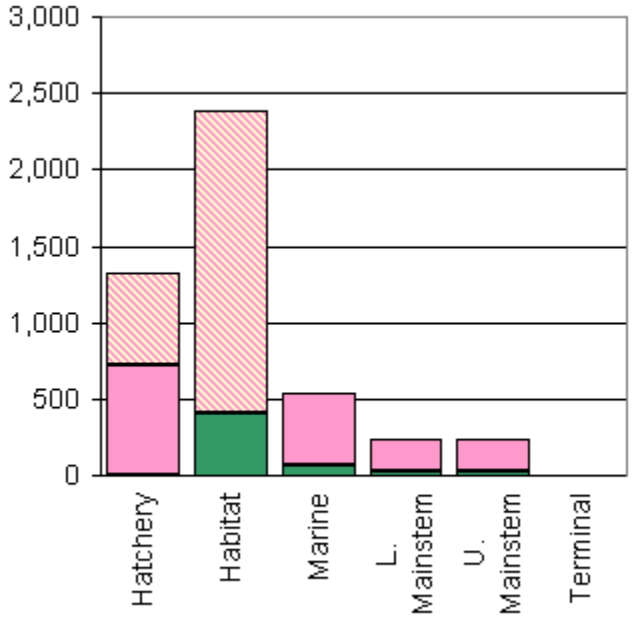


Figure 69. Summary of AHA results comparing the number of adult fish in the spawning population and in harvest. The contribution of hatchery origin fish (HOS) in each area is shown in pink, and the contribution of natural-origin fish (pNOB) are shown in green. "Candy-stripe" indicates hatchery fish returning in excess to spawning needs while "khaki" indicates return of hatchery-origin fish that have been selected at least one generation in the natural environment.

Editing Patterns (Hydro, Harvest, Habitat)

Patterns provide a standard set of assumptions that can be applied across populations. Some of these variables appear on the strategy and population pages as well. Population settings under hydro, harvest, and habitat patterns are viewed and edited by going to the corresponding pattern under the "Patterns" menu bar item (Figure 70).

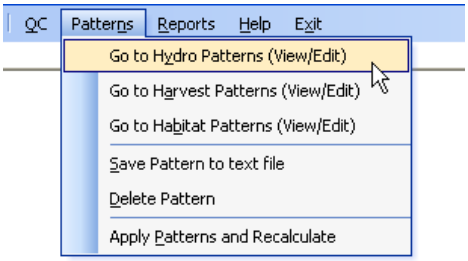


Figure 70. Pattern menu items in AHA.

Patterns downloaded from the Hatchery Reform web site can be chosen here for editing. Each pattern editor has its own view, as shown below in Figure 71.

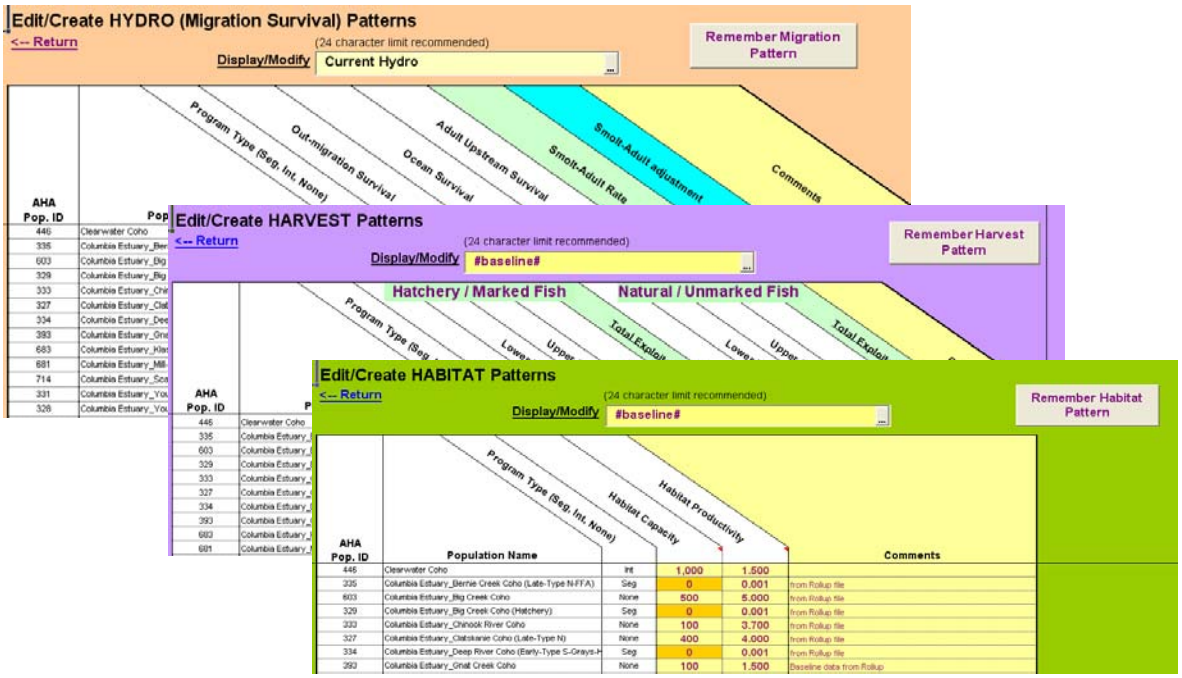


Figure 71. Viewer/Editors for Hydro, Harvest, and Habitat patterns.

The interface in this view works like a standard database program in that changes must be APPLIED in order to take effect. In other words, click the "Remember H… Pattern in the upper-right of the view to apply changes.

To edit pattern values, simply type into yellow cells. Solid red cells will display for populations where no pattern data is present**. It is recommended that the user makes sure that data under the "#baseline#" pattern is complete. If no baseline pattern data exists, the lack of data could cause some inputs to go to zero.** Type a new name in the dropdown menu and click "Remember H… Pattern" to create a new pattern. To delete a pattern, pick "Delete Pattern" from the Patterns menu.

Data Tables

The population data shown on the Landing Page can also be viewed in a tabular form by choosing the menu bar item **Rollup Views > Data Tables** (Figure 72). This is provided to allow a more detailed evaluation of results across scenarios,

All H Analyzer

Spawning Escapement

Scenario	NOS	HOS (PNI>.5)	HOS (PNI<.5)
Current	109,318	10,975	54,435
No Hat	147,683	-	-
HSRG Sol	125,660	33,000	30,775
HSRG+Hab	116,886	30,077	32,756
HSRG+Hab_2	123,667	32,599	28,938
Historic	5,422,325	-	-
Temp	109,318	10,975	54,435

Harvest Composition

Scenario	NOR	HOR	Total
Current	104,750	260,537	365,287
No Hat	139,799	-	139,799
HSRG Sol	137,195	285,516	422,711
HSRG+Hab	127,169	282,462	409,630
HSRG+Hab_2	135,425	285,116	420,542
Historic	50,030	-	50,030
Temp	104,750	260,537	365,287

NOR Harvest Distribution

Scenario	Ocean	L. Mainstem	U. Mainstem	Tributary
Current	68,960	10,774	15,242	9,775
No Hat	91,540	14,448	20,710	13,101
HSRG Sol	89,416	13,667	20,958	13,155
HSRG+Hab	81,713	13,092	19,768	12,596
HSRG+Hab_2	87,938	13,412	20,953	13,123
Historic	30,073	8,055	4,994	6,907
Temp	68,960	10,774	15,242	9,775

Stock Counts: Hatchery Influence on Natural Species

Scenario	LOW	MEDIUM	HIGH
Current	59	10	81
No Hat	150	-	-
HSRG Sol	46	16	88
HSRG+Hab	48	11	91
HSRG+Hab_2	46	17	87
Historic	150	-	-
Temp	59	10	81

HOR Harvest Distribution

Scenario	Ocean	L. Mainstem	U. Mainstem	Tributary
Current	162,802	24,658	28,313	44,764
No Hat	-	-	-	-
HSRG Sol	170,799	28,948	33,402	52,366
HSRG+Hab	168,842	28,655	32,975	51,989
HSRG+Hab_2	170,464	28,891	33,402	52,358
Historic	-	-	-	-
Temp	162,802	24,658	28,313	44,764

Stock Counts: Fitness of Hatchery Populations

Scenario	LOW	MEDIUM	HIGH
Current	116	7	27
No Hat	-	-	150
HSRG Sol	105	21	24
HSRG+Hab	114	17	19
HSRG+Hab_2	105	22	23
Historic	-	-	150
Temp	116	7	27

Scenario	Smolt Release	Hatchery Surplus
Current	106,175,995	68,933
No Hat	-	-
HSRG Sol	102,255,283	83,839
HSRG+Hab	100,810,072	81,696
HSRG+Hab_2	102,065,308	85,390
Historic	-	-
Temp	106,175,995	68,933

Count of Populations at Different PNI Levels

	Current	No Hat	HSRG Sol	HSRG+Hab	HSRG+Hab_2
pHOS>.1	132	-	119	123	119
PNI<.5	9	150	6	7	6
50-67%	4	-	11	10	13
>67%	5	-	14	10	12

Figure 72. Tabulated data from the population rollup.

Stray Matrix

The stray matrix can be viewed and edited by choosing the menu bar option **Strays > Stray matrix** (Figure 73). Type changes to values in yellow cells, and make sure that you are not creating a duplicate pair of donor/recipient population ID's. After making revisions on the stray matrix page, be sure to click the "Reload Stray matrix" button to apply the changes.

STRAY MATRIX

Reload Stray Matrix

<-- Return to Strategy Page

Comment field.

Stray Matrix Test

1634

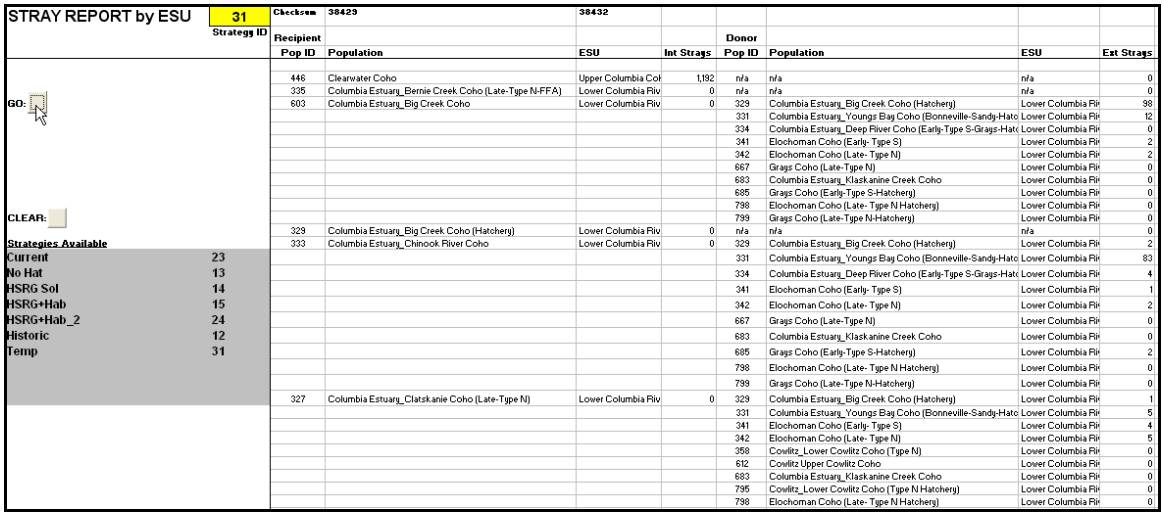
Recipient ID	Recipient Pop	Donor ID	Donor Pop	Pct
16	[None matched]	17	[None matched]	99.900%
551	6-Grande Ronde_Minam Spring Chinook	213	Grande Ronde_Lookingglass Creek Spring Chinook	1.000%
510	3-Grande Ronde_Wenaha Spring Chinook	213	Grande Ronde_Lookingglass Creek Spring Chinook	1.000%
509	2-Asotin Spring-Summer Chinook	213	Grande Ronde_Lookingglass Creek Spring Chinook	0.000%
216	Grande Ronde_Upper Grande RondeSpring Chinook	213	Grande Ronde_Lookingglass Creek Spring Chinook	1.000%
215	7-Grande Ronde_Lostine Spring Chinook	213	Grande Ronde_Lookingglass Creek Spring Chinook	1.000%
214	Grande Ronde_Catherine Creek Spring Chinook	213	Grande Ronde_Lookingglass Creek Spring Chinook	1.000%
551	6-Grande Ronde_Minam Spring Chinook	214	Grande Ronde_Catherine Creek Spring Chinook	1.000%
510	3-Grande Ronde_Wenaha Spring Chinook	214	Grande Ronde_Catherine Creek Spring Chinook	1.000%
509	2-Asotin Spring-Summer Chinook	214	Grande Ronde_Catherine Creek Spring Chinook	0.000%
216	Grande Ronde_Upper Grande RondeSpring Chinook	214	Grande Ronde_Catherine Creek Spring Chinook	1.000%
215	7-Grande Ronde_Lostine Spring Chinook	214	Grande Ronde_Catherine Creek Spring Chinook	1.000%
213	Grande Ronde_Lookingglass Creek Spring Chinook	214	Grande Ronde_Catherine Creek Spring Chinook	1.000%
551	6-Grande Ronde_Minam Spring Chinook	215	7-Grande Ronde_Lostine Spring Chinook	1.000%
510	3-Grande Ronde_Wenaha Spring Chinook	215	7-Grande Ronde_Lostine Spring Chinook	1.000%
509	2-Asotin Spring-Summer Chinook	215	7-Grande Ronde_Lostine Spring Chinook	0.000%
216	Grande Ronde_Upper Grande RondeSpring Chinook	215	7-Grande Ronde_Lostine Spring Chinook	1.000%
214	Grande Ronde_Catherine Creek Spring Chinook	215	7-Grande Ronde_Lostine Spring Chinook	1.000%
213	Grande Ronde_Lookingglass Creek Spring Chinook	215	7-Grande Ronde_Lostine Spring Chinook	1.000%
551	6-Grande Ronde_Minam Spring Chinook	216	Grande Ronde_Upper Grande RondeSpring Chinook	1.063%
510	3-Grande Ronde_Wenaha Spring Chinook	216	Grande Ronde_Upper Grande RondeSpring Chinook	1.063%
509	2-Asotin Spring-Summer Chinook	216	Grande Ronde_Upper Grande RondeSpring Chinook	0.375%
215	7-Grande Ronde_Lostine Spring Chinook	216	Grande Ronde_Upper Grande RondeSpring Chinook	1.063%
214	Grande Ronde_Catherine Creek Spring Chinook	216	Grande Ronde_Upper Grande RondeSpring Chinook	1.063%
213	Grande Ronde_Lookingglass Creek Spring Chinook	216	Grande Ronde_Upper Grande RondeSpring Chinook	0.375%
744	4-Clearwater_Lolo Summer Steelhead (A+B-Run)	218	8A-Grande Ronde_Cottonwood Creek Summer Steelhead (Wallowa-Lyons F	0.200%

Figure 73. The stray matrix.

To add a population name that does not appear in the stray matrix, go to the menu bar: **Strays > Go to population list** and append the list with the population IDs and names to be added.

Strays Reporting

A summary of straying results by population and strategy can be produced in AHA. Go to the menu bar and choose **Strays > Strays report.** Type the ID number of the strategy (number to the right of the strategy name in the grayed section) in the yellow box (upper left) shown in Figure 74 for which you want to generate a report, and click "Go".



STRAY REPORT by ESU — Strategy ID: 31 — Checksum: 38429 — 38432

GO: CLEAR:

Strategies Available

Current	23
No Hat	13
HSRG Sol	14
HSRG+Hab	15
HSRG+Hab_2	24
Historic	12
Temp	31

Recipient Pop ID	Population	ESU	Int Strays	Donor Pop ID	Population	ESU	Ext Strays
446	Clearwater Coho	Upper Columbia Col	1,192	n/a	n/a	n/a	0
335	Columbia Estuary_Bernie Creek Coho (Late-Type N-FFA)	Lower Columbia Riv	0	n/a	n/a	n/a	0
603	Columbia Estuary_Big Creek Coho	Lower Columbia Riv	0	329	Columbia Estuary_Big Creek Coho (Hatchery)	Lower Columbia Ri	98
				331	Columbia Estuary_Youngs Bay Coho (Bonneville-Sandy-Hato	Lower Columbia Ri	12
				334	Columbia Estuary_Deep River Coho (Early-Type S-Grays-Hato	Lower Columbia Ri	0
				341	Elochoman Coho (Early- Type S)	Lower Columbia Ri	2
				342	Elochoman Coho (Late- Type N)	Lower Columbia Ri	2
				667	Grays Coho (Late-Type N)	Lower Columbia Ri	0
				683	Columbia Estuary_Klaskanine Creek Coho	Lower Columbia Ri	0
				685	Grays Coho (Early-Type S-Hatchery)	Lower Columbia Ri	0
				798	Elochoman Coho (Late- Type N Hatchery)	Lower Columbia Ri	0
				799	Grays Coho (Late-Type N-Hatchery)	Lower Columbia Ri	0
329	Columbia Estuary_Big Creek Coho (Hatchery)	Lower Columbia Riv	0	n/a	n/a	n/a	0
333	Columbia Estuary_Chinook River Coho	Lower Columbia Riv	0	329	Columbia Estuary_Big Creek Coho (Hatchery)	Lower Columbia Ri	2
				331	Columbia Estuary_Youngs Bay Coho (Bonneville-Sandy-Hato	Lower Columbia Ri	83
				334	Columbia Estuary_Deep River Coho (Early-Type S-Grays-Hato	Lower Columbia Ri	4
				341	Elochoman Coho (Early- Type S)	Lower Columbia Ri	1
				342	Elochoman Coho (Late- Type N)	Lower Columbia Ri	2
				667	Grays Coho (Late-Type N)	Lower Columbia Ri	0
				683	Columbia Estuary_Klaskanine Creek Coho	Lower Columbia Ri	0
				685	Grays Coho (Early-Type S-Hatchery)	Lower Columbia Ri	2
				798	Elochoman Coho (Late- Type N Hatchery)	Lower Columbia Ri	0
				799	Grays Coho (Late-Type N-Hatchery)	Lower Columbia Ri	0
327	Columbia Estuary_Clatskanie Coho (Late-Type N)	Lower Columbia Riv	0	329	Columbia Estuary_Big Creek Coho (Hatchery)	Lower Columbia Ri	1
				331	Columbia Estuary_Youngs Bay Coho (Bonneville-Sandy-Hato	Lower Columbia Ri	5
				341	Elochoman Coho (Early- Type S)	Lower Columbia Ri	4
				342	Elochoman Coho (Late- Type N)	Lower Columbia Ri	5
				358	Cowlitz_Lower Cowlitz Coho (Type N)	Lower Columbia Ri	0
				612	Cowlitz Upper Cowlitz Coho	Lower Columbia Ri	0
				683	Columbia Estuary_Klaskanine Creek Coho	Lower Columbia Ri	0
				795	Cowlitz_Lower Cowlitz Coho (Type N Hatchery)	Lower Columbia Ri	0
				798	Elochoman Coho (Late- Type N Hatchery)	Lower Columbia Ri	0

Figure 74. Stray reporting by ESU

2.2.6 Ending the AHA Session

To end the AHA session, the population dataset must first be saved. The AHA application must also be saved if it is desired to preserve the pattern and stray matrix files that were loaded earlier.

Saving an AHA Rollup Dataset

The Save button is accessible from the **menu bar at the top. Go to File > Save.**

The simplest option is the "Quick Save" feature. Clicking this feature will result in a request to select a directory and to name the file (Figure 75).

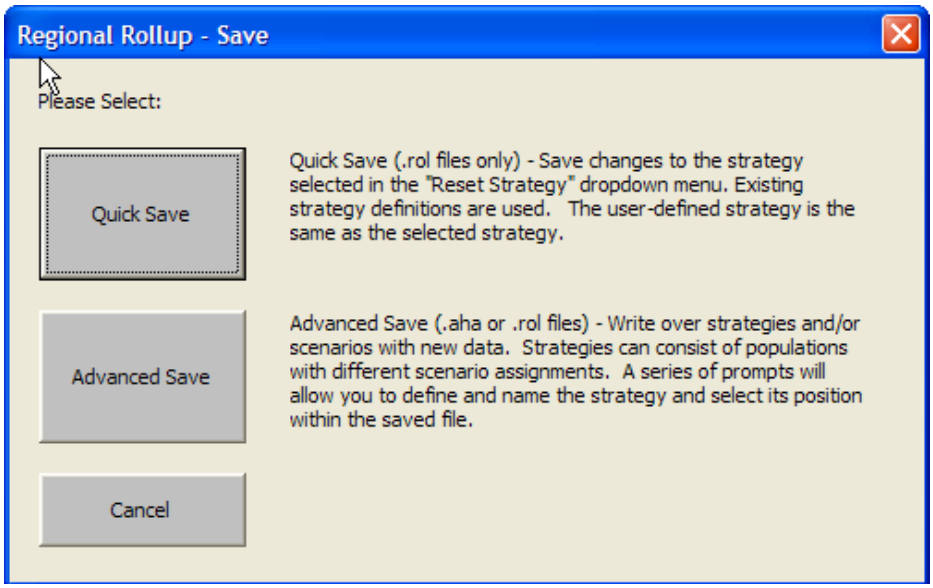


Figure 75. Options for saving an AHA Rollup dataset.

The "Advanced Save" allows the user to save the populations as individual population *.aha datasets or to save the dataset as a *.rol file with the option to revise a strategy label (Figure 76).

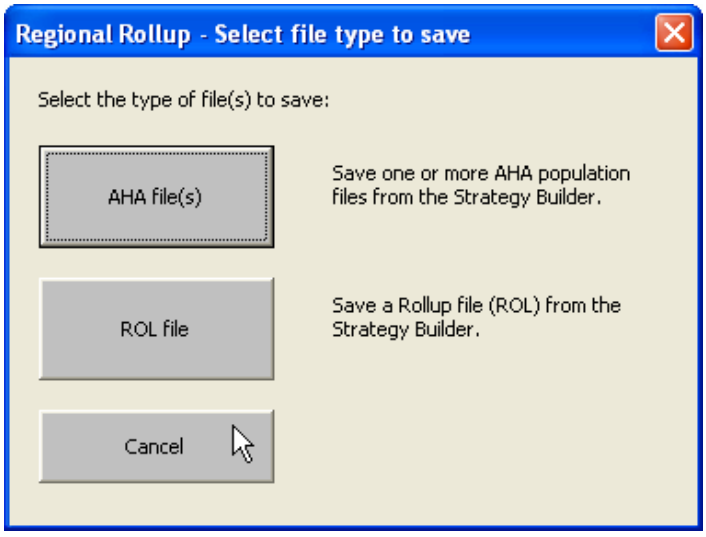


Figure 76. Save options for the "Advanced Save" feature.

Both of these options will ask the user to identify a strategy and a strategy label to overwrite. The AHA Rollup will overwrite the selected strategy with the information shown on the Strategy Builder Screen. In other words, if the current strategy was selected, the program will overwrite the chosen strategy with the current conditions. This feature is used to copy a strategy to other strategies during the save process.

It is recommended that most users employ the "Quick Save" feature unless they want to specifically overwrite a strategy. Note that the Advanced Save is the only way to permanently reassign a strategy to different ID (Figure 77).

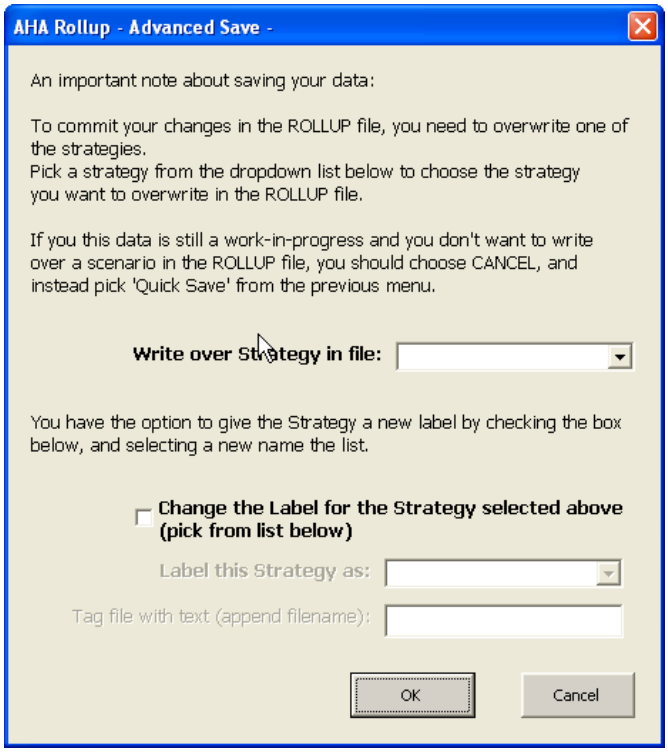


Figure 77. A request to select a strategy to overwrite and the label for the Strategy under the "Advanced Save" option.

The Strategy currently selected on the strategy page is the one that will be permanently saved. Choose the name of the strategy to be overwritten from the dropdown menu. Then if a different Name/ID for the strategy is desired, check the box "Label Strategy As…", and choose a new Name/ID from the enabled dropdown menu.

Exporting Patterns and Stray Matrix Data

From the menu bar, choose **File > Export Pattern Set and Stray Matrix Files**. This will bring up the Save screen for patterns and stray matrix (Figure 78)

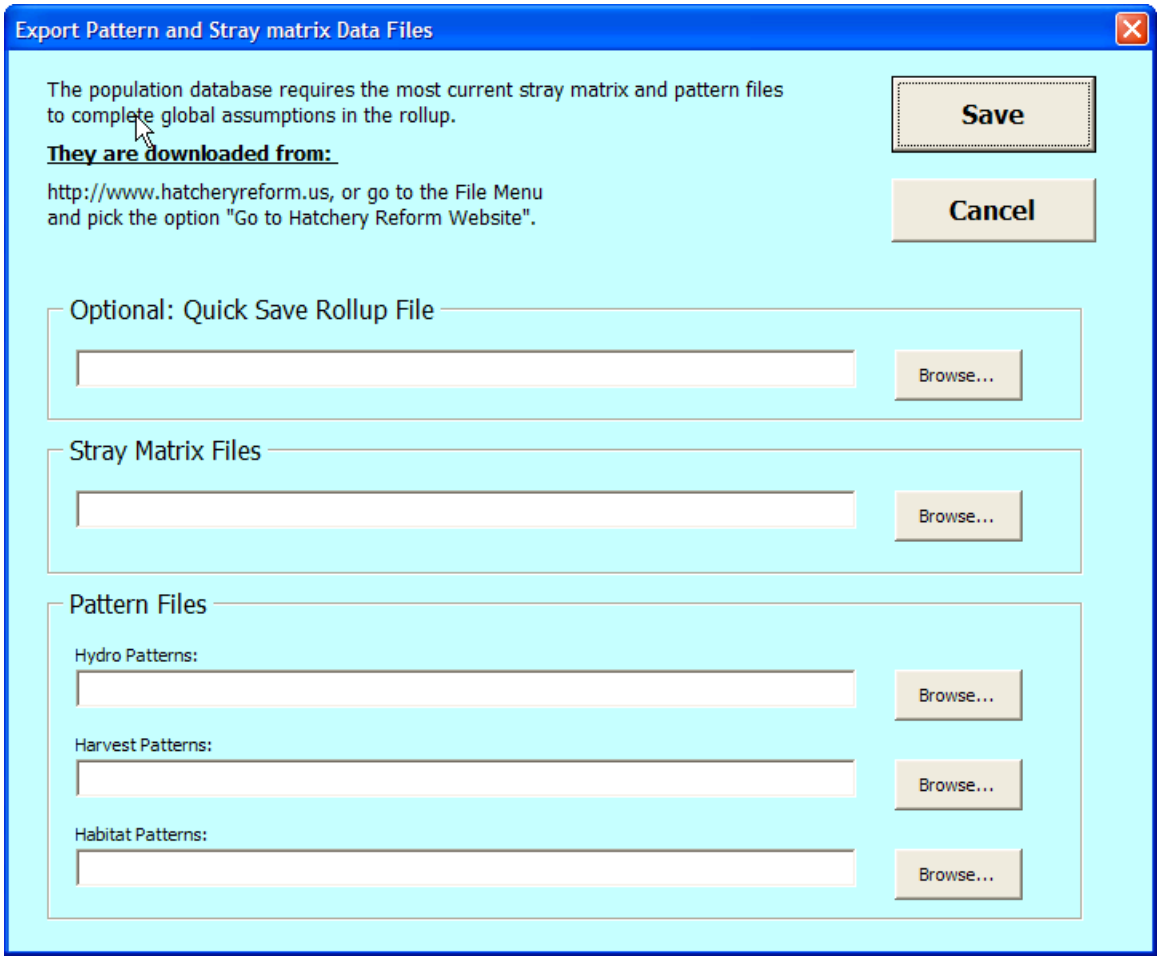


Figure 78. The save/export pattern data menu

Here the user can browse to the desired locations in which the pattern (*.hyd, *.hrv, *.hab), stray matrix (*.smx), and if desired, population data (*.rol) files will be saved. AHA will allow any of these fields to be left blank, if saving only subset of these files is all that is needed.

Saving an AHA Rollup Application

When closing Excel, the program will prompt the user to save the AHA Application (Figure 79). This was added to ensure the user does not close without saving global variable information. This information is saved with the application and not the AHA dataset. Selecting Cancel will stop the procedure and will allow you to save the AHA Excel file using the standard save menu item in Excel. It does not matter which version of Excel is being used.

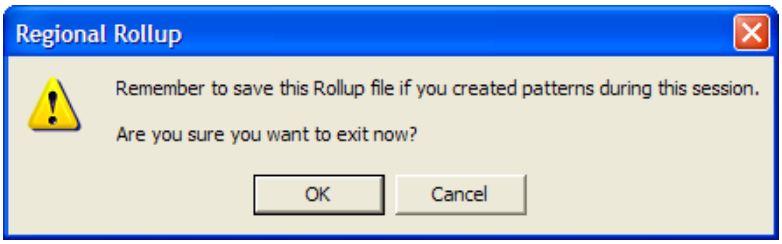


Figure 79. Prompt to save AHA Rollup application when closing Excel. If pattern and stray matrix data should be saved in the application, hit OK, then click the function key - F12 to save the AHA application as a new file containing pattern data.

The standard Excel prompt to save the file after selecting OK may appear. There is no need save the file if no edits have been made to the global variables.

3 References

Budy, P. and H. Schaller. 2007. Evaluating tributary restoration potential for pacific salmon recovery. Ecological Applications, 17(4): 1068-1086.

NMFS (National Marine Fisheries Service). 2008. Endangered Species Act – Section 7 Consultation Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Consultation on remand for operation of the Federal Columbia River Power System and 19 Bureau of Reclamation Projects in the Columbia Basin. NMFS, Portland, Oregon.