

River, Floodplain and Other Habitat Optimization Models for Ecosystems (HOME™)

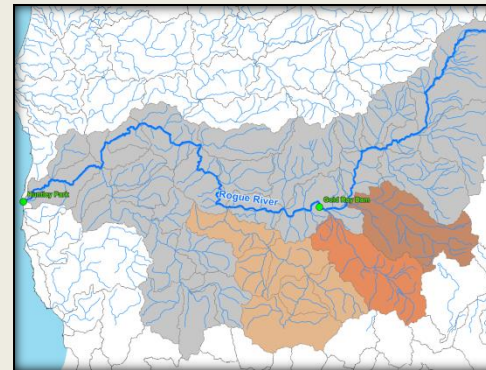
John Monahan, Wayne S. Wright and Ross Hendrick
July 31, 2013 | NCER 2013, Greater Chicago, IL



Introduction

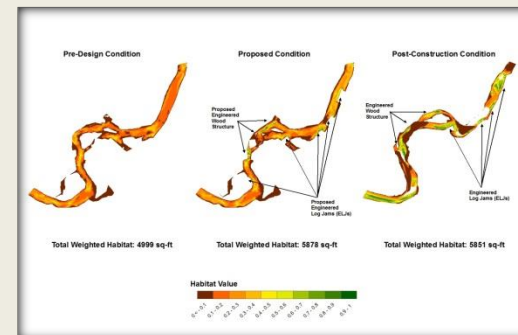
Rogue River Project

- Setting
- Issues
- Solution(s)



HOME™

- Habitat
- Optimization
- Model for
- Ecosystems



The Setting

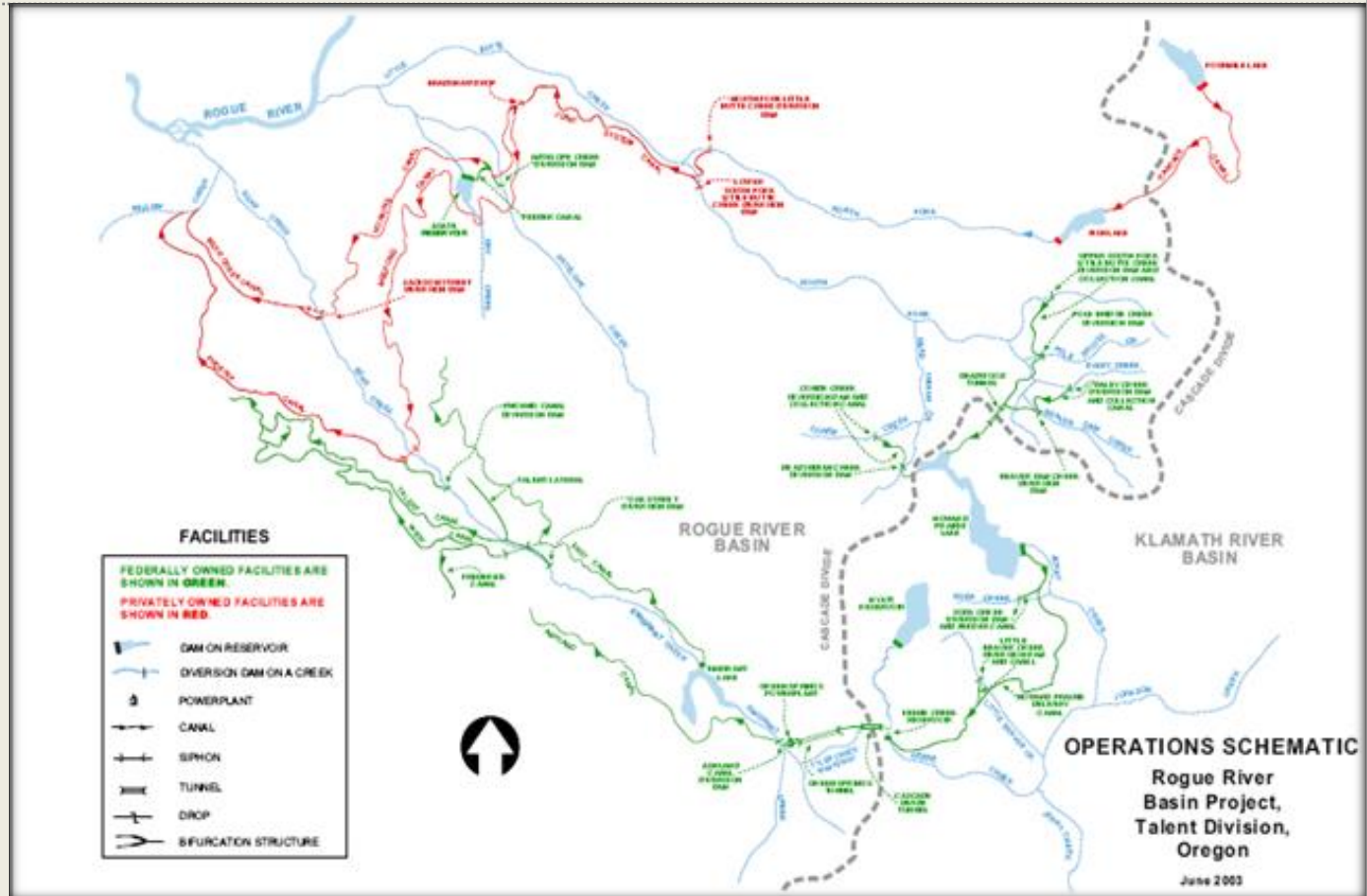


The Challenge

Addressing the issues to achieve a balanced outcome to meet multiple needs, demands, and legal requirements.

Rogue Project Facilities (cont.)

- Dams
- Diversions
- Powerplant
- Canals
- Siphons
- Tunnels
- Drops
- Bifurcations



Private Facilities - red

Federal Facilities - green

PHABSIM Analysis, Modeling and Critical Review

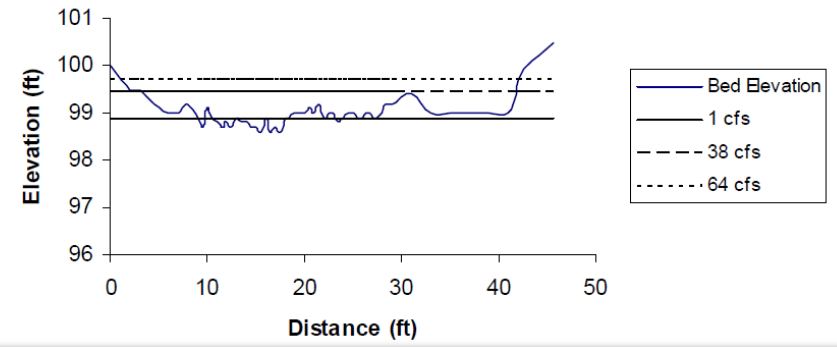
Appendix D – Weighted Usable Area (WUA) Versus Discharge Relationships

Table D-1. Weighted usable area (WUA) versus discharge relationships for coho juveniles and spawning/incubation in Emigrant Creek.

Discharge (cfs)	Total (ft ²)/1000 ft	WUA (ft ²)/1000 ft			Percent of maximum habitat		
		Spawning/ incubation	Juvenile-summer	Juvenile-winter	Spawning/ incubation	Juvenile-summer	Juvenile-winter
0.5	17335	866	3920	2354	7.8	50.9	42.1
1	21403	1418	4804	2941	12.8	62.4	52.5
2	22446	2130	5252	3274	19.2	68.2	58.5
3	23477	2847	5679	3586	25.7	73.8	64.1
4	24471	3571	5986	3819	32.2	77.7	68.2
5	25423	4223	6233	4012	38.1	81.0	71.7
6	26311	4859	6450	4181	43.8	83.8	74.7
7	27178	5332	6645	4334	48.1	86.3	77.4
9	27968	6087	6958	4589	54.9	90.4	82.0
10	28217	6397	7076	4695	57.7	91.9	83.9
15	29088	7787	7468	5069	70.2	97.0	90.6
20	29679	8829	7629	5273	79.6	99.1	94.2
24	30136	9359	7692	5377	84.4	99.9	96.1
25	30212	9458	7697	5397	85.3	100.0	96.4
26	30286	9567	7700	5417	86.3	100.0	96.8
30	30546	9955	7889	5473	89.8	99.9	97.8
31	30702	10060	7671	5475	90.7	99.6	97.8
32	30877	10160	7676	5495	91.6	99.7	98.2
33	30953	10239	7672	5510	92.3	99.6	98.5
34	31024	10308	7656	5516	93.0	99.4	98.5
35	31095	10396	7639	5519	93.7	99.2	98.6
40	31434	10668	7545	5536	96.2	98.0	98.9
45	31938	10872	7477	5572	96.0	97.1	99.6
50	32543	11004	7379	5595	99.2	95.8	100.0
55	33118	11071	7229	5597	99.8	93.9	100.0
60	33408	11090	7056	5564	100.0	91.6	99.4
65	33581	11044	6849	5514	99.6	89.0	98.5
70	33752	10960	6779	5527	96.8	88.0	98.7
75	33917	10870	6708	5540	96.0	87.1	99.0
80	34096	10889	6644	5553	96.2	86.3	99.2



Emigrant Creek - Gun Club, Transect 3



RAS-SIM Solution

Spreadsheet - based tool to reproduce PHABSIM results using HEC-RAS modeling

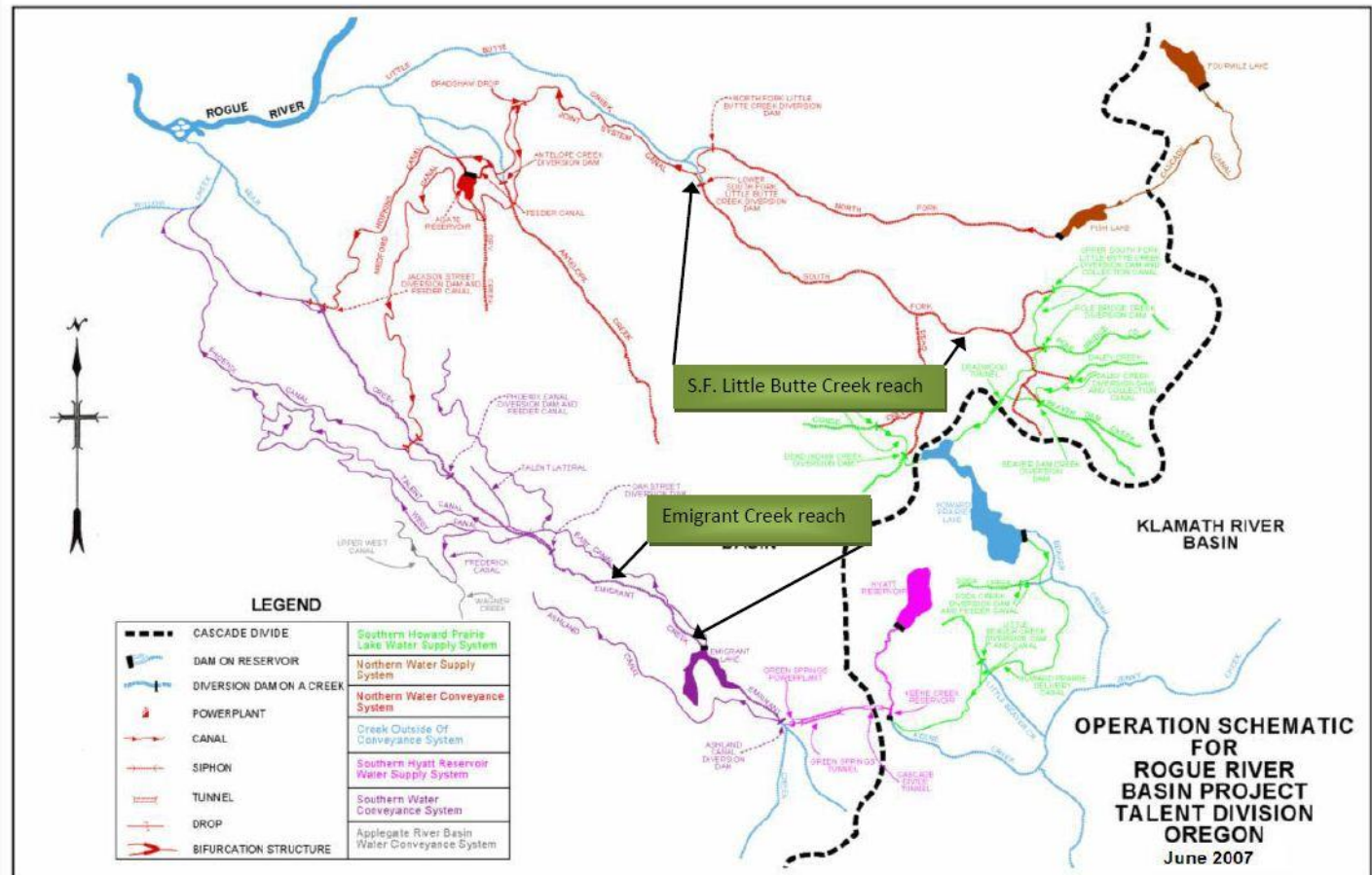
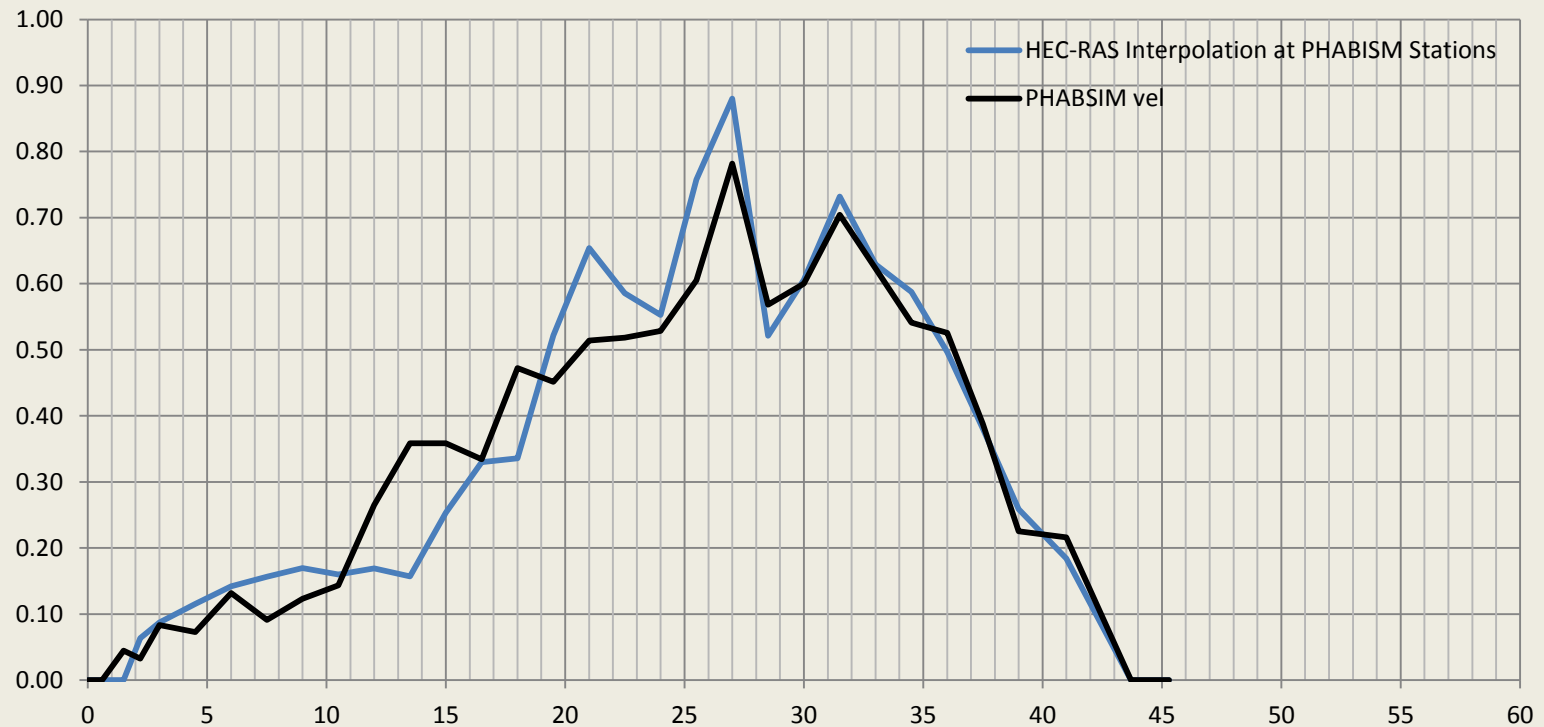


Figure 2. Map showing stream segmentation for Rogue Project instream flow assessment and the 2 reaches analyzed for coho salmon production potential in the Bear and Little Butte Creek watersheds.

RAS-SIM Velocity Output Example – Velocity Calibration



RAS-SIM Attributes: labor intensive, voluminous Excel spreadsheets, non-automated, non-visual, very accurate.

RAS-SIM Habitat Uplift Results

TABLE 3. WUA RESULTS FOR EMIGRANT CREEK EXISTING AND PROPOSED CONDITIONS (IN FT²/1,000 FT)

	Winter Rearing		Summer Rearing	
	2 cfs	10 cfs	2 cfs	10 cfs
Existing Conditions	3,244 ¹	4,705 ¹	5,146 ¹	7,100 ¹
Bar Apex Jam²	4,145	5,372	6,092	7,861
Barb Type Jam²	4,657	6,455	6,429	8,568
Cross Channel Structure²	4,088	5,687	6,339	8,600

TABLE 4. WUA UPLIFT PER PROPOSED CONDITION, IN AREA (FT²/1,000 FT) AND PERCENT OF EXISTING CONDITION

	Winter Rearing		Summer Rearing	
	2 cfs	10 cfs	2 cfs	10 cfs
Bar Apex Jam¹	901 ft ² /1000 ft (+28%)	667 ft ² /1000 ft (+14%)	946 ft ² /1000 ft (+18%)	761 ft ² /1000 ft (+11%)
Barb Type Jam¹	1413 ft ² /1000 ft (+44%)	1750 ft ² /1000 ft (+37%)	1283 ft ² /1000 ft (+25%)	1469 ft ² /1000 ft (+21%)
Cross Channel Structure¹	844 ft ² /1000 ft (+26%)	982 ft ² /1000 ft (+21%)	1193 ft ² /1000 ft (+23%)	1501 ft ² /1000 ft (+21%)

Project Results – Biologic Opinion “No Jeopardy”



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
 NATIONAL MARINE FISHERIES SERVICE
 Northwest Region
 7600 Sand Point Way N.E., Bldg. 1
 Seattle, WA 98115

Refer to NMFS No:
 2003-01098

April 2, 2012

William D. Gray
 Area Manager
 Bureau of Reclamation
 Columbia-Cascades Area Office
 1917 Marsh Road
 Yakima, Washington 98901-2058

Re: Endangered Species Act Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Future Operation and Maintenance of the Rogue River Basin Project (2012-2022), Rogue and Klamath River Basins (HUCs: 18010206, 17100308, 17100307), Oregon and California

Dear Mr. Gray:

The enclosed document contains a biological opinion (opinion) prepared by the National Marine Fisheries Service (NMFS) pursuant to section 7(a)(2) of the Endangered Species Act (ESA) on the effects of the Bureau of Reclamation's (Reclamation) future operation and maintenance of the Rogue River Basin Project (2012-2022), Rogue River and Klamath River basins, in Oregon and California. In this opinion, NMFS concludes that the proposed action is not likely to jeopardize the continued existence of Southern Oregon and Northern California Coasts (SONCC) coho salmon (*Oncorhynchus kisutch*) or result in the destruction or adverse modification of designated critical habitat for SONCC coho salmon. The NMFS also concluded that the proposed action is not likely to adversely affect southern distinct population segment Pacific eulachon (*Thaleichthys pacificus*), southern distinct population segment North American green sturgeon (*Acipenser medirostris*), or critical habitat designated for eulachon. The effects of this action would all occur outside the geographic range of designated critical habitat for green sturgeon.

As required by section 7 of the ESA, NMFS is providing an incidental take statement with the opinion. The incidental take statement describes reasonable and prudent measures NMFS considers necessary or appropriate to minimize the impact of incidental take associated with this action. The take statement sets forth nondiscretionary terms and conditions, including reporting requirements, that Reclamation must comply with to carry out the reasonable and prudent measures. Incidental take from actions that meet these terms and conditions will be exempt from the ESA's prohibition against the take of listed species.



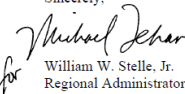
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This document also includes the results of our analysis of the action's likely effects on essential fish habitat (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), and includes twelve conservation recommendations to avoid, minimize, or otherwise offset potential adverse effects on EFH. Six of these conservation recommendations are a subset of the ESA take statement's terms and conditions. Section 305(b)(4)(B) of the MSA requires Federal agencies to provide a detailed written response to NMFS within 30 days after receiving these recommendations.

If the response is inconsistent with the EFH conservation recommendations, the Federal action agency must explain why the recommendations will not be followed, including the scientific justification for any disagreements over the effects of the action and the recommendations. In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we request that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

If you have questions regarding this consultation, please contact Ken Phippen, Branch Chief of the Oregon Coast Habitat Branch, at 541.957.3385.

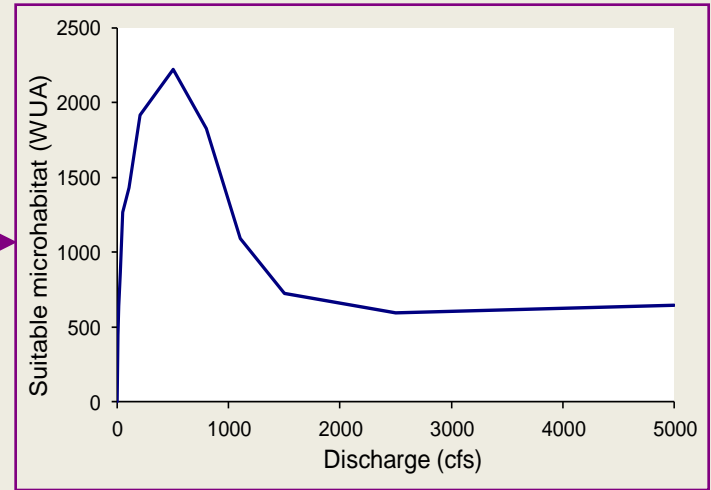
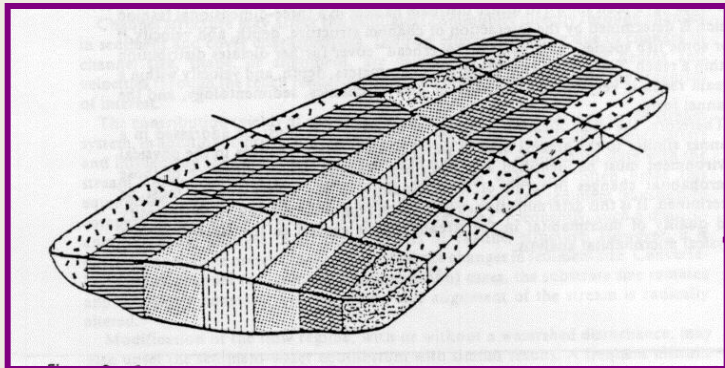
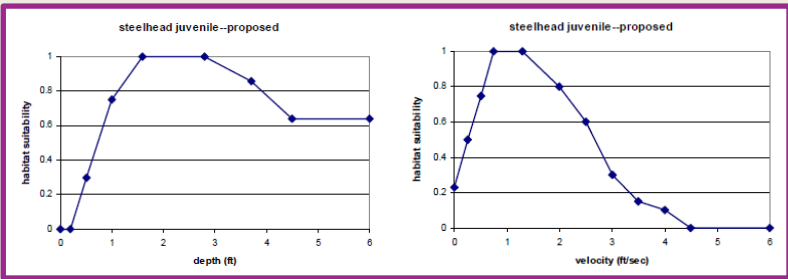
Sincerely,

for 
 William W. Stelle, Jr.
 Regional Administrator

cc: Carol Bradford, Medford Irrigation District
 Chris Eder, Bureau of Reclamation
 Brian Hampson, Rogue River Irrigation District
 Jim Pendleton, Talent Irrigation District
 Scott Willey, Bureau of Reclamation

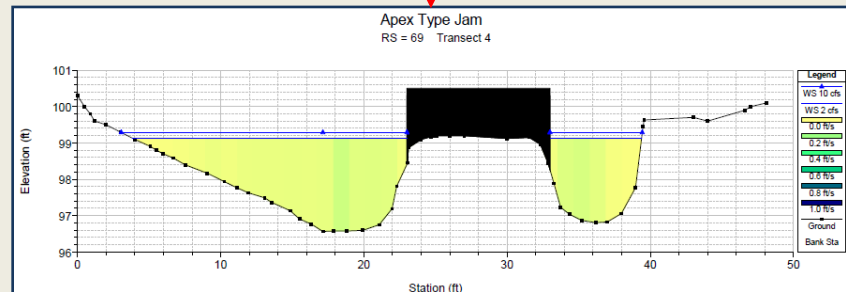
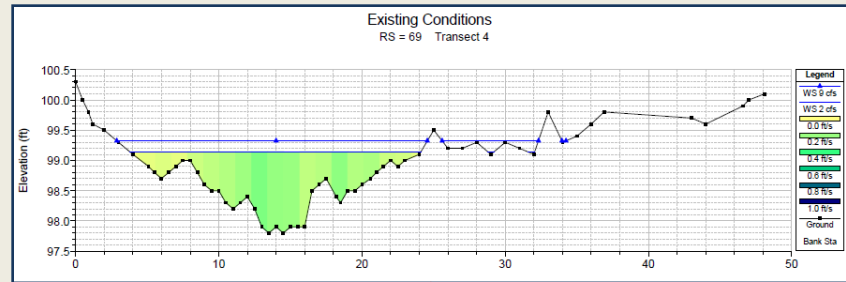
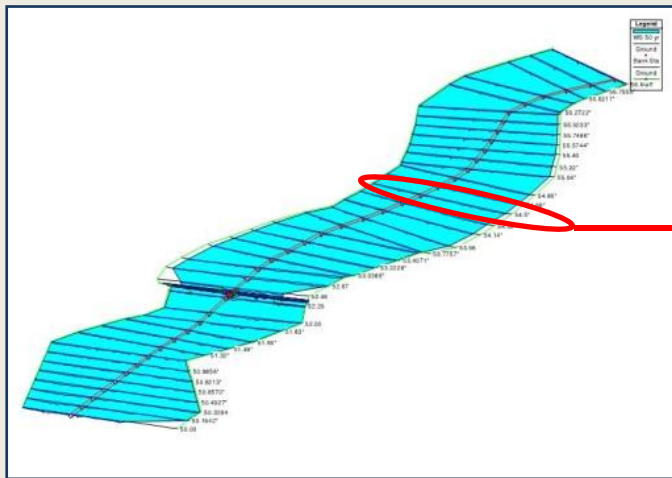
HOME™ Development

PHABSIM

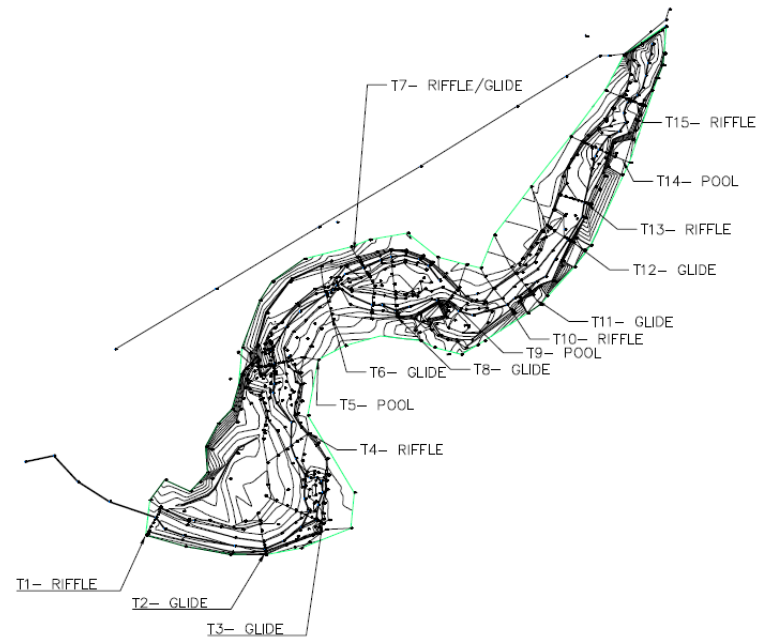


HOME™ Development

HEC-RAS

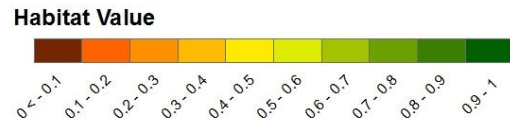
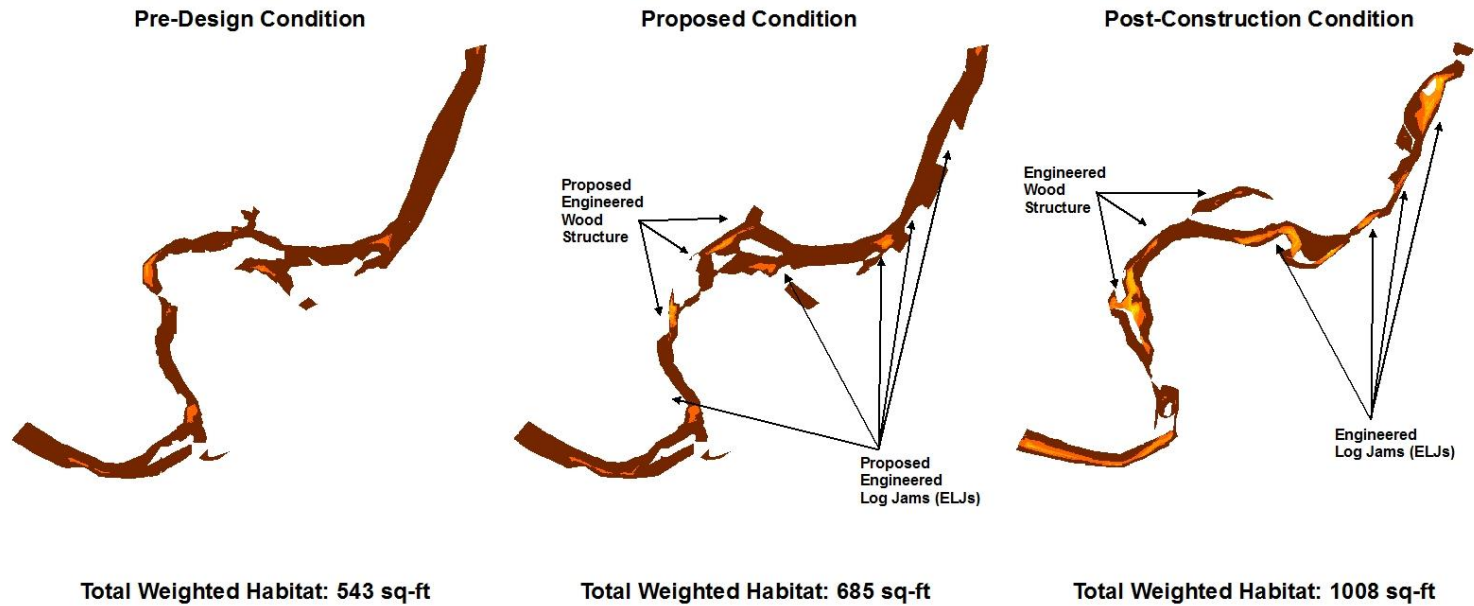


HOME™ Methods – Survey, Hydraulics & Geomorphology

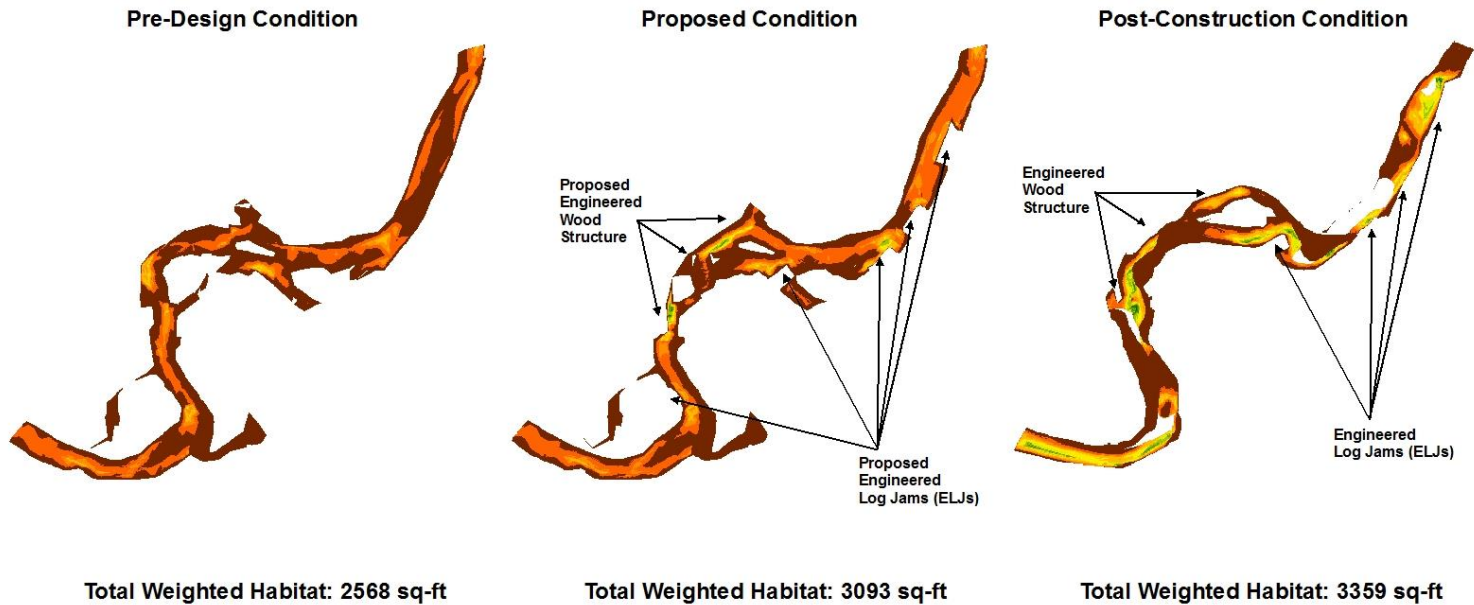


HOME™ Development

Squalicum Creek – Juvenile Steelhead Rearing – 10 CFS



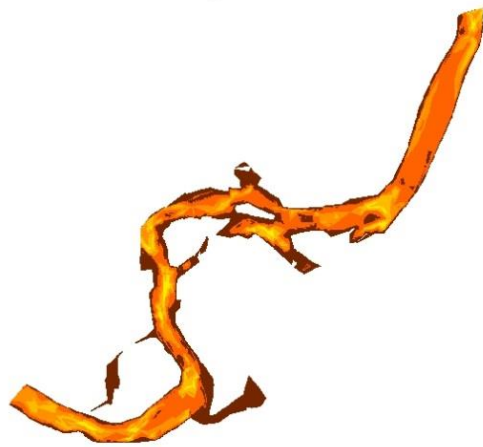
HOME™ Development Squalicum Creek – Juvenile Steelhead Rearing – 50 CFS



HOME™ Development

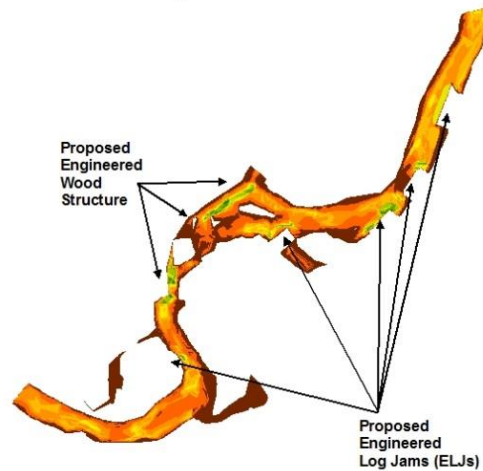
Squalicum Creek– Juvenile Steelhead Rearing – 100 CFS

Pre-Design Condition



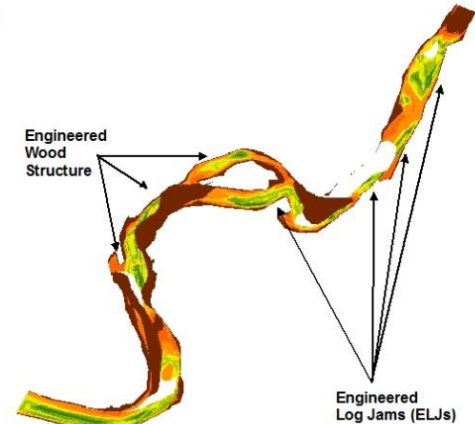
Total Weighted Habitat: 4999 sq-ft

Proposed Condition



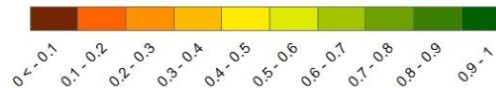
Total Weighted Habitat: 5878 sq-ft

Post-Construction Condition



Total Weighted Habitat: 5851 sq-ft

Habitat Value



HOME™ Development White River – Juvenile Bull Trout Rearing – 64 CFS

Existing Condition – WUA 11,786 sq-ft



Proposed Condition – WUA 12,291 sq-ft

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White River – Juvenile Bull Trout Rearing – 175 CFS

Existing Condition – WUA 20,257 sq-ft

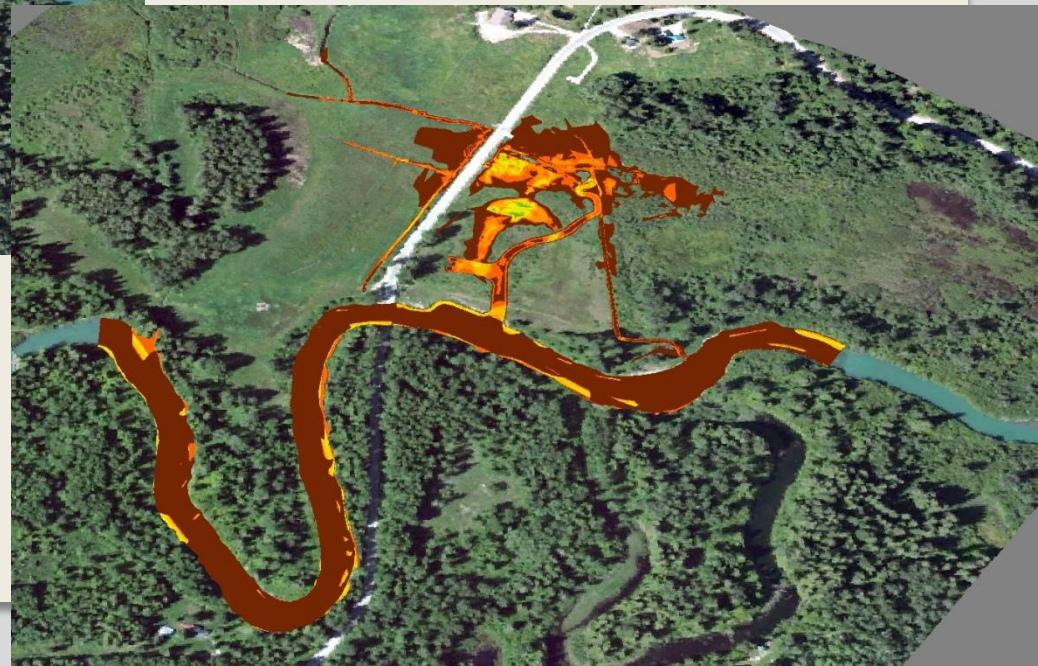


Proposed Condition – WUA 21,422 sq-ft

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White River – Juvenile Bull Trout Rearing – 4650 CFS

Existing Condition – WUA 41,807 sq-ft



Proposed Condition – WUA 77,296 sq-ft

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White River – Juvenile Chinook Salmon Rearing – 64 CFS

Existing Condition – WUA 11,356 sq-ft



Proposed Condition – WUA 12,284 sq-ft

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White River – Juvenile Chinook Salmon Rearing – 175 CFS

Existing Condition – WUA 20,828 sq-ft

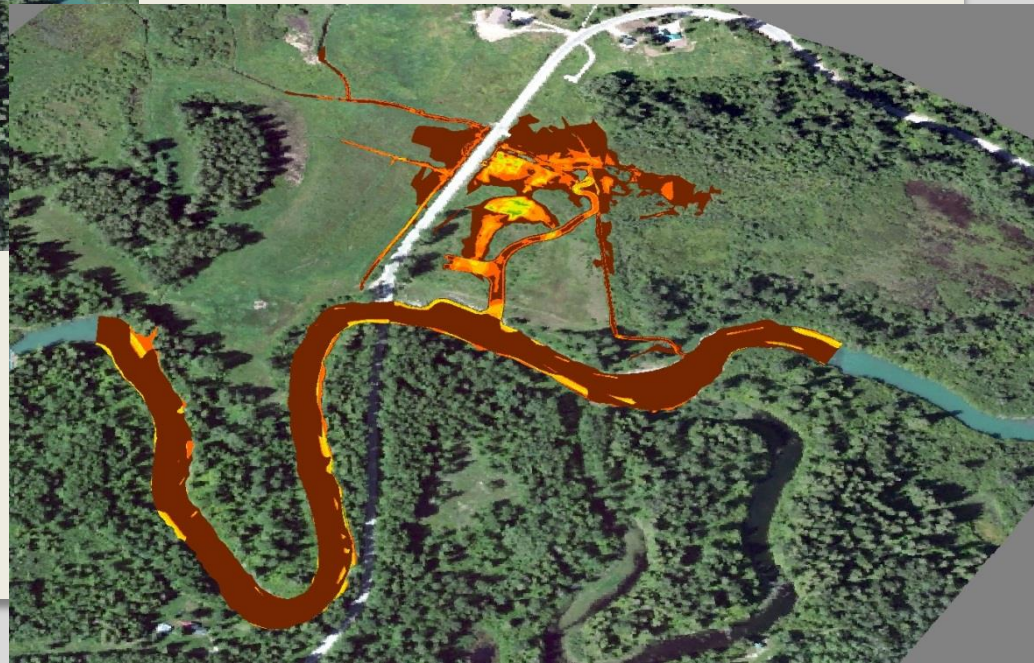
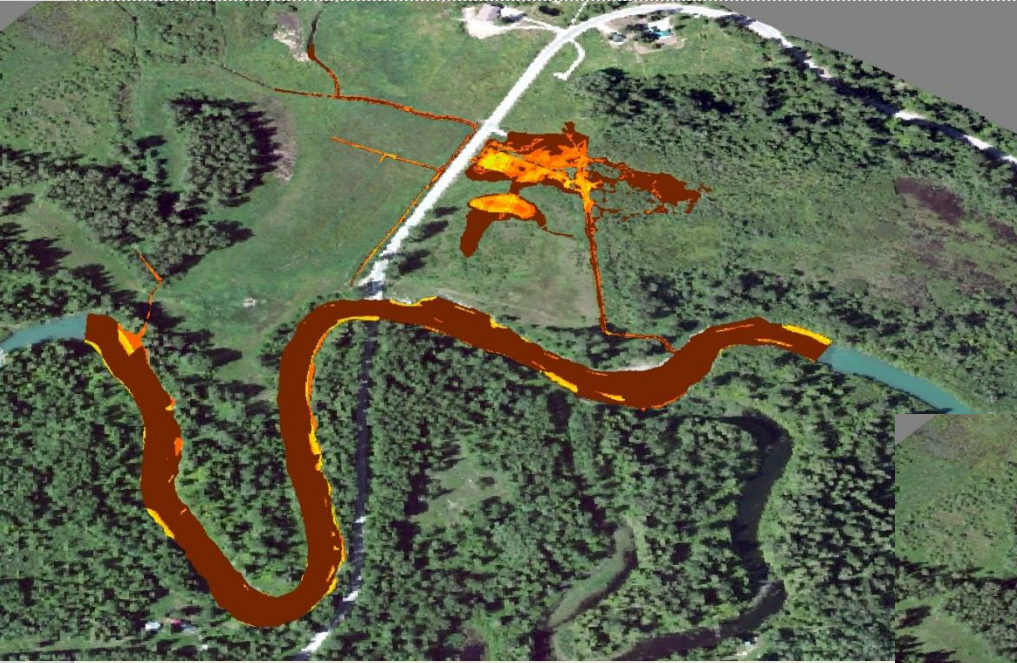


Proposed Condition – WUA 21,568 sq-ft

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White River – Juvenile Chinook Salmon Rearing – 4650 CFS

Existing Condition – WUA 63,033 sq-ft



Proposed Condition – WUA 80,268 sq-ft

CONCLUSIONS

\$ Billions Spent – more coming

- “What did we get?”
- “How much did we get?”
- “How well did we do?”

With HOME™

NOW WE CAN ANSWER THESE QUESTIONS
... AND MORE