

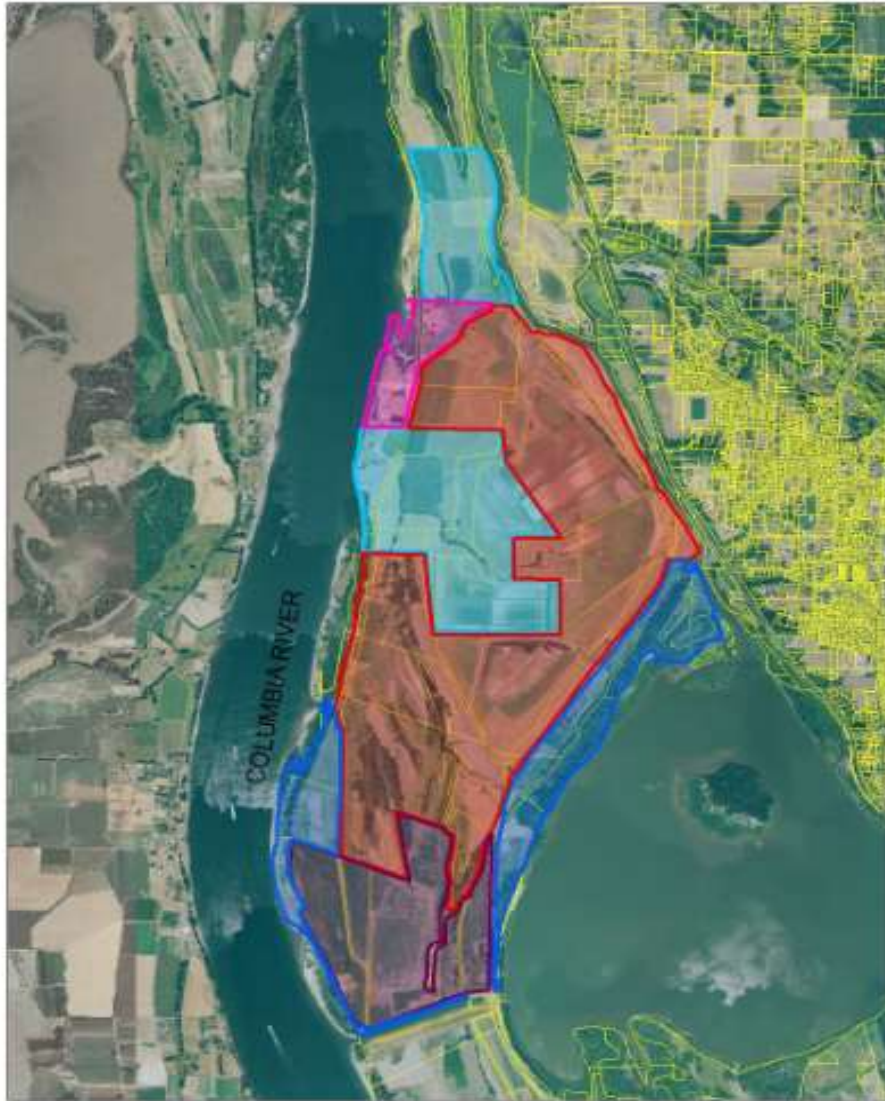


WDFW South Unit Shillapoo Wildlife Area

~CRM 100

‘Vancouver
Lowlands’, upper
Reach F

SHILLAPOO PARCEL MAP



3,700 1,850 0 3,700 Feet



Legend

- Port of Vancouver, 515 acres
- Clark County Parks, 532 Acres
- WDFW, 1799 Acres
- Andersen, 83 Acres
- Fazio, 763 Acres
- Clark County Parcels

WDFW Shillapoo

Wildlife Area:

~2370 acres

South Unit Project

Area:

~700 acres of Open Water Wetlands, Emergent Marsh, Scrub/Shrub, Uplands

Includes Clark County (CREST Phase 1, Buckmire Slough)

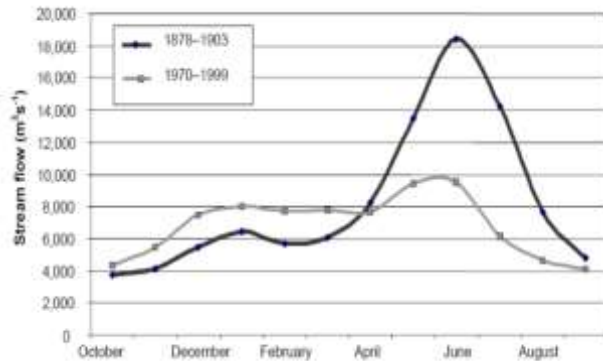
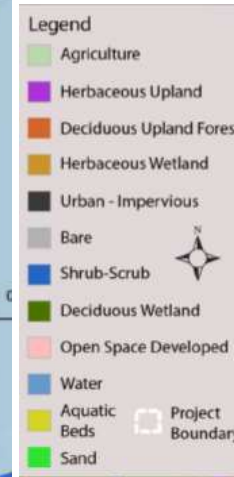
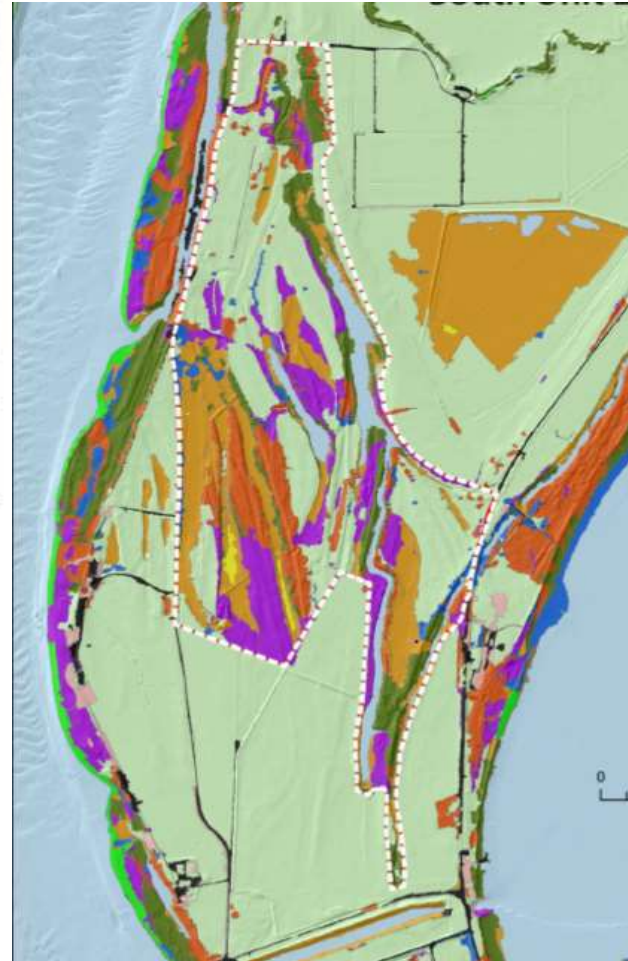
~200 acres

(Construction in 2015)

Change: Hydrology Land Use Vegetation

Levees constructed in 1950, WDFW Shillapoo Wildlife Area established

Yr 2000, two pumps installed to pump water into wetlands to enhance waterfowl hunting opportunity



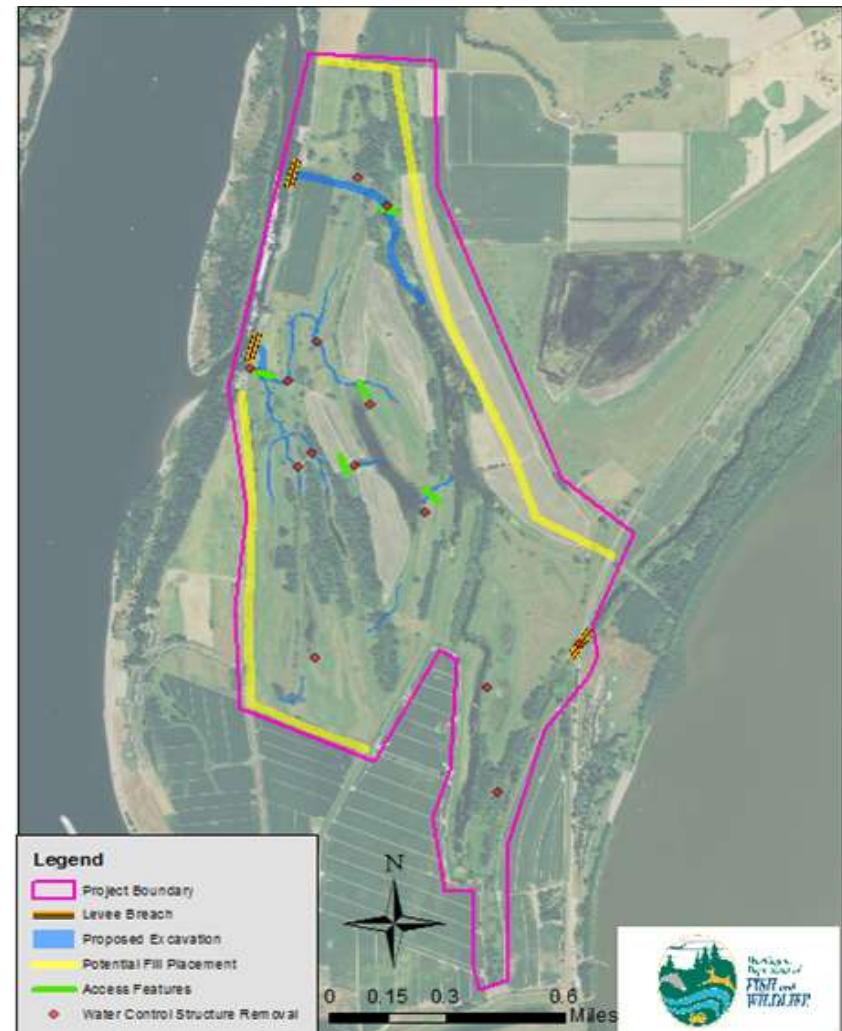
Historical v. Contemporary flow patterns at Dalles Dam (Bottom, 2005)

Wetland Hydrology: Existing conditions vs Proposed Conditions

Existing Conditions
South Unit Shillapoo



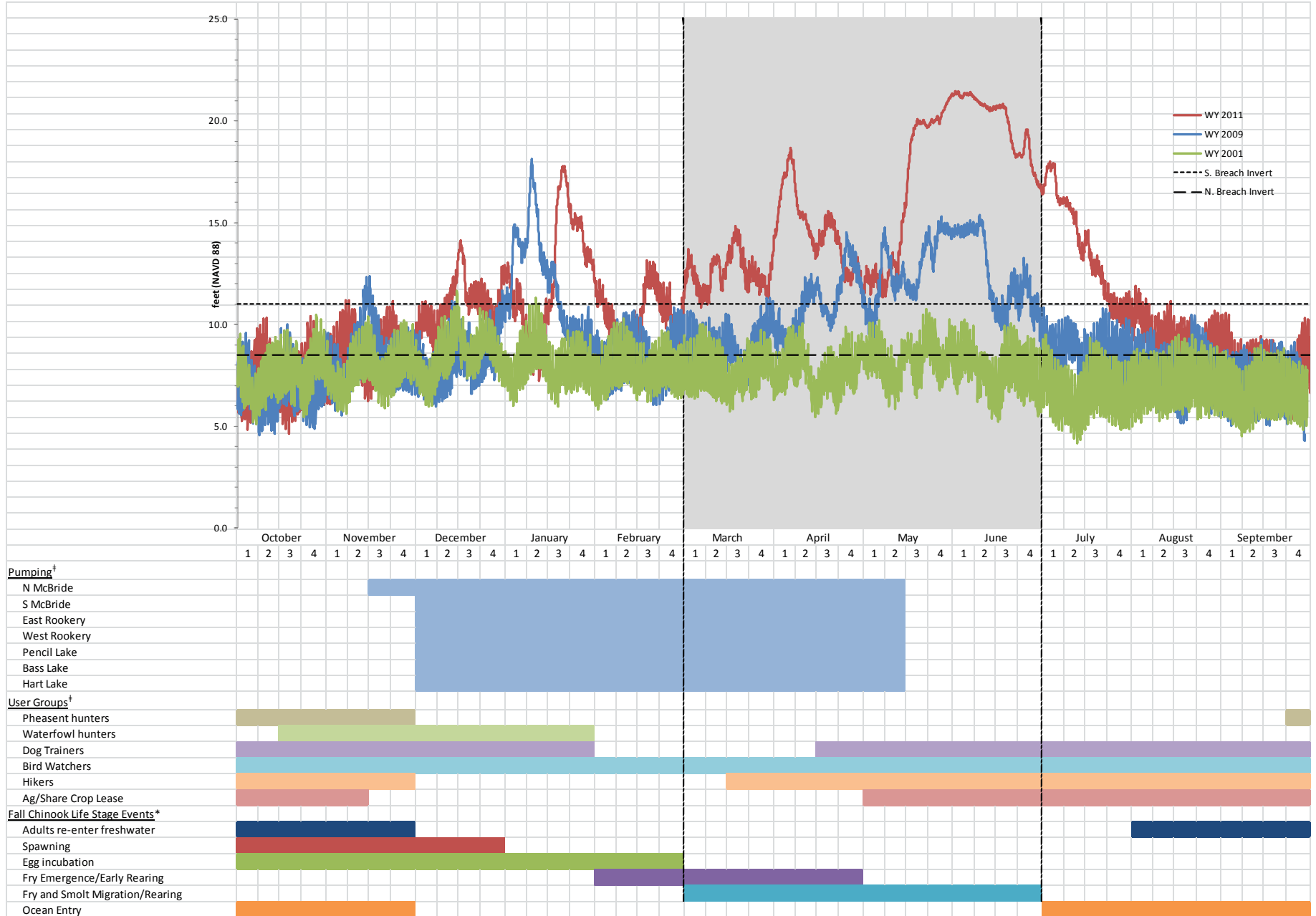
Major Restoration Project Features
South Unit Shillapoo



Project Objectives

- 1) Restore habitat for threatened and endangered salmon by providing access and hydrologic connectivity to mainstem Columbia River
- 2) Maximize wetland habitat capacity for fish and wildlife
- 3) Minimize flood risk to adjacent landowners with flood protection measures
- 4) Maintain or enhance user access for hunting, birding, and other outdoor recreational activities

Hydrology, Current Management and User Group



Assessment Tools/Data

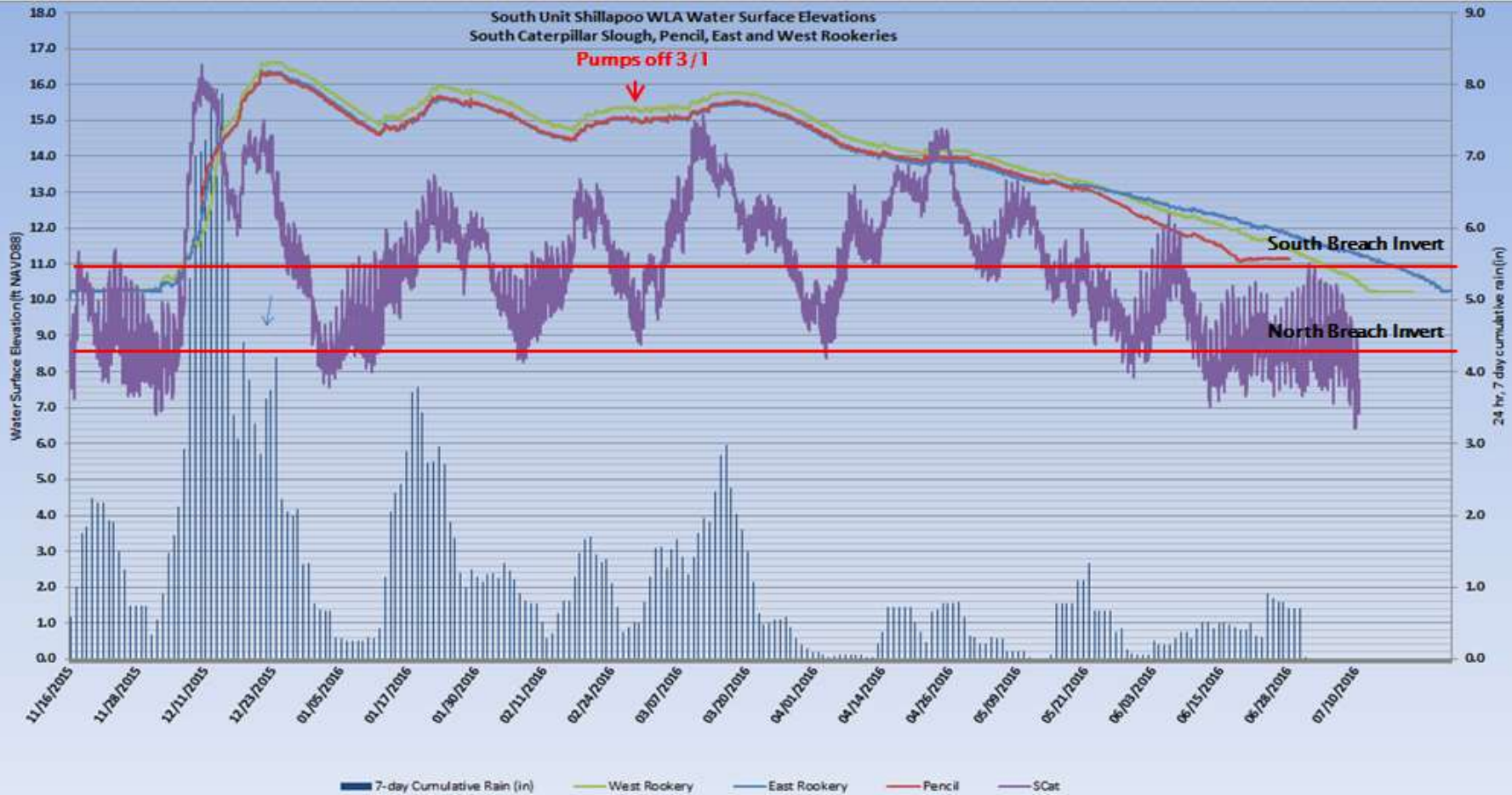
Existing Conditions

- 'Pumping Records', (water depths recorded weekly at water control structures since 2006)
- Reference Sites throughout 'Reach F' to define hydrology, vegetation
- Onsite WSE monitoring and vegetation mapping
- GIS Mapping

Proposed Conditions

- HEC-ras 2-D modeling (USACOE, Dec-June 2009)
- USGS and USACOE Historic hydrology at Vancouver WA
- HEC-efm statistical outputs
- GIS (to present HEC-efm results)

Pumping vs Columbia River Hydrology



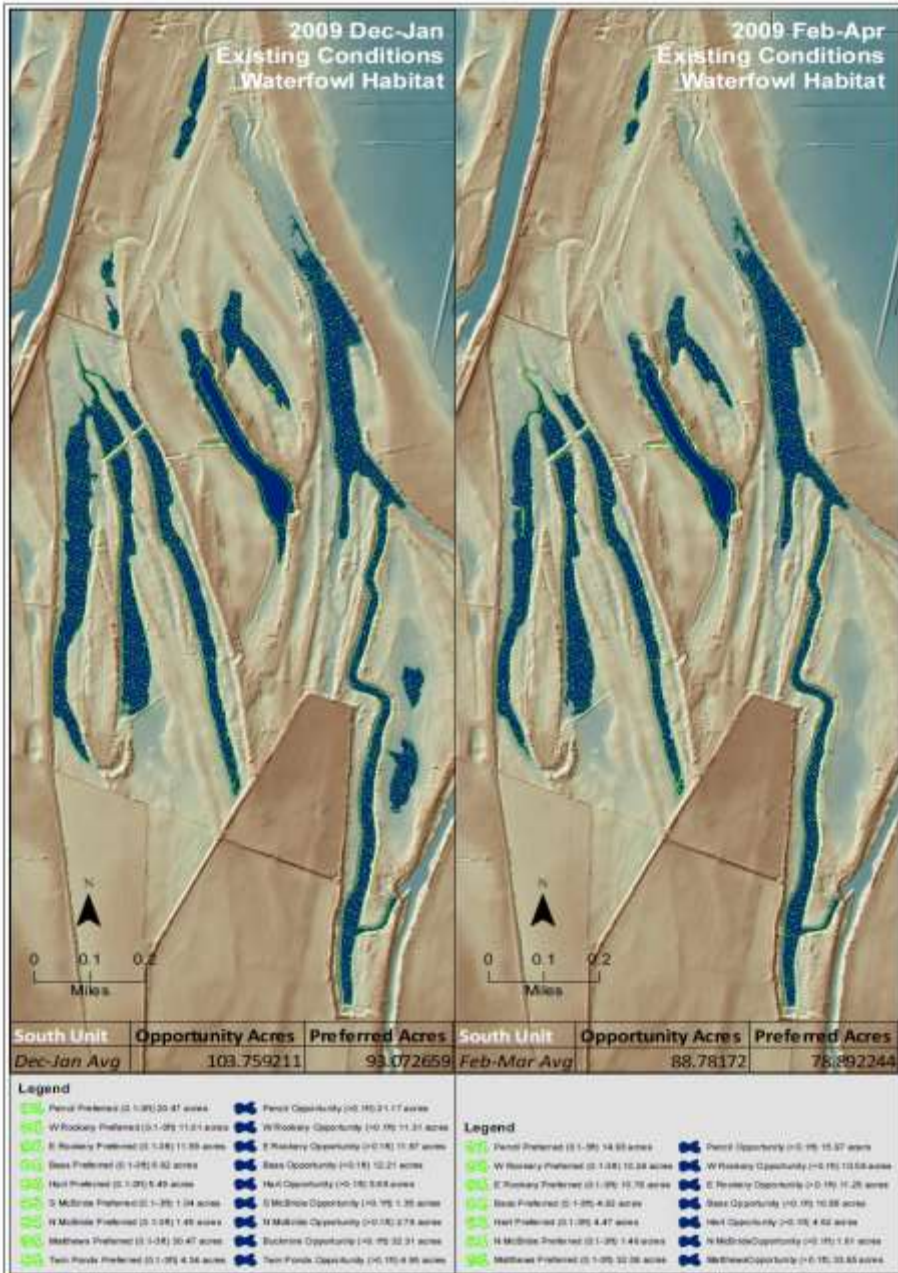
Pumping Records: Weekly water depth measurements at water control structures

Seasonal minimum, average, maximum water surface elevations estimated based on limited data



Pencil Lake WCS

Year	2005-06	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	Weekly Average Depth (in)	Weekly Average WSE (ft)	Monthly Average Depth (in)	Monthly Min Depth (in)	Monthly Max Depth (in)	Monthly Average WSE (ft)	Monthly Min WSE (ft)	Monthly Max WSE (ft)	Month
4-Dec 12/4			0					10		5.0	13.3							
12-Dec 12/12			0			12		4		5.3	13.3	10.7	0.0	32.0	13.8	0.0	15.6	Dec
19-Dec 12/19			0			14		21		11.7	13.9							
26-Dec 12/26		10	11			14		32		16.8	14.3							
2-Jan 1/2		0	9		0	14		25		9.6	13.7							
8-Jan 1/8		11	10	12	2	14		22		11.8	13.9	15.0	0.0	42.0	14.1	0.0	16.4	Jan
19-Jan 1/19	38	13	14	12	14	19		18		18.3	14.4							
22-Jan 1/22	42	12	14	10	13	28	14	12		18.1	14.4							
31-Jan 1/31		0		6	9	30	27			14.4	14.1							
5-Feb 2/5	37	0	11	0	0		27	7		11.7	13.9	9.7	0.0	37.0	13.7	0.0	16.0	Feb
12-Feb 2/12	36	0		0	0	25	18	0		11.3	13.8							
21-Feb 2/21	34	0	8	0	0	23	0	0	11	8.4	13.6							
26-Feb 2/26	22	12	0	0	0	24	3	0	11	8.0	13.6							
2-Mar 3/2	15	0	0	0	0	24	7	0	12	6.4	13.4	9.7	0.0	39.0	13.7	0.0	16.2	Mar
12-Mar 3/12	10	9	0	0	0	30	6	0	20	8.3	13.6							
19-Mar 3/19	6		0	0	0	33	26	0	27	11.5	13.9							
26-Mar 3/26	0		0	0	0	39	37	0	28	13.0	14.0							
4-Apr 4/4	0		0	0	0	40	54	0	25	14.9	14.1	15.9	0.0	54.0	14.2	0.0	17.4	Apr
13-Apr 4/13	0			0	0	46	48	0	21	16.4	14.3							
20-Apr 4/20	15			7	0	53	42	3		20.0	14.6							
27-Apr 4/27	0			12	0	43		3	18	12.7	14.0							
4-May 5/4	12			9	0	42	42			21.0	14.7	20.4	0.0	43.0	14.6	0.0	16.5	May
11-May 5/11	12				0	38				16.7	14.3							
18-May 5/18	16				0	33				16.3	14.3							
25-May 5/25	17				0	43	37		26	24.6	15.0							
1-Jun 6/1	21			22	12	48				25.8	15.0	27.8	0.0	60.0	15.2	0.0	17.9	Jun
8-Jun 6/8	23			25	15	59			19	28.2	15.3							
15-Jun 6/15	29			24	23	59			11	29.2	15.3							
22-Jun 6/22	28			17	24	60			0	25.8	15.1							
29-Jun 6/29	24			14	22	60				30.0	15.4	17.9	0.0	54.0	14.4	0.0	17.4	Jul
6-Jul 7/6	12			0	17	54				20.8	14.6							
13-Jul 7/13					0	35				17.5	14.4							
19-Jul 7/19						10	27			18.5	14.4							
25-Jul 7/25						6				6.0	13.4							



‘Pumping Record’ used to estimate Acres of Shallow-Water habitat

Acres of shallow water habitat provided seasonally by pumping during winter and spring 2009

	E Rookery	W Rookery	Pencil	N. McBride	S. McBride	Twin Ponds	Hart	Bass	Buckmire	TOTAL
2009 Dec-Jan Avg	11.70	11.01	20.47	2.61	1.05	4.35	5.49	5.92	30.47	93.07
2009 Feb-Mar Avg	10.77	10.25	14.93	1.46	0.00	0.00	4.47	4.92	32.09	78.89

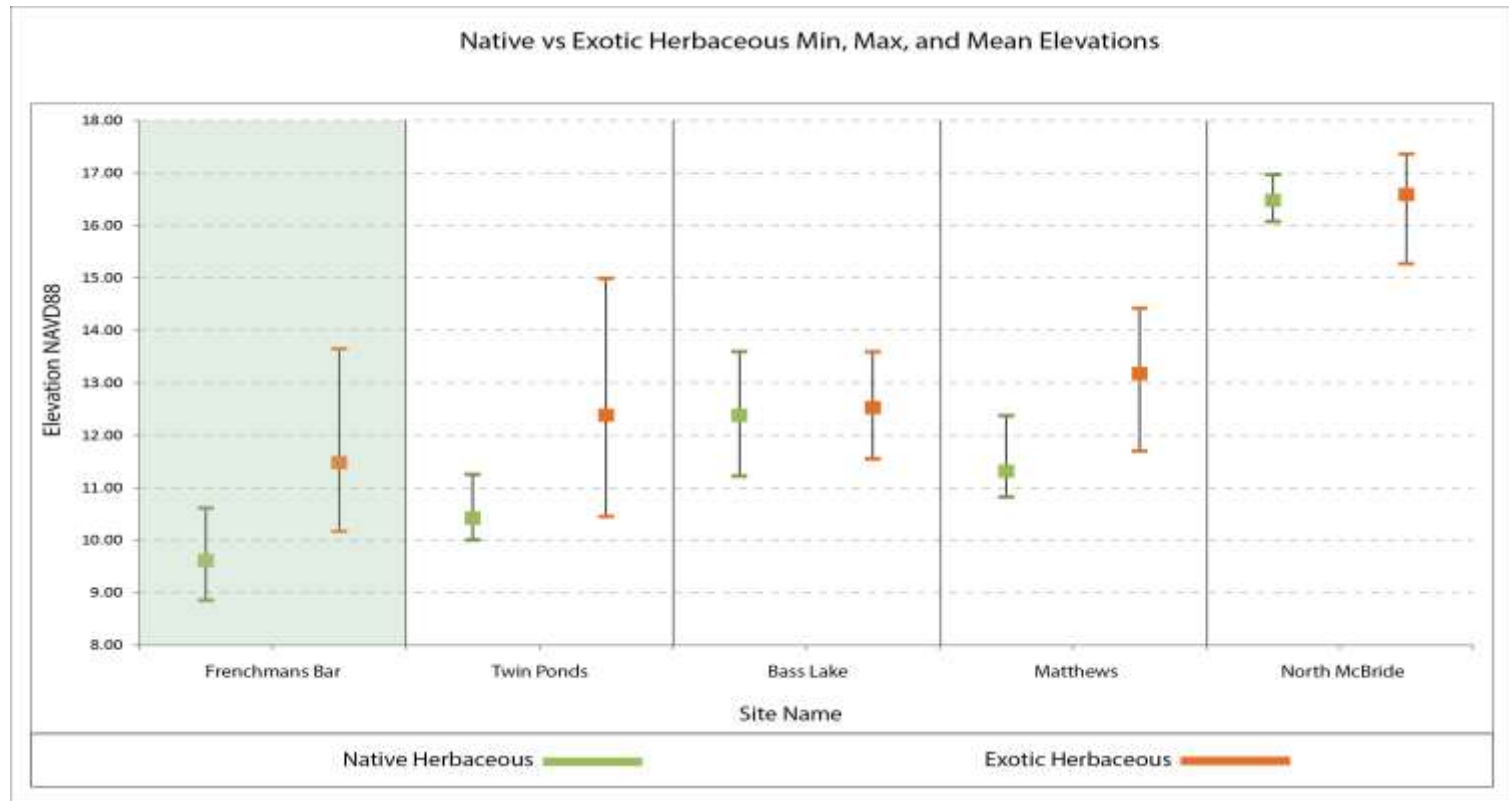


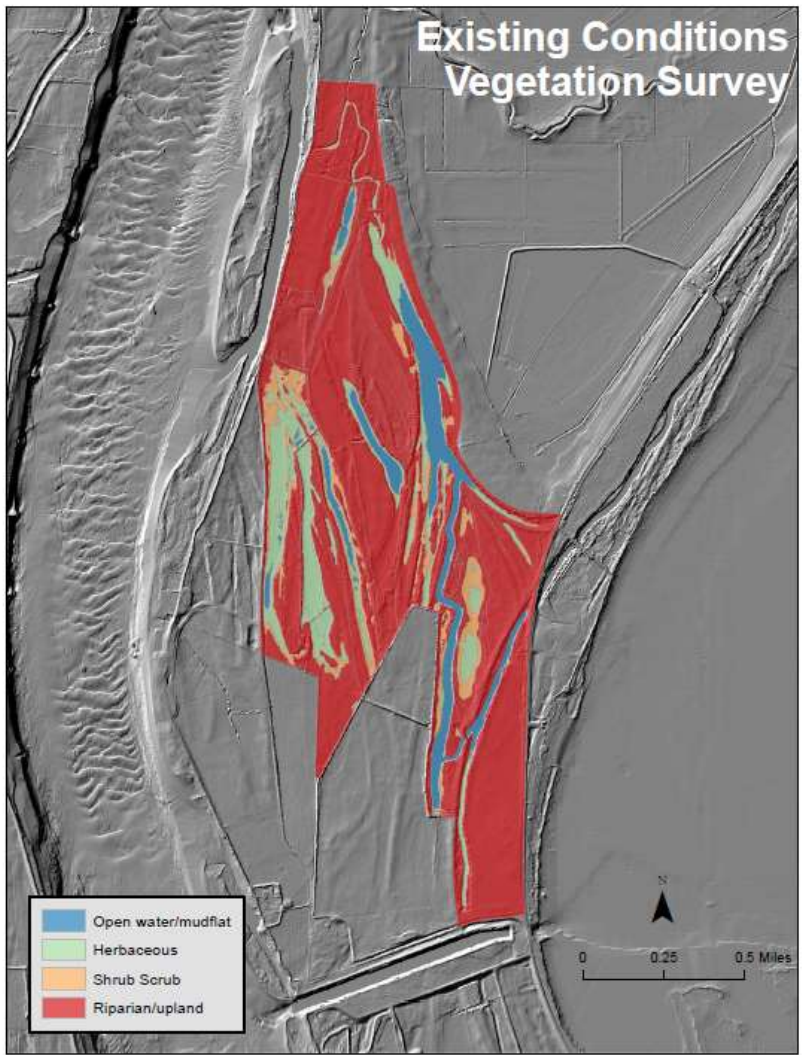
Reference Sites: Reach F 'Status' and 'Trend' Sites

Onsite veg/elevation surveys



Vegetation: South Unit Wetland-Elevation v. Reference (Frenchman's Bar)





2015 Onsite veg/topo surveys used to map/quantify Existing Conditions Vegetation zones throughout South Unit

Existing Conditions

Goal #3 Expand and improve native wetland vegetation communities										
Wetland	E Rookery	W Rookery	Pencil	N. McBride	S. McBride	Twin Ponds	Hart	Bass	Buckmire	
Predominantly Native Herbaceous (acres)	10.6	10.9	10.7	2.4	0	1.4	*	5.8	16.1	
Predominantly Exotic Herbaceous (acres)	5.6	14.1	22.5	4.4	0.0	18.7	*	3.9	19.3	
Total acres of predominatly native herbaceous vegetation within the South Unit	57.9									

*Area was sprayed and mowed so there was no living vegetat

HEC-ras 2D hydrodynamic Model Results 2009

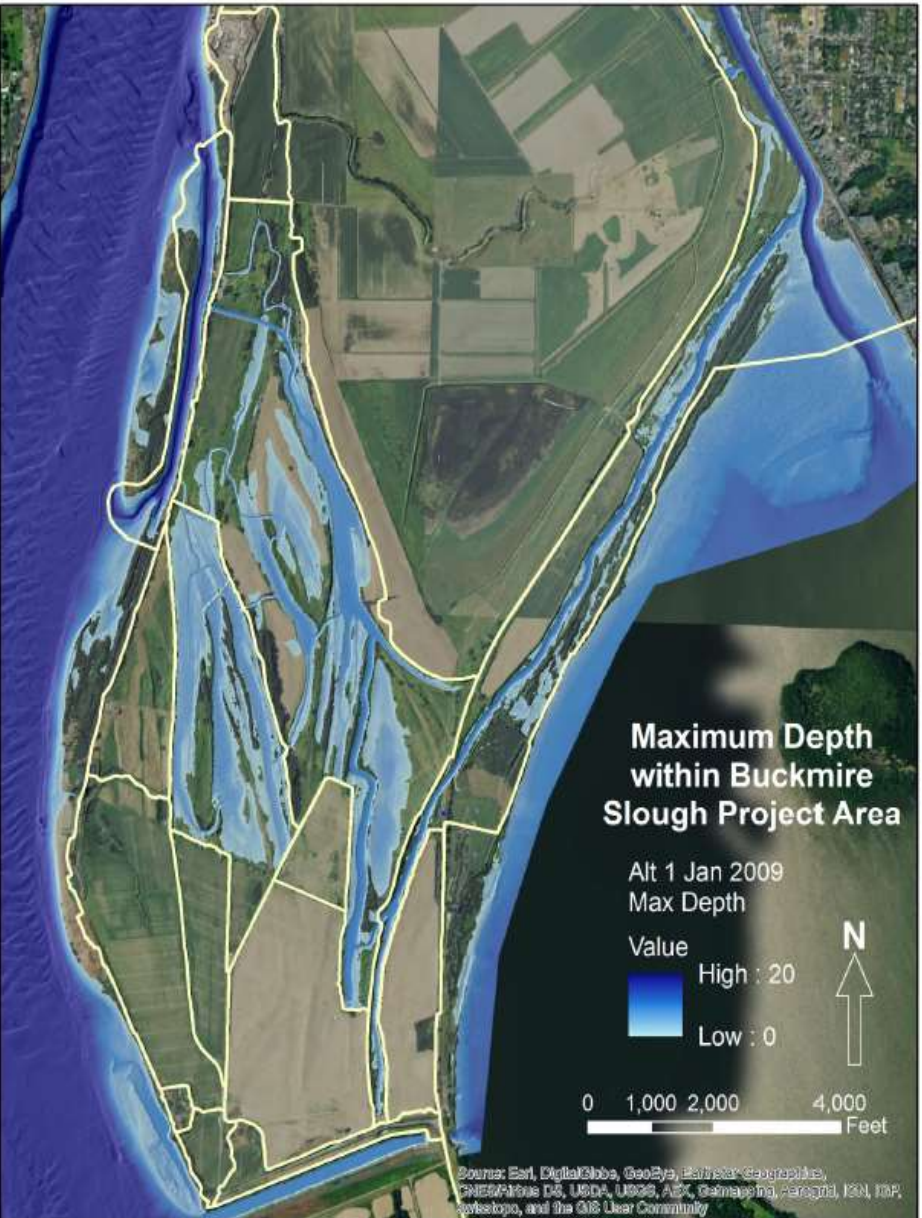


Figure 47: Maximum depth grid for Alternative 1 during the January 2009 high water event. This event approximates a 2 year recurrence interval event on the Columbia River at this location.

Statistical Analysis of HEC-ras Results

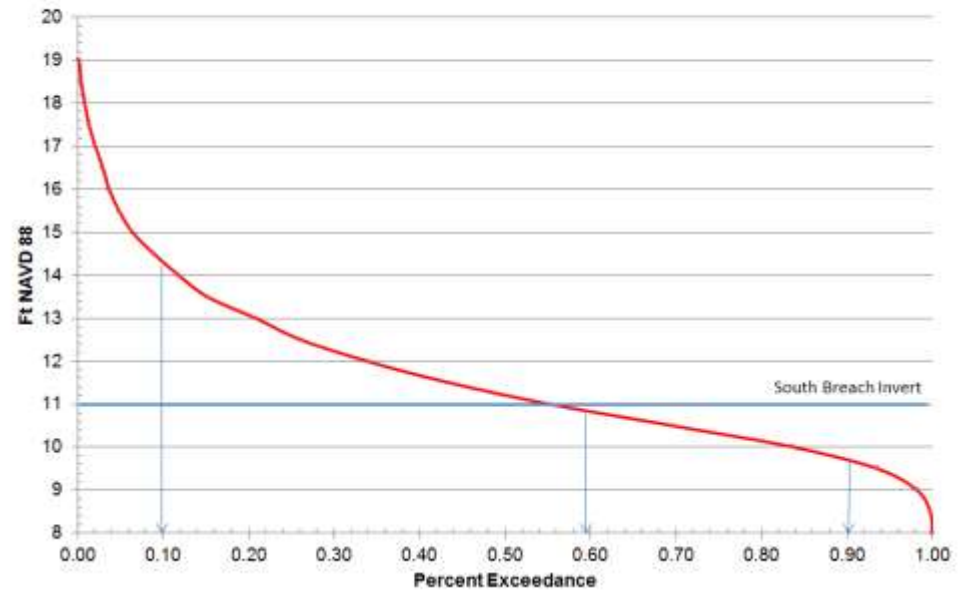
- Relied on model outputs from hydro-statistics of single cell from 2D grid (one from each wetland)



USGS Vancouver Gage POR

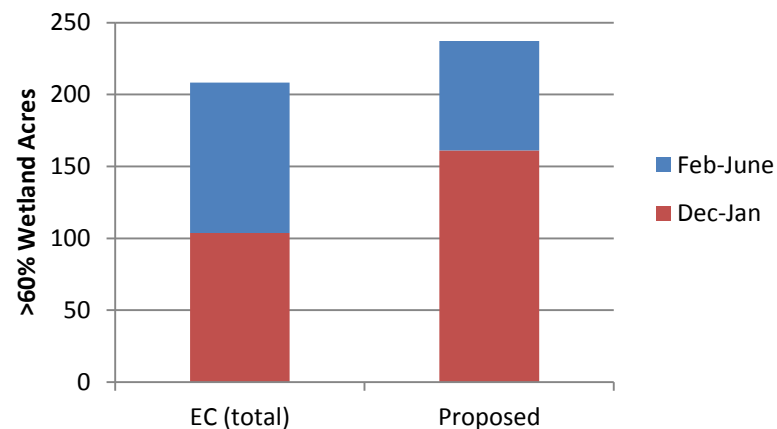


Pencil Lake
Dec-April 1998-2015



Summary Existing Conditions Habitat vs Modeled Proposed

Model Predicted and Average Observed Aquatic Habitat 2009	
Modeled Alternative By Period	Acres 0.1-7 feet depth
EC: 2009 Dec-Jan Avg	103.8
EC: 2009 Feb-Apr Avg	88.8
EC: 2009 Feb-June Avg	104.4
Alt 1 2009 Dec-Jan (>60% acres)	161.1
Alt 1 2009 Feb-Apr (>60% acres)	34.3
Alt 1 2009 Feb-June (>60% acres)	76.2



South Unit Shillapoo

