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BY: Rabecca S. Lawson	ON: 8/4/2014
THE LOWER ELWHA KLALLAM TRIBE	
ВҮ:	ON:
THE PORT GAMBLE S'KLALLAM TRIBE	
ВҮ:	ON:
THE JAMESTOWN S'KLALLAM TRIBE	
BY:	ON:
UNITED STATES FISH AND WILDLIFE SERVICE	ON BEHALF OF THE DEPARTMENT OF THE INTERIOR
BY:	ON:
THE NATIONAL OCEANIC AND ATMOSPHERIC	ADMINISTRATION
ВҮ:	ON:

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BY:	ON:
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BY:	ON:
THE JAMESTOWN S'KLALLAM TRIBE	
ВҮ:	ON:
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ВҮ:	ON:
UNITED STATES FISH AND WILDLIFE SERVICE ON BEHAL	F OF THE DEPARTMENT OF THE INTERIOR
ВҮ:	ON:
THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINIST	TRATION
BY: MATHING	on: 8/07/14

# Assessment of Natural Resource Service Losses related to the Rayonier Mill Study Area Port Angeles, WA

7/10/2014

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1

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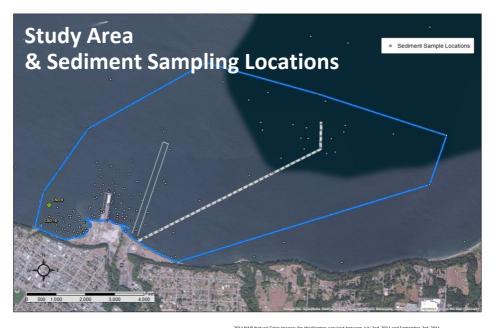
## **Introduction and Purpose**

This presentation, documenting the completion of Phase 1, currently reflects the trustees best available knowledge of:

- Existing conditions,
- Contaminant sources,
- Approach and models used, and
- Range and magnitude of injuries to ecological services provided by natural resources within the Rayonier Study Area.

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7/10/2014

2011 NAP Natural Color imagery for Washington acquired between July 2nd, 2011 and September 3rd, 2011 Confidential Settlement Negotiations Subject to Federal Rules of Evidence Section 408 Preliminary Draft/Subject to Revision





# Numerous staged soil piles from City of Port Angeles CSO Project (looking west)





## Definitions

- Injury scientific concept; measurable adverse impacts to resources resulting from release of hazardous substance
- **Damage** translation of injuries into what liable party must pay or do as compensation
- Services values provided by resources (e.g., wildlife shelter/food/human uses)
- **Baseline** resource condition had the release not occurred; "but for" condition

7/10/2014

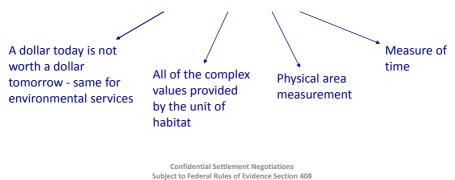
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## **Exchange rate - Unit of measure**

Dollars not used as exchange rate:

- Most habitats provide a complex suite of services not typically valued in monetary terms
- The most common unit is the dSAY

discounted Service-Acre-Years



Preliminary Draft/Subject to Revision

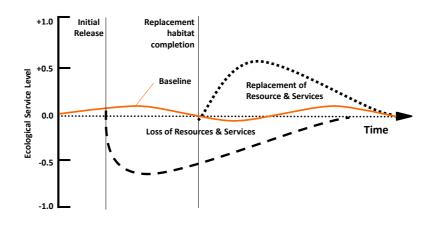
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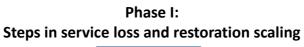
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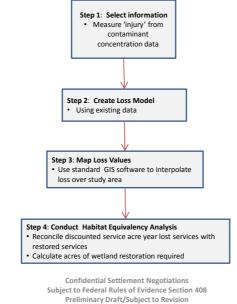
7/10/2014

Habitat Equivalency Analysis (HEA)



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7/10/2014

## **Hazardous Substances Involved**

- Polychlorinated biphenyls (PCBs),
- Polycyclic aromatic hydrocarbons (PAHs)
- Dioxin/furan toxic equivalents (TEQ)
- Phenols
  - 2-methylphenol,
  - 4-methylphenol,
  - pentachlorophenol, and
  - phenol

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# Service Loss Models

Lower and Upper Bounds

- Commencement Bay (Wolotira 2002) and the Lower Duwamish River (NOAA 2013) Superfund sites in Puget Sound were used as they were regionally specific studies and were based on toxicity in Puget Sound.
- St. Lawrence River in Massena, New York (Natural Resource Trustees of the St. Lawrence River Environment 2013) was used in a recent NRDA settlement and its threshold values create ranges of DSAYs.
- A dioxin TEQ model was developed and used to calculate injuries associated with that class of contaminants

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## Dioxin Toxic Equivalent (TEQ) Model

- Site specific dioxin injury model developed because no relevant dioxin/furan injury models currently exist.
- Service losses associated with dioxins were scaled using a TEQ to TEQ-based approach for dioxin-like compounds.
- Used dose-response curve developed for PCB concentrations in sediment from the St. Lawrence River NRDA.
- An intermediate TEQ value for Aroclor 1254 -- 7.7 -- was selected to convert from PCB concentration to an equivalent TEQ value.
- The resultant model then predicts injury from input values of sediment dioxin/furan TEQ values.

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# **Concentration Based Service Loss**

Puget Sound (Hylebos Waterway, Lower Duwamish River*) Service Loss Thresholds								
CHEMNAME	Units	5%	10%	15%	20%	40%	60%	80%
PAHs, total	ppb				1,000	8,000	17,000	70,000
PCBs, total*	ppb				128	1,100	3,100	15,200
2-Methylphenol	ppb	55	63	72	77			
4-Methylphenol	ppb	110	670	1,800	3,600			
Pentachlorophenol	ppb	12	400		690			
Phenol	ppb	180	420		1,200			

#### St. Lawrence River tPCB Service Loss Thresholds

CHEMNAME	Units	1%	2.1%	4.1%	5.6%	13.2%
PCBs, total	ppb	190	410	825	1,100	2,900

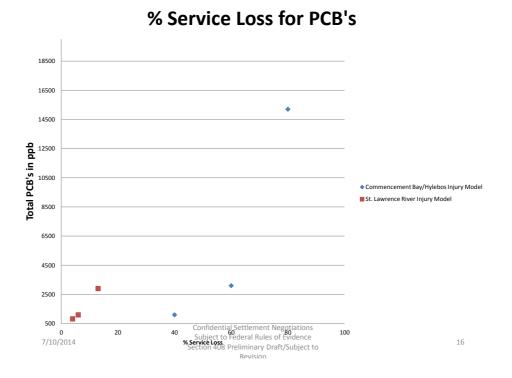
#### St. Lawrence River tPAH Service Loss Thresholds

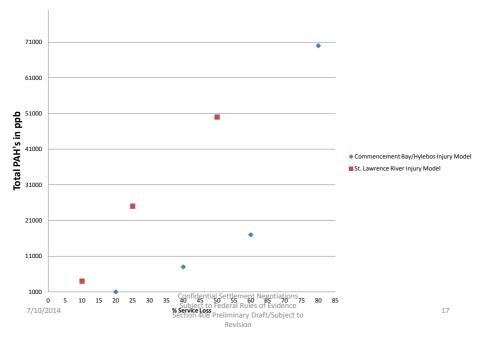
CHEMNAME	Units	10%	25%	50%
PAHs, total	ррь	4,000	25,000	50,000

#### Port Angeles Dioxin Service Loss Thresholds

(TEQ linear model used (slide 19) – These are point values to show the relationship)						
CHEMNAME	Units	4.6%	8.4%	15.9%	24.5%	28.2
Dioxin TEQ	pptr	Confidentia	Settlefnent N	legotia <b>?</b> ons	50	60
Subject to Federal Rules of Evidence						
Section 408 Preliminary Draft/Subject to						
Revision						

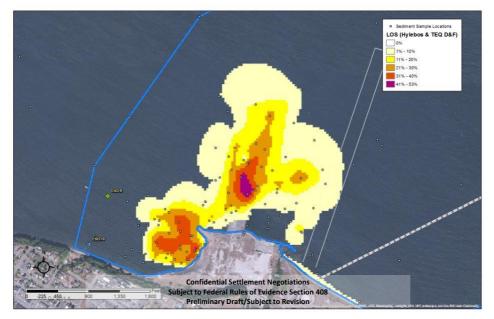
7/10/2014

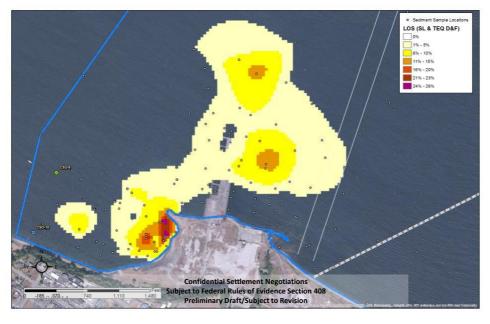




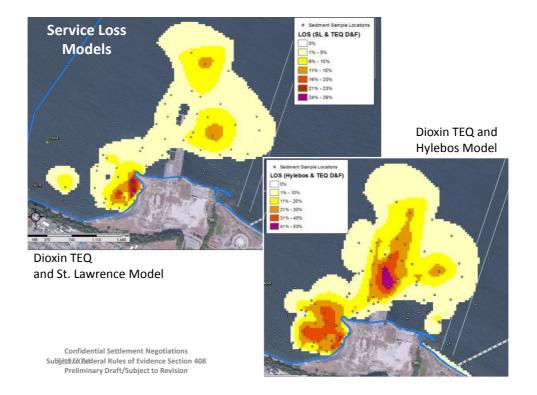
## % Service Loss for PAH's

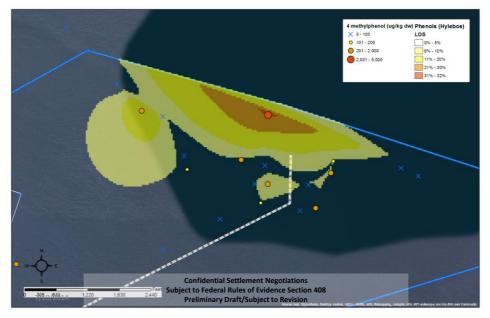
Service Loss - Dioxin TEQ and Hylebos model





## Service Loss - Dioxin TEQ and St. Lawrence models





## Service Loss – Outfall Vicinity (phenolics)

**Habitat Value Adjustments** 

Habitat values (Hylebos model, 2001; relative to estuarine wetland = 1.0)

Habitat Zone	Hylebos Value*	Zone Description
Shallow Subtidal	0.7	Area between Zero and -14' MLLW
Deep Subtidal	0.3	Area Below -14' MLLW, no wood or overwater structures present

#### Baseline values (Hylebos model, 2001; relative to native = 1.0)

Habitat Zone	Hylebos Value*	Zone Description
Dredged areas	0.1	log pond, berths and dredged approach
Buried Pulp or Scattered Wood	0.5	Identified by SAIC (1999)
Wood Waste	0.1	Identified by SAIC (1999)
Overwater structure	0.1	Area under docks, etc.

\* These Hylebos habitat values are similar to other habitat models considered for Port Angeles Harbor.

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## Loss of services calculation

- Habitat Equivalency Analysis (HEA) determines how much restoration is required to make the public whole after losses of natural resource services caused by releases of oil or hazardous substances
- HEA model used to integrate injuries at the habitat level
- Bracket liability range under various assumptions of injury

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## **Preliminary** Injury Evaluation

- HEA Assumptions:
  - HEA start year of 1981
  - Remediation Starts in 2015
  - Recovery by 2030
  - Discount factor of 3%
  - 1,310 acres within study area
  - No change in contamination over time
- Estimated range of injury 100-300 dSA<sub>estuary</sub>Y

7/10/2014

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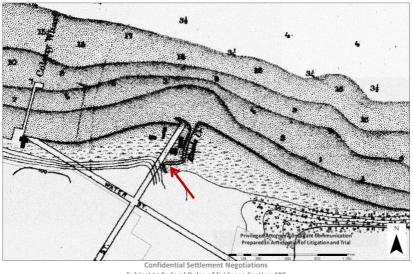
## **Preliminary Restoration Evaluation**

- Assign "credit" to be derived from the selected restoration options
- Use HEA/GIS to summarize total credit for each habitat component
- Compare the 'restoration requirement' to how much restoration can be created
- Estimated range 132-330 dSA<sub>estuary</sub>Y will be created for a project of approximately 7.5 ac

7/10/2014

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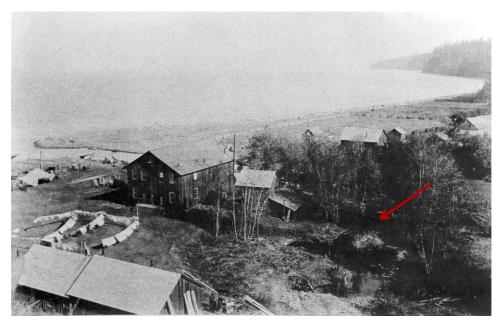
## Ennis Creek (c. 1898)



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#### Puget Sound Cooperative Colony (c. 1887) Confidential Settlement Negotiations Subject to Federal Rules of Evidence Section 408 Preliminary Draft/Subject to Revision

7/10/2014

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BY: Robecca S. Lawson	ON: 12/11/14	
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ВҮ:	ON:	
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ВҮ:	ON:	
THE JAMESTOWN S'KLALLAM TRIBE		
ВҮ:	ON:	
UNITED STATES FISH AND WILDLIFE SERVICE ON BEHALF OF THE DEPARTMENT OF THE INTERIOR		
BY:	ON:	
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ВҮ:	ON:	

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BY:	ON:	
THE JAMESTOWN S'KLALLAM TRIBE		
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BY: AMphamman	ON: 15 DEC 14	
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BY:	ON:	

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вулатура	on: <u>2114-12-11</u>	