Port of Kalama

10 Years: Evolution of Port of Kalama's Dredging Material Management Program

October 28, 2021

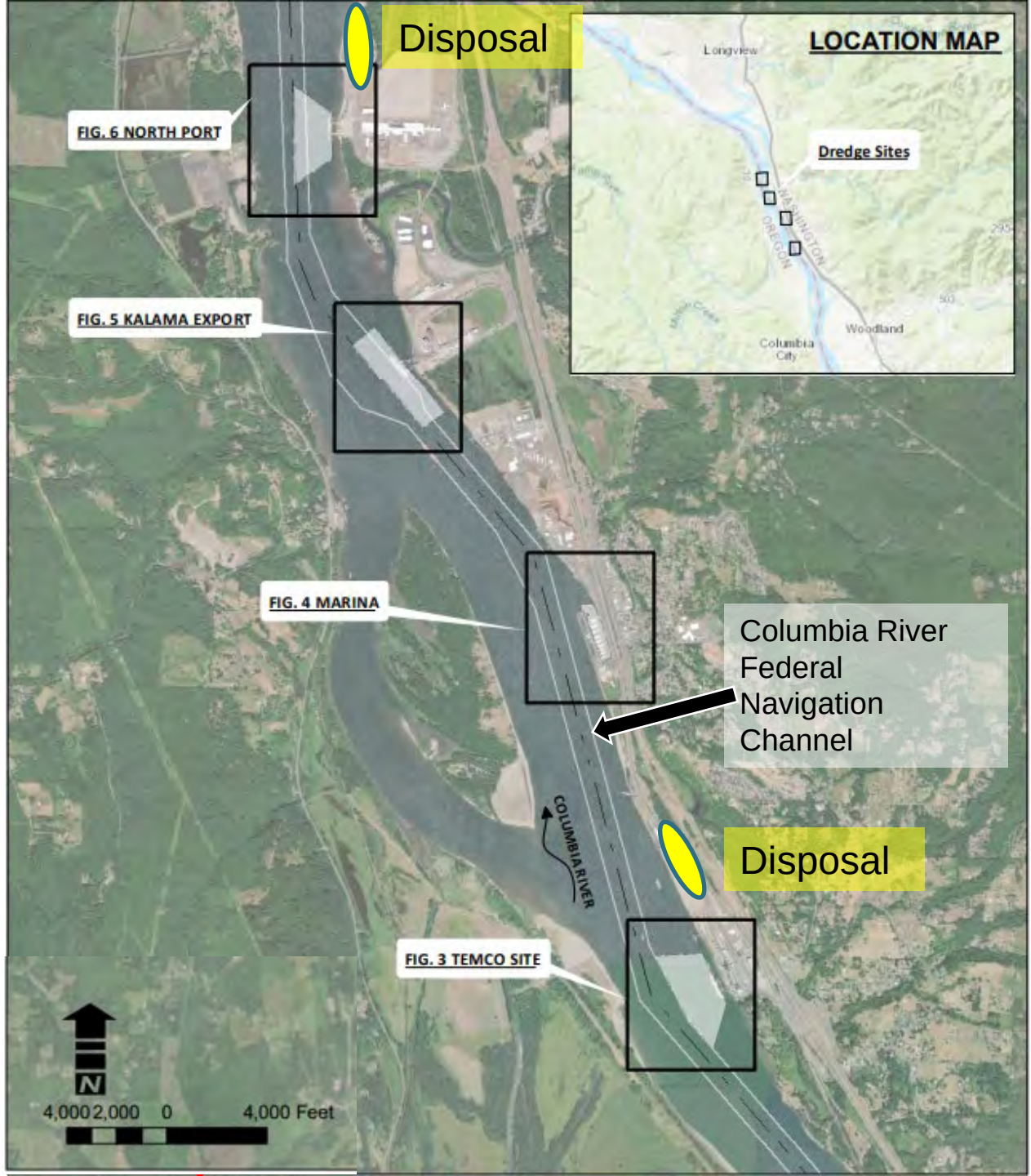
Project Location

- Lower Columbia River
- RM 72 to 77 Columbia River Navigation Channel
- Deep Draft Vessel Calls ~270/year
- 3 Marine Terminals
- Significant Ag Export

2013 Project

Challenges & Permitting Approach

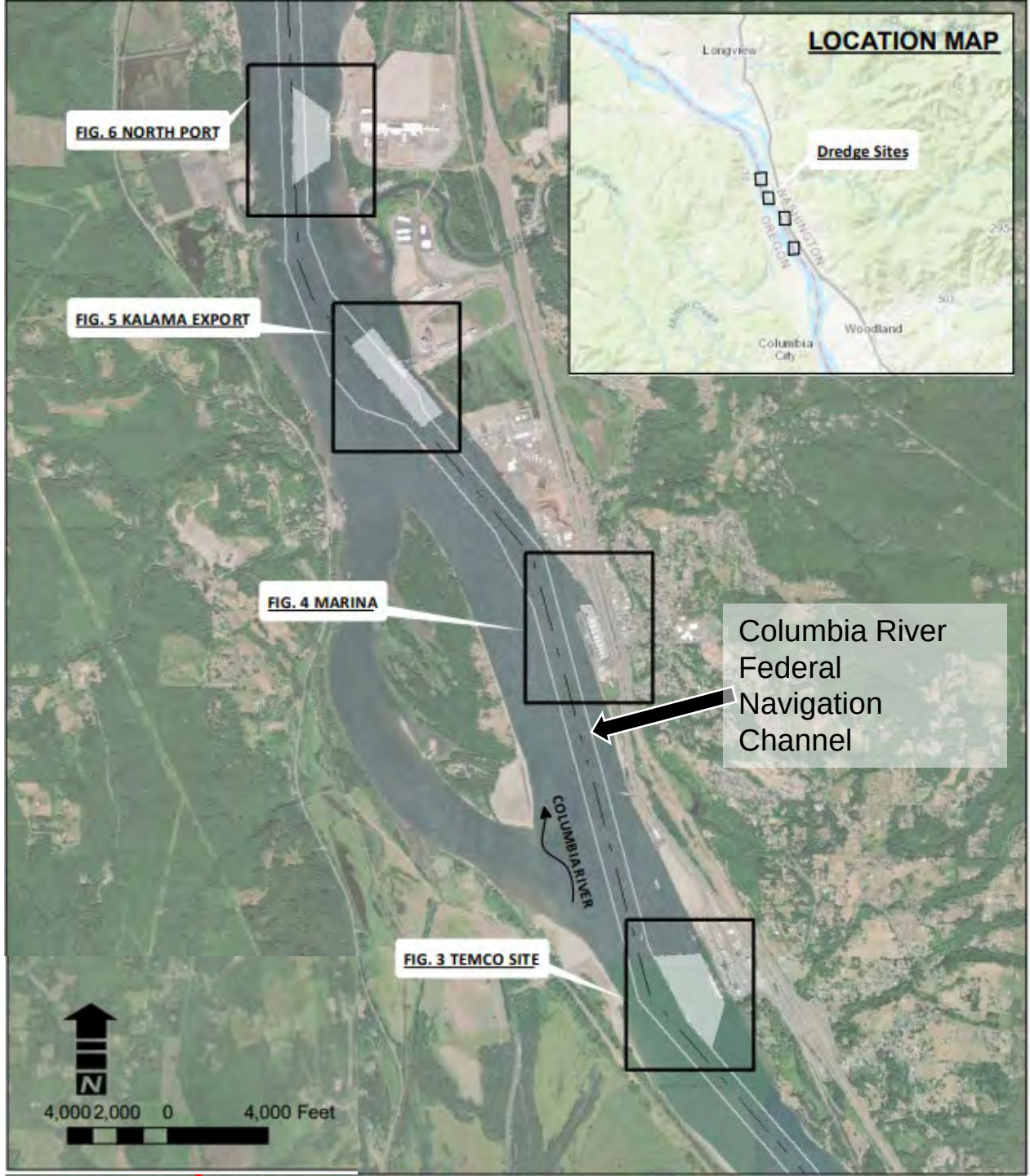
- 2013 Permit Challenges (to be addressed)
  - 3 Marine Terminal & 1 Marina Facilities
    - Dredging Needs Highly Variable - Morphology
    - Limited # of Disposal Options
    - Distance between N & S Port Locations
      - ~ 6 miles
    - Very high annual dredging requirements @ TEMCO
      - **>150,000 cy**
- Approach & Strategy
  - Increase # of Disposal & Placement Options
    - Type: Add In-Water placement Sites
    - Location: Distributed along 5 miles
  - Optimize Dredging Volumes
    - W/out Terminal Operational Impact
  - Dredging Equipment
    - Increase Options for Flexibility



Dredging Locations

- Dredging Sites
  - North Port – Deep Draft Vessel Berth
    - ~ 20-year cycle
  - Kalama Export – Deep Draft Vessel Berth
    - ~ 10-year cycle
  - Marina – Small Craft Marina Basin
    - ~ 5-year cycle
  - TEMCO – Deep Draft Vessel Access & Berth
    - ~ Annual Cycle (Majority of Total Volume)

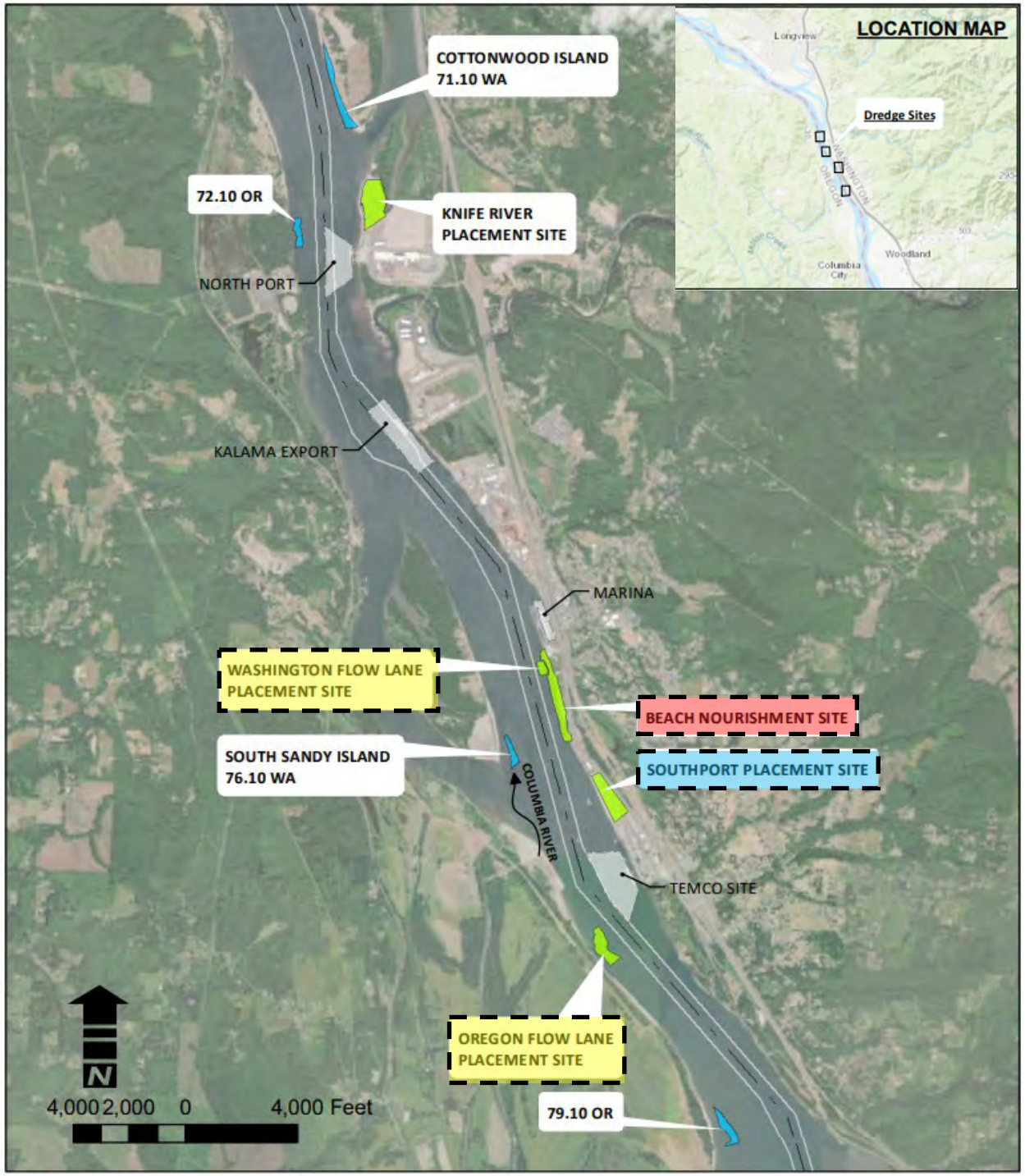
- Dredged Material
  - Permitted Dredging Volume
    - 2.1 million for 10-year permit
  - Actual Dredged Volume
    - 1.2 million over 8 years
  - Open Water Suitable (except Marina)



Disposal & In-Water Placement Sites

- Upland (for Commercial Reuse)
  - Total = 3
  - Utilized = 2

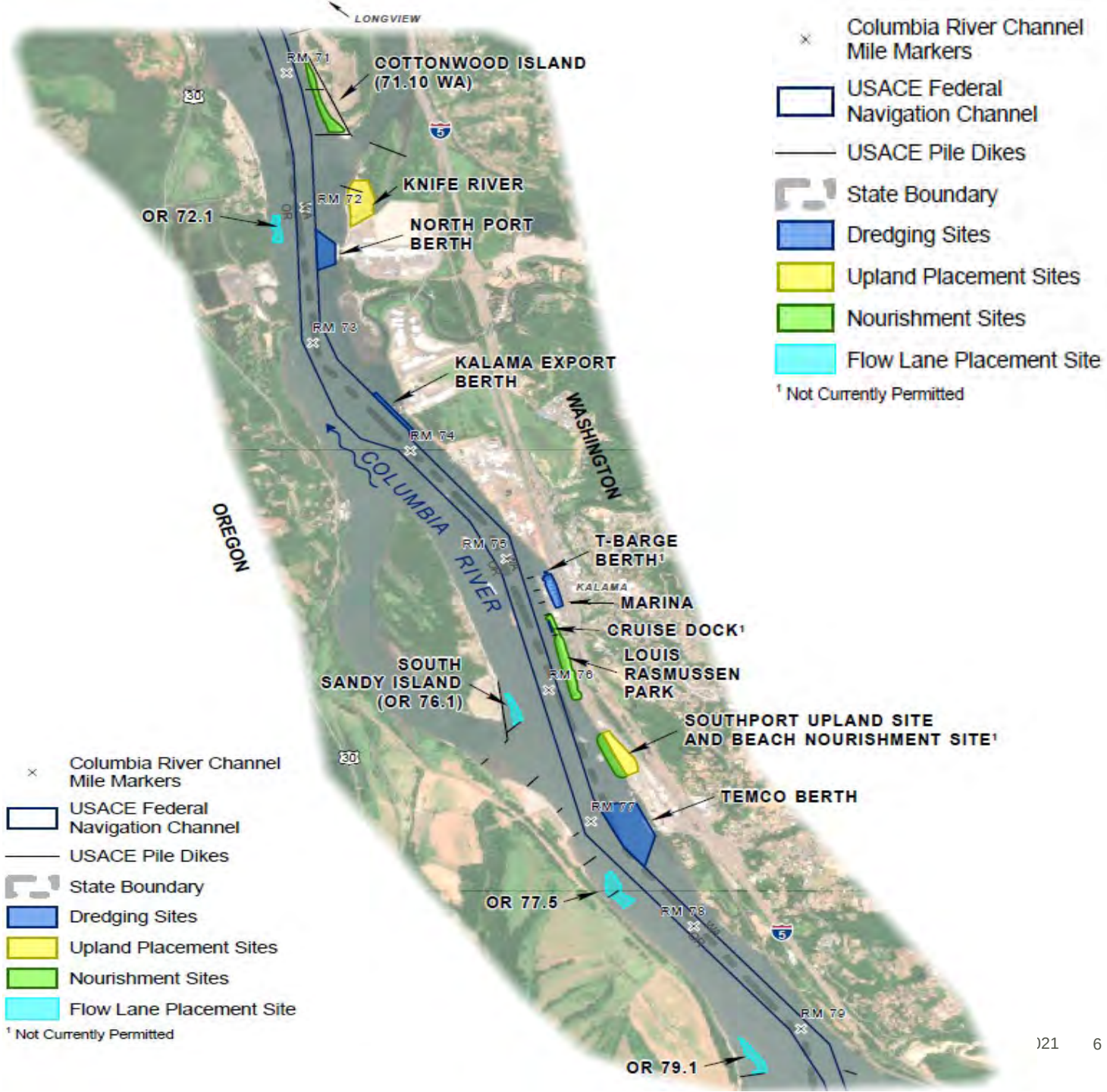
- In-Water (OR & WA)
  - Total = 7
    - 1 Beach Nourishment
      - Utilized = 1
    - 6 Flow Lane Disposal
      - Utilized = 2



Historical Context

October 2013
Receive 10 yr. Permit (2.1 million CY)
4 dredge sites (Temco, Kalama Export, North Port and Marina)
2 Upland Placement Sites (Knife River & Southport)
3 Water Placement Sites – (Beach nourishment at Louis Rasmussen Beach Park, OR pile dike 77.5 and WA pile dike 75.6

Permit Modification - April 2018
Extend footprints of the Louis Rasmussen beach nourishment site and the OR pile dike (77.5)
Permit Modification - December 2018
Add new placement sites: Cottonwood Island for beach nourishment; and 3 new flow lane sites: 72.1 OR, 76.1 South Sandy Island, 79.1 OR
Permit Modification - December 2020
Add Santosh Aggregate Facility for upland placement



Permitting Challenges

- Permitting Multiple Sites over Wide Area
  - State Approvals (2) – OR/WA for in-water placement areas
  - Local Approvals (2) - City of Kalama & Cowlitz County
  - USCOE – Section 10/404, ESA Consultation, RSET, Section 408, Navigation

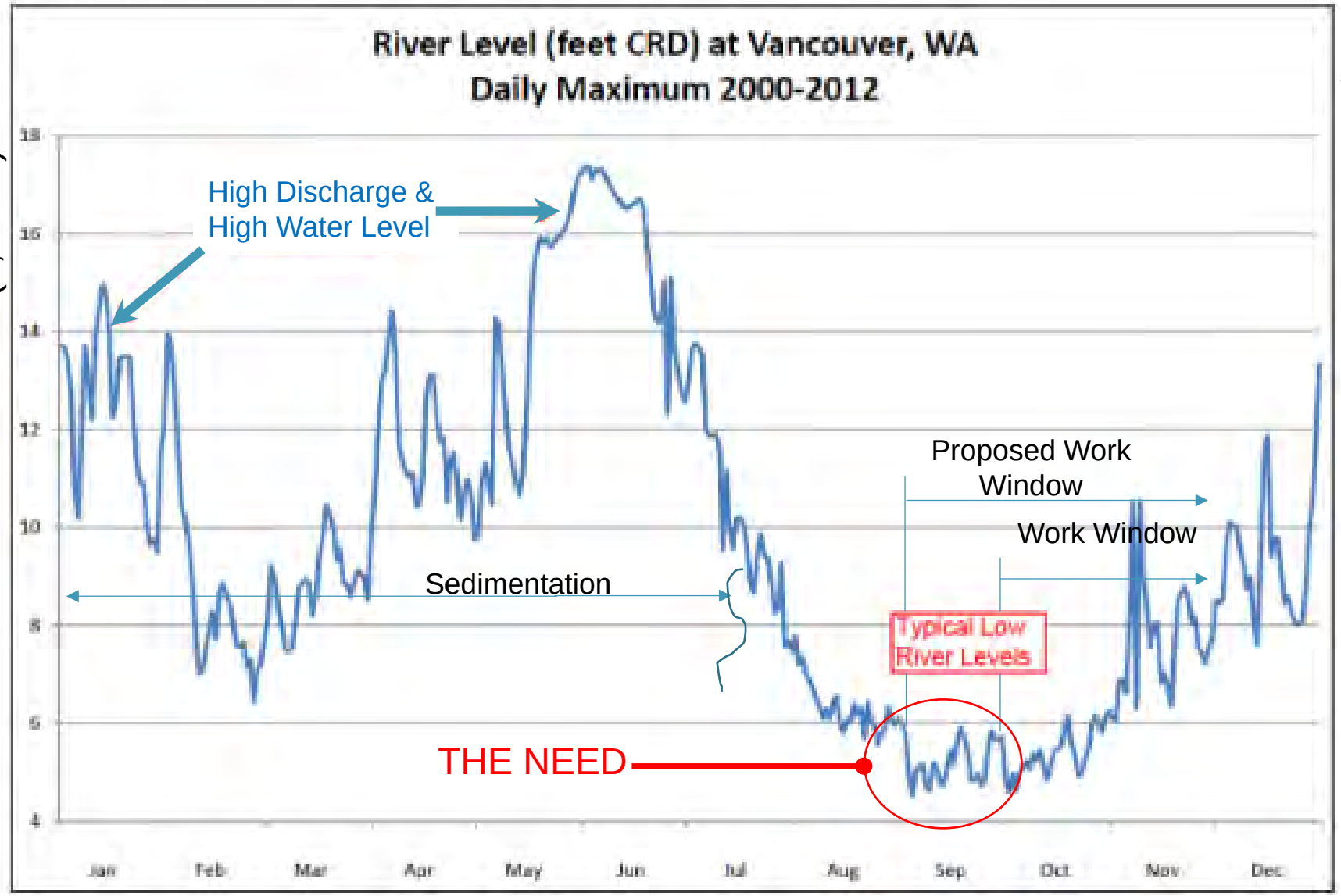
- Considerations?

  - Dredge Work timing relative to low water & peak terminal usage – TEMCO
    - Differing work window timing between state & federal permits

  - Flexibility on use of disposal site based on dredging site, method and results of monitoring

  - Sediment Quality
    - Marina not suitable for in-water placement – manage separately
    - Variable dates for recency of suitability determinations – manage timing & outcomes

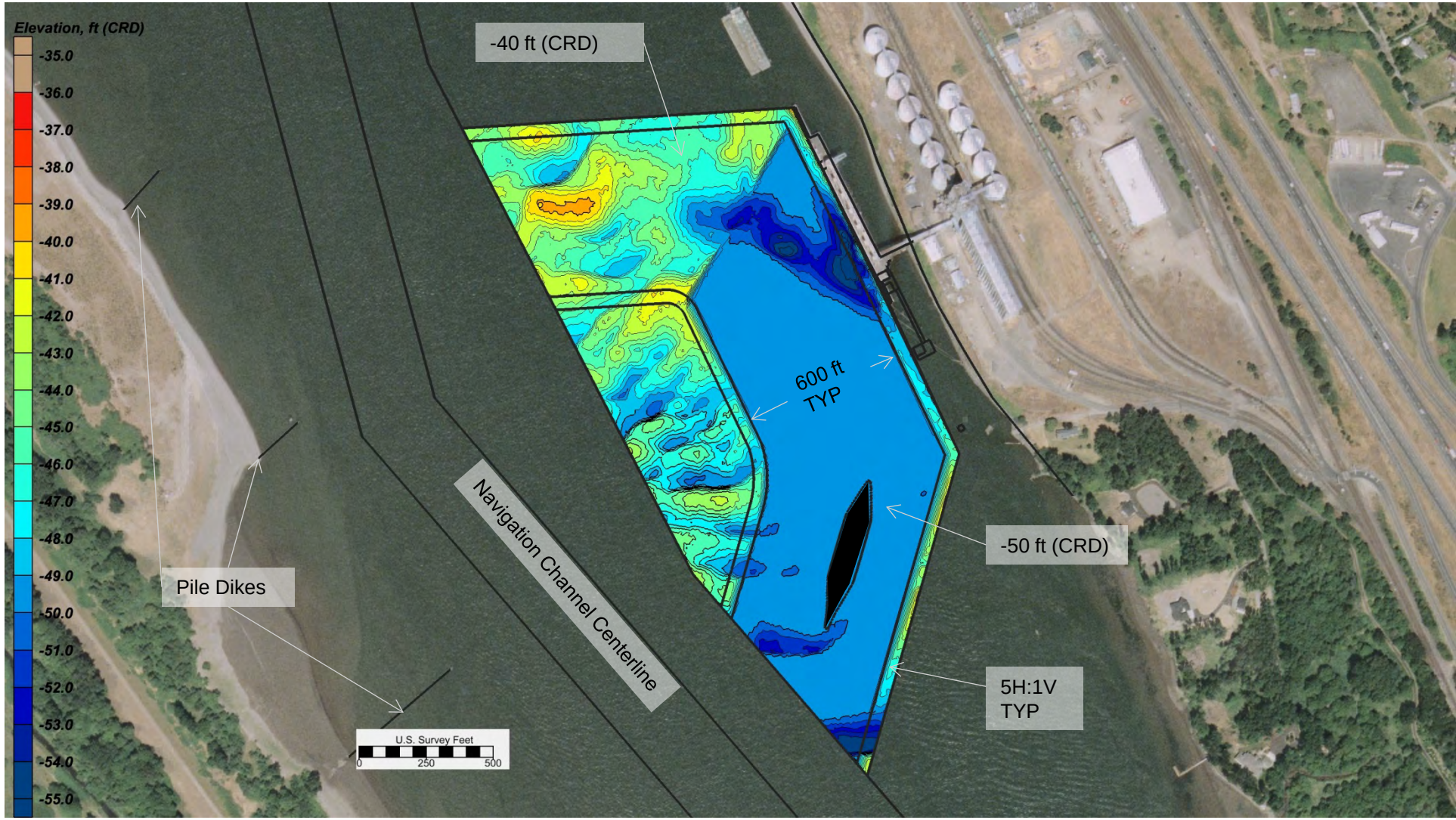
Permitting & Operational Challenges



- Dredge work timing relative to time period of greatest need
- Close the operational gap
- Requested earlier start to work window by 1 month
- The “Need” at time period of lowest water and maximum vessel draft for terminal operations

Dredging Optimization - TEMCO

- Navigation Requirement Assessment
- Optimize Dredging Requirements relative to Operational Needs
- Pilots Discussions
- Strategy: Be more effective on dredge area, conduct earlier & Monitor
- Sand waves translation vs. reformation

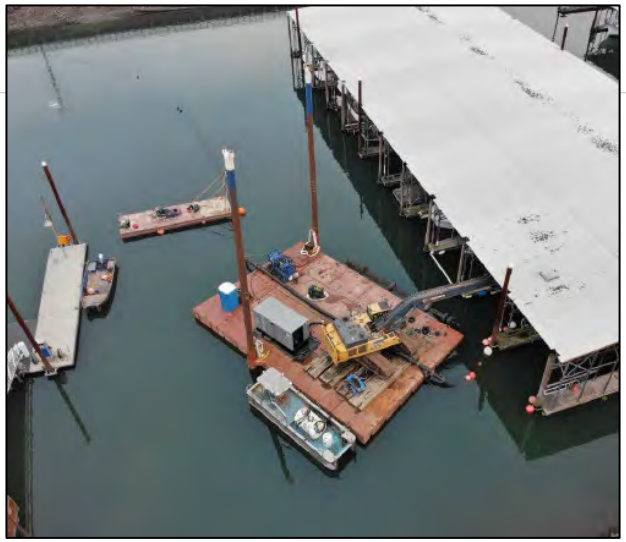


Dredging & Placement Methods

Permitted Dredge & Placement Methods

- Hydraulic
  - Cutter Suction Dredge & Trailing Arm Hopper Dredge
    - All sites permitted

- Mechanical:
  - Clamshell & Bucket Dredge w/ Barge Transport
    - Flatdeck or Bottom Dump Barges
      - Flow lane disposal
      - Transport to beach nourishment site(s)
      - Transport to transloading for off site disposal
      - All Sites Permitted



Marina Dredging

TEMCO Dredging/Beach Nourishment

TEMCO Dredging

Beach Nourishment Site

Placement Site Selection Considerations

USACE Considerations

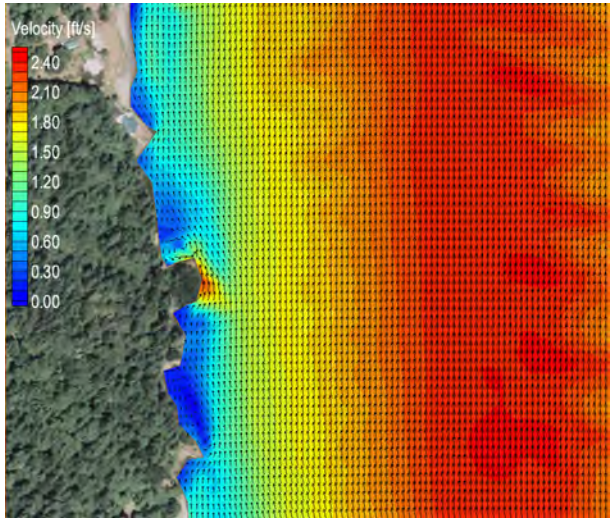
- 408 Consultation/Review, BMP's

In-Water Placement Site Selection Criteria:

- Reintroduction of natural material back to littoral system
- No impact to Federal Navigation Channel; proximity; dispersion
- Pile Dike Considerations
- Proximity to dredging sites
- Proximity to Vessel Anchoring Areas
- Volumetric capacity vs Dredging needs
- Ease of access for placement method (Operability)
- Recreational & Bank Stabilization Benefits

>12 sites evaluated; shortlisted down to 7

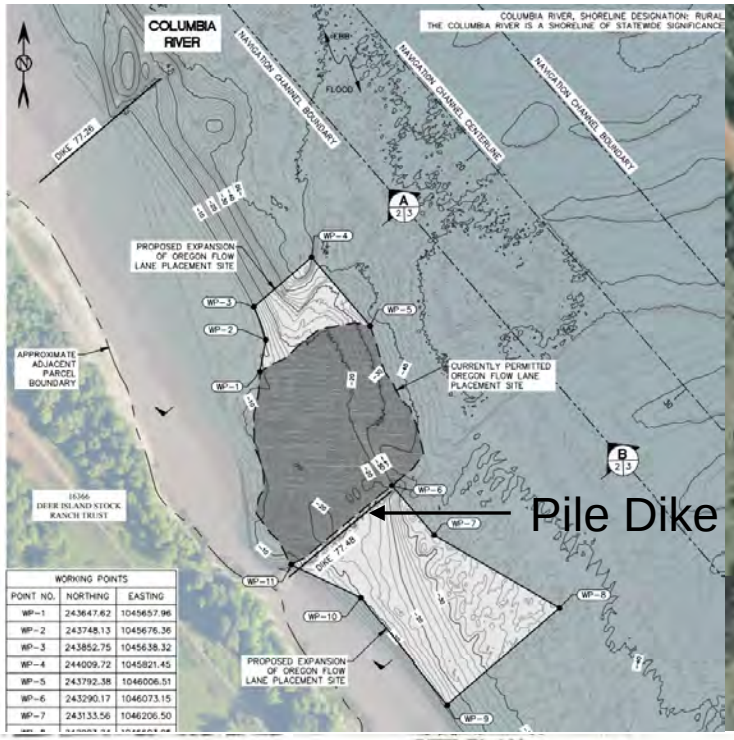
- Hydrodynamic Analysis – Dispersion
- Conformance with project criteria



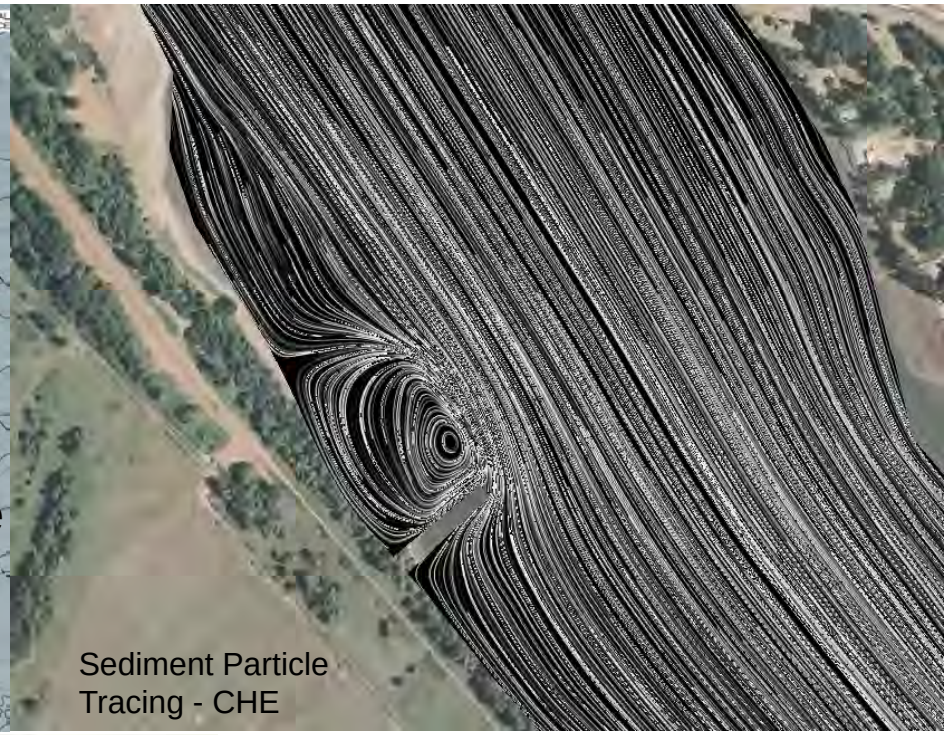
Hydrodynamic Analysis Supporting Prior Permitting Effort – OR 72-100 Site

Currents & Sediment Particle Tracing - CHE

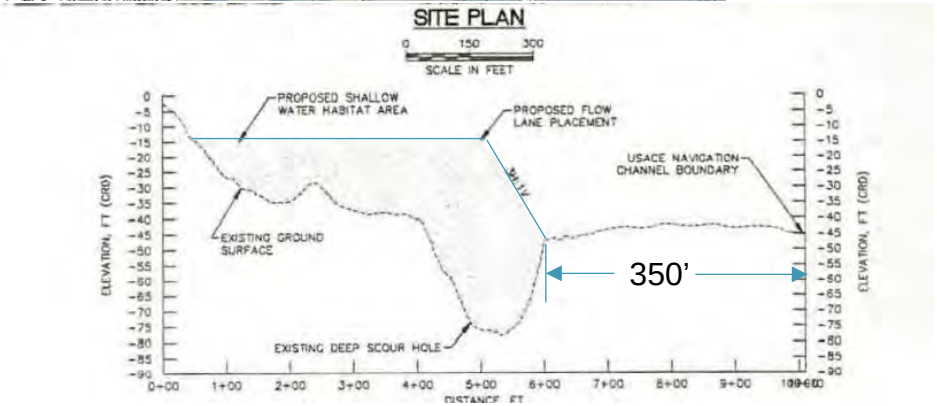
Placement – 77.45 OR



Pile Dike



Sediment Particle Tracing - CHE



Typ Section

Considerations

- Pile Dike Protections
  - USACE BMP's
- Offset from Navigation Channel
  - 350ft

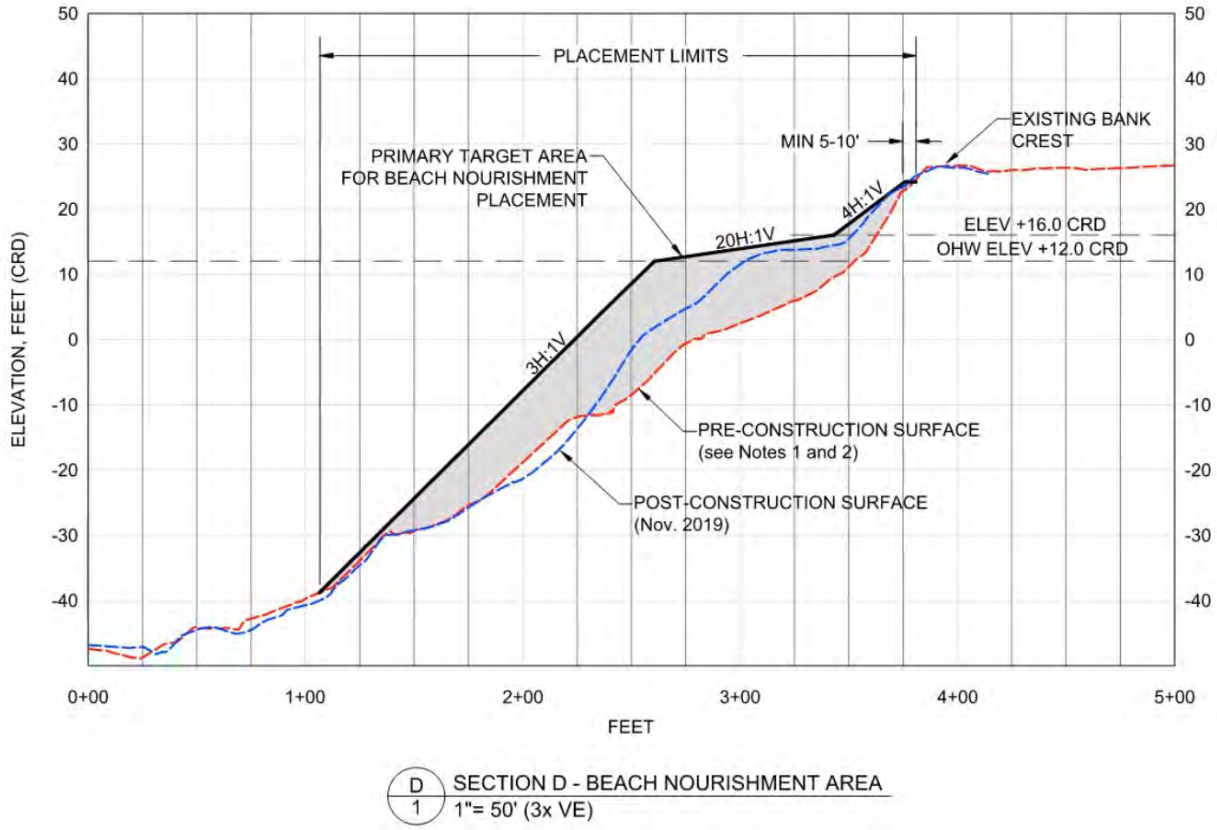
Purpose & Use

- Fill deep scour hole caused by pile dike for natural dispersion
- Dispersive site for future reuse
- Placement = 243,000 cy

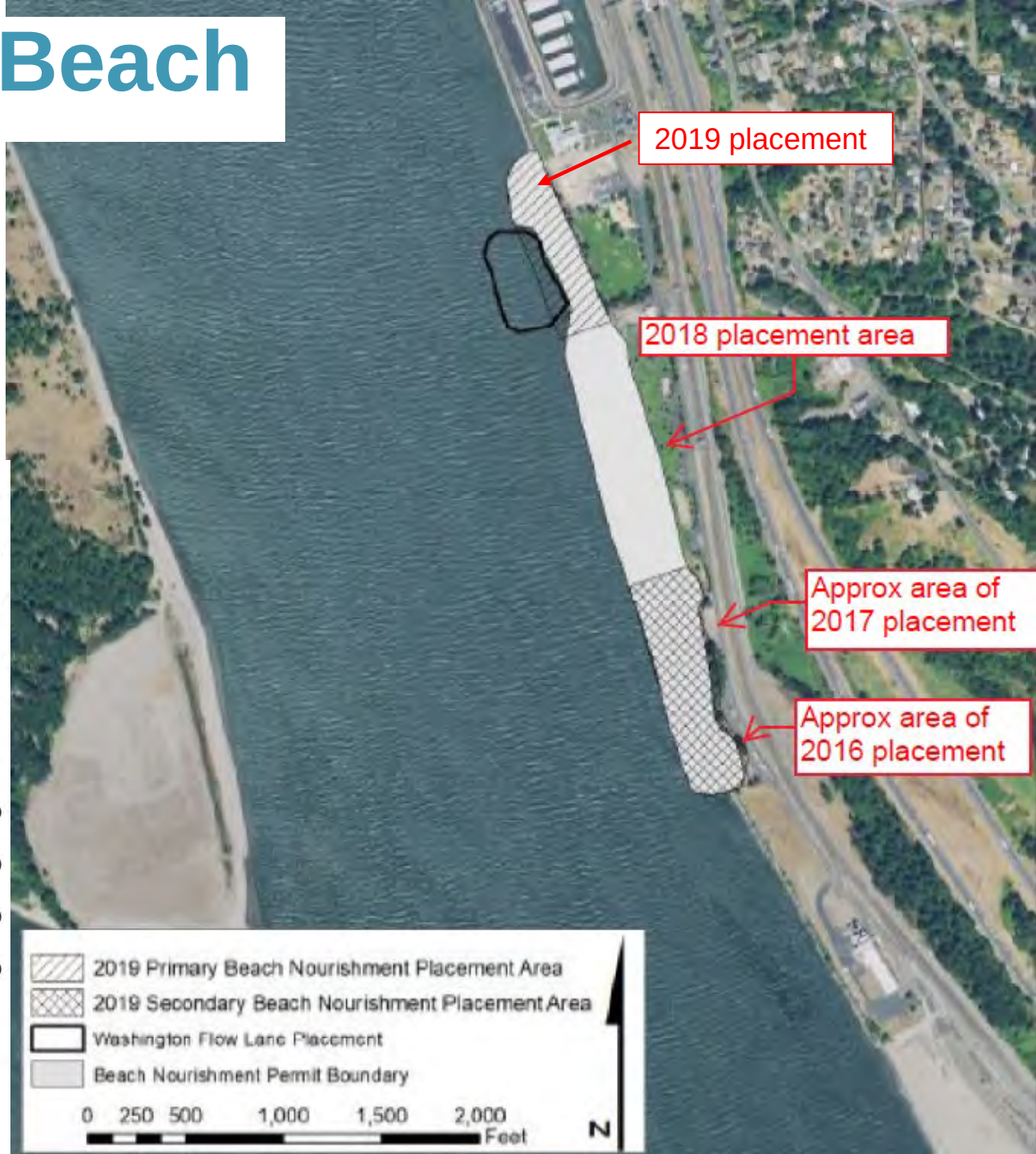
- Dispersion rate lower than expected

Louis Rasmussen Park Beach Nourishment 76.0 - WA

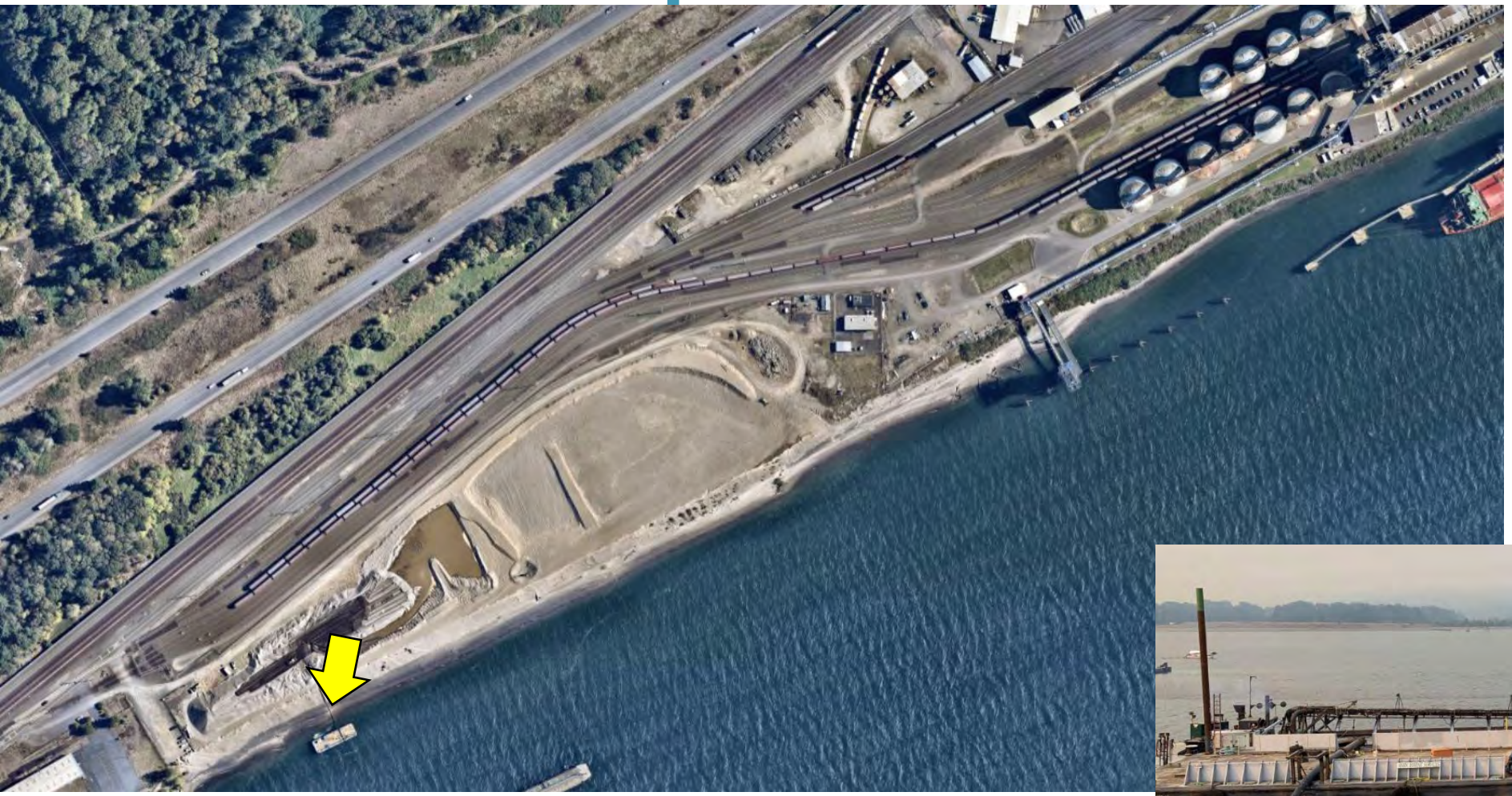
- Considerations: Pile Dike, channel offset
- Purpose: Shoreline erosion protection and recreational use
- Use: 328,000 Cy
- New Permit: Maintenance of Existing



D / 1 SECTION D - BEACH NOURISHMENT AREA
1"= 50' (3x VE)



Placement – Upland

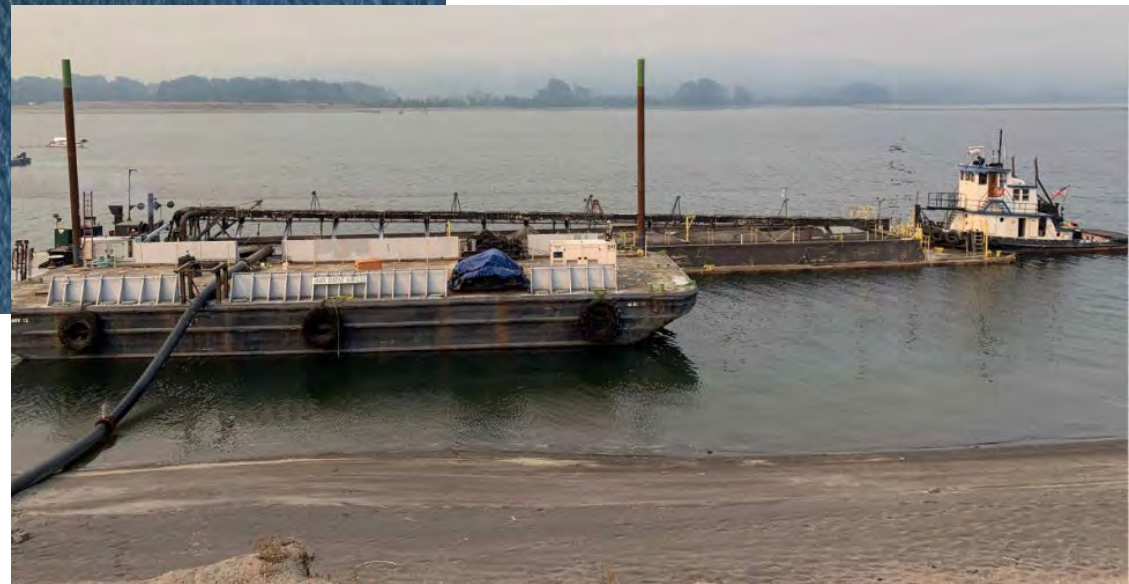


<u>Considerations</u>

- Capacity limited to available space

<u>Purpose & Use</u>

- Commercial Reuse
- V = 121,000 cy



Results & Lessons Learned

- Approach was successful
  - Adaptability & Redundancy Critical

- Early coordination with the Agencies for dredging each season
  - Submit work plan to Ecology and Corps 3 months prior

- Contingency Planning Built into Permit Strategy
  - Build in redundancy for dredging and placement sites – improves resiliency to meet operational needs & marketplace conditions

- Dispersion rates at in water placement sites less than expected
  - Although not used prior, justifies need for access to additional sites

- Monitoring was an effective multi-use tool
  - Address concerns during initial permitting, justify permit renewal and serve as a monitoring tool for berth operations

- Documentation of data, permitting, design, construction and monitoring;
  - Critical to future permit renewals with changes in staffing for both technical and regulatory side – continuity of information

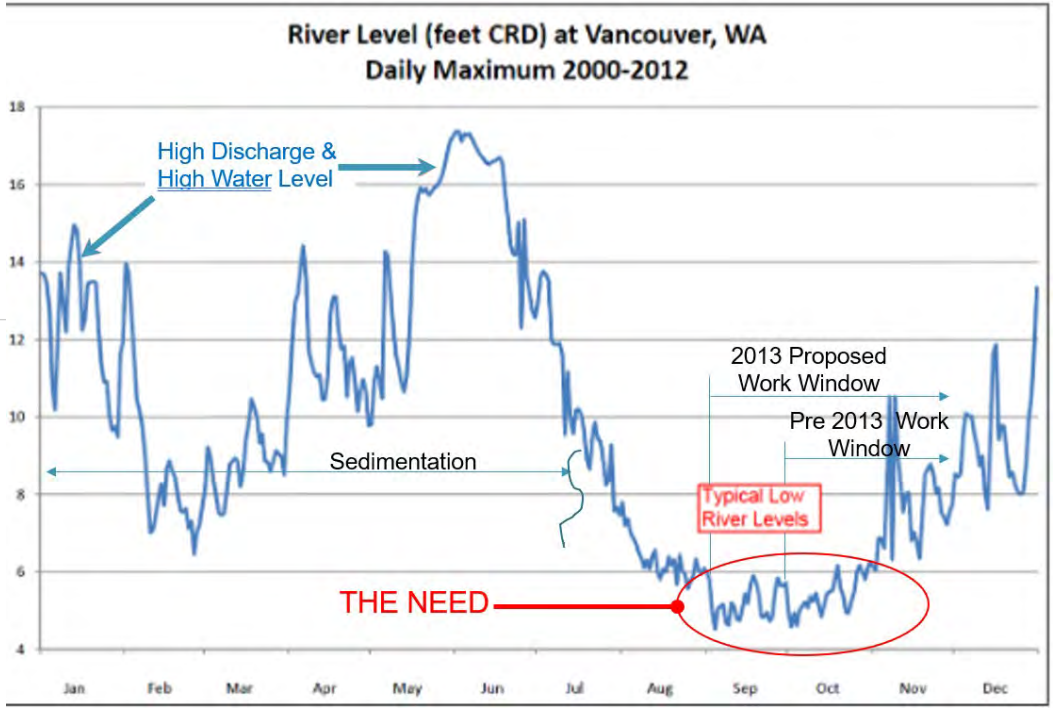
Next Steps – New 10 Year Permit

- Work Window Considerations Relative to Changing Climate and Columbia Basin Hydrology
  - Earlier and more frequent low water years
  - Requesting additional earlier work window (close operational gap)

- Future Modification of Permits?
  - More challenging to get modified permit conditions to meet needs changing from dynamic conditions – anticipating needs for next 10 years

  - Contingency Planning/Redundancy Built in

  - Include New Port Facilities – Anticipation of Needs?
    - Mitigation requirements from NOAA
    - Strategy to address



Project Team – Collaborative Decade Effort

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- Solmar Hydro
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Thank you