Phase 1 Habitat Replacement & Reconstruction

Marc Greenberg, USEPA

greenberg.marc@epa.gov

EPA
United States Environmental Protection Agency

Hudson River
PCBs SUPERFUND SITE

EPA's Expectation of Habitat Reconstruction & Replacement

- Hudson River provides diverse habitats
  - Plants, plankton, aquatic invertebrates, fish, amphibians, reptiles, birds and mammals
  - Animals living in wetlands, floodplains and upland communities are also dependent on the river

EPA
United States Environmental Protection Agency

Hudson River
PCBs SUPERFUND SITE

Habitat Reconstruction & Replacement (Con't)

- A habitat replacement program is being implemented:
  - To mitigate for impacts to habitats from the remedial activity
  - To reconstruct, replace, and/or stabilize
    - Unconsolidated River Bottom (UCB)
    - Submerged Aquatic Vegetation (SAV)
    - Riverine Fringing Wetland (RFW)
    - Shoreline (SHO)

EPA
United States Environmental Protection Agency

Hudson River
PCBs SUPERFUND SITE

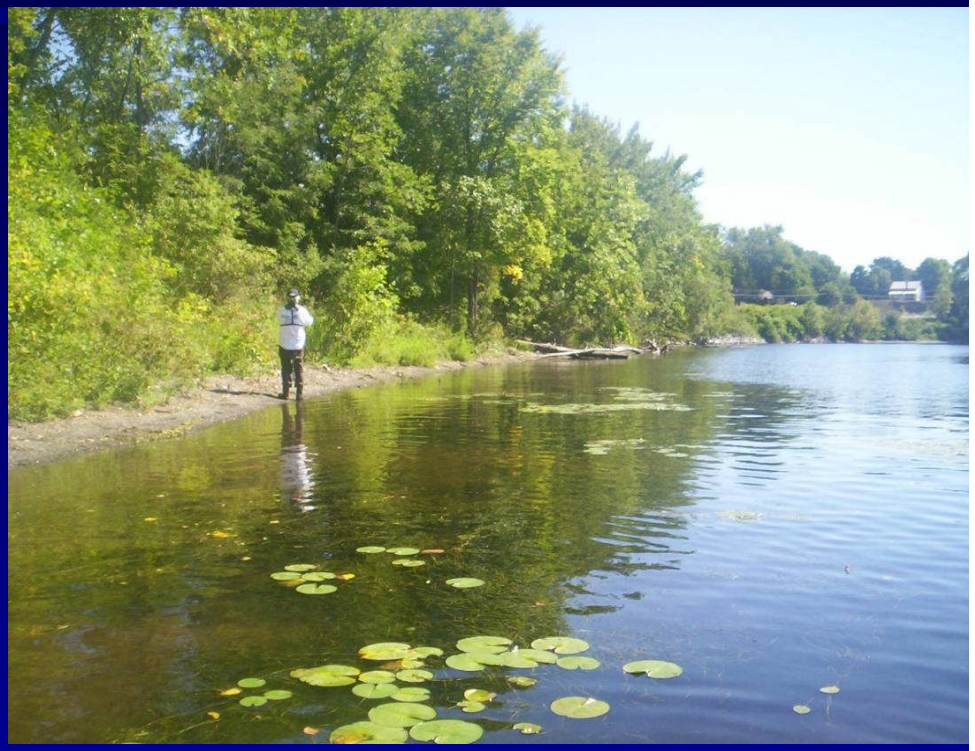
Unconsolidated River Bottom (UCB)

- Generally non-vegetated
- Habitat for bottom-dwelling organisms

EPA
United States Environmental Protection Agency

Hudson River
PCBs SUPERFUND SITE

Submerged Aquatic Vegetation (SAV)



- Underwater vegetation
- Serves as habitat for fish and bottom-dwelling organisms

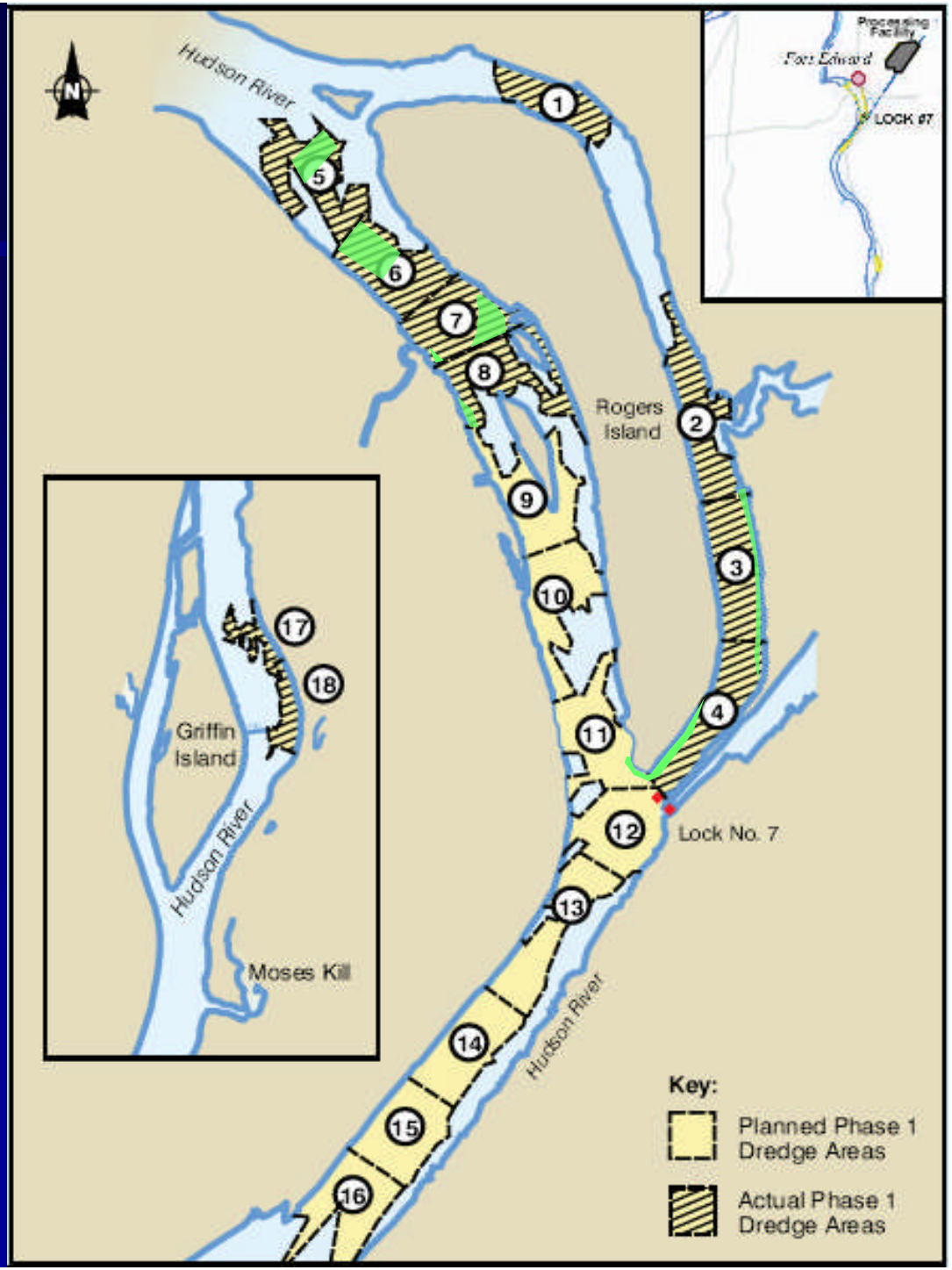
EPA
United States Environmental Protection Agency

Hudson River
PCBs SUPERFUND SITE

SAV Primary Planting Areas

- Approx 5.7 acres to plant in 2010
- Areas shown are original proposed
- Actual areas to be determined at Spring 2010 pre-planting inspection

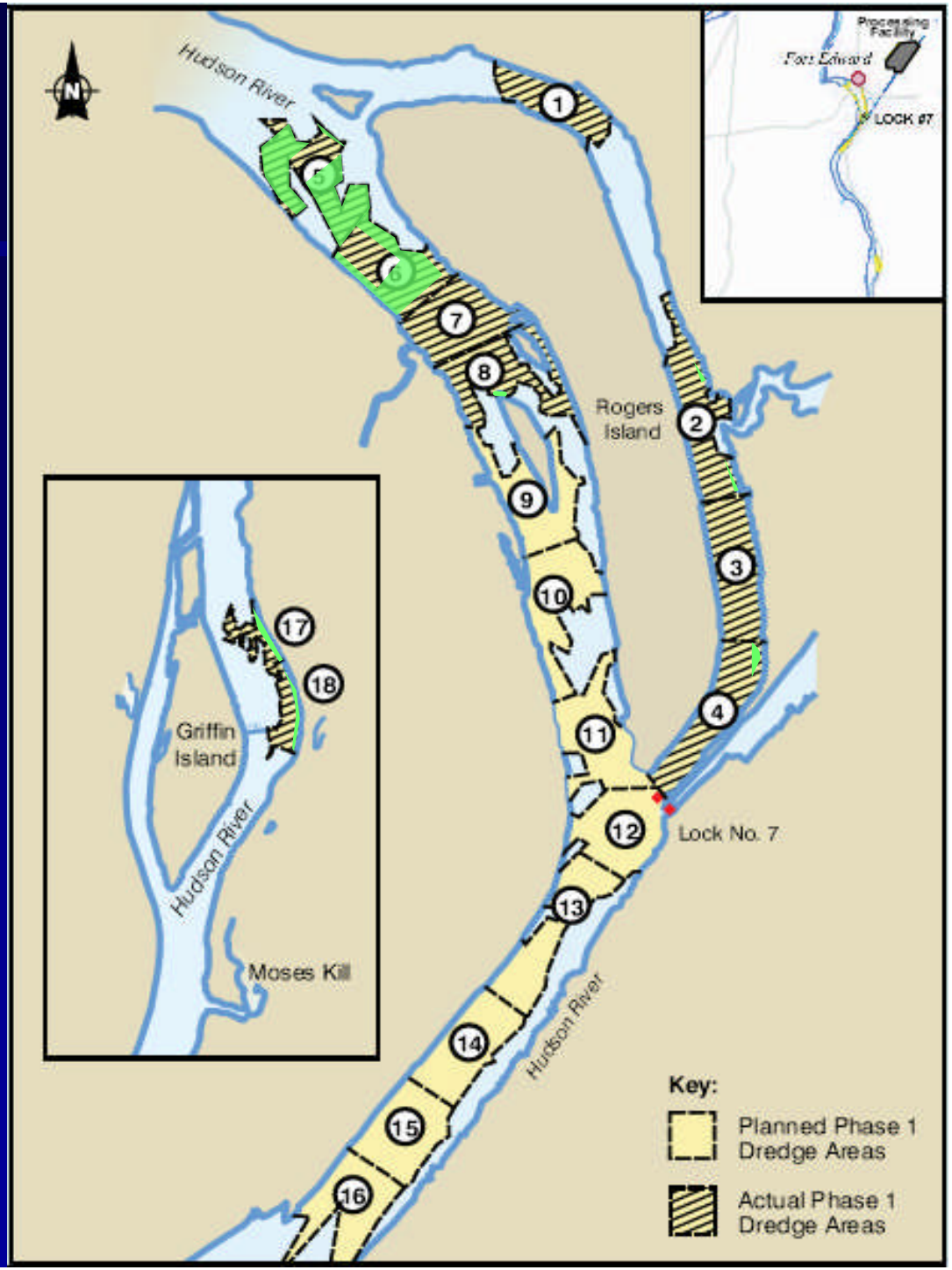
EPA
United States Environmental Protection Agency



SAV Contingency Planting Areas

- Up to approx 7.2 acres
- For use if primary planting areas not suitable in Spring 2010
- If not planted, revert to natural recolonization areas

EPA
United States Environmental Protection Agency



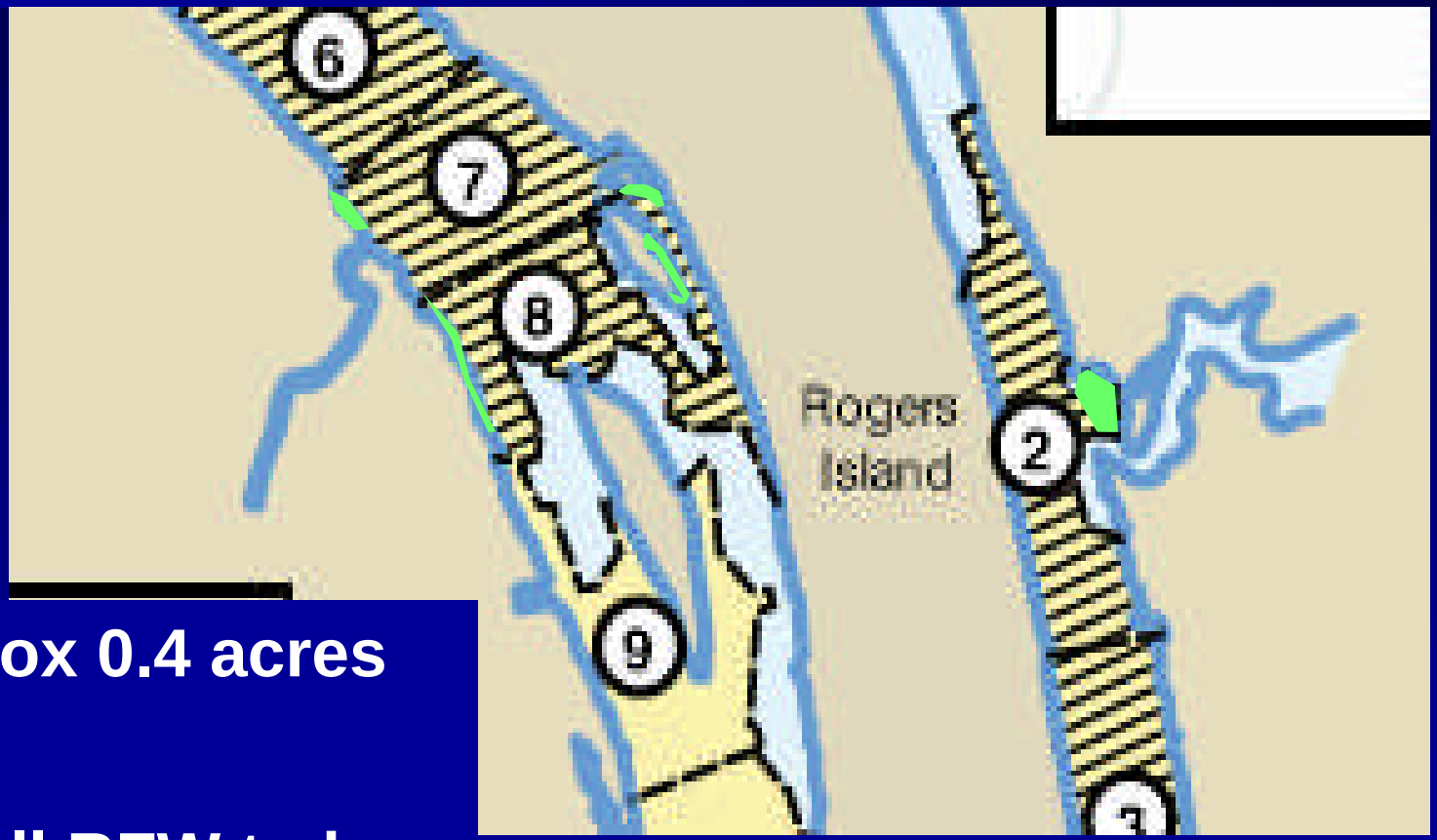
Riverine Fringing Wetland (RFW)

- Wetlands at the shoreline
- Habitat for birds, mammals, other aquatic-dependent organisms

EPA
United States Environmental Protection Agency

Hudson River
PCBs SUPERFUND SITE

RFW Habitat Reconstruction Areas



- Approx 0.4 acres total
- Not all RFW to be reconstructed in place

Hudson River
PCBs SUPERFUND SITE

Shoreline (SHO)

- Habitat along the terrestrial edge of the river (riparian)
- Stability is important for maintaining habitat integrity
- Many species utilize

EPA
United States Environmental Protection Agency

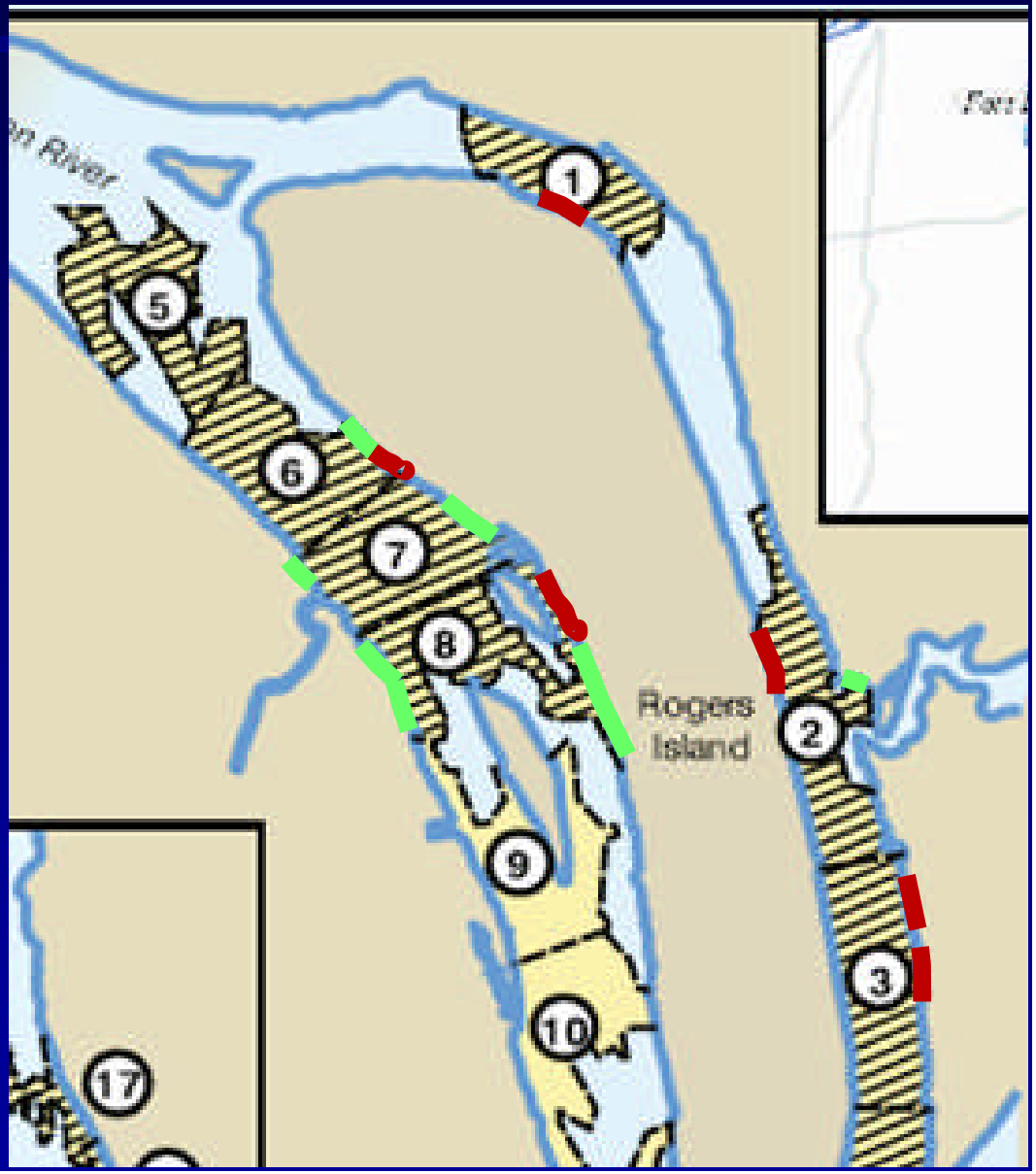
Hudson River
PCBs SUPERFUND SITE

SHO Stabilization Measures

Type P Stone

Biolog

- Installed during dredging
- Less stabilization installed than designed
  - Redrawn (offshore) CU boundaries



EPA
United States Environmental Protection Agency

2009-2010 Phase 1 Habitat Replacement & Reconstruction Activities Overview

2009:

- Dredging
- Backfill placement (BF)
- Install riverine fringing wetland biologs and erosion fabric (jute mesh)
- Shoreline stabilization

EPA
United States Environmental Protection Agency

Hudson River
PCBs SUPERFUND SITE

2009-2010 Overview (Con't)

2010:

- Pre-planting inspections of aquatic vegetation beds and fringing wetlands
- Seeding and planting of the SAV and RFW
- End-of-season replantings, if needed
  - "… replace dead or unhealthy plants with plants of the same size and species as specified."

EPA
United States Environmental Protection Agency

Hudson River
PCBs SUPERFUND SITE


SUPERIOR
BF Loading


BF Delivery


320—11
CAT
BF Placement


Biolog Installation at RFW

Habitat Replacement & Reconstruction Materials

Backfill

- Three Types
  - Sand
  - Coarse sand
  - Sand + topsoil

Armor Stone

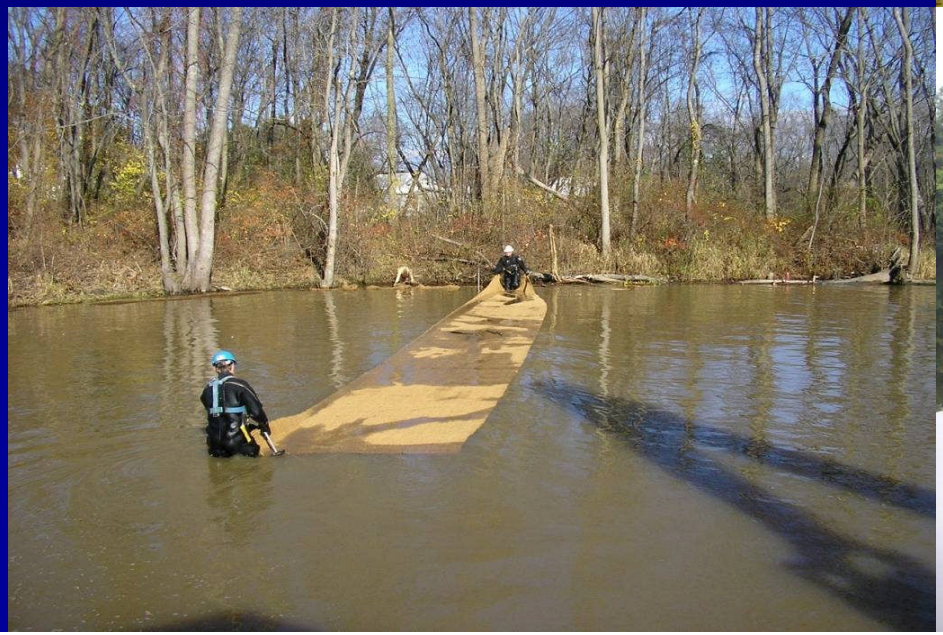
- Type “P” Stone
- Used at shorelines for stabilization

Hudson River
PCBs SUPERFUND SITE

Habitat Replacement & Reconstruction Materials

Biologs, Fabric, and Plants

- 12 inch diam. logs for RFW reconstruction; SHO stabilization
- Jute mesh at RFW
- Plants/Seed at RFW and SAV



Habitat Replacement & Reconstruction: SAV Seedlings and Tubers

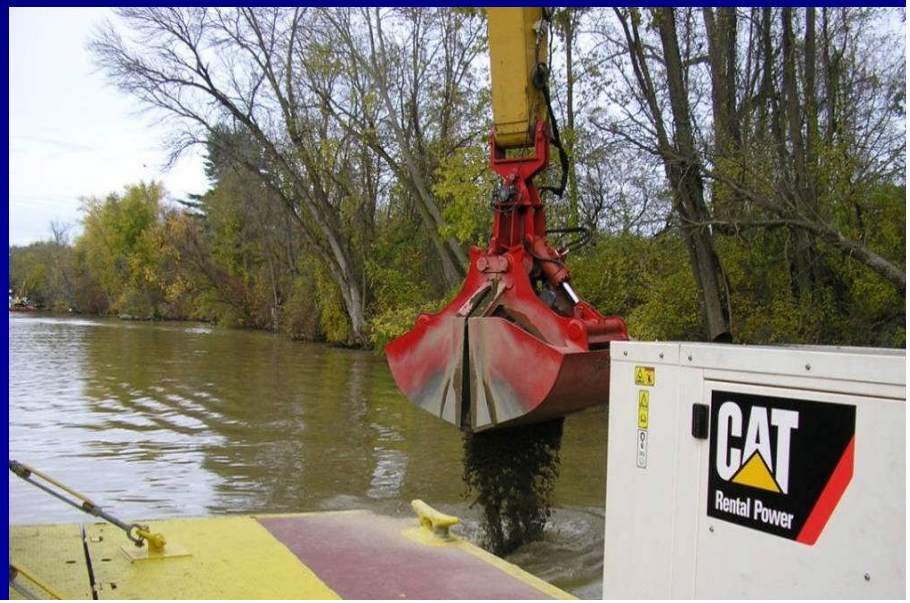
Collected in Fall 2008

- Upper Hudson River, North of Glens Falls
- *Vallisneria americana* (wild celery) was targeted
- Cultured and maintained at a nursery until planting in 2010

Habitat Replacement & Reconstruction: *Unconsolidated River Bottom* (UCB)

- Backfill placement during 2009
- Included unvegetated nearshore & offshore areas

- Nearshore areas restored to pre-dredge bathymetry



EPA
United States Environmental Protection Agency

Habitat Replacement & Reconstruction: *Shorelines* (SHO)

Habitat Replacement & Reconstruction: *Shorelines* (SHO)

Stabilization at Dredge Cuts (≤119 ft)

- Location specific
- Measures include:
  - Biologs
  - Backfill
  - Type P Armor Stone
  - Wooden Plank

Reconstruction of affected habitat (>119 ft)

- NOT needed in Phase 1
- 119 ft elevation is the CU boundary
- Measures include:
  - Type P Armor Stone
  - Topsoil and Seed Mix
  - Topsoil and live stakes

EPA
United States Environmental Protection Agency

Hudson River
PCBs SUPERFUND SITE

Shoreline Stabilization Example: Biolog Option

EPA
United States Environmental Protection Agency

Hudson River
PCBs SUPERFUND SITE

Shoreline Stabilization Example: Biolog Option

EPA
United States Environmental Protection Agency

Hudson River
PCBs SUPERFUND SITE

Habitat Replacement & Reconstruction: *Submerged Aquatic Vegetation* (SAV)

- **Backfill placed in 2009**
- **Replacement & reconstruction planning:**
  - **At or near many pre-dredge SAV bed areas**
  - **Depth & flow considerations**
  - **Primary planting and contingency areas**

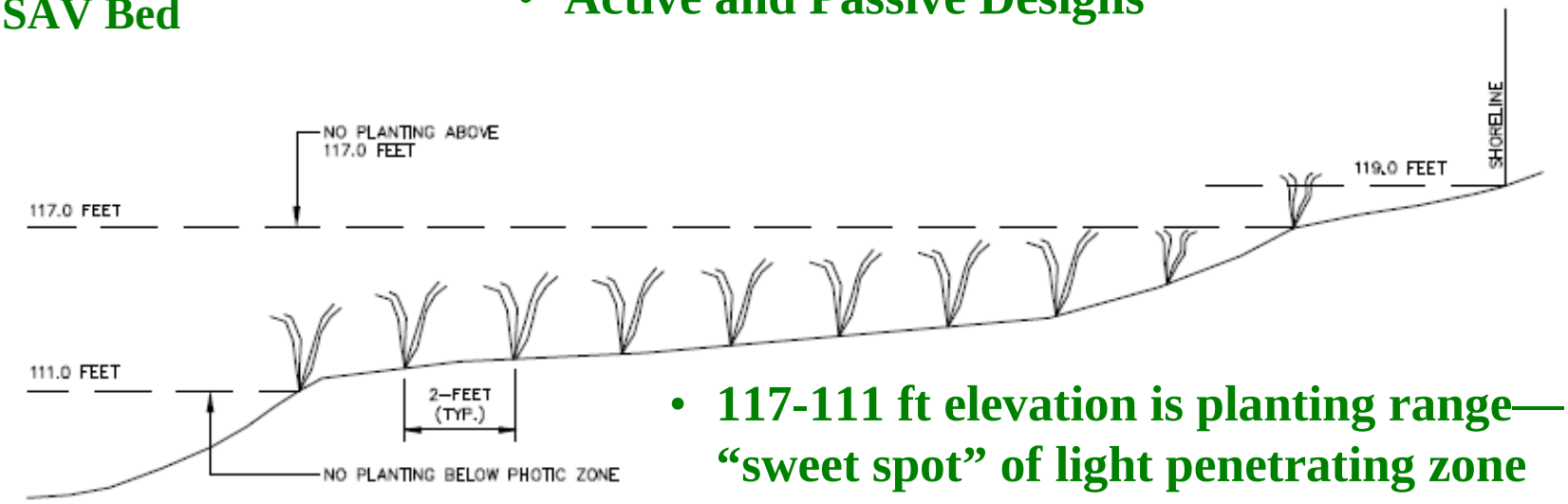
EPA
United States Environmental Protection Agency

Hudson River
PCBs SUPERFUND SITE

Habitat Replacement & Reconstruction: *Submerged Aquatic Vegetation* (SAV)

SAV Bed

- **Active and Passive Designs**

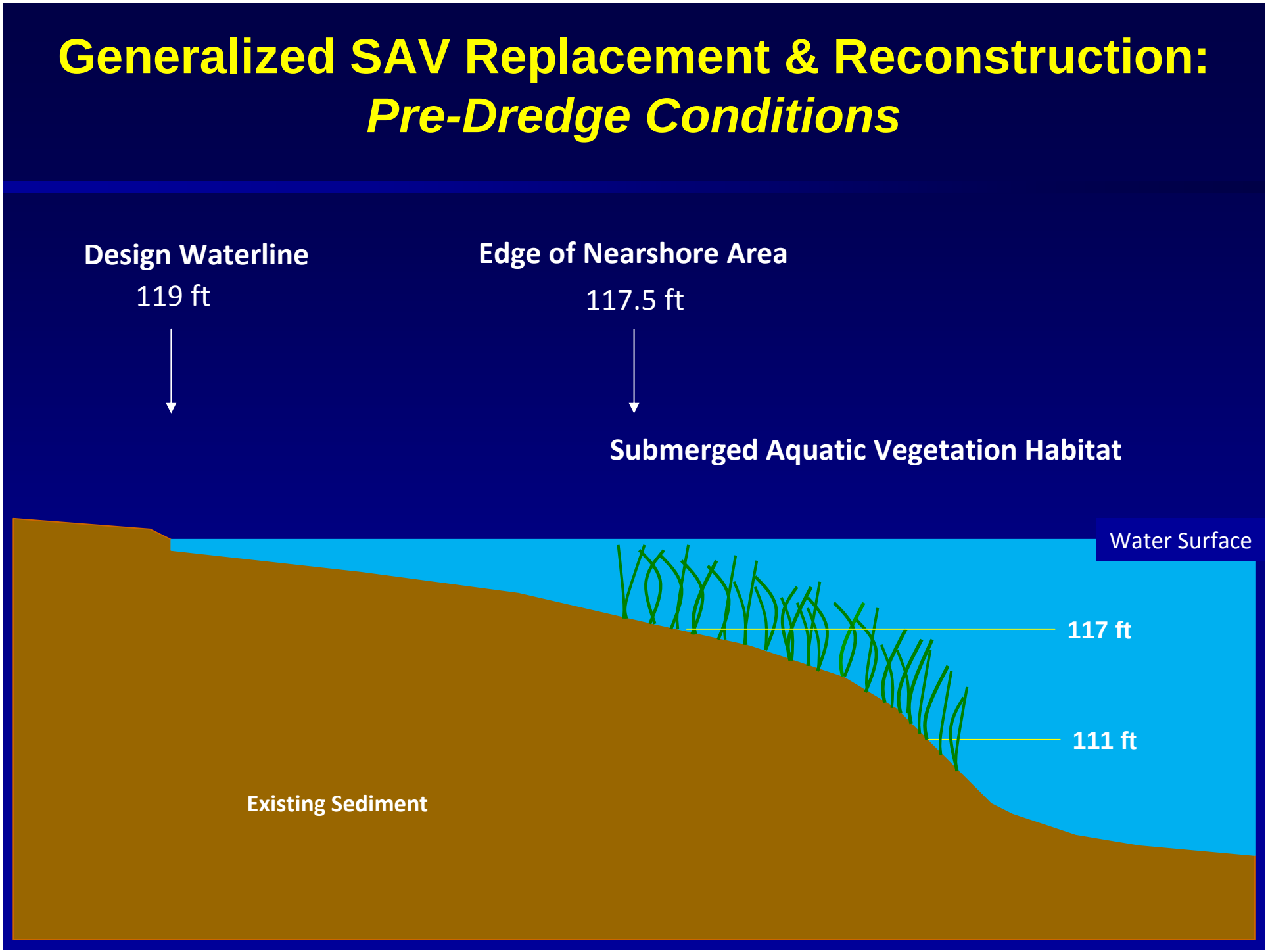


- **117-111 ft elevation is planting range—"sweet spot" of light penetrating zone**

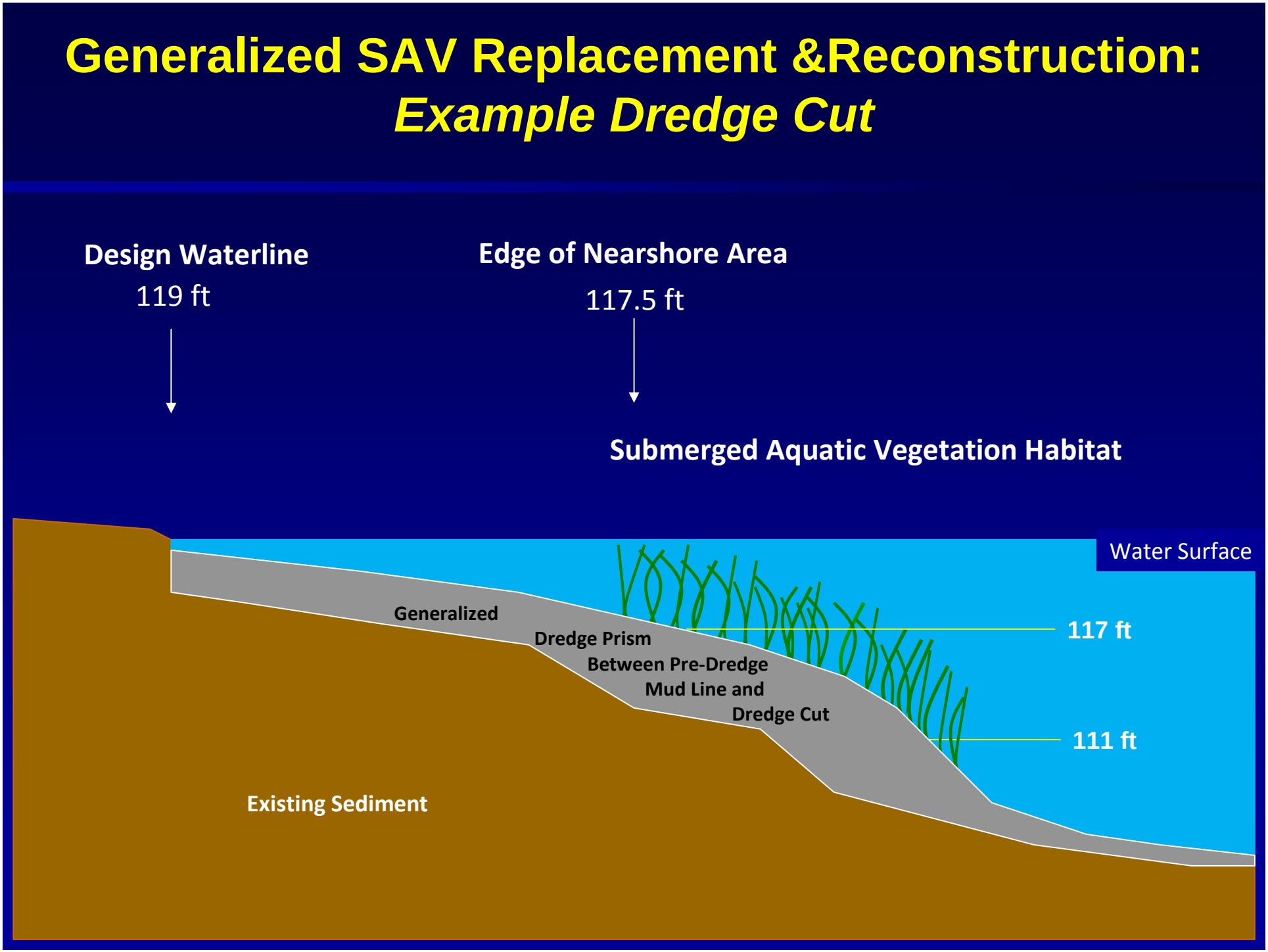
Major Activities	Approx. Quantity
Wetland Planting	21,800 Plants 0.4 Acres to be replaced
Submerged Aquatic Vegetation Planting	57,000 Adult Plants 8,550 Tubers Total of 5.7 Acres

Hudson River
PCBs SUPERFUND SITE

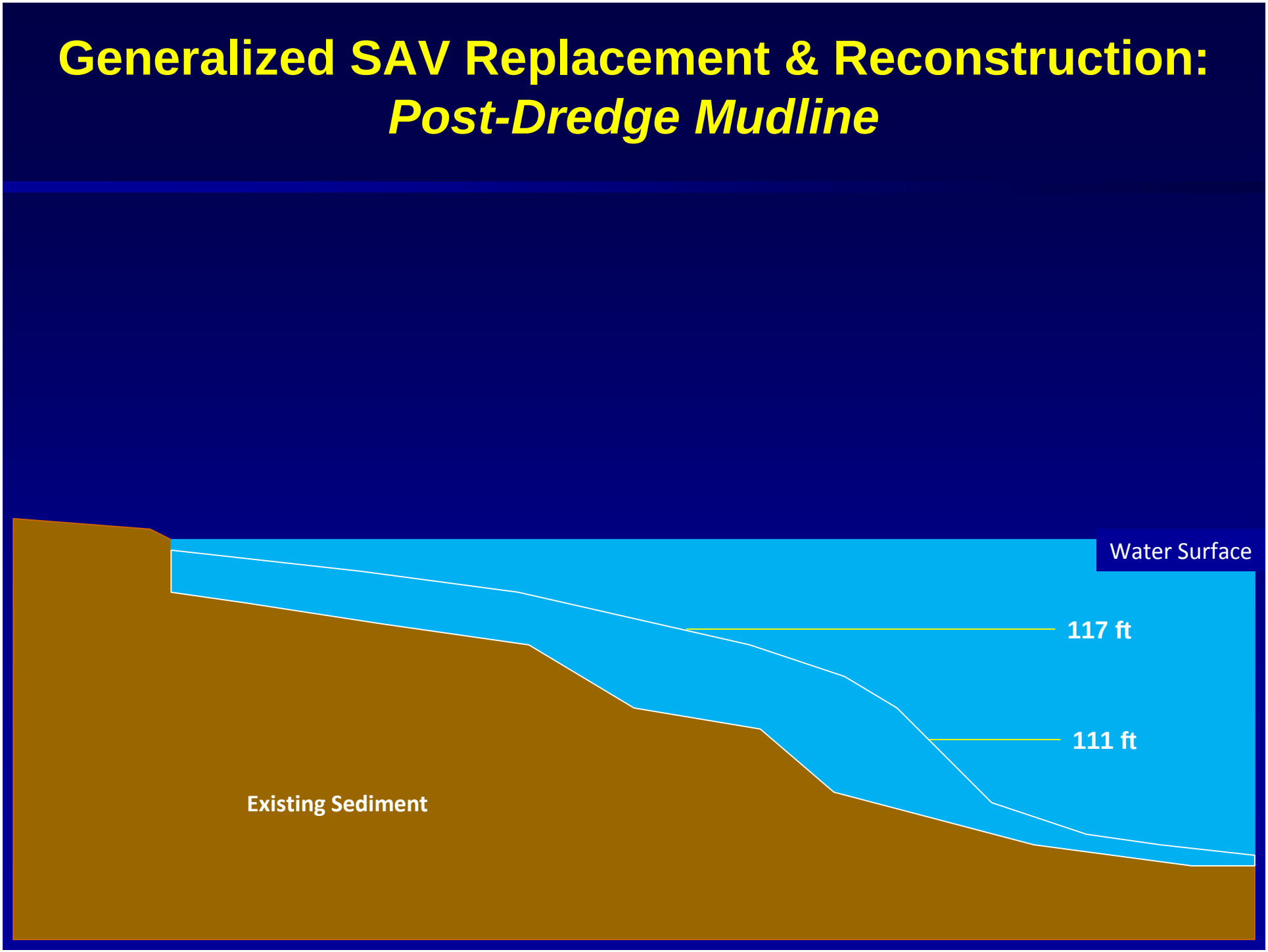
Generalized SAV Replacement & Reconstruction:
Pre-Dredge Conditions



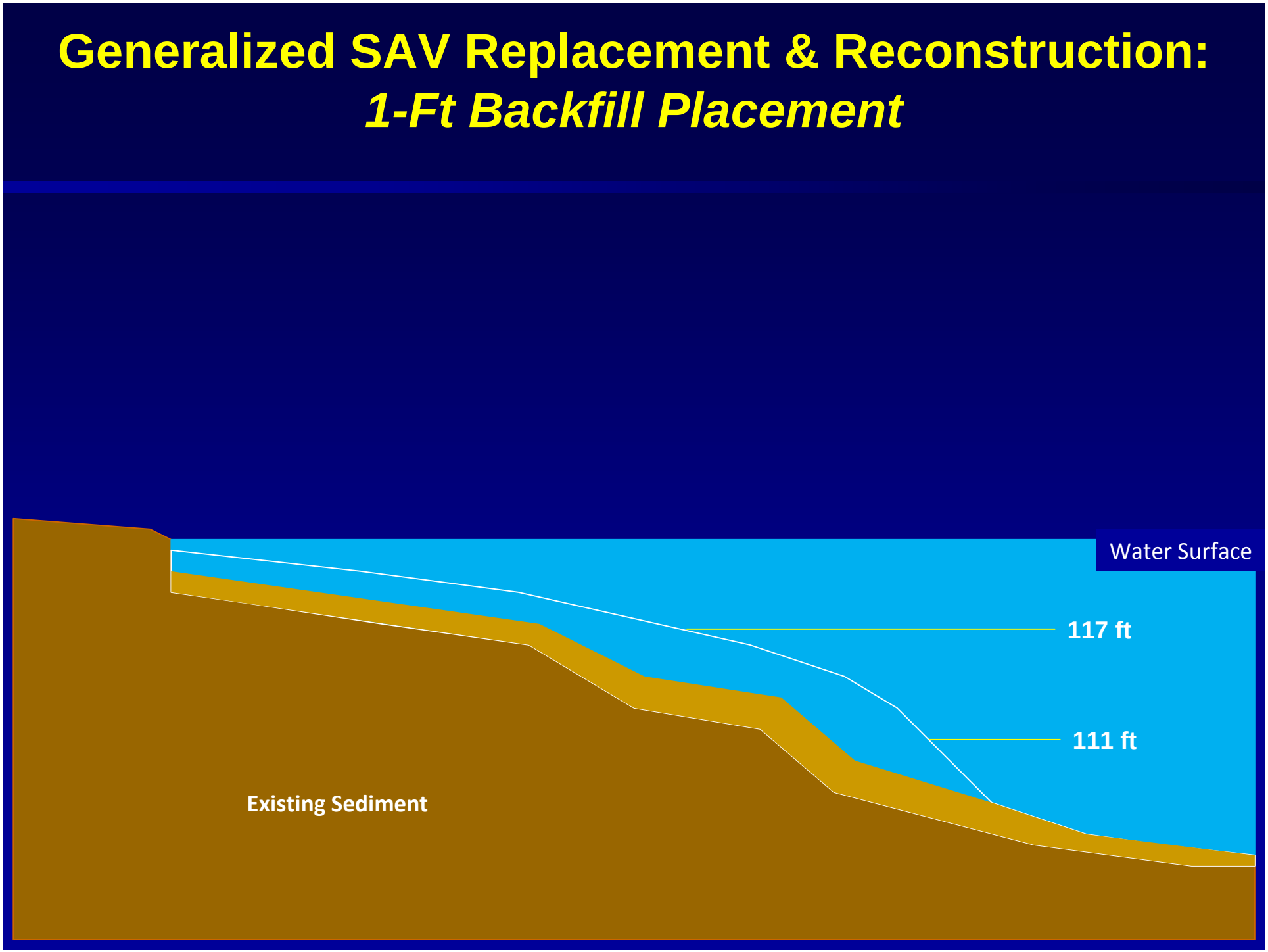
Generalized SAV Replacement &Reconstruction:
Example Dredge Cut



Generalized SAV Replacement & Reconstruction:
Post-Dredge Mudline

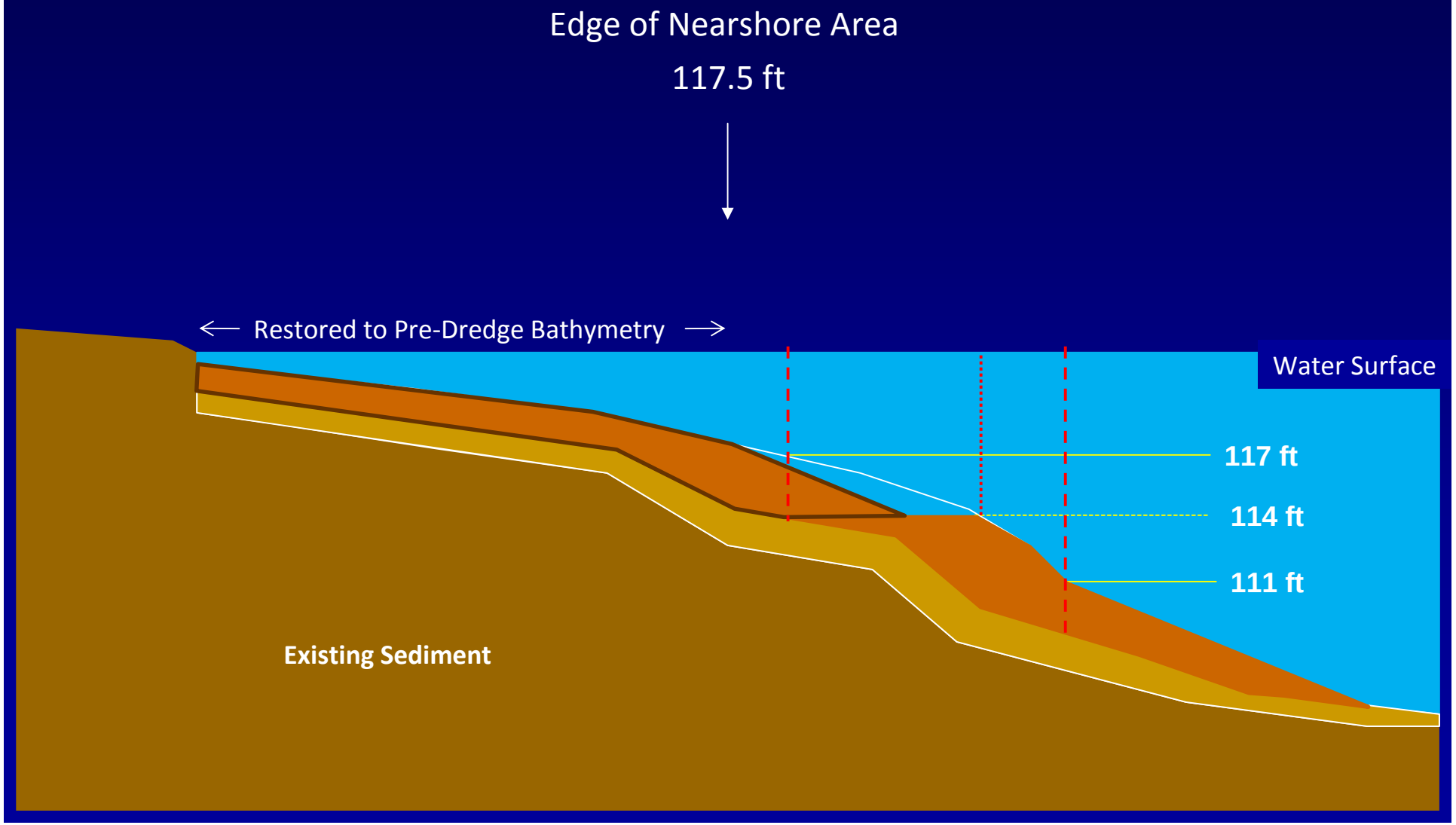


Generalized SAV Replacement & Reconstruction:
1-Ft Backfill Placement



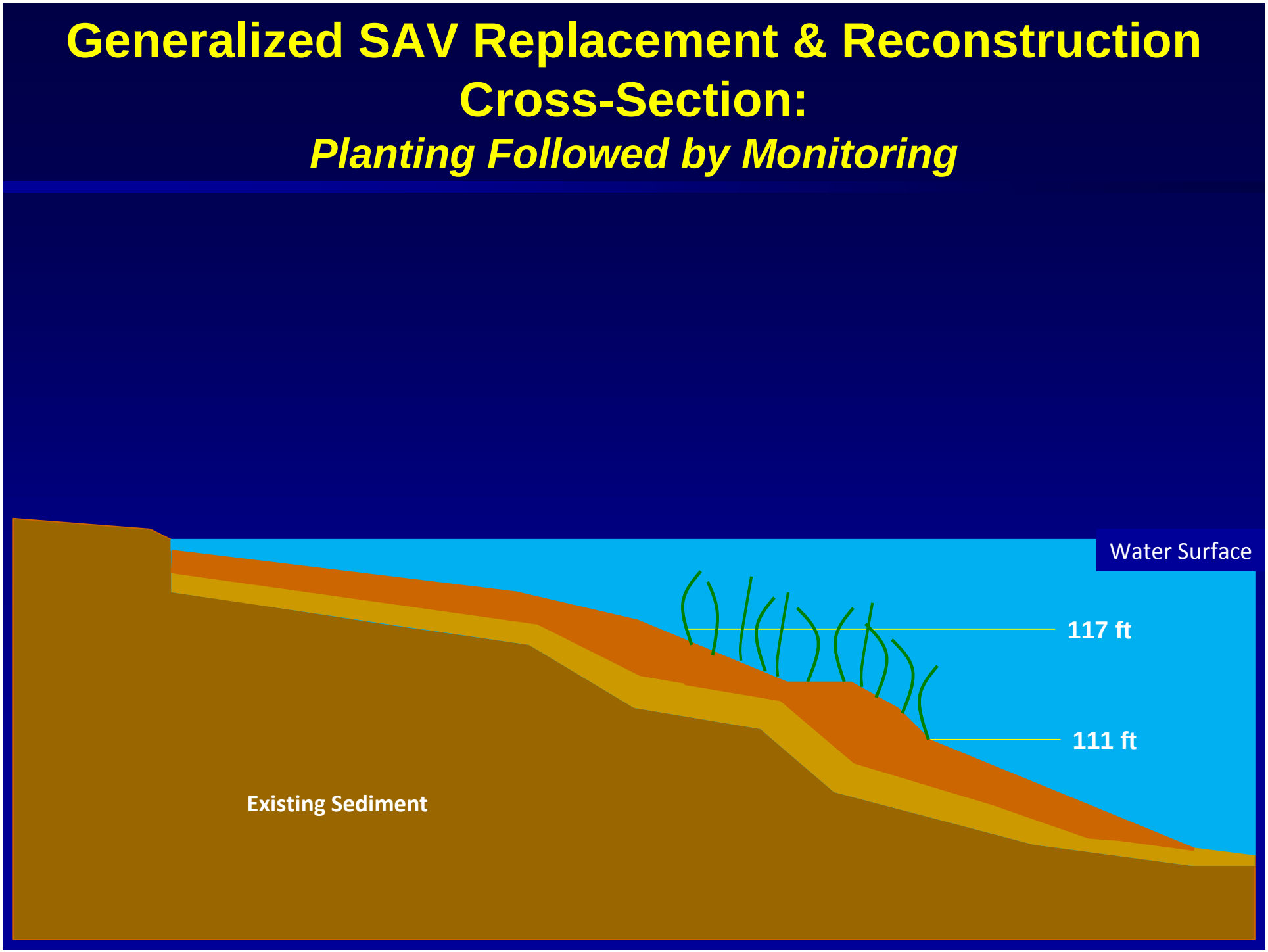
Generalized SAV Replacement & Reconstruction:

Supplemental & Nearshore Backfill Placement

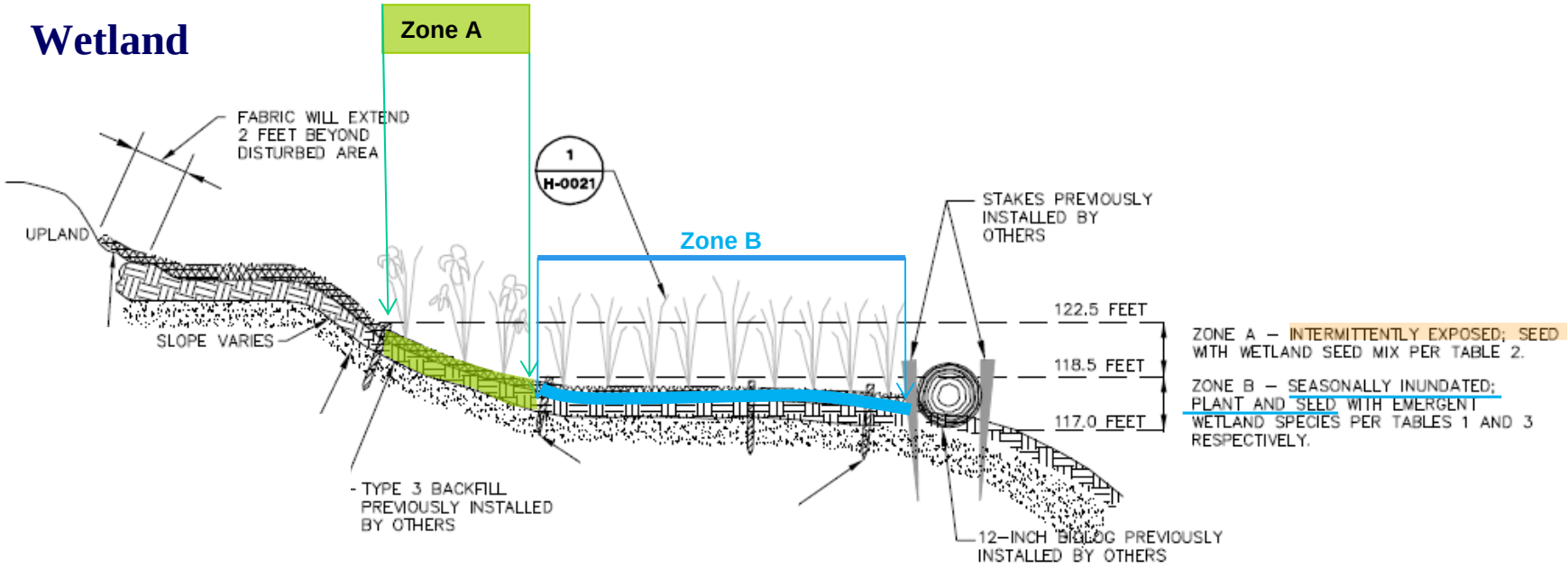


Generalized SAV Replacement & Reconstruction Cross-Section:

Planting Followed by Monitoring



Habitat Replacement & Reconstruction: *Riverine Fringing Wetlands* (RFW)



- **Two planting zones above & below 118.5 ft**

Major Activities	Approx. Quantity
Wetland Planting	**21,800 Plants** **0.4 Acres to be replaced**
Submerged Aquatic Vegetation Planting	**57,000 Adult Plants** **8,550 Tubers** **Total of 5.7 Acres**

Habitat Replacement & Reconstruction: *Riverine Fringing Wetlands* (RFW)

- **Backfill placed during 2009**
- **Biolog and Jute Mesh Installed 2009**

Typical RFW **Zone A** Seed Mix Spp.

Habitat Replacement & Reconstruction: *Riverine Fringing Wetlands* (RFW)

Typical RFW **Zone B** Plants

Habitat Replacement & Reconstruction Timeline: Riverine Fringing Wetland Example

Habitat Replacement & Reconstruction Timeline: Riverine Fringing Wetland Example

In Dredging Year (May-November 2009)

- Remove contaminated sediments
- Place backfill
- Install erosion control blanket and/or biologs

In Following Growing Season (2010)

- Pre-planting inspection to identify final RFW planting areas
- Prepare selected planting areas
- Install plants; monitor for health & desired conditions

Year After Planting (2011)

- Adaptive Management Plan
- Monitoring begins for benchmarks

EPA
United States Environmental Protection Agency

Hudson River
PCBs SUPERFUND SITE

Habitat Summary

- Approximately **48 acres** were dredged and filled in 2009
- SAV habitat prepared for inspection, then planting, in Spring 2010:
  - Primary planting – **5.7 acres** (approx.)
  - Contingency areas – up to **7.2 acres** (approx.)
- Approximately **0.4 acre** RFW habitat was stabilized and backfilled in preparation for inspection/planting 2010

EPA
United States Environmental Protection Agency

Hudson River
PCBs SUPERFUND SITE

Habitat Summary (Con't)

- Impacts to shoreline habitats greater than an elevation of 119 ft did not occur in 2009
- Shoreline stabilization:
  - Type P stone: 1,380 linear ft (approx)
  - Biolog: 1,500 linear ft (approx)
  - Remaining shorelines stabilized with nearshore BF

EPA
United States Environmental Protection Agency

Hudson River
PCBs SUPERFUND SITE

Thank You!

Questions?