

Habitat Reconstruction Update

Hudson River CAG December 8, 2016



Hudson River
PCBs SUPERFUND SITE



A habitat replacement program is being implemented in an Adaptive Management context to reconstruct and stabilize habitats impacted during dredging

- Shoreline (SHO)
- Riverine Fringing Wetland (RFW)
- Submerged & Floating Aquatic Vegetation (SAV/FAV)
 - Planting and Natural Recolonization Areas
- Unconsolidated River Bottom (UCB)
- Reconstruction of these areas is tracked using a ledger (by CU and reach)

Reconstruction & Monitoring Sequence



Dredging/Backfilling

Erosion control fabric/berms
Initial RFW Zone A seeding

Prior to Planting

Pre-Planting Survey

Elevation and water depth checks

RFW Zone A & B Seeding

RFW & SAV Planting

Year of Planting

Initial Planting Monitoring/Maintenance

Herbivory monitoring & controls
Maintenance monitoring & planting
Invasive plants monitoring & control

Post-Construction Monitoring

Benchmark Monitoring Phase
Success Criteria Phase

After Planting

Benchmark and Success Criteria Considerations



Natural variability in vegetative habitats were taken into account when developing benchmarks and success criteria

- Factors that challenge reconstructed habitats include:
 - Amount of sunlight, fluctuating water levels and temperatures
 - River flows (high flow vs low flow years—droughts and floods)
 - Ice flows, herbivory, and invasive species
 - Scour from boats and other human activity (removing plants)
- Extensive scientific analysis and discussion with NYS/other agencies went into developing the reconstruction approach and monitoring criteria (2005 through 2013)
- Final criteria is science driven, complex, statistically based, reflects environmental variability, and is based on comparisons of reconstructed areas to nearby plant habitat reference areas
- Overall approach is to replace enough plants to establish recovery conditions along with natural recolonization, monitoring, and potential consider response actions (if necessary)

Post-Construction Monitoring Approach: Two Phases



Benchmark Evaluation Phase

- Purpose: to monitor progress of initial plantings and natural recolonization
- Anticipated to last five years (including year of planting)
- Observation of percent cover and species composition
- Individual areas compared to reference areas

Success Criteria Phase

- Quantitative, statistically-based evaluation
- Habitat-specific (RFW and SAV)
- Comparison to reference areas on reach-wide basis

Habitat Reconstruction Monitoring

Benchmark Monitoring



Benchmarks are used to evaluate reconstruction areas to determine whether potential response actions might be needed

Benchmark Monitoring Involves:

- Individual areas are compared to reference areas for up to 5 years
- Quantitative, but non-destructive measures applied to individual habitat reconstruction areas

Perspective:

- Some phase 1 areas are now in their 6th year of benchmark monitoring
- No reconstruction areas have been evaluated against success criteria yet
- Goal of benchmark monitoring is to help areas get on trajectory to success by monitoring their progress and evaluating the need for potential response actions
- EPA approves transition from benchmark monitoring to success criteria phase

Habitat Reconstruction Monitoring

RFW Benchmarks



Benchmark Years	Time Since Planting	Benchmarks
1 (First)	Year of Planting	<ul style="list-style-type: none"> • 100% of plants meet acceptance criteria • Invasive species not present
2 (Second)	First full growing season post-planting	<ul style="list-style-type: none"> • 90% species and planting units present • % cover increased from initial planting density • No invasive species
3 (Third)	2 years after planting	<ul style="list-style-type: none"> • % cover \geq 70% of reference area cover • 20% species cover is from native volunteers • No invasive species
4 (Fourth)	3 years after planting	<ul style="list-style-type: none"> • % cover \geq 85% of reference area cover • 40% species cover is from native volunteers • Invasive species % cover \leq reference areas
5 and 6	4 th and 5 th year after planting	<ul style="list-style-type: none"> • % cover \geq 85% of reference area cover • Invasive species % cover \leq reference areas

Habitat Reconstruction Monitoring

SAV Benchmarks



Benchmark Years	SAV Planting Areas Benchmarks	SAV natural Recolonization Areas Benchmarks
Planting Year	<ul style="list-style-type: none"> 100% of plants installed meet acceptance criteria 	<ul style="list-style-type: none"> Invasive species not present
First full season after planting	<ul style="list-style-type: none"> % cover \geq 20% of the reference area cover No invasive species 	<ul style="list-style-type: none"> Native species are colonizing No invasive species
2 years after planting	<ul style="list-style-type: none"> % cover \geq 30% of reference area cover No invasive species 	<ul style="list-style-type: none"> % cover \geq 5% of reference area cover Invasive species % cover \leq reference areas
3 rd –4 th years after planting	<ul style="list-style-type: none"> % cover \geq 40% of reference area cover Invasive species % cover \leq reference areas 	<ul style="list-style-type: none"> % cover \geq 10% of reference area cover Invasive species % cover \leq reference areas
5 th –6 th years after planting	<ul style="list-style-type: none"> 4th yr \geq 50% of reference area 5th yr \geq 70% of reference area Invasive species % cover \leq reference areas 	<ul style="list-style-type: none"> % cover \geq 40% of reference area cover Invasive species % cover \leq reference areas

Habitat Reconstruction Monitoring Success Criteria Evaluations



Success criteria evaluation process designed to determine whether the habitat reconstruction work can be approved by EPA

Success Criteria Evaluation Involves:

- Comparison to reference areas
- More quantitative criteria
- Application at river-reach scale (e.g., Thompson Island Pool / Reach 8)

Perspective:

- Evaluation against success criteria involves an additional 2-5 years of monitoring
- Total time in monitoring (benchmark + success criteria) will depend on how the data indicate the reconstruction areas are performing



RFW Success Criteria

- RFW areas show progress towards designed acreages and no significant slumping can occur that would negatively impact vegetation establishment
- Percent cover is 85%, with percent invasive species less than or equal to that of the reference condition
- The Weighted Average Index value is acceptable for three out of five years or the final two years
- Indicators of wetland hydrology (similar to indicators used in the Phase 1 design) and hydric soils are present



SAV Success Criteria

Variables (metrics):

Above-ground biomass

Stem density

Percent Cover

- Reach-wide reconstruction areas metrics must be within 20% of reference areas
- This criteria must be met within reaches for 2 consecutive years or 3 out of 5 years

Benchmark Monitoring Representative Habitats



A few reconstruction areas have experienced some challenges...



CU71 RFW and FAV/SAV



CU08 RFW and SAV

Response actions were identified and implemented

Benchmark Monitoring Representative Habitats

Other reconstruction areas
that have developed relatively
quickly...



CU60-1 RFW



CU80 RFW



CU38 RFW

Habitat Reconstruction Update



Questions?