COLLABORATIVE URBAN STREAM RIPARIAN STREAM REHABILITATION: THE J.J. SEABROOK PROJECT

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WATERSHED PROTECTION

Partnerships

City of Austin

Watershed Protection Department

- Hydraulic Engineers
- Landscape Architect
- Biologists
- Stream Ecologists

Public Works Department

- Civil Engineers
- Bike & Urban Trail Program

Transportation Department

- Traffic Engineers

Parks and Recreation

- Trails Coordinator

J.J. Seabrook Neighborhood Association

Goals ~ Success

Project Goals

Stream Restoration
Create a stable, hydrologically connected & ecologically improved stream system

Water Quality
Reduce pollution from urban stormwater runoff

Neighborhood Connectivity
Construct urban trail for bicycle & pedestrian use

Community Sense of Place
Create a place to explore & learn about the natural environment

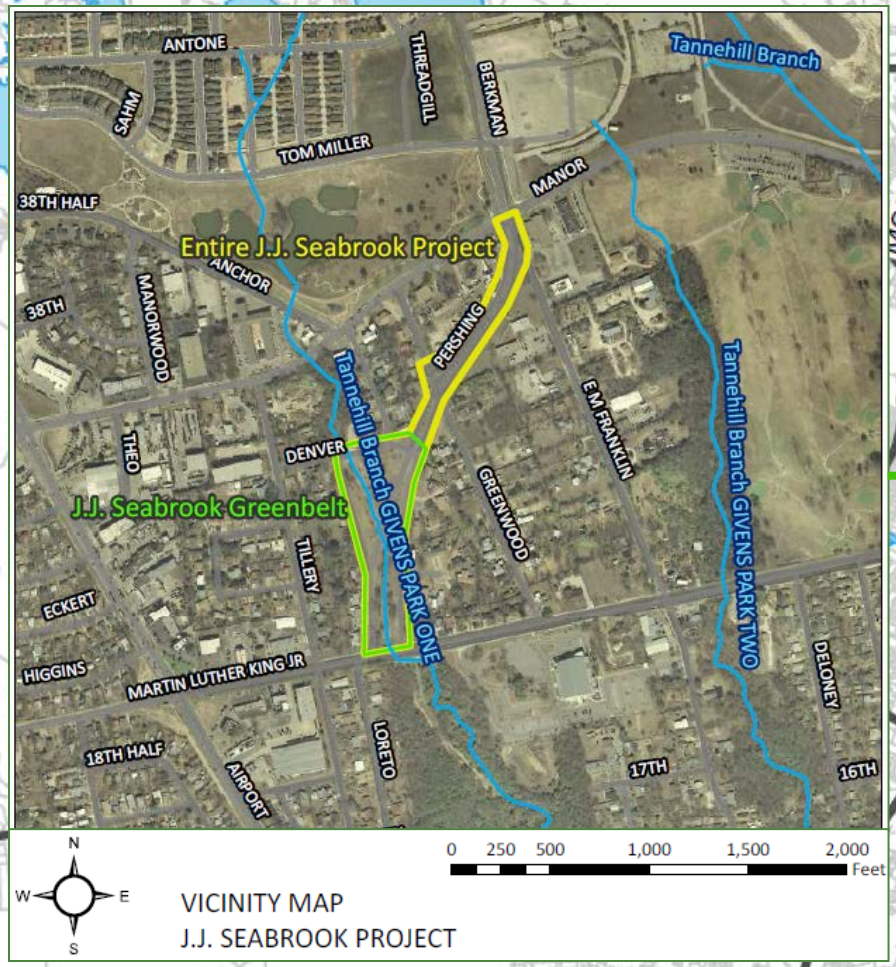
Traffic Calming
Reconfigure intersections & streets to improve traffic safety

Plan for &Determine Success

- Clear project objectives/goals
- Plan for evaluation
- Monitor
- Adaptive response

Palmer et al. 2005

Location



Austin, Texas

Existing Conditions

- The reach is ~ 900 ft long;
- The contributing drainage area is 180-210 AC

Existing Conditions

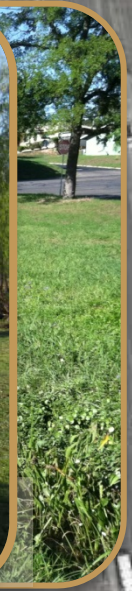
Pershing Dr.

East MLK Jr. Blvd

Denver Ave.

Existing spring outlet

Greenbelt: view downstream



knees are unique features

Pre-design Data Collection

Existing Conditions Assessment

- Performed Texas Rapid Assessment Module (TXRAM) to assess existing conditions
- Established baseline metrics for future monitoring
  - EII: Environmental Integrity Index
  - RFA: Riparian Functional

Pre-design Data Collection

Existing Conditions Assessment

- Measured metrics at reference reach downstream to inform design
  - Bankfull widths & depths
  - Riffle/pool spacing, depths
  - Sediment size distribution

Pre-design Data Collection

Existing Conditions Assessment

Soil & Sediment analysis

- Sediment size distribution
- Geotechnical borings
- Infiltration rates
- On-site soil testing for soil amendment of reused soils

Infiltration

Geotechnical borings

Pre-design Data Collection

Vegetation Inventories

Vegetation on-site

Vegetation at reference site

Proposed Design

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Project Design

- Channel Improvements
- Culvert Removal
- Instream Habitat Structures
- Riparian Revegetation
- Soil Salvage Plan
- Spring enhancement
- WQ Swales
- Rain Gardens

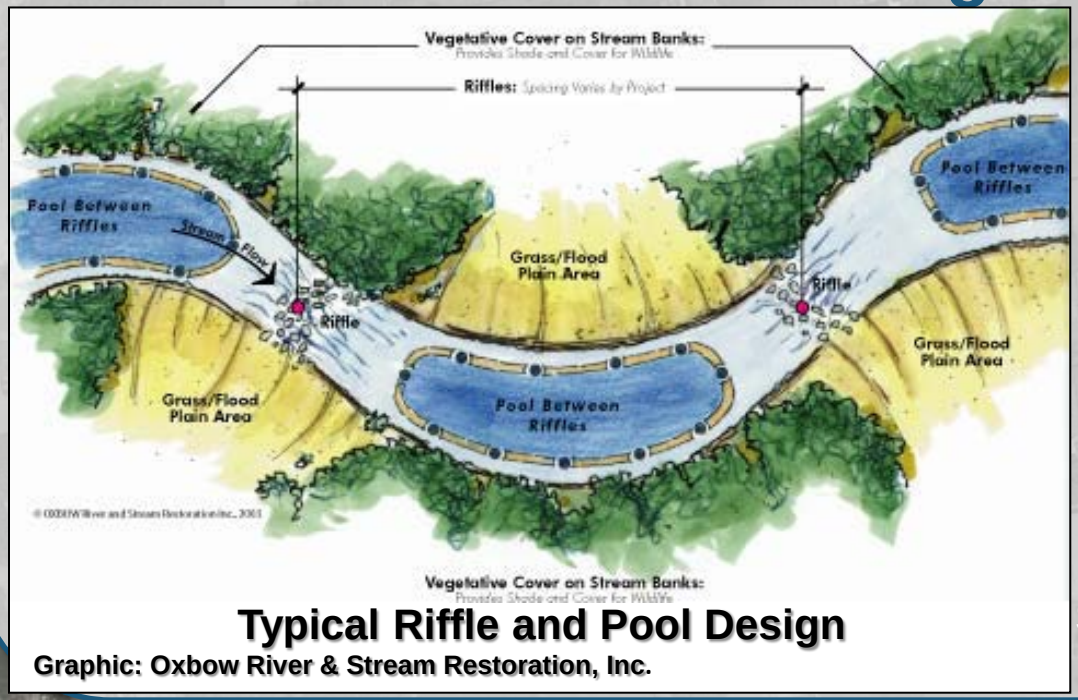
Goals+Design+Monitoring: It's all connected

Project Monitoring

- Riparian Functional Assessment
- **Environmental Integrity Index**
- **Revegetation Assessment**

Proposed Design

Stream Restoration Design



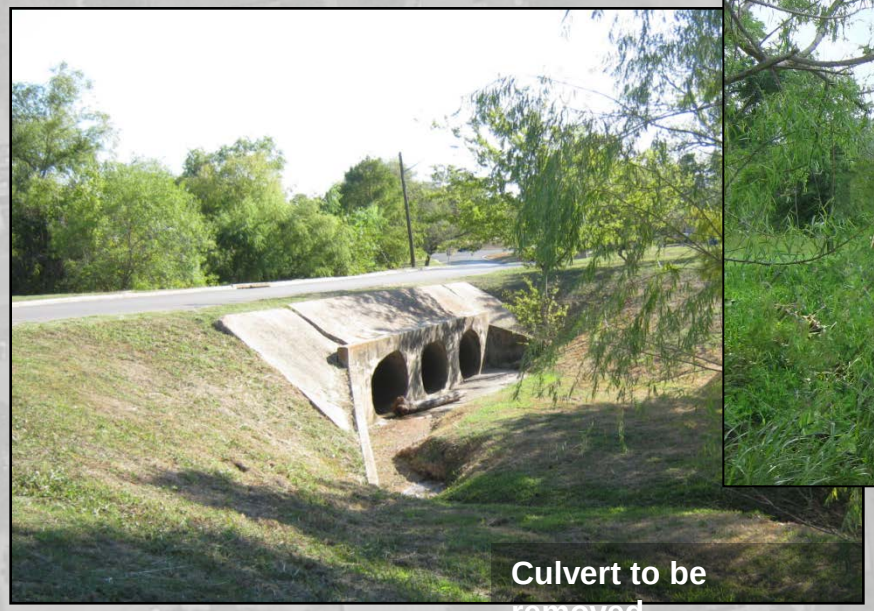
Typical Riffle and Pool Design

Graphic: Oxbow River & Stream Restoration, Inc.

Salvaging tree for log habitat structure

Proposed Design

Culvert Removal



Culvert to be removed

New pedestrian bridge ~ photo simulation

Enhance hydrologic connection

Spring Enhancement

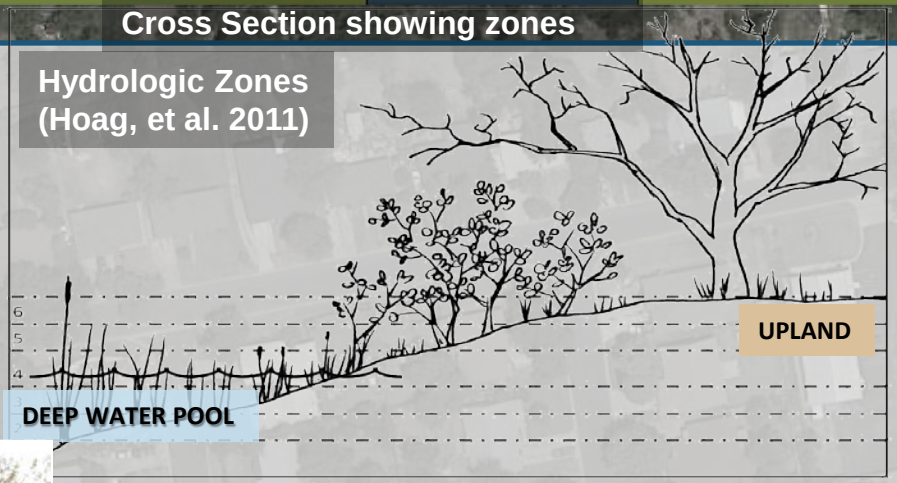
Existing pipe outlet with groundwater discharge

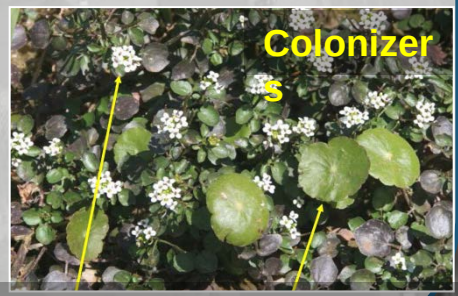
Rendering of proposed spring enhancement

Proposed Design

Cross Section showing zones

Hydrologic Zones (Hoag, et al. 2011)





Proposed Design

Water Quality Improvements

Denver Avenue Rain garden rendering

Photo simulation of water quality swale

Monitorin g

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- **Culvert Removal**
- **Instream Habitat Structures**
- **Riparian Revegetation**
- **Soil Salvage Plan**
- **Spring enhancement**
- **WQ Swales**
- **Rain Gardens**

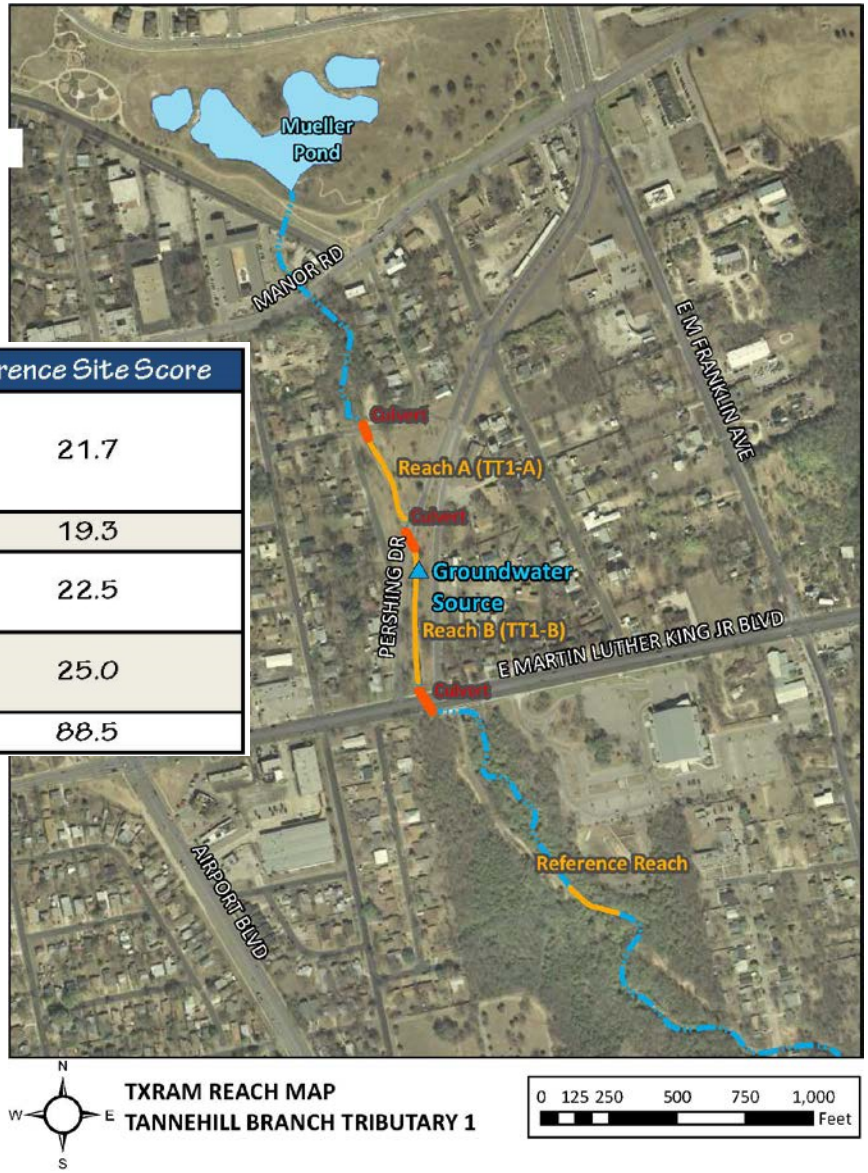
Project Monitoring

- Riparian Functional Assessment (RFA)
- **Environmental Integrity Index (EII)**
- **Revegetation Assessment**

Monitoring: Texas Rapid Assessment Model (TX RAM)

- Rapid, repeatable, field-based method to derive score of stream integrity and health.
- Used to assess a project's impacts to a stream or wetland.

Core Elements	Metrics	JJ Seabrook Score	Reference Site Score
Channel Condition	Floodplain Connectivity	22.5	21.7
	Bank Condition		
	Sediment Deposition		
Riparian Buffer Condition	Riparian Buffer	0	19.3
In-stream Condition	Substrate Composition	10.8	22.5
	In-stream Habitat		
Hydrologic Condition	Flow Regime	15.7	25.0
	Channel Flow Status		
Overall Score		49.0	88.5



Monitoring: Riparian Functional Assessment

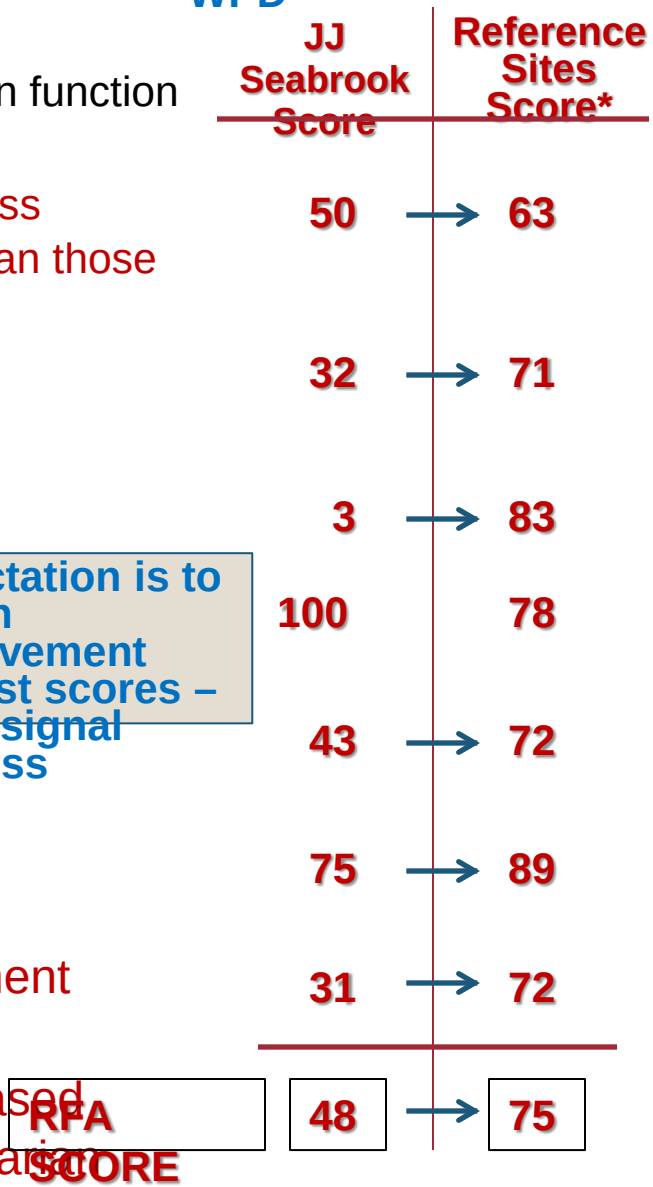
See also paper by Ana Gonzales, COA, WPD

- Riparian Functional Parameters

0 – 100 scale: 0 = lack of function; 100 = best possible riparian function
These are normalized results

- Hardwood Demography: the dominant species are less hydrophilic and present in lower numbers of age classes than those in reference sites
- Recruitment: the site plant community is not being replenished
- Riparian Width: there is little to no riparian b
- Soil Moisture: the soil moisture is high
- Structural Diversity: the diversity is low
- Soil Compaction: compacted soils need improvement
- Canopy Cover: needs more plant cover and increased structural diversity for a healthier, more functional riparian zone

Expectation is to see an improvement in most scores – it will signal success



*Reference: Richter & Duncan (2012) *Riparian Functional Assessment: Choosing Metrics that Quantify Restoration Success in Austin, Texas*

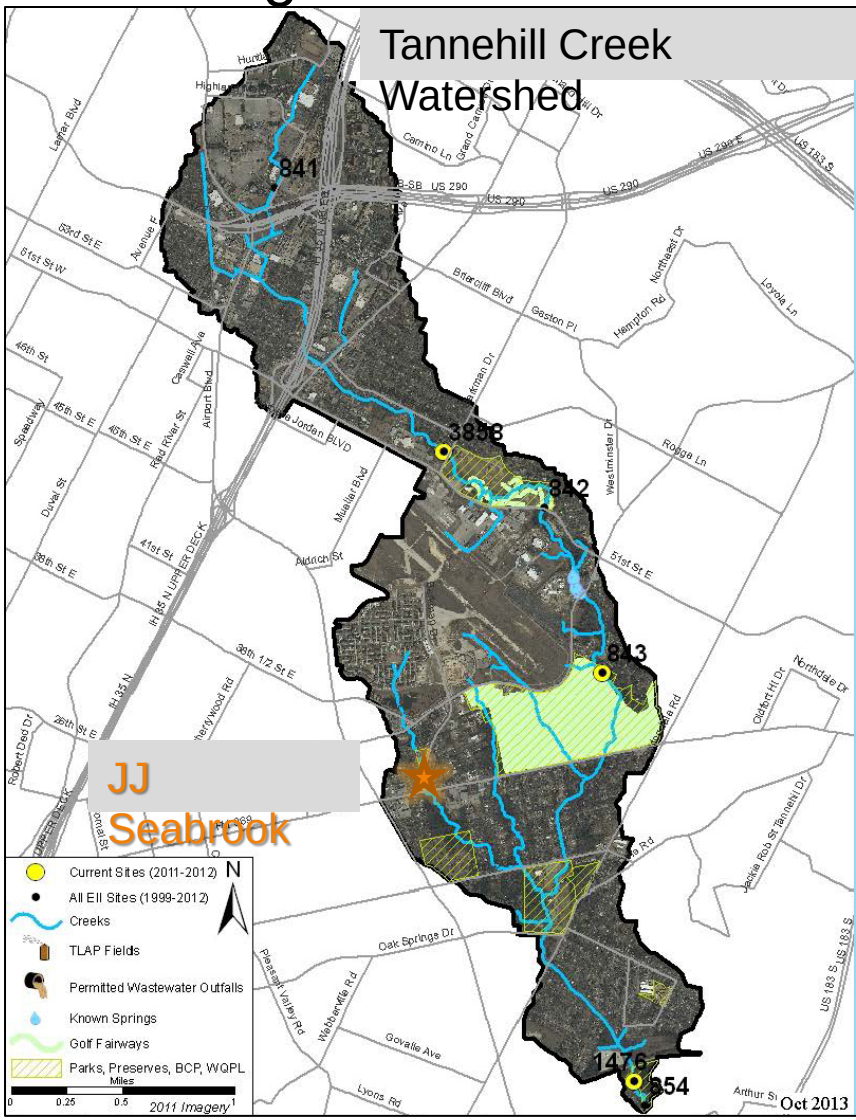
Monitoring: Environmental Integrity Index (EII)

- Program to continuously monitor and assess chemical, biological, physical integrity of Austin's creeks and streams.
- All watersheds monitored on 2-year rotating basis.

6 Categories of Data:

- Contact Recreation – E. Coli Bacteria
- Non-contact Recreation – Visual Assessment
- Water Quality – Chemical Measurements
- Sediment Quality – Sediment Chemistry
- Habitat Quality – visual assessment & direct measurements
- Aquatic Life – Benthic Macroinvertebrates & Diatom Community

JJ Seabrook Scores	Reference Scores (Barton Creek)
56, 62, 63 →	80s



Monitoring: Revegetation

During Construction

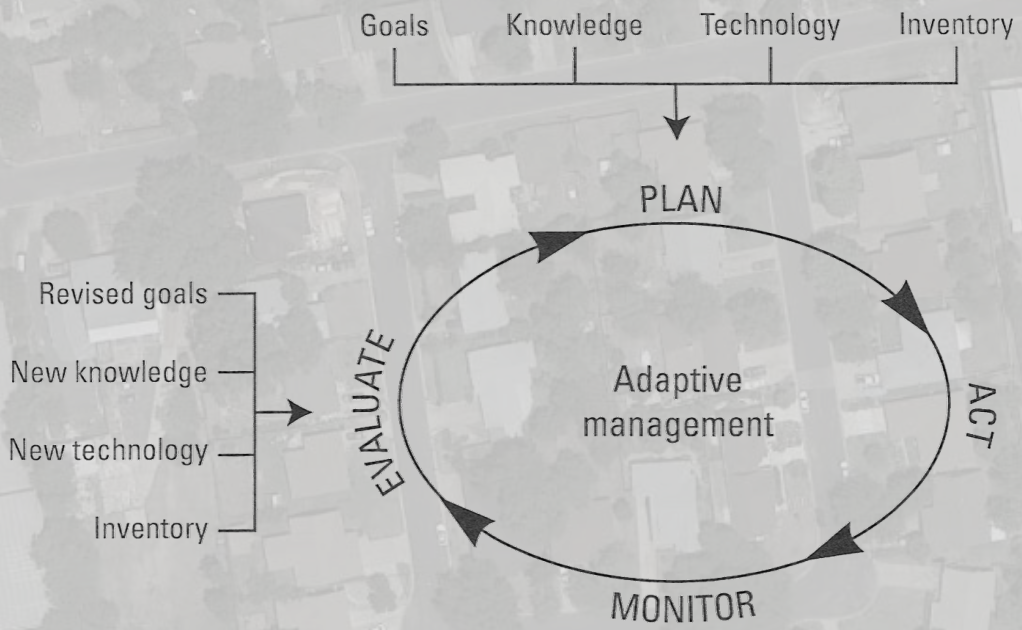
1 Year Later

Vegetation Category	Landscape Performance Criteria Target Values		
	Year 1	Year 2	Year 3
Desired Native Plant Coverage	At least 30-50%	At least 60-70%	At least 75-95%
Native Plant Species Diversity	No one species should be the dominant species in more than 20% of all the quadrants		
Non-native Invasive Plant Coverage	Non-native plants occupy more than 5% of any quadrat area		

Quadrat Measuring Method

Manageme nt

Riparian Adaptive Management Plan



Reconnecting a Community to its Creek…

The J.J. Seabrook Stream Restoration, Rain Garden, and Urban Trail Project