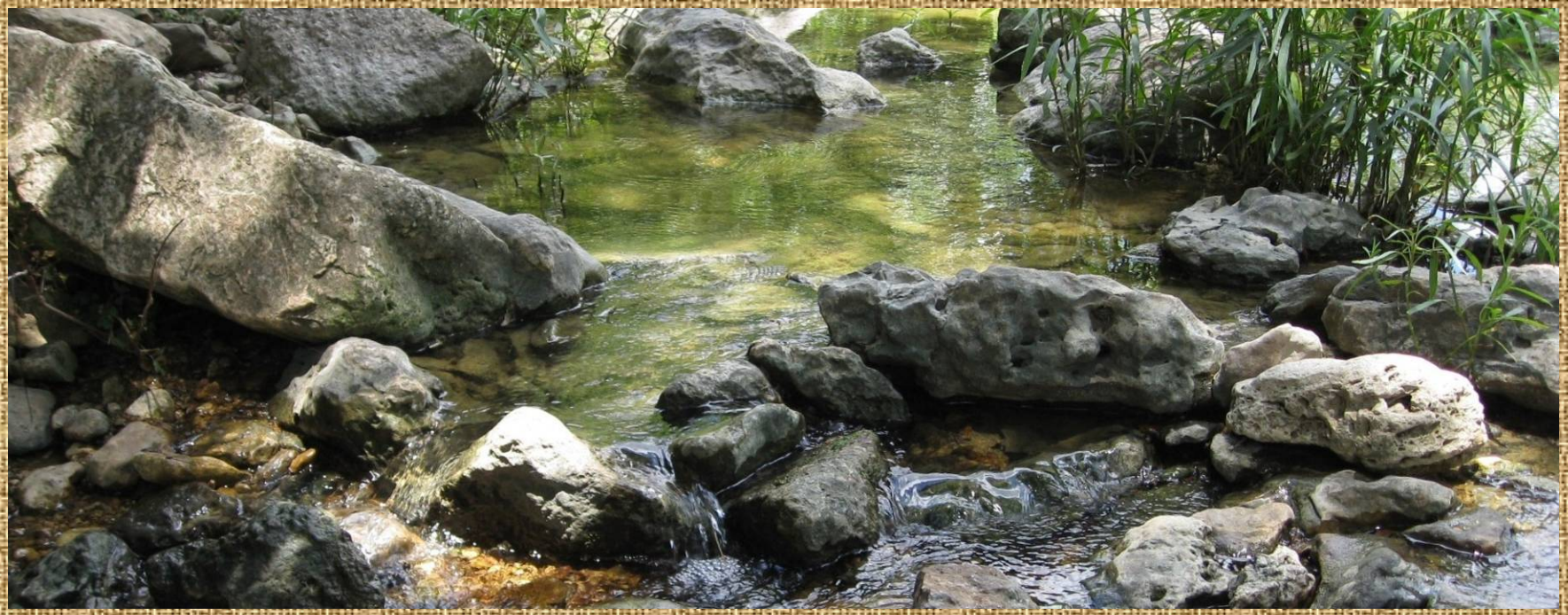

Welcome. . .

Sustainable Stream Management

in the City of Austin

Texas Riparian Association - Urban Riparian Symposium
Austin, TX – February 11 – 13, 2015



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City of Austin
Watershed Protection Department
Environmental Resource Management Division

Presentation Outline

- WPD Program Background
- Definitions
- Sustainable Stream Management
  - Regulations
  - Projects
  - Maintenance & Monitoring

City of Austin
Watershed protection department

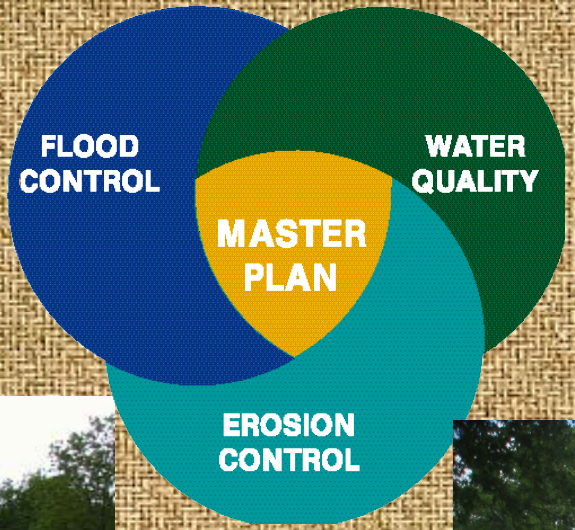
three primary service missions:

- **Water Quality →**
  - stormwater Control Measure Retrofits (i.e. SCM's = BMPs),
  - "green" Infrastructure
  - Riparian Zone Management
- **Creek Erosion →** Stream restoration & Rehabilitation
- **Flood Control →** Multi-Objective Conveyance

A **<u>mission integration process</u>** (MIP) was developed to :
<u>Maximize the opportunities</u> and **<u>Minimize negative impacts</u>** to Other missions (flooding, erosion and water quality) when planning improvement projects.

Watershed Master Plan

Mission Integration



Sustainable Designs

stream restoration

City of Austin
WATERSHED PROTECTION

stormwater treatment

Definitions

- **Stream Restoration**
  - The establishment of function to a pre-disturbance condition. May be achieved through active or passive techniques.
- **Stream Rehabilitation**
  - The recovery of functions making the land useful again after a disturbance.
- **Stream Potential**
  - The ultimate ability to support certain functions (flood conveyance, stability, recreation, ecosystem services)
- **Stream Transformation**
  - Changing the original condition to support non-existent functions.
- **Stream Resurrection**
  - Daylighting streams previously placed underground

Definitions

- **Sustainable Channel Design**
  - Active or passive approaches to channel design that provide high level of natural function with a limited maintenance regime
- **Sustainable Stream Management**
  - Framework that balances **environmental** protection with **economic** incitement applied **equitably** through use of regulations, restoration projects and low impact maintenance with adaptive management advised by monitoring.

Sustainable Channel Design

- **Natural Design Approach**
  - **Mimic** the morphological variability observed in **nature**
  - Stabilize using **natural materials**
    - (rock, wood and vegetation)
  - Consider **biologic response** to imposed changes
- **Sound Scientific Basis**
  - Using geomorphology and hydraulic engineering principles include use of analog, empirical-statistical and analytical methods.
- **Minimize Long-term Maintenance**
  - Allow for naturally sustainable conditions (e.g. high roughness)

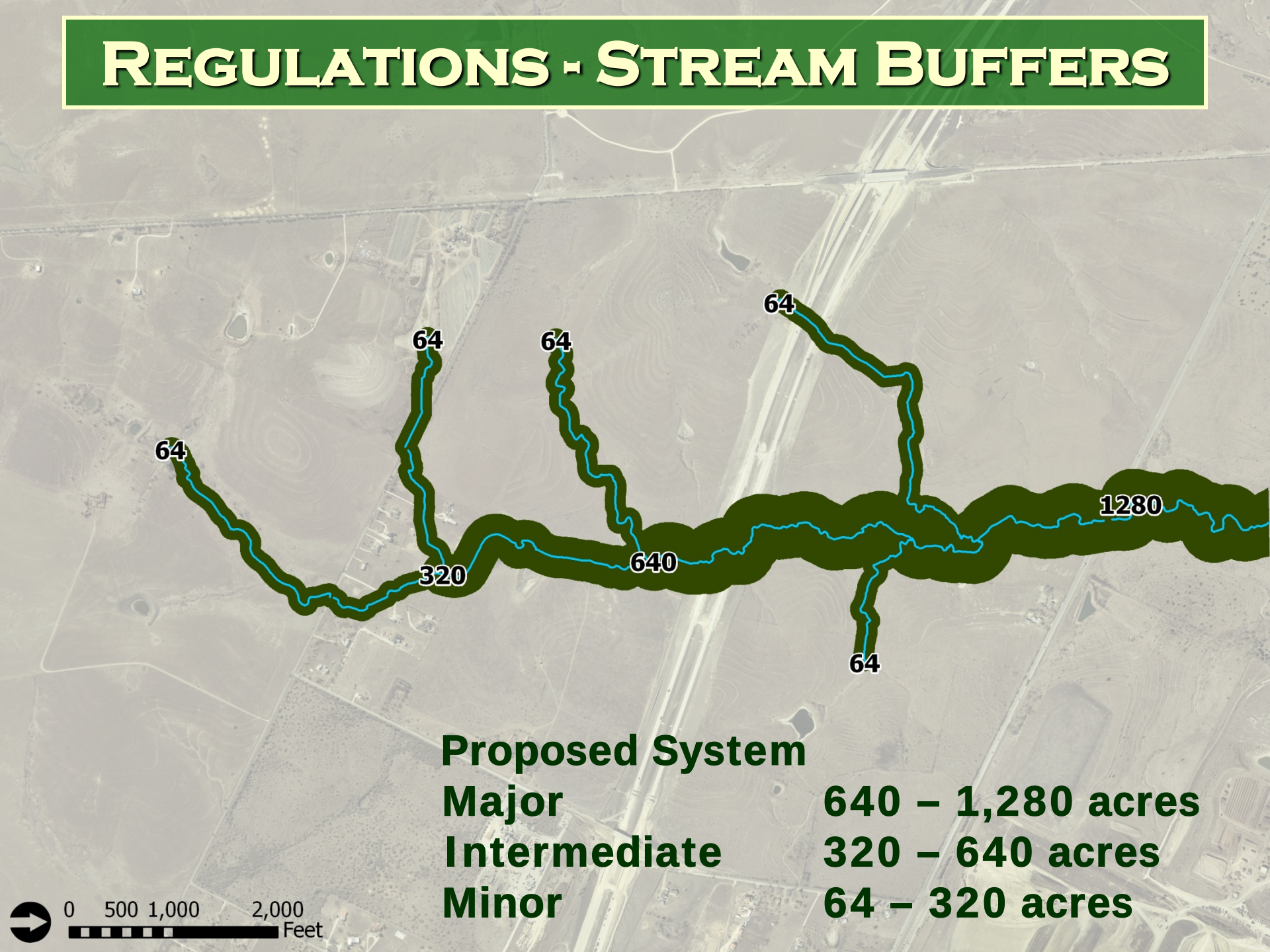
Sustainable Stream Management

- Regulations
- Intervention - Restoration Projects
- Maintenance
- Monitoring w/ Adaptive Management

City of Austin Watershed Regulations

- **Impervious Cover Limits**
- **Stream Buffers**
  - Critical Water Quality Zones
  - Floodplain Protections
  - Erosion Hazard Zones
- **Stormwater Management Controls**
  - Water Quality Volume
    - *Austin Sand Filter, Vegetated Filter Strip, Retention-Irrigation, Biofiltration, Rain Gardens, Wet Ponds, Extended Detention, etc.*
  - Flood Detention (Peak Flow Control 2 – 100-year)
- **Function Based Channel Design Criteria (Floodplain Modifications)**
  - (in progress – lead by example)

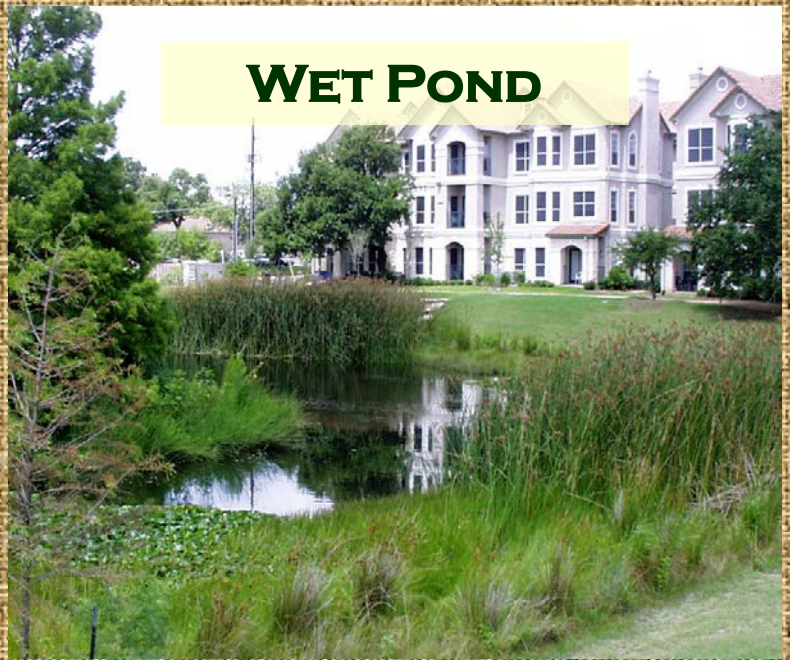
Regulations - Stream Buffers



Proposed System

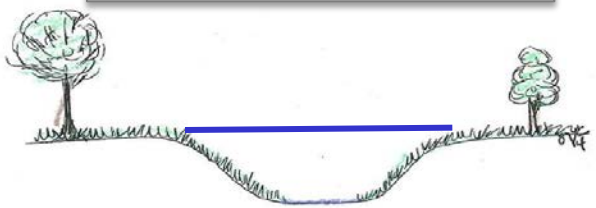
Major	**640 – 1,280 acres**
Intermediate	**320 – 640 acres**
Minor	**64 – 320 acres**

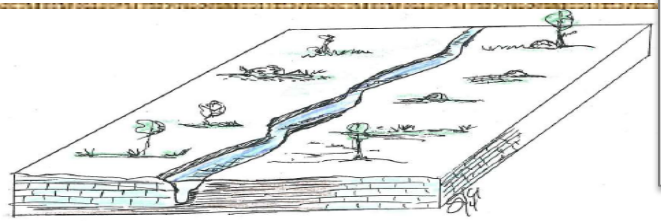
Regulations - Water Quality Volume



Regulations - Channel Design Criteria

Level 1

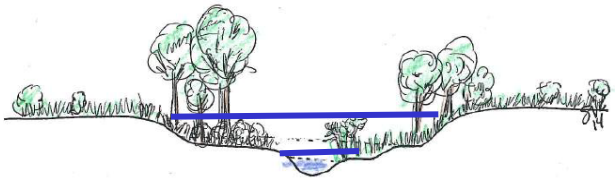


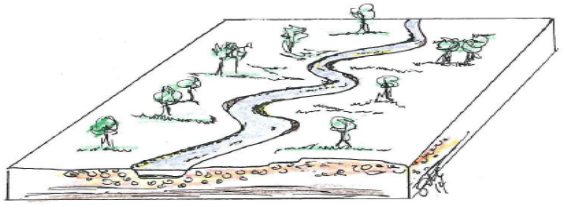


Design Layers

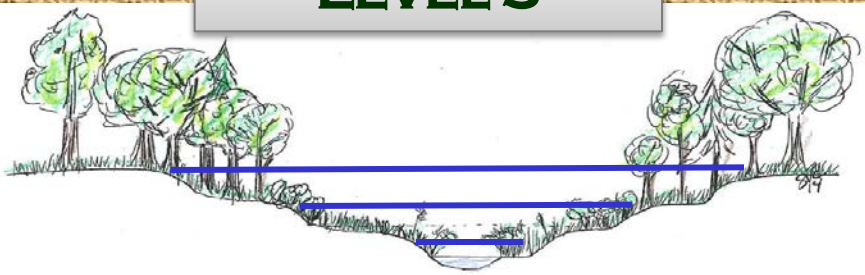
- Channel Form
- Boundary Material
- Canopy/Understory
- Habitat Structure

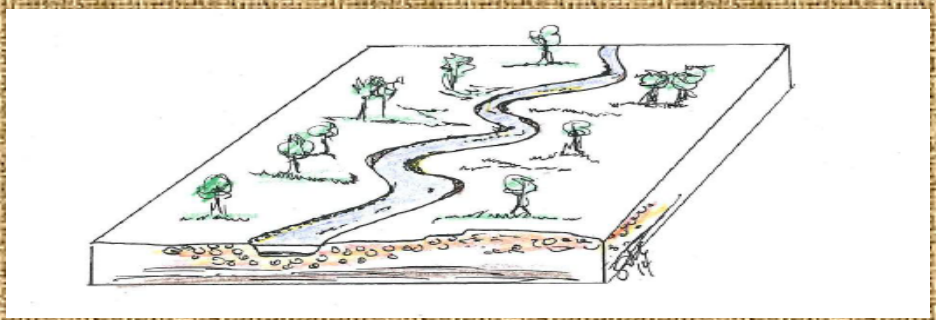
Level 2





Level 3





Stream Restoration Projects

- **Active Restoration**
  - Practices that involve in-channel or floodplain construction
    - Stream Restoration/Rehabilitation
    - Bank Stabilization
    - Grade Control

- **Passive Restoration**
  - Nonstructural practices that remove stressors and allow for more natural recovery with minimal intrusion
    - Property Buyouts
    - Remove Grazing and Agriculture
    - Vegetation Management and Grow Zones (Buffers)

Stream Restoration Project Types

Wilderness

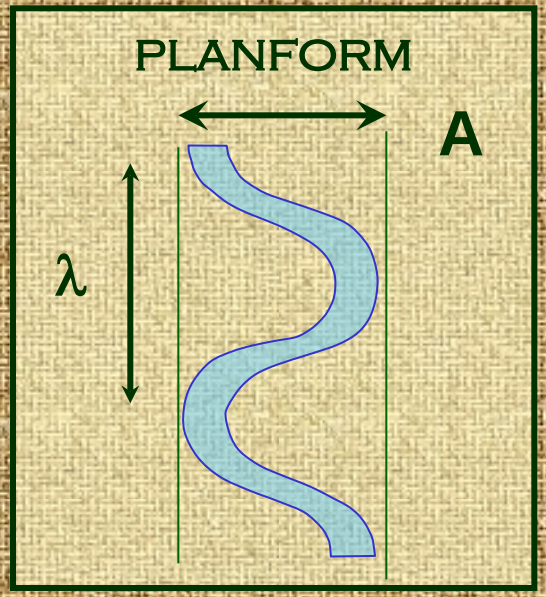
Passive ***Active***

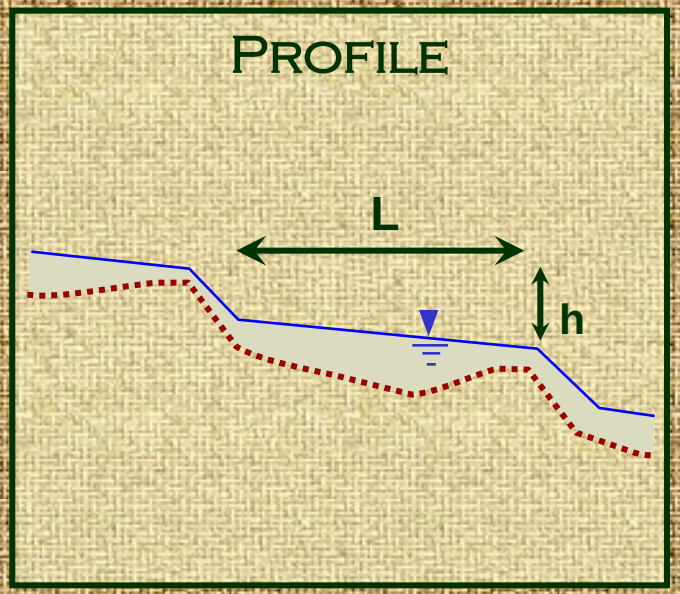
Self Heal ***Surgery***

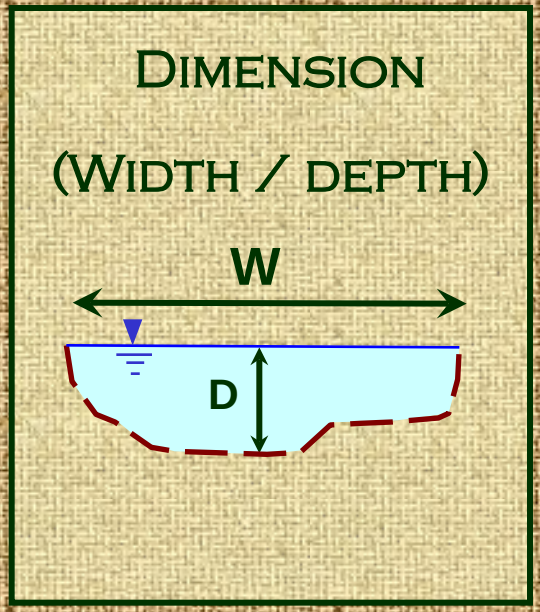
Urban

???

Active Restoration
Modes of Channel Adjustment

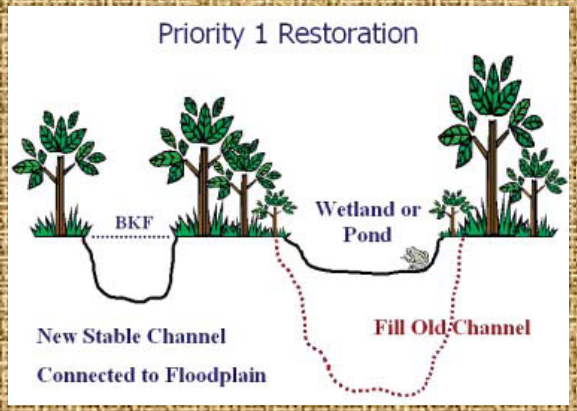


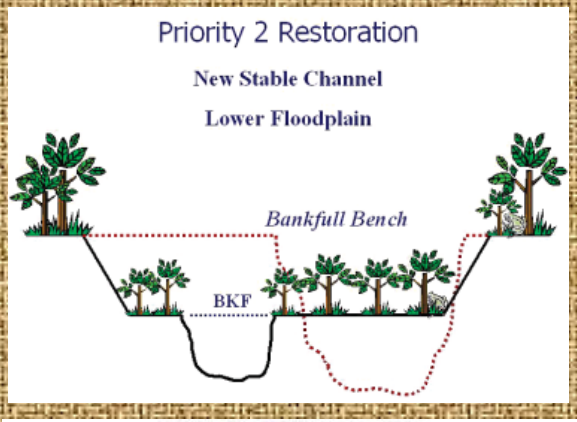




Many Degrees of Freedom

Active Restoration (Dimension)





Priority 1: Fill Channel

- Requires modifications to energy slope or armoring to reduce sediment transport potential.
- Floodplain increase considerations

Priority 2: Create Inset floodplain

- Requires significant excavation and impact to adjacent resources (trees, infrastructure)

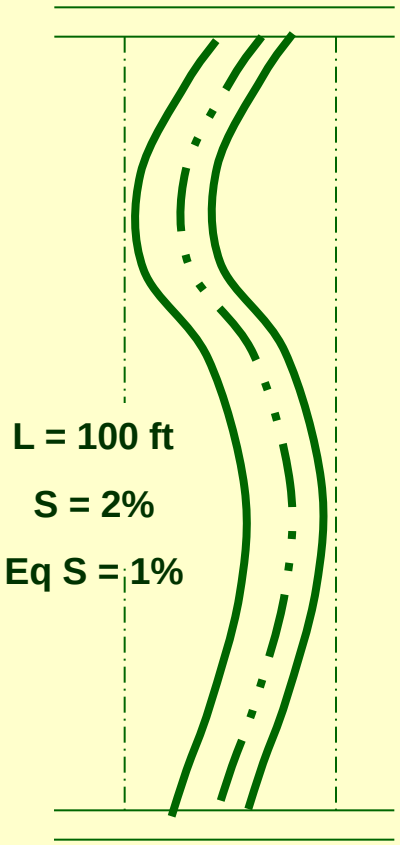
Priority 3: Bank Grading/Widen Channel

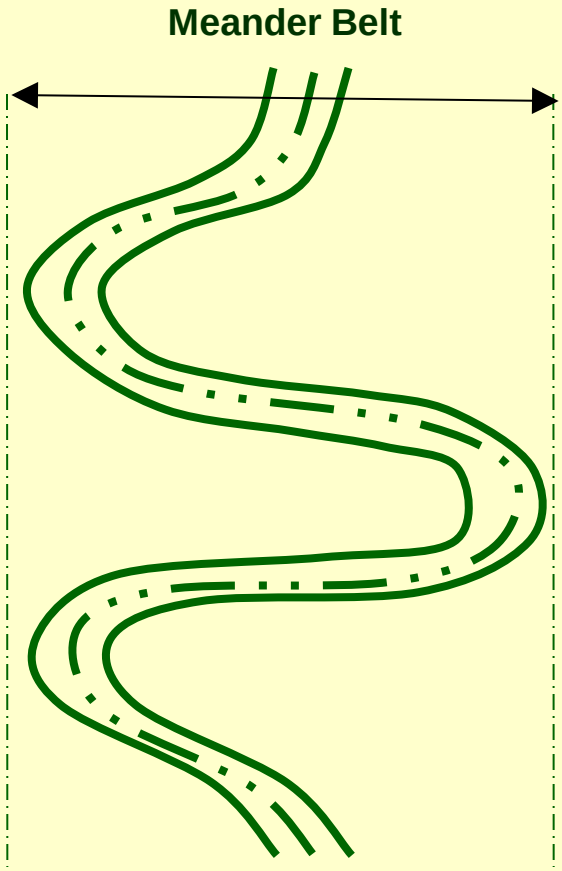
- Minor bank grading, benching or creation of inner berms

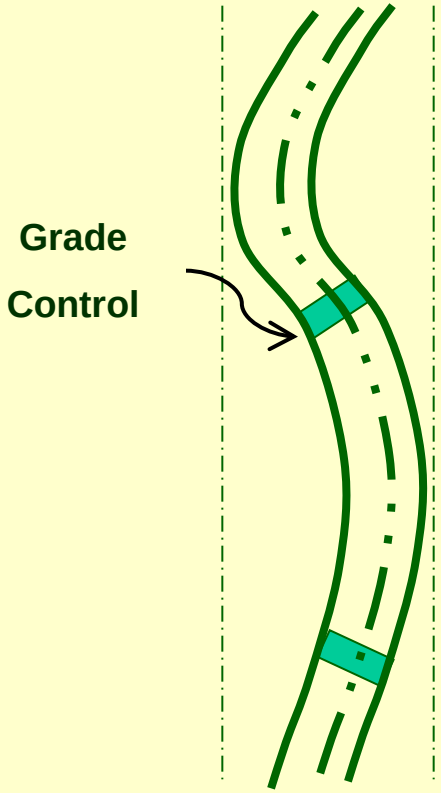
Priority 4: Stabilize in-Place

Active Restoration (Slope)

Existing Unstable Channel	Meandering (Priority 1 & 2)	Grade Control (Priority 3 & 4)

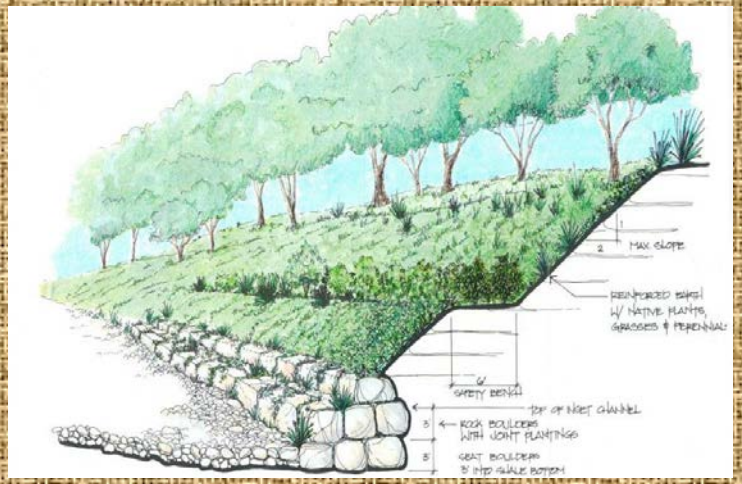




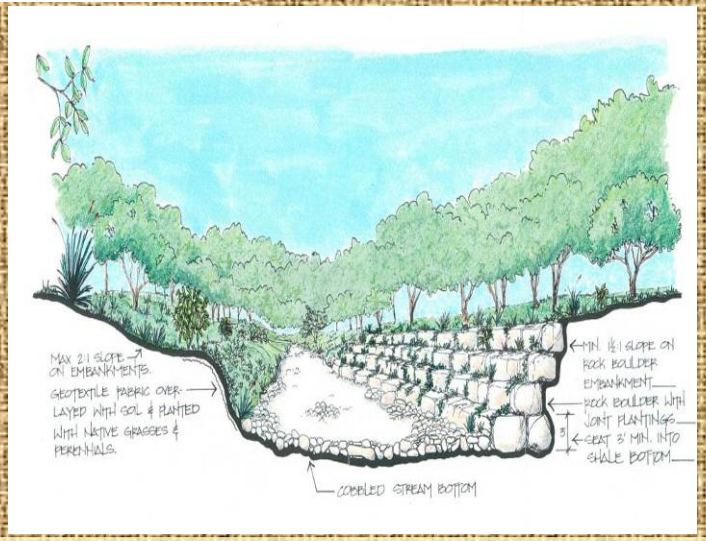


Active Restoration
Bank Stabilization Techniques

Vegetated Graded Slopes

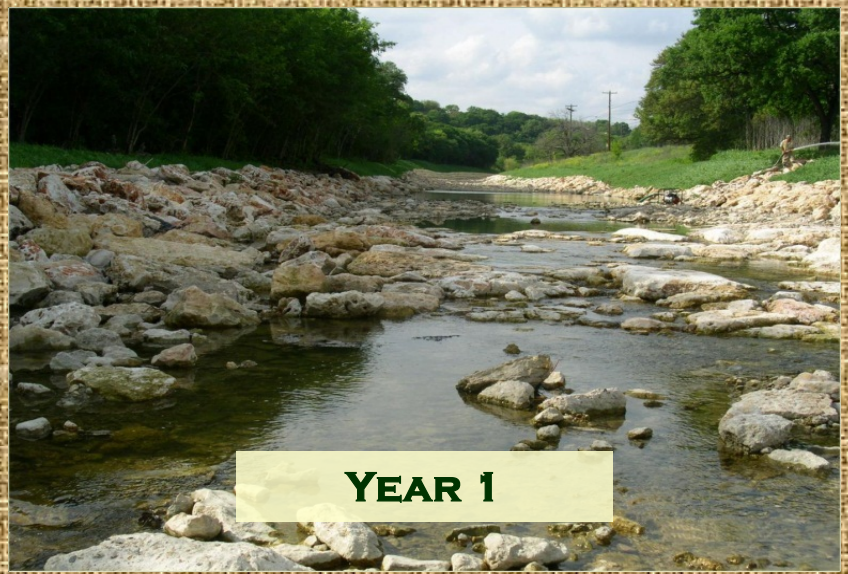


Natural Limestone Boulder Toe with Vegetated Upper Slopes



Natural Limestone Boulder Wall

Active Restoration (Before-After)

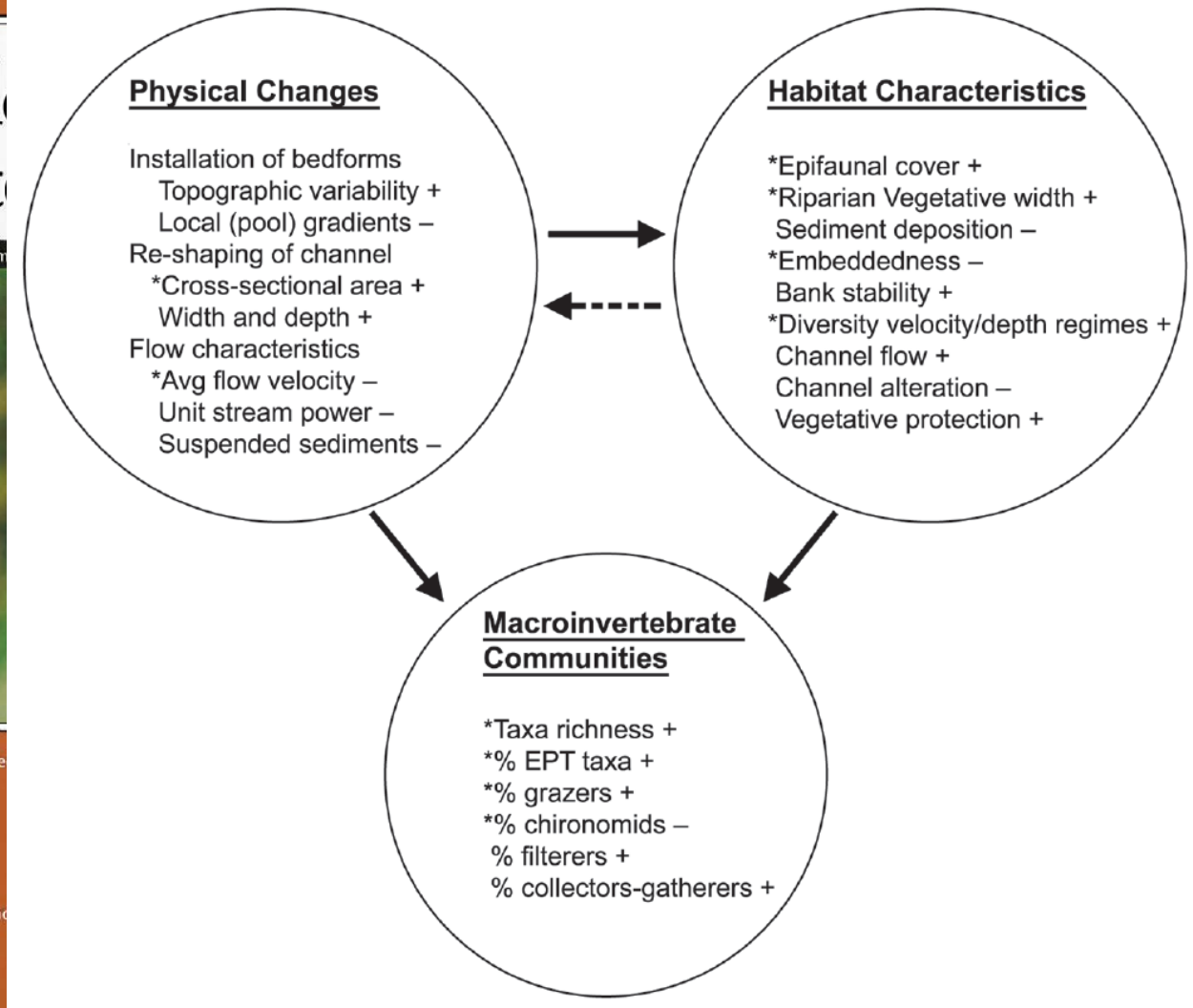


Natural & Minimal Maintenance

Passive Restoration (Before-After)

Natural & Minimal Maintenance

Ecological Benefits



Summary

Sustainable stream management in the City of Austin is accomplished through

- protective **regulations** for new developments
- **restoration projects** (passive & active)
- strategic **maintenance** practices and **monitoring** with **adaptive management** to provide functional riparian zones and reduce safety hazards.


I like it
natural
…


Thank You