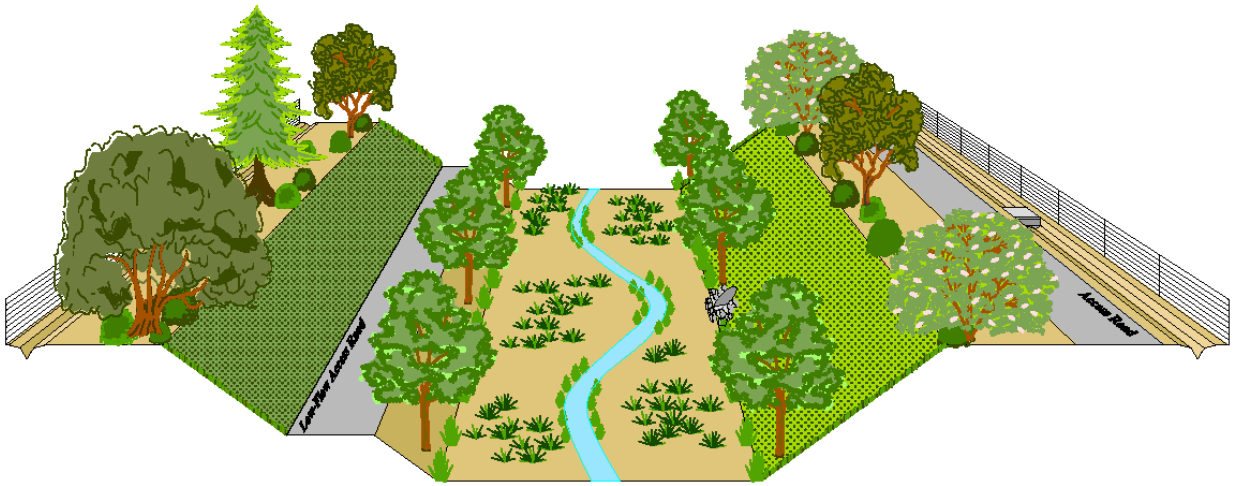
Sonoma County Water Agency
Stream Maintenance Program

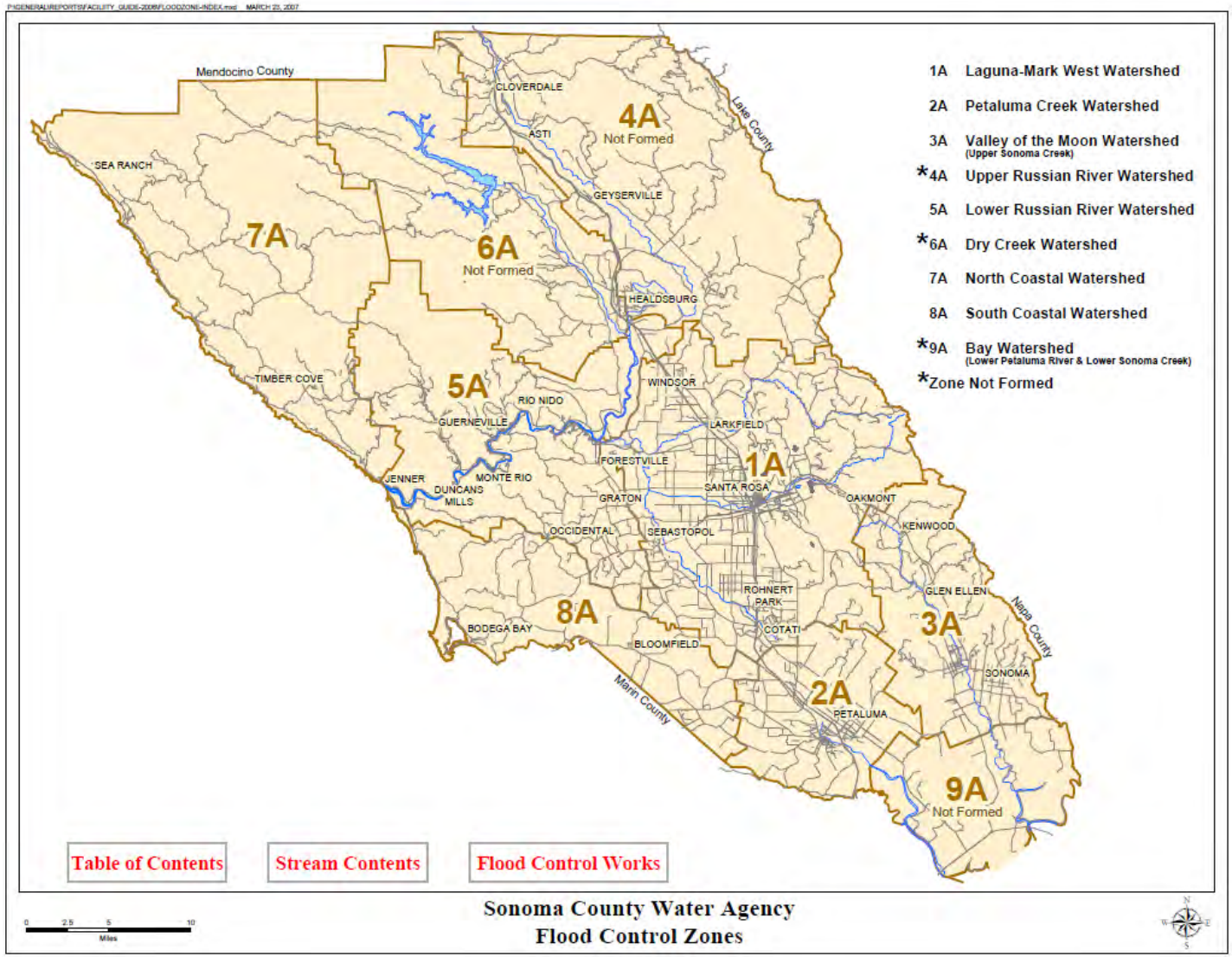
Informing Vegetation Management

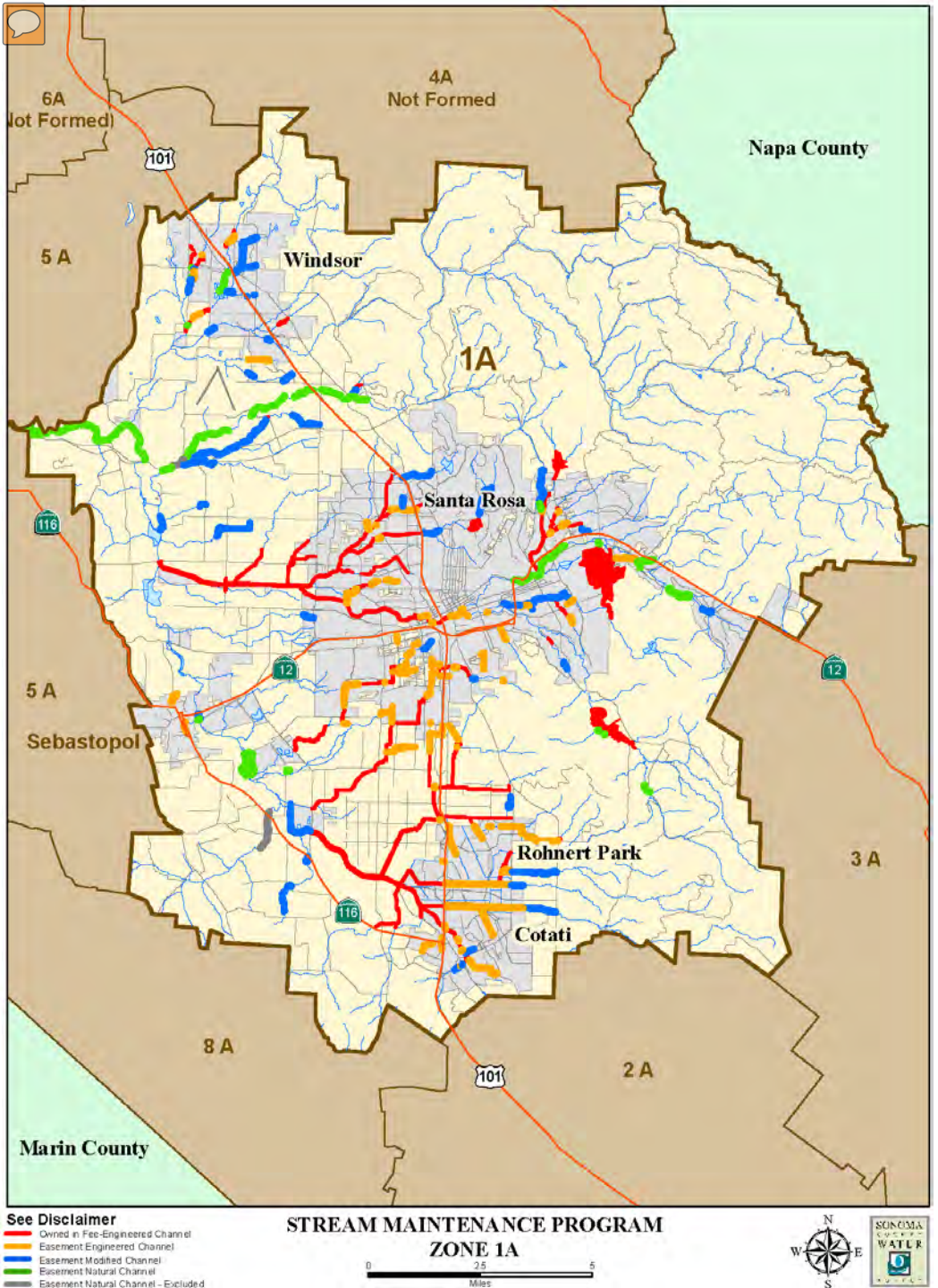


May 18, AEP San Francisco Bay Area

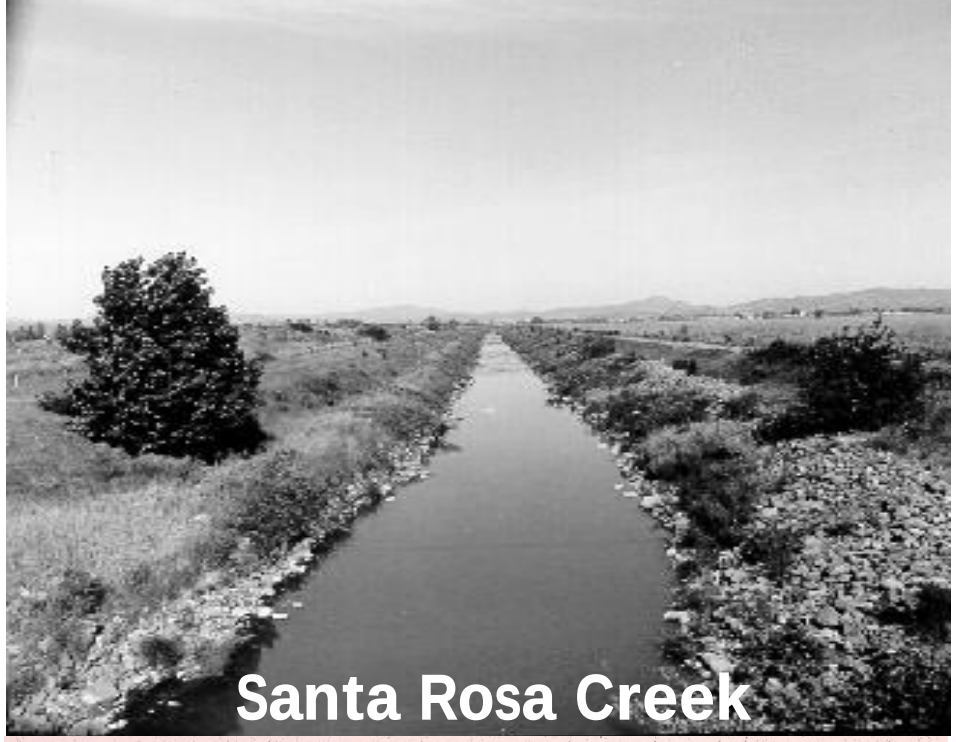
Sonoma County Water Agency Stream Maintenance Program

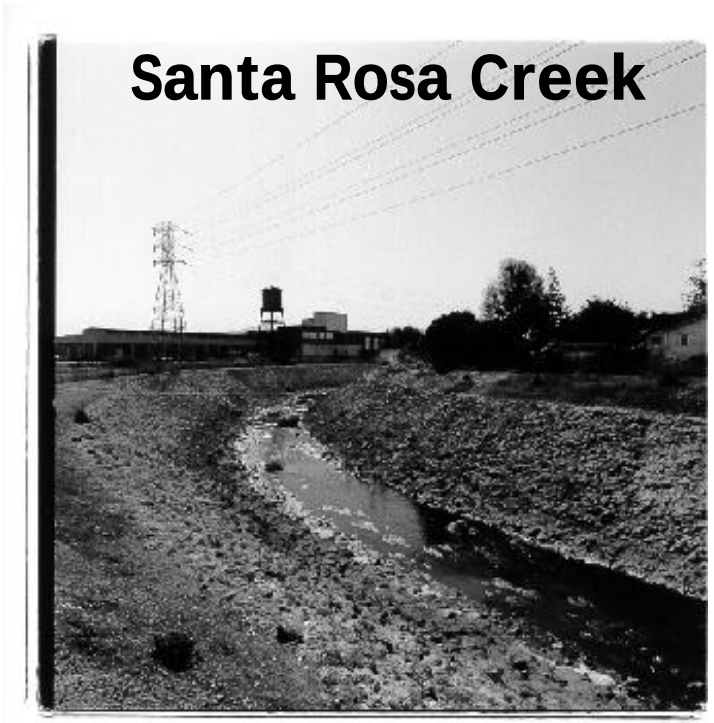
- 75 miles of engineered flood control channels
- 150 miles of natural channel easements
- Central Sonoma Watershed Project
  - Channels
  - Reservoirs



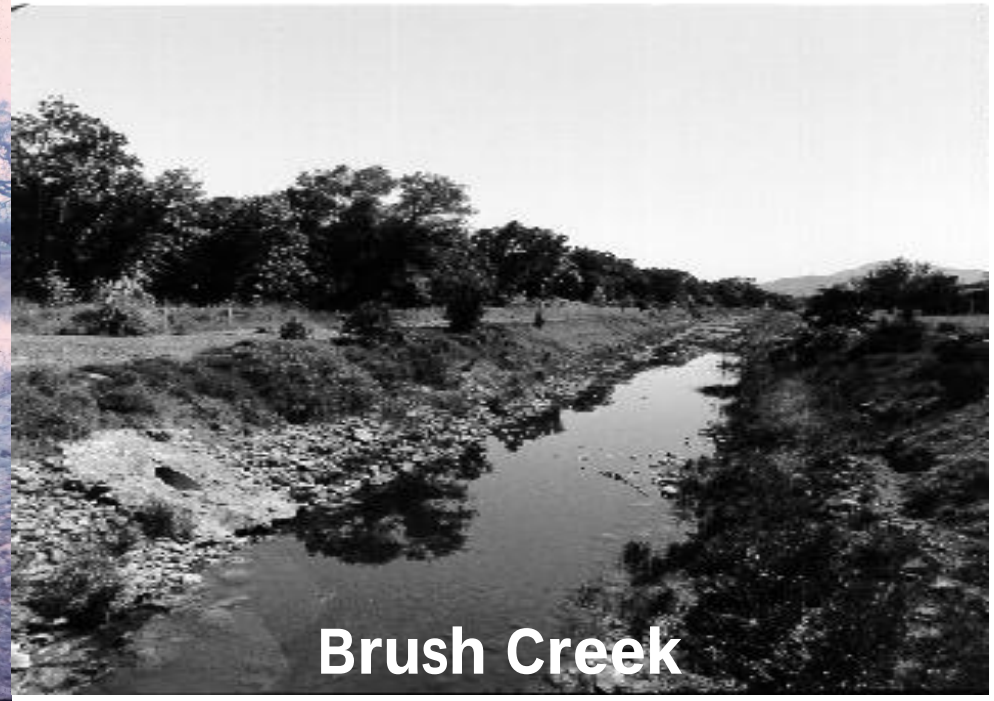


Forestview Creek


Santa Rosa Creek


Santa Rosa Creek

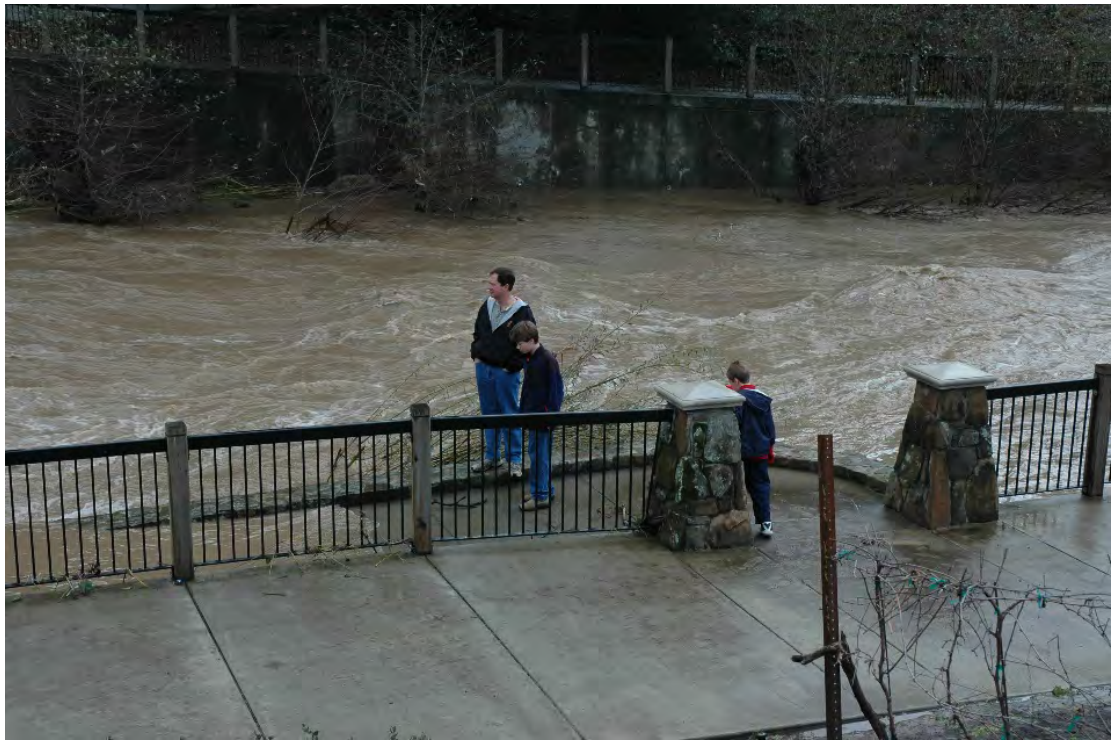

Santa Rosa Creek


Brush Creek

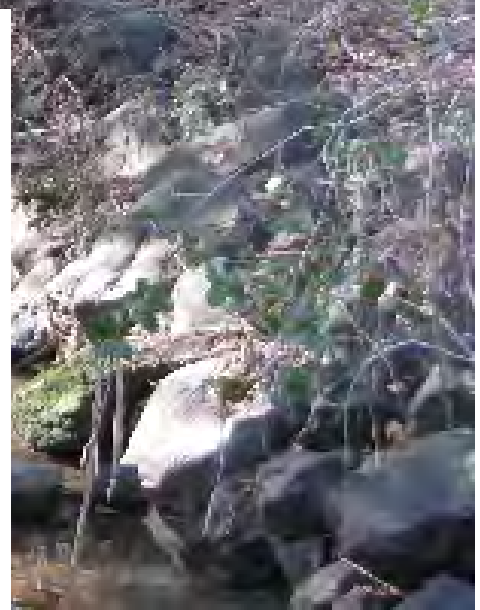
Historic Vegetation Management

Facility Constraints

- Depositional channels
- Crossings and culverts often control hydrology
- Largely urban land use
- Work occurs only in easements
- Ponded and perched systems
- Linear trails/parks, access and pedestrian safety
- Require regular mowing for fuel reduction (fire)
- Homeless encampments



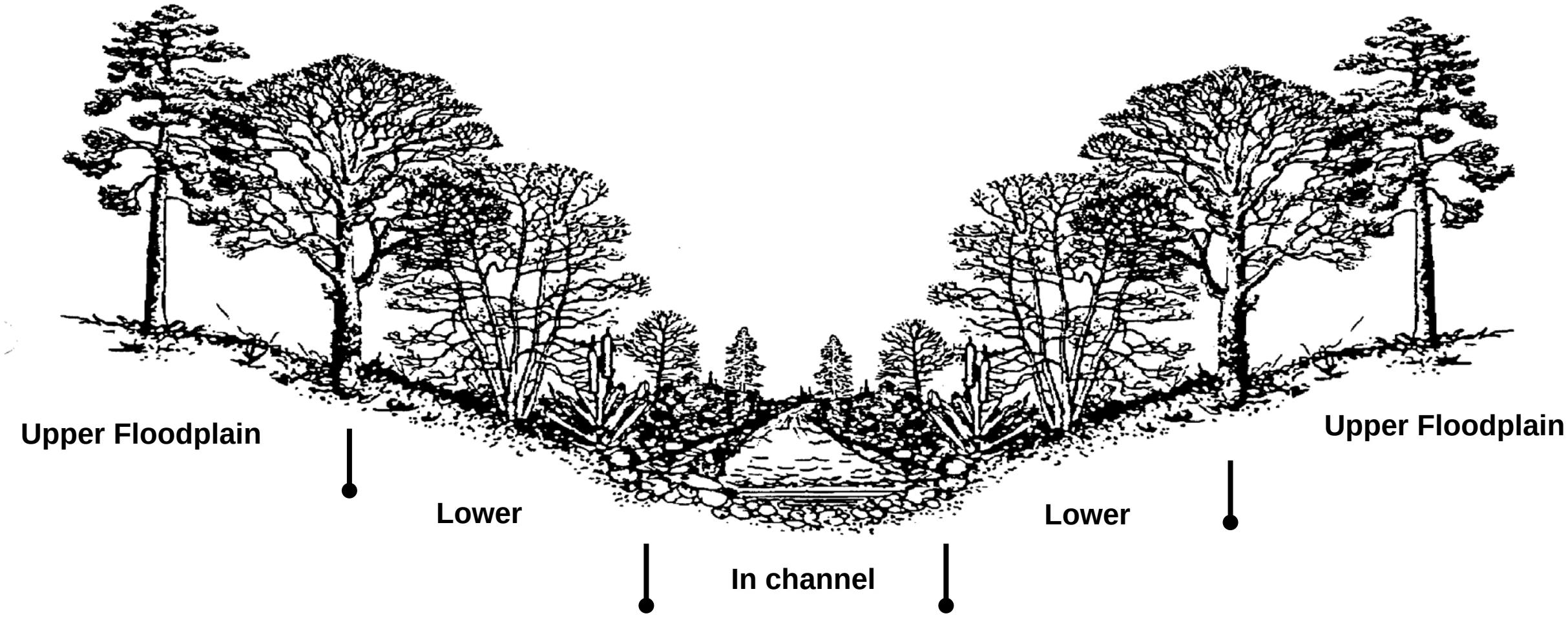
Multiple Goals of Vegetation Management



- Preserve flood protection capacity
- Improve habitat and water quality conditions
- Maintain public safety
- Reduce frequency of required maintenance
- Monitor stream conditions & maintenance needs
- Develop watershed partnerships

Inherent Principles of Vegetation Management

- Species selection and location are key for success

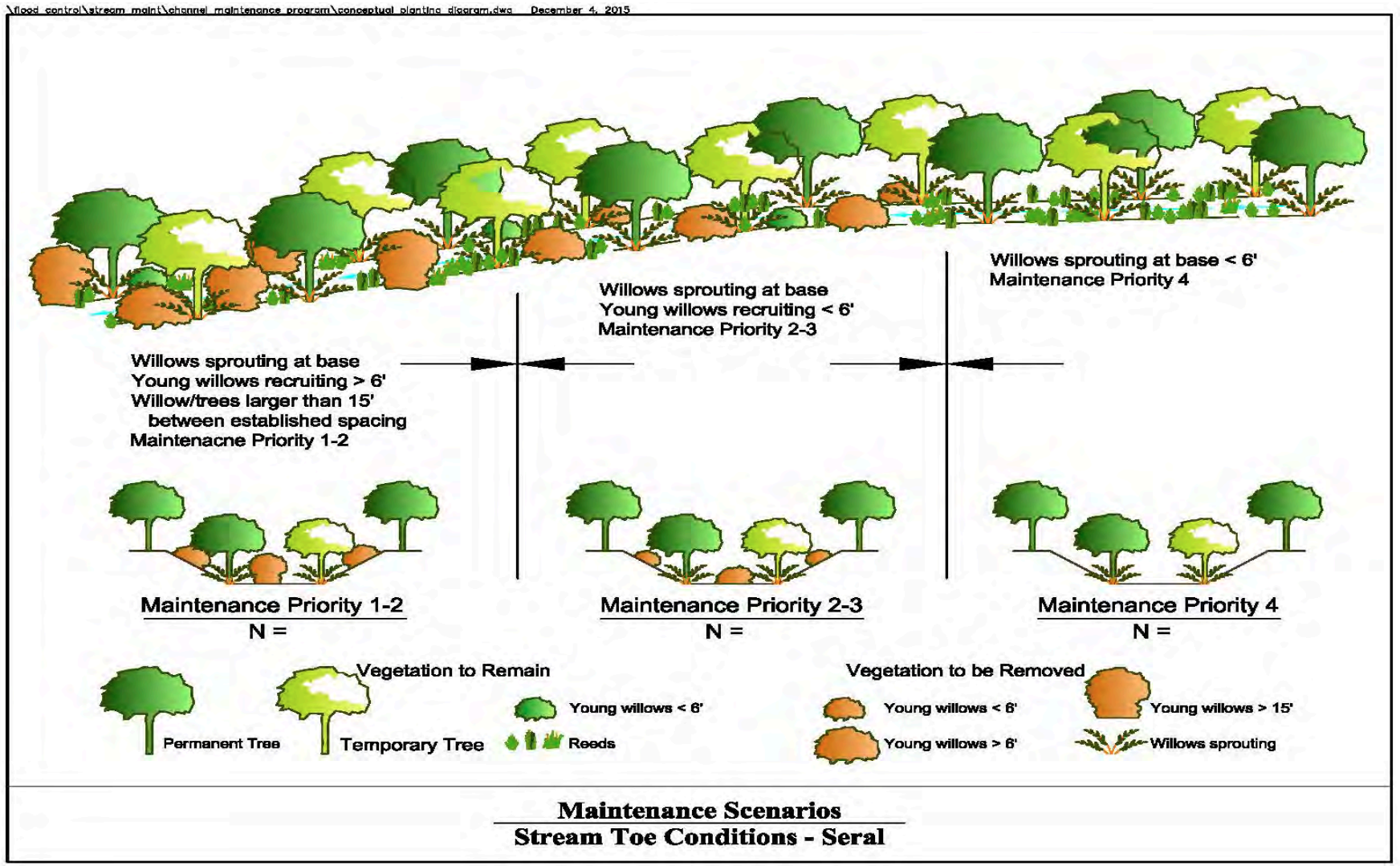


Inherent Principles of Vegetation Management

- Shade reduces in-stream vegetation density

Inherent Principles of Vegetation Management

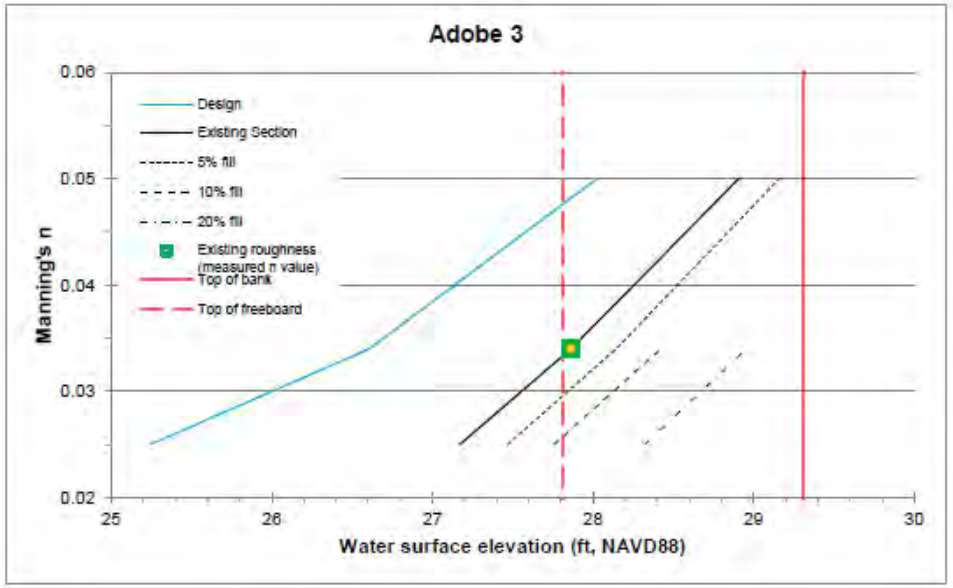
- Channel restoration is a successional process

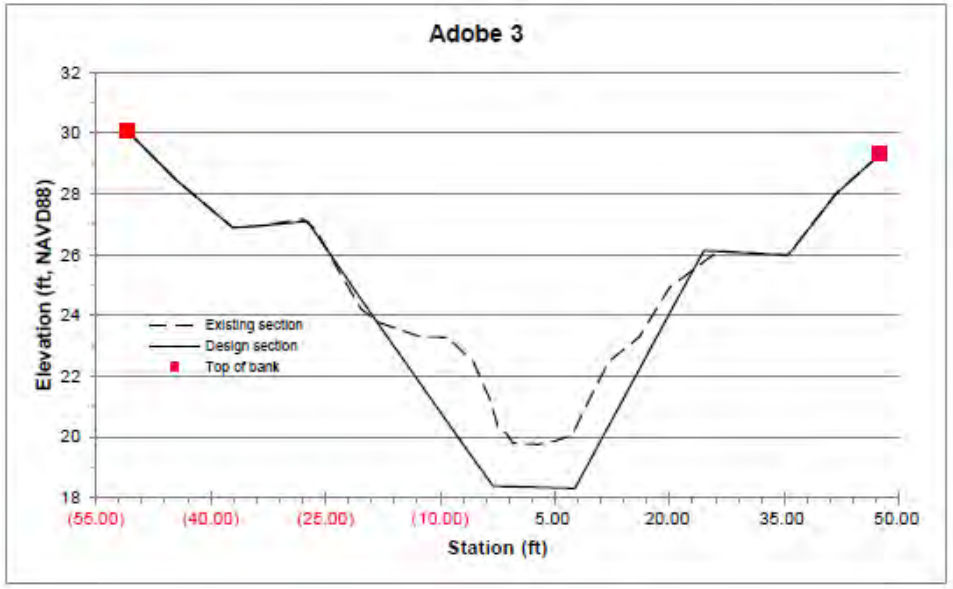


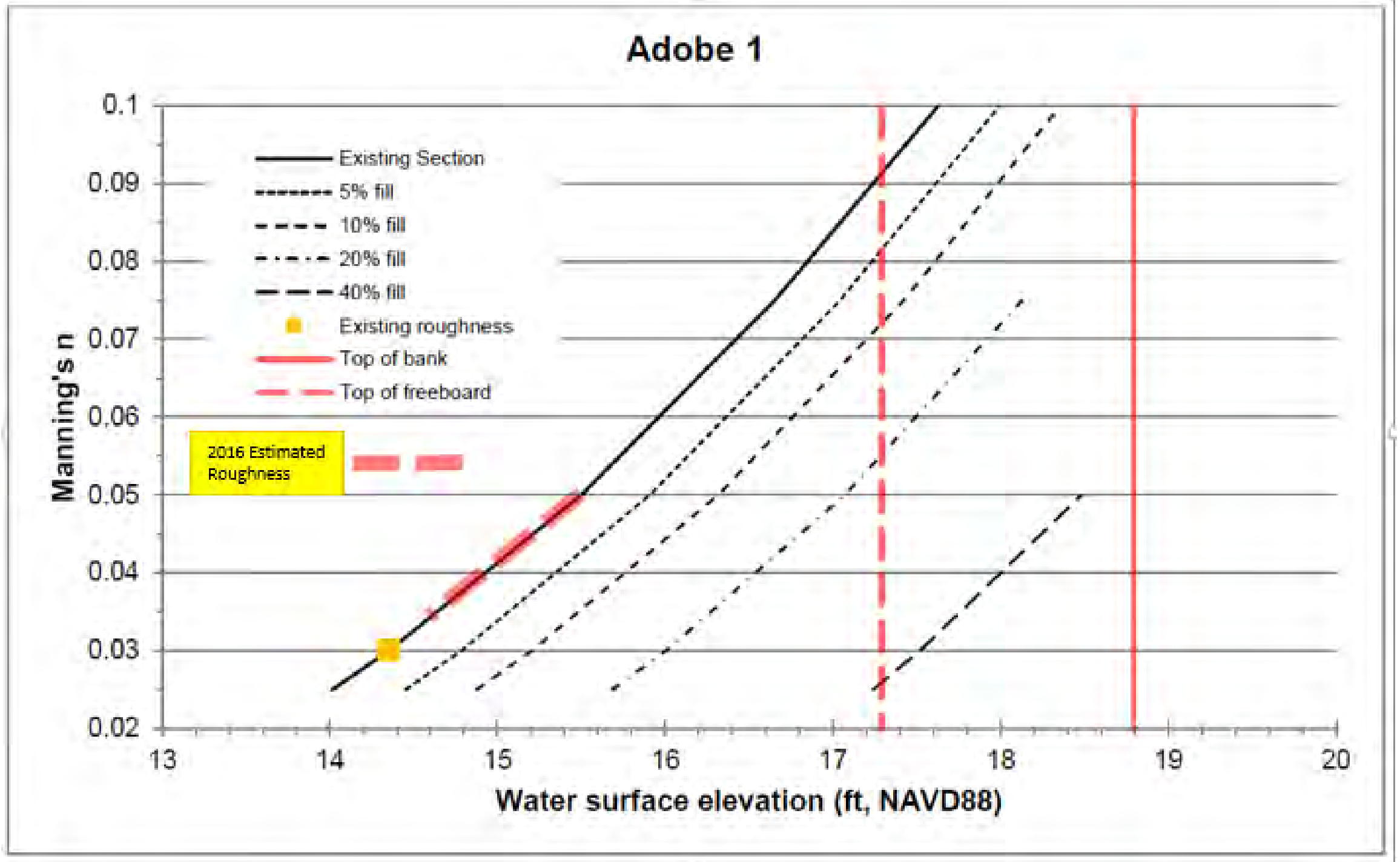
Inherent Principles of Vegetation Management

- Use species that provide structure in the summer but lay down in the winter

Developing Channel Maintenance Objectives



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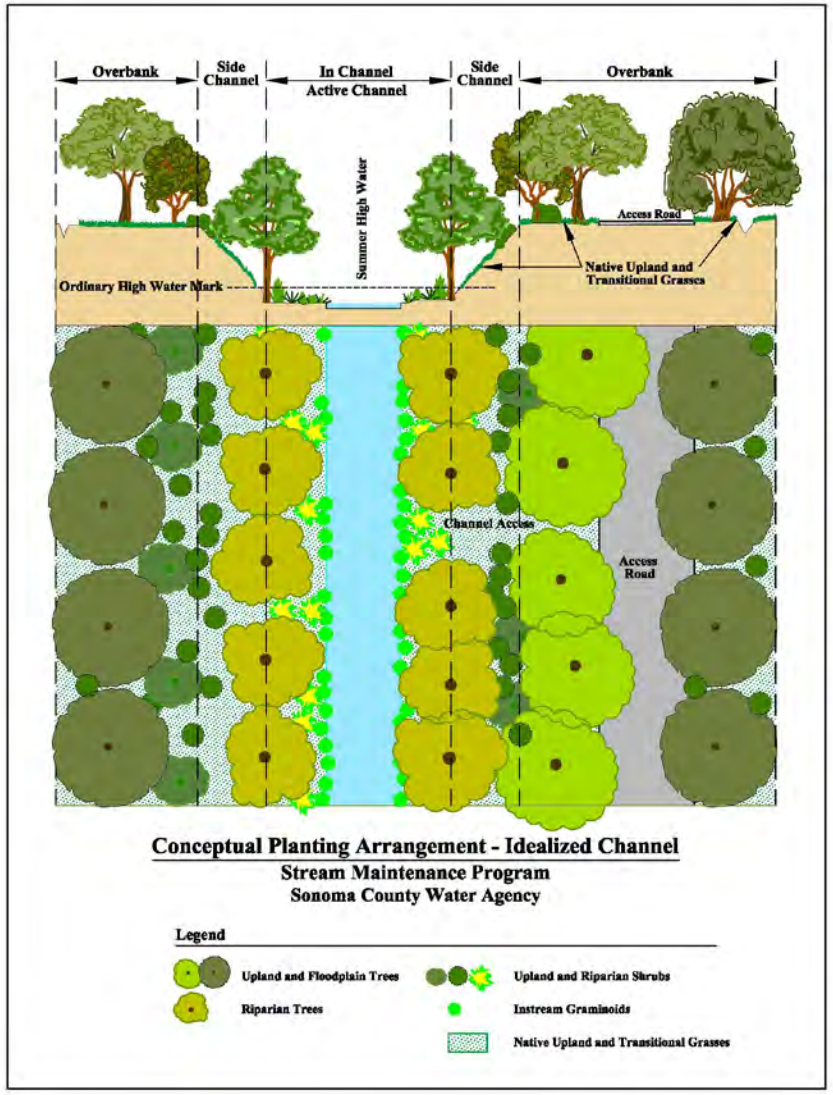
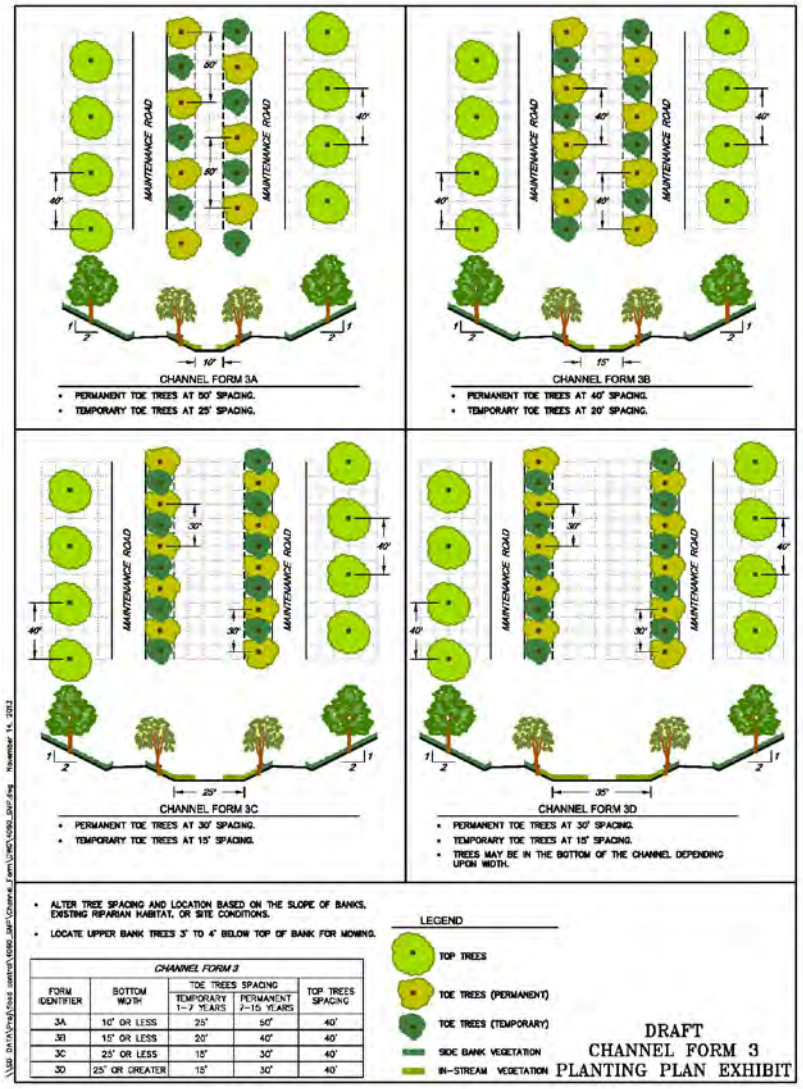
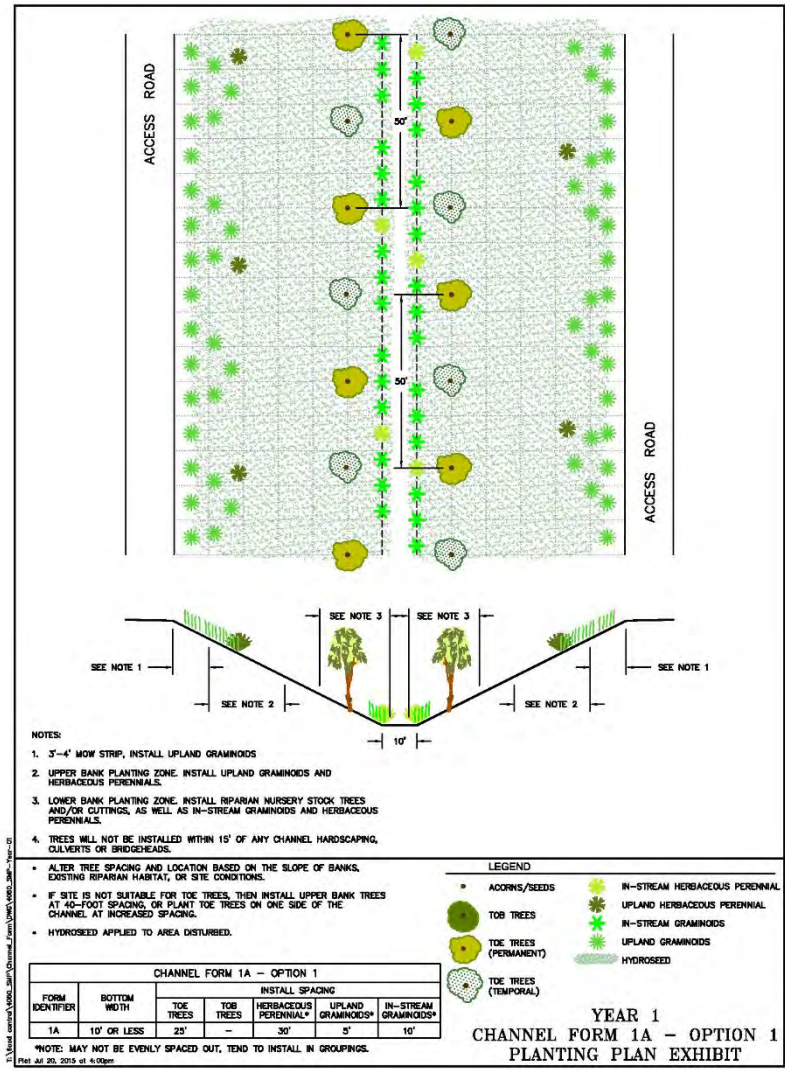
19
20
Water surface elevation (ft, NAVD88)
Existing Section
5% fill
10% fill
20% fill
40% fill
Existing roughness
Top of bank
Top of freeboard
2016 Estimated Roughness

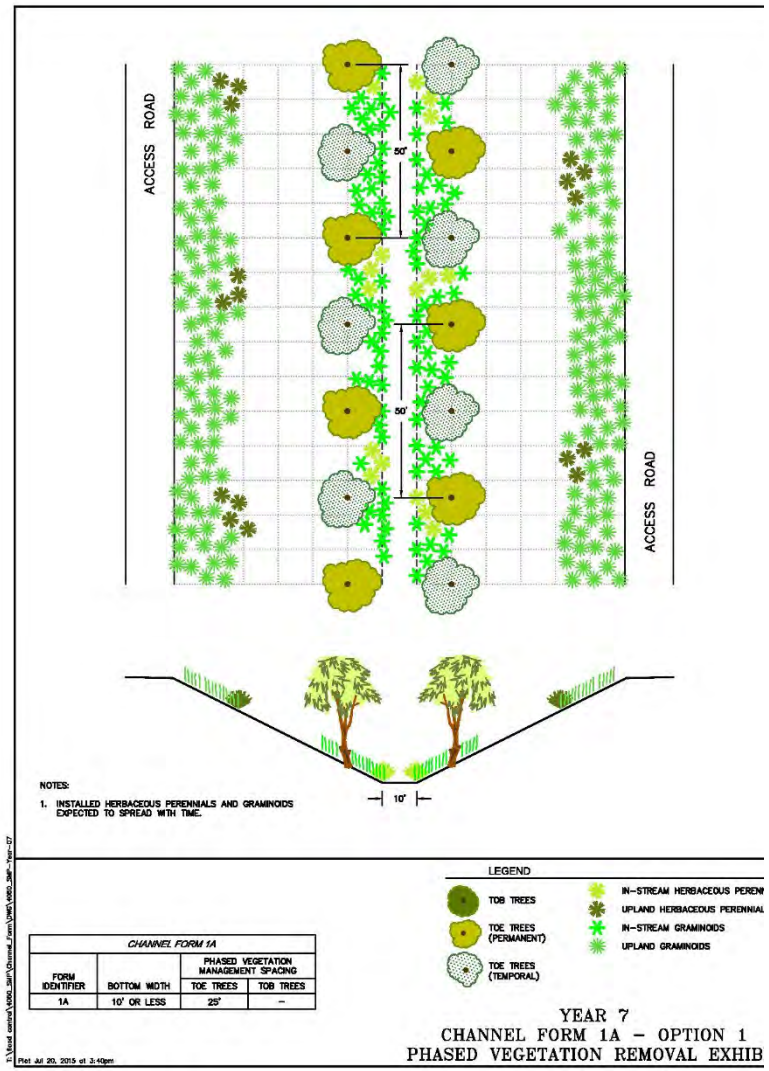
Developing Successional Planting and Clearing Templates

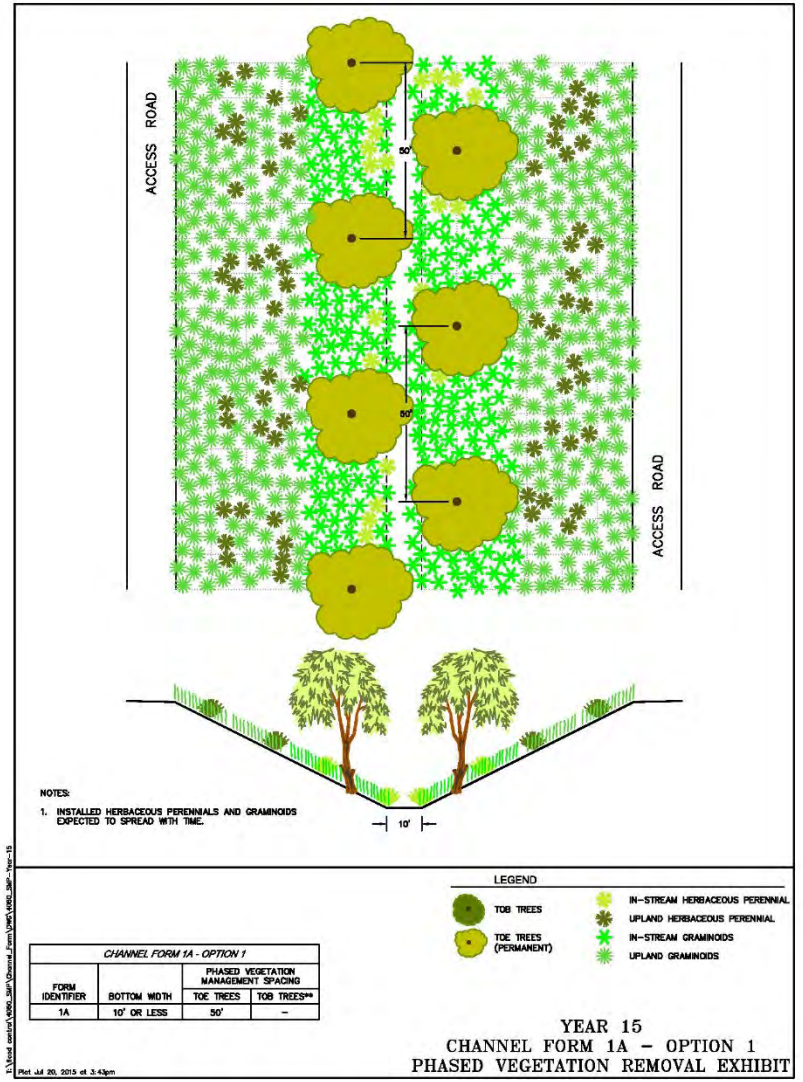




Planting (and Clearing) Templates







Quantitative vs Qualitative Management

- Channel Assessments
- Roughness Estimates/Modeling
- Maintenance Objectives
- Climate Record
- Sediment Budget
- Planting Templates
- Species Selection
- Management Techniques
- Facility Condition

- Aesthetics
- Public Safety
- Preserving Sight-Lines
- Recreational Opportunities
- Assessing LWD/Blockages
- Retaining Trees
- Managing Complexity
- Professional Opinion

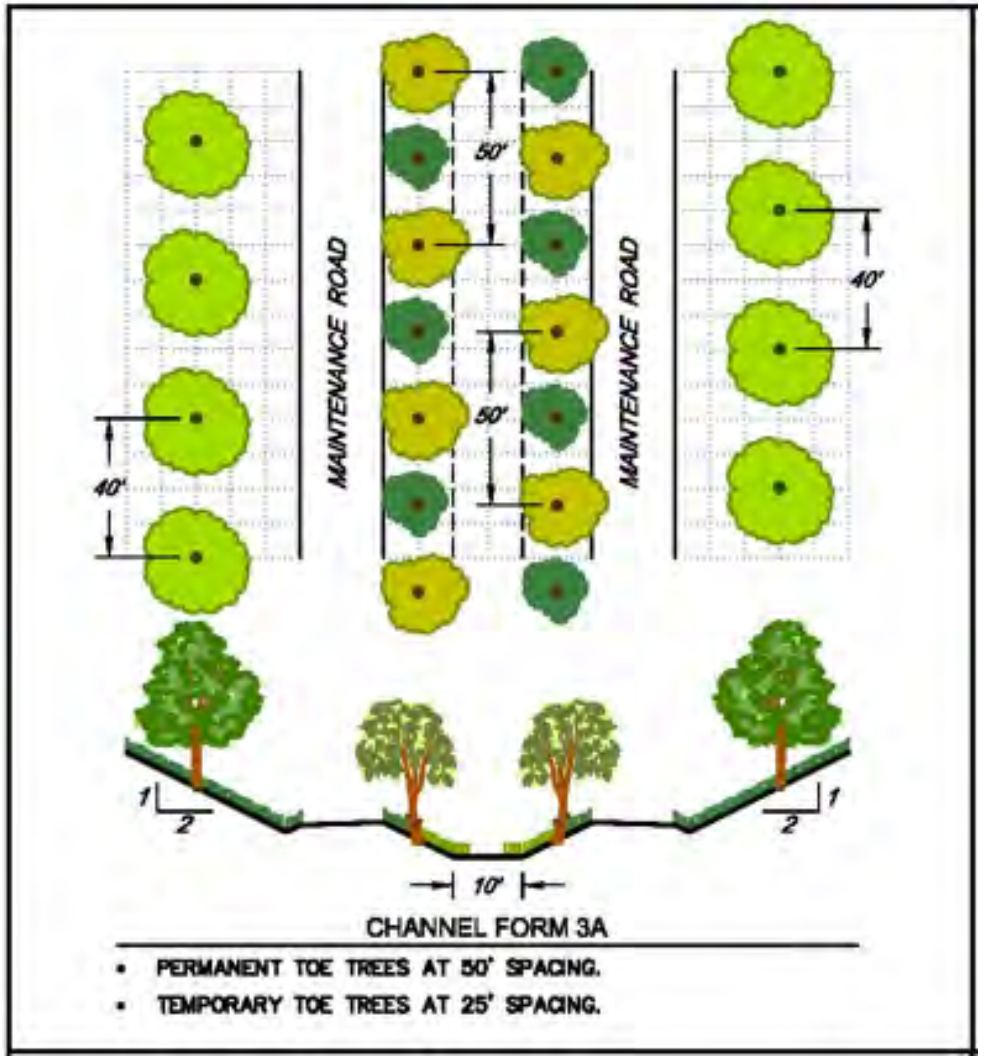
Work Need-Quantitative Triggers for Vegetation Management

- Deviation from Template “target trees”
  - Facility out of compliance with template
  - Trees recruiting between permanent trees
  - Sprouts at base of target trees
  - Successional trees thinned when canopy overlaps
- Roughness estimates
- Sprouts at base of tree
- LWD and debris blocking bankfull dimension
- Diameter at Breast Height (DBH) and other forest metrics-basal area, density, etc.

Work Need-Qualitative Triggers for Vegetation Management

- Vegetation is dead or dying
- Vegetation growth is significantly decreasing flood conveyance capacity, particularly where infrastructure or adjacent properties are at risk
- Fall hazards
- Vegetation is causing erosion in-channel
- Invasives are reducing native recruitment
- Decision to retain saplings
- Vegetation may cause a channel breakout
- Vegetation is creating significant scour
- Public Safety- sight-line clearance
- Fence line clearing

Planting and Clearing Templates



Establishing Canopy

- Target Trees vs Successional Trees
- Retaining saplings for future
- Thin by half between 5-7years

Maintaining Canopy

- Retain target trees, plan for future recruitment
- Integrate with Objectives
- Manage Diameter at Breast Height < 3’

Closing the Canopy

(Santa Rosa Creek)

1993

2005

2007

2012

Corona Creek: 2007 to 2016

Manage instream and upper bank Habitat with Aggressive Native Competitors

Plantings are designed to displace undesirable “sedimentation encouraging” species and/or respond favorably to periodic mowing and clearing.

Use native species to create a “Temporal Forest”

Plant herbaceous warm season perennial natives, these species lay down or break off in winter during high flows.

Re-purpose existing vegetation to the benefit of habitat

Manage density of trees in-channel, sidebank, and upper bank by pruning to renew brushy sub-canopy

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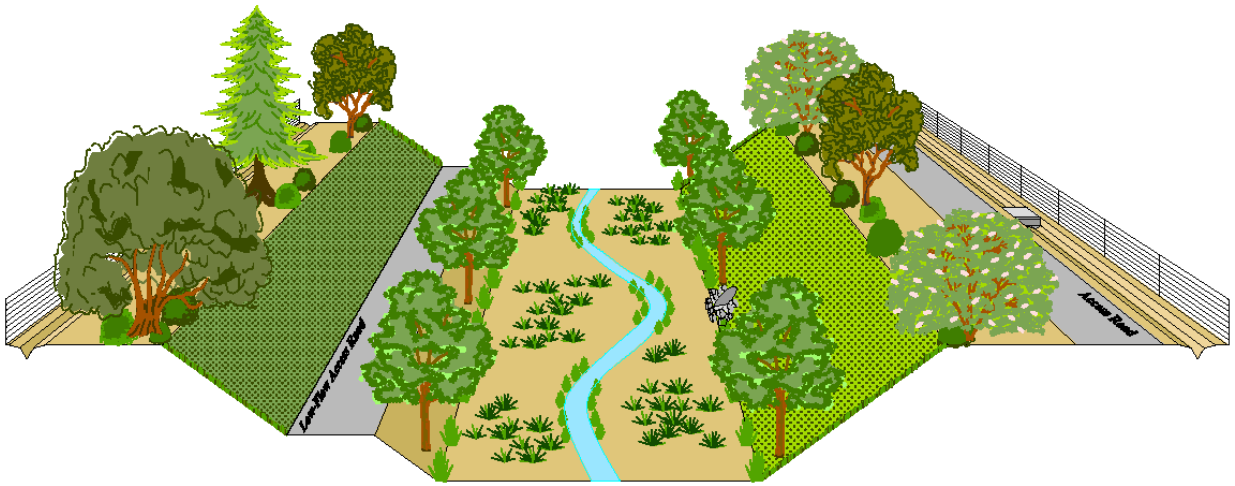

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