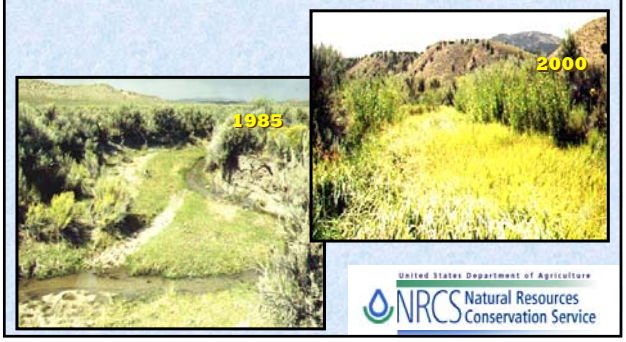
Keys to Successful Streambank Soil Bioengineering



United States Department of Agriculture
NRCS Natural Resources Conservation Service

Plant Person after trying to explain plants and how they fit into designs to engineers, geomorphologists, hydrologists, and others.

Can you use Soil Bioengineering Treatments in Dry and/or Wet areas?

- Drier areas are tougher to establish
- Principles are very similar for both precipitation areas
  - Need accurate inventory
  - Need proper prior planning
  - Need to pay attention to details
- Wetter areas are more forgiving
  - Until a drought
  - Until a flood
  - Or another event that changes the parameters used for the original planning

Successful Establishment Of Vegetation In Soil Bioengineering Treatments depends on:

- Understanding your stream
- Accurate Planning
- Reconnaissance
- Selection of species and species type
- Handling
- Establishment techniques
- Monitoring and Maintenance

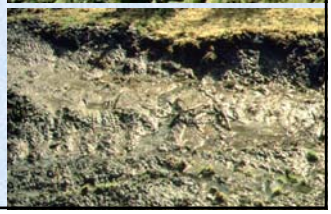
Success of the Project is dependent on the complete integration of these steps.....

INVENTORY

- Objectives and Goals
- Is Management in Place?
- Soils data
- Watertable history
- Stream Flow data
- Reconnaissance
- Are woody plants in the Vicinity?
  - If not, planting them may not be an option!

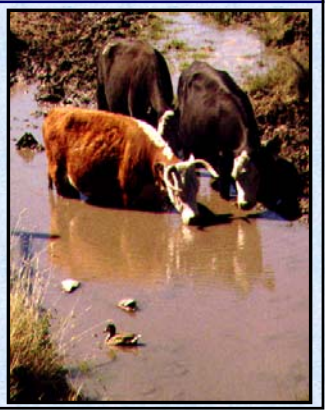
INVENTORY CONSIDERATIONS

- Soils
  - Texture, Layers, Chemical, Limiting factors, etc.
- Climate
  - Precipitation, hardiness zone, etc.
- Water
  - Water table history, low water level, stream gage data, timing of runoff , diversions, dams, etc.



INVENTORY CONSIDERATIONS

- Poor Livestock Grazing Management
- Big Game Wintering Range
- Poor Farming Practices
- Lack of Buffers



INVENTORY CONSIDERATIONS

- Beaver and Muskrat Activity
- Watershed size
- Vertical to near vertical streambanks
- Stream Flow Velocities

INVENTORY CONSIDERATIONS

- **Amount and seasonal availability of water**
  - **Long term survival**
  - **Range of adaptation**
- **Regional extremes of temperature**
  - **Limits range of adaptation**
  - **Mean temps vs. extremes**

INVENTORY CONSIDERATIONS

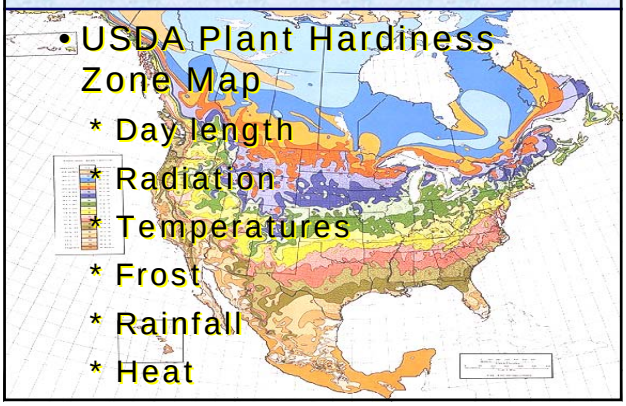
- Elevation
  - * High Elevation to Low
    - – High success
    - – Match the Soils
    - – Match the Moisture Regime
  - * Low Elevation to High
    - – Poor success
    - – Physiological cycle
    - – Shorter growing season

INVENTORY CONSIDERATIONS

- Latitude
  - * Local Native Collections are the best!
  - * Collection distances
    - – No more than 100-200 miles in latitude from the planting site

INVENTORY CONSIDERATIONS

- USDA Plant Hardiness Zone Map
  - * Day length
  - * Radiation
  - * Temperatures
  - * Frost
  - * Rainfall
  - * Heat



Accurate Planning

- Concerns/Problems
- Goals/Objectives
- Existing Conditions
- Future Conditions
- Possible Actions/Tasks/Projects

DECIDING OBJECTIVES

- Wildlife Habitat (What is limiting?)
- Water Temperature and Fish Habitat
- Grazing: Low Palatability
- Aesthetics (Color, Size, Shape, Berries, etc.
- Bank Stability

PLANNING

- Is Management in Place?
- Soils data
- Watertable history
- Are woody plants in the Vicinity?
  - * If not, planting them may not be an option!

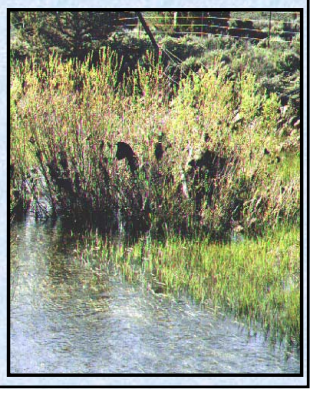
PLANNING

- Woody plants need a long time to establish
  - * Emergency Situations = Structures
- Visually Reconstruct the Area
  - * Compare project area with natural or reference area
  - * Risk of failure will increase as soil and watertable parameters depart from natural site!

Reconnaissance

SPECIES SELECTION

- Flexibility of Stems
  - * Creeping or Shrub type
  - * High water velocities
  - * High debris loads
  - * High Ice loads
- Different species have different growth and flexibility characteristics

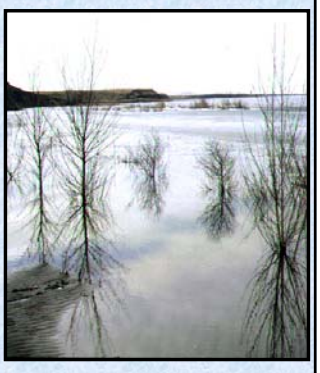


SPECIES SELECTION

- Grazing problems
  - ❖Low palatability species
  - ❖Strongly suckering species
  - ❖Rhizomatous vs. seed producers
- Severe Ice flows
  - ❖Deep rooting or Rhizomatous

SPECIES SELECTION

- Fire tolerance
- Aesthetics
  - * Size, shape, color
  - * Diversify by layers
- Flooding
  - * Inundation tolerance
  - * Willows = months
  - * Chokecherry = week



SEASON OF PLANTING

- Planting window
  - *Optimum conditions for best establishment
- Dormant Fall
  - *Plant with no expectation of growth
  - *Absorbs moisture through winter
  - *Competition with weeds in spring
  - *Snow can press seed into ground for better seed to soil contact
  - *Frost heaving

SEASON OF PLANTING

- Fall
  - * Short establishment period
  - * Little root growth before frost
  - * Frost heaving
  - * Plant availability from nurseries
- Spring
  - * High surface and ground water!
  - * Hard to find low water level
  - * Better weather (plants and crews)
  - * Plant after flooding is over
  - * Narrow planting window
  - * Competition with weeds

SEASON OF PLANTING

- Summer
  - *Hot temperatures (and getting hotter)
  - *Very little precipitation (Intermountain West)
  - *Poor availability of planting stock
  - *Wetland plants like this season

PLANT PROCUREMENT

- Plant procurement takes time!!
- Advanced planning to get the materials to the planting site on time
- Takes 2 years or more to grow woody plants
- Allow time to collect native seed
  - * Occasionally poor seed crop
  - * Travel time (wide collection area)
  - * Must be cleaned
  - * Stratification needs

PLANT MATERIALS COLLECTION

- Noxious or nuisance weeds
- Select vigorously growing and healthy looking plants
- Insect and disease damage
- Damage to "mother plant"
- Low success = stressed plants
  - * long term stress (drought, flooding, frost during flowering, insects, etc)
  - * short term stress (poor collection tech, poor transportation tech, poor storage tech)

HANDLING OF PLANT MATERIALS

- Handle properly to survive transplanting stress
  - *Keep cool, shaded, and moist
- Harden off greenhouse grown plants
  - *Going from Utopia to real world
  - *Keep well watered and shaded
- Bareroot or unrooted cuttings
  - *Keep in dark, cool, and slightly moist (too wet = water roots)
  - *Soak unrooted cuttings before planting

Monitoring and Maintenance

- Monitoring stimulates maintenance
- Monitoring identifies failures or developing problems
- Monitoring indicates a need for regular maintenance
- Monitoring indicates a need to change management practices
- Monitoring ensures targeted functions are addressed and developing according to plan

Problems associated with M & M:

- Monitoring & Maintenance for the project are not taken into account in the planning process
- Costs of M & M not added into the budget
- Annual operations plan does not have time allocated for M & M
- Responsible parties not specifically identified in APO to carry out M & M
- Responsible parties not given time in their own annual work plan to complete M & M

J. Chris Hoag
Wetland Plant Ecologist
Riparian/Wetland Project
USDA-NRCS Plant Materials Center, Idaho
email: chris.hoag@id.usda.gov
WEBSITE:
http://www.plant-materials.nrcs.usda.gov/idpmc/riparian.html

Tom Moody and Stephanie Yard
Natural Channel Designs
3410 S. Cocopah Drive
Flagstaff, AZ
928-774-1178