Case Histories

Natural landscapes modified by water and power use

(dams and reservoirs)

Cases

- Reservoir, Tampa Bay Water
  - Mitigation: constructing, restoring or enhancing wetlands in Alafia River State Recreation Area and Model Dairy mitigation site
- Bayou DeChene Reservoir, north Louisiana
  - Mitigation: restore bottomland hardwood habitat in Red River Wildlife Management Area

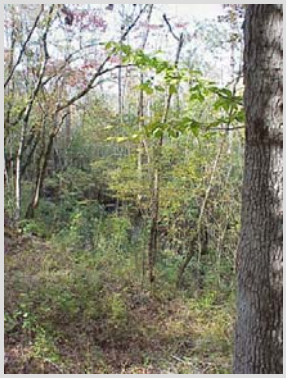
- King William Reservoir, Mattaponi River, Virginia
  - Mitigation: restoration of wetlands, stream, riparian corridor, fish and wildlife habitat, with special care to be taken for populations of two different endangered plant species.

- Tennessee Valley Authority, Reservoir Operations Study, Ch 7: Potential Mitigation Measures
  - Riparian restoration…activities to protect and restore riparian restoration
  - Operate dams so that pool levels provide better habitat for fish, shorebirds and endangered plant species

- Texas Parks and Wildlife Department. 2006. An assessment of direct impacts to wildlife habitat from future water development projects.
  - Includes inventory of habitat types, acreages, habitat quality, acreage lost, projected acreage to compensate for habitat lost
  - Forested river and creek floodplain vegetation, including bottomland hardwoods, a particularly high value wildlife habitat, have declined….
  - Any loss of bottomland hardwood forest must be fully compensated in kind with equal habitat

  - Bottomland hardwood forest and forested riparian vegetation are singled out as being of highest value for waterfowl and are listed as “Priority 1” thru “Priority 6” for preservation

- Texas Forest Service. 2002. The economic impact of the proposed Marvin Nichols Reservoir to the NE Texas forest industry.
  - 53% of conservation pool is bhf
  - 15% is upland forest
  - Rest is crops, grassland
  - Forestland of similar amount “must be acquired elsewhere and intensely managed for wildlife habitat to compensate for lost habitat due to the reservoir”
  - “The proposed reservoir will have a significant economic impact on the local forest industry…”



North Carolina

south Louisiana

southern Illinois

Indiana

- Allen, J.A., B.D. Keeland, J.A. Santurf, A.F. Clewell and H.H. Kennedy. 2004. A Guide to Bottomland Hardwood Restoration. USGS BRD Information and Technology Report 2000-0011. USDA Forest Service, General Technical Report SRS-40

- In this document, bottomland hardwoods are treated as wetlands.
- The scope is most applicable on river systems in the midwest and southeastern U.S. (Virginia to Texas to Illinois)
- 60 to 80% has been lost; highest loss in the north part of the Lower Mississippi watershed

- 154,000 acres has been restored between 1992 and 2002 (mostly by NRCS)
- Some bhf is managed as “green tree reservoirs”
  - Flooded in fall, drained in spring
    - For waterfowl
  - This gradually eliminates less flood-tolerant trees
    - Kills heavy nut producers

- Restoration difficult without natural hydrology
  - Natural hydrology is very energetic
  - Natural floodplains are very patchy (disturbance and remnant patches)
  - System is very dynamic
    - If you restore a small site, it may fall victim to the natural process of a floodplain (floods, erosion, sedimentation)

- Preliminary design
  - Among other things this might include
    - Contours
    - Channels
    - Vegetation communities
- Goals
  - Waterfowl? Plant species?

- Success criteria
  - Species composition
  - Number of trees
    - Overall density
    - distribution
  - Tree height and age
  - % survival

- Regeneration methods
  - Direct seeding
  - Planting seedlings
  - Planting cuttings
  - Transplanting saplings
  - Topsoiling
  - Natural regeneration

- Combinations of methods are commonly used. Example:
  - Direct seeding may be used as primary method of regenerating trees.
  - Topsoiling may be used to introduce understory species
  - Seedlings could be planted to introduce difficult to restore species.

- Evaluate hydrology:
  - Average annual flood duration
  - Average annual growing season flood duration
  - Average growing season depth of water table
  - Large streams tend to have more predictable hydrology
  - Smaller steams tend to have erratic flooding and are more responsive to rainwater events.

- Hydrology and topographic position
  - Topographic positions:
    - Sloughs
    - Natural levees
    - Lower floodplains
    - Terraces
    - Slopes transitional to uplands
    - Depressions
  - Hydrologic alterations have occurred at most sites
    - Drainage, diversion, damming, levees, groundwater extraction, road construction, urbanization of watersheds, removal of forest

- Species selection
  - Reference sites
  - Type systems
  - Literature

- Site preparation (Example: old fields)
  - Restore hydrology
    - Use historical maps or photos
    - Disconnect drains or breach levees
    - Reconstruct ridge and swale topography, channels
  - Control invasive plants

- Seeds
  - Collection
  - Handling
  - Storage
  - Dormancy

- Direct seeding
  - Most done in late fall, spring, early summer
  - Many oaks have acorns that do not store
  - Sow acorns 2-4” deep, deeper with rodents
  - Make hole with broomstick or metal bar if hand sowing
  - Mechanical planters work on old fields

- Planting seedlings
  - Higher survival, faster initial development
  - Bare root or container
    - Bare root – trim root to 8”
    - Container
      - Better in drier climates when planting season is short
      - Often use long thin containers with taprooted trees
  - Do not let roots of any type of seedling dry out
  - Protect from freezing
  - Plant when soil is moist

- Spacing
  - 10’ x 10’ used for wood production
  - 12’ x 12’ to 20’ x 20’ are used for habitat
  - 4’ x 4’ are used to create shade
  - If mechanical mowing or plowing is planned, leave enough space between trees for equipment

- Other planting options
  - Cuttings: willow, cottonwood, ash, sycamore
  - Transplants, wildings, pull-ups: take from dense stands undergoing self-thinning, while soil is wet
  - Topsoiling
    - Take limited amount of soil
    - Will also bring weeds
    - Viable seeds will be in the top 2-4”

- Natural regeneration
  - Works well if seed source is adjacent
  - Good seedbed with microsites helps
  - Appropriate for long skinny or small sites within 100 yds of existing forest
  - Install perches, snags
  - Leave or plant seed trees

- Undergrowth
  - Transplanting
  - Topsoiling
  - Collect seed and grow plants

- Invasive species control
  - Manual
  - Mechanical
    - With adequate clearance, small tractors can cultivate or mow between trees
  - Herbicides
    - Use correct prescription (use most selective formulations)
    - Apply correctly (there are a number of equipment types for applying herbicides in a focused way)
    - Minimize negative impacts

- Protection of site
  - Animals
    - Minimize weeds rodents live in
    - Control water levels
    - Raptor perches
    - Fencing (deer, nutria, cattle, pigs, beaver)
    - Tree shelters
  - Fire: create firebreaks
  - Humans: signs, information

- Monitoring
  - Hydrology
  - Plants
    - Restoration target species
    - Invasives
  - Herbivory
- Monitoring only is useful if it results in a response when a threshold is exceeded.