

## Site Modification

ESRM 302/CFR 590  
Restoration Design

Site Modification can include a number of different treatments

- Invasive plant removal
- Grading
- Removal of unacceptable materials
  - Weed seedbanks, toxic substances, non-soil
- Seedbed preparation
- Placement of aboveground obstructions

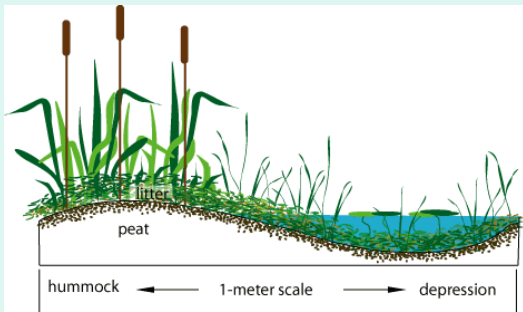
- Creation of wildlife habitat structures
- Engineered elements
  - Weirs, dams, dikes, infiltration systems, swales
- Plugging ditches and removing tiles
- Installing liners
- Structurally repairing eroded areas

## Methods

- Invasive plant removal
  - Mechanical removal
  - Hand removal
  - Herbicides
  - Fire
  - Grazing
  - Flooding



- Grading
  - Sometimes done to recreate historical contours at filled site
  - Can also be used to attain desirable connection with site hydrology
  - Grading can create small landforms
    - Islands
    - Pits and mounds
  - Channelized streams may be given more natural forms and elevations
  - Often done to create adequate drainage and prevent erosive failures



- Removal of materials
  - Seedbanks of weedy species
  - Toxic fill
  - Non-soil (concrete, building materials)
  - Fill
  - Levees or dikes
  - Excessive deposited sediment
  - Wood waste
  - Refuse or garbage
  - Liners or landscape fabric



- Seedbed preparation
  - Goal is to improve infiltration, minimize runoff, and support nutrient cycling
  - Ideal process results in site that has tilled soil that is firmed in seed zone, no weeds, no weed seed bank
  - Mulch or plant residue on surface are desirable

- Seedbed preparation
  - Mechanical
  - Chemical
  - Burning
  - Biological
  - Special water harvesting techniques
  - Special approaches for saline soil or active sand dunes



- Seedbed preparation: roughening
  - Provides seed safe sites
  - Decreases wind erosion
  - Decreases fluvial erosion and collects water
  - Increases accumulation of other resources

- Aboveground obstructions
  - Provide safe sites
  - Create shade and block wind
  - Accumulate resources
  - Act as obstacles to fluvial flow
  - Can remove water along contours
  - Increase soil stability



- Materials used as aboveground obstructions
  - Live plants
  - Stubble
  - Logs
  - Rocks
  - Brush bundles
  - Fascines
  - Crimped organic substances (straw, cotton trash, paper)



- Creation of wildlife habitat structures
  - Insectaries
  - Bird boxes (bat, bee)
  - Perches, snags
  - Rubble or rockpiles (reptiles)
  - Medium-sized woody debris
  - Buried clay pots, pipes, utensils
  - Amphibian egg-mass vegetation (spikerush)
  - On-site placement of brush or wood piles
  - Feeding stations, watering stations, shade



- Creation of wildlife habitat structures

- Food plots
- Cowbird traps
- Hedgerows
- Conservation tillage
- Vegetated corridors
- Vegetated ditches
- Tailwater ponds
- Rock and log weirs
- Forage fields



- Engineered elements

- Weirs
- Spillways
- Valves
- Dams, dikes
- Infiltration systems
- Leaky berms
- Conveyances
- Wells
- Temporary irrigation
- Temporary nurseries
- Sediment control



Narbeck Wetland (Leaky Berms)



Weirs

- Plugging ditches and removing tiles

- Many farm fields have had some kind of drainage to at least part of the field
- Or low areas have been filled
- Blocking of open drains, or running them into tailwater ponds, will make site wet again
- Drain tiles can have segments removed, causing them to cease functioning.
- Fill areas may be excavated

- Installing liners

- Ounce of prevention: many PNW wetlands are perched on till above more permeable gravels or sands. Do not excavate through the till.
- Liners may be rubberized membrane or clay.
  - Sub-soil is smoothed, shaped and compacted
  - Membrane or clay is placed on top of sub-soil
  - Soil is placed on top of membrane or compacted clay to protect it



- Structurally repairing eroded areas

- Cribbing
- Half-moon dams
- Rock walls
- Water bars
- Structures or obstructions to encourage deposition
- Cottonwood plantings
- Picket fences



