

**Practice: 657 - Wetland Restoration**

**Scenario: #1 - Mineral Flat**

**Scenario Description:**

A Mineral Flat wetland is to be restored. The tract size is 160 Acres consists of surface saturated soils interspersed with shallow depressions that are not depressional class HGM wetlands. The wetland size is also 160 acres. Resource Concerns are: 4-SOIL QUALITY DEGRADATION - Organic matter depletion, 11- WATER QUALITY DEGRADATION - Excess nutrients in surface and ground waters, 12 - WATER QUALITY DEGRADATION - Pesticides transported to surface and ground waters, 16 - WATER QUALITY DEGRADATION - Excessive sediment in surface waters, 18 - DEGRADED PLANT CONDITION - Undesirable plant productivity and health, 19 - DEGRADED PLANT CONDITION, Inadequate structure and composition, 22- INADEQUATE HABITAT FOR FISH AND WILDLIFE - Habitat degradation.

**Before Situation:**

The site has been drained with a tile drain system. A suitable seed bank exists for natural regeneration to re-establish hydrophytic vegetation. The site is in agricultural production.

**After Situation:**

The drain tiles have been rendered non-functional by excavating 50 foot lengths of tile mains and laterals in 24 separate locations, and backfilling with excavated earth, which is compacted with the excavator bucket. There are no facilitating practices. Restoration of hydrology and plant community functions will improve the WATER QUALITY and DEGRADED PLANT CONDITION concerns listed above. The hydrologic and vegetative practices will address the SOIL QUALITY DEGRADATION and INADEQUATE HABITAT FOR FISH AND WILDLIFE concerns.

**Scenario Feature Measure:** Acres of Tract

**Scenario Unit:** Acre

**Scenario Typical Size:** 160

**Scenario Cost:** \$1,901.43

**Scenario Cost/Unit:** \$11.88

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	\$50.55	24	\$1,213.20
<b>Labor</b>						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	\$18.98	24	\$455.52
<b>Mobilization</b>						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$232.71	1	\$232.71

**Practice: 657 - Wetland Restoration**

**Scenario: #2 - Riverine Levee Removal and Floodplain Features**

**Scenario Description:**

A Riverine HGM tract on a large floodplain is to be restored. It has been converted to agricultural production by surface ditching and clearing of woody vegetation. The size of the tract is 100 acres. The wetland extent is 60 acres, and 40 acres are adjacent non-wetland. Resource Concerns are: 4-SOIL QUALITY DEGRADATION - Organic matter depletion, 11- WATER QUALITY DEGRADATION - Excess nutrients in surface and ground waters, 12 - WATER QUALITY DEGRADATION - Pesticides transported to surface and ground waters, 16 - WATER QUALITY DEGRADATION - Excessive sediment in surface waters, 18 - DEGRADED PLANT CONDITION - Undesirable plant productivity and health, 19 - DEGRADED PLANT CONDITION, Inadequate structure and composition, 22- INADEQUATE HABITAT FOR FISH AND WILDLIFE - Habitat degradation.

**Before Situation:**

A levee prevents floodwater from entering the tract. The original cover was forest. The site is drained by surface ditches which collect surface water and direct it to the river through a flap gate structure. The site has been completely cleared, and no suitable adjacent seedwall exists for natural regeneration of forest species. The lateral connectivity between the channel and floodplain has been altered by construction of levees along the reach.

**After Situation:**

The hydrology of the site is restored with the installation of ditch plugs, and the excavation of macrotopographic features with an average depth of 6" over 30% of the wetland area. Excavated spoil is placed adjacent to the features on the wetland and adjacent non-wetland area with a maximum depth of 24 inches. The levee has been breached at the upstream and downstream ends of the tract reach, restoring dynamic stream flooding. The breach length is 150 feet long at both locations. Both the wetland and non-wetland areas are planted with a Bottomland Hardwood species mix. The levee breaches are armored with rock riprap. Facilitating practices include Grade Stabilization Structure and Tree and Shrub Planting. Restoration of hydrology and plant community functions will improve the WATER QUALITY and DEGRADED PLANT CONDITION concerns listed above. The hydrologic and vegetative practices will address the SOIL QUALITY DEGRADATION and INADEQUATE HABITAT FOR FISH AND WILDLIFE concerns.

**Scenario Feature Measure:** Acres of Tract

**Scenario Unit:** Acre

**Scenario Typical Size:** 100

**Scenario Cost:** \$33,216.53

**Scenario Cost/Unit:** \$332.17

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	\$1.93	16520	\$31,883.60
<b>Mobilization</b>						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	\$444.31	3	\$1,332.93

**Practice: 657 - Wetland Restoration**

**Scenario: #3 - Depression Sediment Removal and Ditch Plug**

**Scenario Description:**

A Depressional HGM class wetland is to be restored. The tract size is 15 acres, and the actual wetland size is 10 acres. The site is a recharge depression, fed only from surface runoff. Resource Concerns are: 4-SOIL QUALITY DEGRADATION - Organic matter depletion, 11- WATER QUALITY DEGRADATION - Excess nutrients in surface and ground waters, 12 - WATER QUALITY DEGRADATION - Pesticides transported to surface and ground waters, 16 - WATER QUALITY DEGRADATION - Excessive sediment in surface waters, 18 - DEGRADED PLANT CONDITION - Undesirable plant productivity and health, 19 - DEGRADED PLANT CONDITION, Inadequate structure and composition, 22- INADEQUATE HABITAT FOR FISH AND WILDLIFE - Habitat degradation.

**Before Situation:**

The wetland has been converted to agricultural production, and the tract drained with a surface ditch. The ditch is 4' average depth, and 12 feet average width. The wetland receives surface runoff from an adjacent upland watershed, and ponds water on a shallow perched layer. The watershed has been converted from native to agricultural landuse, and the resultant soil erosion has deposited 6" of sediment in the bottom of the depression.

**After Situation:**

The ditch has been plugged by the installation of a 50' long section of compacted clay fill, and the deposition has been removed down to the original topsoil layer. A herbaceous plant community has been seeded. Facilitative practices include Conservation Cover. Restoration of hydrology and plant community functions will improve the WATER QUALITY and DEGRADED PLANT CONDITION concerns listed above. The hydrologic and vegetative practices will address the SOIL QUALITY DEGRADATION and INADEQUATE HABITAT FOR FISH AND WILDLIFE concerns.

**Scenario Feature Measure:** Acres of Tract

**Scenario Unit:** Acre

**Scenario Typical Size:** 15

**Scenario Cost:** \$16,775.66

**Scenario Cost/Unit:** \$1,118.38

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	\$1.93	8067	\$15,569.31
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	\$3.57	89	\$317.73
<b>Mobilization</b>						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	\$444.31	2	\$888.62

**Practice: 657 - Wetland Restoration**

**Scenario: #4 - Estuarine Fringe Levee Removal**

**Scenario Description:**

An Estuarine Fringe HGM landscape is to be restored. The wetland is subject to tidally induced water level fluctuations. The tract size is 120 acres, and the wetland area is 100 acres. Resource Concerns are: 4-SOIL QUALITY DEGRADATION - Organic matter depletion, 11- WATER QUALITY DEGRADATION - Excess nutrients in surface and ground waters, 12 - WATER QUALITY DEGRADATION - Pesticides transported to surface and ground waters, 16 - WATER QUALITY DEGRADATION - Excessive sediment in surface waters, 18 - DEGRADED PLANT CONDITION - Undesirable plant productivity and health, 19 - DEGRADED PLANT CONDITION, Inadequate structure and composition, 22- INADEQUATE HABITAT FOR FISH AND WILDLIFE - Habitat degradation.

**Before Situation:**

The wetland has been converted to agricultural production by construction of a dike to prevent tidal flows. The dike has a culvert with a flapgate to allow surface water to flow out, but prevents tide water from entering. The dike is 7 feet high above the current marsh surface. The dike has side slopes of 3:1, with a 12 foot top. A suitable seedbank exists for natural regeneration of the original plant community. The soils are organic, and loss of hydrology has caused the land surface to subside 3 feet due to aerobic decomposition of organic matter (mineralization).

**After Situation:**

The dike has been breached in 4 locations, corresponding to the number of original inlet channels. The breach locations have 8 foot long steel sheet pile Structures for Water Control installed to prevent tidal surges from causing serious erosion on the subsided land surface. The original flap gate culvert has been removed. The dike is 4 feet higher than the weir crests, so the excavations are 4 feet by 8 feet long, with 3:1 side slopes. The culvert has been removed and salvaged by the landowner. Facilitating practices are Structure for Water Control. Restoration of hydrology and plant community functions will improve the WATER QUALITY and DEGRADED PLANT CONDITION concerns listed above. The hydrologic and vegetative practices will address the SOIL QUALITY DEGRADATION and INADEQUATE HABITAT FOR FISH AND WILDLIFE concerns.

**Scenario Feature Measure:** Acres of Tract

**Scenario Unit:** Acre

**Scenario Typical Size:** 120

**Scenario Cost:** \$1,881.05

**Scenario Cost/Unit:** \$15.68

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	\$1.93	284	\$548.12
<b>Mobilization</b>						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	\$444.31	3	\$1,332.93

**Practice: 657 - Wetland Restoration**

**Scenario: #5 - Riverine Channel and Floodplain Restoration**

**Scenario Description:**

A Riverine HGM landscape on a small stream on a low stream order riparian landscape has been converted to agricultural production. The stream channel has degraded. The reach is 1500 feet in length, and the tract size is 15 acres. The wetland area is 10 acres. Resource Concerns are: 4-SOIL QUALITY DEGRADATION - Organic matter depletion, 11- WATER QUALITY DEGRADATION - Excess nutrients in surface and ground waters, 12 - WATER QUALITY DEGRADATION - Pesticides transported to surface and ground waters, 16 - WATER QUALITY DEGRADATION - Excessive sediment in surface waters, 18 - DEGRADED PLANT CONDITION - Undesirable plant productivity and health, 19 - DEGRADED PLANT CONDITION, Inadequate structure and composition, 22- INADEQUATE HABITAT FOR FISH AND WILDLIFE - Habitat degradation.

**Before Situation:**

Channel incision has broken the lateral connectivity between the stream and floodplain. The conversion to cropland was accompanied by filling and leveling of backswamp, side channel, and oxbow features which formerly ponded water or exposed the floodplain groundwater table. The site no longer has access to floodwater or water surface profile supported groundwater. No suitable seed bank exists for natural regeneration of the original hydrophytic plant community, either in the channel, or on the floodplain.

**After Situation:**

The hydrology of the site is restored by the installation of a series of rock check structures to raise the stream water surface profile. Floodplain macrotopographic features replicating the original side channels, oxbows, and backswamps are constructed by excavation. Spoil is placed adjacent to the excavations to replicate natural depositional features. The average depth of the excavated features is 2 feet, and the surface area of the excavations is 25% of the tract size. The eroding stream bank is stabilized with soil bio-engineering features, and fish habitat improvement measures are installed in the channel. The tract is seeded to appropriate hydrophytic and upland vegetation, both woody and herbaceous. Facilitating practices are Streambank and Shoreline protection, Structure for Water Control, Conservation Cover, Tree/Shrub Establishment, and Stream Habitat Improvement and Management. Restoration of hydrology and plant community functions will improve the WATER QUALITY and DEGRADED PLANT CONDITION concerns listed above. The hydrologic and vegetative practices will address the SOIL QUALITY DEGRADATION and INADEQUATE HABITAT FOR FISH AND WILDLIFE concerns.

**Scenario Feature Measure:** Acres of Tract

**Scenario Unit:** Acre

**Scenario Typical Size:** 15

**Scenario Cost:** \$6,726.87

**Scenario Cost/Unit:** \$448.46

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	\$1.93	3025	\$5,838.25
<b>Mobilization</b>						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	\$444.31	2	\$888.62

**Practice: 657 - Wetland Restoration**

**Scenario: #6 - Aquaculture Pond Levee Breach**

**Scenario Description:**

Levee Breach - minimum 50 ft. base with 6:1 side slope (includes mobilization, equipment and labor to cut breach and spread spoil along levee). An Aquaculture Pond tract on a large floodplain is to be restored to a wetland and reconnected to the floodplain. It has been converted to aquacultural production by clearing of woody vegetation, land leveling and building levees. The total levee breach is 500 feet. Resource Concerns are: 19 - DEGRADED PLANT CONDITION, Inadequate structure and composition, 22- INADEQUATE HABITAT FOR FISH AND WILDLIFE - Habitat degradation.

**Before Situation:**

Levee construction for aquaculture production has reduced floodplain size and eliminated floodplain function in impacted area. The conversion to aquaculture was achieved by filling and leveling of backswamp, side channel, and/or oxbow features which formerly ponded water, provided floodplain storage, and/or provided floodplain filtering. The site no longer has access to floodwater and does not function as part of the floodplain.

**After Situation:**

A minimum breach of 50 feet at the base (varying top widths) will be used to allow the floodplain hydrologic access into and out of the existing aquaculture pond bottoms in order to restore floodplain wetland functions. Levee breaches will be installed in sizes and amounts where needed to restore floodplain and wetland function. Levee breaches are typically installed with 6:1 side slopes to provide easy maintenance and deter animal burrowing. Bottom widths are wide (min. 50') to allow adequate floodplain function, maintenance, and deter beaver dam activity. Breaches are typically installed with heavy equipment to address the resource problem of impaired hydrological function.

**Scenario Feature Measure:**

**Scenario Unit:** Each

**Scenario Typical Size:** 8

**Scenario Cost:** \$10,783.27

**Scenario Cost/Unit:** \$1,347.91

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	\$3.57	945	\$3,373.65
Excavation, clay, large equipment, 1500 ft	1217	Bulk excavation of clay with scrapers with average haul distance of 1500 feet. Includes equipment and labor.	Cubic Yard	\$5.86	945	\$5,537.70
<b>Labor</b>						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	\$31.56	3	\$94.68
<b>Mobilization</b>						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	\$444.31	4	\$1,777.24

**Practice: 657 - Wetland Restoration**

**Scenario: #8 - Levee Demolition - DS**

**Scenario Description:**

Demolition of Levee - 10 ft. top and 2:1 side slope. A levee on a large floodplain is to be demolished to restore a wetland. It has been converted to agricultural production by clearing of woody vegetation, land leveling and building levees. The levee size is 1000 feet.

Resource Concerns are: 19 - DEGRADED PLANT CONDITION, Inadequate structure and composition, 22- INADEQUATE HABITAT FOR FISH AND WILDLIFE - Habitat degradation.

**Before Situation:**

This practice will be applied by removing existing levees which impede the restoration of the hydrological functions of wetlands.

**After Situation:**

This is typically installed with heavy equipment to address the resource problem of impaired hydrological function.

**Scenario Feature Measure:** 1000 ft of levee

**Scenario Unit:** Each

**Scenario Typical Size:** 1

**Scenario Cost:** \$2,523.84

**Scenario Cost/Unit:** \$2,523.84

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<i>Equipment/Installation</i>						
Truck, dump, 8 CY	1401	Dump truck for moving bulk material. Typically capacity is 12 ton or 8 cubic yards. Includes equipment only.	Hour	\$52.58	48	\$2,523.84

**Practice: 657 - Wetland Restoration**

**Scenario: #10 - Microhydrology haul spoil - DS**

**Scenario Description:**

Pond/Serpentine excavation and dumping greater than 200 ft., creating mound from spoil (typically 1.2 acre pond or 750 ft. serpentine). Serpentine typical size is 50' bottom, 3:1 s/s 3' deep, yeilding 4916 c.y. of spoil.

**Before Situation:**

This practice is typically conducted on hydrologically impaired degraded wetlands where slough type habitat has been removed.

**After Situation:**

This is typically installed with heavy euipment to address the resource problem of impaired hydrological function and lacking wetland habatit.

**Scenario Feature Measure:** 750' of serpentine

**Scenario Unit:** Acre

**Scenario Typical Size:** 1

**Scenario Cost:** \$10,652.03

**Scenario Cost/Unit:** \$10,652.03

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Truck, dump, 8 CY	1401	Dump truck for moving bulk material. Typically capacity is 12 ton or 8 cubic yards. Includes equipment only.	Hour	\$52.58	38	\$1,998.04
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	\$50.55	38	\$1,920.90
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	\$60.66	25	\$1,516.50
<b>Labor</b>						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	\$31.56	10	\$315.60
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	\$22.13	101	\$2,235.13
<b>Mobilization</b>						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	\$444.31	6	\$2,665.86