

Practice: 395 - Stream Habitat Improvement and Management

Scenario #1 - Riparian Zone Improvement-Forested

**Scenario Description:**

This scenario describes fish and wildlife habitat improvement and/or management actions focused on the community structure and function of forested riparian zone plant communities. The planned activity meets the 395 standard, and facilitating practice standards, especially Codes 390 and 391, utilized in combination to satisfy all requirements specific to habitats needed for the stream and riparian species for which the practice is being implemented. Implementation will improve instream and riparian habitat complexity, water quality, hiding and resting cover, and/or increased food availability for desired riparian and stream species. Because species and habitats differ dramatically within and across regions and/or MLRAs, up to 12 riparian plant community-specific scenarios may be required across the US.

**Before Situation:**

Riparian quality and quantity are at risk as determined by the NRCS Stream Visual Assessment Protocol score of less than 5 for those elements. The site does not have adequate food, cover, and/or connectivity for riparian wildlife, and contributes insufficient amounts of organic matter and/or large woody material for stream species food and cover. The site's riparian vegetation is compromised by human activities and/or access of vehicles, people, and/or livestock is not controlled adequately to protect riparian functions and stream habitat quality. Nutrients are transported to surface waters through runoff or soil erosion or to ground water from leaching in quantities that degrade water quality and limit use of intended purposes. Soil quality may be reduced due to compaction. Riparian vegetation quality and/or quantity is compromised to the extent that the riparian area and floodplain are not functioning to provide necessary stream and riparian habitat components.

**After Situation:**

Revegetation/reforestation of the riparian zone is completed and the vegetation community is under close management to insure long-term survival and ecological succession of the plant community. The quality and quantity of the riparian zone components of the site are managed to support a diverse vegetation community suitable for the site, the species that depend on it for habitat, and the functions it performs or will eventually perform as the vegetation matures. These functions include: stream temperature moderation thru shading, recruitment of instream large wood and/or non-woody organic matter, riparian habitat for terrestrial insects and other riparian-dependent species, streambank integrity, and filtration of contaminants from surface run-off into the stream.

Feature Measure: acres

Scenario Unit:: Acre

Scenario Typical Size: 2

Total Scenario Cost: \$17,320.75

Scenario Cost/Unit: \$8,660.38

**Cost Details:**

Component Name	ID	Description	Unit	Cost	QTY	Total
<b>Equipment Installation</b>						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	\$46.33	16	\$741.28
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	\$54.66	8	\$437.28
<b>Labor</b>						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	\$26.79	160	\$4,286.40
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$19.35	40	\$774.00
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	\$25.22	24	\$605.28
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	\$40.55	40	\$1,622.00
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	\$102.60	40	\$4,104.00
<b>Materials</b>						
Compost	265	A mixture of decaying organic matter, as from leaves and manure, used to improve soil structure and provide nutrients.	Ton	\$53.63	1	\$53.63
Cuttings, woody, large size	1309	Woody pole cuttings or posts 2" to 6" in diameter and 6' long. Includes materials and shipping only.	Each	\$18.38	200	\$3,676.00
Tree, willow	1426	Willow tree for planting, 18" to 36" seedling. Includes materials and shipping only.	Each	\$0.67	200	\$134.00

Tree shelter, wire mesh	1557 5 feet tall, Woven Wire mesh, 6"x 6" opening or smaller, 10 gauge wire (minimum) , cage placed around seedling for animal protection. Materials only.	Each	\$2.32	200	\$464.00
<b>Mobilization</b>					
Mobilization, medium equipment	1139 Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$211.44	2	\$422.88

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Scenario #2 - Instream wood placement

**Scenario Description:**

This scenario involves placement of large wood (logs, root wads, log structures) into a stream channel in order to improve aquatic habitat that currently does not meet quality criteria for stream species habitat. A stream assessment (i.e. Stream Visual Assessment Protocol) should be conducted in order to document habitat components lacking for aquatic species (i.e. large wood, pools). A project design for wood placement will be based on assessment of the target stream reach characteristics and those of a suitable reference reach. These characteristics include channel geometry, channel slope, stream bottom substrate size and composition, and the geomorphic setting influencing the channel form, pattern and profile. Large wood and root wads placed into the stream will mimic genus, age, and size of mature trees found in intact, reference riparian areas in the MLRA where the project is located. Large wood/trees with rootwads intact should be placed in streams to create pool habitat according to NRCS engineering specifications and with close review & approval of a fish habitat biologist. Boulders placed to provide ballast shall only be used if the geomorphic setting and project design demand this component. The planned activity will meet the current 395 standard, and facilitating practice standards utilized, including timing of work windows required for protected aquatic and riparian species, and protecting/restoring vegetation and substrates of/to areas impacted by heavy equipment. Implementation will result in the improvement of instream habitat complexity, hiding and resting cover, and/or increased food availability for fish and other stream species. Payment for implementation is to defray the costs of project implementation. Monitoring records demonstrating implementation of this scenario will address resource concerns for stream species of concern are required.

**Before Situation:**

In this stream reach, habitat for fish, aquatic insects and/or other stream species is sub-optimal as determined by the NRCS Stream Visual Assessment Protocol score of less than 5 overall. The site does not have adequate food, cover, and perhaps habitat connectivity for desired species. Riparian vegetation quality and/or quantity may also be compromised to the extent that the riparian area and floodplain are not functioning to provide necessary stream and riparian habitat components, such as large wood.

**After Situation:**

Stream habitat within the project reach is improving as a result of placing logs, root wads, and/or wood structures in the channel and/or along the stream bank. Pool habitat in the reach is improved, and hiding cover, food availability and refuge habitat for all stream species is improving.

**Feature Measure:** Bankfull width x reach length

**Scenario Unit::** Acre

**Scenario Typical Size:** 1

**Total Scenario Cost:** \$14,113.30

**Scenario Cost/Unit:** \$14,113.30

**Cost Details:**

Component Name	ID	Description	Unit	Cost	QTY	Total
<b>Equipment Installation</b>						
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	\$135.92	16	\$2,174.72
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	\$79.94	8	\$639.52
<b>Labor</b>						
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	\$25.22	24	\$605.28
<b>Materials</b>						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	\$24.15	20	\$483.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	\$24.48	30	\$734.40
Compost	265	A mixture of decaying organic matter, as from leaves and manure, used to improve soil structure and provide nutrients.	Ton	\$53.63	1	\$53.63
Cuttings, woody, large size	1309	Woody pole cuttings or posts 2" to 6" in diameter and 6' long. Includes materials and shipping only.	Each	\$18.38	300	\$5,514.00
Boulder	1761	Rock boulders (approximately 5 ft dia. 6.67 Tons) Includes materials and delivery (up to 100 miles) only.	Ton	\$34.32	40	\$1,372.80
Steel, rebar	1832	Steel rebar, grade 60. Materials only.	Pound	\$0.50	50	\$25.00
Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	\$20.53	15	\$307.95
Log, un-anchored	2035	Price of log picked up at the Mill. Includes material only.	Ton	\$40.58	30	\$1,217.40

Root Wad	2045 Tree stump buried into the streambank with the roots left exposed. Includes material only.	Ton	\$8.91	20	\$178.20
<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	\$403.70	2	\$807.40

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Scenario #3 - Instream rock placement

**Scenario Description:**

This scenario describes the implementation of a stream habitat improvement and management project that places individual boulders or boulder clusters, or rock structures in or adjacent to the stream channel as habitat components. A project design for boulder placement will be based on assessment of the target stream reach characteristics and those of a suitable reference reach. These characteristics include channel geometry, channel slope, stream bottom substrate size and composition, and the geomorphic setting influencing the channel form, pattern and profile. Large rocks/boulders placed in the stream channel will mimic geologic material sizes typically present in the watershed or observed in intact, reference stream reaches in the MLRA where the project is located. Boulders should be placed in streams to create pool habitat and hydraulic complexity according to NRCS engineering specifications and with close review & approval of a fish habitat biologist onsite during implementation of the project design. Spawning gravel placement should be placed to restore spawning area substrates potentially disturbed by rock placement. The planned activity will meet the current 395 standard, and facilitating practice standards utilized. Implementation will result in the improvement of instream habitat complexity, hiding and resting cover, spawning habitat, and/or increased food availability for fish and other stream species. Payment for implementation is to defray the costs of stream habitat assessment, and project implementation. Records demonstrating implementation of this scenario will address resource concerns for stream species of concern will be required.

**Before Situation:**

In this stream reach, habitat for fish, aquatic insects and other stream species is sub-optimal as determined by the NRCS Stream Visual Assessment Protocol score of less than 5 overall. The site does not have adequate food, cover, and perhaps habitat connectivity for desired species. Riparian vegetation quality and/or quantity may be also compromised to the extent that the riparian area and floodplain are not functioning to provide necessary stream and riparian habitat components, such as large wood, leaf matter, and shade.

**After Situation:**

Stream habitat within the project reach is improving as a result of placing boulders or constructing rock structures in the channel and/or along the stream bank. Hydraulic complexity of the habitat in the reach is increased, and hiding cover, food availability and refuge habitat for stream species is improving. Streambank vegetation is increasing and contributing to stability of the streambanks.

**Feature Measure:** Bankfull width x reach length

**Scenario Unit::** Acre

**Scenario Typical Size:** 1

**Total Scenario Cost:** \$12,506.42

**Scenario Cost/Unit:** \$12,506.42

**Cost Details:**

Component Name	ID	Description	Unit	Cost	QTY	Total
<b>Equipment Installation</b>						
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	\$135.92	16	\$2,174.72
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	\$79.94	8	\$639.52
<b>Labor</b>						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$19.35	16	\$309.60
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	\$25.22	24	\$605.28
<b>Materials</b>						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	\$24.15	30	\$724.50
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	\$24.48	120	\$2,937.60
Cuttings, woody, large size	1309	Woody pole cuttings or posts 2" to 6" in diameter and 6' long. Includes materials and shipping only.	Each	\$18.38	100	\$1,838.00
Boulder	1761	Rock boulders (approximately 5 ft dia. 6.67 Tons) Includes materials and delivery (up to 100 miles) only.	Ton	\$34.32	60	\$2,059.20
Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	\$20.53	20	\$410.60
<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	\$403.70	2	\$807.40



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Scenario #4 - Rock and wood structures

Scenario Description:

This scenario describes the implementation of a stream habitat improvement and management project where practices are focused on instream habitat improvement with a combination of rock AND wood structures. This scenario involves placement of large wood and rock structures into a stream channel in order to improve aquatic habitat that currently does not meet quality criteria for stream species habitat. A stream assessment (i.e. Stream Visual Assessment Protocol) should be conducted in order to document habitat components (such as large wood, pools ) are not currently present in the stream or are limited for aquatic species. A project design for placement of habitat structures (boulders, boulder clusters, wood, wood structures) will be based on assessment of (a) the target stream reach characteristics and (b) those of a suitable reference reach. These characteristics include channel geometry, channel slope, stream bottom substrate size and composition, and the geomorphic setting influencing the channel form, pattern and profile. Large rocks/boulders placed in the stream channel will mimic geologic material sizes typically present in the watershed or observed in intact, reference stream reaches in the MLRA where the project is located. Rock boulder sizes should also reflect the geomorphic setting of the stream reach. Large wood placed into the stream under this scenario should be similar in species, age, and size (diameter) as trees found in the surrounding riparian area, to the extent possible. Wood, boulders and/or boulder clusters will be placed in the stream to create pool habitat and hydraulic complexity according to NRCS engineering specifications and with close review & approval of a fish habitat biologist onsite during the planning and implementation of the project. This scenario involves restoring one acre of stream. The planned activity will meet the current 395 standard, and facilitating practice standards utilized. Implementation will result in the improvement of instream habitat complexity, hiding and resting cover, and/or increased food availability for fish and other stream species. Payment for implementation is to defray the costs of project implementation. Records demonstrating implementation of this scenario will address resource concerns for stream species of concern will be required.

Before Situation:

In this stream reach, habitat for fish, aquatic insects and/or other stream species is sub-optimal as determined by the NRCS Stream Visual Assessment Protocol score of less than 5. The site does not have adequate food, cover, and perhaps habitat connectivity for desired species. Riparian vegetation quality and/or quantity may also be compromised to the extent that the riparian area and floodplain are not functioning to provide necessary stream habitat components, such as large wood and off-channel refuge habitat.

After Situation:

Stream habitat within the project reach is improving as a result of placing logs, rocks, or constructing wood and rock structures in the channel and/or along the stream bank. Pool habitat in the reach is improved, and hiding cover, food availability and refuge habitat for all stream species is improving.

Feature Measure: stream length X bankfull width

Scenario Unit:: Acre

Scenario Typical Size: 1

Total Scenario Cost: \$27,154.91

Scenario Cost/Unit: \$27,154.91

Cost Details:

Component Name	ID	Description	Unit	Cost	QTY	Total
<b>Equipment Installation</b>						
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	\$135.92	16	\$2,174.72
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	\$79.94	8	\$639.52
<b>Labor</b>						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	\$26.79	60	\$1,607.40
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$19.35	24	\$464.40
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	\$25.22	24	\$605.28
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	\$40.55	180	\$7,299.00
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	\$102.60	32	\$3,283.20
<b>Materials</b>						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	\$24.15	17	\$410.55

Aggregate, Gravel, Graded	46 Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	\$24.48	60	\$1,468.80
Compost	265 A mixture of decaying organic matter, as from leaves and manure, used to improve soil structure and provide nutrients.	Ton	\$53.63	1	\$53.63
Cuttings, woody, large size	1309 Woody pole cuttings or posts 2" to 6" in diameter and 6' long. Includes materials and shipping only.	Each	\$18.38	300	\$5,514.00
Boulder	1761 Rock boulders (approximately 5 ft dia. 6.67 Tons) Includes materials and delivery (up to 100 miles) only.	Ton	\$34.32	40	\$1,372.80
Steel, rebar	1832 Steel rebar, grade 60. Materials only.	Pound	\$0.50	8	\$4.00
Aggregate, river rock	1834 Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	\$20.53	7	\$143.71
Log, un-anchored	2035 Price of log picked up at the Mill. Includes material only.	Ton	\$40.58	30	\$1,217.40
Root Wad	2045 Tree stump buried into the streambank with the roots left exposed. Includes material only.	Ton	\$8.91	10	\$89.10
<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	\$403.70	2	\$807.40

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Scenario #5 - Fish Barrier

**Scenario Description:**

This scenario describes the implementation of a stream habitat improvement and management project where practices are focused on the stream channel. The planned activity will meet the current 395 standard, and facilitating practice standards utilized. Implementation will result in protecting native aquatic fauna in the reach from competition or harrassament from non-native fish. This action may also increase food availability for fish and other stream species located above the constructed barrier. Payment for implementation is to defray the costs of stream habitat assessment above the barrier, and project implementation. Records demonstrating implementation of this scenario will address resource concerns for aquatic and riparian species of concern will be required.

**Before Situation:**

In this stream corridor, native aquatic species are at risk as determined by the state fish and wildlife agency. NRCS Stream Visual Assessment Protocol for the reach being protected by a barrier meets quality criteria and provides habitat for native species of concern, as determined by a Stream Visual Assessment Protocol score of greater than 5 .

**After Situation:**

Native fish inhabiting areas upstream of the newly constructed concrete barrier will not be adversely affected by interactions with non-native species/competitors.

Feature Measure: Each

Scenario Unit:: Cubic Yard

Scenario Typical Size: 5

Total Scenario Cost: \$25,552.21

Scenario Cost/Unit: \$5,110.44

**Cost Details:**

Component Name	ID	Description	Unit	Cost	QTY	Total
<b>Equipment Installation</b>						
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	\$320.62	60	\$19,237.20
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	\$135.92	10	\$1,359.20
Truck, Concrete Pump	1211	Concrete pump, normally truck mounted. Use this item in association with other concrete components when job requires placement by other than normal chutes. Include drive and setup time in quantity; therefore, do not include mobilization. Includes equipment and operator.	Hour	\$60.86	36	\$2,190.96
<b>Labor</b>						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	\$26.79	10	\$267.90
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$19.35	10	\$193.50
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	\$25.22	10	\$252.20
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	\$102.60	8	\$820.80
<b>Materials</b>						
Steel, rebar	1832	Steel rebar, grade 60. Materials only.	Pound	\$0.50	40	\$20.00
Plywood, 3/4 inch, untreated	1833	Untreated 4' x 8' sheets of 3/4 inch exterior grade plywood. Includes materials only.	Each	\$26.87	15	\$403.05
<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	\$403.70	2	\$807.40