

Stream and Wetland Restoration at Rendezvous Mountain Educational State Forest

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Project Partners

North Carolina State University

North Carolina Cooperative Extension Service

North Carolina Forest Service

North Carolina Division of Water Resources

North Carolina Clean Water Management Trust Fund

North Carolina Wildlife Resources Commission

United States Fish & Wildlife Service

Quail Unlimited

Project Bog Turtle

North State Environmental, Inc.



North Carolina Forest Service Rendezvous Mountain Educational State Forest Wilkes County, NC, USA



Problems

1. Streambank erosion
2. Cattle access
3. Lack of riparian buffer
4. Incised channel
5. Channel in road ditch
6. Drained riparian wetlands



Project Goals

1. Improve water quality by reducing sediment & nutrients
2. Improve aquatic and terrestrial habitat for cold-water fish, mammals, birds
3. Improve wetland functions to support bog turtle habitat
4. Provide educational opportunities for landowners and restoration professionals



NC Forest Service
Rendezvous Mountain
Educational State Forest

Phase 1 (2006)

600 ft stream restoration
2 acres wetland restoration

Phase 2 (2007)

1500 ft stream
enhancement
1800 ft stream restoration

Phase 3 (2009)

1500 ft stream restoration



Phase 1 Stream Restoration (2006)

- Realign 600 ft channel
- Lift channel to provide floodplain connection
- In-stream habitat structures
- Culvert replacement to enhance connectivity
- Native riparian vegetation

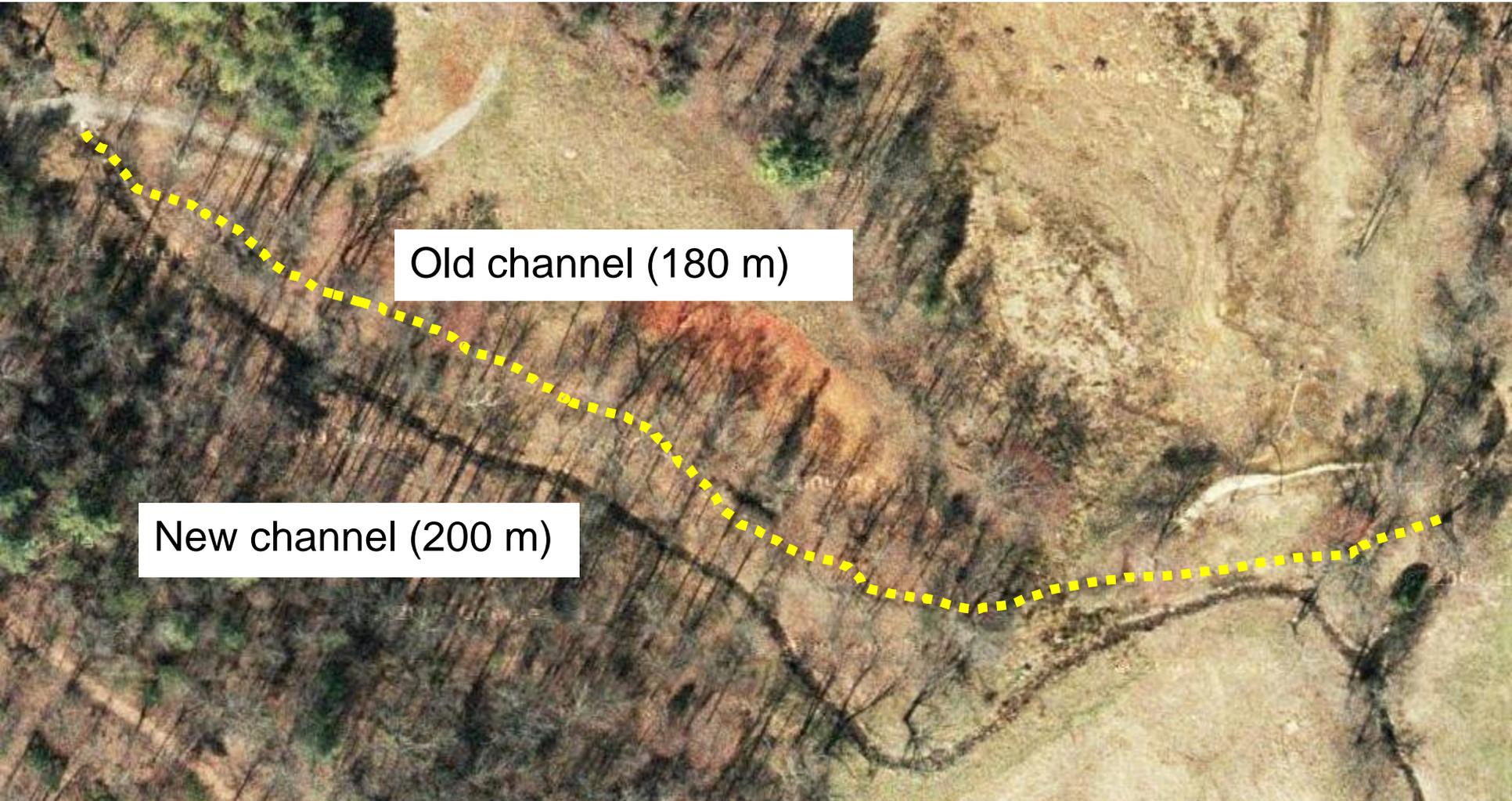


2006

2011

Phase 1 Stream Restoration

- Realign channel to follow valley thalweg



Old channel (180 m)

New channel (200 m)

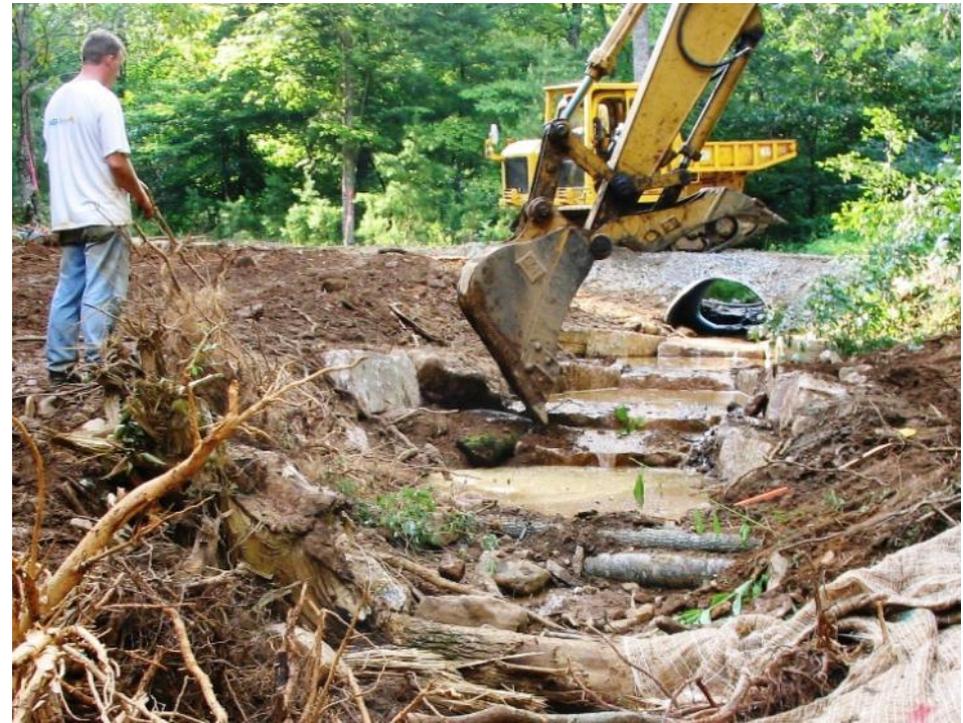
Phase 1 Stream Restoration

- Excavate new channel in valley thalweg (6% valley slope)



Phase 1 Stream Restoration

- In-stream log/rock structures for habitat and grade control



Constructed Step-Pool



Phase 1 Stream Restoration

- Culvert replacement to maintain natural bed conditions



Culvert with Buried Bottom: 2008



Culvert with Buried Bottom: 2011



Phase 1 Stream Restoration

- Temporary erosion control matting (coir 700g)



Temporary Matting

- Biodegradable (coir, jute, excelsior)
- Stakes: wood or biodegradable plastic
- Seed and straw UNDER mat
- Keep matting relaxed
- Key in at top



Phase 1 Stream Restoration

- Substrate transfer from old channel to new channel



Phase 1 Stream Restoration

- Transplant native riparian vegetation



Phase 1 Stream Restoration

- Floodplain soil preparation and seeding



Phase 1 Stream Restoration

- Tree and shrub planting in winter





Phase 1 Stream Restoration

- Invasive plant removal (stilt grass, tree of heaven, fescue)



Ailanthus altissima (tree of heaven)

Phase 1 Stream Restoration (2006-2011)



Phase 1 Wetland Restoration (2006)

- Bog turtle surveys
- Invasive plant eradication
- Seeding with native wetland plants
- Restore hydrology by plugging ditches



Phase 1 Wetland Restoration (2006-2011)



Phase 2 & 3 Stream Restoration (07-09)

- Enhance 1800 ft upstream
- Realign 3300 ft downstream
- Lift channel to provide floodplain connection
- In-stream habitat structures
- Native riparian vegetation



Phase 2 & 3 Stream Restoration

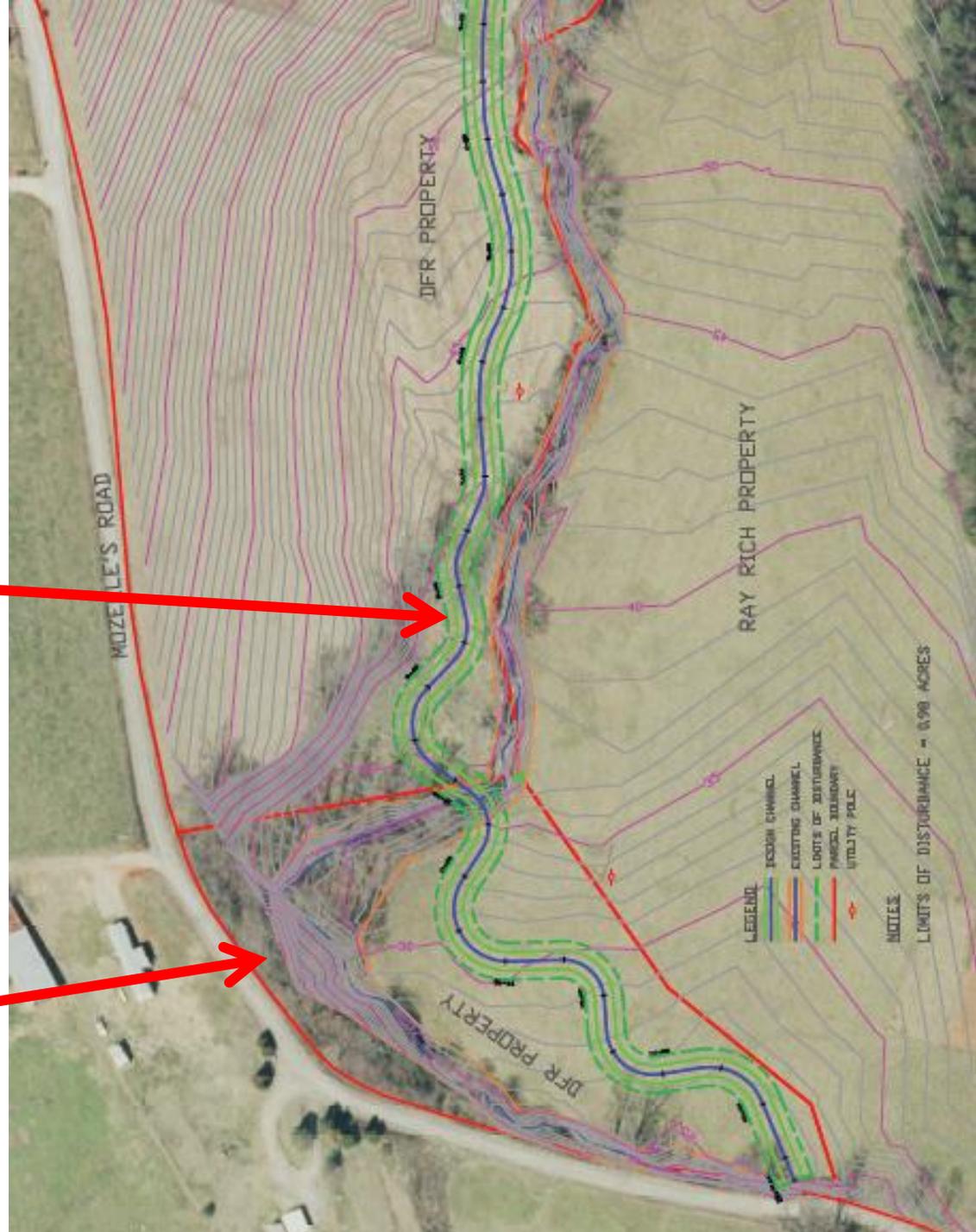
- Excavate new channel in valley thalweg (3% valley slope)



Phase 3 Stream Restoration: Realign channel to follow valley thalweg (3%)

New channel

*Old channel
(600 ft in road ditch)*



Phase 2 & 3 Stream Restoration

- In-stream log/rock structures for habitat and grade control



J-Hook Log Vane



2010

2011

Riffles with Boulder/Log Steps



Riffles with Boulder/Log Steps



Log Rollers



Off-line vernal pools in old channel



Phase 2 & 3 Stream Restoration

- Riparian vegetation:
 - transplanted juncus, willow, alder
 - tree seedlings



Phase 2 & 3 Stream Restoration (2011)



Education



Monitoring

- Morphology surveys – *stable*
- Vegetation surveys – *good early growth*
- Water quality – *upstream sediment*
- Macroinvertebrate populations – *recovering slowly*



Is the Project Achieving its Goals?

- Streambank erosion eliminated
- Floodplain & wetlands functioning
- Vegetation improving
- Water quality and habitats improving but not achieving reference conditions yet



Lessons Learned

- Need more focus on macro- and micro-habitats:
 - Riffles, pools, glides, steps
 - Fine roots
 - Wood
 - Cover and food sources
 - Hyporheic connections
- Floodplain connection critical
- Expect long time for ecological recovery



Successful Ecosystem Restoration

- Achieve ecological goals
- Self-sustaining
- Serve as model for future projects
- Accepted by the public

