

# Large Wood Past Work & Lessons Learned

October 11, 2018 ~ BCCD Large Wood Workshop, Gunstock Mtn. Resort

## *Presenters*

Colin Lawson  
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Joel DeStasio  
TU - New England Field Manager  
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## New England Conservation Program (NECP)



### Full Time Staff Overview

- Colin Lawson: New England Restoration Coordinator  
Focusing on eastern MA, NH & southern ME
- Erin Rodgers: Western NE Restoration Coordinator  
Focusing on western MA and southern VT
- Joel DeStasio: New England Field Manager  
Working primarily on Large Wood Habitat Projects
- Hiring Engineer: Stream Restoration Specialist ~ Engineering Services  
Working on Projects across MA, ME, NH, VT
- Other NE Staff: Tracy Brown (western Connecticut & Upstate NY),  
Jeff Reardon (ME), and Open Position (northern NH & VT)

# The New England Conservation Project ~ What we do:



## Stream Connectivity & Habitat Development

- In-stream Assessments
- Culvert Replacement & Dam Removal
- Large Wood Habitat Restorations
- Prioritization of project sites
- Stream Bank stabilization
- Restoration Monitoring

## We need to focus on keeping the “Ecosystem” in balance to reduce vulnerability!

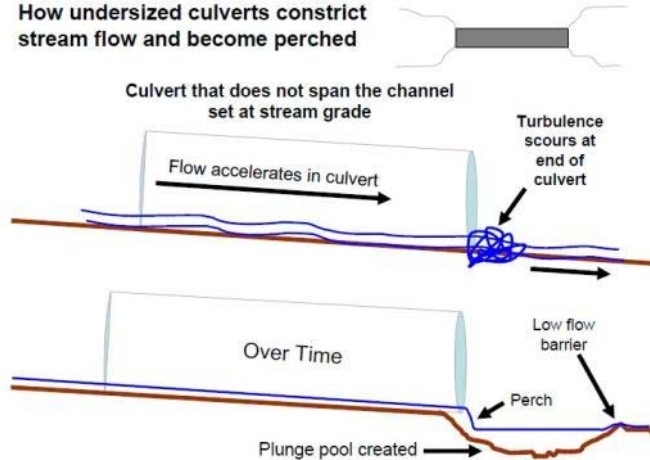
- Improve habitat connectivity
- Allow access to larger number of interconnected stream miles
- Focus on habitat ~ species diversity & productivity



## How the habitat and stream channel disconnect begins...



How undersized culverts constrict stream flow and become perched



## A Well Designed Crossing



- Large size suitable for handling most flood flows
- Open-bottom arch considered optimum for most conditions
- Openness ratio needs to be > than 0.5 ft (sqft / length)
- Bankfull width greater than 1.2x stream's active channel
- Water depth and velocity match up and down stream
- Natural substrates create good conditions for stream biota



# Ammonoosuc River ~ Assessment Prioritization & Outreach

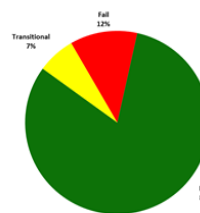
Evaluate vulnerability of structures across the watershed...



- “Pass” ● (Green)
- “Transitional” ● (Yellow)
- “Fail” ● (Red)

### Hydraulic Model Results:

Ammonoosuc River Watershed  
2-Year Flood Impact



Ammonoosuc River Watershed  
100-Year Flood Impact



Stream Name	Crossing ID	Structure Type	Condition	Structure Width (ft)	Crossing Slope	Culvert Invert Type	Culvert Drop Distance (ft)	Crossing Length (ft)	Bankfull %	AOP Status	2 YR Return Interval	10 YR Return Interval	25 YR Return Interval	50 YR Return Interval	100 YR Return Interval
Barnard Brook	EL_BABK_01	Culvert	Roasted	1	3	Concrete	1.7	31		GRAY	FAIL	FAIL	FAIL	FAIL	FAIL
Barnard Brook	EL_BABK_03	Culvert	Old	2.4	3.5	At Grade	0	38	17.3	GRAY	FAIL	FAIL	FAIL	FAIL	FAIL
Barnard Brook	EL_BABK_06	Culvert	Old	3	8	Free Fall	5.4	58	18.8	RED	PASS	PASS	PASS	PASS	FAIL
Barnard Brook	EL_BABK_07	Culvert	New	8	3	At Grade	0	44	23.9	GRAY	PASS	PASS	PASS	PASS	PASS
Breed Brook	EL_BBRK_01	Culvert	New	2	3.5	Free Fall	0.7	31	18.6	RED	FAIL	PASS	FAIL	FAIL	FAIL
Breed Brook	EL_BBRK_02	Culvert	Ending	4	2	Free Fall	0.4	60	41.2	RED	PASS	Transitional	FAIL	FAIL	FAIL
Breed Brook	EL_BBRK_03	Culvert	Old	3	1	At Grade	0	30	21.1	GRAY	PASS	PASS	FAIL	FAIL	FAIL
Breed Brook	EL_BBRK_04	Culvert	New	2	3	Free Fall	0.4	33	17.8	RED	-	-	-	-	-
Breed Brook	EL_BBRK_06	Culvert	Collapsing	2	2.5	At Grade	0	66.5	17.4	RED	FAIL	FAIL	FAIL	FAIL	FAIL
Breed Brook	EL_BBRK_07	Culvert	Old	3	1	Free Fall	0.9	34	13.5	RED	PASS	PASS	PASS	PASS	Transitional
Breed Brook	EL_BBRK_08	Culvert	New	4	1	Free Fall	0.8	51		RED	PASS	PASS	PASS	PASS	PASS
Breed Brook	EL_BBRK_09	Culvert	Old	1.3	2	At Grade	0	45		GRAY	FAIL	FAIL	FAIL	FAIL	FAIL
Breed Brook	EL_BBRK_10	Arch	New	7	5.8	At Grade	0	63		GRAY	PASS	PASS	PASS	PASS	PASS
Breed Brook	EL_BBRK_11	Culvert	Old	3	4	Free Fall	0.8	38	25.5	ORANGE	PASS	FAIL	FAIL	FAIL	FAIL
Breed Brook	EL_BBRK_12	Culvert	New	8	2.8	Free Fall	0.2	30		ORANGE	PASS	PASS	PASS	PASS	PASS
Breed Brook	EL_BBRK_13	Culvert	Roasted	1.5	3	At Grade	0	51	6.1	GRAY	FAIL	FAIL	FAIL	FAIL	FAIL
Breed Brook	EL_BBRK_14	Culvert	New	2.4	3	Concrete	0.4	39.5	22.4	GRAY	Transitional	FAIL	FAIL	FAIL	FAIL
Chute Brook	EL_CBRK_01	Culvert	New	1.3	4.5	At Grade	0	31	6.7	GRAY	FAIL	FAIL	FAIL	FAIL	FAIL

# Community Workshops and Outreach



# The goals of habitat restoration efforts:



- Improve aquatic bio-density
- Influence spawning potential by developing pool riffle runs
- Improve mobility within this tributary to offer thermal refugia
- Re-engage floodplain access where appropriate ~ slow water velocities down
- Improve water quality & retain nutrients throughout the system

## Beebe River Restoration Project

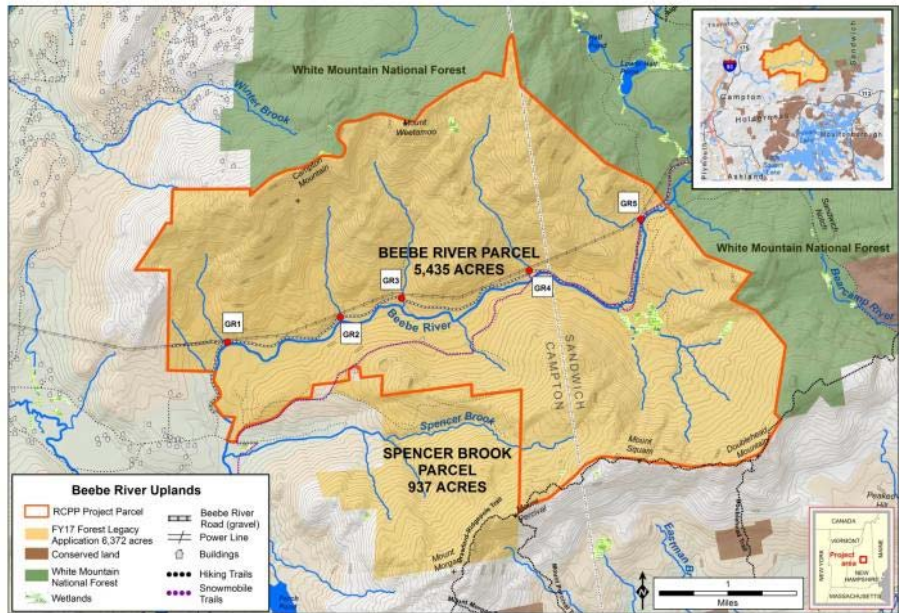
Campton & Sandwich, NH

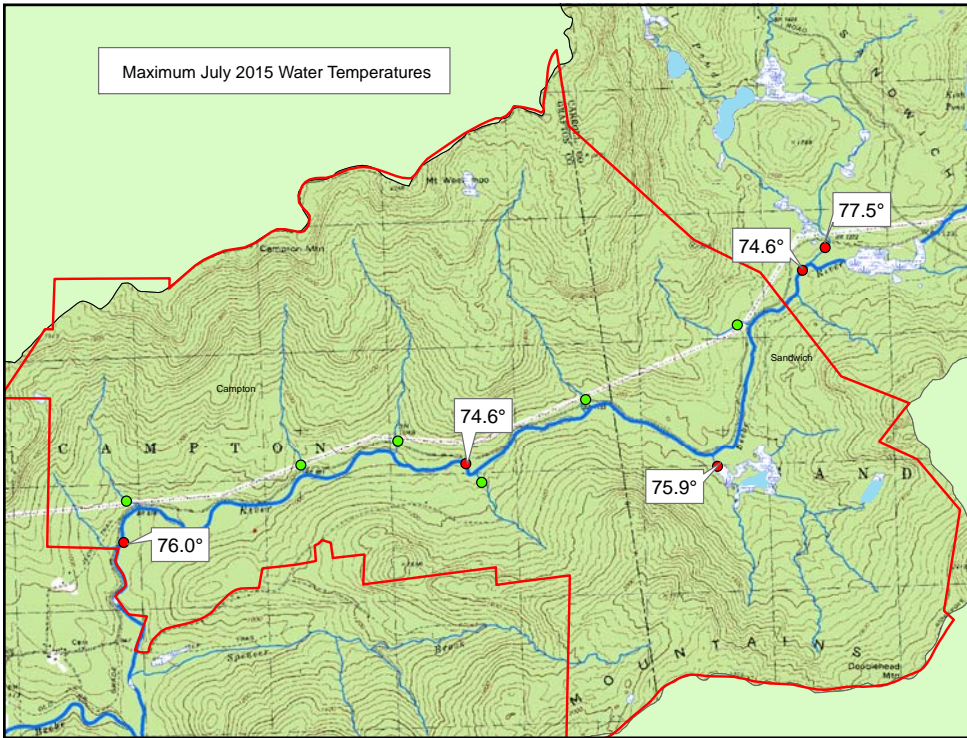
### Landowner

### The Conservation Fund

- 58% of the Beebe River Watershed is now protected
- 6.5 mile boundary shared with the national forest

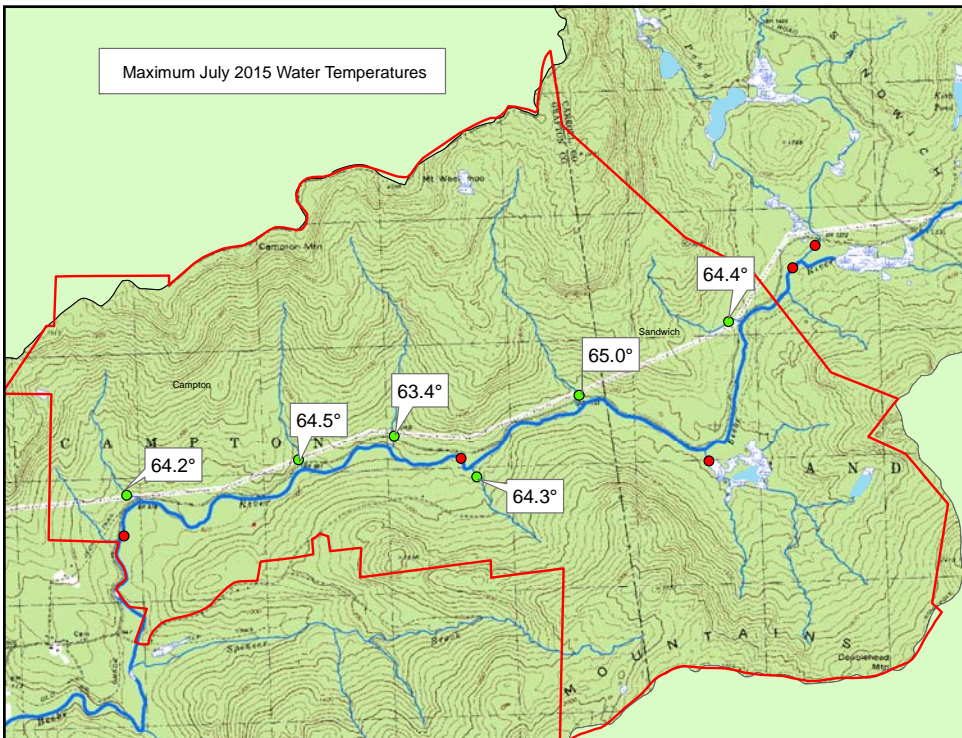
Made possible with a  
**NH NRCS RCPP Grant**  
 as well as numerous other federal,  
 state and private contributions





## Beebe River Mid-Summer Main Stem Water Temperatures

exceeded  
suitable  
temperatures  
for brook trout



## Beebe River Mid-Summer Tributary Water Temperatures

once reconnected,  
trout have  
excellent  
opportunity for  
access to cooler  
thermal refugia

# Beebe River ~ Undersized Crossing



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# Beebe River ~ Restored Crossing



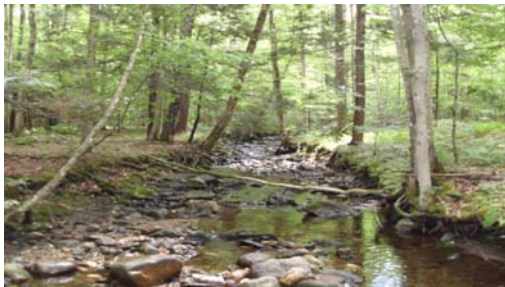
[www.tu.org](http://www.tu.org)

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# High Quality Habitat Requires



- Water Depths
- Gravel Substrate
- Large Wood**
- Water quality
- Structure Diversity
- Riparian Vegetation
- Cold Temperatures
- In-stream Vegetation
- Water Velocity
- Floodplain Access



## Initially Worked with NRCS

- Reviewed 100 WRP properties
- Selected 30 priority sites
- Prioritized and completed 23 restorations

3. Meadowsend Property, Londonderry Turnpike East, Bow, NH (not bordered by other easement properties)



- Bow Bog Brook and tributary; drainage is into the Merrimack River, 1<sup>st</sup> order stream
- Property Acreage: 200
- Basin Drainage Area: 2.19 mi<sup>2</sup>
- Potential Work Area: 5,000 ft<sup>2</sup>
- Average Basin Slope: 8.5%
- 2 year return interval flow: 80.5 cfs
- 50 year return interval flow: 298 cfs
- Bow Bog Brook has wild EBT downstream from this site

## Natural Resource Conservation Service (NRCS) Wood Loading Projects

### Collaborating with Trout Unlimited in New Hampshire

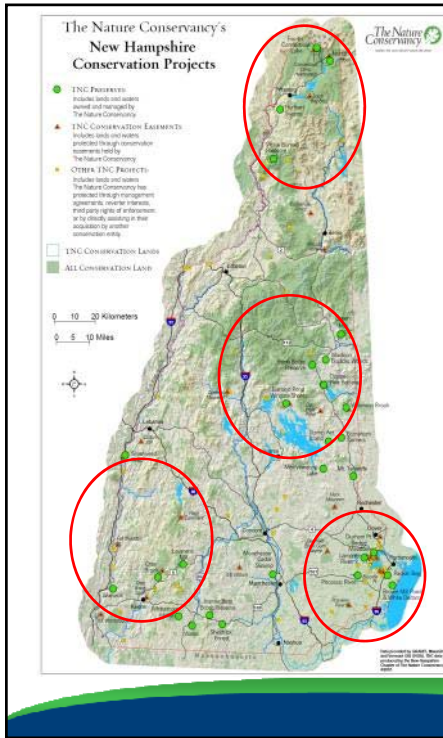
NRCS Wetlands Reserve Program: Conservation Easement Combined Reviews 4/12/2013

#### Easement Properties:

GIS RID	Property Owners	Town	Stream Name	Stream Order	Potential Stream Work Area (ft)	Acres	Review Date
34	Walter Cheney	Lee	Dube Brook	3	4,646	43	3/20/2013
87	Friel	Epping	Lamprey River Trib	1	3,000	526	3/20/2013
68	Meadowsend	Bow	Bow Bog Brook	1	3,704	200	3/20/2013
10	Stave	Milton Mills	Miller Brook Trib	1	2,296	129	3/20/2013
60	Greene	Jaffrey	Stony Brook	3	1,332	154	3/20/2013
45	Underwood	Jaffrey	Cortocook River Trib	2	1,500	290	3/20/2013
2	Meadows End	Kingston	Little River	1	7,000	371	4/11/2013
67	Harbor St	Candia	Fordway Brook	1	3,000	52	4/11/2013
11	Graykin	Deerfield	Lamprey River	3	2,800	49	4/11/2013
33	Harbor Street	Nottingham	North River	3	2,000	52	4/11/2013
50	Dupee	Stafford	Isinglass River	3	1,217	29	4/5/2013

Overall these restorations helped but had limited impacts due to the average installation of roughly 2,000 linear feet.





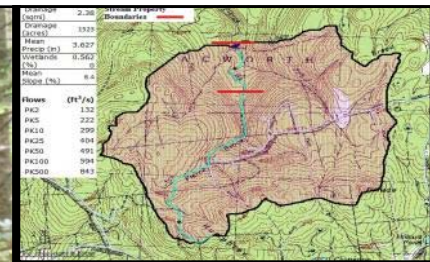
# New Hampshire



## TU's Large Wood Projects Around the State

1. Southeast NH – NRCS WRP: 23 Installations
2. Ashuelot River Tributaries – interested private landowners: 6 Installations
3. Beebe River; roughly 40,000 linear feet added to six major tributaries – Tin Mountain Crew
4. Working now to target watershed scale large wood restoration projects
  - Poorfarm Brook & Gunstock River: 2+ miles

- Drainage Area = 2.4 mi<sup>2</sup>
- Drainage Area = 1,523 acres
- Mean Slope = 6.4 %
- 2 Year Storm = 594 ft<sup>3</sup>/s
- 2<sup>nd</sup> Order Stream



Little Sugar River Drainage

Wood is good,  
but its missing...!

Pierce Brook, Acworth, NH  
Wood Installation – WHIP Project

## Pierce Brook, Acworth, NH ~ Large Wood Restoration



Field work  
completed  
11/21/2012



## Pierce Brook, Acworth, NH ~ Large Wood Restoration



Great  
results two  
years later.



## Pierce Brook, Acworth, NH ~ 2 Years after restoration



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## Hand Placing Large Wood



- Trees felled day of or in advance
- Sections cut to length
- Placed to enhance fish passage
- Re-engage floodplain



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# Grip-hoist techniques



- Powerful Come-along
- Used to secure large wood
- Allows for moving whole trees
- Useful on non-channel spanning wood



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# Chop & Drop In-Stream Large Wood:



Graykin Easement – Lamprey River Deerfield, NH ~ Restoration Completed August 30<sup>th</sup>, 2016



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# Poorfarm Brook Large-Wood Habitat Restoration

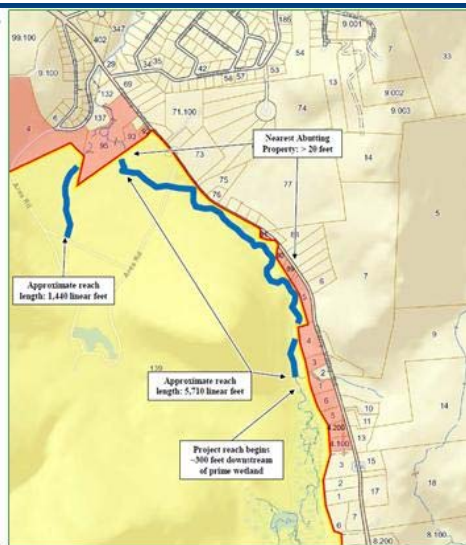
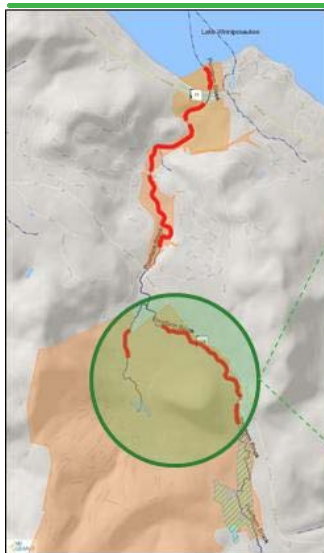
Gilford, New Hampshire



- Trout Unlimited conducted restoration assessment during the 2017 summer season.
- Drafted site assessment for Belknap County Conservation District (BCCD) for use in grant proposals.
- Grant funding awarded to BCCD from New Hampshire State Conservation Committee "Moose Plate" grant program & NFWF.

# Poorfarm Brook Large-Wood Habitat Restoration

Gilford, New Hampshire



- This particular stream reach will serve as a 'conservation demonstration area', as proposed by BCCD.
- Public stream restoration workshops in 2018 & 2019 will feature this demonstration area.
- Post-project monitoring plan to be developed that can be conducted by volunteers

# Some Lessons Learned



1. Project development: landowner coordination requires patience
2. Permits: start early communicating with NHFGD & NHDES
3. Designs: best to go into the field with a plan; revise as needed
4. Field Teams: project dependent, a good field team is 4 to 6 persons
5. Sawyers are the backbone of the operation; let them set the pace
6. Safety First ~ Production Second

## ANDORRA FOREST FISH PASSAGE PROJECT ROBINSON BROOK TOWN OF STODDARD, NEW HAMPSHIRE

PREPARED FOR:  
ANDORRA FOREST

PREPARED BY:  
STREAMWORKS, PLLC,  
and TROUT UNLIMITED, INC.

90% DESIGN  
SEPTEMBER 23, 2016

*THESE PLANS HAVE BEEN  
ISSUED FOR PERMITTING  
PURPOSES ONLY.*

APPROVED BY:  
\_\_\_\_\_  
X  
ANDORRA FOREST, STODDARD, NH



**DRAWING INDEX**

SHEET	TITLE
1	COVER SHEET
2	GENERAL NOTES
3	EXISTING FEATURES PLAN
4	EROSION & SEDIMENT CONTROL PLAN
5	EROSION & SEDIMENT CONTROL NOTES & DETAILS
6	STREAM SIMULATION & CHANNEL PLAN
7	CHANNEL CONSTRUCTION DETAILS & PROFILE
8	BANK CONSTRUCTION PLAN & CHANNEL SECTIONS
9	ROAD PLAN, PROFILE & TYPICAL DETAILS
10	ROADWAY SECTIONS & STRUCTURE LAYOUT
11	SUBSTRUCTURE & BRIDGE DETAILS



ANDORRA FOREST FISH PASSAGE PROJECT ROBINSON BROOK TOWN OF STODDARD, NEW HAMPSHIRE	
<b>COVER SHEET</b>	
SHEET NO.	<b>1</b>
TOTAL SHEETS	11

# Andorra Forest Fish Bypass Channel, Stoddard, NH



Andorra Pond



E-fished 12" Wild Brook Trout



# Andorra Forest Fish Bypass Channel, Stoddard, NH



View of Andorra Pond looking downstream



Property access road across top of dam

Stream channel above pond



## Andorra Forest Fish Bypass Channel, Stoddard, NH



Original stormwater spillway



Vertical  
Pond Outlet



Horizontal  
Outlet



## New Channel Roughed Out



Pond level lowered to construct in dry conditions; photos are roughed out stream bed...







## Finished Stream Channel

Stream bed washed in from welcomed September rains.



## Family and Volunteer Replanting Day

Over 300 woody and herbaceous plants installed.



## Questions welcomed...



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