Stream Habitat and Aquatic Populations

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Stream Fishes of Vermont

Brook Trout

Brown Trout

Rainbow Trout
Burbot
Rainbow Smelt
White Sucker
Slimy Sculpin
Minnows

Blacknose dace

Creek Chub

Longnose dace

Common Shiner
Other Aquatic Species

Spring salamander

Two-lined salamander

Wood turtle
Fishing Expenditures in Vermont 2011:
$131,223,000
1 in 5 Vermont Residents Fished in 2011
Aquatic Habitat

- **Water Quality** – temperature, pH, D.O., etc....
- **Water Quantity** – water withdrawals, flow regulation
- **Physical Habitat** – streambed, banks, riparian zone
“Good Habitat”

Complex
“Good Habitat”

Messy
“Good Habitat”

Connected
Lifestages of a Brook Trout
Important Features of Aquatic Habitat

- Riparian Vegetation
Riparian Areas and Aquatic Habitat

Maximum Daily Temperatures

- **Alder Meadow Brook (Granville)**
- **First Branch White River (Chelsea)**
Temperature Refuge
Riparian Areas and Aquatic Habitat

- Shading – Temperature moderation
- Water Quality Protection
- Sediment Filtration
- Nutrient Absorption
Riparian Areas and Aquatic Habitat

- Shading – Temperature moderation
- Water Quality Protection
- Sediment Filtration
- Nutrient Absorption
- Organic Input & Retention
Riparian Buffers and Aquatic Habitat

- Shading – Temperature moderation
- Water Quality Protection
  - Sediment Filtration
  - Nutrient Absorption
- Organic Input
- Streambank Stability & Aquatic Habitat
Important Features of Aquatic Habitat

- Riparian Vegetation
- “Clean” substrate
Sediment
Effects of Sedimentation

Embeddedness
Important Features of Aquatic Habitat

- Riparian Vegetation
- “Clean” substrate
- Habitat Complexity
  - Bedrock, boulders, cobbles
  - Natural wood
Small, High Gradient Streams
Large, Low Gradient Rivers
Yearling and Older Wild Trout
Altered & Non-altered Stream Sections
Vermont Department of Fish and Wildlife Surveys - 2012

<table>
<thead>
<tr>
<th>Stream</th>
<th>Non-Altered</th>
<th>Altered</th>
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<tbody>
<tr>
<td>Locust Creek</td>
<td>200</td>
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<tr>
<td>Stony Brook</td>
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<td>200</td>
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<tr>
<td>Reservoir Brook</td>
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<td>Lilliesville Brook</td>
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Bed Armor

Dover Brook, Wardsboro
Stream Flow Regulation
Toxic Discharges

- 1971, 89, 04 - Dog River
- 1999 - Third Branch White River
- 1999 - Thatcher Brook
- 2002 - Gunner Brook
- 2005 - Winooski River
Exotic Species /Diseases

- Fish Health Program
  - Importation
  - Private, State Hatchery Inspections
  - Baitfish
  - Live fish transport
  - Wild fish monitoring
Habitat Connectivity
Biological Consequences of Stream Crossings

- Loss of aquatic habitat
- Altered habitat above and below
- Barrier to movement
Aquatic Organism Movement

- **Daily**
  - feeding
  - resting

- **Seasonal**
  - reproduction
  - changing habitat conditions or lifestage
Aquatic Organism Movement
Recolonize Habitat
Batten Kill Brown Trout Radiotracking Study
Study 2 - Fish 12 - Summer and Winter range locations in Batten Kill Main Stem.
Study 2 - Fish 12 - Locations in Batten Kill Main Stem and Roaring Branch

Fish 12
- ○ Summer range
- ★ Spawning movement
- ● Winter range
Impassable Structures result in...
- Habitat fragmentation
- Population isolation
  - Altered community structure
  - Altered genetic structure
Barriers impact more than just trout:
Bridge = Passage

Culvert = Barrier
Culvert Treatments

- Baffles / sills
- “Oversize”
- Embedment
Past structure design considered hydraulic capacity but did not always consider other stream functions – most importantly the transport of sediment and debris!
Undersized Structures

 Interruption of stream sediment/debris transport – aggradation above
Interruption of stream sediment/debris transport – degradation below
Hourglass Syndrome
Chase Brook  Oct 1, 2010
ANR Culvert Assessments
AOP Ratings

BFW $\geq$ 10 feet ($N = 3376$)

<table>
<thead>
<tr>
<th>Percentage of Culverts</th>
<th>Passable</th>
<th>Reduced Passage</th>
<th>Impassable</th>
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AOP Guidelines

- Technical engineering document
- Developed with VTrans & VDEC
- VT specific biology & hydrology
AOP Design
Box with constructed bed

Downstream grade control structure

Bed retention sills and constructed streambed
Stream Habitat Protection

- Regulatory
  - Act 250 / Section 248
  - Stream Alteration General Permit
  - Hydro Relicensing / Water Quality Certifications
- Dam Safety
- Corps of Engineers
- Forestry AMP’s
Stream Habitat Protection

Rivers & Roads Training
Stream Habitat Restoration
Stream Habitat Restoration
Partnerships

Riparian Restoration

Instream Habitat
Stream Habitat Restoration Partnerships
Rock Weir Retrofit 2007
WRP, USFWS, USFS, TU, ANR
Culvert Baffles Retrofit
2014
Friends of Winooski River, USFWS, VDFW
Stream Habitat Restoration Partnerships

Dam Removal

Friends of Winooski River, USFWS, VDEC, VDFW,

Culvert Replacement

Friends of Mad River, USFWS, USFS, Winooski NRCD, VDFW
The MISSION of the Vermont Fish & Wildlife Department is the conservation of fish, wildlife and plants and their habitats for the people of Vermont.