Ecology and Management of Headwater Streams
Groundwater
Steep and Narrow Channels
High flow (spring and after rain)
Base flow (early summer)
No flow (late summer/fall)
Mapped USGS Streams
(1:24,000 scale)

19,553 Acres

21,405 Acres
Mapped USGS Streams
(1:24,000 scale)

19,553 Acres

21,405 Acres
Headwater Streams-
small but mighty!

• Amphibians (17 species)
  – Most common American Toad, Red-backed salamander, wood frog

• Macros (53 species)
  – Most common black flies, mosquitoes, and midges, but also stone flies, mayflies, and cadis flies
Number of Brook Trout in 330 ft of stream channel

<table>
<thead>
<tr>
<th># of fish</th>
<th>25</th>
<th>50</th>
<th>75</th>
<th>100</th>
<th>125</th>
<th>150</th>
</tr>
</thead>
<tbody>
<tr>
<td># of fish</td>
<td></td>
<td></td>
<td></td>
<td>141</td>
<td>40</td>
<td></td>
</tr>
</tbody>
</table>
Length & Weight of Brook Trout

Average Fish: 3 in. and .01 lbs
Management of Headwater Streams
15 Acres

990 ft.
Manomet Headwater Experiment

• Treatments:
  – No Buffer (3 streams)
  – 38ft. Buffer (3 streams)
  – 75ft. Buffer (3 streams)
  – No harvest (control)

• BMPs
  – Filter strip (no scarification within 15ft of stream channel)
  – No unbridged/armored stream crossings
Sediment Plume
Natural Turbidity Changes

Turbidity (NTU)

2001 2002 2003 2004 2005 2006
Natural Turbidity Changes

Turbidity (NTU)

2001 2002 2003 2004 2005 2006

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4

2001 2002 2003 2004 2005 2006
No Buffer vs. Control

Turbidity (NTU)

2001 2002 2003 2004 2005 2006

Harvest
No Buffer vs. Control

Turbidity (NTU)

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4

2001 2002 2003 2004 2005 2006

Harvest
75ft Buffer vs. Control

Turbidity (NTU)

2001 2002 2003 2004 2005 2006

Harvest
BMPs are important!
Water Temperature

Headwater Streams are Sensitive to Increases in temperature due to their small volume
Maximum Daily Post-Harvest Temp Change - **No Buffer**

Distance from Forest (ft)

<table>
<thead>
<tr>
<th>Distance from Forest (ft)</th>
<th>T. change (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>330</td>
<td>-5</td>
</tr>
<tr>
<td>660</td>
<td>0</td>
</tr>
<tr>
<td>990</td>
<td>5</td>
</tr>
</tbody>
</table>
Maximum Daily Post-Harvest Temp Change- No Buffer and 38ft. Buffer

Distance from Forest (ft)

T. change (°F)

330 660 990

0 5 10 15
Average Temperature - No Buffer

Temperature (°F)

2001 2002 2003 2004 2005

Temp Changes: 3.8-6.2°F

Harvest
Average Temperature -
No Buffer and 38ft. Buffer

Temperature (oF)

2001 2002 2003 2004 2005

Temp Changes:
-0.1-4.4°F

3.8-6.2°F

Harvest
Average Temperature - 75ft. Buffer & Control

Temp Changes:
-2.2-0.9°F
-2.4-0.7°F

Harvest
Average Temperature - No Buffer, 38ft., 75ft., & Control

BT Threshold = 66°F (NH)
Management Recommendations

• Follow BMPs!!
  – Prevent disturbance of soil near stream
  – Bridge or armor all stream crossings

• Avoid long area of unbuffered streams

• Consider site specific conditions (e.g. soils, aspect, Atlantic salmon)
For more information visit:
http://www.manometmaine.org/headstream.html

Or contact:
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