Watershed Challenges… and Opportunities

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PEI Landscape

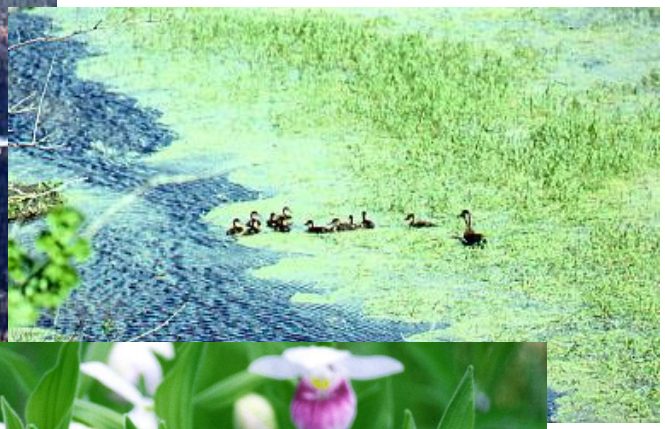
- Island shaped by runoff from mainland mountains, melting glaciers
- ~260 watersheds. The three largest have 150-180 km of stream.
- Thousands of springs keep our rivers flowing in summer.
- Normally, short productive tree-lined streams, long estuaries
- 75% of PEI land surface < 45 m above sea level. Highest point 145 m
- Unusual stream gradients

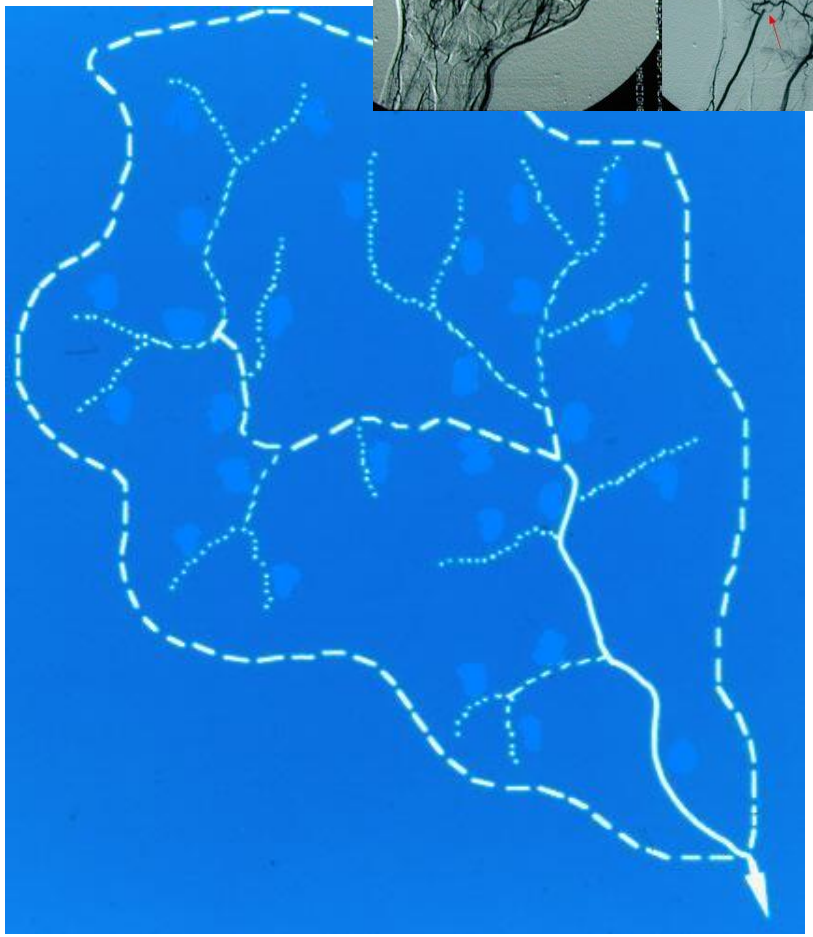
Rivers are so much more than water

- Our rivers are not pipes carrying water to the ocean
- Rivers are complex aquatic ecosystems
- Development and grassed waterways degrade and simplify Island watercourses

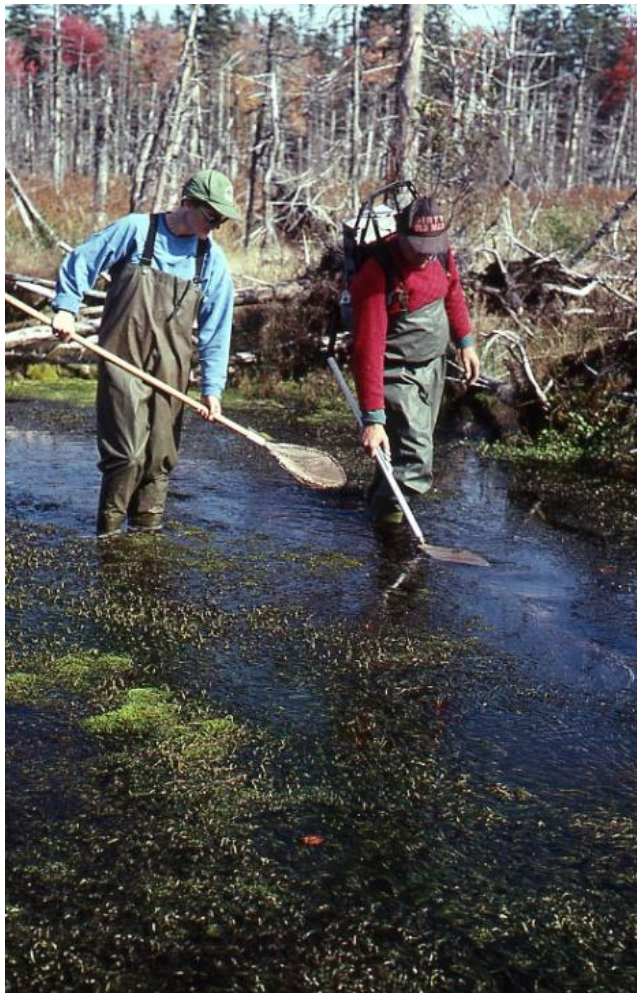
- According to the PEI Dept. Environment and the PEI Potato Board, "PEI presently used only 7% of available groundwater recharge".
- The assumption is that the remainder is there primarily for our use.
- THERE IS NO SURPLUS
- Rivers need a continuous supply of water to support aquatic ecosystems.

- Pisquid Pond – a natural pond on the Morell River
- High biodiversity





- The tiny, spring fed headwater streams are essential for the functioning of the entire river.
- Reduction of water volume in our streams will cause degradation of our freshwater aquatic ecosystems and widespread loss of biodiversity
- Therefore, our precious groundwater should be used with prudence.



- *"To limit the impact on headwater streams, the new policy requires that no more than 100 m of the main branch(s) of headwater stream be predicted to dry up during the low flow time of year as a result of groundwater extraction."*
- *The new groundwater extraction policy will safeguard stream flow and provide greater assurance that aquatic wildlife habitat will be protected…"*

Water Extraction Permitting Policy January 2013"

Importance of Springs and Headwater Streams

- 7-8˚C year round. Keeps streams warmer in winter and cooler in summer.
- Cold water refugia for many organisms
- Critical for brook trout spawning and nursery areas
- 100% of stream flow in summer is composed of groundwater and thus springs are the lifeblood of our streams
- To maintain stream flow in summer, much of the potential 17" of groundwater would be unavailable for other uses.
- In a dry summer in PEI with current water extraction, aquatic organisms are often stressed because of low flow or reduced water quality (water temperature and oxygen).

- For example, juvenile trout use grasses, shrubs and small woody debris along stream edges for food and protection. With surface water reduction, if young fish have to move to deeper zones, they become food, rather than searching for food.

- Dry stream beds in summer or early autumn mean major unreported fish kills in these areas. Brook trout that die because streams dry up or their eggs are smothered in silt are just as dead as fish killed from pesticide runoff.

The Argument for Irrigation?

- The Industry says:
  - "We're not competing anymore… Elsewhere the yield has gone up and if we don't get our yields up we will be economically out of the picture".
  - "Without irrigation, productivity will decline"

- Experts say:
  - Management practices to improve soils can significantly increase potato yield (23-51%) and can serve as a substitute to supplemental irrigation in the cool, humid northeast.
  - "So growers have the option of either investing in irrigation or improving their soils in order to increase potato yield." Dr. Wayne Honeycutt, Research Leader and Soil Scientist

The Soil Management Approach

- Detailed descriptions of best management practices can be found in two publications:
  - *Soil Conservation for Potato Production*
  - *1999 Action Committee Report on Agricultural Runoff Control*
- Most potato producers are currently not following all of the recommendations in these booklets
- The current production model is degrading our Island environment

- According to the potato industry, they are "Committed to environmental sustainability"
- The P.E.I. Potato Board says "*it's time for the public to move past the history and look at what today's potato growers are doing to protect the environment.*"
- Is this commitment translating into action?

Severe soil erosion in the Dunk River watershed

Summary

- The poor land stewardship that reduces recharge of our ground water and degrades water quality must change:
  - rivers running red
  - red snow as far away as the mainland
  - sedimentation throughout watercourses
  - exploding nitrate levels
  - anoxic estuaries
  - shellfish closures
  - larvae mortality
  - fish kills
  - overall ecosystem degradation
- We are aware of solutions to slow and even stop this ecosystem degradation after numerous reports, commissions, and action committees. However, we continue to have poor soil and water conservation on PEI and are being bullied by corporate interests to further jeopardize our precious freshwater resources.

What are we doing to our best rivers on PEI?


Trout River 2011


Trout River 2012


Trout River 2013

Gary Linkletter, chairman of the P.E.I. Potato Board, emphasizes that *"potato farmers of today have learned a lot from past challenges and are making tangible changes in production practices in order to farm in a more environmentally sustainable fashion."*

March 21, 2014 The Guardian

Opening day of the trout season 2013

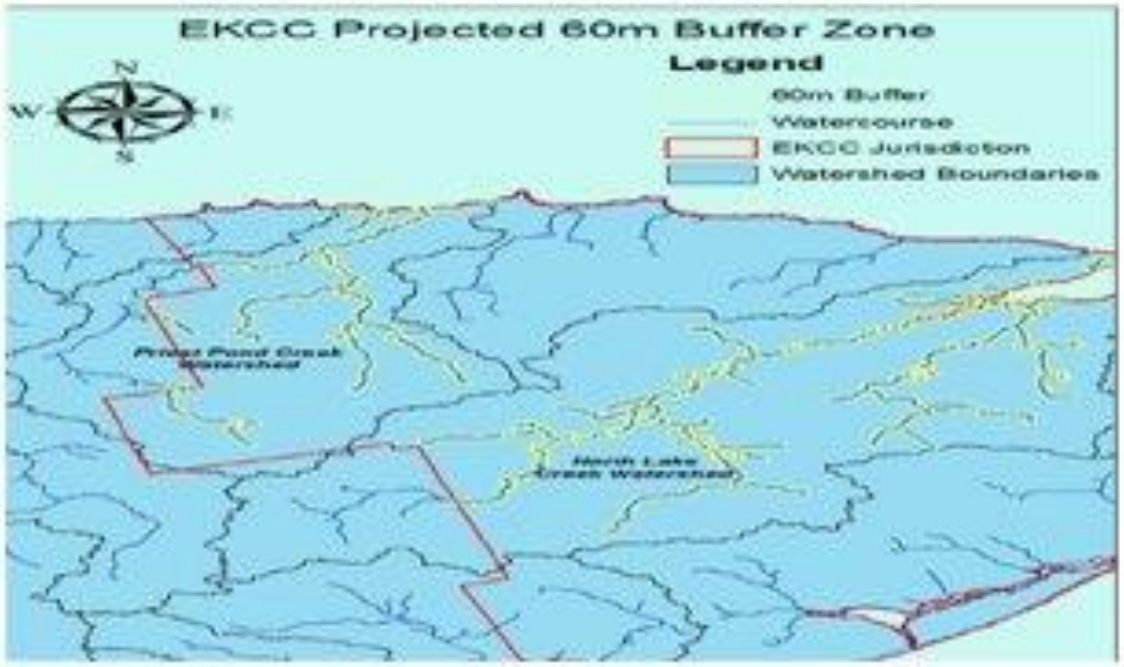
Opening day of fishing season – Dunk River 2013

Angling on the Dunk River
early 1900s

Solutions to Environmental Dilemmas

- Landowner, public and politician awareness
- An ecological-based Island education system

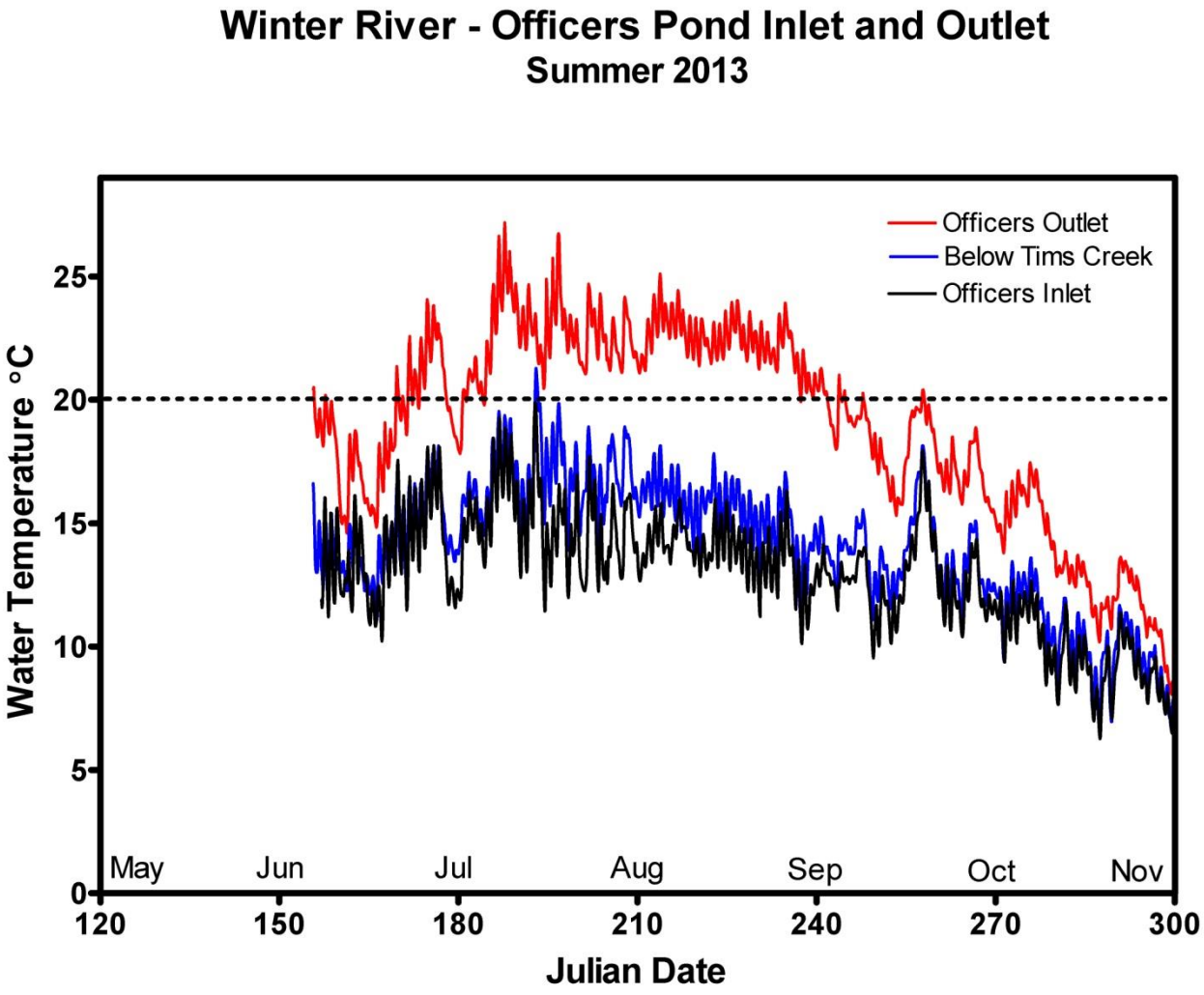
- Increased emphasis on restoring diversified aquatic ecosystems along our Island streams
  - E.g. "Beadlike" protected riparian buffer zones (as in the lower section of the Morell River) along stream corridors
  - Restoration of native habitat (grasses and herbs, wetlands, shrub and tree layers) within the riparian zone
  - Restore essential habitat for a myriad of wildlife species



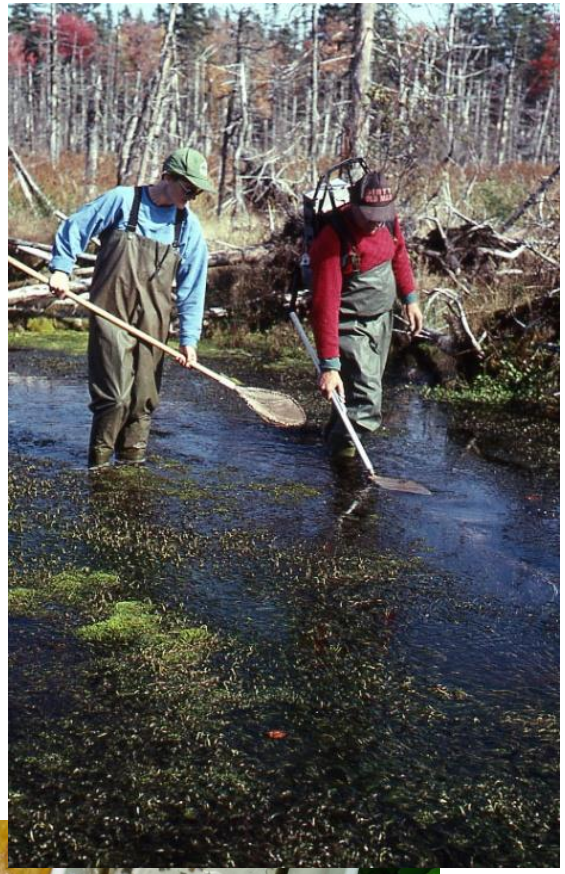
Brook Trout (speckled trout or sea-run trout)

- Connectivity
  - Anadromous – need free passage from estuaries to the headwaters
  - Culverts and dams (velocity and physical barriers)
  - Temperature and oxygen problems (may occur in riverine or estuarine habitat)
  - Water volume
  - Point and non-point contamination

Fish Passage


Winter River - Officers Pond Inlet and Outlet
Summer 2013
Officers Outlet
Below Tims Creek
Officers Inlet
Water Temperature °C
25
20
15
10
5
0
May
Jun
Jul
Aug
Sep
Oct
Nov
120
150
180
210
240
270
300
Julian Date

- Spawning
  - In upper estuary to headwater springs
  - How can sites be protected from sediment?
  - When and where do brook trout spawn?
  - What is desirable at the spawning sites?
  - When do brook trout eggs hatch?



- Since brook trout (and rainbow trout) are carnivorous, where do juveniles find cover and food?
  - Dense vegetation in headwaters and springs
  - Grasses along stream banks (note water temperatures and initial feeding)
  - Alder bases and small woody debris
  - Red-osier dogwood and native willows
  - Overhanging cover, desirable instream vegetation and gravel-cobble provide insect food
  - Properly installed brush mats

- Juvenile trout (1-3 years of age)
  - At least 2 years before they migrate to estuaries. Limited movement in freshwater after initial dispersal.
  - Rely extensively on aquatic insects both within the stream and drift
  - Seasonal supplement of high protein eggs and juvenile fish from other species (e.g. smelt, alewives)
  - Found in shallow pools with cover

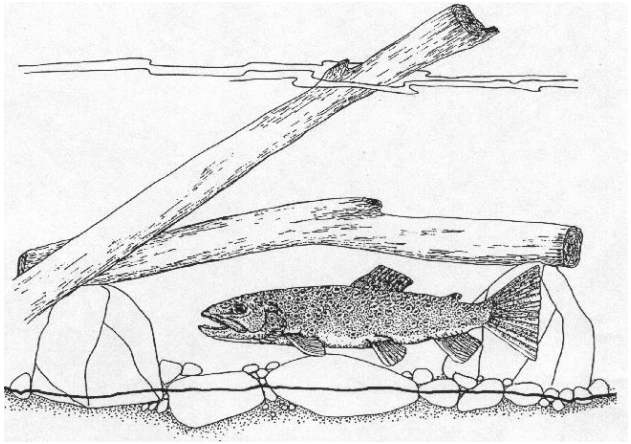
- Life in Estuaries
  - Benefits and challenges
  - How have sea runs changed?
  - How has water quality changed in estuaries?

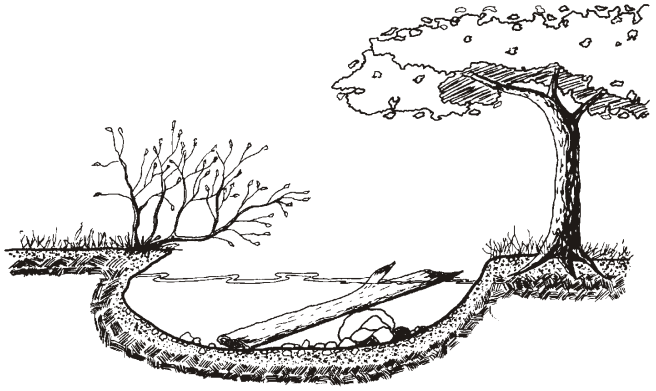
Leards Pond – Pisquid River

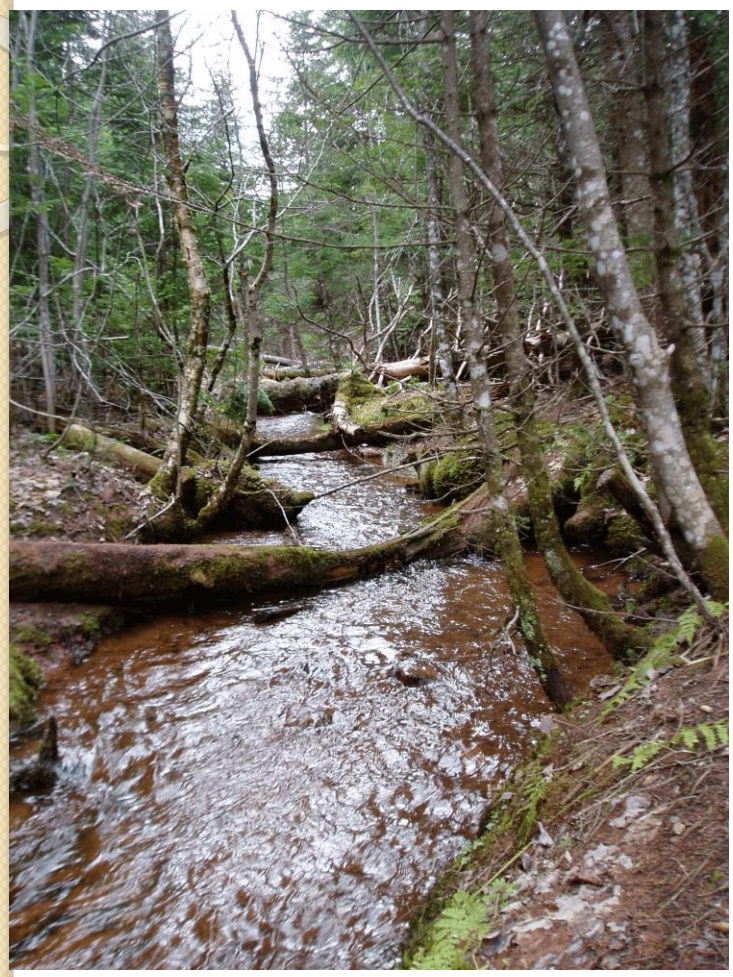
Before

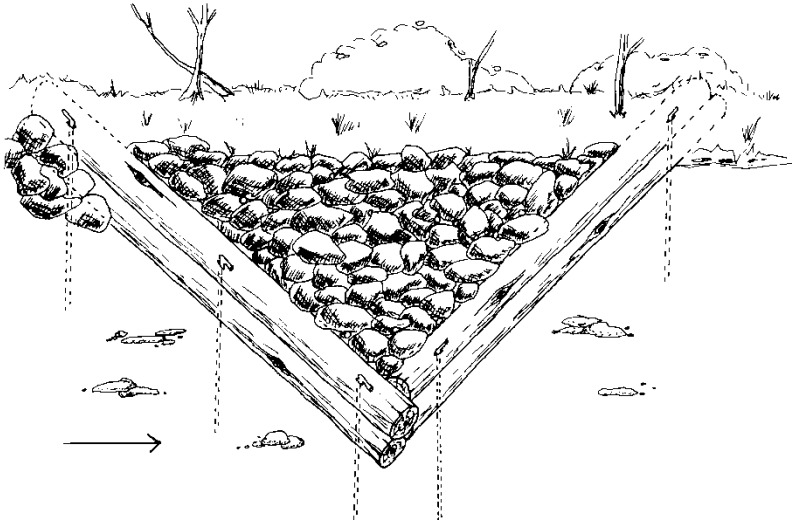
After

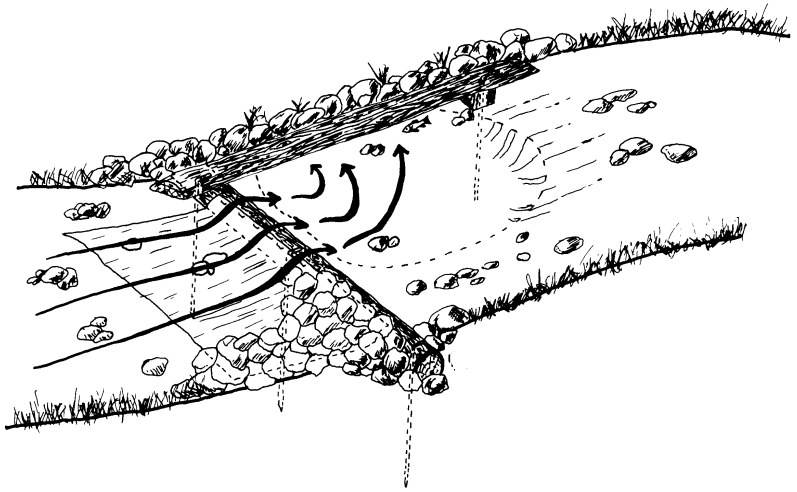
- Instream Restoration
  - Could be undercuts, large woody debris, deflectors, digger logs, cross vane, J-hooks vane, etc.

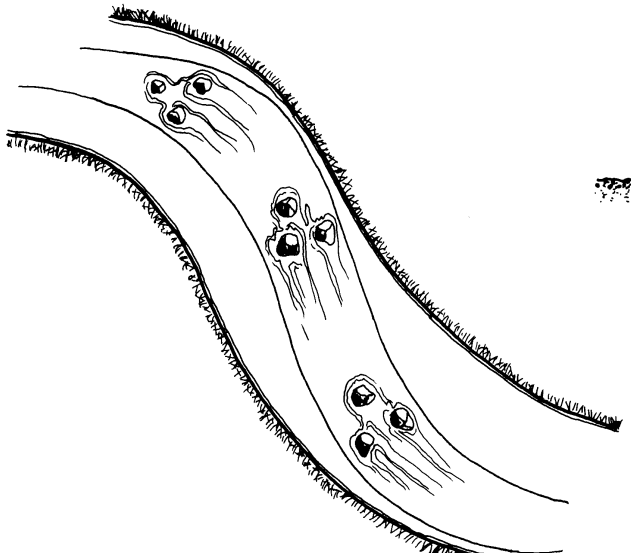


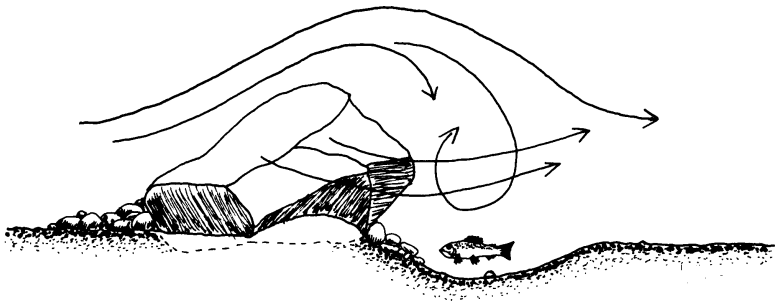


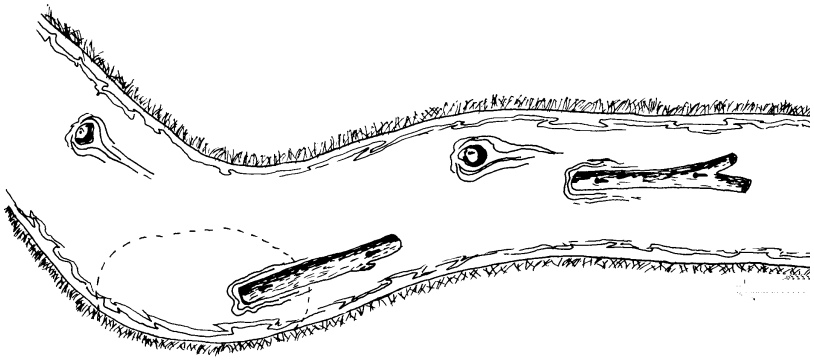


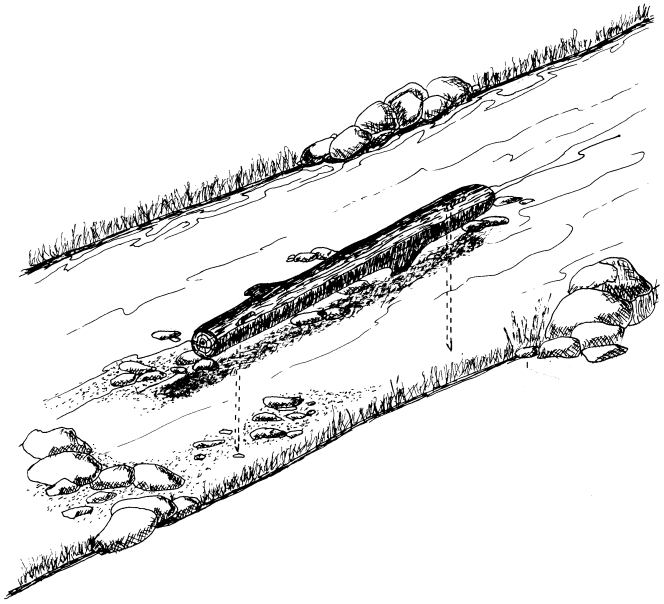












Sediment Traps

Riparian Zone Restructuring

"Yes, the planet got destroyed. But for a beautiful moment in time we created a lot of value for shareholders."