



WATERSTRIDER



Clean Annapolis River Project

Restoring and protecting the ecological health of the Annapolis River watershed through science, leadership and community engagement

Flooded Forests

Article by Nora Spencer, Ecological Restoration Technician

Riparian areas are the transition between aquatic and terrestrial ecosystems. Old growth Acadian forests in these zones can be recognized by tree species such as red spruce, balsam fir, eastern hemlock, eastern white pine, yellow birch, sugar maple, and American beech.

Riparian areas are important for supporting high levels of biodiversity, preservation of nutrients and providing habitat for plants and wildlife. The old riparian Acadian forest is an essential component to maintain and restore the ecological health of the Annapolis River watershed.

The Annapolis valley is one of the few regions where these forests are still present, in spite of nearly 400 years of European settlement. These actively flooded forests are among the most endangered ecosystems in eastern Canada and are a high priority to conserve, some with rare plants that have not been found in other areas of Nova Scotia. As many of these sites are on private land little research has been conducted in respect to the threats facing them.

Currently, 34 sites are being assessed for impacts to the forests or streambanks, threats and potential for conservation. Soil conditions, species present and land use are also being recorded. The data collected will be used to determine what the best conservation option for the land is,



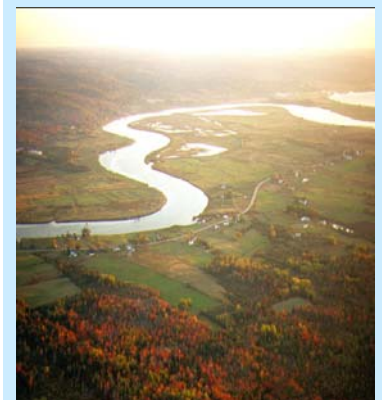
Cedar stand along the Annapolis River

including stewardship agreements, conservation easements or purchase. Encouraging protection of these sites as part of the Environmental Goals and Sustainable Prosperity Act (EGSPA) is the next goal.

EGSPA requires the province to protect 12% of Nova Scotia's landmass by 2015. As most crown land possibilities have been exhausted, the need to protect private land is essential to achieve the 12% goal. The predominantly agricultural landscape of the Annapolis valley has eliminated the majority of old growth Acadian forest throughout its history, therefore the protection of these nationally unique sites would further Nova Scotia's goal.

There are many benefits to conserving private land. These include ensuring that future generations are able to enjoy the land as is as well as financial benefits. If you would like to learn more about conservation options for private land you can visit www.nsnt.ca

Clean Annapolis River Project is a charitable, community-based organization dedicated to restoring and protecting the ecological health of the Annapolis River watershed through science, leadership, and community engagement.



Nature gives to every time and season some beauties of its own; and from morning to night, as from the cradle to the grave, it is but a succession of changes so gentle and easy that we can scarcely mark their progress.
-Charles Dickens

Fostering our Forests



Nora Spencer (staff) measuring dbh of a deciduous species.

Article by Chelsae Postma, Ecological Restoration Technician

Climate change frequents news programs, from hurricanes to the greenhouse effect. But what effect is it having on the world's forests? Are air pollutants changing the way a forest grows and matures? Are more sensitive tree species slowly dying while hardier ones survive? These are some of the questions that environmental professionals hope to be answered through the long term monitoring of secluded forests across Canada.

For over seven years, CARP has been a partner in the Terrestrial Vegetation Monitoring program, facilitated by EMAN, the Ecological Monitoring and Assessment Network. This is a global program to assess forest health and biodiversity.

This is a long-term program designed to assess how a forest changes through time and the impact human development may be having. As part of this program, four forest plots were chosen, marked, and examined for species abundance, diversity, and regeneration in the Cloud Lake Wilderness Area near Nictaux.

First selected and surveyed in 2005, the plots were again visited this past summer in 2010. Every five years the plots are reassessed and the changes in the stand's ecosystem analysed.

The process began by choosing four permanent 20m by 20m adjacent quadrants that were staked to ensure continued use throughout the project. Trees were then assigned a unique ID number, species identified, and diameters measured in a spiral fashion

working from the edge of each plot toward the centre. Only trees with 4.0 cm or greater dbh (diameter at breast height) were included in the survey. As the project spans many years, new trees are added as they achieve the minimum diameter and receive the next number in the sequence.

The exact location of each tree within the plot was recorded, to aid in re-locating the tree in subsequent surveys. This is particularly helpful to identify dead or fallen trees years later. The physical condition of the tree is recorded with two characteristics. The first parameter declares the health, alive or dead, and the second its position, standing broken, leaning, fallen, or dead top. Other parameters such as tree height and age can also be determined.

Within each plot, five smaller regeneration areas of 2m by 2m are



staked where seedlings and saplings are surveyed. The number of species present, and their height between 16cm and 200cm for seedlings, and over 200cm for saplings, are recorded.

The data collected by CARP is pooled with that from hundreds of other plots across Canada to allow regional, national and international assessments of forest health, biodiversity and regeneration.

Forests are dynamic ecosystems that change in species' abundance, dominance, and diversity as they mature through time. By monitoring the species at specific intervals throughout the life of the forest, one can gain insight into its natural progression. The smaller regeneration plots also flag possible problems in the forest's regeneration capabilities.

As our world becomes increasingly industrialized, its ecological footprint expands creating a greater impact on the environment. Continually

assessing the health of the forest gives insight into its tolerance of "climate change, toxins, UV-B, and changing land use" (Roberts-Pichette and Gillespie, 1999). The goal of this project is to facilitate long-term monitoring of the natural forest and observe how current practices may be affecting forest dynamics. As the research methods of the program are consistent, data from many regions can be combined to paint a broader picture of how the forest ecosystems have changed in the last 50+ years.

Reference: Roberts-Pichette, Patricia, and Lynn Gillespie 1999. *Terrestrial vegetation biodiversity monitoring protocols. EMAN Occasional Paper Series, Report No. 9. Ecological Monitoring Coordinating Office, Burlington, Ontario*



Young seedling measuring just 16cm in height in a regeneration plot

Sierra Buddies

Sierra Buddies is a high school leadership and eco-mentoring program offered by the Sierra Club. It focuses on equipping high school students with the tools and skills to partner with grade six classes and teach them about ecological footprint and sustainability.

The Sierra Club would like to expand the schools it partners with in the Sierra Buddies program. Please contact the Sierra Club if you are interested in the program.

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Broken Brooks: Repairing Past Wrongs

Article by Katie Taylor, Ecological Restoration Technician

Culverts serve to re-route a brook/river under a roadway to maintain the flow of water through a streambed. Within the Annapolis River Watershed there are over 1,500 culverts. Research completed by CARP in 2007 and 2008 looked at over 250, finding that 55% of culverts on fish bearing streams were barriers to fish passage.

Fish rely on access to brooks for spawning, feeding and for refuge from warmer waters. Research completed this year was based on Brook trout (*Salvelinus fontinalis*), which migrate to brooks and streams to spawn in the fall. Eggs remain in the brook until spring when the fry emerge.

Culverts are barriers to fish passage when they are not installed properly, are poorly designed or not maintained. These culverts can have one or a combination of problems, such as a significant outflow drop,



Perched Culvert in the Watershed

insufficient outflow pool size, a steep slope, rusted out bottom, broken baffles, insufficient water in the culvert or debris blocking either the inflow or outflow.

CARP staff completed 777 bridge and culvert assessments during spring, summer and early fall of 2010, throughout the watershed and along the Bay of Fundy shore.

Assessing these culverts gave CARP a better understanding as to how culverts are impacting aquatic connectivity. Aquatic connectivity is the network created by brooks, rivers and lakes as they interact before reaching the ocean.



Cement weir culvert, Shaw Rd Bridgetown

CARP first assessed all of the culverts that directly feed into the Annapolis River and the Annapolis Basin. If barriers are found at these culverts, it means that significant upstream habitat is not accessible for Brook trout and other fish. It also means that fish living in that stream are trapped within a small area of habitat.

Segmentation of brooks and streams leads to a decline in fish populations, as fish living in these areas are restricted to limited resources. Segmentation can also lead to habitat degradation over time.

Of the 777 culverts and bridges that were investigated, 635 were determined to be on fish bearing streams. Table 1 presents the results for culverts and bridges located on fish bearing streams.

In an effort to restore upstream habitat loss, CARP staff carried out 10 culvert remediations. Remediations consisted of nine debris removals and one tailwater control, restoring over 11 kilometres of fish habitat.

The image below is of CARP staff at the end stages of completing the three-day installation of a tailwater control. This particular stream is located in Granville Centre and has two large steel culverts running beneath the road. The velocity coming through these two culverts exceeded the swim capacity for most fish species.

The velocity of the water was measured at various times and flow conditions and found to be between 0.45 and 2.6 m/s. The prolonged

swim speed of a 10cm Brook trout is 0.49 m/s. for duration of 10 minutes and a burst speed of 0.93 for duration of 10 seconds (swim speeds obtained from the FishXing™ software).

The tailwater control or rock weir was designed and built at the end of the outflow pool raising the water level in the culvert, reducing the velocity of water in the culvert and the outflow drop and ultimately allowing fish to pass through the culvert.



Table 1

Type	Total	Barriers	% Barriers
Bridge	119	5	4%
Culvert	516	285	55%
Total	635	290	46%

Got Holiday Fever?

The holidays are just around the corner. Consider ways to make them green:

- Recycled paper and reusable bags for wrapping
- Give an experiential gift (tickets to a concert or sports event)
- Make a donation in someone's name to a worthy organization or charity.

Environmentally focused New Year's resolutions can have a large impact.

- Vow to stop buying bottled water and invest in a filter
- Commit to carpooling or biking to work
- Decide to eat a local, vegetarian or organic meal once a week
- Volunteer with an environmental organization

Visit: www.onemillionactsofgreen.com for more ideas.

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Something Good Came from the '90's!

Article by Nicole Oliver, Board member

In 1990, the Annapolis River was rejected as a candidate for a Canadian heritage river because of human alteration. At the same time the river was selected by the scientific community in Nova Scotia as a demonstration site for innovative environmental management. These events converged and Clean Annapolis River Project (CARP) was born.

The organization started with five founding directors: Shae Griffith, John Starr, Eric Hundert, Graham Daborn and Stephen Hawboldt. Stephen Hawboldt was appointed full time as executive director of CARP and the organization began to grow.

One of the earliest and longest running projects is the Annapolis River Guardians, a volunteer water quality monitoring network that has provided long term data on the physical and chemical characteristics of the river. This project has received awards for its success in engaging citizens in an important community environmental issue, as well as collecting valuable scientific data.

Another area of focus is the protection and restoration of riparian areas. Riparian areas (transition zones

between aquatic and terrestrial areas) can also suffer from human action by reduced vegetation, habitat and biodiversity, as well as increased erosion and soil compaction. Through various projects over 16,100m of riparian areas have been fenced and protected from negative impacts. Additionally, more than 8500 live willow stakes and 20,000 native plants have been planted in the watershed to increase biodiversity and protect native habitats.

The organization has also educated many schools, businesses, government representatives and industries on CO₂ emission and energy use reduction, protection of native habitats and species, water conservation, pollution prevention and environmental stewardship.

The past 20 years have yielded many successes; many more than have been listed here. However, each day new environmental challenges surface and CARP continues to evolve to protect and restore the ecological health of our environment. To learn more about the organization, volunteer or learn ways that you can become a better steward of the environment visit the website: www.annapolisriver.ca or call 1-888-547-4344.

CARP Seeks Executive Director

Press release first published in the Annapolis County Spectator on September 23, 2010

Annapolis Royal - Due to the pending retirement of its current executive director, Stephen Hawboldt, the Clean Annapolis River Project (CARP) is seeking a new Executive Director according to President, Richard Bridge.

"Everyone associated with CARP is very sorry that Hawboldt is retiring," said Bridge. "Over the past 20 plus years, Stephen has played a pivotal role in making CARP the success that it has become. His extraordinary leadership and effort have contributed dramatically to the ecological health of the Annapolis River watershed and our understanding of it" said Bridge.

CARP is among the most respected environmental groups in the country because it has been so successful in engaging the residents of the Annapolis River watershed in building a sustainable future for their communities, according to Hawboldt. "It has been a real privilege," he said, "to have had the opportunity to work with the hundreds of dedicated individuals who has made these achievements possible."

Bridge said that there have been many strong applications received for this position. It is anticipated that the new executive director will be in place later this fall. We are fortunate that the outgoing executive director will be available to make this transition seamless, he added.

Created in 1990, CARP is a charitable, non-governmental organization with a mission to restore and protect the ecological health of the Annapolis River watershed through science, leadership and engagement. CARP is involved in a wide range of programs related to ecological monitoring, habitat restoration, watershed stewardship, environmental management, energy conservation and public engagement. The organization has received wide regional, national and international recognition for its achievements.

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Clean Annapolis River Project

Contributions welcome:

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Contribution deadlines:

Spring: 1 March
Summer: 1 June
Autumn: 1 September
Winter: 1 December

Membership:

Adult \$7 Family \$10