Great Aquatic Habitat is More Than *Just* Clean Water

We all know that clean water is important. We need it to drink. We use it for swimming, paddling, fishing, cleansing, and playing. Clean water is essential for human health. But have you ever considered how crucial clean water is to other animals, plants or their habitats?

The Vermont Department of Fish and Wildlife has long recognized that the health and abundance of fish and wildlife populations is dependent upon the quality of their habitats. For land animals, this means adequate drinking water, and functional ecosystems that can support their needs for food and shelter. For aquatic populations (plants and animals that live in the water), this means both the physical and structural habitat within lakes, ponds, rivers, streams and wetlands, as well as the quality of the water itself.

The Issues:

Physical Habitat: Good physical habitat is diverse, complex, messy and connected. Fish and other aquatic organisms need habitat diversity and structural complexity in order to thrive. Different species require distinct habitat and those may vary with changing life stages and environmental conditions. A healthy water body might include a mix of large boulders, fallen trees, cobbles, gravels and a forested shoreline and provide a mix of fast and slow currents, and of deep and shallow areas. The quality of the water itself is equally as important as the physical makeup of the waterway. Many factors contribute to water quality, but from a wildlife perspective, some of the most important include temperature, sediment and nutrient levels.

Water temperature has a profound influence on aquatic species distribution and abundance. Colder waters maintain higher oxygen levels, essential for sustaining aquatic populations. Species such as brook trout and spring salamanders thrive in our colder forested mountain streams. These cold water streams also moderate temperatures in larger rivers which they feed, and provide thermal refuge for many species during the warm summer months.

Excessive sediment can also impact the quality of water. While sediment is transported and deposited by streams and rivers through the natural process of erosion of the landscape, when adjacent land use practices and the elimination of forest buffers increase the rate and magnitude of erosion, it can lead to excessive sediment levels in the water. These disproportionate amounts of sediment in the water can degrade aquatic habitat quality and complexity, leading to a reduced

density and diversity of aquatic insects and negatively impacting the ability of many fish species to successfully reproduce.

Finally, **nutrient levels** influence water quality. Nutrients are often transported with sediment and, in excess, can result in algae blooms and overabundant aquatic plant life. When these proliferations of plant life die, the decomposition process consumes oxygen, in extreme cases creating an environment so anoxic (bereft of oxygen) that it can result in fish kills.

How We Work to Protect and Improve Aquatic Habitat:

The Department of Fish and Wildlife staff are actively and continually working to protect water quality by influencing land and water use activities. Some of our efforts include:

Promoting the protection and enhancement of riparian areas or "buffers" –A riparian area that is unmowed, undisturbed, and naturally vegetated buffers the waterbody and riparian ecosystem from the impacts of adjacent land uses. Buffer functions include protecting water quality and providing for aquatic and terrestrial habitats. Riparian areas provide water access and travel routes for wildlife and plants, and help to dissipate floodwaters.

Stream crossing designs which allow for the passage of aquatic organisms and are compatible with natural processes. Well-designed stream crossings can minimize or prevent streambank instability. If left unchecked, instability leads to erosion and sedimentation of water. Additionally, many existing stream crossings are barriers to the movement of fish and other wildlife. In cooperation with VDEC and VTRANS, we work to develop stream crossing designs and practices that allow aquatic organisms to freely pass and which are compatible with stream processes.

Co-administration of the Watershed Grants Program and State Wildlife Grant Program (with VDEC) Funds from these grant programs support water quality and aquatic habitat improvements across the state. The Vermont Watershed Grants program offers Vermonters an opportunity to protect and restore watersheds. By purchasing Vermont Conservation License Plates, you contribute grant funds that are distributed for noteworthy local and regional water conservation and restoration projects throughout Vermont. While the State Wildlife Grant Program is not solely focused on aquatic ecosystems, the federal funds that support these grants are used to protect Vermont species of great conservation need, including many aquatic animals such as lake sturgeon, turtles, and even freshwater mussels. By protecting these critical species, the overall aquatic environment and other species also benefit.

Provide outreach and technical assistance on aquatic habitat and ways to protect or improve it. Another way that Fish & Wildlife work to improve our waterways is to provide assistance to private landowners, towns, regional planning commissions, and not-for-profits. As experts in their fields, our

scientists work collaboratively with Vermonters to protect habitat both on land and in the water. If you are looking for technical assistance for a waterway or other piece of land, our online Web Guide to Technical Assistance Programs is a great place to begin!

Promoting water quality protection through participation in proceedings regulating water-based development. The Vermont Fish & Wildlife Department provides review for a variety of regulatory processes, including Vermont's land-use development law Act 250, Vermont's Endangered Species law, Vermont Wetlands Conditional Use permits, Corps of Engineers permits, Stream Alteration and Stream Crossing permits, and Dam Safety permits. Our scientists review for potential impacts to streams, shorelines and aquatic habitats, necessary wildlife habitat, rare, threatened and endangered species occurrences, and significant natural communities. You can learn more about our involvement in regulatory review processes here.

What You Can Do:

It is clear to all of us who work in natural resource conservation that the people of Vermont care about wildlife and their habitats. That doesn't necessarily mean, however, that we know what we can do to help. My final message is aimed at those who would like to support the work of keeping water clean and healthy for our wildlife, and for their environments. Here are some things you can do to conserve and protect aquatic habitats:

- **Learn about habitat.** What do fish and other aquatic organisms need? For anglers, think about a fish that you enjoy catching. You know where to find them, right? What is it about that part of the river or lake that meets the habitat needs of these adult fish? What other types of habitat do fish need to support them during their life stages as an egg, fry and juvenile? You will find that they are dependent on an entire array of other living things in the water, each with its own requirements for food, shelter, terrain, etc. Learning about these organisms and their needs will help you to understand about and identify high quality aquatic habitat. Anglers, hunters and others can join or assist angler and watershed groups. Technical assistance is readily available from state, federal and local organizations. You can find a comprehensive list of watershed groups and partnership organizations here.
- **Become a steward.** Do you own land that borders a stream, lake, pond or river, or that contains a wetland or vernal pool? Consider managing your land to protect and improve habitat for fish and other aquatic organisms. One of the most important things you can do for fish habitat is to leave a naturally vegetated buffer strip of 50 to 100 feet wide on streambanks and lakeshores. Forested buffer strips shade streams, keeping water temperatures cool, contribute leaves and woody debris for food and cover, and reduce the amount of nutrients, toxins, and sediment entering a stream or lake. If you want to know more about managing

land for wildlife (aquatic and terrestrial) consider ordering the Landowners Guide – Wildlife Habitat Management for Lands in Vermont.

- **Get involved.** There are many groups and individuals working to protect aquatic habitats in Vermont. Join up – offer your knowledge, experience and helping hand. Working with others is a great way to learn and to get a lot done. Can't find a group in your area, or can't find a group working on the stream or lake you want to protect? Start one! Involvement can range from hands-on work in your favorite river to activism in the political or regulatory areas.
- **Spread the word.** Take what you've learned and educate others! Many hands make light work!

As you come to the close of this article, take a moment to reflect on what it took for a fish or other aquatic organism to move through the different phases of its life, and to reach adulthood. For the organism you are imagining, and ultimately for all aquatic plant and animal species, the best way to ensure healthy and sustainable fisheries and aquatic communities is to protect and restore habitat.