STREAM CONNECTIVITY, STREAM STABILITY, & FLOODPLAIN PROTECTION

Addressed by 5 management objectives, 11 action plans

Rivers and streams in the Piscataqua Region watershed are crossed by multiple roads and are restricted by large and small dams. Where roads cross waterways, their accompanying infrastructure, culverts and bridges can inhibit aquatic passage by fish, reptiles, amphibians and mammals, as well as restrict streamflow, resulting in ponding (water backup behind restrictions) or perching (outflow enters above stream level). These physical restrictions may lead to water quality degradation, road flooding and unintended hydrologic alteration upstream and downstream of the crossing. Stream crossing guidelines issued by New Hampshire and Maine agencies recently have been updated to accommodate appropriate designs that allow passage of aquatic organisms and help to retain or restore stream connectivity.

Dams can prevent diadromous fish from moving between saltwater and freshwater habitats critical to their migratory lifecycles and prevent movement of freshwater fish between river reaches. Alewives, American shad, rainbow smelt, striped bass, blueback herring, sea lamprey and American eels are the most common diadromous fish that enter the Piscataqua Region watersheds. Freshwater fish affected by dam restrictions include Eastern brook trout, American brook lamprey, and blacknosed dace, among many others. Impoundments created by dams often have water quality problems as a result of dams slowing down water movement and increasing the residence time for sediments, nutrients and other pollutants. Low dissolved oxygen levels and higher temperatures of impoundments may be problematic for many migratory fish, native coldwater fish species, and freshwater mussels. Dams also alter the transport of sediment and nutrients through the stream network and cause upstream and downstream impacts to stream channel structure and function.

There are 17 head-of-tide dams in the New Hampshire seacoast blocking most major and minor tributaries to the estuaries and ocean. These dams have eliminated a natural transition zone between saltwater and freshwater and have thereby almost completely eliminated important brackish marsh habitats. There are fish ladders on only seven head-of-tide dams that provide upstream passage for some diadromous fish species and two of those that additionally allow downstream passage. While fish ladders make passage possible some of the time for some species, most experts believe that existing ladders are not effective at passing most migratory fish species most of the time. In 2009, removal of the head-of-tide dam on the Winnicut River re-established the only free-flowing tributary to the Great Bay.

Another important issue related to rivers and streams is flooding. Historic alteration of floodplains and crossings can worsen flood impacts. Rivers and streams adjust their shape and flow characteristics based on channel materials, topography, storm intensity and duration, and nearby land use. River and stream shapes can be broadly categorized, and the tendency for rivers to change (stability) can be assessed. A stream or river's shape and stability provide valuable information about flooding potential and stream migration.

Increased storm frequency and intensity have caused serious flooding on many Piscataqua Region rivers and streams, most notably the "100-year" flood events in 2006 and 2007. A 100-year flood is defined as a storm where the level of floodwater is equaled or exceeded every 100 years on average. This recent flooding highlights the vulnerability of roads and other development in floodplain areas to damage and catastrophic loss. The State of Vermont responded to its flooding problems by conducting geomorphic assessments of rivers to determine their stability. This was followed by stream restoration and flood zone protection activities. A similar approach is being undertaken in New Hampshire for those rivers that have experienced catastrophic flooding over the past several years. Portions of the Exeter River and Isinglass River have been evaluated, and other coastal rivers will be surveyed in coming years.

Once the fluvial geomorphology – the study of stream patterns and properties – is understood, fluvial erosion hazard (FEH) zones can be identified along river segments. Identification and adoption of FEH zones and floodplain development restrictions are needed for flood-prone areas.

Beginning in 2009, New Hampshire towns were granted the authority to adopt FEH zoning. FEH zoning is an effective mechanism to keep development out of harm's way and allow natural channel adjustment processes to take place.

DAMS, DIKES, PERCHED CULVERTS, AND OTHER STREAM BARRIERS HAVE THE POTENTIAL TO LIMIT OR COMPLETELY RESTRICT ACCESS TO SPAWNING HABITAT AND OTHER HABITATS FOR VARIOUS LIFE STAGES OF NATIVE RESIDENT … AND ANADROMOUS SPECIES."

GULF OF MAINE COUNCIL ON THE MARINE ENVIRONMENT, STREAM BARRIER REMOVAL MONITORING GUIDE, 2007

"IF A RIVER CANNOT ACCESS ITS FLOODPLAIN, WHICH SERVES THE ESSENTIAL PURPOSE OF SLOWING FLOODWATERS AND STORING SEDIMENT, STREAM BANKS ARE SUBJECTED TO THE FULL POWER OF FLOOD FLOWS, LEADING TO EXTENSIVE FLUVIAL EROSION."

VERMONT RIVER MANAGEMENT PROGRAM, MUNICIPAL GUIDE TO FLUVIAL EROSION HAZARD MITIGATION, 2008