Confined River

Confined river at Plattekill Creek

Photo credits: *Andy Finton*

System Riverine

Subsystem Natural Streams

Did you know?
Common features of confined rivers include plunge pools, flumes, chutes, cascades, alluvial fans, and mussel beds. The predominant source of energy is generated in the stream. These streams have high water clarity, are well oxygenated, and typically have cool water.

Summary

Protection Not listed in New York State, not listed federally.

Rarity G4, S3

A global rarity rank of G4 means: Apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery.
A state rarity rank of S3 means: Typically 21 to 100 occurrences, limited acreage, or miles of stream in New York State.

Conservation Status in New York

There are probably several hundred occurrences statewide. Many documented occurrences have good viability and are protected on public land or private conservation land. This community has statewide distribution, and includes several high quality examples. The current trend of this community is probably stable for occurrences on public land, or declining slightly elsewhere due to moderate threats related to development pressure or alteration to the natural hydrology.

Short-term Trends

The number and miles of confined rivers in New York have probably remained stable in recent decades as a result of water quality regulations. Several examples have shown improvement in water quality in recent decades attributed to improved treatment of municipal and industrial waste (Bode et al. 1993).

Long-term Trends

The number and miles of confined rivers in New York are probably comparable to historical numbers, but the water quality of several of these rivers has likely declined significantly prior to the enforcement of water quality regulations (New York State Department of Environmental Conservation, Division of Water 2000).

Larger occurrences of this natural community (>12.5 acres) are protected under NY State wetland laws.

Conservation and Management

Threats

Confined rivers are threatened by development and its associated run-off (e.g., residential, agricultural, roads, bridges), recreational overuse (e.g., ATVs, intensive fish stocking and removal), and habitat alteration in the adjacent landscape (e.g., excessive logging, instream gravel mining, pollution run-off). In addition, alteration to the natural hydrology (e.g., impoundments, ditching, stream channelization, dredging, canals), spread of non-native invasive species, and reduction in water quality (e.g., siltation, trash, turbidity, septic/nutrient run-off) are threats to confined river communities. Agricultural activity is the most frequently cited nonpoint source of water quality impact and use impairment to New York State rivers (New York State Department of Environmental Conservation, Division of Water 2000).

Conservation Strategies and Management Practices

Where practical, establish and maintain a riparian buffer to reduce storm-water, pollution, and nutrient run-off, while simultaneously capturing sediments before they reach the river. Buffer width should take into account the erodibility of the surrounding soils, slope steepness, and current land use. If possible, minimize the number and size of impervious surfaces in the surrounding landscape. Avoid habitat alteration within the river and surrounding landscape. For example, roads should not be routed through the riparian buffer area. If the river must be crossed, then bridges and boardwalks are preferred over filling and culverts. Restore past impacts, such as removing obsolete impoundments and ditches in order to restore the natural hydrology. Prevent the spread of invasive exotic species into the river through appropriate direct management, and by minimizing potential dispersal corridors.

Development and Mitigation Considerations

When considering road construction and other development activities, minimize actions that will change what water carries and how water travels to this community, both on the surface and underground. Water traveling over-the-ground as runoff usually carries an abundance of silt, clay, and other particulates during (and often after) a construction project. While still suspended in the water, these particulates make it difficult for aquatic animals to find food; after settling to the bottom of the system, they bury small plants and animals and alter the natural functions of the community in many other ways. Thus, road construction and development activities near this community type should strive to minimize particulate-laden run-off into this community. Water traveling on the ground or seeping through the ground also carries dissolved minerals and chemicals. Road salt, for example, is becoming an increasing problem both to natural communities and as a contaminant in

household wells. Fertilizers, detergents, and other chemicals that increase the nutrient levels in wetlands cause algal blooms and eventually an oxygen-depleted environment in which few animals can live. Herbicides and pesticides often travel far from where they are applied and have lasting effects on the quality of the natural community. So, road construction and other development activities should strive to consider: 1. how water moves through the ground, 2. the types of dissolved substances these development activities may release, and 3. how to minimize the potential for these dissolved substances to reach this natural community.

Inventory Needs

Survey for occurrences statewide to advance documentation and classification of confined rivers. A statewide review of confined rivers is desirable. Continue searching for large rivers in good condition (A- to AB-ranked).

Research Needs

There is a need to research the composition of confined rivers statewide in order to characterize variations. In addition, there is a need to collect sufficient quantitative data to support the recognition of several distinct types of confined rivers based on composition and by ecoregion.

Identification Comments

Confined rivers are relatively large, fast flowing sections of streams with a moderate to gentle gradient. They have a well-defined pattern of alternating pools, riffles, and runs, and usually have poorly defined meanders (i.e., low sinuosity). Confined rivers occur in confined valleys and are most typical of the midreaches of stream systems. These streams are typically of moderate depth, width, and low flow discharge, and usually represent a network of third- to fourth-order stream segments. Most of the erosion is lateral, creating braids, channel islands, and bars, and deposition is moderate with a mix of coarse rocky to sandy substrate. Waterfalls are often present. Other features include plunge pools, flumes, chutes, cascades, alluvial fans, and mussel beds. These streams have high water clarity, are well oxygenated, and have cool water. They are typically surrounded by open upland riverside communities including riverside sand/gravel bar, cobble shore, or one of the shoreline outcrop communities.

Characteristic fishes include creek chub (Semotilus atromaculatus), pumpkinseed (Lepomis gibbosus), common shiner (Luxilus cornutus), and trout-perch (Percopsis omiscomaycus) in pools; rosyface shiner (Notropis rubellus) at the head of pools; tessellated darter (Etheostoma olmstedi), longnose dace (Rhinichthys cataractae), slimy sculpin (Cottus cognatus) or mottled sculpin (C. bairdi), and stonecat (Noturus flavus) in riffles; and bluntnose minnow (Pimephales notatus) and northern hogsucker (Hypentelium nigricans) in runs. Common introductions are rainbow trout (Salmo gairdneri) and brown trout (S. trutta).

Characteristic mollusks include eastern elliptio (Elliptio complanta), eastern floater (Pyganodon cataracta), and fingernail clams (Sphaerium spp.). A diversity of other macroinvertebrates are present, including abundant net-spinning caddisflies (Hydropsychidae); riffle and rocky bottom specialists as well as algae shredders such as

crayfish (Cambaridae), mayflies (Ephemeroptera including Ephemeridae, Heptageniidae, Baetidae, Isonychia spp., Eurylophella spp.), stoneflies (Plecoptera including Chloroperlidae, Perlidae), caddisflies (Trichoptera including Hydropsychidae, Helicopsyche spp., Dolophilodes spp., Rhyacophila spp., Nectopsyche spp., Psilotreta spp., Glossosoma spp., Brachycentrus spp., Neophylax spp., Goera spp.), beetles (Elmidae, Psephenus spp.), dobsonflies (Corydalidae), midges (Polypedilum spp.), craneflies (Hexatoma spp., Tipulidae including Hexatoma spp.), and blackflies (Simulidae). Odonate (Odonata including Calopteryidae) larvae may be characteristic of runs. True bugs (Gerridae, Vellidae, Mesovellidae) are characteristic of pools.

Epilithic algae are present, often at moderate percent cover. Aquatic macrophytes are usually sparse. Typical aquatic macrophytes include waterweed (Elodea canadensis) and linear-leaved pondweeds such as sago pondweed (Stuckenia pectinatus). An additional characteristic vascular plant may be riverweed (Podostemum ceratophyllum). Bryophytes such as the moss Grimmia alpicola var. rivularis are often confined to shallows and the intermittently exposed channel perimeter.

The Best Time to See

The waterfalls and fast-flowing riffles of confined rivers are especially dramatic in the spring when snow melts in the uplands and surges into rivers.

Characteristics Most Useful for Identification

The aquatic community of relatively large, fast flowing sections of streams with a moderate to gentle gradient. Confined rivers usually represent a network of third- to fourth-order stream segments, and waterfalls are typically present. Confined rivers are generally depicted as a double line on 7.5 minute USGS topgraphic maps (starting where streams transition from single to double line at 1:24,000 scale).

Elevation Range

Known examples of this community have been found at elevations between 195 feet and 2145 feet.

Similar Ecological Communities

Unconfined river: Unconfined rivers generally occur downstream of confined rivers. They are also larger and have more meanders (higher sinuosity) than confined rivers.

Marsh headwater stream: Marsh headwater streams typically flow along or between wetlands (e.g., marshes, bogs, swamps) while confined rivers are generally larger and tend to flow through terrestrial communities. Marsh headwater streams typically occur upstream of confined rivers.

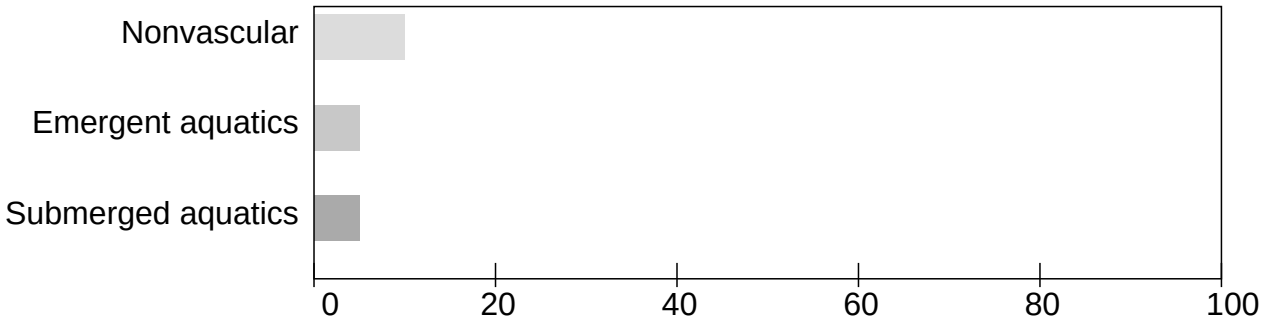
Rocky headwater stream: Confined rivers are generally larger than rocky headwater streams; they tend to have a lower gradient and higher water volume. Rocky headwater streams typically occur upstream of confined rivers.

Characteristic Species

Nonvascular
Grimmia alpicola rivularis

Emergent aquatics
Hornleaf Riverweed (*Podostemum ceratophyllum*)
Ribbon-leaf Pondweed (*Potamogeton epihydrus*)
Schoenoplectus Subterminalis (torrey) Soj (*Schoenoplectus subterminalis*)
Narrow-leaf Burreed (*Sparganium angustifolium*)

Submerged aquatics
Broad Waterweed (*Elodea canadensis*)
Spiral Pondweed (*Potamogeton spirillus*)
Sago Pondweed (*Stuckenia pectinata*)



This figure helps visualize the structure and "look" or "feel" of a typical confined river. Each bar represents the amount of "coverage" for all the species growing at that height. Because layers overlap (shrubs may grow under trees, for example), the shaded regions can add up to more than 100%.

Additional Resources

Links

Brooklyn Botanic Garden
http://www.bbg.org/sci/publications/blackrock/veg/brfmidstrm.html

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