



Hudsonia

Conservation Recommendations for Selected Habitats

Below are conservation recommendations for selected habitats of conservation concern. Many of these recommendations have been published in Hudsonia reports on townwide habitat mapping projects over the last few years. The recommendations are offered here in abbreviated format for use by anyone wishing to incorporate biodiversity conservation into land use planning, selection of sites for development or conservation, site plan design, or site management.

The habitats included below are by no means the only habitats of conservation concern in the region, but provide a sample of significant habitats and ways to minimize harm from human land uses.

Each set of recommendations is based on the needs of a **“focal” species** or group of species with particular habitat needs, but most of these measures will benefit a large array of other organisms of these habitats and landscapes, including many other species of conservation concern. Ecological and life history information that underpins these recommendations is provided in our habitat reports (see References list) and other referenced documents. Please contact us if you have questions.

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CIRCUMNEUTRAL BOG LAKE

Focal species: northern cricket frog

1. **Maintain water quality.** Avoid the application of herbicides for controlling invasive aquatic plants. Consider mechanical harvesting of undesired species, such as Eurasian milfoil. Reduce or eliminate use of fertilizers and pesticides on lawns and nearby agricultural fields; minimize soil disturbance within the watershed of the circumneutral bog lake; upgrade nearby septic systems to prevent nutrient enrichment of the lake; minimize runoff from roads and other impervious surfaces.
2. **Maintain hydrology.** Avoid changing water levels or patterns of inflow and outflow. This requires attention to activities in the lake watershed such as road and building construction, stormwater management infrastructure, and groundwater extraction (e.g., wells).
3. **Maintain or restore a vegetated buffer of 300 ft (90 m) from the lake edge.** Leaving a broad buffer of undisturbed soils and vegetation may be crucial to safeguarding wetland habitat quality, hydrology, and potential northern cricket frog overwintering sites.
4. **Protect habitats and assess potential impacts within 3,300 ft (1,000 m) of the lake edge.** Development within this area may sever important travel corridors between potential northern cricket frog breeding habitats, and between the lake and the cricket frog overwintering habitats. Conservation measures within this area will also protect hydrology and water quality for other rare species.
5. **If any significant land use changes are proposed in the vicinity, conduct rare species surveys in the lake, adjacent wetlands, and surrounding forests early in the planning process,** so that development designs can accommodate the needs of sensitive species. Surveys should include rare plants, amphibians, reptiles, and breeding birds.
6. **Discourage use of motorized watercraft.** Gasoline-powered watercraft pollute water, and create noise disturbance. Motorized watercraft of all kinds can physically damage plant and animal life, and may introduce non-native species.
7. **Avoid the introduction of non-native fish species that may disrupt the lake's food web,** including grass carp (used for biological weed control) or game fish.

CREST, LEDGE, & TALUS

Focal species: rare reptiles

1. **Avoid disturbance of crest, ledge, and talus habitats wherever possible, and** concentrate any unavoidable development in a manner that maximizes the amount and contiguity of undisturbed rocky habitat. Minimize the extent of new roads through undeveloped land with extensive crest, ledge, and talus. Take special measures to restrict the potential movement of snakes into developed areas, thereby minimizing the likelihood of human-snake encounters (which are often fatal for the snake) and road mortality.

(Crest, Ledge, & Talus continued)

2. **Maintain broad corridors** between crest, ledge, and talus habitats. Intervening areas between habitats provide travel corridors for species that migrate among different habitats for breeding, basking, foraging, overwintering, and dispersal.
3. **Consider the impacts of habitat disturbance** to crest, ledge, and talus when reviewing all applications for mining permits and other development proposals, keeping in mind that rare snakes typically travel long distances from their den sites.
4. **Educate construction workers, utility workers, and residents** about snake conservation and whom to contact to safely relocate snakes.

FEN

Focal species: bog turtle

The U.S. Fish and Wildlife Service (Klemens 2001) recommends the following for wetlands known to support bog turtles. We recommend these measures for any fen that appears to be suitable habitat for the bog turtle, whether or not the turtles have been found there. Bog turtles are difficult to find, and may occur in yet undiscovered places. Moreover, protecting adequate fen habitat will help to support the dispersal needs of the bog turtle metapopulation.

1. **Protect the wetland habitat.** The entire wetland, not just those portions that have been identified as, or appear to be, optimal for bog turtle nesting, basking, or hibernating, should be protected from direct destruction and degradation. The following activities (not a comprehensive list) should be avoided within the wetland:
 - development of any kind;
 - wetland draining, ditching, tiling, filling, excavation, stream diversion, or construction of impoundments;
 - herbicide, pesticide, or fertilizer application (except as part of approved bog turtle management plan);
 - mowing or cutting of vegetation (except as part of approved bog turtle management plan);
 - delineation of lot lines for development, even if the proposed building or structure will not be in the wetland.
2. **Establish a 300 ft (90 m) buffer zone.** A protective “buffer” 300 ft (90 m) wide should be established around known or potential bog turtle wetlands to help prevent or minimize the effects of human activities. Activities in this zone could indirectly destroy or degrade the fen habitat over the short or long term and should be thoroughly evaluated in consultation with the US Fish and Wildlife Service and the NYS DEC. Activities in this zone that may adversely impact bog turtles and their habitats include but are not limited to:
 - construction of roads, residences, driveways, parking lots, sewer lines, utility lines, stormwater or sedimentation basins, or other structures;
 - mining;

(Fens, continued)

- herbicide, pesticide, or fertilizer application;
 - farming (with the exception of light to moderate grazing);
 - hardening of stream banks (e.g., with rip-rap or concrete).
3. **Assess potential impacts within at least a 2500 ft (750 m) conservation zone.** Despite the distance, development activities occurring within the drainage basin of the fen or at least one-half mile (800 m) from the boundary of the buffer zone may adversely affect bog turtles and their habitat. Development within this area may also sever important travel corridors between wetlands occupied or likely to be occupied by bog turtles, thereby isolating populations and increasing the likelihood of road mortality as turtles attempt to disperse.
- Activities such as the construction of roads and other impervious surfaces, groundwater extraction (e.g., from drinking water wells), septic/sewer facilities, and mining have a high potential to alter the hydrology and chemistry of the fen habitat.
 - Construction of new roads and bridges should be avoided within this area.
 - Existing roads with medium to high volume traffic may be ideal candidates for “turtle underpasses” that may provide safer travel corridors for this species.

FOREST

Focal species: A large array of forest wildlife, including **mammals, reptiles, amphibians, and interior-breeding forest songbirds.**

1. **Protect large, contiguous forested areas** wherever possible, and avoid development in forest interiors.
2. **Protect patches of forest types that are less common in the town regardless of their size.** These include mature forests (and old-growth, if any is present), natural conifer stands, forests with an unusual tree species composition, or forests that have smaller, unusual habitats (such as calcareous crest, ledge, or talus) embedded in them.
3. **Maintain or restore broad corridors of intact habitat between large forested areas.** For example, a forested riparian corridor or a series of smaller forest patches may provide connections between larger forest areas. Forest patches on opposite sides of a road may provide a “bridge” across the road for forest-dwelling animals.
4. **Maintain the forest canopy and understory vegetation intact.**
5. **Maintain standing dead wood, downed wood, and organic debris, and prevent disturbance or compaction of the forest floor.** Also leave in place any hemlocks infested with woolly adelgid; cutting these trees does not slow the infestation’s spread, but does interfere with natural forest processes.

INTERMITTENT WOODLAND POOL

Focal species: pool-breeding amphibians

To help protect pool-breeding amphibians and the habitat complex they require, we recommend the following protective measures (adapted from Calhoun and Klemens 2002):

1. **Protect the intermittent woodland pool depression.** This zone of protection should include the pool basin up to the spring high water mark and all associated vegetation. The soil in and surrounding the pool should not be compacted in any manner and the vegetation, woody debris, leaf litter, and stumps or root crowns within the pool should not be removed.
2. **Protect all upland forest within 100 ft (30 m) of the intermittent woodland pool.** During the spring and early summer this zone provides important shelter for high densities of adult and recently emerged salamanders and frogs. The forest in this zone also helps shade the pool, maintains pool water quality, and provides important leaf litter and woody debris to the pool system. This organic debris constitutes the base of the pool food web and provides attachment sites for amphibian egg masses.
3. **Maintain critical terrestrial habitat within a 750 ft (230 m) conservation zone around the pool.** The upland forests within 750 ft (230 m) or more of a woodland pool are critical foraging and shelter habitats for pool-breeding amphibians during the non-breeding season. Roads, development, logging, ATV use, and other activities within this terrestrial habitat can crush many amphibians and destroy the forest floor microhabitats that provide them with shelter and invertebrate food. Development within this zone can also prevent dispersal and genetic exchange between neighboring pools, thereby making local extinction more likely. A minimum of 75% of this zone should remain in contiguous (unfragmented) forest with an undisturbed forest floor. Wherever possible, forested connections between individual pools should be identified and maintained in broad configurations to provide overland dispersal corridors.
4. **Direct runoff from roads and developed areas (including overflow from stormwater ponds) away from intermittent woodland pools.**

We also recommend the following for all development activity proposed **within the conservation zone (750 ft [230 m])** of an intermittent woodland pool:

1. **Avoid or minimize the potential adverse affects of roads to the greatest extent possible.** Pool-breeding salamanders and frogs are especially susceptible to road mortality from vehicular traffic, predation, and desiccation. Curbs and other structures associated with roads frequently intercept and funnel migrating amphibians into stormwater drains where they may be killed. To minimize these potential adverse impacts:
 - Site no roads and driveways with projected traffic volumes in excess of 5-10 vehicles per hour within 750 ft (230 m) of the pool.
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- Regardless of traffic volumes, limit the total length of roads and driveways within 750 ft of a woodland pool to the greatest extent possible. This can be achieved, among other ways, by clustering development to reduce the amount of needed roadway.
 - Use gently sloping curbs or no-curb alternatives to reduce barriers to amphibian movement.
 - Use oversized square box culverts (2 ft wide by 3 ft high [0.6 m x 0.9 m]) near wetlands and known amphibian migration routes to facilitate amphibian movements under roads. These culverts should be spaced at 20 ft (6 m) intervals. Special “curbing” should also be used along the adjacent roadway to deflect amphibians into the box culverts.
2. **Maintain woodland pool water quality and quantity at pre-disturbance levels.** Development within a woodland pool’s drainage basin can degrade pool water quality by increasing sediments, nutrients, and other pollutants. Even slight increases in sediments or pollution can stress and kill amphibian eggs and larvae, and may have adverse long-term effects on the adults. Activities such as groundwater extraction (e.g., from wells) or the redirection of natural surface water flows can reduce the pool hydroperiod below the threshold required for successful egg and larval development. Increasing impervious surfaces or channeling stormwater runoff toward pools can increase pool hydroperiod, which can also adversely affect the ability of amphibians to reproduce successfully. Protective measures include the following:
- Do not use intermittent woodland pools for storm water detention, either temporarily or permanently.
 - Aggressively treat stormwater throughout the development site, using methods that allow for the maximum infiltration and filtration of runoff, including grassy swales, filter strips, “rain gardens,” and oil-water separators in paved parking lots. Direct all stormwater away from nearby woodland pools.
 - Avoid or minimize the use of pesticides, herbicides, and fertilizers within the woodland pool’s drainage basin. If mosquito control activities are necessary, limit them to the application of bacterial larvicides, which appear at this time to have lesser negative impacts on non-target pool biota than other control methods. De-icing salts such as sodium chloride cannot be removed by means of treatment methods currently in use; thus it may be appropriate to avoid use of certain de-icing compounds where they will pollute surface runoff into amphibian breeding pools.
 - Maintain both surface water runoff and groundwater inputs to intermittent woodland pools at pre-construction levels. Carefully design stormwater management systems in the pool’s watershed to avoid changes (either increases or decreases) in pool depth, volume, and hydroperiod.
 - Minimize impervious surfaces including roads, parking lots, and buildings to reduce runoff problems and resulting stormwater management needs.
3. **Avoid creating stormwater detention basins and other artificial depressions** (e.g., vehicle ruts) that intermittently hold water within 750 ft (230 m) of an intermittent woodland pool or in areas that might serve as overland migration routes between pools. These “decoy wetlands”

(Intermittent Woodland Pools continued)

can attract large numbers of pool-breeding amphibians, but the eggs laid in them rarely survive due to the high sediment and pollutant loads and short hydroperiod.

4. **Modify potential pitfall hazards** such as swimming pools, excavations, window wells, or storm drain catch basins to prevent the entrapment and death of migrating amphibians, turtles, and other small terrestrial animals. Soil test pits should be backfilled immediately after tests are completed. If left open for more than one day, such pits should be fitted with earthen or plank ramps to enable small animals to escape.
5. **Schedule construction activities to occur outside the peak amphibian movement periods of spring and early summer.** If construction activity during this time period cannot be avoided, temporary exclusion fencing should be installed around the entire site to keep amphibians out of the active construction areas.

LARGE MEADOW

Focal species: grassland breeding birds

At sites where grassland owners have flexibility in their mowing and grazing practices, Massachusetts Audubon (massaudubon.org) has the following management suggestions for minimizing harm to grassland breeding birds in large meadows (e.g., 10 acres and larger) in the northeastern U.S.

1. **Mowing after August 1** helps to ensure fledging of nestling birds; if mowing must occur before then, leave some unmowed strips or patches. Mowing in fall is even less disruptive (some birds continue breeding into August or September).
2. **Mowing each field only once every 1-3 years**, or doing rotational mowing so that each part of a field is mowed once every 3 years, can maintain habitat for nesting birds and butterflies.
3. **On an active farm, leaving some fields out of production each year** provides wildlife habitat. Alternatively, hayfields mowed early in the season can be rotated annually with those that are mowed late in the season.
4. **Removing fences or hedgerows between smaller fields** enlarges the habitat area for grassland breeding birds.
5. **Raising mower blades six inches or more, using flushing bars, and avoiding night mowing** when birds are roosting all help reduce bird mortality.
6. **Light grazing**, if livestock are rotated among fields throughout the season, can be beneficial.

STREAM

Focal species: wood turtle

1. **Protect the integrity of stream habitats.**

- Prohibit engineering practices that alter the physical structure of the stream channel such as stream channelization, artificial stream bank stabilization (e.g., rock rip-rap, concrete), construction of dams or artificial weirs, vehicle crossing (e.g., construction or logging equipment, ATVs), and the clearing of natural stream bank vegetation. These activities can destroy key hibernation and basking habitats;
- Avoid direct discharge of stormwater runoff, chlorine-treated wastewater, agricultural by-products, and other potential pollutants;
- Establish a stream conservation zone extending at least 160 ft (50 m) on either side of all streams in the watershed, including perennial and intermittent tributary streams, regardless of whether or not they are used by wood turtles. These conservation zones should remain naturally vegetated and undisturbed by construction, conversion to impervious surfaces, agriculture and livestock use, pesticide and fertilizer application, and installation of septic leachfields or other waste disposal facilities.

2. **Protect riparian wetland and upland habitats.** All riparian wetlands adjacent to known or potential wood turtle streams should be protected from filling, dumping, drainage, impoundment, incursion of construction equipment, siltation, polluted runoff, and hydrological alterations. In addition, large, contiguous blocks of upland habitats (e.g., forests, meadows, and shrublands) within a **660 ft (200 m) conservation zone** of a core wood turtle stream should be preserved to the greatest extent possible to provide basking, foraging, and nesting habitat, and safe travelways for this species. Special efforts may be needed to protect particular components of the habitat complex such as wet meadows and alder stands—wood turtle has been found to favor stands of alder, and wet meadows are often sought by wood turtles, especially females, for spring basking and foraging.

3. **Minimize impacts from new and existing stream crossings.** Stream crossings, particularly undersized bridges and narrow culverts, may be significant barriers to wood turtle movement along their core stream habitats. Wood turtles may shy away from entering such structures and choose an overland route to reach their destination. Typically, this overland route involves crossing a road or other developed area, often resulting in road mortality. If a stream crossing completely blocks the passage of turtles, individuals can be cut off from important foraging or basking habitats, or be unable to interbreed with turtles of neighboring populations. Such barriers could significantly diminish the long-term viability of wood turtle populations. If new stream crossings must be constructed, we recommend that they be specifically designed to accommodate the passage of turtles and other wildlife. The following prescriptions, although not specifically designed for wood turtles, may be an important first step to improving the connectivity of stream corridors (adapted from Singler and Graber 2005):

- Use bridges and open-bottomed arches instead of culverts.

(Streams continued)

- Use structures that span at least 1.2 times the full width of the stream so that one or both banks remain in a semi-natural state beneath the structure.
 - Design the structure to be at least 4 ft (1.2 m) high and have an openness ratio of at least 0.5 (openness ratio = the cross-sectional area of the structure divided by its length). Higher openness ratio values mean that more light is able to penetrate into the interior of the crossing.
 - Construct the substrate within the structure of natural materials and match the texture and composition of upstream and downstream substrates.
 - If the stream bed must be disturbed during construction, design the final elevation and gradient of the structure bottom so as to maintain water depth and velocities at low flow that are comparable to those found in natural stream segments just upstream and downstream of the structure. Sharp drops in elevation at the inlet or outlet of the structure can be a physical barrier to wood turtle passage.
4. **Minimize impacts from new and existing roads.** Road mortality of nesting females and individuals dispersing to new habitats is one of the greatest threats to wood turtle populations. To help minimize the adverse effects of roads on this species, we recommend the following actions be undertaken within the 660 ft (200 m) wide stream conservation zone:
- Prohibit the building of new roads crossing or adjoining wood turtle habitat complexes. This applies to public and private roads of all kinds, including driveways.
 - Keep vehicle speeds low on existing roads by installing speed bumps, low speed limit signs, and wildlife crossing signs.
5. **Maintain broad corridors between habitats and habitat complexes.** Broad, naturally vegetated travel corridors should be maintained between individual habitats within a complex (e.g., between core stream habitats, foraging wetlands, and nesting areas) and between neighboring habitat complexes.
6. **Protect nesting areas.** Wood turtles often nest in upland meadow or open shrublands, habitats that also tend to be prime areas for development. Construction of roads, houses, and other structures on potential nesting habitats could severely limit the reproductive success of the turtles over the long term. We recommend that large areas of potential nesting habitat within the 660 ft (200 m) stream conservation zone (e.g., upland meadows, upland shrublands, waste ground with exposed gravelly soils) be protected from development and other disturbance.

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