

**BOG TURTLE (*Clemmys muhlenbergii*)**  
**Northern Population**  
**RECOVERY PLAN**

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U.S. Fish and Wildlife Service  
Hadley, Massachusetts

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**BOG TURTLE (*Clemmys muhlenbergii*),**  
**NORTHERN POPULATION**

**RECOVERY PLAN**

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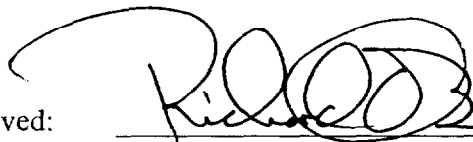
in cooperation with:

Pennsylvania Field Office  
U.S. Fish and Wildlife Service  
State College, Pennsylvania

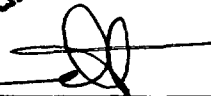
for

Region 5  
U.S. Fish and Wildlife Service  
Hadley, Massachusetts

Approved:



Acting  
Dr. Richard O. Bennett



Date:

5-15-01

MAY 15 2001

**APPENDIX A**

**BOG TURTLE CONSERVATION ZONES**

(revised April 18, 2001)

Projects in and adjacent to bog turtle habitat can cause habitat destruction, degradation, and fragmentation. Of critical importance is evaluating the potential direct and indirect effects of activities that occur in or are proposed for upland areas adjacent to bog turtle habitat. Even if the wetland impacts from an activity are avoided (i.e., the activity does not result in encroachment into the wetland), activities in adjacent upland areas can seriously compromise wetland habitat quality, fragment travel corridors, and alter wetland hydrology, thereby adversely affecting bog turtles.

The following bog turtle conservation zones have been designated with the intent of protecting and recovering known bog turtle populations within the northern range of this species. The conservation suggestions for each zone are meant to guide the evaluation of activities that may affect high-potential bog turtle habitat, potential travel corridors, and adjacent upland habitat that may serve to buffer bog turtles from indirect effects. *Nevertheless, it is important to recognize that consultations and project reviews will continue to be conducted on a case-by-case basis, taking into account site- and project-specific characteristics.*

Zone 1

This zone includes the wetland and visible spring seeps occupied by bog turtles. Bog turtles rely upon different portions of the wetland at different times of year to fulfill various needs; therefore, this zone includes the entire wetland (the delineation of which will be scientifically based), not just those portions that have been identified as, or appear to be, optimal for nesting, basking or hibernating. In this zone, bog turtles and their habitat are most vulnerable to disturbance, therefore, the greatest degree of protection is necessary.

Within this zone, the following activities are likely to result in habitat destruction or degradation and should be avoided. These activities (not in priority order) include:

- ▶ development (e.g., roads, sewer lines, utility lines, storm water or sedimentation basins, residences, driveways, parking lots, and other structures)
- ▶ wetland draining, ditching, tiling, filling, excavation, stream diversion and construction of impoundments
- ▶ heavy grazing
- ▶ herbicide, pesticide or fertilizer application<sup>1</sup>
- ▶ mowing or cutting of vegetation<sup>1</sup>
- ▶ mining
- ▶ delineation of lot lines (e.g., for development, even if the proposed building or structure will not be in the wetland)

## EXHIBIT DEC 2

Some activities within this zone may be compatible with bog turtle conservation but warrant careful evaluation on a case-by-case basis:

- ▶ light to moderate grazing
- ▶ non-motorized recreational use (e.g., hiking, hunting, fishing)

### Zone 2

The boundary of this zone extends *at least 300 feet* from the edge of Zone 1 and includes upland areas adjacent to Zone 1. Activities in this zone could indirectly destroy or degrade wetland habitat over the short or long-term, thereby adversely affecting bog turtles. In addition, activities in this zone have the potential to cut off travel corridors between wetlands occupied or likely to be occupied by bog turtles, thereby isolating or dividing populations and increasing the risk of turtles being killed while attempting to disperse. Some of the indirect effects to wetlands resulting from activities in the adjacent uplands include: changes in hydrology (e.g., from roads, detention basins, irrigation, increases in impervious surfaces, sand and gravel mining); degradation of water quality (e.g., due to herbicides, pesticides, oil and salt from various sources including roads, agricultural fields, parking lots and residential developments); acceleration of succession (e.g., from fertilizer runoff); and introduction of exotic plants (e.g., due to soil disturbance and roads). This zone acts as a filter and buffer, preventing or minimizing the effects of land-use activities on bog turtles and their habitat. This zone is also likely to include at least a portion of the groundwater recharge/supply area for the wetland.

Activities that should be avoided in this zone due to their potential for adverse effects to bog turtles and their habitat include:

- ▶ development (e.g., roads, sewer lines, utility lines, storm water or sedimentation basins, residences, driveways, parking lots, and other structures)
- ▶ mining
- ▶ herbicide application<sup>1</sup>
- ▶ pesticide or fertilizer application
- ▶ farming (with the exception of light to moderate grazing - see below)
- ▶ certain types of stream-bank stabilization techniques (e.g., rip-rapping)
- ▶ delineation of lot lines (e.g., for development, even if the proposed building or structure will not be in the wetland)

Careful evaluation of proposed activities on a case-by-case basis will reveal the manner in which, and degree to which activities in this zone would affect bog turtles and their habitat. Assuming impacts within Zone 1 have been avoided, evaluation of proposed activities within Zone 2 will often require an assessment of anticipated impacts on wetland hydrology, water quality, and habitat continuity.

## EXHIBIT DEC 2

Activities that are likely to be compatible with bog turtle conservation but that should be evaluated on a case-by-case basis within this zone include:

- ▶ light to moderate grazing
- ▶ non-motorized recreational use (e.g., hiking, hunting, fishing)
- ▶ mowing or cutting of vegetation

### Zone 3

This zone includes upland, wetland, and riparian areas extending either to the geomorphic edge of the drainage basin or at least one-half mile beyond the boundary of Zone 2. Despite the distance from Zone 1, activities in these areas have the potential to adversely affect bog turtles and their habitat. This particularly applies to activities affecting wetlands or streams connected to or contiguous with Zone 1, because these areas may support undocumented occurrences of bog turtles and/or provide travel corridors. In addition, some activities (e.g., roads, groundwater withdrawal, water/stream diversions, mining, impoundments, dams, “pump-and-treat” activities) far beyond Zone 1 have the potential to alter the hydrology of bog turtle habitat, therefore, another purpose of Zone 3 is to protect the ground and surface water recharge zones for bog turtle wetlands. Where the integrity of Zone 2 has been compromised (e.g., through increases in impervious surfaces, heavy grazing, channelization of stormwater runoff), there is also a higher risk of activities in Zone 3 altering the water chemistry of bog turtle wetlands (e.g., via nutrient loading, sedimentation, and contaminants).

Activities occurring in this zone should be carefully assessed in consultation with the Fish and Wildlife Service and/or appropriate State wildlife agency to determine their potential for adverse effects to bog turtles and their habitat. Prior to conducting activities that may directly or indirectly affect wetlands, bog turtles and/or bog turtle habitat surveys should be conducted in accordance with accepted survey guidelines.

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<sup>1</sup> Except when conducted as part of a bog turtle habitat management plan approved by the Fish and Wildlife Service or State wildlife agency

**APPENDIX B**

**GUIDELINES FOR BOG TURTLE SURVEYS <sup>1</sup>**

*(revised May 2001)*

**RATIONALE**

A bog turtle survey (when conducted according to these guidelines) is an attempt to determine presence or probable absence of the species; it does not provide sufficient data to determine population size or structure. Following these guidelines will standardize survey procedures. It will help maximize the potential for detection of bog turtles at previously undocumented sites at a minimum acceptable level of effort. Although the detection of bog turtles confirms their presence, failure to detect them does not absolutely confirm their absence (likewise, bog turtles do not occur in all appropriate habitats and many seemingly suitable sites are devoid of the species). Surveys as extensive as outlined below usually suffice to detect bog turtles; however, there have been instances in which additional effort was necessary to detect bog turtles, especially when habitat was less than optimum, survey conditions were less than ideal, or turtle densities were low.

**PRIOR TO CONDUCTING ANY SURVEYS**

If a project is proposed to occur in a county of known bog turtle occurrence (see attachment 1), contact the U.S. Fish and Wildlife Service (Service) and/or the appropriate State wildlife agency (see attachment 2). They will determine whether or not any known bog turtle sites occur in or near the project area, and will determine the need for surveys.

- ▶ If a wetland in or near the project area is *known* to support bog turtles, measures must be taken to avoid impacts to the species. The Service and State wildlife agency will work with federal, state and local regulatory agencies, permit applicants, and project proponents to ensure that adverse effects to bog turtles are avoided or minimized.
- ▶ If wetlands in or adjacent to the project area are *not* known bog turtle habitat, conduct a bog turtle habitat survey (Phase 1 survey) if:
  1. The wetland(s) have an emergent and/or scrub-shrub wetland component, and
  2. Direct and indirect adverse effects to the wetland(s) cannot be avoided.

See *Bog Turtle Conservation Zones* for guidance regarding activities likely to affect bog turtles and their habitat. In addition, consult with the Fish and Wildlife Service and/or appropriate State wildlife agency to definitively determine whether or not a Phase 1 survey will be necessary.

## EXHIBIT DEC 2

### BOG TURTLE HABITAT SURVEY (= Phase 1 survey)

The purpose of this survey is to determine whether or not the wetland(s) are *potential* bog turtle habitat. These surveys are usually performed by someone who is either: (1) qualified to conduct bog turtle surveys (i.e., Phase II surveys) or (2) qualified to identify and delineate wetlands. The following conditions and information apply to habitat surveys.

- ▶ Surveys can be performed any month of the year (except when significant snow cover is present). This flexibility in conducting Phase 1 surveys allows efforts during the Phase 2 survey window to be spent on wetlands most likely to support bog turtles (i.e., those that meet the criteria below).
  
- ▶ Potential bog turtle habitat is recognized by three criteria (*not all of which may occur in the same portion of a particular wetland*):
  1. **Suitable hydrology.** Bog turtle wetlands are typically spring-fed with shallow surface water or saturated soils present year-round, although in summer the wet area(s) may be restricted to near spring head(s). Typically these wetlands are interspersed with dry and wet pockets. There is often subsurface flow. In addition, shallow rivulets (less than 10 cm deep) or pseudo-rivulets are often present.
  
  2. **Suitable soils.** Usually - a bottom substrate of soft muck or mucky-like soils (this does not refer to a technical soil type); you will usually sink to your ankles or deeper in muck, although in summers of dry years this may be limited to areas near spring heads. In some portions of the species' range, the soft substrate consists of scattered pockets of peat (6+ inches deep) instead of muck. Suitable soils are the critical criterion.
  
  3. **Suitable vegetation.** Dominant vegetation of low grasses and sedges (emergent wetland), often with a scrub-shrub wetland component. Common emergent vegetation includes: tussock sedge (*Carex stricta*), soft rush (*Juncus effusus*), rice cut grass (*Leersia oryzoides*), sensitive fern (*Onoclea sensibilis*), tearthumbs (*Polygonum spp.*), jewelweeds (*Impatiens spp.*), arrowheads (*Sagittaria spp.*), skunk cabbage (*Symplocarpus foetidus*), Panic grasses (*Panicum spp.*), other sedges (*Carex spp.*), spike rushes (*Eleocharis sp.*), grass-of-Parnassus (*Parnassia glauca*), shrubby cinquefoil (*Potentilla fruticosa*), sweet-flag (*Acorus calamus*), and in disturbed sites, reed canary grass (*Phalaris arundinacea*) or purple loosestrife (*Lythrum salicaria*). Common scrub-shrub species include alder (*Alnus spp.*), red maple (*Acer rubrum*), willow (*Salix spp.*), tamarack (*Larix laricina*), and in disturbed sites, multiflora rose (*Rosa multiflora*).

## EXHIBIT DEC 2

- ▶ Suitable hydrology, soils and vegetation are necessary to provide the critical wintering sites (soft muck, peat, burrows, root systems of woody vegetation) and nesting habitats (open areas with tussocky or hummocky vegetation) for this species. It is very important to note, however, that one or more of these criteria may be absent from portions of a wetland or wetland complex supporting bog turtles. Absence of one or more criteria does not preclude bog turtle use of these areas to meet important life functions, including foraging, shelter and dispersal.
- ▶ If these criteria (suitable soils, vegetation and hydrology) are present in the *wetland*, then the *wetland* is considered to be potential bog turtle habitat, regardless of whether or not that portion of the wetland occurring within the project boundaries contains all three criteria. If the *wetland* is determined to be potential habitat and the project will directly or indirectly impact *any portion* of the wetland, then either:
  - ▶ Completely avoid all direct and indirect effects to the wetland, in consultation with the Service and appropriate State wildlife agency, *OR*
  - ▶ Conduct a Phase 2 survey to determine the presence of bog turtles.
- ▶ The Service and appropriate State agency (see list) should be sent a copy of survey results for review and comment including: a USGS topographic map indicating location of site; project design map, including location of wetlands and streams; color photographs of the site; surveyor's name; date of visit; opinion on potential/not potential habitat; a description of the hydrology, soils, and vegetation.

### **BOG TURTLE SURVEY (= Phase 2 survey)**

If the wetland(s) are identified as potential bog turtle habitat (see Phase 1 survey), and direct and indirect adverse effects cannot be avoided, conduct a bog turtle survey in accordance with the specifications below. Note that this is *not* a survey to estimate population size or structure; a long-term mark/recapture study would be required for that.

Prior to conducting the survey, contact the appropriate State agency (see attached list) to determine whether or not a scientific collector's permit valid for the location and period of the survey will be required.

1. Surveys should only be performed during the period from April 15-June 15. This coincides with the period of greatest annual turtle activity (spring emergence and breeding) and before vegetation gets too dense to accurately survey. While turtles may be found outside of these dates, a result of no turtles would be considered inconclusive. Surveys beyond June also have a higher likelihood of disruption or destruction of nests or newly hatched young.



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2. Air and water temperatures should be a minimum of 55° F.
3. Surveys should be conducted during the day, at least one hour after sunrise and no later than one hour before sunset.
4. Cloud cover should be <50 percent, and surveys should not be conducted during or immediately following rain events, unless it clears rapidly and is sunny.
5. One (1) to three (3) people should survey each wetland together. At least one (1) of these must be a recognized qualified bog turtle surveyor<sup>2</sup>, and the others should have at least some previous experience conducting bog turtle surveys. To maintain survey effort consistency and increase the probability of encountering turtles, it is recommended that the same surveyors be used for each wetland.
6. A minimum of four (4) surveys per wetland site are needed to adequately assess the site for presence of bog turtles. At least two of these surveys must be performed in May. From mid-April to mid-May, surveys should be separated by six or more days. From mid-May to mid-June, surveys should be separated by three or more days. The shorter period between surveys during late May and June is needed to ensure that surveys are carried out during the optimum window of time (i.e., before wetland vegetation becomes too thick).

Note that bog turtles are more likely to be encountered by spreading the surveys out over a longer period. For example, erroneous survey results could be obtained if surveys were conducted on four successive days in late April due to possible late spring emergence, or during periods of extreme weather because turtles may be buried in mud and difficult to find.

If bog turtles are found on the first, second or third visit, the site does not need to be revisited. Because this is solely a presence/absence survey, survey efforts at a particular wetland may cease once a bog turtle has been found.

7. Survey time should be three (3) to six (6) person-hours per acre of wetland per visit. Both random opportunistic searching and transect surveys should be used at each wetland.
8. Walk quietly through the wetland. Bog turtles will bask on sedge tussocks and mossy hummocks, or be half-buried in shallow water or rivulets. Walking noisily through the wetland will often cause the turtles to submerge before they can be observed. Be sure to search areas where turtles may not be visible, including shallow pools, underground springs, open mud areas, vole runways and under tussocks. Do not step on the tops of tussocks or hummocks because turtle nests, eggs and nesting microhabitat may be destroyed.

## EXHIBIT DEC 2

9. Photo-documentation of each bog turtle located will be required; a macro lens is highly recommended. The photos should be in color and of sufficient detail and clarity to identify the bog turtle to species and individual. Therefore, photographs of the carapace, plastron, and face/neck markings should be taken of each individual turtle. Do not harass the turtle in an attempt to get photos of the face/neck markings; if gently placed on the ground, most turtles will slowly extend their necks if not harassed. If shell notching is conducted, do the photo-documentation after the notching is done.
10. The following information should be collected for each bog turtle: sex, carapace length-straight line, carapace width, weight, and details about scars/injuries. Plastron length-straight line information should also be collected to differentiate juveniles from adults (> 70 mm; Ernst 1977) as well as to obtain additional information on recruitment, growth, and demography.
11. Each bog turtle should be marked (e.g., notched, PIT tagged) in a manner consistent with the requirements of the appropriate State agency and/or Service. Contact the appropriate State agency prior to conducting the survey to determine what type of marking system, if any, should be used.
12. All bog turtles must be returned to the point of capture as soon as possible on the same day as capture. They should only be held long enough to identify, measure, weigh, and photograph them, during which time their exposure to high temperatures must be avoided. No bog turtles may be removed from the wetland without permission from the Service and appropriate State agency.
13. The Fish and Wildlife Service and appropriate State agency should be sent a copy of survey results for review and concurrence, including the following: dates of site visits; time spent per wetland per visit; names of surveyors; a site map; a description of the wetlands within the project area (e.g., acreage, vegetation, soils, hydrology); an explanation of which wetlands or portions of wetlands were or were not surveyed, and why; survey methodology; weather per visit at beginning and end of survey (air temperature, water temperature, percent cloud cover, wind, and precipitation); presence or absence of bog turtles, including number of turtles found and date, and age/sex of turtles found; and other reptile and amphibian species found and date.

### **ADDITIONAL SURVEYS / STUDIES**

Proper implementation of the Phase 2 survey protocol is usually adequate to determine species presence or probable absence. Additional surveys, however, may be necessary to determine whether or not bog turtles are using a particular wetland, especially if the Phase 2 survey results are negative but the quality and quantity of habitat are good and in a watershed of known occurrence. In this case, additional surveys (Phase 2 and/or trapping surveys), possibly extending into the following field season, may be recommended by the Service or appropriate State agency.

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If bog turtles are documented to occur at a site, additional surveys/studies may be necessary to characterize the population (e.g., number, density, population structure, recruitment), identify nesting and hibernating areas, and/or identify and assess adverse impacts to the species and its habitat, particularly if project activities are proposed to occur in, or within 300 feet of, wetlands occupied by the species.

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<sup>1</sup> As additional information becomes available regarding survey techniques and effectiveness, these survey guidelines may be updated and revised. Contact the Fish and Wildlife Service or one of the state agencies listed below for the most recent version of these guidelines.

<sup>2</sup> Searching for bog turtles and recognizing their habitat is a skill that can take many months or years of field work to develop. This level of expertise is necessary when conducting searches in order to ensure that surveys are effective and turtles are not harmed during the survey (e.g., by stepping on nests). Many individuals that have been recognized as qualified to conduct bog turtle surveys obtained their experience through graduate degree research or employment by a state wildlife agency.

**CONTACT AGENCIES - BY STATE***(Revised May 2001)*

STATE	FISH AND WILDLIFE SERVICE	STATE AGENCY
Connecticut	U.S. Fish and Wildlife Service New England Field Office 22 Bridge Street, Unit #1 Concord, NH 03301	Department of Environmental Protection Env. & Geographic Information Center 79 Elm Street, Store Floor Hartford, CT 06106 <i>(info about presence of bog turtles in or near a project area)</i>  Department of Environmental Protection Wildlife Division, Sixth Floor 79 Elm Street, Store Floor, Hartford, CT 06106 <i>(to get a Scientific Collectors Permit or determine what type of marking system to use)</i>
Delaware	U.S. Fish and Wildlife Service Chesapeake Bay Field Office 177 Admiral Cochrane Drive Annapolis, MD 21401	Nongame & Endangered Species Program Delaware Division of Fish and Wildlife 4876 Hay Point Landing Road Smyrna, DE 19977
Maryland	U.S. Fish and Wildlife Service Chesapeake Bay Field Office 177 Admiral Cochrane Drive Annapolis, MD 21401	Maryland Department of Natural Resources Wildlife & Heritage Division PO Box 68, Main Street Wye Mills, MD 21679
Massachusetts	U.S. Fish and Wildlife Service New England Field Office 22 Bridge Street, Unit #1 Concord, NH 03301	Division of Fisheries and Wildlife Dept. Fisheries, Wildlife and Env Law Enforcement Rt. 135 Westboro, MA 01581
New Jersey	U.S. Fish and Wildlife Service New Jersey Field Office 927 North Main Street, Bldg. D-1 Pleasantville, NJ 08232	Endangered & Nongame Species Program Division of Fish, Game & Wildlife Northern Region Office 26 Route 173W Hampton, NJ 08827
New York	U.S. Fish and Wildlife Service 3817 Luker Road Cortland, NY 13045	New York Natural Heritage Program Department of Environmental Conservation 700 Troy-Schenectady Road Latham, NY 12110-2400 <i>(info about presence of bog turtles in or near a project area)</i>  NY Department of Environmental Conservation Special Licenses Unit 50 Wolf Road Albany, NY 12233 <i>(for endangered species permit applications)</i>
Pennsylvania	U.S. Fish and Wildlife Service Pennsylvania Field Office 315 South Allen Street, Suite 322 State College, PA 16801	Endangered Species & Herpetology Coordinator Pennsylvania Fish and Boat Commission Bureau of Fisheries and Engineering 450 Robinson Lane Bellefonte, PA 16823

**BOG TURTLE COUNTIES OF OCCURRENCE OR LIKELY OCCURRENCE<sup>1</sup>***(Revised May 2001)*

STATE	COUNTY	
Connecticut	Fairfield	Litchfield
Delaware	New Castle	
Maryland	Baltimore Carroll	Cecil Harford
Massachusetts	Berkshire	
New Jersey	Atlantic Burlington Camden Gloucester Hunterdon Mercer Middlesex Monmouth	Morris Ocean Passaic Salem Somerset Sussex Union Warren
New York	Albany Columbia Dutchess Genesee Orange Oswego Putnam	Seneca Sullivan Ulster Warren Wayne Westchester
Pennsylvania	Adams Berks Bucks Chester Cumberland Delaware Franklin	Lancaster Lebanon Lehigh Monroe Montgomery Northampton York

<sup>1</sup> This list is valid for one year from the date indicated. It may, however, be revised more frequently if new counties of occurrence are documented. Updates to this list are available from the Service upon request.