restoration activities are being undertaken. Over the 5-year period covered by this opinion (*i.e.*, 2006 - 2010), habitat restoration practices may occur at 100 to 200 bog turtle sites resulting in the death or injury of up to 15 bog turtles.

This level of incidental take is not expected to result in adverse population-level effects at either individual sites or within the northern range of the species. The Service anticipates that the beneficial effects of habitat restoration will substantially exceed the adverse effects.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of expected take is not likely to result in jeopardy to the bog turtle.

REASONABLE AND PRUDENT MEASURES

Many measures to reduce take have been incorporated into the descriptions of the practices reviewed in this document. These measures are integral to the analysis of effects and resulting determinations. Implementing programs are responsible for assuring consistency of all projects conducted under the auspices of this biological opinion with these conservation measures. The only reasonable and prudent measure for these projects, therefore, is monitoring and reporting of take in accordance with the terms and conditions specified below.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Endangered Species Act, the Service (*e.g.*, Partners for Fish and Wildlife Program) or the applicant (e.g., State wildlife agency) must monitor and report take in accordance with the following non-discretionary terms and conditions:

1. Upon finding a dead or injured turtle that has been, or is likely to have been, killed or injured by habitat restoration practices at a site, the action agency or project proponent will immediately contact the Service. If the turtle was likely killed or injured by the use of heavy equipment (*e.g.*, tracked or wheeled vehicles), use of the vehicles will be discontinued until a site investigation by a Service endangered species biologist takes place. The conditions leading to the death or injury of the turtle(s) will be documented to assist the Service in designing future projects and to ensure that the assumptions and effects detailed in this opinion are correct.

2. Care must be taken in handling dead or injured bog turtles that are found in the project area to preserve biological material in the best possible state. In conjunction with the preservation of any dead specimens, the finder has the responsibility to ensure that evidence intrinsic to determining the cause of death of the specimen is not unnecessarily disturbed. The finding of dead specimens does not imply enforcement proceedings pursuant to the Endangered Species Act. The reporting of dead specimens is required to enable the Service to determine if take is reached or exceeded and to ensure that the

conservation measures and terms and conditions are appropriate and effective. Upon locating a dead, injured, or sick bog turtle, notification must be made within 24 hours to:

- U.S. Fish and Wildlife Service – Office of Law Enforcement, 300 Westgate Center Drive, Hadley, Massachusetts 01035-9589 (telephone: 413-253-8343); and

- The lead endangered species biologist in the Ecological Services Field Office within the State where the restoration project took place.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of threatened and endangered species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. To the maximum extent practicable, engage Service endangered species staff in collaborative review of site-specific restoration plans prior to project implementation.

2. Where opportunities exist, work with landowners, the general public, and other agencies to promote education and information about the bog turtle and its conservation. Assist in the purchase and protection of wetlands occupied by bog turtles.

3. To determine the effect of restoration activities on bog turtles, conduct pre- and post-restoration telemetry studies to document habitat areas used for nesting, hibernating, and foraging. In addition, determine nesting success pre- and post-restoration.

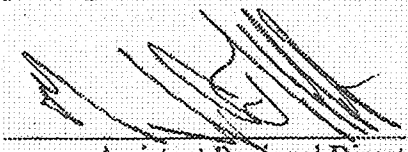
4. Pursue opportunities for funding studies to further investigate the effects of glyphosate and other herbicides (of presumably low toxicity) on reptiles.

5. Determine the effectiveness of controlling reed canary grass via spray applications of glyphosate in wetlands that are *not* occupied by bog turtles. Of particular interest is determining the level and duration of control, and conducting follow-up monitoring to determine what plant species colonize after treatment. If native plant species do not readily re-colonize former reed canary-dominated stands, determine what level of seeding or replanting is necessary to re-establish desirable herbaceous vegetation.

REINITIATION NOTICE

This concludes formal consultation on the actions outlined in the request. As provided in 50 C.F.R. §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the actions has been retained (or is authorized by law) and if: 1) The amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; 3) the action is subsequently modified in a manner that causes an

effect to the listed species or critical habitat not considered in this opinion. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.



Assistant Regional Director

3/10/06

Date

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Appendix A – GLOSSARY OF TERMS

Glove application – application of glyphosate to a plant using a cotton glove saturated with the herbicide. The herbicider wears chemical resistant nitrile or latex gloves on both hands covered by a fleecy, cotton glove on one of the hands. The target plant is held by the hand with the cotton glove and herbicide is sprayed into that hand (trying not to hit non-target plants). Then the cotton glove is wicked up the top one-third of the plant.

Heavy equipment – tracked or wheeled vehicles

Large grazers – cattle, horses and other similar-sized animals

Light equipment – equipment that is hand carried (*e.g.*, chainsaw, hatchet or E-Z-Ject® Lance)

Light to moderate grazing – Also referred to as "habitat maintenance grazing" or "maintenance grazing". This type of grazing is done to maintain bog turtle habitat in a primarily emergent vegetative condition, with minimal presence of invasive herbaceous plants. A stocking density of up to 0.75 animal units per acre of "grassland" is used within the fenced enclosure. "Grassland" is defined as open, grassy areas such as areas with emergent wetland vegetation (*e.g.*, sedges, rushes); upland pasture grasses (*e.g.*, fescue, timothy); or invasive, exotic plants (*e.g.*, *Phragmites*, reed canary grass). This stocking density is equivalent to one dairy cow per two acres, four mature sheep per acre, or five mature goats per acre of grassland within the fenced enclosure. See Appendix B for an animal unit equivalents guide. Grazers have access to both upland and wetland areas, and large grazers are excluded from known nesting areas during the bog turtle nesting season (June 1 to September 30).

Maintenance grazing – see "light to moderate grazing"

Monitoring biologist – a biologist familiar with bog turtle life history and habitat requirements. This person is a Service endangered species biologist, a State non-game biologist, a recognized qualified bog turtle surveyor, or other approved biologist skilled in the identification of potential bog turtle habitat, as well as the identification of known and potentially suitable nesting and hibernating areas within wetlands occupied by bog turtles. The qualifications of potential monitoring biologists will be reviewed and approved at the Field Office level by an endangered species biologist. - Many?

Mucky areas – areas of the wetland having soft, saturated substrates at least four inches deep. These areas are usually identified using a wooden probe (*e.g.*, broom or tool handle).

Non-mucky areas – areas of the wetland lacking soft, saturated substrates or having soft, saturated substrates that can only be probed to a depth of less than four inches.

Small grazers – sheep and goats

Travel route – a path used repeatedly by heavy equipment to access the project site.

Wetland – refers to the entire wetland, not just the best bog turtle habitat within the wetland

Wetlands occupied by bog turtles – any wetland where bog turtles have been confirmed at any time within the past 50 years.

Appendix B – ANIMAL UNIT EQUIVALENTS[1]

Kind of livestock	Animal-unit equivalent[2]
Cow, young dairy (heifer, 1-2 yrs)	1.0
Cow, mature dairy (3+ yrs)	1.5
Bull, mature	1.5-1.9
Cattle, mature beef (1-2 yrs)	1.0
Horse, mature draught	2.0
Horse, mature saddle	1.25
Sheep, mature	0.20
Lamb, 1 year old	0.15
Goat, mature	0.17
Kid, 1 year old	0.10

[1] Table compiled from various sources, including: Maryland Department of Agriculture, 1999 (*http://www.mda.state.md.us/resource_conservation/nutrient_management/manual/animal_unit_equivalencies.php*); Delaware Department of Agriculture, 2000 (*http://www.state.de.us/deptagri/nutrients/newsltr/feb_00.shtml*); USDA, 2003, Table 6-5 of the National Resource Conservation Service's National Range and Pasture Handbook, Rev. 1.

[2] One Animal Unit is equivalent to the forage consumption of a 1000-pound grazer.

In Reply Refer To:
FWS/Region 5/ES

Memorandum

To: Assistant Regional Director – Migratory Birds and State Programs
Regional Chief – National Wildlife Refuge System
Chief, Threatened and Endangered Species
Field Supervisors – New England Field Office, New Jersey Field Office, New York Field Office, Pennsylvania Field Office, Chesapeake Bay Field Office

From: Assistant Regional Director - Ecological Services

Subject: Amendment #1 (Restoration Grazing in Degraded Bog Turtle Habitat) to March 10, 2006, Biological Opinion on Bog Turtle Habitat Restoration Practices

This amendment documents intra-U.S. Fish and Wildlife Service (Service) consultation on implementation of restoration grazing in degraded habitat of the threatened northern population of the bog turtle (*Clemmys (Glyptemys) muhlenbergiii*). The amendment provides compliance with section 7(a)(2) of the Endangered Species Act (ESA) for implementation of the described project when conducted or funded, in whole or part, by the Service (*e.g.*, Partners for Fish and Wildlife, Federal Assistance, Threatened and Endangered Species, or the National Wildlife Refuge System).

As anticipated in the master Biological Opinion (BO), dated March 10, 2006, this amendment contains a description of the subject practice, its effects on the bog turtle, the Service's conclusion as to whether the practice will jeopardize the bog turtle's survival and recovery, and an incidental take statement. Readers should reference other pertinent sections of the March 10, 2006, BO (e.g., status of the species, reinitiation notice).

Any questions regarding implementation of the practices addressed in this opinion should be directed to Threatened and Endangered Species personnel at the field office covering the area where projects are proposed.

Project Description

For the purposes of this BO, this method of habitat management is limited to the use of goats or sheep on sites (or fenced sub-portions of a site) where exotic invasive species or woody

successional species (*e.g.*, red maple, alder) comprise less then 50 percent cover. This would typically include portions of the wetland dominated by *Phragmites* or dense scrub-shrub areas. A stocking density of 0.75 animal units per acre of open grassy habitat works equally well for habitat maintenance enclosures and habitat restoration enclosures, since it is the design of the enclosures that will determine the amount of grazing pressure in a wetland, not the density (Tesauro 2006). For restoration grazing, the enclosure should include the targeted degraded wetland area plus an adjoining upland area approximately 10 percent of the size of the targeted wetland. The intent of this grazing method is to restore highly degraded wetland habitat, rather than maintain already suitable wetland habitat. Tesauro 2006 presents a more detailed discussion of restoration grazing, including methods to calculate stocking density. See also Appendix B of the March 10, 2006, BO for an animal unit equivalents guide.

Conservation Measures

To minimize the risk of take, the following conservation measures will be implemented in all projects conducted under the auspices of this biological opinion amendment.

1. *Project description and map* – After the site has been field-viewed to determine which restoration activities are necessary and appropriate, a detailed project description, project location map, and site map will be prepared. The project location map will identify the project's location on a U.S. Geological Survey topographic map. The site map will identify the property boundaries, wetland boundaries, *known* and potentially suitable nesting habitat, hibernating areas, treatment areas and the fence location (in the wetland and upland). The project narrative will include information about the type and density of grazers, anticipated grazing duration, the acreage of wetland and acreage of upland to be grazed, target plant species, and short- and long-term grazing objectives. This information will be submitted to the Service (*e.g.*, Private Stewardship Grants) or appropriate State wildlife agency (*e.g.*, State Wildlife Grants, Landowner Incentive Program Grants) for review and approval. In the case of projects implemented by the Partners for Fish and Wildlife Program, this information will be retained in their project files.

2. *Fencing installation* – Fencing will be installed in accordance with Practice 1 of the March 10, 2006, BO, and grazers will have access to both upland and wetland habitat.

3. *Grazing density and duration* – A stocking density of 0.75 animal units per acre of fenced enclosure will be used; however, up to 1.0 animal units per acre may be used for goats when addressing the invasion of woody vegetation. This equates to 5 to 10 mature sheep or goats per acre. The grazing period will not exceed 5 consecutive months. This treatment may occur over 1 to 5 years, but will not exceed 5 consecutive years. Goats should not be pastured at 1 animal unit per acre for more than 3 years (Tesauro 2006).

4. *Known and potentially suitable nesting areas* - Prior to conducting restoration grazing, known and potentially suitable nesting areas will be identified and fenced to exclude

restoration grazing. These are typically areas with native emergent vegetation (*e.g.*, sedges, rushes), and little or no shading from woody vegetation or tall invasive herbaceous plants. Grazers will be excluded from these areas because restoration grazing is not an appropriate practice within high quality habitat. As restoration grazing proceeds into its second or third year, treated areas of the wetland may become suitable for nesting (*i.e.*, look like potentially suitable nesting areas). However, restoration grazing may continue in these areas (for up to 5 years total) in order to achieve effective control of the target plant species. Grazers may have access to potentially suitable nesting areas at maintenance grazing densities (*i.e.* up to 0.75 animal units/acre).

5. *Site monitoring* – Experienced staff who have successfully done prescribed grazing and who have a good understanding of bog turtle ecology will monitor the grazing project. They will survey the vegetation in the fenced area at least once a week, while the goats or sheep are grazing, to ensure that adverse effects to native herbaceous vegetation are minimized. They will also determine if the grazing pressure needs to be increased or decreased, although it will not be increased beyond 1.0 animal units per acre. Any indications of imminent denuding of hummocks with moss to substrate should result in prompt removal of grazers, as this is a sign of detrimental over-grazing.

6. *Treatment documentation* – Areas that have been treated using this restoration practice will be inspected during the growing season, after removal of high stocking densities, to determine the effectiveness of the treatment method. By December 31 of each treatment year, a report will be submitted to the Service documenting the following for each site treated: Name(s) of the target plant species, area (in acres) treated, type of grazer(s) used and stocking density, extent of treatment (*e.g.*, 2 months each year for 2 consecutive years), effectiveness of the treatment (percent control), any observed adverse or beneficial effects on non-target vegetation, and any observed effects on bog turtles or their use of habitat. A map showing the wetland and treated areas within the wetland will be submitted with this report, along with before and after photos. Annual performance reports submitted by State agencies to Federal Assistance may be used for reporting purposes provided that they contain all of the requisite information and copies are provided to the Ecological Services by Federal Assistance. This information will assist the Service in: 1) Identifying the risks, benefits and effectiveness of various habitat restoration practices; 2) tracking recovery implementation; and 3) determining if changes to this opinion are necessary to further the recovery of the bog turtle.

As stated in the March 10, 2006, BO (page 28), no more than 50 percent of the wetland will be subject to all combined habitat restoration practices in any 1-year period. However, this limit on overall treatment area does not apply to restoration grazing as described in this amendment, to the installation of fencing to facilitate grazing, or to the practices not likely to adversely affect bog turtles (listed on pages 5 through 7 of the March 10, 2006, BO).

Effects

Goats are browsers whose food preferences target species, especially woody vegetation and *Phragmites*, which degrade bog turtle habitat. Heavy grazing of *Phragmites* has been demonstrated to deplete the plants' reserves and slow its regeneration, promoting the re-establishment and maintenance of suitable native wetland vegetation (Tesauro 2001). Goats control shrubby vegetation by eating the accessible leaves and small branches and stripping the bark.

Except under duress, goats are unlikely to over-graze herbaceous vegetation preferred by bog turtles. Any instances of degradation of vegetation preferred by bog turtles will be temporary and rapidly offset by the re-growth of herbaceous vegetation when goat numbers are reduced. An exception to this is over-grazing is moss hummocks. When goats denude moss hummocks to substrate, it takes years for the moss to recover (Alison Whitlock, Service, personal communication). This may affect bog turtles by reducing high quality nesting areas within the wetland.

Goats are too small to damage wetland soils or crush bog turtles, which are likely to be absent or at very low densities on such highly degraded sites – particularly in the areas of these sites that would be subject to goat grazing. Further, because goat grazing will typically occur in areas dominated by woody vegetation, no damage to nests or eggs is anticipated.

In contrast to goats, sheep tend to crop herbaceous vegetation off close to the ground. The sheep densities contemplated for restoration grazing may result in short-term degradation of herbaceous vegetation and some trampling and exposure of soils. Because both sheep and bog turtles would likely be using the open, emergent portions of the wetland, bog turtles may be harassed or harmed by this practice if individual turtles are displaced from their home ranges or if foraging, basking, or nesting areas are trampled or degraded. However, should this occur, the effects would be offset by a reduction in stocking density or complete removal of sheep following restoration grazing, allowing native herbaceous vegetation to recover.

Because it may be necessary to use goats or sheep for restoration grazing over several seasons, emergent wetland vegetation favored by bog turtles for nesting, foraging, basking, or cover may show signs of over-grazing. The vegetation may be very short and some exposed wetland soils may be evident. As a result, bog turtles and any nests in the grazed area may be exposed to an increased risk of predation. In addition, nests may experience decreased hatching due to egg desiccation resulting from increased solar exposure. However, the long-term beneficial effects are expected to outweigh the short-term effects on the vegetation and any temporary effects on turtles using the habitat. Take in the form of harassment or harm may result, but native vegetation is expected to quickly recover after the goat/sheep stocking densities are reduced, and the status of individual bog turtle sub-populations is expected to improve due to the restoration of native emergent vegetation.

Conclusion

Restoration grazing on highly degraded sites is not likely to jeopardize the continued existence of the northern population of the bog turtle. No critical habitat has been designated for the bog turtle; therefore, none will be affected.

Incidental Take Statement

Restoration grazing by goats or sheep on degraded sites could temporarily cause further degradation of preferred plant species that might slightly reduce the survival rates or reproductive rates of any turtles persisting on the site. Since such injury would be difficult to detect, a noticeable reduction of native herbaceous vegetation by goats or sheep on a degraded but occupied bog turtle site will be presumed to indicate injury to or harassment of one or more turtles.

The risk of take is lowest where goats are used to treat an enclosed area of scrub-shrub vegetation and highest where sheep are used to treat a large area of emergent wetland supporting bog turtles. It is anticipated that harassment will occur at up to 25 percent of the sites grazed by goats and up to 75 percent of the sites grazed by sheep. Multiple turtles may experience short-term harassment due to restoration grazing, particularly at sites grazed by sheep. The Service estimates that restoration grazing within emergent wetland habitat will result in the loss of up to one nest for every ten sites grazed, and the death or injury of up to one bog turtle for every twenty sites grazed.

The take described above will partially off-set take due to other habitat restoration practices described in the March 10, 2006, BO. This is because of the expectation that restoration grazing will be substituted for other methods at some sites. However, it is also anticipated that this amendment to the BO will facilitate an increase in the total amount of habitat restoration undertaken for bog turtles. Over the 5-year period 2006 through 2010, the combined habitat restoration practices discussed in the March 10, 2006, BO and in this amendment, may result in the death or injury of up to 20 bog turtles. This level of incidental take is not expected to result in adverse population-level effects at either individual sites or within the range of the listed species. Indeed, the Service anticipates that expanded habitat restoration will increase the net benefits to recovery of the northern population of the bog turtle.

Reasonable And Prudent Measures – Many measures to reduce take have been incorporated into the description of restoration grazing, above. These measures are integral to the analysis of effects and resulting determinations. Implementing programs are responsible for assuring consistency of all projects conducted under the auspices of this BO amendment with the conservation measures. The only reasonable and prudent measure for these projects, therefore, is monitoring and reporting of take in accordance with the terms and conditions specified below.
Terms And Conditions – In order to be exempt from the prohibitions of Section 9 of the ESA, the Service (*e.g.*, Partners for Fish and Wildlife Program) or the applicant (e.g., State wildlife

agency) must monitor and report take in accordance with the following non-discretionary terms and conditions:

1. Upon finding a dead or injured turtle that has been, or is likely to have been, killed or injured by habitat restoration practices at a site, the action agency or project proponent will immediately contact the Service. If the turtle was likely killed or injured by the use of heavy equipment (*e.g.*, tracked or wheeled vehicles), use of the vehicles will be discontinued until a site investigation by a Service endangered species biologist takes place. The conditions leading to the death or injury of the turtle(s) will be documented to assist the Service in designing future projects and to ensure that the assumptions and effects detailed in this opinion are correct.

2. Care must be taken in handling dead or injured bog turtles that are found in the project area to preserve biological material in the best possible state. In conjunction with the preservation of any dead specimens, the finder has the responsibility to ensure that evidence intrinsic to determining the cause of death of the specimen is not unnecessarily disturbed. The finding of dead specimens does not imply enforcement proceedings pursuant to the ESA. The reporting of dead specimens is required to enable the Service to determine if take is reached or exceeded and to ensure that the conservation measures and terms and conditions are appropriate and effective. Upon locating a dead, injured, or sick bog turtle, notification must be made within 24 hours to:

   - U.S. Fish and Wildlife Service – Office of Law Enforcement, 300 Westgate Center Drive, Hadley, Massachusetts 01035-9589 (telephone: 413-253-8343); and

   - The threatened and endangered species biologist with lead responsibility for bog turtle recovery in the Ecological Services field office within the State where the restoration project took place.

Literature Cited

Tesauro, J. 2006. Guidelines for Grazing in Bog Turtle Habitats. Report prepared for the U.S. Fish and Wildlife Service, New Jersey Field Office, Pleasantville, New Jersey 16 pp.

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