

BIOLOGICAL OPINION

Effects of the Texas Eastern Transmission, LP (Lines 12 and 19 Anomaly Repair - Kulps Project) Pipeline Maintenance on the Bog Turtle

Berks County, Pennsylvania

February 26, 2010



Photo: U.S. Fish and Wildlife Service

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Table of Contents

CONSULTATION HISTORY	1
BIOLOGICAL OPINION.....	3
DESCRIPTION OF THE PROPOSED ACTION	3
CONSERVATION MEASURES	10
ENVIRONMENTAL BASELINE.....	19
CONCLUSION.....	28
AMOUNT OR EXTENT OF TAKE.....	29
CONSERVATION RECOMMENDATIONS.....	37
REINITIATION NOTICE.....	39
LITERATURE CITED	40

CONSULTATION HISTORY

On June 8, 2007, the Fish and Wildlife Service (Service) received a species list request regarding a proposed Texas Eastern natural gas pipeline repair project (Kulps Project) located in Berks County, Pennsylvania

On June 19, 2007, the Service attended a site visit with the Pennsylvania Fish and Boat Commission (PFBC) and the applicant's representatives to discuss ongoing bog turtle monitoring within the action area of the Kulps Project.

On July 24, 2007, the Service met with the project applicant's representatives to discuss the formal consultation process for the project.

On August 27, 2007, the Service received a Phase 1 bog turtle habitat survey of the action area.

On October 29, 2007, the Service concurred that the Deer Run Road portion of Line 12 constituted a separate action.

On April 4, 2008, the Service received a report describing bog turtle habitat and the population study completed in the vicinity of natural gas lines 12 and 19.

On February 26, 2009, the Service notified the applicant's representatives that the proposed Kulps Project "may affect" bog turtles and that the proposed avoidance measures were not likely to be successful in avoiding adverse effects because occupied bog turtle habitat would be directly disturbed. Consequently, the Service recommended the project applicant consider abandoning the pipeline segment needing repair and installing a new segment on the same alignment via horizontal directional drilling (HDD). Alternatively, a new pipeline could be installed on a new alignment to avoid adverse effects on bog turtles. The Service advised the U.S. Army Corps of Engineers, Philadelphia District (ACOE), that they should initiate formal consultation regarding any required Clean Water Act permits, pursuant to section 7 of the Endangered Species Act of 1973, as amended, if impacts to bog turtles and their habitat could not be avoided.

On February 27, 2009, the project applicant responded that HDD was not feasible because it would require extensive bedrock blasting and may also result in wetland disturbance and take of bog turtles.

On March 10, 2009, the project applicant requested a March 30, 2009 meeting with the Service to discuss the Kulps Project. This request included site plans (dated March 5, 2009) depicting proposed project activities and describing the maintenance schedule and project background.

On March 30, 2009, the Service met with the applicant, their consultants, and the ACOE to discuss possible avoidance, minimization and monitoring measures during the installation of Line 12 and 19 through occupied bog turtle habitat.

On May 19, 2009, the Service attended a second site visit with the applicant and their representatives to view hydrologic conditions of the Kulps East and to review where each dig site was proposed.

On May 21, 2009, the Service notified the ACOE that the Kulps Project was likely to adversely affect bog turtles and recommended that they initiate formal consultation.

On June 10, 2009, the project applicant provided the Service with the results of bog turtle trapping studies within the action area, along with an updated project schedule for pipeline construction.

In a letter to the ACOE dated August 6, 2009, the Service explained its rationale for determining that the project was likely to adversely affect the federally listed bog turtle.

The Service received a draft biological assessment (BA) from the applicant on September 15, 2009.

On September 16, 2009, the Service and the applicant met on site to discuss any outstanding questions and to view the site conditions one more time prior to the initiation of formal consultation. During that meeting we were provided with a copy of a report entitled, "Draft Confidential Report Scientific Collector's Permit Number 23 Type 3 – TETLP Natural Gas Lines 12 and 19 Project".

On October 15, 2009, the Service received the ACOE's October 14, 2009, request to initiate formal consultation regarding the Texas Eastern Energy Transmission Pipeline Maintenance Project (Kulps Project). The Service acknowledged initiation of formal consultation by letter of October 26, 2009 and indicated a Biological Opinion (BO) would be issued by February 26, 2010.

On December 14, 2009, the Service and the PFBC met with the applicant and their representatives to discuss project commencement and sequencing the installation of silt fence.

On February 22, 2010, the Service, ACOE and applicant discussed and agreed to minor modifications to project sequencing to reduce adverse effects on bog turtles.

The final BO was completed and delivered to the ACOE on February 26, 2010.

BIOLOGICAL OPINION

This BO is based on information provided in the following documents: 1) *Biological Assessment Texas Eastern Transmission, LP, Kulps Project*, 2) *Confidential Report – Natural Gas Line 12 and 19 (April 2008)*, and 3) *Draft Confidential Report Scientific Collector’s Permit Number 23 Type 3 – TETLP Natural Gas Line 12 and 19 Project (September 2009)*, as well as other information available in Service files. The complete administrative record of this consultation is on file at the Service’s Pennsylvania Field Office.

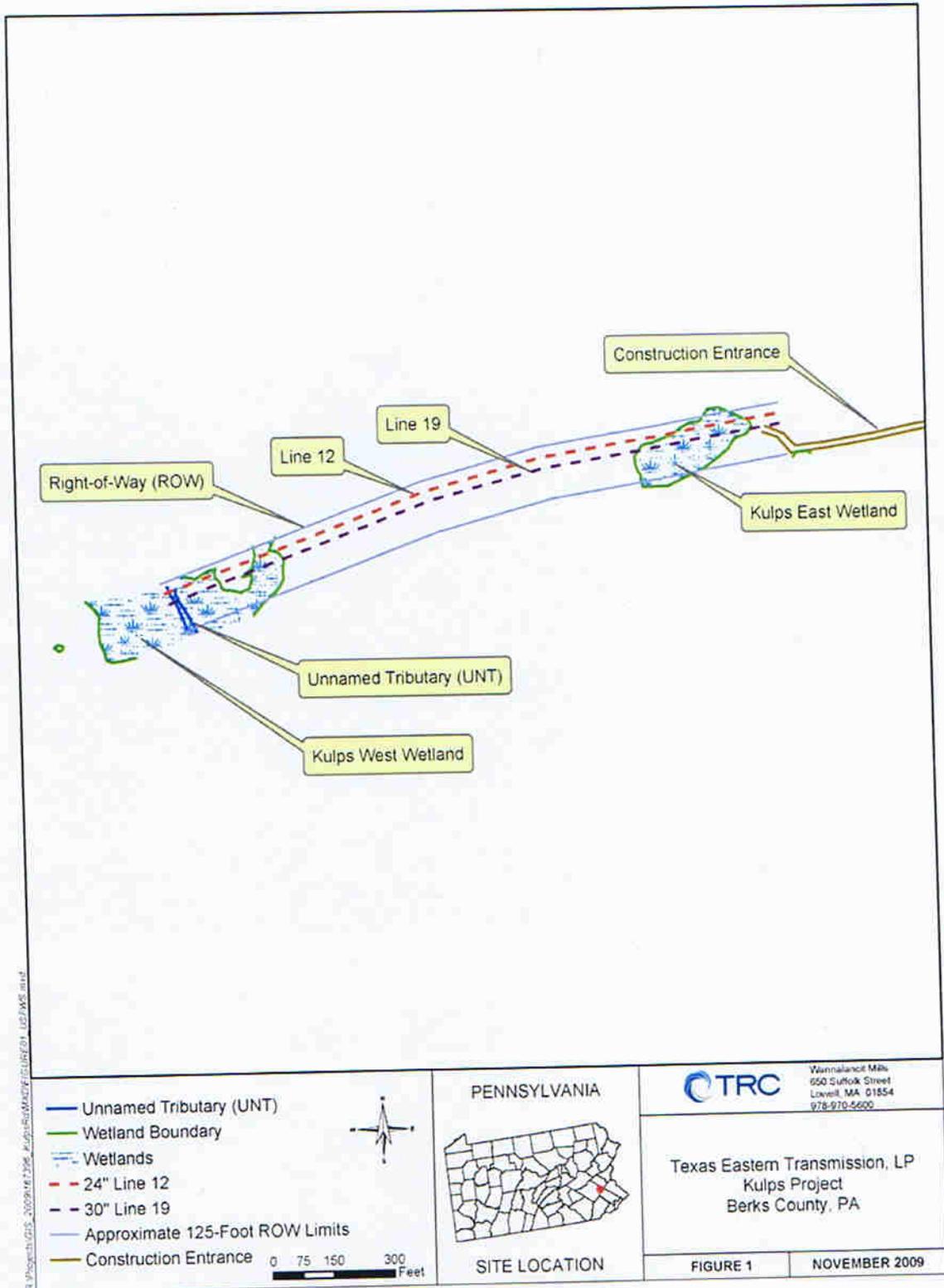
DESCRIPTION OF THE PROPOSED ACTION

As defined in 50 CFR 402.02, “action” means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies in the United States. The “action area” is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action. The direct and indirect effects of the actions and activities must be considered in conjunction with the effects of other past and present federal, State, or private activities within the action area, as well as cumulative effects of future State or private activities that are reasonably certain to occur within the action area.

This BO evaluates a proposed pipeline anomaly repair project currently under consideration by the ACOE on an existing maintained right-of-way (ROW) adjacent to an unnamed tributary (UNT) to the West Branch of the Perkiomen Creek, located in Berks County, Pennsylvania. The BA describes activities that may adversely affect the bog turtle (*Clemmys (Glyptemys) muhlenbergii*) a species that is federally listed as threatened. This BO considers whether implementation of the project is likely to jeopardize the continued existence of this species.

The action area (Figure 1) is the area within which project-associated environmental effects (*e.g.*, earth disturbance, hydrologic modification, erosion, mowing, silt-fence installation, and stabilization effects) are anticipated to occur. This includes uplands within the ROW, as well as wetlands, streams and springs that are hydrologically connected to or pass through the ROW. The action area is approximately 3,800 feet long and 125 feet in width, extending from the western edge of a wetland referred to as “Kulps West”, eastward to a wetland referred to as “Kulps East”. It also includes an unnamed tributary and upland habitat between the two wetlands, as well as an upland construction entrance at a local township road. Although Texas Eastern’s ROW encompasses only portions of both bog turtle wetlands, the action area extends beyond the ROW to include all of the Kulps West (1.2 acres) and Kulps East (0.7 acres) wetlands because the proposed action may indirectly affect the hydrology and bog turtles’ use of the entire wetland.

Figure 1: Project action area



The following project area and project descriptions are based on the BA, which was received on October 2, 2009, and the Service's observations.

Project Area

The project is proposed entirely within an existing Texas Eastern natural gas pipeline ROW. The ROW contains wetlands, springs, a tributary, uplands and fields/meadows. The vegetation within the ROW is maintained by mowing approximately every 3-5 years, in an herbaceous or scrub/shrub condition by the gas company. Surrounding land use is mainly mature forest areas although there is an agricultural field at the western end of the ROW. A few residences border the ROW both at its northern and southern ends and a parcel to the north is managed by the Pennsylvania Game Commission as State Game Lands.

The two palustrine emergent wetlands (PEM) (Kulps West and Kulps East) associated with this project were once forested wetland complexes, but have been maintained as emergent wetlands through the installation of the pipeline and its maintenance (Figure 2). Each wetland extends outside of the ROW.

Kulps West drains through an unnamed tributary that flows approximately 1,320 feet downstream to its confluence with the West Branch of the Perkiomen Creek



Figure 2. Standing in Kulps West looking towards the UNT (U.S. Fish and Wildlife Service)

Project Description

The ROW, which now contains four subsurface gas pipelines (Lines 12, 19, 27 and 28), was originally cleared in 1956 to install Line 12. These pipelines are part of an interstate pipeline system that transmits natural gas to the northeastern United States. In accordance with the United States Department of Transportation (USDOT) regulations, Texas Eastern has inspected its pipeline system and, based on the results of those inspections, is required to conduct repairs to its Line 12 and 19 pipeline systems pursuant to 49 CFR 192, Subpart I (Requirements for Corrosion Control) and Subpart O (Gas Transmission Pipeline Integrity Management) of these regulations. The details of these inspections and the required repairs are outlined below.

A "close interval potential" survey used to measure the corrosion potential of buried steel pursuant to Subpart I was conducted on Texas Eastern's Line 12 and revealed low potentials on this pipeline at the Kulps Project site. Low potentials indicate that a corrosive condition exists on the pipeline. When an active corrosive condition exists, Texas Eastern is required by USDOT regulations to inspect and repair the external coating of the pipeline to correct this deficiency. Texas Eastern is therefore proposing to

complete an inspection and repair of the external coating of Line 12 at this location as part of the Kulps Project.

Texas Eastern also conducts an internal inspection of its pipeline systems at regular intervals as part of its pipeline integrity management plan required under Subpart O of 49 CFR Part 192. An internal inspection of Texas Eastern's Line 19 revealed numerous metal loss anomalies at the Kulps Project site. All metal loss anomalies are issued a "due date" that is calculated using an estimate of the rate of growth of the anomaly to a condition that could potentially threaten the integrity of the pipeline system. If the "due date" occurs before the next scheduled integrity assessment of that pipeline, that anomaly is referred to as a "scheduled" anomaly.

The Kulps Project includes five "scheduled" anomalies located on Line 19 with the following due dates for inspection and repairs:

Scheduled Anomalies at the Kulps Project Site for Line 19

<u>Dig Site No.</u>	<u>Site Reference</u>	<u>Due Date</u>
1	West Wetland	October 25, 2012
2	Upland	August 21, 2011
3	Upland	October 25, 2012
4	Upland	January 29, 2011
5	East Wetland	April 13, 2010

Dig Site numbers are in order in a west to east direction (*e.g.* Dig Site 1 is the most western Dig Site, while Dig Site 5 is the most eastern Dig Site). Dig Sites 2, 3 and 4 lie exclusively in the upland area between the two wetlands (Figure 1). Dig Site 5 occurs entirely within Kulps East, while only a small section of Dig Site 1 lies within Kulps West.

There is only one section of Line 12 that requires repairs. Approximately one-quarter of this section lies within Kulps East, while the remaining section lies in the upland area. Corrosion repair on Line 12 has no specific due date; however, repairs to this line will take place concurrently with the integrity management at Dig Site No.5 on Line 19.

Texas Eastern proposes to complete all required repairs to both Line 12 and Line 19 (Dig Sites No. 1-5) at the Kulps Project site to avoid repeated disturbance to wetland resources and to reduce the number of required permits. To avoid constructing a stream crossing and additional disturbance in Kulps West, construction access will be from the east. Moving west from the access road, the project area slopes to the west down a steep hill through Kulps East, and to a point within Kulps West, on the east side of a perennial stream (see site plans in BA). Both wetlands are used by bog turtles and provide suitable habitat for the species.

Before the start of construction, land surveys will be finalized, and the pipeline centerline and construction area will be marked. As proposed, the construction area will be 100-foot wide in upland areas and 50-foot wide in wetlands.

Use of best management practices (BMPs) and adherence to the construction sequencing schedule will help to minimize impacts to the bog turtle and its habitat. Project BMPs are detailed below.

Timber mats

To access the work area in the uplands and in Kulps West, timber mats will be installed across portions of Kulps East to minimize impacts to this wetland. Timber mats will be laid in place across part of Kulps East, which will allow access to the rest of the construction site. See *Conservation Measures* for more specific information.

Silt fence installation

With the exception of the installation of timber matting, silt fence will be installed prior to any work activities taking place. Silt fence will be installed east of Dig Site 1 and west of Dig Site 2, bisecting the ROW, then following the limits of disturbance (LOD) line in the upland through and around Kulps East. This will prevent any migrating turtles from traveling into the project area during construction.

To minimize impacts to the bog turtle, super-silt fence will be installed in Kulps West and associated LOD after April 15 and when ambient temperatures in the shade reach 55°F, as outlined in the Service's Guidelines for Bog Turtle Surveys (see attachment).

Immediately prior to the installation of super-silt fence in Kulps West, a Phase 2 pre-construction survey will be conducted in the area where the super-silt fence will be placed and in the portion of Kulps West that is proposed to be disturbed. All Phase 2 survey procedures are applicable except that one pre-construction clearance search per wetland rather than the minimum of four searches per wetland shall be acceptable. Super-silt fence will be used in and within 300 feet of wetlands. See *Conservation Measures* for more specific information.

Vegetation

Upland and wetland vegetation will need to be removed prior to the installation of timber mats and silt fencing. Initial clearing operations will include the removal of vegetation within the construction workspace either by mechanical means or hand-cutting. The limits of clearing will be identified and flagged in the field prior to any clearing operations. In the Kulps East and West wetlands, vegetation will be hand-cut. Unless grading is required for safety reasons, wetland vegetation will be trimmed no shorter than 4 inches from the ground to insure that existing root system remains intact. Cut vegetation will be removed from the wetlands for chipping or disposal.

Other construction activities

The construction workspace will be rough graded as necessary to allow for safe passage of equipment and to prepare a work surface for construction activities. Typically, the grading of the construction workspace will be completed with bulldozers. Backhoes will be used in conjunction with bulldozers in areas where boulders and tree stumps require removal.

Temporary water bars, which are temporary erosion control measures constructed of materials such as compacted soil, silt fence, staked straw bales, hay bales, or sand bags are intended to reduce runoff velocity and divert water off the construction ROW. The water bars will be installed on all disturbed areas as necessary to avoid excessive erosion following grading operations on slopes greater than five percent where the base of the slope is less than 50 feet from waterbody or wetland. Where the base of the slope is equal or greater than 50 feet from a waterbody or wetland, water bars will be installed at spacing necessary to avoid excessive erosion. Each temporary water bar will outfall to a stable, well vegetated area or energy-dissipating device. The outfall will be positioned so as to prevent discharge of sediment into wetlands, waterbodies, or other sensitive resources. If hay bales are used as water bars, the hay will not be used as mulch and will be removed at project completion.

Following grading, a trench will be excavated with a backhoe to expose the existing pipeline to permit inspection and repair. The trench will be deep enough (approximately 10 feet) to provide adequate room for inspection and repair of all pipeline surfaces. The excavated material will be placed next to the trench so as to avoid unnecessary movement of machinery across the terrain. Should it become necessary to remove water from the trench, it will be pumped to a stable, vegetated upland area (where practical) and/or filtered through a filter bag or siltation barrier.

Once the pipeline segment has been exposed, the protective coating will be inspected for any defects that require repair. Defects may include significant pitting, abrasions, or disbonded coating. Depending on the type of defect discovered, repairs may include removal and replacement of the coating, attachment of a "clock-spring" protective coating over the area requiring repair, or in severe cases, removal and replacement of the segment of pipeline affected. Once all repairs to the pipeline segment have been completed, a final inspection of the coating will be conducted.

Closely following vegetation clearing and before any required grading activities occur, all erosion and sediment controls will be installed and maintained in accordance with an approved Berks County Conservation District Erosion and Sediment Control Plan (E&SCP). Erosion and sediment control measures will be removed once the site has reached 70 percent uniform vegetative cover. Anomaly repairs are expected to occur in April 2010 and take approximately 6 to 8 weeks to accomplish.

Conservation methods will minimize the extent and time that construction equipment operates in wetland areas. When wetland soils are inundated or saturated to the surface,

the pipeline trench will be excavated across the wetland by equipment supported on wooden swamp mats to minimize the disturbance to wetland soils. In wetlands that have firm substrates, and are unsaturated and not frozen, the top 12 inches of wetland soil over the trenchline will be segregated to preserve existing native seed stocks. Trench spoil (side cast) will be temporarily piled in a ridge along the pipeline trench. Gaps in the spoil pile will be left at appropriate intervals to provide for natural circulation or drainage of water. Trench spoil from wetlands that cannot be placed along the trench due to workspace restrictions will be relocated to adjacent upland areas within the construction workspace limits.

Texas Eastern has prepared a Spill Prevention Control and Countermeasure Plan (SPCC Plan) to address the handling of construction fuel and other materials. The SPCC Plan provides a set of minimum requirements to be used by the contractor in developing their own Project-specific SPCC Plan (*Attachment E* of the BA). Except in circumstances specified in the SPCC Plan, potential impacts to water quality will be avoided while work is being performed in wetlands by implementing the following measures:

- Construction materials, fuels, etc. will not be stored within wetlands or within 100 feet of any stream or wetland system;
- Construction equipment will not be refueled within wetlands or within 100 feet of any stream or wetland system;
- Construction equipment will not be washed in any wetland or watercourse; and
- Equipment will be well maintained and checked daily for leaks.

Environmental training will be given to Texas Eastern's personnel and to contractor personnel whose activities may impact the environment during construction. The training program will cover the job-specific permit conditions, Endangered Species Act provisions, the E&SCP, the SPCC Plan, and any other pertinent information related to the job. This training will be provided by the pipeline company. All construction personnel play an important role in maintaining strict compliance with all permit conditions to protect the environment during construction.

No changes to Texas Eastern's operation and maintenance procedures are proposed. The pipeline will be monitored on a routine basis and evidence of post-construction soil erosion or sedimentation on the pipeline ROW will be reported to the local operations supervisor. Prompt corrective measures will be performed as needed in accordance with the E&SCP. During periodic pipeline and ROW patrols, all permanent erosion control devices installed during construction will be inspected to ensure that they are functioning properly.

Once backfilling of the trenches at each Dig Site has been completed, restoration and revegetation of the construction workspace will immediately occur.

Revegetation will be completed in accordance with permit requirements and written recommendations on seeding mixes, rates, and dates obtained from the local soil conservation authority or other duly authorized agency and in accordance with the

E&SCP. The construction workspace will be seeded within 6 working days following final grading, weather and soil conditions permitting. Any soil disturbance that occurs outside the permanent seeding season or any remaining bare soil areas unstabilized by vegetation will be mulched in accordance with the E&SCP.

CONSERVATION MEASURES

Measures to offset potential direct and indirect effects on the bog turtle will consist of implementing on-site design, management and surveying components that reduce direct and indirect effects to a minimal level. Incidental take associated with direct and indirect effects will be partially offset by a combination of conservation measures such as on-site construction sequencing, pre-construction surveys, post-construction monitoring, salvaging and post-construction habitat searches. The ACOE/Texas Eastern propose to implement the following measures which will be implemented as part of the proposed action to minimize incidental take of the bog turtle. These measures are detailed in the "Conservation Measures" section of the BA (pp. 6-5 through 6-6), in the meeting minutes dated December 15, 2009, and in the notes associated with the conference call of February 22, 2010. A summary of the most significant of these conservation measures follows.

1. Inside the action area, sequence the installation of erosion control measures and survey and monitor the construction area in a manner that minimizes impacts on the bog turtle and its habitat, as described below. Actions (silt fence installation, vegetation removal, timber mat installation and construction) pertaining to Dig Sites 2-5 may occur as soon as the applicant is prepared. However, to minimize impacts to the species, all actions pertaining to Dig Site 1 and Kulps West will occur between April 15 and June 15, and when ambient temperatures in the shade reach 55°F (as outlined in the Service's Guidelines for Bog Turtle Surveys).
 - a. Telemetry data indicate Kulps East is infrequently used by bog turtles. The only turtle documented to use Kulps East is currently in Kulps West (Jay Drasher, personal communication). Therefore, the installation of timber mats and silt fence in Kulps East can occur without preconstruction bog turtle surveys.
 - b. Install timber mats within Kulps East only within the location shown on the most recently approved site plans.
 - c. In both wetlands, vegetation will be cleared by hand. Vegetative debris will be placed in uplands outside of the project area. Pre-construction clearing of vegetation in wetlands and uplands may occur at anytime, if hand clearing is used. Vegetation may be cleared in the upland area by machine, provided equipment access through wetlands is via timber mats and the LOD is silt fenced.

Herbaceous vegetation within the Phase 2 survey area (Kulps West) shall be hand cut to a height of four inches prior to the survey in order to promote search

effectiveness. The qualified surveyor shall conduct the vegetation clearing in Kulps West.

- d. Prior to the installation of super silt fence in Kulps West, a qualified surveyor will conduct one Phase 2 bog turtle clearance search of the proposed project area (area to be disturbed by the silt fence and area within the silt fence).
- e. Install the silt fence and super silt fence along the proposed LOD shown on the most recently approved site plans. Any side cast soil from the installation of the silt fence/ super-silt fence should be searched for bog turtles by a qualified bog turtle surveyor.
- f. Super-silt fence should only be used in Kulps West. Super-silt fence does not need to be used in Kulps East or within 300 of Kulps West or East. Super-silt fence will be installed by hand. The chain link portions of the super silt-fence will be installed facing the work area, with the fabric side of the silt-fencing facing the undisturbed wetland.

ACOE or the qualified bog turtle surveyor shall forward the results of the pre-construction bog turtle survey in writing to the Service and the PFBC via mail, facsimile, or e-mail within 48 hours of completing the surveys.

- g. The interior and exterior of the silt fence will be monitored by a qualified bog turtle surveyor before the start of each work day to ensure the effectiveness of the silt fence has not been compromised. The surveyor will also monitor the interior and exterior of the silt fence daily for turtles trying to enter or exit the construction area. If turtles are found during daily monitoring they will be moved outside of the work area into suitable habitat.
- h. Side cast soil from the pipeline maintenance and repair activities in Kulps West should be searched for bog turtles.
- i. Upon finding a dead or injured turtle, the ACOE or Texas Eastern 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 Fish and Wildlife Service endangered species biologist takes place. The conditions leading to the death or injury of the turtle(s) will be documented (written and photo) to assist the Service in designing future projects and to ensure that the assumptions and effects detailed in this BO are correct.
- j. If dead or injured bog turtles are found in the project area, care must be taken in handling the specimen to preserve biological material in the best possible state. In conjunction with the preservation of any dead specimen, 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 a dead specimen

does not imply enforcement proceedings pursuant to the Endangered Species Act. The reporting of a dead specimen 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:

- i. U.S. Fish and Wildlife Service – Office of Law Enforcement, 300 Westgate Center Drive, Hadley, Massachusetts 01035-9589 (telephone: 413-253-8343);
 - ii. U.S. Fish and Wildlife Service, Pennsylvania Field Office (Attn: Endangered Species Biologist); 315 South Allen Street, Suite 322, State College, PA 16801 (telephone: 814-234-4090); and,
 - iii. Pennsylvania Fish and Boat Commission (Attn: Natural Diversity Section); 450 Robinson Lane, Bellefonte, PA 16823 (telephone: 814-359-5186).
- k. Construction materials and equipment should be free of invasive or non-native plant seeds/soil.
2. To determine if other known populations occur in the ROW, but outside of the action area, conduct Phase 2 bog turtle surveys within the ROW. Phase 2 surveys will be completed within at least 0.86 acre of suitable habitat for bog turtles (i.e. have positive determinations as a result of a Phase 1 habitat survey). This total area may be comprised of several smaller wetlands that total at least 0.86 acre. Wetlands should be located within Texas Eastern's ROW and, if possible, in close proximity to the Kulp's Project site. Aerial photographs may be used to identify potential wetlands for Phase 1 surveys followed by Phase 2 surveys to be completed from April 15-June 15. Phase 1 surveys will be completed in 2010, followed by Phase 2 surveys in 2011. All survey information will be submitted to the Service's Pennsylvania Field Office as well as the PFBC.

STATUS OF THE SPECIES

Species Description

The bog turtle is one of North America's smallest turtles. New England specimens are less than 100 mm (3.9 inches) in carapace length (Klemens 1990, 1993), although farther south, bog turtles attain larger sizes up to a maximum of 115 mm (4.5 inches) (Ernst and Barbour 1989). This turtle is recognized by a combination of two characteristics: a light brown to ebony, lightly sculptured carapace and a bright yellow, orange, or red blotch on each side of the head. The moderately domed and weakly keeled carapace may have a pattern of radiating light lines or be uniformly dark brown. The sides of the carapace are nearly parallel, giving the shell a distinctly oblong appearance when viewed from above. The plastron is variable in coloration with strongly contrasting cream and black areas. The limbs are dark brown with reddish flecking; the feet are weakly webbed.

Hatchlings are similar in appearance to adults. Their tails are proportionately longer than those of adults. Sexual dimorphism is marked in adult animals. Males are characterized by a proportionately flatter carapace, concave plastron, and long, thick tail with the vent beyond the posterior carapace margin. Females are more highly domed and have a wider carapace for their size, have flat or slightly convex plastrons, relatively short and thinner tails, with the vent located beneath the posterior margin of the carapace.

Life History

Bog turtles have a long lifespan reaching upwards of 40 or more years in age (Holub and Bloomer 1977). They are semi-aquatic species and typically active from April to mid-October in the northern part of their range (Barton and Price 1955, Arndt 1977, Nemuras 1967). Bog turtles brumate (hibernate) from October to April, often just below the upper surface of frozen mud or ice (Chase *et al.* 1989). Their varied diet consists of slugs, beetles, lepidopteran larvae, caddisfly larvae, snails, nematodes, millipedes, fleshy pondweed seeds, sedge seeds, and carrion (Barton and Price 1955, Nemuras 1967). They usually occur in discrete populations occupying suitable habitat dispersed along a watershed (Collins 1990).

Female bog turtles reach sexual maturity between 5 and 8 years of age (Barton and Price 1955, Ernst 1977). Mating occurs in May and June, and females deposit from two to six white eggs in sphagnum moss or sedge tussocks in May, June, or July (Arndt 1977, Herman 1990, Herman and George 1986). Bog turtles construct nests in sphagnum or on slightly elevated vegetation (e.g., tussock sedges) where the eggs can be deposited above the water level of the wetland (Shiels 1997). The eggs are left to incubate unattended for approximately six to eight weeks (Shiels 1997) and the young emerge in August or early September (Arndt 1977, Barton and Price 1955). Infertile eggs are common (Arndt 1977, Herman 1990, Tryon 1990a), and not all females produce clutches annually (Tryon 1990a). There is no evidence to suggest that multiple clutches are deposited in a single season. The eggs and young are preyed on by mice, raccoons, skunks, foxes, and birds (Shiels 1997).

According to Ernst *et al.* (1989), turtles can be found hibernating in spring-fed rivulets under soft mud, in muskrat burrows, under sedge clumps, at the base of tree stumps, and in meadow vole burrows.

Habitat

Bog turtles typically inhabit shallow spring-fed fens, sphagnum bogs, swamps, marshy meadows, and pastures with soft muddy areas. These emergent wetlands are usually a mosaic of shallow water, soft muddy bottoms, low grasses and sedges, and interspersed wet and dry pockets. Spring seeps often form a network of small rivulets in the wetland. The open canopy of these wetlands provides sunlight for basking and nesting, and is essential for continued use by bog turtles. The shallow water and mucky soils allow bog turtles to disappear from sight within seconds after being disturbed or sensing an approaching threat. Deep, mucky soils are a crucial bog turtle habitat component.

Burrowing under the muck is the species' primary anti-predator defense mechanism.

Bog turtle habitats are sustained primarily by groundwater, although surface water also contributes to wetland function. Bog turtles depend upon relatively stable, year-round supplies of clean groundwater to support their food base, brumation (hibernation) and aestivation areas, and their nesting habitat. Soft substrates and slow moving water both above and below the surface protect the bog turtles against freezing and overheating.

Population Dynamics

The bog turtle is vulnerable to local extirpation due to the small size and isolation of many populations, delayed sexual maturity, low juvenile recruitment, low mobility, and small home range (Arndt 1977, Chase et al. 1989). Population modeling and sensitivity analysis show that the viability of turtle populations is far more dependent on adult survivorship than hatchling survivorship. Many species models show that the added loss of even one adult at a site may compromise the survival of that population (Alison Whitlock, USFWS, personal communication). In addition, the isolation of populations limits gene flow which could result in inbreeding depression. Furthermore, isolation and habitat fragmentation prevent the recolonization of existing habitat where populations have declined or disappeared, as well as expansion and colonization of newly created habitat (USFWS 1997).

Threats

Primary threats to the bog turtle are loss, fragmentation, and degradation of its fragile, early successional wet-meadow habitat, and illegal collection for the wildlife trade (USFWS 1997). Direct habitat loss or degradation has occurred from the draining, ditching, dredging, or filling of suitable sites for agricultural use, development, and pond or reservoir construction. The proximity of many remaining bog turtles to developed areas, including pipeline corridors, exposes these populations to increased predation, road kills, collection, pollution, and establishment of invasive native or exotic plant species which pose a significant indirect threat to the species. The eggs and young bog turtles are particularly vulnerable to predators such as raccoon, opossum, skunk, fox, snapping turtle, water snake, and larger birds. Populations of many of these predators are elevated in areas of high human activity.

Habitat degradation due to succession and invasive plant species is one of the main threats to this species and can be a threat in both wetlands. Spread of invasive vegetation and exotic plants, including common reed (*Phragmites australis*), purple loosestrife (*Lythrum salicaria*), multiflora rose (*Rosa multiflora*), and reed canary grass (*Phalaris arundinacea*), degrades bog turtle habitat by competing with native vegetation that is preferred by bog turtles for nesting, hibernating and foraging.

The bog turtle is also vulnerable to local extirpation and range-wide reduction due to the small size and isolation of many populations, delayed sexual maturity, low juvenile recruitment, low mobility, and small home range (Arndt 1977, Chase et al. 1989).

Isolation of populations prevents gene flow which can result in an inbred population with low fecundity. Furthermore, isolation and habitat fragmentation prevent the recolonization of existing habitat where populations have declined or disappeared, as well as expansion and colonization of newly created habitat (USFWS 1997).

Status of the Species within its Range

The northern population of the bog turtle was federally listed as threatened, and the southern population listed as threatened due to similarity of appearance, on November 4, 1997 (USFWS 1997). The northern population occurs in the States of Connecticut, Delaware, Maryland, Massachusetts, New Jersey, New York, and Pennsylvania. The recovery plan for the species was finalized in 2001.

The species has been reported from twelve eastern States, with a sparse, discontinuous and localized distribution over a geographic range extending from western Massachusetts and Connecticut, southward through southern New York south to New Jersey and eastern Pennsylvania, to northern Delaware and Maryland, and then southward in the Appalachian Mountains from southwestern Virginia, North Carolina, Tennessee and South Carolina to northern Georgia (USFWS 2001). A 250-mile gap within the range separates the species into distinct (*i.e.*, allopatric) northern and southern populations (Klemens in press, Tryon 1990 a, Tryon and Herman 1990). Disjunct populations previously occurred in western Pennsylvania, and in the Lake George and Finger Lakes regions of New York. The western Pennsylvania and Lake George populations have been extirpated, and only a remnant population exists at one remaining site in the Finger Lakes region (USFWS 1997).

As of 2008, there were 601 bog turtle occurrences in the northern range (Table 1). The term "occurrence" refers to bog turtles associated with a specific location or site, typically a discrete wetland.

Table 1. Extant bog turtle occurrences by State and recovery unit.

State	Prairie Peninsula/ Lake Plain	Outer Coastal Plain	Hudson/ Housatonic	Susquehanna / Potomac	Delaware	Total
CT	-	-	12	-	-	12
DE	-	-	-	-	15	15
MD	-	-	-	82	-	82
MA	-	-	4	-	-	4
NJ	-	6	75	-	131	212
NY	5	-	57	-	-	62
PA	0	-	-	62	152	214
Total	5	6	148	144	298	601

Bog turtles occurrences are tracked and ranked by State natural heritage programs throughout the northern range. Each individual occurrence (termed an "element occurrence" or "EO") is given a rank by the State heritage programs to reflect the occurrence's estimated viability or probability of persistence based on condition, size, and landscape context. Bog turtle occurrences range-wide were ranked using heritage methods, which have the following general rank definitions:

- A – Excellent estimated viability
- B – Good estimated viability
- C – Fair estimated viability
- D – Poor estimated viability
- E – Verified extant, but viability has not been assessed

Using heritage ranking methods, 165 out of 601 extant occurrences (27 percent) are considered to be viable (ranked A-C) in the northern range. "D" ranked occurrences are considered to have a poor chance of viability if current conditions persist, so the D-ranked sites were not considered viable. The States with the largest numbers of bog turtle occurrences had incomplete data on the majority of their sites, leading to the assignment of E ranks for those occurrences. There are 393 unranked (E) sites of 601 total extant sites (65 percent are unranked). This indicates the sites are occupied but have not been assessed to determine condition or viability.

In the northern range, 116 occurrences are on "protected" lands, meaning the occurrence is owned by the public or a conservancy, has an easement held by a public entity or conservancy, or has an agricultural easement. While these sites are on protected lands, they are not necessarily protected, as defined in the Bog Turtle Recovery Plan. The Recovery Plan (USFWS 2001) describes protection as including habitat protection (from direct and indirect anthropogenic threats), protection from predators, heightened law enforcement efforts, habitat management to control invasive species and succession, and conservation of groundwater recharge areas. None of the occurrences characterized as "protected" has measures in place to address all of these needs; therefore, none is fully protected as defined in the Recovery Plan. However, placement of a site under some type of protective ownership is often key to reducing threats due to development, and implementing habitat and species management and monitoring.

Individual wetlands occupied by bog turtles (*i.e.*, bog turtle occurrences) are clustered or grouped into a "Population Analysis Site" (or PAS) if they are part of the same wetland system/drainage basin and there are no major impediments to turtle movements between the wetlands. Therefore, each PAS consists of one or more extant bog turtle occurrences. As of 2008, there were 390 PAS within the range of the northern population (Table 2). Due to widespread wetland habitat fragmentation throughout the bog turtle's range, however, many PAS consist of only one small, marginally viable, extant occurrence, often isolated from other such occurrences and under threat of development (U. S. Fish and Wildlife Service 2001).

Of the 390 PAS range-wide, 251 (64 percent) consist of a single occurrence, 74 (19

percent) consist of two occurrences, and 32 (8 percent) consist of three occurrences (Table 4). Only 33 PAS range-wide (8 percent) consist of four or more occurrences. Bog turtle populations associated with multiple-occurrence PAS may have an advantage over those that are limited to a single, isolated wetland. Bog turtles associated with a population that occurs in multiple, interconnected wetlands can freely disperse to suitable habitat if their natal habitat becomes degraded, thereby increasing their chances of survival. Gene flow is also more likely to occur between sub-populations associated with multiple-occurrence PAS.

From 2000 to 2007, an 11 percent increase in PAS's (350 to 390) occurred in the northern range (Table 2). This may be due to the screening process that is in place in some States to search for bog turtle habitat prior to undertaking land development activities. As a result, the majority of new bog turtle sites are discovered through the State/Federal permitting process. Due to the fidelity that bog turtles exhibit to their natal wetlands, most of these "new" sites are likely to represent already-occupied sites that were newly discovered, rather than sites that have newly formed via colonization of previously unoccupied habitat.

Table 2. Extant bog turtle PAS by State and Recovery Unit in 2000 and 2007

State	Prairie Peninsula/ Lake Plain		Outer Coastal Plain		Hudson/ Housatonic		Susquehanna / Potomac		Delaware		Total PAS		percent Change
	2000	2007	2000	2007	2000	2007	2000	2007	2000	2007	2000	2007	
CT					5	5					5	5	0
DE									4	6	4	6	50
MD							61	57			61	57	(7)
MA					3	4					3	4	33
NJ			3	6	46	45			116	97	165	148	(10)
NY	4	5			33	34					37	39	5
PA	0	0					31	41	44	90	75	131	75
Total	4	5	3	6	87	88	92	98	164	193	350	390	11
percent Change	25		100		(1)		7		20		11		

Recovery Units

A species' recovery plan lays out the best available scientific information relative to the areas and environmental elements needed for that species to recover. Recovery plans may geographically describe actual recovery units (e.g., show lines on a map) essential to recovering the species that may or may not have been designated as critical habitat.

As detailed in the bog turtle recovery plan, the overall recovery objective is to secure long-term protection, restoration and maintenance for no fewer than 185 populations (PAS) and habitat in the northern range of this species. To facilitate recovery, the northern population of the bog turtle is divided into five recovery units: Prairie Peninsula/Lake Plain, Outer Coastal Plain, Hudson/Housatonic, Susquehanna/Potomac, and Delaware. These five recovery units are distinguished from one another by a combination of the following characteristics: habitat distinctiveness, biogeographical and ecological affinities, and variation in the intensity and severity of multiple threats to the species' survival (USFWS 2001).

The bog turtle population in the action area is located within the Delaware Recovery Unit. This recovery unit is the most ecologically diverse of the five recovery units, encompassing inner Coastal Plain, Piedmont, river valleys, Appalachian plateau areas, and fens. It contains both glaciated and non-glaciated habitats. This unit contains the highest densities of roads and major urban areas and has the highest number of lost sites range wide. There is less agricultural pressure here; however, urban sprawl and habitat fragmentation are major conservation challenges, as is maintaining ground water quality and quantity (USFWS 2001).

The recovery objective for the Delaware Recovery Unit is to protect 80 viable bog turtle populations and sufficient habitat to ensure the sustainability of these populations. As of 2008, 26 bog turtle populations were reported to be on protected lands. However, as discussed above this does not constitute protection as defined in the recovery plan, particularly in light of habitat loss and degradation due to succession, invasive exotic plants, and development.

Additional information on the recovery objectives, status, and threats to the bog turtle can be found under "Summary of Factors Affecting the Species" in the final listing rule (USFWS 1997) and "Reasons for Decline and Threats to Continued Existence" in the Recovery Plan for the Northern Population of the Bog Turtle (USFWS 2001).

The following formal consultations have taken place in Pennsylvania for projects that adversely affected bog turtles, and for which incidental take has been estimated (Table 3).

Table 3. Previous biological opinions authorizing incidental take of the bog turtle in Pennsylvania.

Project Name	Estimated Incidental Take	Year	Monitoring Report Received	Monitoring Report Citation	Project Status
Effects of the Implementation of Habitat Restoration Projects on the Northern Population of the Bog Turtle	15 turtles at 100-200 sites	2006	No	-	Ongoing
Warren Street (SR 222), Berks County	4 turtles	1999	No	-	Complete
Tri-County Mall, Chester County	1 bog turtle population	2001	No	-	Complete

ENVIRONMENTAL BASELINE

Regulations implementing the Act define the environmental baseline as the past and present impacts of all federal, State, or private actions and other human activities in the action area (50 CFR §402.02). Also included in the environmental baseline are the anticipated impacts of all proposed federal projects in the action area that have undergone section 7 consultation, and the impacts of State and private actions that are contemporaneous with the consultation in progress.

Status of Species within the Action Area

Aqua-Terra Environmental LTD, conducted studies in the project area using multiple survey techniques (Phase 1, Phase 2, trapping and radio-telemetry) in accordance with Service guidelines. These studies began with Phase 1 surveys on June 6, 2007. All studies were located in the 1.2-acre Kulps West wetland and the 0.65-acre Kulps East wetland.

The following is a summary of data collected from 2007 to 2009 in Kulps West and Kulps East (Drasher 2009a, Drasher 2009b).

Kulps East

This wetland is approximately 0.7 acres in size with approximately 0.33 acres (47%) proposed to be disturbed. Kulps East is a PEM wetland dominated by *Phragmites australis*. A specific vegetation map showing vegetation in this wetland can be found in Attachment G of the BA. Kulps East contains surface hydrology as well as hydrology

from several seasonal ground seeps. A Hydrologic Features Map of Kulps East is can be found in *Attachment F* of the BA. Mucky soils (soft and probe-able to over three inches in depth) were observed in many areas of Kulps East in association with springheads and spring runs and tire depressions.

On June 30, 2007, one female bog turtle (61F) was captured via trapping in Kulps East. No other bog turtles were captured via Phase 2, trapping or radio-tracking techniques in the eastern wetland. A transmitter was attached to 61F and radio-tracking was conducted between June 30 and November 21, 2007. By July 12, 2007, 61F was found to have moved over 1,500 feet to the Kulps West wetland. 61F was tracked throughout the 2009 season and remained in Kulps West. Specifically, 61F was found in Kulps West on May 19, 2009. All 19 turtles, including 61F, were documented on the western side of the UNT in Kulps West as of November 2009.

On May 3, 2009, 36 traps were deployed at Kulps East. Traps were checked daily and removed after 20 days. No bog turtles were found in this wetland during the 2009 trapping period. Additionally, in 2009, no bog turtles were found, via telemetry, to have moved to Kulps East.

Kulps West

This wetland is approximately 1.2 acres in size with approximately 0.1 acres (8.3%) proposed to be disturbed. The emergent plant community found in Kulps West included three significant stands of common reed. West of the UNT was dominated by common reed, while two smallest stands of common reed were located to the east of the UNT. A Kulps West vegetation map is enclosed as *Attachment I*. The western half of Kulps West was hydrologically stable as compared to the eastern portion of the wetland. Several large and many smaller groundwater emergence points on the west side of the UNT watercourse persist throughout the year. An UNT and a diversion channel/ditch provide surface hydrology in this wetland. A Hydrologic Features Map of Kulps West is enclosed as *Attachment H*. Mucky soils were observed in many areas of the Kulps West Wetland in association with springheads and spring runs. The muck could be probed from 6-12 inches in depth at many places throughout the wetland.

There is a small amount of potential nesting habitat near the southwestern edge of the LOD (Drasher 2009b) in the Kulps West. Therefore, it is possible that turtle nests and juvenile turtles could occur within the proposed LOD. There is a high probability that another nesting area occurs on the eastern side of the UNT in Kulps West (Drasher 2009b). This is based on a 2007, capture of two yearling bog turtles found approximately 20 feet (6m) east of the UNT, in the middle of the ROW. These juvenile turtles appeared to be hatchlings from the 2006 nesting season. It seems unlikely these turtles originated from the primary nesting area on the west side of the UNT and traversed the 2-3 foot bank and flowing water associated with the UNT.

In 2007, bog turtle trapping surveys resulted in the capture of 15 bog turtles. Trapping surveys were conducted again on May 5, 2009, at which time 52 traps were deployed in

this wetland. Traps were checked daily and removed after 20 days. These traps captured 18 bog turtles (three adult males, nine adult females, one subadult male, one subadult female and four juveniles), one of which was 61F (Table 4). As illustrated in Table 4, the number of trap captures and new individuals peaked within the first few days of trapping effort. No new individuals were captured after the tenth day of trapping. One known bog turtle (9F) was encountered and fitted with a transmitter prior to 2009 trapping surveys. Although she was not recaptured during the 2009 trapping effort, the turtle was tracked during telemetry efforts and was found in an upland area west of the Kulps West.

Table 4. Bog turtle trapping data (Aqua-Terra 2009)

*Aqua-Terra Environmental Ltd.
Reading, P.A*

Table 1 - 2009 *G. muhlenbergii* trap capture data for Kulp's Rd West Wetland

Turtle ID	Sex/Age Class	1st capture	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
1	Adult Male	7-May	9-May	10-May	16-May	21-May					
2	Subad. Male	8-May	22-May	24-May	25-May						
3	Adult Female	6-May	9-May								
4	Adult Male	7-May	8-May	9-May	12-May	13-May	14-May	15-May	20-May	22-May	25-May
5	Adult Female	13-May									
6	Adult Female	8-May	15-May	21-May							
8	Adult Female	9-May									
10	Subad. Female	9-May	10-May	25-May							
11	Adult Male	7-May	9-May	13-May	17-May	23-May					
12	Adult Female	9-May	24-May								
13	Adult Female	9-May	24-May								
61	Adult Female	8-May	10-May								
16	Adult Female	7-May	8-May	9-May	15-May	18-May	20-May				
17	Juvenile	7-May	24-May								
18	Juvenile	7-May	16-May	20-May	22-May						
19	Adult Female	9-May									
20	Juvenile	11-May									
21	Juvenile	15-May									

*TEELP - Kulp's Road Project, Phase 3 Summary
June 3, 2009 - File #0903*

Bog turtles were radio tracked through the 2009 season (Table 5), but were only found to utilize Kulps West. According to these data, the majority of the known bog turtle population (~ 80%) did not utilize the project area during this study period.

Table 5. Bog Turtle Tracking Locations in Kulps West during Spring and Summer 2009

<u>Location</u>	<u>East side of UNT</u>	<u>Both sides of UNT</u>	<u>Total</u>
Outside of project area	11	4	15
Within the project area	0	4	4
Total	11	8	19

As of November 9, 2009, 15 of the 19 turtles captured in 2009 had active radio-transmitters attached to their carapaces. All of these turtles were located in Kulps West on the western side of the UNT presumably in hibernating areas. Two of the four other bog turtles had transmitters that went “off air” or had dead batteries, one of the turtle’s transmitters fell off in the wetland and the other is suspected to be active but unreachable in a subsurface tunnel (personal communication, Jay Drasher December 28, 2009).

It is important to note both habitat and bog turtles are influenced (positively and negatively) by periodic pipeline maintenance activities ranging from digging up the wetland habitat to mowing it.

Using the Schnabel mark-recapture formula, (Drasher 2009b) estimated a bog turtle population of 19 +/- 3.08 turtles (95% CI) at this site.

EFFECTS OF THE ACTION

"Effects of the action" refers to the direct and indirect effects of an action on listed species or critical habitat, together with the effects of other activities interrelated and interdependent with that action, which will be added to the environmental baseline. Indirect effects are caused by the proposed action and are later in time, but are still reasonably certain to occur. Interrelated actions are those that are part of a larger action, and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration.

Direct Effects

Direct effects are the immediate effects of the project on the species or its habitat. The proposed pipeline maintenance/repair project is expected to result in direct effects on bog turtles.

Kulps West

Direct effects are expected to occur in Kulps West within the LOD area due to movement of construction equipment and excavation. This consists of approximately 0.1 acres of temporary wetland impacts.

Adult, juvenile and hatchling bog turtles may be killed or injured during installation of silt fence or during construction activities.

Avoiding impacts to juvenile turtles is difficult because of their small size; these turtles are much more difficult to find using Phase 2 survey techniques. Therefore, the proposed pre-construction bog turtle surveys may fail to locate juvenile turtles in the work area. Although four juveniles were captured during trapping surveys, it is unlikely that this accounted for all of the juveniles in the population. All juveniles were captured in traps, which indicates that Phase 2 survey techniques may not pick up these small bog turtles in this wetland and the risk of missing juvenile turtles during these surveys is high.

A primary nesting area exists on the west side of the UNT, which is outside the proposed work area. Between May 7 and 15, 2009, all four known juvenile bog turtles (17J, 18J, 20J, 21J) were captured in traps in this area. As of August 6, 2009, all four turtles remained on the west side of the UNT in Kulps West (Drasher 2009b). Three females (8F, 12F, 13F) crossed the UNT from east to west to a suspected nesting area in mid June 2009 and then crossed the UNT again returning to the east side. These migrations corresponded with significant weight-loss (5-12 grams) suggesting these females nested in habitat on the western side of the UNT. Another female (3F) was found on the east and west edges of the primary nesting area during a week in which she had lost 20 grams in body mass. These data indicate the likely use of a nesting area west of the UNT by several females in 2009. However, no hatchlings have been caught in traps or using Phase 2 survey search methods, despite the suspected egg laying activity. This may indicate that hatchlings are too small to detect at this site (because of tall vegetation and

their small size) or that eggs or hatchlings are being preyed upon.

Additionally, telemetry studies showed that 4 bog turtles, 3 of which were females (6F, 13F and 16F), used the LOD area in the Kulps West during the nesting season (June and July). Based on the data, 13F was assumed to nest on the western side of the UNT (as described above), while 16F and 6F may have nested in the LOD. 16 F was found to use the LOD more frequently, then 6F. Based on this information, it appears that there could be some nesting in the ROW, and that pre-construction surveys may very well miss hatchlings and juveniles due to their size. Therefore, any hatchlings and juveniles in the work area are likely to be killed during construction activities. Adult turtles can also be missed during pre-construction surveys, although the chance of finding them is greater.

Based in this information we are estimating that one bog turtle nested in the LOD area in the 2009 season. Therefore, at least 1 set (5) of hatchings from the 2009 season could be killed in the LOD during the 2010 pipeline construction.

All turtles with active transmitters were found to be using hibernating areas outside the proposed construction area, west of the UNT in Kulps West (Drasher 2009b). However, there is suitable hibernating habitat in the proposed work area. It is possible that adult turtles lacking radio transmitters or whose radio transmitters have failed over the winter could be hibernating in the LOD area. If these turtles are not detected in the pre-construction survey process, they will likely be killed or injured as heavy equipment operates in the wetland. Despite searching all side cast material for turtles, they could be buried in the side cast or killed by construction equipment if they are missed during the searches.

Pre-construction bog turtle surveys (a project conservation measure) will occur after April 15 and when conditions meet the specifications in the Guidelines for Bog Turtle Surveys, increasing the chance of finding the turtles. If found, these turtles will be removed from the proposed work area and moved to the undisturbed part of the wetland. While this constitutes harassment (a form of take), these turtles will likely be able to carry on with foraging, etc. even if part of their home range is temporarily unavailable.

Bog turtles could be harassed by equipment and noises associated with construction implementation. Disturbance from machinery could result in decreased foraging which could affect reproduction. However, Teresa Amitrone monitored a bog turtle during the inactive season approximately 23-26 feet from an area where sheet piling was being installed. Through the vibrations and loud noises associated with the installation, this turtle was found basically in the same location. The bog turtle inhabited this small area for about 2 weeks and then moved to another location. The turtle was weighed and measured during this period and reported to have remained the same weight during the time he was exposed to the disturbance (Amitrone 2004). Therefore, according to this scenario, it seems that noises and vibrations from heavy equipment may have limited potential to disturb bog turtles.

However, since Amitrone's turtle was in a torpor state, it may have reacted differently to

equipment disturbance then bog turtles at this site, since construction in Kulps West will occur during the active season. Therefore, all bog turtles in this population could be harassed by equipment and associated noises and vibrations.

Kulps East

The chance for direct effects on bog turtles in Kulps East is minimal. Only one bog turtle was found utilizing the Kulps East in 2007, and that turtle (61F) was last located in Kulps West. In addition, in the 2009 field season, extensive trapping and Phase 2 surveys failed to locate any bog turtles in Kulps East. No nesting areas have been identified in Kulps East, nor have female bog turtles been observed migrating to Kulps East to lay eggs in this wetland. Based on the available data, it appears that Kulps East is used by a very small number of bog turtles and only infrequently. Consequently, in light of the infrequent habitat use and the proposed implementation of BMPs to keep bog turtles out of construction areas, the risk of direct effects on bog turtles is very low in Kulps East.

If any bog turtles are in the Kulps East work area during timber mat placement and earth disturbance activities (grading, excavation, soil stockpiling), they will very likely be killed.

Indirect Effects

Indirect effects are those effects that are caused by or will result from the proposed action and are later in time, but are still reasonably certain to occur [50 CFR §402.02]. The proposed pipeline maintenance/repair project is expected to result in indirect effects on bog turtles.

Kulps West

The entire Kulps West including areas inside the LOD, areas within the ROW and areas outside of these regions is approximately 1.2 acres. Bog turtles forage within the LOD area of Kulps West, which is approximately 0.1 acres. We anticipate that vegetation will be destroyed, and wetland soils and hydrology will be disturbed within the LOD area. Because earth disturbance will be occurring during the growing season, the disturbed area is expected to gradually revegetate over 6-8 weeks. However, during the intervening period, foraging habitat will be degraded and either unsuitable or marginally suitable for bog turtles, forcing them to use undisturbed parts of Kulps West for foraging. This resulting reduction in foraging habitat may reduce the fitness and/or reproductive success of the turtles dependent on this habitat or increase competition between turtles, especially those displaced from portions of their home ranges. Of the 19 turtles located, 4 were found to use Kulps West. This is approximately 20% of the population that is being effected by temporary displacement of its foraging and nesting habitat during the 2010 active season.

Deep, soft, mucky soils allow bog turtles to avoid predators and to escape climatic extremes such as hot and cold temperatures (Shiels 1997). The project applicant

anticipates that hydrologic/mucky features (springs) will persist in the LOD area in Kulps West. However, altering spring flows that provide mucky soils needed by bog turtles, even for a temporary period, may expose bog turtles to predators and affect their thermoregulation, which can result in death, reproductive failure, or induced migration to find suitable habitat.

Groundwater springs, seeps, and subsurface flows provide areas where the turtles can overwinter without the threat of freezing to death (Shiels 1997). All of the tracked bog turtles were found to hibernate on the west side of the UNT in the Kulps West (Drasher 2009b). However, there are potential hibernating areas (springs and mucky soils) within the LOD area in Kulps West. The degree of soil disturbance and excavation associated with the project is likely to make any hibernating habitat within the work area unsuitable, at least temporarily, due to the loss and compaction of tunnels, root systems, soils, and seeps. Over a period of a few years post-construction, the microhabitat elements that make areas suitable for hibernation (loose, mucky soils, root systems, tunnels, etc.) will gradually re-establish. However, until that occurs, any hibernating habitat in the work area will be unavailable to bog turtles, forcing them to find suitable hibernating habitat elsewhere in Kulps West. Should they decide to hibernate in the disturbed area before it is suitable, the risk of over-winter mortality will increase.

The east side of the UNT of Kulps West hosts a large stand of common reed (*Phragmites australis*). Habitat degradation due to succession and invasive plant species is one of the main threats to this species and can be a threat in both wetlands. Spread of invasive vegetation and exotic plants, including common reed (*Phragmites australis*), purple loosestrife (*Lythrum salicaria*), multiflora rose (*Rosa multiflora*), and reed canary grass (*Phalaris arundinacea*), degrades bog turtle habitat by competing with native vegetation that is preferred by bog turtles for nesting, hibernating and foraging. Soil disturbance associated with this project can provide an avenue for the introduction or spread of invasive exotic plants. Over time, these invasive exotic plants can form monotypic stands and can further accelerate succession and make the wetland drier. As a result, valuable nesting and basking habitat is lost and escape cover is reduced.

Kulps East

The entire Kulps East including areas inside the LOD, areas within the ROW and areas outside of these regions is approximately 0.7 acres. Kulps East is known to be used intermittently by one bog turtle. This wetland has the habitat elements essential to the bog turtle's survival, including food sources and escape cover (Drasher 2009b). Thus the disturbance of this wetland (approximately 0.33 acres) habitat will reduce foraging habitat, which can affect the species' reproduction or ability to survive hibernation.

Kulps East contains mucky soils fed by groundwater hydrology, which is suitable habitat for hibernation. Indirect effects on potential nesting and hibernating habitat are expected to be similar to those described for Kulps West.

Cumulative Effects

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this BO. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation under section 7 of the Endangered Species Act.

While the species ultimately benefits from ROW maintenance mowing, mowing also poses risks to the bog turtle. Currently, the ROW is maintained approximately every 3-5 years with a track-mounted brush hog. Mowing is typically conducted in the summer because the ROW is generally drier. While continued maintenance of the ROW maintains emergent habitat for this species, mowing in the wetlands during the summer with a brush hog can damage nesting areas, crush eggs, and injure or crush bog turtles.

CONCLUSION

After reviewing the current status of the bog turtle, the environmental baseline for the action area, and the effects of the proposed anomaly repairs, it is the Service's biological opinion that the Kulps project as proposed is not likely to jeopardize the continued existence of the northern population of the bog turtle. No critical habitat has been designated for these species; therefore, none will be affected.

The Service has based this determination specifically on the relatively few bog turtles that are likely to be killed or injured during repairs to Dig Site 1, but also based on the lower probability that bog turtles will be killed or injured during construction of the other repairs. Through the implementation of the outlined Conservation Measures, the minimal amount (0.1 acres – 8.3% of the Kulps West) of wetland disturbance anticipated in Kulps West and the implementation of species sensitive maintenance measures (mowing the wetland areas between November 1 and March 31 using hand tools) in the ROW, take will be significantly reduced. Additionally, staging maintenance and repair of Lines 12 and 19 concurrently, will assist in minimizing direct and indirect effects on the bog turtle and its habitat.

Despite some incidental take, we expect the population to eventually recolonize the disturbed portions of the action area after hydrology and vegetation are restored. Additionally, due to the large amount of habitat available to this population, the population numbers, the quality of the habitat, the long-term viability of this population is assured.

Based on a review of the current status of the species' reproduction, numbers and distribution range wide, the Service concludes that the aggregate effects of the proposed Kulps project are not likely to jeopardize the continued existence of the bog turtle.

INCIDENTAL TAKE STATEMENT

Sections 4(d) and 9 of Endangered Species Act, as amended, prohibit taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the federal agency or the applicant. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking, provided that such taking is in compliance with the terms and conditions of this incidental take statement.

Because incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity, this Incidental Take Statement is valid only upon receipt by the applicant of all appropriate authorizations and permits from Federal, State and local permitting authorities. These permits/authorizations may include, but are not limited to, a permit under section 404 of the Clean Water Act from the ACOE; a section 401 Water Quality Certification and Chapter 105 Dam Safety and Encroachment Permit from the Pennsylvania Department of Environmental Protection (PADEP); a section 75.4 Special Permit from the PFBC; and an approved Erosion and Sedimentation Control Plan from the Berks County Conservation District. Again, this incidental take statement, along with its exemption from the section 9 prohibitions of the Endangered Species Act, is valid only upon receipt of all required permits and authorizations.

The measures described below are non-discretionary, and must be undertaken by the ACOE so that they become binding conditions of any funding, permits, and/or approvals, as appropriate, issued to the applicant for the exemption in section 7(o)(2) to apply. The ACOE has a continuing duty to regulate the activity covered by this incidental take statement. If the ACOE 1) fails to require that the permit applicant and their contractor adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit, authorization, or funding document; and/or 2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the ACOE must report the progress of the action and its impact on the species to the Service, as specified in the incidental take statement [50 CFR §402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE

Incidental take of bog turtles is expected to be in the form of killing, injuring, harming or harassing (as defined in 50 CFR §17.3) during construction activities. The actual level of incidental take will be difficult to detect or quantify for the following reasons: 1)

individuals of this species are small; 2) bog turtles are likely to exhibit predator-evasive behaviors (*e.g.*, burying themselves in the substrate during construction activities) making them difficult to locate; 3) finding dead or injured specimens can be difficult due to the nature of activities proposed; and 4) it is difficult to determine mortality during hibernation.

The Service anticipates that take in the form of harassment (as defined in 50 CFR §17.3) will occur as a result of the proposed action. We anticipate that all of the bog turtles in Kulps West and Kulps East [(population estimate 19 +/- 3 turtles (95% CI)] will be harassed during the period when construction activities are occurring in the wetlands. Harassment is likely to occur due to the noise, vibrations and visual disturbance associated with operating heavy equipment in the wetland, excavating deep trenches, and backfilling and grading those trenches.

Take in the form of harm (as defined in 50 CFR §17.3) will occur during and after construction activities, resulting in an increased risk of mortality and injury from temporary impairment of feeding, reproduction, and sheltering behavior. Stressors such as changes in hydrology, loss and degradation of vegetative cover, and alteration of habitat are predicted to occur in the action area leading to short-term reproductive impairment, changes in foraging patterns, displacement from habitat, and a reduction in fitness. The project will result in the temporary loss and decreased suitability of bog turtle habitat due to fill and earth disturbance. Consequently, harm is expected to occur until the wetland achieves preexisting site conditions hydrologically, vegetatively and structurally.

Of the 19 bog turtles fitted with transmitters, four were documented to have home ranges that included the portion of Kulps West that will be subject to construction activities. These four turtles will be harmed through the temporary loss of foraging and basking habitat. They will be displaced from this habitat for most of the 2010 active season, having to locate other suitable habitat nearby, and potentially bringing them into competition with other turtles. After a few years, the disturbed habitat may become fully suitable again, but in the meantime, the reduction in habitat quality and quantity will reduce the availability of plant and animal food sources, thereby reducing the turtles' survival and fitness. Turtles using the disturbed construction area may also face an increased risk of mortality due to the loss or degradation of escape habitat (thick vegetation, tunnels, and root systems). This will increase their vulnerability to predators.

It appears that one or two females may be using the proposed work area for nesting. These females will be displaced from nesting habitat, and have to find suitable nesting habitat elsewhere in the wetland. Considering the fidelity bog turtles exhibit to their nesting areas, and the competition that is sometimes seen among females for prime nesting areas, it is likely that females displaced from nesting areas will experience a reduction in reproductive success. This could result from them attempting to nest in the construction area before habitat conditions are suitable for nesting, or from selecting suboptimal nesting sites in areas that they have not previously used. Consequently, we estimate that up to three years of reproductive success will be lost for one to two female

bog turtles; this approximates the time we are estimating it will take for the disturbed wetland area to again become fully suitable for nesting.

Despite pre-construction salvage surveys, bog turtles are likely to be killed during construction activities. Based on telemetry studies, it appears that one or two females using the proposed work area in Kulps West may be nesting in that area. If this is the case, hatchlings are likely to be present in the work area in the spring when construction activities commence because hatchlings typically hibernate relatively close to their nest. Due to the small size of hatchlings, it is very unlikely that they will be detected during pre-construction surveys; consequently, we estimate that all of the hatchlings from the nest of one female bog turtle will be killed during construction. Based on a typical clutch size of 3-5 eggs, we estimate that up to five hatchlings will be killed. Dead hatchlings could be found during survey efforts of the side cast material from installing the silt fence or constructing the trenches. Dead hatchlings could also be found when the trench is dug or at the surface in the Kulps West.

Juvenile and adult bog turtles may also be present in the Kulps West work area prior to construction. As was the case with hatchlings, juvenile bog turtles are likely to be missed during pre-construction salvage surveys. It is noteworthy that all four of the juveniles found in Kulps West were found via trapping, not via standard visual and probing searches typical of salvage surveys.

As of November 9, 2009, 15 of the 19 turtles captured in 2009 had active radio-transmitters attached to their carapaces. Finding all 19 turtles prior to in-wetland construction will be dependent upon no radio-transmitter battery failures over the hibernating period and no additional transmitters falling off. However, if turtles are unaccounted for prior to construction, there is a reasonable likelihood that they will be found during intensive pre-construction salvage surveys. In light of most turtles having transmitters, the proposed use of pre-construction surveys, and the documented use of the proposed work area by a small number of turtles (four), we estimate that construction-related mortality will be up to two bog turtles (including adults and juveniles, but not hatchlings). Dead adults or juveniles could be found during survey efforts of the side cast material from installing the silt fence or constructing the trenches. Dead adults or juveniles could also be found when the trench is dug or at the surface in the Kulps West.

We expect bog turtles that are not radio-tracked (or have radio-transmitter batteries that have failed over the winter) and hibernating in the action area to face the highest risk of mortality, injury, or stress due to their cryptic behavior in the substrate. However, due to the time of year this project is occurring, effects related to mortality are expected to decrease due to the increased chance of finding turtles because they are active.

Table 6 provides a summary of the anticipated take due to the Kulps Project. The actual level of incidental take will be difficult to detect or quantify because individual bog turtles (juveniles and adults) are small, and often buried in the muck, making it unlikely that dead or injured specimens will be located.

Table 6. Incidental take estimate of bog turtles for the Kulps Project.

Individuals	Type of Take
19 to 22	Harassment during construction activities, due to construction-related noise, heavy equipment operation, trenching, grading, etc.
4	Harm during and after construction activities, due to the loss and degradation of suitable foraging, nesting, basking, and escape habitat, and potentially hibernating habitat. This is expected to result in reduced fitness and reproductive success.
≤ 5 hatchlings	Death due to construction activities.
≤ 2 juveniles/ adults	Death or injury due to construction activities.

This level of incidental take is not expected to result in adverse population-level effects at either this site or within the northern range of the species. Over the long term, we anticipate the bog turtle population within the action area to recover to near present levels, as bog turtles eventually recolonize suitable habitat. In addition, implementing future species-specific protective maintenance (hand mowing from November 1 – March 31) of the wetland areas within the pipeline ROW will exceed or at a minimum offset adverse effects caused by the project. This will be beneficial for the population as hand mowing during this time of year will aid in the protection of hibernating and nesting areas. Finally, proper maintenance of an early successional habitat will enable the population to thrive.

EFFECT OF THE TAKE

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

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize incidental take of the bog turtle at the Kulps Project site:

1. Minimize the impact of construction activities on the bog turtle and its habitat through careful project design and implementation.
2. Reduce bog turtle take through pre-construction salvage surveys and fencing to keep turtles from entering the construction areas.
3. Monitor the level of take of bog turtles in the action area to ensure that the effects of the project on bog turtles and bog turtle habitat are consistent with those anticipated in this BO.
4. Conduct vegetative maintenance on the ROW in a manner that reduces the likelihood of taking bog turtles or degrading their habitat.
5. Implement treatment of the common reed (*Phragmites australis*) stand on the eastern side of the UNT in Kulps West.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Endangered Species Act, the ACOE must comply with the following terms and conditions, which carry out the reasonable and prudent measures described above, and outline required reporting and monitoring requirements. These terms and conditions are non-discretionary.

1. Design and implement the project in a manner that minimizes impacts on the bog turtle and its habitat, as described below.
 - a. If further impacts need to occur on Line 19, Dig Site 1 (*e.g.* digging further into the wetland than anticipated due to unforeseen circumstances), provide a brief report to this office justifying why additional work needed to be conducted then what was originally proposed.
 - b. Implement construction sequencing and conservation measures to reduce take of bog turtles.

- i. Install silt fencing around the entire work area prior to the bog turtle active season (prior to April 15), excluding the portion of the work area in the Kulps West wetland from the rest of the work area.
 - ii. Install super-silt fence in Kulps West after April 15 in accordance with the Service's Guidelines for Bog Turtle Surveys.
 - iii. Implement the attached *Bog Turtle Pre-Construction Survey Protocol* in the Kulps West wetland, and install and maintain silt fencing in accordance with that *Protocol* and the E&SCP.
- c. Develop and implement an erosion and sedimentation control plan to address all sources of project-related erosion and sedimentation, including, but not limited to, construction access road, staging areas, wetland crossings, pipeline repair, etc.
- i. Monitor the project site daily to ensure the erosion and sedimentation control practices are implemented and properly maintained, and to identify any project-related impacts due to sediment build-up.
 - ii. Erosion and sediment control Best Management Practices (BMPs) will be in place before, during, and after any work is conducted. All BMPs will be properly installed and maintained in accordance with the Berks County Conservation District E&SCP.
 - iii. Based on the proposed project sequencing, construction work in Kulps West (Dig site #1) will occur last. All silt fencing in Kulps West will be removed within four weeks following construction. Additionally, after construction activities have concluded, place breaks in the silt fence to allow migration of wildlife across the ROW.
 - iv. Site restoration will include stabilizing any exposed soils with native non-invasive wetland or upland seed mixes.
 - v. To minimize the spread of exotic invasive plant species, all equipment should be hosed down prior to bringing it into the action area.
- d. Implement the Spill Prevention Control and Countermeasure Plan (SPCC Plan) as described in the BA (Section 2-5 and Attachment E). However, refuel and store fuel at least 300 feet from any wetlands.
- i. ACOE and contractors will monitor the project site daily to ensure spill avoidance practices are implemented.
 - ii. If a spill does occur, implement emergency remediation procedures to contain the spill, and prevent the spill from entering the wetlands and the UNT.

- iii. The Service will be notified immediately of any spills of hazardous materials.
- e. During the bidding process, prospective project contractors will be notified regarding the presence of endangered species in the project area, and the special provisions necessary to protect them. Considering the species vulnerability to collection, the species name should not be revealed to the contractors. The successful contractor(s) will be instructed on the importance of the natural resources in the project area, and the need to ensure proper implementation of the required erosion and sedimentation controls, and spill avoidance/remediation practices. The following conditions (language) will be included in all construction and demolition contracts awarded for project implementation:
 - i. Endangered species are present in the project area and there is a risk of unauthorized take (Endangered Species Act section 9 violation) if the Terms and Conditions of the Service's BO are not closely followed.
 - ii. Best Management Practices (BMPs) for erosion and sedimentation control will be in place before, during, and after any work is conducted. All best management practices will be properly installed and maintained.
 - iii. Contractors will monitor the project site daily to ensure the erosion and sedimentation control, and spill avoidance practices are implemented.
 - iv. Implement the Spill Prevention Control and Countermeasure Plan (SPCC Plan). However, refuel and store fuel at least 300 feet from any wetlands, rather than 100 feet.
 - v. The Fish and Wildlife Service's Pennsylvania Field Office will be notified immediately of any failures of erosion and sedimentation control measures, or spills of hazardous materials.
 - vi. Contractors will not begin work at Dig site #1 until the site has been surveyed by a qualified biologist and silt fencing has been installed in accordance with the terms of the Biological Opinion. A Texas Eastern project manager will coordinate with the qualified biologist, the Fish and Wildlife Service, and construction contractors to ensure work in wetlands is sequenced and carried out in accordance with the terms of the Biological Opinion.
 - vii. After construction, no project-related or project-generated materials, waste, or fill will be deposited in or within 300 feet of wetlands or streams.
- f. If this project is not completed by 2015, the ACOE will reinitiate consultation with the Service to re-evaluate project impacts on the bog turtle, and to determine the appropriateness of the reasonable and prudent measures, and terms and conditions contained in this BO.

2. Monitor take of bog turtles using various survey and radio-telemetry methods. Provide a report to the Fish and Wildlife Service's Pennsylvania Field Office documenting the following:
 - a. Bog turtles found during pre-construction surveys and those moved into undisturbed portions of the wetland.
 - b. Bog turtles found during searches of spoil piles from excavation. Document the condition of each turtle found.
 - c. Bog turtle behavioral response to construction activities and their behavioral response to habitat alterations resulting from construction. This will be done via a radio-telemetry study. A qualified bog turtle surveyor will continue to track and monitor all bog turtles at the Kulps Project site during the 2010 active season via radio telemetry. Monitoring will occur daily for one week prior to, during, and following construction activities within the wetland. Monitoring will continue on a weekly basis through the remainder of the 2010 active season, ending approximately October 31st. The bog turtle survey will maintain functional radio-transmitters on the tracked bog turtles, and will ensure that all transmitters are removed by November 1 so bog turtles are not entering hibernation with transmitters on. The only exception to this is the retention of radio transmitters on any bog turtles that move into the restored work area. Those turtles will be tracked through June of 2011 to monitor their over-winter survival in altered hibernating habitat. A report on all telemetry studies conducted at the site is due to the Service's Pennsylvania Field Office by January 31, 2011. If any bog turtles hibernate in the disturbed ROW, a telemetry report related to those turtles is due to the Service by August 1, 2011.
 - d. Bog turtle injury and mortality. The Service's Pennsylvania Field Office and Region 5 Division of Law Enforcement are to be notified within 24 hours should any endangered or threatened species be found dead or injured as a direct or indirect result of the implementation of this project. Notification must include the date, time, and location of the carcass, and any other pertinent information. Bog turtles that are accidentally killed, or that are moribund or freshly-dead and contain soft tissues, are to be preserved according to standard museum practices, properly identified or indexed (date of collection, complete scientific and common name, latitude and longitude of collection site, description of collection site), and submitted to a recognized museum or research facility (e.g., USGS facility in Leetown, WV). The appropriate person at the selected repository institution should be contacted regarding proper specimen preservation and shipping procedures.
 - e. The condition of disturbed habitat post-construction. A qualified bog turtle surveyor will conduct vegetation monitoring of disturbed wetland areas, and the adjacent undisturbed wetland areas for 5 year post-construction. The surveyor will provide annual reports to the Service's Pennsylvania Field Office, including

written and photo documentation at the site. The report will document the progression of revegetation, noting the types and densities of native and exotic plant species present. Wetland revegetation will be considered successful if the vegetative cover is at least 80 percent of the type, density, and distribution of the vegetation in the adjacent wetland areas that were not disturbed by construction. The presence of invasive species and/or non-native species within the Site will be documented during each vegetation monitoring event. If invasives and/or non-native species are found within the former construction area, Texas Eastern will prepare and implement an invasive species control plan in coordination with the Fish and Wildlife Service.

3. To reduce the take of bog turtles during periodic maintenance of vegetation on the ROW, conduct ROW mowing in Kulps East, Kulps West, and the upland between these wetlands between November 1 and March 31, when turtles are hibernating. Vegetation maintenance in Kulps East and Kulps West will be done using hand tools or light equipment. Heavy equipment use in these wetlands will be avoided. Heavy equipment includes wheeled or tracked vehicles capable of rutting wetland soils (e.g., tractors, brush hogs, etc.). This will minimize disturbance to turtles, nests, and hibernacula.
4. Control common reed (*Phragmites australis*) in Kulps West. This will improve available bog turtle habitat, partially off-setting the habitat degradation resulting from pipeline maintenance/repair activities. A proposed treatment plan will be submitted to the Service for review and approval at least 60 days prior to the proposed treatment. Control measures will be implemented in 2011 and 2012, and a report documenting the treatment methods and effectiveness will be submitted to the Service by December 31, 2012.

The above reasonable and prudent measures, and the implementing terms and conditions are designed to minimize the impact of incidental take that might otherwise result from the proposed action.

CONSERVATION RECOMMENDATIONS

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

The Service has identified the following actions which, if undertaken by the ACOE or applicant, would further the conservation and assist in the recovery of the bog turtle:

1. Participate in developing a bog turtle conservation banking program to benefit the

species when its habitat is being impacted.

2. Sponsor a bog turtle avoidance training for project applicants that reviews measures on how to reduce take, such as conducting pre-construction surveys.
3. Secure the long-term protection of bog turtle sites (Recovery Plan, Task 2) by protecting bog turtle sites through purchase and conservation easements (Recovery Plan, Task 2.3).
4. Conduct surveys of known, historical, and potential bog turtle habitat (Recovery Plan, Task 3).

To be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of the conservation recommendations carried out.

REINITIATION NOTICE

This concludes formal consultation on the actions outlined in the information presented with the U.S. Army Corps of Engineers, October 14, 2009, request for initiation of formal consultation. As written in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law), and if (1) the amount or extent of incidental take is exceeded (as outlined in Table 6); (2) new information reveals the agency action may affect listed species or critical habitat in a manner or to an extent not considered in this BO; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this BO; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Patricia Cole
Patricia Cole, Acting Supervisor

2/26/2010
Date

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U.S. Fish and Wildlife Service
Bog Turtle Pre-Construction Survey Protocol

The purpose of a pre-construction survey is to find bog turtles within a proposed work area and move them to a safer location before work begins. Because bog turtles are small, cryptic and shy, it is not likely that all bog turtles will be found within a search area, unless the search area is relatively small and is thoroughly searched. Pre-construction surveys will be most effective in non-mucky¹ areas of the wetland, since turtles cannot escape into firm soils. However, they may still evade surveyors by hiding under dense wetland vegetation or by moving back into areas that have already been searched. While pre-construction surveys are not always effective in avoiding take, they are considering a viable option to reduce take, especially in non-mucky portions of the wetland or in small, isolated mucky areas².

Pre-construction surveys will be done by qualified bog turtle surveyors. Lists of qualified surveyors are available from the Fish and Wildlife Service Field Office in the State in which the survey is proposed.

Pre-construction surveys will be done between April 15 and September 15, which approximates the bog turtle active season. Surveys are likely to be most effective between April 15 and May 30, when bog turtles are quite active and wetland vegetation is not as dense as it is later in the growing season. Surveys will be done in accordance with the Phase 2 survey specifications outlined in the Service's *Guidelines for Bog Turtle Surveys* (revised April 2006), except as modified below.

Survey Methods

1. Clearly mark the full extent of the proposed disturbance area within the wetland³.
2. Where wetland vegetation is dense and difficult to search, consider cutting wetland vegetation to a height of approximately 4-6 inches using a mower or weed-eater and raking away this vegetation.
3. Thoroughly search the proposed disturbance area. Visual pre-construction surveys will take anywhere from several hours to a few days, depending upon the size of the area to be searched.
4. If a bog turtle is found in the proposed disturbance area, collect and record appropriate turtle data in accordance with Service and State requirements. Hold the turtle in an appropriate container with 1-2 inches of water in a safe location on-site until the pre-construction survey is complete for that day.

¹ "Non-mucky" refers to soils that only be probed (e.g., with a blunt tool handle) to a depth of less than 3 inches.

² "Mucky" refers to soft, saturated soils that can be probed (e.g., with a blunt tool handle) to a depth of at least 3 inches. In this case, it does NOT refer to a specific wetland soil type(s) or classification.

³ The disturbance area includes all areas that will be affected by any type of construction or heavy equipment use, including, but not limited to, temporary roads, staging areas, construction areas, temporary fill or stockpiling areas, areas where timber mats will be placed, etc.

5. Immediately following the first pre-construction survey (*i.e.*, the same day), or as the pre-construction survey is progressing, install silt fencing to isolate the work area from the remainder of the wetland. The purpose of this fencing is two-fold – to keep bog turtles from entering the disturbance area, and to keep sediment from entering the undisturbed portion of the wetland.
6. Once silt fencing has been installed, release any bog turtles that were found during the pre-construction survey into appropriate habitat in the same wetland, outside the fenced area.
7. Before beginning any work activities within the fenced area, conduct a second pre-construction survey within the next 1-2 days and move any bog turtles to wetland habitat outside the fenced area.
8. If 2500 ft² (*e.g.*, 50 x 50 ft) or more of the proposed disturbance area is “mucky”, conduct at least 10 days of trapping in the fenced area using a trapping density of at least 20 traps/acre to locate bog turtles and remove them from the disturbance area. Trapping will be done by Service-approved surveyors with appropriate permits and authorizations.
9. Once the second pre-construction survey is complete (#7) and the trapping survey is complete (#8), work activity within the fenced area may begin.
10. If the silt fencing is breached during the bog turtle active season (between April 15 and September 15), immediately repair the breach and conduct another pre-construction survey within the fenced area before resuming any work.
11. Within 30 days, provide the Service and appropriate State wildlife agency with a report, including copies of all field forms and data sheets documenting bog turtle captures.

GUIDELINES FOR BOG TURTLE SURVEYS¹

(revised April 2006)

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 are usually sufficient 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, or are forested with suitable soils and hydrology (see below), *and*
 2. Direct and indirect adverse effects to the wetland(s) cannot be avoided.

See *Bog Turtle Conservation Zones*² for guidance regarding activities that may 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.

¹ These guidelines are a modification of those found in the final "Bog Turtle (*Clemmys muhlenbergii*), Northern Population, Recovery Plan" (dated May 15, 2001). Several minor revisions were made to facilitate survey efforts and increase searcher effectiveness. 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 in Attachment 1 for the most recent version of these guidelines.

² See Appendix A of the "Bog Turtle (*Clemmys muhlenbergii*), Northern Population, Recovery Plan" (dated May 15, 2001).

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 performed by a recognized, qualified bog turtle surveyor (contact the Service or the appropriate State wildlife agency to receive a list of recognized, qualified bog turtle surveyors). The following conditions and information apply to habitat surveys.

- ▶ Surveys can be performed any month of the year (except when significant snow and/or ice 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 4 inches deep) or pseudo-rivulets are often present.
 2. **Suitable soils.** Usually a bottom substrate of permanently saturated organic or mineral soils. These are often soft, mucky-like soils (this does not refer to a technical soil type); you will usually sink to your ankles (3-5 inches) or deeper in muck, although in degraded wetlands or summers of dry years this may be limited to areas near spring heads or drainage ditches. In some portions of the species' range, the soft substrate consists of scattered pockets of peat instead of muck.
 3. **Suitable vegetation.** Dominant vegetation of low grasses and sedges (in emergent wetlands), often with a scrub-shrub wetland component. Common emergent vegetation includes, but is not limited to: 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* spp.), grass-of-Parnassus (*Parnassia glauca*), shrubby cinquefoil (*Dasiphora 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*). Some forested wetland habitats are suitable given hydrology, soils and/or historic land use. These forested wetlands include red maple, tamarack, and cedar swamps.

Suitable hydrology and soils are the critical criteria (*i.e.*, the primary determinants of potentially suitable habitat).

- ▶ 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 (see *Bog Turtle Conservation Zones*), 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 wildlife 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 stream and delineation of wetland type (PEM, PSS, PFO, POW) and “designated survey areas”³; 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. A phase 1 report template and field form are available from the States and Service.

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.

The Phase 2 survey will focus on the areas of the wetland that meet the soils, hydrology and vegetation criteria, as defined under the Phase 1 survey guidelines. Those areas that meet the criteria are referred to as “designated survey areas” for Phase 2 and Phase 3 survey purposes.

1. Surveys should only be performed during the period from April 15-June 15. For the Lake Plain Recovery Unit (see Recovery Plan), surveys should only be performed during the period from May 1 to June 30. 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.

³ “Designated survey areas” are those areas of the wetland that meet the soils, hydrology and vegetation criteria for potential bog turtle habitat. These areas may occur within the emergent, scrub-shrub or forested parts of the wetland.

2. Ambient air temperature at the surface in the shade should be $\geq 55^{\circ}$ F.
3. Surveys should be done during the day, at least one hour after sunrise and no later than one hour before sunset.
4. Surveys may be done when it is sunny or cloudy. In addition, surveys may be conducted during and after light rain, provided air temperatures are $\geq 65^{\circ}$ F.
5. At least one surveyor must be a recognized qualified bog turtle surveyor⁴, and the others should have some previous experience successfully conducting bog turtle surveys or herpetological surveys in wetlands. To maintain survey effort consistency and increase the probability of encountering turtles, the same surveyors should 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 April 15 to April 30, surveys should be separated by six or more days. From May 1 to June 15, surveys should be separated by three or more days. The shorter period between surveys during 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.

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 at least four (4) to six (6) person-hours per acre of designated survey area per visit. Additional survey time may be warranted in wetlands that are difficult to survey or that have high quality potential habitat. The designated survey area includes all areas of the wetland where soft, mucky-like soils are present, regardless of vegetative cover type. This includes emergent, scrub-shrub, and forested areas of the wetland.

If the cover is too thick to effectively survey using Phase 2 survey techniques alone (*e.g.*, dominated by multiflora rose, reed canary grass, *Phragmites*), contact the Service and State wildlife agency for guidance on Phase 3 survey techniques (trapping) to supplement the Phase 2 effort. In addition, Phase 3 (trapping) surveys may also be warranted if the site is in the Lake Plain-Prairie Peninsula Recovery Unit. Check with the Service or State wildlife agency for further guidance.

⁴ 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. Others have spent many years actively surveying for bog turtles as amateur herpetologists or consultants.

8. Walk quietly through the wetland. Bog turtles will bask on herbaceous vegetation and bare ground, 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 under mats of dead vegetation, 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. Both random opportunistic searching and transect surveys should be used at each wetland.

The following survey sequence is recommended to optimize detection of bog turtles:

- Semi-rapid walk through the designated survey area using visual encounter techniques.
 - If no bog turtles are found during visual survey, while walking through site identify highest quality habitat patches. Within these highest quality patches, begin looking under live and dead vegetation using muddling and probing techniques.
 - If still no bog turtles are found, the rest of the designated survey area should be surveyed using visual encounter surveys, muddling and probing techniques.
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 and maximum length, carapace width, weight, and details about scars/injuries. Maximum plastron length information should also be collected to differentiate juveniles from adults 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 wildlife 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 designated survey area per wetland per visit; names of surveyors; a site map including wetlands and delineations of designated survey areas; a table indicating the size of each wetland, the designated survey area within each wetland, and the survey effort per visit; 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, wind, and precipitation); presence or absence of bog turtles, including number of turtles found and date, and information and measurements specified in item 10 above; 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, especially in small wetlands lacking invasive plant species.

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 Phase 3 (trapping) surveys), possibly extending into the following field season, may be recommended by the Service or appropriate State agency.

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.

CONTACT AGENCIES - BY STATE*(April 2006)*

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	New Jersey Division of Fish and Wildlife Endangered and Nongame Species Program 143 Van Syckels Road Hampton, NJ 08827
New York	U.S. Fish and Wildlife Service 3817 Luker Road Cortland, NY 13045	New York Natural Heritage Program 625 Broadway, 5th Floor Albany, NY 12233-4757 Phone: (518) 402-8935 <i>(info about presence of bog turtles in or near a project area)</i> NYS Department of Environmental Conservation Division of Fish, Wildlife, and Marine Resources Special Licenses Unit 600 Broadway, 5th Floor Albany, NY 12233-4752 <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	Natural Diversity Section Pennsylvania Fish and Boat Commission 450 Robinson Lane Bellefonte, PA 16823

BOG TURTLE COUNTIES OF OCCURRENCE OR LIKELY OCCURRENCE¹
(September 2008)

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

¹ 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.