United States Department of the Interior

FISH AND WILDLIFE SERVICE
1208-B Main Street
Daphne, Alabama 36526

IN REPLY REFER TO
2014-F-0006

FEB 27 2014

Mr. Jerry Feist
U.S. Department of Agriculture
Animal and Plant Health Inspection Service
529 Centerville Street
Greensboro, AL 36744

Dear Mr. Feist:

This document transmits the Fish and Wildlife Service's (Service) biological opinion based on the Service's review of the U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services' (USDA-APHIS-WS) proposed beaver control and maintenance of a water control structure on behalf of the City of Birmingham at Roebuck Springs in Roebuck-Hawkins Park (also known as Don A. Hawkins Park and Roebuck Municipal Golf Course) and the effects of these actions on the federally endangered watercress darter (*Etheostoma nuchale*). The site is located at approximately 33°35'1.9"N, -86°42"37.5'W in Jefferson County, Alabama. Your request for formal consultation was received on October 17, 2013.

This biological opinion is based on information provided in former USDA-APHIS-WS State of Alabama Director Frank Boyd's September 4, 2013, letter, survey reports, available literature, and other sources of information. A complete administrative record of this consultation is on file in the Alabama Ecological Services Field Office (AFO) located in Daphne, Alabama.

FWS Log No:	2014-F-0006
Date Started:	October 17, 2013
Action Agency:	U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services
Project Title:	Roebuck Springs Beaver Control and Water Control Structure Maintenance
County:	Jefferson County, Alabama

Consultation History

- September 19, 2008: The City of Birmingham used a trackhoe excavator to remove a beaver dam and an underlying rock structure at the downstream end of the spring pool at Roebuck Springs, Jefferson County, Alabama, resulting in rapid draining of the

spring pool and the loss of approximately 11,760 individual watercress darters (Service 2008; Service 2009; Fluker *et al.* 2009b).

- October 9, 2008: Frank Boyd of USDA-APHIS-WS conducted a site visit with Service biologists to Roebuck Springs to discuss water control structure options.

- March 18-19, 2009: A permanent water control structure was installed by the City of Birmingham at the site of the former beaver dam and rock structure at Roebuck Springs (Fluker *et al.* 2009b).

- January 19, 2012: Service biologist, Eric Spadgenske, sent an e-mail to Andre Bittas of the City of Birmingham informing him of beaver activity at Roebuck Springs pond that had partially blocked the water control structure with debris and raised the water level at the spring pond by approximately 8-10 inches. The Service strongly recommended removal of the blockage, slowly and by hand, to avoid a rapid dewatering event and initiation of beaver control efforts (Spadgenske 2012a).

- February 20, 2012: The Service and the City of Birmingham entered into a Settlement Authorization for Civil No. INV 2008404914 U.S. Fish and Wildlife Service v. City of Birmingham, Alabama, and signed a "Memorandum of Agreement for Watercress Darter Buffer Zone Management at Hawkins Park and Roebuck Springs" (MOA) in which the Service agreed to provide recommendations regarding control or removal of beavers causing interference with the water control structure, among other things (Service 2012).

- November 26, 2012: James Robinett with the City of Birmingham sent an e-mail to Service biologist, Eric Spadgenske, and others reporting that beavers continued to be a problem at the Roebuck Springs pond and were causing high water levels within the pond itself, as well as other maintenance issues, including a clogged storm sewer pipe and deteriorating retaining wall at the entrance driveway (Robinett 2012). Eric Spadgenske responded that if the City intended to do any major construction with the pipes/headwalls to let the Service know and that control of the beavers was of the utmost importance (Spadgenske 2012b).

- January 9, 2013: Andre Bittas of the City of Birmingham sent an e-mail to Service biologist, Eric Spadgenske, asking if the Service had any questions or comments on the City's proposal to repair a storm sewer at Don Hawkins Park and providing a copy of the materials cost estimate for the work (Bittas 2013). Eric responded with a request for more details on the work that was proposed and asked for an update on progress made by the City in instituting a beaver control program for the site (Spadgenske 2013a).

- January 11, 2013: A letter from William Pearson, Field Supervisor of the Service's Alabama Ecological Services Field Office, was sent to Andre Bittas of the City of Birmingham, repeating the Service's request for a description of the proposed storm

sewer repair work to allow the Service to assist the City in developing measures to minimize impacts to the watercress darter and its habitat and asking for an update on the City's progress in implementing a beaver control program. The Service also suggested a meeting to revisit the obligations and commitments set forth in the February 20, 2012, settlement agreement and MOA (Pearson 2013a).

- January 24, 2013: A letter from Michael Eddington, Chief Civil Engineer with the City of Birmingham, was sent to Service biologist Karen Marlowe requesting the Service's review of the City's proposal to perform maintenance and repair to the drainage culvert near the entrance to the Don Hawkins Recreation Center (Eddington 2013).

- January 29, 2013: Service biologist, Karen Marlowe, sent an e-mail to Michael Eddington requesting additional information and offering to meet with the City and the Army Corps of Engineers to discuss the project (Marlowe 2013a).

- February 7, 2013: Service biologist, Eric Spadgenske, met with personnel from the City of Birmingham and the Army Corps of Engineers at Roebuck-Hawkins Park to discuss maintenance/repair of the culvert and repair of the headwall. During this meeting, Eric once again advised City personnel that beaver activity was the basis for much of the problems they were encountering at the culvert, headwall, and water control structure. He stressed the importance of removing debris from the culvert pipe slowly, by hand, to avoid a rapid dewatering event that could trap watercress darters in vegetation (Spadgenske 2013b).

- February 8, 2013: James Robinett of the City of Birmingham sent an e-mail to Service, Army Corps of Engineers, and City personnel informing everyone that two storm sewer repair crews were assigned to begin removing the debris from the Roebuck Springs pond and header wall by hand (Robinett 2013a).

- February 11, 2013: Service biologist, Eric Spadgenske, received a report from Jay Haffner (Alabama Department of Conservation and Natural Resources) of dozens of dead watercress darters at Don Hawkins Park, Roebuck Springs. The fish (and aquatic snails) were stranded, trapped, and dead in the vegetation of a dewatered area between the driveway entrance to the Park and (upstream) to the tennis courts in an open area of the spring run (Spadgenske 2013b).

- February 19, 2013: Service biologist, Eric Spadgenske, sent an e-mail to Michael Eddington and Andre Bittas of the City of Birmingham recommending that they stabilize the soil along the spring run area between the entrance driveway and the tennis courts as soon as possible to reduce possible erosion from the recently dewatered area into the endangered species habitat of the spring run. He recommended using grass seeding, straw or mulch. He also, again, recommended that a beaver control program be implemented at Roebuck-Hawkins Park as soon as possible (Spadgenske 2013c).

- February 22, 2013: Service biologist, Eric Spadgenske, sent an e-mail to Michael Eddington, Andre Bittas, and James Robinett of the City of Birmingham, informing them that the culvert of Roebuck Springs was again obstructed with debris from recent beaver activity and that the obstruction was causing flooding and erosion in adjacent areas. He recommended that they carefully remove the debris by hand, slowly and incrementally, to avoid a rapid dewatering of any inundated areas that may contain aquatic life (Spadgenske 2013d). James Robinett responded that the City had removed a small amount of debris and that the parking lot was flooding (Robinett 2013b).

- March 6, 2013: A letter from William Pearson, Field Supervisor of the Service's Alabama Ecological Services Field Office, was sent to Andre Bittas of the City of Birmingham suggesting a meeting in early April to enhance communication regarding debris removal, soil stabilization, storm sewer repair work, filling of sink holes, beaver control, and other issues that may affect the watercress darter at Don Hawkins Park and Roebuck Springs and to assist the City in identifying measures to minimize impacts to the darter (Pearson 2013b).

- March 25, 2013: The City of Birmingham entered into a Cooperative Service Agreement with USDA-APHIS-WS to capture and remove beavers from two locations in the City of Birmingham, including Roebuck Springs at Don Hawkins Park (USDA-APHIS-WS 2013).

- April 4, 2013: Service biologist, Karen Marlowe, met with Claude Vaughn, Wildlife Specialist, USDA-APHIS-WS, at Roebuck-Hawkins Park to discuss debris and beaver removal procedures at the site, including the Service's recommendation to remove the debris within the water control structure slowly, by hand, to ensure that the water levels at the spring pond do not decrease more than 3 inches per hour (Marlowe 2013b).

- August 28, 2013: Service biologist, Karen Marlowe, met with Frank Boyd, USDA-APHIS-WS, at Roebuck-Hawkins Park to evaluate conditions and discuss the debris and beaver removal activities at the site. Andre Bittas of the City of Birmingham participated by phone. Andre confirmed that the City wanted USDA-APHIS-WS to proceed with debris removal and maintenance of the water control structure at Roebuck Springs as part of their Cooperative Service Agreement to control beavers at the site. Frank Boyd said that USDA-APHIS-WS agreed to do this and would proceed with a request for formal section 7 consultation with the Service on these activities (K. Marlowe, personal communication 2013).

- August 29, 2013: Frank Boyd sent an email to Andre Bittas confirming that the USDA-APHIS-WS would monitor the site, conduct beaver management, and perform maintenance on the water control structure under their existing agreement with the City (Boyd 2013a).

- September 4, 2013: Letter from Frank Boyd, State Director, USDA-APHIS-WS, to William Pearson, Field Supervisor of the Service's Alabama Ecological Services Field

Office, received by the Service on October 17, 2013, requesting initiation of formal section 7 consultation regarding the control of beavers and maintenance of the water control structure at Roebuck Springs (Boyd 2013b).

- October 30, 2013: Letter from Jeffrey Gleason, Acting Field Supervisor of the Service's Alabama Ecological Services Field Office, acknowledging receipt of the USDA-APHIS-WS September 4, 2013, letter and initiating formal consultation (Gleason 2013).

Table 1. Species and critical habitat evaluated for effects.

SPECIES or CRITICAL HABITAT	PRESENT IN ACTION AREA	PRESENT IN ACTION AREA BUT "NOT LIKELY TO BE ADVERSELY AFFECTED"
Watercress darter (*Etheostoma nuchale*)	Yes	

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

USDA-APHIS-WS intends to control beavers in Roebuck Springs pond and its spring run and perform regular maintenance on the water control structure in the pond to keep it free of debris. Beavers will be removed with conibear© traps, foothold traps in drown sets, and snares. Beaver dams will be removed as necessary and, in the event that the water control structure becomes blocked or partially blocked with debris, either as a result of beaver activity or other events, USDA-APHIS-WS will remove the debris within the water control structure slowly and incrementally in an attempt to reduce water levels in the spring pond at a rate not to exceed 3 inches (7.62 centimeters (cm)) per hour. The Service does not anticipate any impacts to the watercress darter as a result of the removal of beavers. This biological opinion addresses the impacts from removing debris, both beaver-produced and naturally deposited, and other obstructions from the water control structure and the impacts from removing beaver dams in the spring pond and spring run.

The Service has described the **Action Area** to include Roebuck Springs pond and the spring run to its confluence with Village Creek at Roebuck-Hawkins Park in the City of Birmingham, Jefferson County, Alabama (Figures 1, 2, 3, 4, and 5) (Howell 2012).

Figure 1. Spring House to Water Control Device = 141 meters

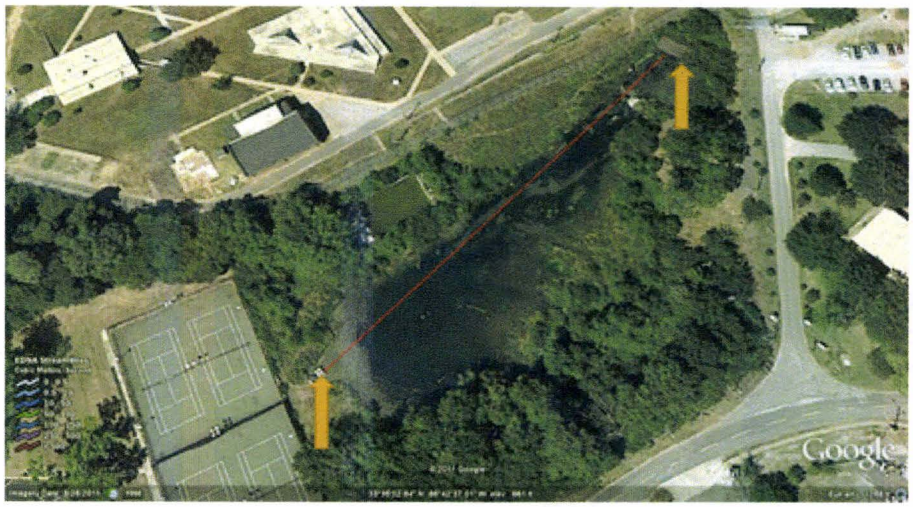

Figure 2. Water Control Device to Culvert near End of Hawkins Park Parking Lot = 183 meters

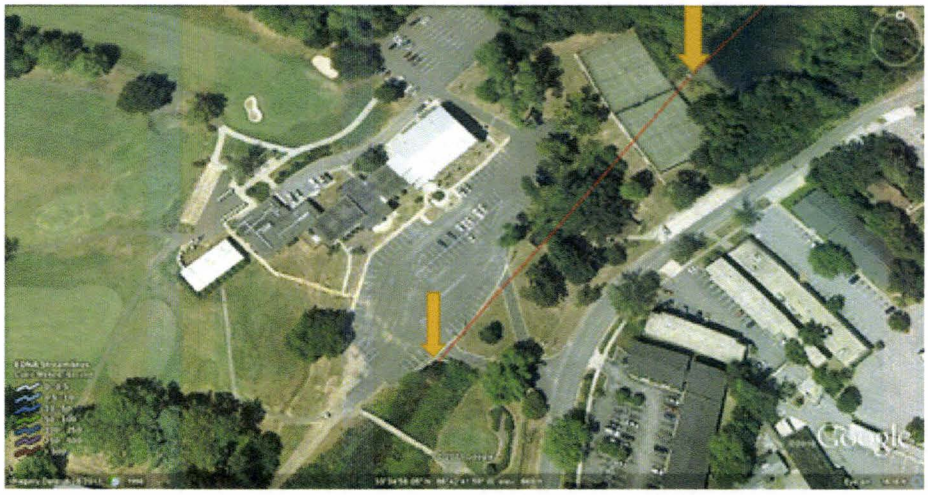

Figure 3. Culvert at End of Hawkins Park Parking Lot to Dam below Lower Impoundment = 163 Meters

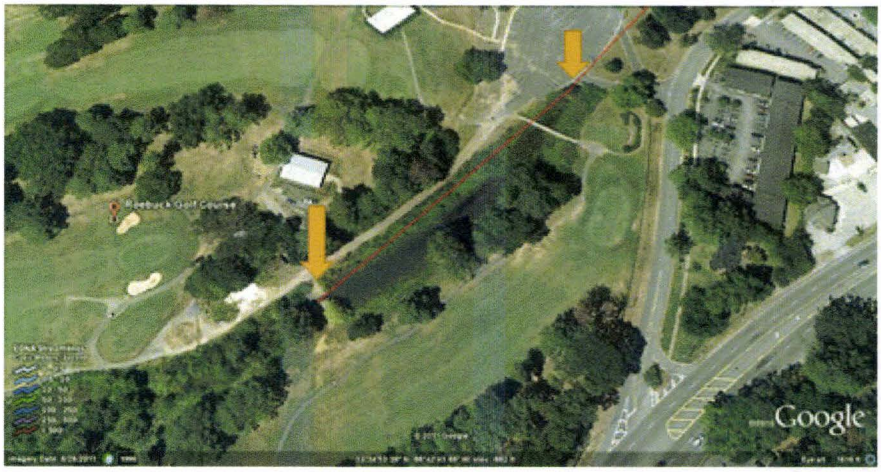

Figure 4. Lower Dam Impoundment to Confluence of Spring Run with Wilson Creek = 138 Meters

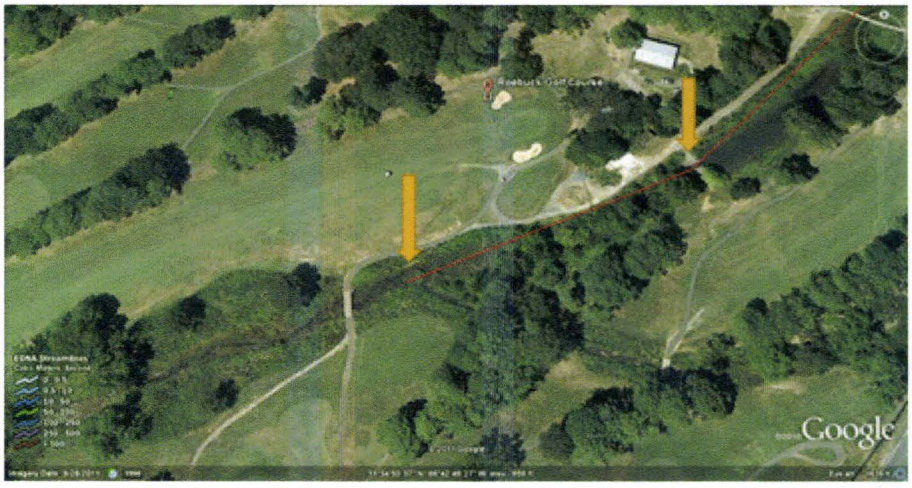

Figure 5. Confluence of Wilson Creek with Spring Run down to Village Creek = 198 Meters

STATUS OF THE SPECIES/CRITICAL HABITAT

Listed species/critical habitat description

The watercress darter is a small, robust species growing to a maximum total length of 56 millimeters (mm) (2.2 inches (in)) (Howell 1986). Breeding males have red-orange and blue fins, and red-orange coloration on the lower part of the body (Service 1992). There are nine or so saddles on the back and usually a pale stripe across the dorsal midline of the nape (Stiles 2004).

The species was listed as endangered in 1970 under the Endangered Species Act of 1969 (Service 1970) without critical habitat. It is a spring endemic; restricted to springs, spring ponds, and spring runs. Although the species seems to prefer the low-current, deep waters at the margins of spring pools with dense aquatic vegetation, such as watercress (*Nasturtium officinale*), aquatic moss (*Fontinalis* sp.), stonewort (*Chara* sp.), and green filamentous algae (*Spirogyra* sp.) (Howell and Caldwell 1965; Howell 1986; Service 1992; Stiles 2004), a recent study has shown that the darter may be more flexible in its habitat use than previously presumed, being able to utilize both shallow and non-vegetated habitats where structural diversity is provided by detritus or gravel (Duncan *et al.* 2010).

The watercress darter occurs naturally in only four springs in Jefferson County, Alabama. It was first described by Howell and Caldwell (1965) from specimens collected in Glenn Spring in Bessemer. In 1976, a second population was found in Thomas Spring in Bessemer (Howell and Black 1976). A third population was discovered by W. M. Howell and D. Ann Black in Roebuck Springs, Birmingham, in 1977 (Howell 1986; Howell 1989), and in 2002, a fourth population was located in Seven Springs, Birmingham (Stiles 2004). These springs are all within the Valley and

Ridge Physiographic Province in the Black Warrior River system in Jefferson County, Alabama (Boschung and Mayden 2004). Glenn, Thomas, and Seven Springs are tributaries to Valley Creek, while Roebuck Springs is a tributary to Village Creek, which joins the Locust Fork River. Valley Creek and the Locust Fork River are both tributaries to the Black Warrior River. Given that the species is found in two distinct tributaries to the Black Warrior River, the watercress darter may have been more widely distributed historically (Duncan *et al.* 2010).

In 1988, watercress darters from Roebuck Springs were introduced into three similar springs in an attempt to expand the species' range (Howell 1988; Service 1992). These attempts resulted in the establishment of a fifth population of watercress darters at Tapawingo Springs (also known as Penny Spring), a tributary of Turkey Creek in Pinson, Jefferson County (Howell 1988; Service 1992; Duncan *et al.* 2010).

Life history

Little is known about the life history of the watercress darter. It apparently feeds on small snails, crustaceans, and insect larva (Howell 1986; Service 1992) and deposits its eggs on aquatic vegetation (Stiles 1986). Spawning occurs from March to July (Service 1992; Stiles 2004).

Population dynamics

Population surveys were carried out at Glenn, Thomas, Roebuck, and Tapawingo Springs from 1991 to 1995. However, collection techniques and parameters were varied, making comparisons difficult and population sizes and viability difficult to ascertain (Moss and Haffner 1991; Moss 1992; Moss 1995; Service 2009). Subsequent presence/absence data were collected sporadically from 1996 to 2006 (Service 2009). Beginning in 2006, biologists with the University of Alabama began monitoring of the 4 native populations (Glenn, Thomas, Roebuck and Seven Springs) and the Tapawingo Springs population on a quarterly basis, using consistent techniques and parameters. These quarterly surveys were conducted from fall 2006 to fall 2008 (Fluker *et al.* 2008, 2009a)

In November and December 2011, the four native populations and the Tapawingo Springs population were resurveyed using the same techniques as those that were employed from 2006 to 2008. In addition, habitat use was studied in the Roebuck Springs run (Hodges and Duncan 2011), and the data collected from that study was used to estimate the population size of the watercress darter in the spring run at Roebuck-Hawkins Park (Duncan and Kuhajda 2012).

Roebuck Springs

The Roebuck Springs population is a genetically distinct unit (Mayden *et al.* 2005; Fluker *et al.* 2008, 2009a) and, based on relative abundance and amount of suitable habitat, is the largest native population (Howell 1989; Moss and Haffner 1991; Fluker *et al.* 2008, 2009a). No population estimates have been made within the spring pool; however, in May-June 2011, the spring run portion of the population was estimated to be 85,017 fish (Duncan and Kuhajda 2012).

The September 2008 dewatering event resulted in the draining of approximately 57% of the aquatic habitat for the watercress darter and the loss of an estimated 11,760 individuals (Buntin and Johnson 2008; Moss 2008; Duncan *et al.* 2008; Fluker *et al.* 2009b; Service 2009). Prior to the dam removal, the average number of individuals caught at the site between the fall of 2006 and summer of 2008 was 145, representing an average catch per unit effort (CPUE) of 43.67 and consisting of 93 small, 46.5 medium, and 5.5 large size/age classes (Fluker *et al.* 2009a). Following the dewatering event, from the fall of 2008 to the summer of 2011, the average number of individual watercress darters caught at the same site (the upper end of the pool) was 53.64, representing an average CPUE of 18.24 and consisting of an average of 11.91, 32.73, and 9 small, medium, and large size/age classes, respectively (Duncan and Kuhajda 2012).

An area that had not been previously surveyed at the lower end of the pool was sampled from September 29, 2008 through June 8, 2010. An average of 57.33 individuals was caught, representing a CPUE of 44.39 and consisting of an average of 22.56 small, 30.33 medium, and 4.44 large size/age classes (Duncan and Kuhajda).

Taken altogether, from 2006 to 2008, an average 114.88 individuals were captured, representing an average catch per unit effort (CPUE) of 26.76 with an average of 57.88 small size class, 53.5 medium size class, and 3.5 large size class represented (Fluker *et al.* 2009a; Duncan and Kuhajda 2012), while in 2011 a total of 63 individuals were captured, representing a CPUE of 21.0 and made up of 10 small class size individuals, 33 medium class size, and 20 large class size.

On February 11, 2013, another dewatering event occurred at the spring run portion of the site when the City of Birmingham cleared debris from the water control structure and a culvert at the head of the spring run. At that time, 465 dead and stranded watercress darters were reported over a 178-foot (54.25 meters (m)) by 30-foot (9.14 m) dewatered area (J. Rawls, Service, personal communication 2014). To date, there have been no follow-up surveys since the 2011 surveys of Duncan and Kuhajda (2012); therefore, it is uncertain how the population at Roebuck Springs, that had been improving since the 2008 dewatering event (Duncan and Kuhajda 2012), has been affected by this most recent dewatering event.

Glenn Spring

The population at Glenn Spring, where the species was first discovered, consists of darters in the spring pool, spring run, and an unnamed tributary to Halls Creek. This site had the lowest number of individuals caught and the lowest average CPUE of all of the sites from 2006 to 2008, with an average of only 3.13 individuals caught at the spring head, 4 in the run, and 9.75 in the unnamed tributary to Halls Creek, representing average CPUEs of 0.27, 0.275, and 0.69, respectively. In 2011, 2 individuals were caught at the spring head, 11 in the run, and 0 in the unnamed tributary to Halls Creek, representing a CPUE of 0.5, 2.2, and 0.0, respectively (Fluker *et al.* 2009a).

Thomas Spring

In 1977, the former landowner of Thomas Spring introduced grass carp (*Ctenopharyngodon idellus*) to clear aquatic vegetation in the spring and pool (Thomas Spring One). By October of that year, most of the spring vegetation was removed and only a single, adult female watercress darter was collected during sampling at that time (Howell 1989). On October 1, 1980, the Service purchased 7.1 acres around Thomas Spring, establishing the Watercress Darter National Wildlife Refuge (WDNWR), following which the grass carp were removed and the spring and spring pool were re-vegetated (Service 1992; Service 2010). Soon thereafter watercress darters were translocated from Glenn Spring to WDNWR to restock Thomas Spring (Howell 1985). A second pond (Thomas Spring Two) was then constructed on the Refuge just below Thomas Spring to create additional watercress darter habitat, and in January 1988, 100 watercress darters were translocated from Thomas Spring into the newly constructed pond (Howell 1988).

The average number of individuals captured in Thomas Spring One from 2006 to 2008 was 22, representing an average CPUE of 2.79, while the average number caught in Thomas Spring Two was 32.5 with an average CPUE of 6.67. In 2011, 26 individuals were captured in Thomas Spring One (a CPUE of 3.71) and 12 individuals were captured in Thomas Spring Two (CPUE 2.0) (Fluker *et al.* 2009a). There was a large amount of filamentous algae at Thomas Spring Two at the time of the 2011 survey, which affected seining efficiency and may be the reason for the much lower CPUE (Duncan and Kuhajda 2012).

Seven Springs

The Seven Springs population was discovered on the property of Faith Apostolic Church in Birmingham (Powderly), Alabama, in 2002 (Stiles 2004). The site consists of a spring pool and run. The average number of individuals captured in Seven Springs from 2006 to 2008 was 55.38, representing an average CPUE of 9.62 and consisting of all size/age classes (Fluker *et al.* 2009a). The dominant aquatic vegetation at the time of those surveys were aquatic moss (*Fontinalis* sp.) and *Ludwigia* sp. (Duncan and Kuhajda 2012).

In 2011, the habitat at Seven Springs was dramatically different. Five beaver dams had been built throughout the spring run and at the lower end of the spring pool, resulting in deeper water throughout the site and far less *Fontinalis* and *Ludwigia.* Cattails (*Typha* sp.) were the dominant vegetation in the spring pool, along with watercress, and the spring run was bordered with a dense understory of the invasive Chinese privet (*Ligustrum sinense*) and bereft of aquatic vegetation except in areas below the last beaver dam (Duncan and Kuhajda 2012).

Only two watercress darters were captured at Seven Springs in 2011, one in the lower spring pool in *Fontinalis* and one at the transition from the spring pool to the spring run, representing a CPUE of only 0.14 (Duncan and Kuhajda 2012)

Tapawingo Springs

The Tapawingo Springs population was created in 1988 with an introduction of watercress darters from Roebuck Springs (Howell 1988; Service 1992). It is located in the Turkey Creek watershed in Pinson, Alabama, and is owned and managed by the Freshwater Land Trust (FWLT). The average number of individuals captured at this site from 2006 to 2008 was 90.25, representing an average CPUE of 13 and consisting of all size classes (small, medium, large). Results were similar in 2011 when 97 individuals were captured, representing a CPUE of 16.17 in all size classes (Fluker *et al.* 2009a; Duncan and Kuhajda 2012).

Status and distribution

The watercress darter is restricted to springs located within large urban population centers in the Bessemer-Birmingham area and is most seriously threatened by surface and subsurface water quality and quantity degradation, specifically non-point source pollution, urbanization, and changes in groundwater and surface water flows (Service 2009). Since the 2008 dewatering event at Roebuck Springs when large numbers of watercress darters were killed off and high numbers of the non-native Northern crayfish (*Orconectes virilis*) survived, predation has become an increasing threat to the survival of the watercress darter at this site (Duncan *et al.* 2008; Carroll *et al.* 2009; Service 2009). In addition, the large number (11,760) of watercress darters that were lost at Roebuck Springs in September 2008 represented the loss of approximately one-half of the genetic component of this population (Fluker *et al.* 2009b; Duncan *et al.* 2008), which may result in a genetic bottleneck that could further lower the genetic diversity of future generations and result in corresponding population problems (Hallerman 2003; Fluker *et al.* 2009b) in the spring pool. Catastrophic events, such as chemical spills or rapid dewatering events, are an additional threat to all of the populations.

The Glenn, Thomas, and Tapawingo Springs populations appear to have remained stable between 2006 and 2011, based on the results of surveys (Fluker *et al.* 2009a; Duncan and Kuhajda 2012). Consistently from 2006 through 2008, the fewest number of watercress darters were collected at Glenn Spring and the fewest number of small age classes have been reported from that site in comparison to the other three natural populations and Tapawingo Springs (Fluker *et al.* 2009a; Service 2009; Duncan and Kuhajda 2012). Based on the 2006-2008 and 2011 surveys, the Roebuck Springs population appears to be the largest and most productive native population (Howell 1989; Moss and Haffner 1991; Fluker *et al.* 2008, 2009a). It is unknown, however, how the February 2013 dewatering event may have impacted the population at this site.

The Seven Springs population appears to have declined drastically based on the results of the 2011 survey when only two single individuals were captured where in previous years an average of 55.38 had been caught (Fluker *et al.* 2009a; Duncan and Kuhajda 2012).

PREVIOUS BIOLOGICAL OPINIONS

There have been no previous biological opinions within the Alabama Field Office boundaries that have been issued for adverse impact to the watercress darter.

ENVIRONMENTAL BASELINE

Status of the species within the action area

Within the Roebuck-Hawkins action area, the watercress darter inhabits the spring pool and the spring run down to its confluence with Village Creek (Figures 1, 2, 3, 4, and 5) (Duncan *et al.* 2008; Howell 2012) and may actually enter Village Creek and venture downstream for 100 feet or so when water temperatures are cool in the winter (D. Drennen, Service, personal communication 2014). This population is a genetically distinct unit (Mayden *et al.* 2005; Fluker *et al.* 2008, 2009a) and, based on relative abundance and amount of suitable habitat, is the largest native population (Fluker *et al.* 2008, 2009a). The water control structure serves as a barrier to upstream migration of the watercress darter from the spring run to the pool (Fluker *et al.* 2009b). A second barrier within the spring run itself is a lowhead dam near the Roebuck Golf Course maintenance shed at 33°34'52.19"N, -86°42'45.41" (Duncan and Kuhajda 2012). In addition, the culverts that run under the tennis courts and driveway entrances are barriers to upstream movement by the darter and do not contain suitable habitat (E. Spadgenske, Service, personal communication 2014).

No population estimates have been made within the spring pool; however, in May-June 2011, the spring run portion of the population was estimated to be 85,017 fish (Duncan and Kuhajda 2012). Although there are no current estimates of the population size within the spring pool, the September 2008 dewatering event resulted in the draining of approximately 57% of the aquatic habitat for the watercress darter and the loss of an estimated 11,760 individuals (Buntin and Johnson 2008; Moss 2008; Duncan *et al.* 2008; Fluker *et al.* 2009b; Service 2009). Extrapolating from this, we may assume that the population within the spring pool prior to the 2008 dewatering event may have been approximately 20,632 individuals.

Currently, within the spring pool, numbers are likely not yet as high as they were prior to the 2008 dewatering event, but the population appears to be recovering (Duncan and Kuhajda 2012). Within the spring run, no surveys have been done since the February 2013 dewatering event; therefore, the impacts to this portion of the population have not yet been assessed.

Factors affecting species' environment within the action area

Within the action area, nonpoint source pollution remains the most persistent threat. The springhead, spring pool, and spring run are within 200 feet east and south of Roebuck Boulevard and Roebuck Parkway. The spring head itself is on the Vacca Campus of the State of Alabama, Department of Youth Services (DYS), which lies to the north of the Roebuck-Hawkins Park. There are numerous parking lots, streets, and small driveways in the area, and Interstate 59 and Highway 11 are less than 0.25 miles to the south (Service 2009).

The DYS staff have established buffer zones and limited the use of herbicides and entry into the springhead area (Service 2009); however, in 2012, DYS began a project to pave and increase the size of the gravel parking lot of the Vacca campus. Paving of the parking lot with asphalt is likely to increase storm water discharge from the site, which may carry pollutants and may result in increased sedimentation, excessive water flow, and increased water

temperatures. To avoid such a possibility, the Service recommended that the DYS implement certain measures into the project design to minimize these effects (Everson 2012).

Specifically, the Service recommended the following measures to avoid an increase in storm water discharge at the site and lessen potential negative impacts to the watercress darter and its habitat:

- Redirect the drainage so that the site drains into the tributary on the north of the property that flows into Valley Creek, rather than to the south into Roebuck Spring and pond.
- Create and maintain vegetated bioswales within and around the parking lot.
- Maintain a 100' vegetated buffer around the spring and spring pond, by posting and maintaining "no mowing" signage.
- Add settling basins and bioswales as necessary on the site to slow down and filter storm water leaving the site.
- Add a basin at the outfall of the existing drainage pipe that flows into Roebuck Spring and pond, designed to hold, slow down, and filter water before it enters the spring and pond.

It is currently unknown whether any or all of these measures were implemented.

Another possible threat from non-point source pollution is from a residential area less than 0.5 miles south of Roebuck Springs where Magic Screwdriver Cave is located. This cave is interconnected hydrologically with the Roebuck Springs system (Hearn 1993) and, since 1983, the condition of the groundwater within the cave appears to be declining, as indicated by a strong septic water odor within the cave (Service 2009).

Historically, the spring pool has had high levels of *E. coli* bacteria (U.S. Department of the Interior 1979) and polycyclic aromatic hydrocarbons levels were high and suspected to be potentially harmful to the watercress darter (Service 1991). However, no follow-up testing has been done to ascertain whether these pollutants persist and are impacting the Roebuck Springs population.

Since the 2008 dewatering event at Roebuck Springs when large numbers of watercress darters were killed off and high numbers of the non-native Northern crayfish (*Orconectes virilis*) survived, predation has become an increasing threat to the survival of the watercress darter at this site (Duncan *et al.* 2008; Carroll *et al.* 2009; Service 2009). In addition, the large number (11,760) of watercress darters that were lost at Roebuck Springs in September 2008 represented the loss of approximately one-half of the genetic component of this population (Fluker *et al.* 2009b; Duncan *et al.* 2008), which may result in a genetic bottleneck that could further lower the genetic diversity of future generations and result in corresponding population problems (Hallerman 2003; Fluker *et al.* 2009b) in the spring pool. Catastrophic events, such as chemical spills or rapid dewatering events, are additional threats to the watercress darter within the action area.

EFFECTS OF THE ACTION

Factors to be considered

The watercress darter prefers to perch on aquatic vegetation, rather than on the spring bottom (Howell and Caldwell 1965; Duncan *et al.* 2010). They also rely upon aquatic vegetation to deposit their eggs (Stiles 1986). Thus, any event that results in a rapid decrease in water level and exposes the aquatic vegetation to dry conditions has the capability of stranding and killing individuals of this species and impacting their breeding success, as evidenced by the September 2008 and February 2013 dewatering events at Roebuck Springs.

Analysis for the effects of the action

Direct effects may include injury or death as a result of a rapid decline in water levels within the action area, leaving aquatic vegetation exposed and watercress darters and their eggs stranded.

Indirect effects may include temporary turbidity and siltation and increased predation pressures by the exotic Northern crayfish.

Species' response to the proposed action

If the USDA-APHIS-WS performs debris removal from the water control structure slowly and incrementally with the goal of reducing water levels by 3" per hour at the most, as described, then adult and juvenile watercress darters should be able to move away from vegetation that is slowly becoming exposed to the air and into deeper water. If eggs are present on the exposed vegetation, they would be expected to be lost.

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 biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Future local and private actions within the action area include activities mandated by the Settlement Authorization for Civil No. INV 2008404914 U.S. Fish and Wildlife Service v. City of Birmingham, Alabama, and "Memorandum of Agreement for Watercress Darter Buffer Zone Management at Hawkins Park and Roebuck Springs" (MOA) (Service 2012) and activities specified in the Freshwater Land Trust's 2014 proposal for the use of funds made available under that mediated settlement (FWLT 2014). These activities include maintenance of a 25-foot minimum vegetated buffer on either side of the spring pool and spring run to its confluence with Village Creek; maintenance of signage throughout the action area to inform the public and City workers of the importance of the habitat to the watercress darter and ensure no operation of heavy equipment, digging, application of chemicals or fertilizers, fishing, wading, littering, release of

animals or placing of any plants in the habitat (Service 2012); implementation of a recharge study by the Geological Survey of Alabama and FWLT, and design and construction of improved storm water management features at the Don Hawkins Recreation Center parking lot by the Freshwater Land Trust (FWLT 2014). The removal of Northern crayfish by students at Birmingham-Southern College is also expected to continue until at least the end of the spring 2014 (M. Gibbons, Birmingham-Southern College, personal communication 2014).

CONCLUSION

After reviewing the current status of the watercress darter, the environmental baseline for the action area, the effects of the proposed removal of debris, both beaver-produced and naturally deposited, and other obstructions from the water control structure, and the cumulative effects, it is the Service's biological opinion that the beaver control activities and maintenance of the water control structure at Roebuck Springs, as proposed, are not likely to jeopardize the continued existence of the watercress darter. No critical habitat has been designated for the species; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent 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 defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. 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 to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary for listed species and must be undertaken by USDA-APHIS-WS for the exemption in section 7(o)(2) to apply. USDA-APHIS-WS has a continuing duty to regulate the activity covered by this incidental take statement. If USDA-APHIS-WS fails to assume and implement the terms and conditions of the incidental take statement, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, USDA-APHIS-WS 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 ANTICIPATED

If the USDA-APHIS-WS is successful in removing the debris from the water control structure and allowing water levels to drop no more than 3 inches per hour, as anticipated, and the same

cautious approach is used when removing beaver dams within the action area, then the Service anticipates that no adult or juvenile watercress darters will be incidentally taken as a result of such activities; however, if eggs are present on vegetation that becomes exposed as a result of the water lowering, these eggs will be lost. An accurate number is difficult to surmise, since there is little to no life history information available for the species; however, we would anticipate a total loss of the eggs present on whatever vegetation becomes exposed.

If water levels are mistakenly lowered at a rate that is greater than 3 inches per hour (which may happen if certain debris is removed that causes more debris to be dislodged than anticipated, for example), then adult and juvenile watercress darters may become stranded in exposed vegetation, as well as eggs. Given the careful, meticulous nature by which USDA-APHIS-WS intends to remove debris and other obstructions and the fact that all removals will be done by hand, with no machinery involved, we do not anticipate any dewatering event that comes close to that which occurred in September 2008 at the spring pool when approximately 57% of the aquatic habitat for the watercress darter and an estimated 11,760 individuals were lost. Similarly, we do not anticipate the same level of take that occurred during the February 2013 dewatering event, when approximately 465 dead and stranded watercress darters were reported over a 178-foot (54.25 m) by 30-foot (9.14 m) (= 496 m^2) dewatered area (J. Rawls, Service, personal communication 2014). Duncan and Kuhajda (2012) estimated the inhabitable habitat of the spring run to be 7,046 m^2. Therefore, the 496 m^2 area of habitat is representative of approximately 7% of the inhabitable habitat. If we assume that this 7% of the habitat harbored 7% of the estimated 85,017 fish in the spring run, then the loss of 465 individuals would represent the loss of approximately 8% of the fish in that area.

Given the precautions that USDA-APHIS-WS will be undertaking to avoid stranding of fish (i.e., slow and deliberate removal of debris and beaver dams with goal of lowering water levels no more than 3" per hour), we do not anticipate incidental take anywhere near 8% of the watercress darter populations in the spring pool and spring run. Conservatively, the level of incidental take in the form of adult and juvenile fish being stranded in dewatered areas and dying as a result of USDA-APHIS-WS' removal of debris from the water control structure and removal of beaver dams at Roebuck Springs is anticipated to be no more than 0.5% of the population, which at the present time may be estimated as approximately 20,632 individuals in the spring pool and 85,017 individuals in the spring run. Therefore, the level of incidental take anticipated is a total of 103 individuals in the spring pool at any time during a debris and beaver dam removal event and a total of 425 in the spring run at any time during a beaver dam removal event.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of expected take is not likely to result in jeopardy to the watercress darter. This is based on the fact that, even with the removal of 11,760 individuals in 2008, the population at Roebuck Springs appeared to have been recovering by 2011 (Duncan and Kuhajda 2012) and the fact that there are three other remaining native populations, two of which appear to be at least stable in number (Glenn and Thomas) and one (Seven Springs) which may be in serious decline, along with an

introduced population at Tapawingo Springs that appears to be thriving (Fluker *et al.* 2008, 2009a; Duncan and Kuhajda 2012).

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measure(s) are necessary and appropriate to minimize impacts of incidental take of the watercress darter.

1. Minimize opportunities for sudden water fluctuations as a result of debris removal activities.

2. Reduce numbers of fish stranded by each dewatering event.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the USDA-APHIS-WS must comply with the following terms and conditions, which carry out the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

1. Remove all debris by hand, slowly and incrementally, with the goal of reducing water levels by no more than 3 inches per hour.

2. Ensure that impediments are removed downstream of all debris and beaver dam removal efforts to reduce pooling and dewatering downstream toward Village Creek.

3. Ensure that there is accurate gauging of water levels during debris and beaver dam removal activities, using a water gauge, meter stick, or other suitable measuring method.

4. Have sufficient personnel available during all debris and beaver dam removal events to monitor dewatered areas, search for stranded fish, and immediately move stranded fish to deeper water sections.

Upon locating a dead, injured, or sick individual of an endangered or threatened species, initial notification must be made to the Fish and Wildlife Service Law Enforcement Office (Special Agent Donnie Grace, 1208-B Main Street, Daphne, AL 36526 (251/441-5787). Additional notification must be made to the Fish and Wildlife Service, Alabama Ecological Services Field Office (251/441-5181). Care should be taken in handling sick or injured individuals and in the preservation of specimens in the best possible state for later analysis of cause of death or injury.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded,

such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The USDA-APHIS-WS must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to use 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 adverse effects of a proposed action on listed species or critical habitat, to help carry out recovery plans, or to develop information.

The Service recommends that the USDA-APHIS-WS provide training to the City of Birmingham staff at Roebuck-Hawkins Park on proper methods for debris removal from the water control structure and culverts and make recommendations to the Service and the City on improvements that could be made to the water control structure to minimize beaver activity at the site while maintaining adequate suitable habitat for the watercress darter.

REINITIATION NOTICE

This concludes formal consultation on the actions outlined in the September 4, 2013, request. As written in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary USDA-APHIS-WS 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; (2) new information reveals effects of the USDA-APHIS-WS action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the USDA-APHIS-WS action is later modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; 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 until reinitiation.

For this biological opinion the incidental take would be exceeded when the take exceeds a total of 103 individuals in the spring pool at any time during a debris or beaver dam removal event and a total of 425 in the spring run at any time during a beaver dam removal event, which is what has been exempted from the prohibitions of section 9 by this opinion. The Service appreciates the cooperation of the USDA-APHIS-WS during this consultation. For further coordination please contact Karen Marlowe at (205) 726-2667.

Sincerely,

William J. Pearson
Field Supervisor
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cc: Daniel Drennen, Ecological Services, Jackson, MS
Jerry Ziewitz, USFWS Section 7 Coordinator, Region 4, Atlanta, GA

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