U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Arabis georgiana* Harper

COMMON NAME: Georgia rockcress

LEAD REGION: 4

INFORMATION CURRENT AS OF: March 2010

STATUS/ACTION:

___ Species assessment - determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to Candidate status
___ New candidate
_X_ Continuing candidate
___ Non-petitioned
_X_ Petitioned - Date petition received: May 11, 2004
__ 90-day positive - FR date:
__ 12-month warranted but precluded - FR date:
__ Did the petition request a reclassification of a listed species?
FOR PETITIONED CANDIDATE SPECIES:
a. Is listing warranted (if yes, see summary of threats below)? yes
b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? yes
c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded. Higher priority listing actions, including court-approved settlements, court-ordered and statutory deadlines for petition findings and listing determinations, emergency listing determinations, and responses to litigation, continue to preclude the proposed and final listing rules for the species. We continue to monitor populations and will change its status or implement an emergency listing if necessary. The "Progress on Revising the Lists" section of the current CNOR (*http://endangered.fws.gov/*) provides information on listing actions taken during the last 12 months.
__ Listing priority change
Former LP: ___
New LP: ___
Date when the species first became a Candidate (as currently defined): October 1, 1999
___ Candidate removal: Former LP: ___
___ A - Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.
___U – Taxon not subject to the degree of threats sufficient to warrant issuance of a

proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

___ F - Range is no longer a U.S. territory.

___ I - Insufficient information exists on biological vulnerability and threats to support listing.

___ M - Taxon mistakenly included in past notice of review.

___ N - Taxon may not meet the Act's definition of "species."

___ X - Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Flowering Plants - Brassicaceae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Alabama, Georgia

CURRENT STATES/ COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Alabama (Bibb, Dallas, Elmore, Monroe, Russell, Sumter, Wilcox counties); Georgia (Clay, Chattahoochee, Floyd, Gordon, Harris, Muscogee counties)

LAND OWNERSHIP: Two populations are located on federal lands with one population on the Fort Benning Military Reservation in Chattahoochee County, GA/Russell County, AL; and one on Fort Toulouse/Jackson Park National Historical Site in Elmore County, AL. A third population in Wilcox County, AL may be under a Corps of Engineers easement area. One population in Georgia (Harris/Muscogee counties) is located on buffer lands of the Georgia Power Company (Moffett 2007, p. 4). All other populations are on private land, including two on property owned by The Nature Conservancy (Bibb County, AL; Floyd County, GA), and one owned by the University of West Alabama (Sumter County).

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LEAD FIELD OFFICE CONTACT: Jackson, Mississippi Field Office, Cary Norquist, 601/321-1128, cary_norquist@fws.gov

BIOLOGICAL INFORMATION:

Species Description/Taxonomy

Georgia rockcress is a perennial herb up to 90 centimeters (cm) (35 inches (in.)) tall. The basal leaves are oblanceolate, rounded at the apex, toothed on the margins, 4 to 8 cm (2 to 3 in.) long, and with or without long, tapered petioles. The basal leaves usually persist through the fruiting season and have green lower surfaces. The stem leaves are alternate, lanceolate to narrowly elliptic, 1 to 5 cm (0.4 to 2.0 in.) long, and somewhat clasping around the stems. The upper surfaces of the stem leaves have stiff, branched hairs when young and are smoothish when mature. All leaves tend to be finely hairy. The flowers are borne in a terminal inflorescence that is somewhat loosely branched. There are four, white petals which measure 6 to 10 millimeters (mm) (0.2 to 0.4 in.) long. The fruit stands erect as a slender (1 mm or 0.04 in. wide), relatively long (5 to 7 cm or 2 to 3 in.) pod that splits in two, leaving behind a thin, papery, lengthwise partition. Seeds are brownish, oblong, about 2 mm (0.1 in.) long, and are borne in single rows on

each side of the partition. Flowering occurs from March to April, with fruiting beginning in May and into early July (Allison 1995, p. 4; Patrick *et al*. 1995, p.2).

Arabis georgiana was first collected in 1841 by Boykin from the vicinity of the Chattahoochee River in Georgia. Several other collections of this species were made in the late 1800s; however, Harper was the first to document its distinctiveness, after seeing it in fruit in 1901 on the bank of the Chattahoochee River in Stewart County, Georgia. Harper later described it as a distinct species in 1903 (Allison 1995, p. 4). The Georgia rockcress was maintained as a distinct species in Hopkins's 1937 monograph of *Arabis* in the eastern U.S. (Allison 1995, p. 3). In 2003, most of the North American species of *Arabis* were transferred to the genus *Boechera*, however, *Arabis georgiana* was not one of the species transferred (Al-Shehbaz 2003, p. 381).

Habitat

Arabis georgiana grows in a variety of dry situations, including shallow soil accumulations on rocky bluffs, ecotones of gently sloping rock outcrops, and in sandy loam along eroding riverbanks. It is occasionally found in adjacent mesic woods, but it will not persist in heavily shaded conditions. This species is adapted to high or moderately high light intensities and occurs on soils which are circumneutral to slightly basic (Allison 1995, p. 7; Patrick *et al*. 1995, p. 2).

Life History

There is little information on the life history of this species. Moffett (*in litt*. 2005) reports that plants germinate easily from seed and reseed readily in a garden environment.

Current and Historical Range

Populations of *Arabis georgiana* are known from the Coastal Plain, Piedmont, and Ridge and Valley physiographic provinces of Alabama and Georgia; extensive searches have been conducted for this species throughout these physiographic provinces in both Alabama and Georgia (Allison 1995, p. 1-31; Allison 1999, p. 1-7). Allison (1995, p. 18-31) surveyed 205 sites over nine counties in Georgia and discovered only four new populations (a 2 percent success rate). Currently, 17 populations are documented to occur across Alabama and Georgia. Eleven of these occur solely in Alabama; 5 solely in Georgia; and 1 population extending into both states. Of the 11 populations in Alabama, 6 are in the Ridge and Valley region (all in Bibb County), and 5 occur in the Coastal Plain region (Dallas, Elmore, Wilcox, Monroe and Sumter counties). Of the 5 populations found solely in Georgia, 3 occur in the Ridge and Valley region (Floyd and Gordon counties); 1 population occurs in the Piedmont region (Harris/Muscogee counties); and 1 population occurs in the Coastal Plain region (Clay County). The one population that extends into both states (Russell County, AL/ Chattahoochee County, GA) also occurs in the Coastal Plain region (Allison 1995, p. 13-14; Allison 1999, p. 1-7; Moffett *in litt*. 2005; Moffett 2007, p. 1; Schotz *in litt*. 2007, 2009). A historical location from Stewart County, Georgia, has not been relocated despite repeated searches, including the most recent attempt in 2005 (Moffett 2007, p. 1).

Population Status/Estimates

Arabis georgiana is rare throughout its range. During surveys in 1999, Allison (1999, p. 1-7) found that populations of this species typically had a limited number of individuals restricted over a small area. Of the nine known localities in Georgia, Allison (1995, p. 18-28) reported that six sites consisted of only 3 to 25 plants, and the remaining three sites had 51 to 63 individuals. However, a 2007 survey, by Moffett (2007, p. 8), of the six Georgia populations resulted in counts of 5 or fewer plants at one population; 30 to 50 plants at two populations; 150 plants at one population; and two populations with 800 to 1000 plants. In 2009, plants could not be relocated at one Floyd County, Georgia site and only one plant was seen at another site where 25 to 50 had been documented in 2007 (Elmore 2010, p. 1). Moffett (2007, p. 1-2) indicated that the overall status of the three populations in the Ridge and Valley ecoregion (Floyd and Gordon counties, Georgia) was poor, as these populations tended to be small, and declining in size and vigor. The largest population in Georgia is the multi-site Goat Rock Dam complex in the Piedmont province (Harris/Muscogee counties) with approximately 1000 flowering stems at last census (Moffett 2007, p. 2). Fort Benning also supports a vigorous population with an estimated 1000 plants (Moffett 2007, p. 2).

In Alabama, the larger populations are primarily in the Ridge and Valley physiographic region of Alabama, particularly in Bibb County. Allison (1999, p. 2-4) originally documented this species at 18 localities (representing 7 populations) in Bibb County. However, one of these Bibb County populations was not relocated during surveys in 2001 (Allison 2002, pers. comm.) and plants were not seen at several other sites in this area during visits by the Alabama Natural Heritage Program in 2004. Population estimates of the Alabama sites from the late 1990s by Allison (1999, p. 1-7) are as follows: three of the six Bibb County populations had 5 to 20 plants, and the remaining Bibb County populations had 50, 83, and 180 plants; the three Coastal Plain Alabama populations had population sizes of 12, 24, and 51 plants. The recently discovered Sumter, Dallas, and Monroe county sites had 15, 30, and 160 plants, respectively (Schotz *in litt*. 2007, 2009).

THREATS:

A. <u>The present or threatened destruction, modification, or curtailment of its habitat or range</u>.

Currently, habitat degradation, more than its outright destruction, is the most serious threat to this species' continued existence. Most of the Coastal Plain rivers surveyed by Allison (1995, p. 11) were considered unsuitable for *Arabis georgiana* because their banks had been disturbed to the point where there was no remaining vegetative buffer. Recent habitat degradations (i.e. vegetation denuded and replaced by hard-packed exposed mineral soil) have occurred at several Georgia sites in association with residential development and campsites atop the bluffs (Moffett 2007, p. 3-4). Disturbance, associated with timber harvesting, road building, and grazing in areas where the plant exists has created favorable conditions for the invasion of exotic weeds in this species' habitat (see Factor E).

One population of *Arabis georgiana* in Floyd County, Georgia, appears to be a surviving remnant of a once larger population. The primary habitat at this locality has been extensively quarried (Allison 1995, p. 10). It is likely that other populations on rocky bluffs, in the Piedmont and

Ridge and Valley provinces, were destroyed by quarrying or impoundments. A recently located population in Monroe County, Alabama is adjacent to an area that was once quarried (Schotz *in litt*. 2007). Rock bluffs along rivers have also been favored sites for hydropower dam construction. The construction of a dam in Harris County, Georgia, destroyed a portion of suitable habitat for a population of *Arabis georgiana* and the current population there may also represent a remnant of a once much larger population (Allison 1995, p. 10).

Historically, suitable habitat for this species was destroyed or degraded due to quarrying, residential development, timber harvesting, road building, recreation and possibly hydropower dam construction. Currently, one of the populations in Georgia is confined to a roadside right-of-way and is currently threatened by roadside maintenance such as mowing and herbicides (Hodges *in litt*. 2005). We have determined that the present or threatened destruction, modification, or curtailment of habitat and range continues to represent a significant threat to *Arabis georgiana.*

B. Overutilization for commercial, recreational, scientific, or educational purposes.

Overutilization is not known to pose a threat to this species.

C. Disease or predation.

Limited browsing of plants has been noted in Georgia (Allison 1995, p. 10; Moffett 2007, p. 3). However, disease and predation are not thought to be a significant threat to this species.

D. The inadequacy of existing regulatory mechanisms.

Arabis georgiana is listed as Threatened by the State of Georgia (Patrick *et al*. 1995). This State listing provides legal standing under the Georgia Wildflower Preservation Act of 1973. Georgia law prohibits the removal of this species from public land and regulates the taking and sale of plants from private land. This law also triggers the Georgia Environmental Protection Act process in the event of potential impacts to a population by state activities on state-owned land (Moffett 2007, p. 3); however, the greater problem of habitat destruction and degradation is not addressed by this law. *Arabis georgiana* is considered endangered in Alabama but this state has no protective legislation for plants.

Only two populations are known to occur on Federal land: one population (two localities) on the Fort Benning Military Reservation in Chattahoochee County, Georgia, and Russell County, Alabama, and one population on Fort Toulouse/Jackson Park National Historic Site in Elmore County, Alabama. Fort Benning is aware of the two sites on their property and is working with The Nature Conservancy to monitor and provide for the conservation of these populations (Elmore 2010, pers. comm.). Protection measures at Fort Toulouse are unknown at this time. The Sumter County, Alabama population is owned and managed by the University of West Alabama and is under no apparent threat. All sites are in need of active management to combat invasive plants (see Factor E.).

In summary, declines in *A*rabis *georgiana* have been primarily attributed to habitat degradation which is not currently regulated by any existing laws. Therefore, we have determined that the threat of inadequate existing regulatory mechanisms is an ongoing threat of moderate magnitude to this species.

E. Other natural or manmade factors affecting its continued existence.

The primary threat to *Arabis georgiana* is the ongoing degradation of its habitat and the subsequent invasion of exotic species. Disturbance of most of the species' known sites has provided opportunities for the invasion of aggressive, non-native weeds, especially Japanese honeysuckle (*Lonicera japonica*). *Arabis georgiana* is not a strong competitor and is usually found in areas where growth of other plants is restrained due to the shallowness of the soils or the pioneer status of the site (e.g., eroding riverbanks) (Allison 1995, p. 8). However, non-native species are effectively invading these riverbank sites and the long-term survival of the five riverbank populations in the Coastal Plain province is questionable (Allison 1995, p. 11). This species is only able to avoid competition with non-native species where the soil is limited (e.g., rocky bluffs).

Competition from non-native species, exacerbated by adjacent land use changes, likely contributed to the loss of the population at the type locality in Stewart County, Georgia (Allison 1995, p. 28) and possibly to one of the Bibb County, Alabama, populations and several other sites in this general area (Allison 2002, pers. comm.; Alabama Natural Heritage Program 2004, p. 2). Additional populations are also currently being negatively affected by competition with non-native plants. According to Moffett (2007, p. 3), most of the sites in Georgia are being impacted by the presence of invasive plant species, primarily Japanese honeysuckle (*Lonicera japonica*), Chinese privet (*Ligustrum sinense*), and Nepalese browntop (*Eulalia viminea*). Japanese honeysuckle was observed growing on individual plants of *Arabis georgiana* at three sites visited by Allison in 1995. At a fourth site, plants growing in a mat of Nepalese browntop declined in number from 17 individuals to a single plant (Allison 1995, p. 19). Allison (1995, p. 18-28; Allison *in litt*. 1999) considered four other populations to be imminently threatened by the nearby presence of non-native plants. Thus, approximately 40 percent of the populations visited by Allison in 1995 were reportedly threatened by non-native species.

Populations of *Arabis georgiana* are healthiest in areas receiving full or partial sunlight. This species seems to be able to tolerate moderate shading, but exists primarily as vegetative rosettes in heavily shaded areas (Moffett 2007, p. 4). Those populations occurring in forested areas will decline as the forest canopy closes. Allison (1999, p. 4) attributed the decline of a population in Bibb County, Alabama, to canopy closure. In addition, the small number of individuals at the majority of the sites makes these populations vulnerable to local extinctions from unfavorable habitat conditions such as extreme shading.

In summary, population declines in *Arabis georgiana* populations have been attributed to competition from exotics and also heavy shading associated with canopy closure. In addition, those populations with only a few individual plants are threatened with local extinction.

Therefore, we have determined that other natural or manmade factors currently pose an imminent and high degree of threat to *Arabis georgiana* .

CONSERVATION MEASURES PLANNED OR IMPLEMENTED

The Service funded a status survey on this species throughout its range in the mid-1990s. The Service's Candidate Conservation Program provided limited funding in 2002 to initiate conservation measures for this species including gathering landowner information, development of site management plans for selected populations on public lands and implementation of non-native plant control. In Alabama, preliminary site visits were conducted in 2002, draft management plans were developed, and exotic removal was initiated at two sites (Alabama Natural Heritage Program 2004, p. 2). In 2003 land ownership information was updated for the Alabama sites. Most of the Alabama sites were visited in the summer of 2004. Revisits to these sites were conducted in 2008 and 2009 and a final report will be submitted in 2010. The Georgia sites were visited in 2005 and 2006 (Moffett *in litt*. 2005; 2007, p. 1-7). Selected sites in Georgia were visited in 2009 and additional surveys of Georgia sites are planned for 2010 and 2011 (Elmore 2010, p. 1).

In 2008 and 2009, a population of this species in Georgia (Georgia Power Goat Rock Dam) was augmented by outplantings and sowing of seeds, grown from previously collected seeds at this site (Elmore *in litt*. 2009; Elmore 2010, p.1). Monitoring plots have been established for this population and monitoring will be initiated in 2010 (Elmore 2010, p. 1). Prescribed burning was implemented at this site in 2004 to aid in invasive species removal. Additional management was conducted at this site the last few years to control the regrowth of invasives (Elmore 2010, p. 1, Moffett 2007, p. 5).

Currently the Chattahoochee Nature Center and Callaway Gardens have material from four Georgia populations. Augmentation of a Floyd County, Georgia site is planned for Fall of 2010 (Elmore 2010, p. 2).

A Master's student at Columbus State University has plans to initiate species biology studies on populations of this species throughout its range in 2010 (Garcia *in litt*. 2010).

SUMMARY OF THREATS:

Habitat degradation and the subsequent invasion of exotic species, more than outright habitat destruction, is the most serious threat to this species' continued existence. Disturbance, associated with timber harvesting, road building, and grazing has created favorable conditions for the invasion of exotic weeds, especially Japanese honeysuckle (*Lonicera japonica*), in this species' habitat. A large number of populations are currently or potentially threatened by the presence of exotics. Populations near roadsides are threatened by roadside maintenance practices, particularly herbicides. We find that this species is warranted for listing throughout all its range, and, therefore, find that it is unnecessary to analyze whether it is threatened or endangered in a significant portion of its range.

RECOMMENDED CONSERVATION MEASURES:

Continue annual visits to populations, as feasible. Thoroughly survey habitat on public lands to document any new locations of the species; work with landowners, the state, and conservation agencies to develop protection/management plans for all sites, beginning with those located on public land; and implement management on all sites. Obtain additional funding to support surveys and continuation of restoration efforts on sites. As feasible, maintain material/seed from populations as buffer against possible loss of native populations in the wild.

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	**Imminent**	Monotypic genus	7
		Species	**8****
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude*:* The magnitude of threat is not considered high. The species is not considered highly vulnerable as there are 17 populations scattered over 13 counties in the states of Alabama and Georgia and four of these are protected from outright destruction.

Imminence*:* The primary threat today consists of competition from exotics which is currently affecting at least 8 of the Alabama populations and almost all of the 6 Georgia populations. Though this is considered a gradual threat, the threat is ongoing, thus imminent.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No. This species is not in imminent danger of becoming extinct. There are 17 populations over two states and several populations are secure. The major threat to this species is from exotics which is gradual.

DESCRIPTION OF MONITORING: Species experts, botanists with the state conservation programs, and affected Service field offices were sent copies of the most recent candidate form and asked to provide any new information on this species. Those contacted were as follows: Dr. Mincy Moffett, Georgia Department of Natural Resources (GADNR); Al Schotz of the Alabama Natural Heritage Program; Dr. Wayne Barger of the Alabama Heritage Program in the State Lands Division/Alabama Department of Conservation and Natural Resources; the Service's Daphne, AL and Athens, GA field offices; Dr. Michele Elmore of The Nature Conservancy; Henning Von Schmeling of the Chattahoochee Nature Center ; and Dr. Wayne Barger of the Alabama Heritage Program in the State Lands Division/Alabama Department of Conservation and Natural Resources.

Alabama sites were last visited in 2008 or 2009 by the Alabama Natural Heritage. The Georgia sites were all visited and monitored in 2005 or in 2006 (Moffett 2007, p. 1-7) utilizing funds from the Candidate Conservation Program. An updated status report on the Georgia populations was completed in 2007 by Moffett. Visits were made to selected Georgia sites in 2009 and additional surveys of Georgia populations are planned for 2010 and 2011 (Elmore 2010, p. 1). Funding obtained from Candidate Conservation Program has not been adequate to support annual monitoring or restoration efforts on a regular basis; however, monitoring and restoration efforts are occurring at selected Georgia sites by the Georgia Natural Heritage Program, The Nature Conservancy, Georgia Plant Conservation Alliance, and the Chattahoochee Nature Center (Elmore *in litt*. 2010).

COORDINATION WITH STATES
Information from Alabama and Georgia has been incorporated into this latest species assessment.

This species is not listed in Alabama's State Wildlife Action conservation plan, as is the situation for any plant species (Alabama Department of Conservation and Natural Resources 2005). Georgia lists the Georgia rockcress as a "high priority species" in their State Wildlife Action Plan (Georgia Department of Natural Resources 2005).

REFERENCES/LITERATURE CITED:

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Patrick, T.S., J.R. Allison, and G.A. Krakow. 1995. Protected Plants of Georgia. Georgia Department of Natural Resources, Wildlife Resources Division, Social Circle. 246 pp.

Schotz, A. 2007. Email to Cary Norquist, Alabama Natural Heritage Program. Montgomery, Alabama. March 7, 2007.

Schotz, A. 2009. Email to Cary Norquist, Alabama Natural Heritage Program. Montgomery, Alabama. February 12, 2009.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve: _____ June 15, 2010

for Regional Director, Fish and Wildlife Service Date

Concur: _____ Date: October 22, 2010

ACTING

Director, Fish and Wildlife Service

Do not concur: _____ _____

Director, Fish and Wildlife Service Date

Director's Remarks:

Date of annual review: March, 2010

Conducted by: Jackson, MS Field Office