CANDIDATE ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Ambrysus funebris*

COMMON NAME: Nevares Spring naucorid bug

LEAD REGION: 1

INFORMATION CURRENT AS OF: February 6, 2003

STATUS/ACTION:
_X_ New candidate
___ Continuing candidate
___ Non-petitioned
___ Petitioned - Date petition received: _____
__ 90-day positive - FR date: _____
__ 2-month warranted but precluded - FR date: _____
__ Is the petition requesting a reclassification of a listed species?
___ Listing priority change
Former LP: ___
New LP: ___
Latest Date species first became a Candidate: _____
___ Candidate removal: Former LP: ___
___ A - Taxon more abundant or widespread than previously believed or not subject to a degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.
___ F - Range is no longer a U.S. territory.
___ 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: Naucoridae (true water bug)

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: California

CURRENT STATES/ COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: California / Inyo County / USA

LEAD REGION CONTACT: Diane Elam (CNO), 916-414-6464; Scott McCarthy (RO), 503-231-6131

LEAD FIELD OFFICE CONTACT: Ventura Fish and Wildlife Office, California, 805-644-1766

BIOLOGICAL INFORMATION:

Species Description/Taxonomy

The Nevares Spring naucorid bug (*Ambrysus funebris*) is one of three naucorid species that are endemic to the Amargosa River drainage along the Nevada-California border. The other two species include the Ash Meadows naucorid bug (*A. amargosus*) and the relict naucorid bug (*A. relictus*). Both species are present in a small number of springs in Ash Meadows, Nevada (La Rivers 1953; Polhemus and Polhemus 1994). The Ash Meadows naucorid bug was listed as threatened by the Service in 1985 because water diversion activities had eliminated major portions of the animal's habitat. The species was described using specimens that were collected from Nevares Spring (La Rivers 1948).

Habitat

Naucorids typically prefer stream riffles that are swift enough to keep sand and silt from accumulating, but not so fast that coarse, gravelly substrates are removed (La Rivers 1948). Laboratory and in situ field studies of different naucorid species have confirmed that naucorid habitat preferences are not random, and that water velocity and substrate size play a significant role in determining animal presence or absence (Sites and Willig 1991; Herrmann et al. 1993). These studies also suggest that naucorids have ecological or physiological constraints that limit their ability to persist in modified stream habitats. Water diversion activities that modify water velocities or substrate characteristics are, therefore, likely to affect the distribution and abundance of naucorids because they have a finite ability to use altered streams.

Range

The Nevares Spring naucorid bug is an aquatic insect that has a distribution that is limited to one spring complex in Inyo County, California. The distribution of Nevares Spring naucorid bug is limited to the Travertine-Nevares Springs Complex (Complex) within the boundary of Death Valley National Park (Park). The Travertine Springs area is 3.2 kilometers (km) [2 miles (mi)] long and 0.6 km (1 mi) wide; it includes approximately 20 streams and is located 2.4-4.0 km (1.5-2.5 mi) east of the Furnace Creek Inn and Ranch resort (Ranch) and the Park headquarters building. Texas Spring is an especially notable spring at the northwestern edge of the Travertine Springs area because it possesses a high-volume discharge. The Nevares Spring area is 1.1 km (0.7 mi) long and 0.5 km (0.3 mi) wide. It is located 8 km (5 mi) north of the Travertine Springs area in an area locally referred to as Cow Creek and possesses 14 streams. Seven additional aquatic invertebrate species, including one snail, two amphipods, three ostracodes, and one riffle beetle also have distributions that are endemic to the Complex (Threloff 2001).

Status

Intensive surveys that determined the distribution and abundance of the Nevares Spring naucorid bug were recently completed (Sada and Herbst 2000; Threloff 2001). These surveys documented the presence of the species in 8 of the 20 stream habitats in the Travertine Springs area (Table 1). The species' presence at Texas Spring represents an introduced population. These same surveys only documented the presence of the Nevares Spring naucorid bug in 4 of the 14 spring habitats in the Nevares Spring area. One of the surveys demonstrated that the Nevares Spring naucorid bug occurs at low densities (Sada and Herbst 2000). In May of 1999, the total number of aquatic invertebrates at 72 locations in the Travertine Springs area was

sampled by using 10 by 12 centimenter (4 by 4.7 inch) quadrats. This work revealed the presence of 42,777 individuals belonging to 59 species; only 36 of these individuals were Nevares Spring naucorid bug. Work during this same period in the Nevares Spring area documented the presence of 7,821 individuals belonging to 55 species in 31 quadrats; only 10 of these individuals were Nevares Spring naucorid bug. These data suggest that the species is extremely rare, even when it is present.

Table 1. Length of stream habitats occupied by Nevares Spring naucorid bug in the Travertine-Nevares Springs Complex, Death Valley National Park, California.

stream number	stream length (feet)	affected by past or ongoing water diversion activities?
Travertine Spring stream #1	137	yes
Travertine Spring stream #2	429	no
Travertine Spring stream #3	643	yes
Travertine Spring stream #4	912	yes
Travertine Spring stream #5	967	yes
Travertine Spring stream #6	2,063	yes
Travertine Spring stream #7	2,270	yes
Travertine Spring stream #8	2,500	yes
Nevares Spring stream #1	187	yes
Nevares Spring stream #2	416	yes
Nevares Spring stream #3	417	no
Nevares Spring stream #4	790	no

THREATS:

A. The present or threatened destruction, modification, or curtailment of its habitat or range.

The Travertine and Nevares Springs areas have eight water collection facilities that provide water for commercial and domestic uses. Seven of these facilities provide water that is used to meet human use needs in the Furnace Creek area, and one facility provides potable and irrigation water to the Cow Creek area. The majority of these systems consist of perforated pipe galleries that were installed after the original springheads were excavated. Data that document the extent of streams in the Complex prior to the development of the water collection systems were not collected.

An in-depth study of the effects of water diversion activities on the Travertine-Nevares Springs Complex invertebrate community has recently been completed (Sada and Herbst 2000). The study found that the presence and abundance of different aquatic invertebrate species in the Complex were affected by factors such as water velocity and depth, amount of plant cover, and the size and presence of different substrates. Each of these factors is, in turn, influenced by the intensity of water diversion activities. As water is diverted from a stream, water velocity and depth and wetted perimeter width is reduced, which in turn affects adjacent plant communities and the preponderance of silts and gravels along the stream bottom. The study also found trends that suggest that decreased water flow in a stream channel causes changes in the:

1. presence or absence of endemic species, including the Nevares Spring naucorid bug
2. total number of aquatic invertebrate species that are present at a given location
3. relative abundance of aquatic species in the invertebrate community, and
4. abundance of individual endemic and non-endemic aquatic invertebrate species, including the Nevares Spring naucorid bug.

The cumulative effect of removing 151-195 million liters (40-52 million gal) of water each month from the Travertine Springs area has created effects that suggest the remaining populations of Nevares Spring naucorid bug are relatively small, isolated, and vulnerable to extirpation. The effects of water diversion activities are also most pronounced during the summer months when aquatic habitats and the species that occupy those habitats are most restricted, and, therefore, vulnerable to perturbation.

The water users in the Furnace Creek area include the National Park Service (NPS), the Timbisha Shoshone Indian tribe, and the Furnace Creek Inn and Ranch Resort (Ranch). Between 1987 and 2000, the Ranch consumed 92 percent of the water that was collected from the springs in the Furnace Creek area, and the NPS and Timbisha Shoshone Indian tribe consumed the remainder of the water that was collected. The average combined monthly potable and non-potable water consumption for the three water users during this period was 198.51 million l (liters) [52.440 gallons (gal)] per month (Psomas 2001). Between 1990 and 1994, administrative records suggest an average of 541 million l (143 million gal) of water per year were delivered to the Ranch above their legal entitlement. Most of this water was used to irrigate a golf course and provide water to two flow-through swimming pools during the summer months. During the warmer months following May of each year, the total monthly water consumption by the Ranch can increase by 28 million l (7.38 million gal) as compared to the months of December and January. At the present time, the Ranch has questioned the validity of historical records that have been used to document the amount of water that was delivered to

their property; it remains clear, however, that water deliveries to the Ranch continue to increase dramatically during the summer months as compared to other months of the year when air temperatures are cooler. Staff associated with the Ranch have been adamant that they must continue to receive at least 1.8 billion l (486 million gal) of water each year from the Travertine Springs area.

In 2000, the Timbisha Shoshone Indian tribe was granted reservation status and received a water right of approximately 109.78 million l (29 million gal) of water per year. If the other two water users continue to collect water at previous levels, this new water right will create an additional burden to collect a volume of water that has not, for the most part, previously been diverted from the local springs.

Approximately 314 million l (83 million gal) of water per year are collected from the Nevares Spring water gallery in the Cow Creek area. This water is delivered to a NPS employee housing and office area.

During the summer of 1999, water was diverted from the Travertine Springs water collection system to the surface environment because harmful bacteria were present in the potable water supply. The need to temporarily turn on and off various portions of the Travertine Springs water collection system allowed spring water to be released to the surface environment; this created an unprecedented opportunity to assess the effects of water diversion activities. A Global Positioning System (GPS) was used to map the extent of surface water with and without water being diverted to the Furnace Creek domestic water supply. The results of the GPS mapping suggest that water diversion activities in the Furnace Creek area are collectively responsible for the loss of 11,500 meters (m) [36,500 feet (ft)] of stream habitat when the system is fully operational (Threloff and Koenig 1999). The work with the GPS also demonstrated that operation of the Travertine Springs water collection facilities are collectively responsible for eliminating 80-85 percent of the aquatic habitat that could potentially occur in that area. Approximately 80 percent of the streams in the Travertine Springs area that persist when the water collection system is operational have attributes (i.e., current or abandoned water diversion structures or evidence of ground disturbance) that suggest that they have been, or are being, adversely affected by historical or ongoing water diversion activities.

Water diversion activities have resulted in the complete elimination of some wetland habitats in the Furnace Creek area. For example, the original spring outflow and biological community for Texas Spring was completely eliminated when the current water collection system was developed and the entire spring discharge was diverted into the Furnace Creek potable water collection system (Shepard 1993). This action eliminated a stream habitat that probably was at least 7,315 m (24,000 ft) in length prior to its diversion. A small stream habitat 30 m (100 ft) west of the historical Texas Spring orifice was partially restored in the mid-1990s when Park maintenance staff redirected 95 l (25 gal) per minute of the spring discharge to the local surface environment.

Information pertaining to the historical distribution of the Nevares Spring naucorid bug prior to the development of the local water collection systems is not available. It is likely that the species occupied a large area of habitat where suitable micro-habitat features were present. The widespread loss of aquatic habitat within the Complex since the water collection systems were installed suggests the species has experienced major reductions in abundance and distribution as

stream environments were eliminated or reduced in extent.

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

Not known to be a factor currently affecting the species.

C. Disease or predation.

Naucorids are predatory animals; they consume a number of prey species that include small aquatic insects and crustaceans. Nevares Spring naucorid bugs that occur in Furnace Creek Wash along the southern boundary of the Travertine Springs area co-occur with non-native mosquitofish (*Gambusia affinis*). The presence of mosquitofish in Furnace Creek Wash is likely to adversely affect Nevares Spring naucorid bug by: a) direct predation of young and adult naucorids, and b) competition for food resources. The mosquitofish is a generalist predator (Bence 1988; Linden and Ceck 1990; Rupp 1996). Field experiments that evaluated survival rates of low density mosquito larvae populations when mosquitofish were present suggest that none of the mosquito larvae persisted after a 5-hour trial period (Goodsell and Kats 1999). Other studies have demonstrated that mosquitofish eliminate *Daphnia* and other invertebrate populations (Hurlbert et al. 1972). Additional field experiments have revealed that mosquitofish significantly reduce the abundance of predatory aquatic insect species that include notonectids, belostmatids, and odonates (Lawyer et al. 1999). These animals are typically as large as or larger than individuals of Nevares Spring naucorid bug. Collectively, these studies suggest that Nevares Spring naucorid bugs are likely to experience direct predation by mosquitofish, and compete with these fish for limited food resources.

An introduced crayfish (*Procambarus* sp.) is known to be present in aquatic habitats on the Ranch; these habitats are within 3.2 km (2 mi) of streams that are occupied by the Nevares Spring naucorid bug. Recent studies have indicated that introduced crayfish alter vegetation communities in aquatic environments (Lodge and Lorman 1987; Chambers et al. 1990; Creed 1994; Lodge et al. 1994), and they adversely affect aquatic invertebrate species through direct predation (Chambers et al. 1990; Hanson et al. 1990; Fernandez and Rosen 1996). Because flash flood events infrequently occur in the Travertine Springs area, there is a potential that temporary aquatic corridors could develop between the Furnace Creek Ranch area and the Travertine Springs area. This could create a dispersal corridor that would allow crayfish to colonize stream habitats where Nevares Spring naucorid bugs are present. At least one published account indicates that crayfish have the potential to quickly and effectively disperse into previously unoccupied habitats (Momot 1966). In the event that crayfish dispersed from the Ranch to the Travertine Springs area, it is likely that crayfish would dramatically reduce the limited number of Nevares Spring naucorid bug that inhabit the spring complex.

D. The inadequacy of existing regulatory mechanisms.

The Nevares Spring naucorid bug does not benefit from existing regulatory mechanisms that could be provided by the State of California or the Federal government. Water collection activities in the Furnace Creek area are governed by a 1968 Memorandum of Understanding (MOU) that was signed by the United States of America, Borax (Holdings) Limited, and Fred Harvey, Inc. (i.e., the Ranch). Under this MOU, the NPS has the discretion to deliver water in excess of the Ranch's basic water right of 1.8 billion l (486 million gal) per year.

The species is not currently classified as a threatened, endangered, rare, or species of special concern by California. The State has no regulations that specifically protect invertebrates from habitat loss. Nevares Spring naucorid bug was classified as a candidate Category 2 candidate species in the November 1994 Animal Candidate Notice of Review. The status of the species at that time was considered to be declining. The candidate Category 2 status was discontinued in February 28, 1996 (61 FR 7596), and only Category 1 species became recognized as candidates for listing purposes. The species does not currently appear on any advisory watch list that is maintained by the State or Federal government. There are also no management plans or similar documents at the present time that specifically mention the need to protect the Nevares Spring naucorid bug or its habitat. The Nevares Spring naucorid bug does not have a geographic distribution that overlaps the range of another taxon that is listed as threatened or endangered.

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

Non-native date palms (*Phoenix dactylifera*) and fan palms (*Washingtonia filifera*) are present in the spring habitats that are occupied by the Nevares Spring naucorid bug. The effects of these plants on aquatic communities have not been documented, but anecdotal observations suggest these plant species transpire water that would otherwise be available to maintain water flow within a stream channel. Although the effects to the Nevares Spring naucorid bug are not specifically known, these plants reduce the primary productivity within an aquatic environment by shading stream channels; this effect in turn is likely to reduce the number of prey items available to the naucorid because overgrown stream habitats are likely to have fewer invertebrates. The presence of palm trees also tends to reduce the overall number of aquatic invertebrates in a stream channel because palm roots and fallen fronds reduce water velocities that maintain riffle habitats that are required by naucorids. Park staff have been injecting palm trees with herbicide in an effort to slow the colonization of local stream channels by palm trees, but palms continue to be present in several of the stream channels in the Travertine - Nevares Springs Complex.

FOR RECYCLED PETITIONS: N/A

a. Is listing still warranted? _____

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? _____

c. Is a proposal to list the species as threatened or endangered in preparation? _____

d. If the answer to c. above is no, provide an explanation of why the action is still precluded.

LAND OWNERSHIP:

One hundred percent of the distribution of the Nevares Spring naucorid bug is confined to Federal lands, i.e. Death Valley National Park.

PRELISTING: A conservation agreement that would improve the status of the Nevares Spring naucorid bug has not been initiated. Park staff have not formally indicated that they are interested in developing a conservation agreement.

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LISTING PRIORITY (* after number)

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: Threats to this species is considered high, given that multiple activities or threats have the potential to reduce the number of naucorids, or degrade the habitat quality of the remnant wetlands where the species persists.

Imminence: Threats are considered to be non-imminent at the present time but perturbations, especially anthropogenic activities that adversely affect the species or its habitat have the ability to quickly materialize. This may result in a change in the immediacy of the threat from non-imminent to imminent.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes to the candidate list, including listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all additions of species to the candidate list, removal of candidates, and listing priority changes.

Approve: Steve Thompson March 6, 2003
Acting Regional Director, Fish and Wildlife Service Date

Concur: Steve Williams April 5, 2004
Director, Fish and Wildlife Service Date

Do not concur:_____
Director, Fish and Wildlife Service Date

Director's Remarks: _____

Date of annual review: February 2003
Conducted by: Doug Threloff

Comments: _____