

## Gammarus desperatus (Noel's Amphipod)



Photo: Brian Lang

Brian Lang,

### Taxonomy

- **Class:** Malacostraca
- **Order:** Crustacea
- **Family:** Gammaridae
- **Genus:** Gammarus
- **Scientific Name:** *Gammarus desperatus* Cole, 1981
- **Common Name:** Noel's Amphipod
- **Synonyms:**
- **Taxonomic Name Source:** Cole, G.A. 1981. *Gammarus desperatus*, a new species from New Mexico (Crustacea: Amphipoda). *Hydrobiologia*, 76:27-32.

### Agency Status

- **NMDGF:**
- **Federal Status:**
- **BLM Sensitive:**
- **USFS:**
- **IUCN Red List:** [Not Evaluated](#)
- **Nature Serve Global:** [G2](#)
- **NHNM State:** S2
- **NM Endemic:** YES

### Description

Amphipods are small (4-20mm), shrimp-like animals. They can be distinguished from other orders of the class Crustacea in New Mexico by the combination of a laterally compressed body, seven pairs of legs, and the absence of a carapace, or protective shell (Smith 2001). Species like this one in the *Gammarus pecos* complex can be distinguished from other members of the genus by their non-calceolate antenna with spines on the first penduncular article of the antenna, mandibular palps with unique hairs called C-seta, coxal plates one through four are setiferous, and they have narrow brood plates (Lang et al. 2021). *Gammarus desperatus* is a relatively brightly colored, medium-large species (males are up to 15mm in length, while females are up to 12 mm in length). It can be distinguished from other members of the species complex by the hairs (setae) present on the posterior margin of antenna one, the flagellum on antenna one has fewer than 35 segments, the C-setae on the mandibular palps are up 2.5 times longer than the D-setae, the B-setae on the mandibular palps are 20–50% the length of the longest A-seta, the male gnathopods one and two have distinctly concave palmar margins on the propodi, the coxal plates one through four have numerous facial setae, the bases of the pereopods one through seven have greater than 12 posterior setae and dense facial setae, and the posterior setae on the basis of pereopod seven is approximately 20%–25% the width of the segment (Cannizzaro and

Berg 2024).

## Habitat and Ecology

Like other Amphipods in the *Gammarus pecos* species complex, Noel's Amphipod is associated with spring systems in desert-grasslands. The type locality and neighboring spring habitats lie in impure gypsum substrate of the Roswell Artesian Basin. The waters are moderately saline and of the sulfatochloride type, with sodium being the primary cation in the more concentrated lakes and calcium being predominant in the springs (Cole 1981). The habitat at Rio Hondo is open and the species has only been recorded within vegetation along the banks of the river (Cannizzaro and Berg 2024).

In general, amphipods are primarily nocturnal, hiding in vegetation and other covering during the day (Smith 2001). They typically occupy cool, clean, well oxygenated waters, and are very sensitive to a wide range of toxicants and other changes to water quality, such as altered stream flow, sedimentation, nutrients, and dissolved oxygen levels (Alonso *et al.* 2010). After eggs have been fertilized by males, female amphipods hatch their young in a marsupium, or pouch, on their ventral thorax (Smith 2001).

## Geographic Range:

Noel's Amphipod (*Gammarus desperatus*) is a member of the *Gammarus pecos* species complex, an association of closely related species that occur in Chihuahuan Desert spring systems of southeastern New Mexico and West Texas (Cannizzaro and Berg 2024). Recent molecular phylogenetic studies on the group have revealed several undescribed species, changing our understanding of the distribution of this species, and suggesting that most species in this complex are highly endemic to single spring systems, with very restricted ranges (Siedel *et al.* 2009, Cannizzaro and Berg 2024). As a result, Noel's Amphipod is now thought to be known from just two localities in Chaves County, New Mexico; North Spring, on the Roswell Country Club, and Rio Hondo, a site on the south tract of the Bitter Lake National Wildlife Refuge (Cannizzaro and Berg 2024). Prior to this most recent phylogenetic revision, Noel's amphipod was also thought to be found at six localities in the main tract of Bitter Lake National Wildlife Refuge (Siedel *et al.* 2009), but those populations are now attributable to a new species, *Gammarus acerbatatus* (Cannizzaro and Berg 2024).

For a number of years, a *Gammarus* sp. population found at Lander Spring was considered *Gammarus desperatus* (Cole 1981). At the time of observation in 1950 and 1951, it was mistaken for a similar species, *Gammus fasciatus* (Noel 1954). Researchers returned to the site in 1967 to formally document the species, but the spring had dried up and had apparently been dry since about 1957 (Cole 1988). Given the high degree of endemism within the *G. pecos* species complex, it is now thought this Lander Spring population may have been a unique species that is now extinct. After finding that Lander Spring had dried up in 1967, researchers searched instead at North Spring, just 5 km to the southwest, at the Roswell Country Club. In 1971, specimens were collected from North Spring and were described as *Gammarus desperatus* (Cole 1981). In 1971 the source of this spring consisted of three separate openings leading into a cove, about 25 m<sup>2</sup> in size, with very steep banks. The spring fed a lake on the grounds via a rheocrene. By 1978, the spring had been modified, with a large concrete box catching the spring water before it flowed down the rheocrene to the lake (Cole 1981). Populations at this site did not survive the disturbance and were extirpated sometime between 1978 and 1988 (NMDGF 2020). Currently, this species is known only from the Rio Hondo site, located in the south tract of Bitter Lake National Wildlife Refuge (Cannizzaro and Berg 2024).

## Conservation Considerations:

Noel's amphipod was federally listed as Endangered by the United States Fish and Wildlife Service (USFWS) in 2005 and is now protected under the Endangered Species Act (USFWS 2005). Critical habitat has been designated in Chaves County at Bitter Lake National Wildlife Refuge (USFWS 2011), though this may need to be modified given the current understanding of the distribution of the species. The recovery strategy includes preserving, restoring, and managing the aquatic habitats and maintaining the water quantity and quality, reducing threats so that populations are resilient and able to cope with stressors, conducting monitoring and research to understand species patterns, maintain genetic diversity, identify new sites for species introductions, and work with partners to develop long term management plans and engage in community outreach to promote the protection of this species (USFW 2019). The species is also on the New Mexico State list of Threatened and Endangered species (NMDGF 2020) and in 2006, the species was also identified as a Species of Greatest Conservation need in the Comprehensive Wildlife Conservation Strategy for New Mexico (NMDGF 2006). There has also been some habitat restoration work at the Rio Hondo site. In 2015, an earthen berm was built to redirect the river into its original channel. This allowed the ditch that the river occupied previously, to fill with groundwater from naturally occurring spring vents. Back flow is also prevented by a mechanism downstream at the terminus of the ditch, to prevent effluent water from filling the ditch during periods of heavy flow. The hydrology of the spring is monitored by the USFWS and Noel's amphipod population monitoring is conducted seasonally in the restored channel (NMDGF 2020).

## Threats:

The main threats to this species are habitat modification, groundwater withdrawal and contamination, and stochastic events, such as flood, fire, and drought. Due to the scarcity of water in the arid southwestern United States, groundwater fed springs are often altered by human activity. The species was lost from the type locality due to the modification of its spring habitat at the Roswell Country Club (Cole 1981). The main threat to the remaining habitat is likely groundwater drawdown and stochastic threats. The habitat itself is well protected on the Bitter Lake National Wildlife Refuge. However, land use activities in the Roswell Artesian Basin adjacent to the refuge that rely on the use of groundwater, including agriculture, municipal water use, and oil and gas extraction, may pose long term threats to this species (NMDGF 2020).

Oil and gas development is ongoing in the Roswell Artesian Basin, and these industrial practices can increase groundwater drawdown, alter aquitard hydraulics, and contaminate surface and groundwaters. Degradation of groundwater and surface water may also be caused by septic waste from neighboring urban areas as well as illegal dumping of domestic contaminants, including trash, herbicides, pesticides, and waste oil in sinkholes of karst formations in the area (NMDGF 2020). Droughts, which are expected to become more severe, prolonged, and frequent in the region due to climate change (USGCRP 2008), may also impact surface and groundwater levels and increase the concentration of salinity and contaminants, adversely impacting this species (NMDGF 2020). Reduced flow regimes can significantly alter the physiochemical balance of lotic systems (Lang *et al.* 2001). Increased risk of fire may also be a threat. For example, the 2000 Sandhill Fire burned reaches of Bitter Creek, causing a short-term decline of *Gammarus* species. Post fire, the invasion of common reed (*Phragmites australis*) became a management issue (NMDGF 2020).

## Population:

Given the species is extirpated from one of only two known sites, a population decline in the past is suspected. The population at Rio Hondo is monitored. During the summer of 2024, the Rio Hondo site experienced severe flooding. Populations surveys in February of 2025 will determine the impact of the flooding on the last remaining population of Noel's Amphipod (C. Jacobsen pers. comm. 2024).

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