

Aquatic Macroinvertebrates

INDICATOR SPECIES HABITAT

Aquatic macroinvertebrates or aquatic insects are found in lakes, streams, ponds, marshes and puddles and help maintain the health of the water ecosystem by eating bacteria and dead, decaying plants and animals. Local populations of certain aquatic macroinvertebrates are indicator species of high quality water. They are indicator of overall aquatic conditions, quality of fisheries and associated riparian habitat (USDA 1986a, p.97). For the purpose of analyzing the effects of forest management activities, the primary habitat requirement for aquatic macroinvertebrates is perennial water which supports resident trout.

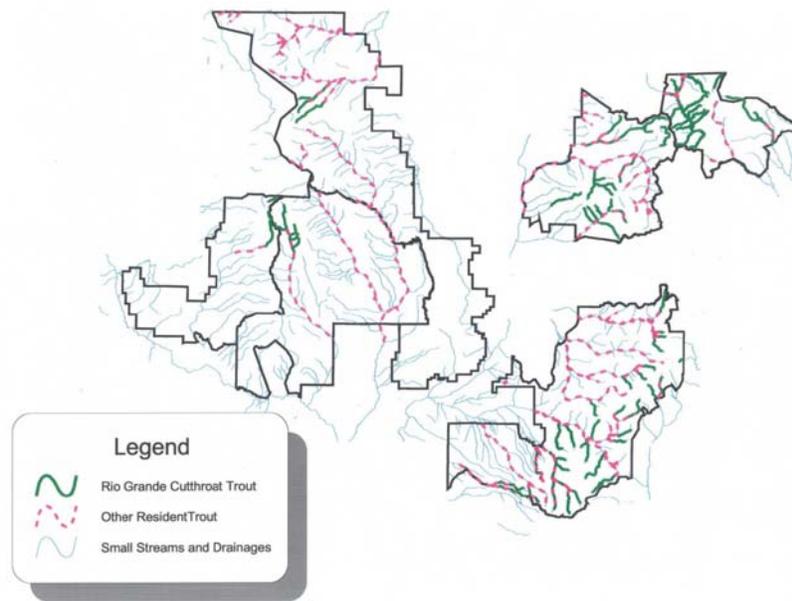
However, many environmental factors and their interactions determine the composition and abundance of stream insects. In natural perennial streams, the key controlling factors are temperature, discharge/current, substrate, chemical conditions and aquatic/riparian vegetation. Overall, it is the water quality that effects which types of organisms can survive in a body of water. Water quality may include the amounts of dissolved oxygen and the levels of algal growth, pollutants, which may be present, and the pH level.

Aquatic insects collectively show a wide range of tolerance to environmental conditions. Riparian vegetation conditions, temperature, hydraulics and substrate composition all change under natural conditions and in response the aquatic invertebrate communities generally reflect those changes. Various locations within a stream are likely to also have a range of conditions that dictate which aquatic invertebrate species are found there. Some taxa or species are more tolerant or have a wider range of acceptable habitat conditions than others.

Some macroinvertebrates such as stoneflies, mayflies, and water pennies require a high level of dissolved oxygen and their abundance is an indication of good water quality. Other macroinvertebrates can survive at a lower dissolved oxygen level because they can come to the surface to get oxygen through a breathing or "snorkel" tube or carry a bubble of air with them around their bodies or under their wings.

Potential Habitat Distribution

Approximately 440 miles of perennial stream on the Carson National Forest is known habitat for aquatic macro invertebrates (Map 1, Forest GIS Stream Inventory 2002).



Map 1. Aquatic Macroinvertebrate Potential Habitat Distribution on the Carson National Forest (USDA 2002)

Management Activities or Natural Events That May Affect Habitat

Negative: Taxa that are less tolerant of impacts (*Ephemeroptera*, *Plecoptera*, *Trichoptera*) affected by habitat degradation and alteration from activities such as road building, grazing, mining, and dewatering.

Positive: Improvement of riparian habitats and upland watershed conditions through proper grazing practices, road maintenance, and the application of best management practices when implementing ground disturbing activities near perennial streams.

Plans, Regulations and Guidelines Supporting, Maintaining or Improving Habitat

- *Carson National Forest Land and Resource Management Plan, Forest-wide Wildlife and Fish standards and guidelines:*

ROAD MANAGEMENT... Emphasize road management and resource/wildlife protection as a primary Forest policy (USDA 1986c, p. Wildlife & Fish –10).

RIPARIAN WOOD VEGETATION... On wet meadows and other riparian areas, favor the establishment of woody riparian vegetation as defined in FSH 2509.23. Control livestock and wildlife grazing through management and/or fencing to allow for adequate establishment of vegetation and the elimination of over use (USDA 1986c, p. Wildlife & Fish –12)

The desired condition for Management Area 14 – Riparian is described as a stable fish population along the shaded, healthy stream and lake bottom, with diverse aquatic species. Manage for these indicator species: resident trout (cutthroat), hairy woodpecker, aquatic macroinvertebrates, elk (USDA 1986c, Management Area Prescriptions for MA 14 Riparian-1 & 3).

- *Record of Decision for Amendment of Forest Plans (1996)* provides guidelines relative to the management of both Mexican spotted owl and northern goshawk habitat. In

Riparian Areas “(e)mphasize maintenance and restoration of healthy riparian ecosystems through conformance with forest plan riparian standards and guidelines. Management strategies should move degraded riparian vegetation toward good condition as soon as possible. Damage to riparian vegetation, stream banks, and channels should be prevented.” (USDA 1996, p. 90)

- *Clean Water Act* (amended 1972 & 1987)
- *Outstanding National Resource Waters* (ONRW) designation of the streams within Valle Vidal of the Carson National Forest incorporates the Antidegradation Policy, which is referenced in the NM Water Quality Standards (20.6.4.8 NMAC). The policy states, “No degradation shall be allowed in high quality waters designated by the Commission as outstanding national resource waters.” The Antidegradation Implementation Procedures establishes three categories of waters, called “tiers”. The tier designation requires different levels of review and allows different levels of degradation. Waters designated as ONRW are assigned a “tier 3” designation.

HABITAT CONDITION AND TREND ON THE CARSON NATIONAL FOREST

In the 1986 Forest Plan EIS, the available habitat for both resident trout and macroinvertebrates was based on the total length of stream miles (estimated at 400 miles) on the Carson National Forest (USDA 1986a, p. 97). As discussed in the *Resident Trout* section of this assessment, data processing and GIS abilities has refined the amount of habitat to 444.26 miles.

Since 2001, the Carson National Forest has been conducting stream habitat inventories on designated streams across the forest. One of the parameters measured is substrate composition, which is an indicator of habitat quality for macroinvertebrates. Baseline data is still being collected. **Based on the available data, the trend in available habitat is stable.**

Railroad logging in the early 1900’s was one of the most significant events that affected stream systems on the Carson National Forest. Riparian conditions were seriously impacted by the use of tie staging along the streams. And the stream conditions were devastated as they were channelized to float cross-ties down to the Rio Grande. Over the next several decades, the watershed conditions rapidly eroded due to the lack of any herbaceous ground cover on the canyon slopes. By the mid-1900’s, the federal government had gradually acquired lands into the National Forest System, that were once privately owned by logging companies. Riparian areas and stream conditions improved as managed grazing systems were established, watershed restoration projects were implemented (which began as early as 1933), roads were closed and obliterated, and logging practices changed.

Today, road systems are the primary source of sedimentation in streams on the Forest. Although affected streams may still be suitable, they are less than optimal for aquatic macroinvertebrates that require high water quality. Other factors that reduce habitat quality include domestic livestock grazing, which can destroy overhanging banks and increase sedimentation, and diversions of water for irrigation, which can significantly reduce the amount of water in a stream system. Dewatering and sedimentation are the two most prevalent factors affecting habitat conditions (Duff 1996).

Habitat conditions on the Carson National Forest vary by stream and by location within the stream. Overall, most habitats appear able to support diverse communities of aquatic macroinvertebrates. Stream habitat surveys, which are ongoing, will better qualify conditions in

specific streams over time. Since the implementation of the Carson Forest Plan in most areas of the forest, physical condition of aquatic habitat appears to be stable or improved.

POPULATION TREND AND VIABILITY

Macroinvertebrate communities are used to display changes from management activities or natural effects and can decline or recover quickly or in the long-term, depending on the type and duration of the impact. Overall, diverse communities of aquatic macroinvertebrates are represented Forest-wide, and are considered stable unless an influence or significant event affects a local or given reach of stream. Most populations, however, can quickly recover.

Because of the volatile fluctuations that can occur in most aquatic macroinvertebrate populations, trends by numbers are of little value unless long-term studies show persistent changes. Persistent absences or declines or in some cases appearances of certain benthic organisms may also indicate a change in aquatic health. **Population trends for aquatic macroinvertebrates on the Carson National Forest appear to be stable**, although additional time is necessary to determine a more reliable indication of trend.

Aquatic macroinvertebrate surveys and analysis have been conducted on several streams within the Forest. Representative streams and sample points within those systems have been selected for aquatic macroinvertebrate sampling. Initial baseline data was collected in 1982. Additional points were included and monitoring samples collected annually between 1997 and 2001. The following are the sampling locations on the Carson National Forest:

Table 1. Sampling Locations for Aquatic Macroinvertebrate Monitoring on the Carson National Forest

Station	Water Body	Segment	Ranger District
COMANCHE01	Comanche Creek	upstream from Clayton Camp	Questa
COMANCHE02	Comanche Creek	upstream from La Belle	Questa
COMANCHE03	Comanche Creek	upstream from Gold	Questa
COMANCHE04	Comanche Creek	0.5 miles downstream from Gold	Questa
COMANCHE05	Comanche Creek	upstream from Little Costilla	Questa
COMANCHE06	Comanche Creek	downstream from Little Costilla	Questa
COMANCHE07	Comanche Creek	downstream from Chuckwagon	Questa
COMANCHE08	Comanche Creek	at Comanche Point	Questa
COMANCHE20	Comanche Creek	within large exclosure	Questa
COMANCHE21	Comanche Creek	downstream from large exclosure	Questa
COMANCHE22	Comanche Creek	upstream from large exclosure	Questa
CWAGON-01	Chuckwagon Creek	0.25 miles upstream from mouth	Questa
ELRITO-A	El Rito Creek	1 mile upstream from barrier	El Rito
ELRITO-B	El Rito Creek	0.5 mile upstream from barrier	El Rito
ELRITO-C	El Rito Creek	0.5 mile downstream from barrier	El Rito
ELRITO-D	El Rito Creek	1 mile downstream from barrier	El Rito
ELRITO-E	El Rito Creek	upstream from campground	El Rito
ELRITO-F	El Rito Creek	at campground	El Rito
ELRITO-G	El Rito Creek	downstream from campground	El Rito
FERNANDZ01	Fernandez Creek	0.25 miles upstream from mouth	Camino Real

Station	Water Body	Segment	Ranger District
LITTCOST01	Little Costilla Creek	0.25 miles upstream	Questa
POT-01	Rito de la Olla	lower	Camino Real
POT-02	Rito de la Olla	middle	Camino Real
POT-03	Rito de la Olla	upper	Camino Real
POWDER-01	Powderhouse Creek	lower	Questa
POWDER-02	Powderhouse Creek	middle	Questa
POWDER-03	Powderhouse Creek	upper	Questa
RRBELOW	Red River	just downstream from town	Questa
RRDEBRIS	Red River	0.5 miles downstream from town	Questa
RRDOWNMINE	Red River	downstream from Molycorp	Questa
RRTOWN	Red River	in town	Questa
RRUPMINE	Red River	upstream from Molycorp	Questa
TIOGRAN-01	Tio Grande Creek	lower	Camino Real
TIOGRAN-02	Tio Grande Creek	middle	Camino Real
TIOGRAN-03	Tio Grande Creek	upper	Camino Real
VIDAL01	Vidal Creek	upstream from Clayton Camp	Questa

Appendix A is a summary of general assemblages of dominant families from the Aquatic Invertebrate Monitoring Report, Carson National Forest (Vinson 2002). Populations are generally represented by a diverse number of families and including those that show sensitivity to degraded aquatic systems and pollution.

Based on the highly fluctuating nature of macroinvertebrate organisms due to hatch timing, stream drift and other factors such as yearly variations in flow and water temperatures; it will likely take many years to determine actual trends. Apparent population trends are healthy and stable.

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