

# Monsoon Passage Fact Sheet

*Safe haven stepping stones from the Mojave Desert to the Northern Great Basin*



East Pass a few years after a fire in the Clover Mountains of the southern Great Basin looking down into the Mojave's Tule Desert © Louis Provencher/TNC

## **Monsoon Passage**

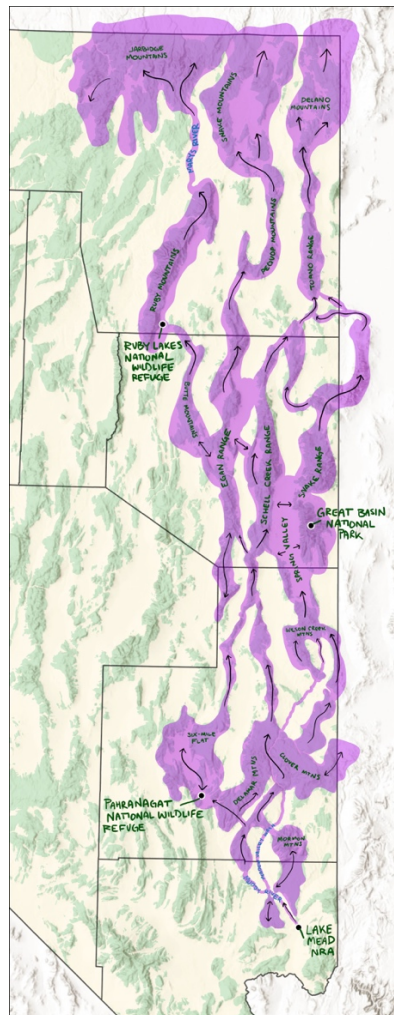
The connected mountain ranges and wet valley bottoms of this natural highway provide desert tortoises, bighorn sheep, Cooper's hawk, mule deer and other species escape routes from growing climate impacts, allowing them to find new homes where they can thrive. The region's name comes from being at the western edge of the summer monsoons that provide needed eastern-facing moisture to buffer rising temperatures and a pathway for species moving north.

Imagine populations of raptors, small carnivores, small mammals, mule deer, bighorn sheep, passerine birds, insects, and plant species pushed northward or up and around mountains by warming temperatures and changes in precipitation patterns. Non-migratory species flow from the hot Mojave Desert ecoregion to the cooler Columbia Plateau ecoregion passing through the entirety of the Great Basin ecoregion is not easily guaranteed. There are less than five corridors of passably connected mountains ranges and wet valley bottoms that fully allow species movement within a viable thermal environment that may be viewed as steppingstones

of safe havens. The Nevada Chapter is proposing one such thermal corridor in eastern Nevada titled Monsoon Passage.

The corridor follows the Nevada-Utah border and is mostly in Nevada. For those familiar with landmarks, the climate change escape corridor at least contains the following from south to north:

Colorado River-Lake Mead ↔ Muddy River (East Mojave) ↔ Meadow Valley Wash (East Mojave) + *Pahrnagat* Valley ↔ Clover Mountains (southern Great Basin) + Delamar Range ↔ Highland to Fairview Ranges + Fortification Range ↔ Snake Range (Great Basin NP) + Schell Creek Range ↔ Goshute Mountains ↔ Toana Range + Pequop Range ↔ Pilot Range ↔ Grouse Creek Mountains (Columbia Plateau in very northwest Utah) + Jarbidge Mountains (Columbia Plateau in northeast NV)



Monsoon Passage © Sarah Byer/TNC

Raptor enthusiasts will recognize this geography as an important migration flyway where ornithologists gather at Goshute Mountains to view the raptor migration (Fig. 1). An important and barely visible feature of the corridor is that it is the western edge of the Baja monsoonal

storms. The summer monsoon extends at most 60 miles west into the Great Basin from Utah (the Quinn-Grant Range is the very edge) oriented north-north-east to south-south-west and encompasses the Las Vegas area in the Mojave Desert. The monsoonal footprint is critical because it provides increased moisture in an eastward direction (towards Utah) to buffer increasing minimum and maximum temperatures, and makes available to species additional ecological systems dependent on summer rains, such as Ponderosa pine, Engelman spruce, bristlecone pine, subalpine grasslands, Stansbury cliffrose, little-leaf mountain mahogany, montane chaparral, swamp cedars, and even aspen-mixed conifer (in contrast to aspen woodland). Under various climate scenarios, it is unclear whether the edge of the monsoon will move east or west, although the majority of models predict a slight westward movement.



Cooper's hawk, a species from the Nevada-Utah flyway whose southern migratory distribution could shift northward © Picasa

There is a list of ecological and management reasons to choose the corridor:

1. The Southern Rockies and Southwest RCN identified two important barriers to connectivity: The eastern Mojave Desert 2005 and 2008 wildfires and the Interstate-80 corridor between about Winnemucca NV and Utah. Both barriers are in Monsoon Passage's geography and solutions exists to reduce the impact of barriers.



- a. In the eastern Mojave Desert, the Muddy River (generally part of the White River carbonate drainage) and Meadow Valley Wash, both which bifurcate in Moapa, are narrow northern corridors through inhospitable upland habitat whose resilience and connectivity could be increased if mitigation funds from solar energy development were invested in the restoration of native plant material for desert tortoise habitat (Figure 2). Novel methods of outplanting and aerial seeding studied at the experimental scale need to be brought to commercial scales with serious funding.



Desert tortoise © U.S. Fish and Wildlife Service

- b. In the northern Great Basin, I-80's Right-of-Way, the Chicago-to-San Francisco railway line, and zones of non-native annual grasses caused by ROW ignitions together form a serious barrier to northern species flow. In recent decades, a few interstate wildlife-only overpasses have been built by NDOT with encouragement from the Nevada Department of Wildlife. More wildlife-only overpasses (<https://vimeo.com/357164380>) need to be built in the most critical areas of the Monsoon Passage geography. Mule deer, elk, pronghorn, carnivores, reptiles, and small mammals have a history of using wildlife-only overpasses.

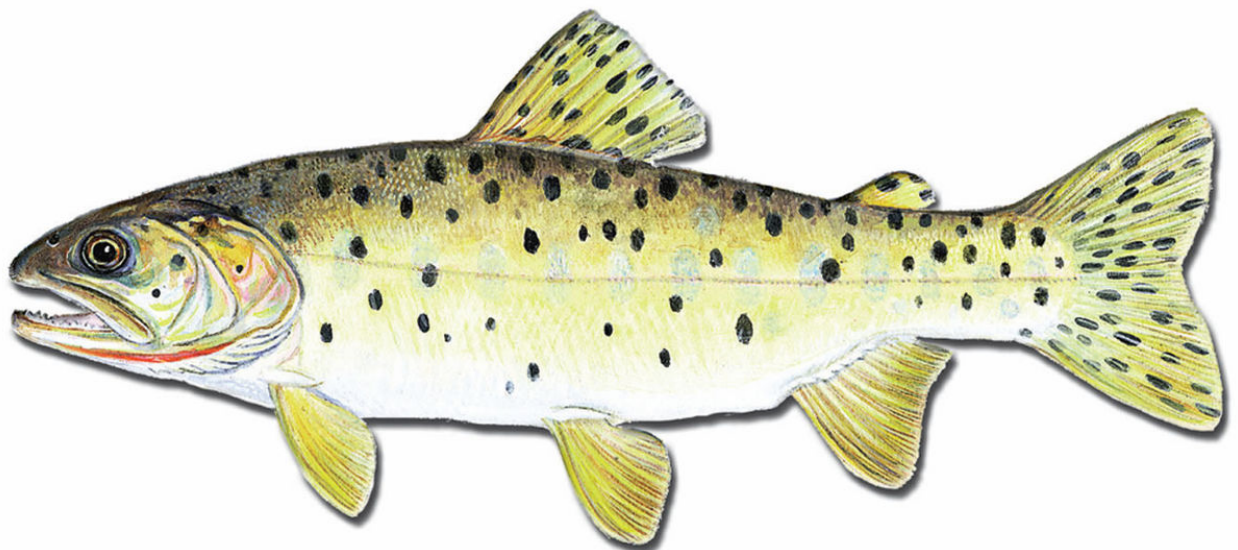


Pronghorn © Eastern Sierra Land Trust

2. Another important and widespread feature of the Monsoon Passage geography is the long chains of mountain ranges and valley bottoms that are public lands and undeveloped. While those areas need natural resources management to make them more resilient (e.g., Provencher et al. 2013, *Park Science* 30:58-67), the diversity of elevation (precipitation) zones and their general south-south-west to north-north-east orientation effectively constitute thermally favorable species conveyor belts towards the north. Iconic species are Rocky Mountain and desert bighorn sheep species, golden eagle, ferruginous hawk, Bonneville cutthroat trout, Big Springs spinedace, and relict dace.



Rocky Mountain bighorn sheep in Great Basin National Park © Kim Keating/USGS



Bonneville cutthroat trout limited to thermal refugia in a few streams connected to Pleistocene Bonneville Lake © Wikipedia Comms





Illustration by Joseph R. Tomelleri

Big Spring spinedace as part of the upper Meadow Valley Wash drainage © U.S. Fish and Wildlife Service

3. The proposed corridor hosts Great Basin National Park in the biodiverse Snake Range, with ancient bristlecone pine, the eastern edge of the newer Basin and Range National Monument, and at least 16 wilderness areas or study areas.
4. Eastern Nevada where the proposed geography is located is underlain by carbonate (limestone and dolomite mostly) rocks through which flows a deep aquifer with old water that occasionally surfaces as springs in which endemic fish, gastropod, and insect live. The surface geology is also primarily carbonate rocks, although volcanic (andesite and tuff) and metamorphic (schists, quartzite, and granite) rocks are locally common especially where old volcanoes blew off their tops. Geology is important because, as a rule of thumb, surface water not fed by deep aquifer springs is uncommon in porous carbonate rocks, whereas surface water is more common on volcanic and metamorphic rocks. Because the mountain ranges of the geography contain lots of carbonate rocks, the cool valley bottom, waterways, and wet systems become disproportionately important under climate change for animals requiring drinking water, but less important on metamorphic and volcanic rocks. The variety of geology and cooling ecological systems are present in the Monsoon Passage geography.
5. The Nature Conservancy in Nevada staff have been active in Monsoon Passage:
  - a. Upper Muddy River multiple-species conservation planning
  - b. Meadow Valley Wash through the Lincoln County multiple species habitat conservation plan and Ely Bureau of Land Management's revision of the Natural Resources Management Plan
  - c. Ownership of Condor Canyon preserve in the Clover Mountains, home to a subpopulation of Big Springs spinedace
  - d. Landscape Conservation Forecasting™ for Great Basin National Park
  - e. To the north as the geography enters the wetter Columbia Plateau ecoregion, staff are testing outcome-based grazing on the Winecup-Gamble Ranch at the eastern edge of the Jarbidge Mountains
  - f. Landscape Conservation Forecasting™ for the Grouse Creek Mountains-Raft River Mountains of the northwest corner of Utah

For more information, please visit [nature.org/tnc/nature/us/en-us/get-involved/how-to-help/places-we-protect/nevadas-monsoon-passage.html](https://www.nature.org/tnc/nature/us/en-us/get-involved/how-to-help/places-we-protect/nevadas-monsoon-passage.html) or contact us at (775) 322-4990 or [nevada@nature.org](mailto:nevada@nature.org)

