HABITAT HANDBOOK

ABOUT

The New Mexico Department of Game and Fish **Habitat Handbooks** provide conservation measures to minimize impacts of land use and development projects on wildlife and wildlife habitats. This Habitat Handbook addresses minimizing wildlife mortality from open trenches excavated for underground water or oil and gas pipelines, powerlines, or fiber optic communication lines .

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ERT for NM

The **Environmental Review Tool** (ERT) for New Mexico is a web-based system that quickly screens land use and development projects for potential impacts to wildlife and wildlife habitats. The ERT provides best management practices and guidance to mitigate these impacts. Evaluate your project with the ERT at: **https://nmert.org**.

EEP DIVISION

The Ecological and Environmental Planning Division's Technical Guidance Program coordinates the Department's environmental review process and works with community, private sector, state and federal government, nongovernmental organizations, and other project proponents to protect and enhance wildlife habitats. The Division also implements the **Share with Wildlife program** and maintains the Biota Information System of New Mexico (**BISON-M**), a database of New Mexico's wildlife species. It also participates in the development and application of wildlife-related information management and planning tools.

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Conservation Measures to Avoid Mortality of Wildlife from Trenching Operations

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NMDGF biologist, Jim Stuart, removes a bullsnake (*Pituophis catenifer*) from an open trench on Albuquerque's West Mesa, Bernalillo County, NM, 2001. Photo M. Watson.

Open trenches excavated for underground water or oil and gas pipelines, powerlines, or fiber optic communication lines can unintentionally entrap and cause the unnecessary mortality of amphibians, reptiles, and small mammals, and cause injury to large mammals (Romano et al. 2014; Doody et al. 2003; Woinarski et al. 2000; Ayers and Wallace 1997; Enge et al. 1996; Anderson et al. 1952; Hawken 1951; NMDGF unpublished data). Trapped animals can die from exposure, starvation, crushing from pipe-laying, entombment from trench backfilling, drowning, and predation. This unnecessary wildlife mortality can be avoided by implementing conservation measures including: concurrent trenching, pipe-laying, and backfilling operations to minimize the amount of trench left open overnight or longer; constructing escape ramps; and employing biological monitors to remove trapped animals.

Multiple studies in Australia have documented the potential for high levels of wildlife mortality from large-scale trenching activities (Doody et al. 2003; Woinarski et al. 2000; Ayers and Wallace 1997). For example, from 1999 to 2000, a 792 kilometer-long gas pipeline in southeastern Australia was documented to have captured 7,438 individuals of 103 species of vertebrates, including multiple endangered species (Doody et al. 2003).

There are also examples of wildlife being trapped in trenches from New Mexico. In 2001, in Bernalillo County, New Mexico, a fiber optic cable trench approximately 4.8 kilometer-long, 0.25 meter wide, and 1.8 meters deep was documented to have trapped 298 individual reptiles and amphibians (see photos above and below). Two species of toads, 5 species of lizards, and 9 species of snakes were removed from the trench, including 105 glossy snakes (*Arizona elegans*), 41 plains black-headed snakes (*Tantilla nigriceps*), and 68 western massasauga rattlesnakes (*Sistrurus tergiminus*). Since no escape ramps were constructed for the trench and no biological monitor was employed to remove trapped animals, all of these animals would have died had they not been removed by Department biologists and concerned citizens. This would have represented unnecessary wildlife mortality, and the endangerment of these animals could have been avoided with better planning efforts. Furthermore, in 2010 in the Mescalero-Monahans shinnery sands ecosystem of southeastern New Mexico, Romano et al. (2014) surveyed portions of a 65 kilometer-long oil pipeline trench from an area south of Maljamar to Artesia. The trench measured 1.5 meters deep and 0.7 meter wide. A total of 24 individuals of 10 vertebrate species (reptiles, amphibians, and small mammals) were removed from the trench, of which four were found dead. Ecological effects of such events are unknown but may adversely affect local populations.

Western massasauga rattlesnake (*Sistrurus tergeminus*) removed from open trench. Photo M. Watson.

The Biota Information System of New Mexico (**BISON-M**) identifies 88 reptile, amphibian, and small mammal species found in New Mexico that are at risk of mortality from trenching operations (see list **here**). Of these, fourteen are state- or federally-listed amphibian and reptile species or subspecies and an additional nine amphibian and reptile species or subspecies are New Mexico Species of Greatest Conservation Need (NMDGF 2016; see Table 1 below). Horned lizards (*Phrynosoma* spp.) are also vulnerable to entrapment in trenches and are protected from take by Chapter 17 of New Mexico Statues Annotated (17-2-15).

The risk of entrapment to vulnerable species of wildlife depends upon a wide variety of conditions at the trenching site, including: location, season, surrounding vegetation, soils, trench depth, side slope angle, and occurrence of precipitation events. Proponents of projects that include trenching activities should utilize BISON-M, the U.S. Fish and Wildlife Service's Information for Planning and Consultation (**IPaC**) tool, and the Department's New Mexico Environmental Review Tool (**NMERT**) to evaluate potential impacts of the project to state- and federally-listed species and other wildlife vulnerable to trenching activities.

Periods of highest activity for amphibians and reptiles vulnerable to entrapment include summer months and wet weather, and they can be active both day and night. Small mammals subject to entrapment are active year-round and generally most active at night.

Implementing the following general trenching conservation measures will help to minimize unnecessary mortality of wildlife, including to state- and federally-listed species (but does not preclude the need to consult with the U.S. Fish and Wildlife Service on potential impacts to federally-listed species):

- Whenever possible, locate trenching activities within previously disturbed areas, such as existing road or pipeline right-of-ways. To the extent possible, avoid trenching in undisturbed habitat.
- Trench during the cooler months (October – March).
- Utilize concurrent trenching, pipe- or cable-laying, and backfilling. Keep trenching, pipe- or cable-laying, and back-filling crews as close together as possible to minimize the amount of open trench at any given time. When trenching activities are temporarily halted (e.g., overnight, weekends, holidays, weather shut-downs), protect wildlife from accessing any open trenches between digging and back-filling operations by using one or more of the methods described below.
- Avoid leaving trenches open overnight. Where trenches cannot be back-filled immediately, escape ramps should be constructed at least every 90 meters and preferably 30 meters. Escape ramps can be constructed parallel or perpendicular to the existing trench. The escape ramp slope should be less than 45 degrees (1:1; see escape ramp photo below). If pipe or cable has been installed but backfilling has not occurred, escape ramps may need to be constructed on both sides of the trench, since, unless the pipe is elevated enough to allow animals to move underneath it (see photo below), the pipe or cable may block access of amphibians, reptiles, and small mammals to the ramps if only constructed on one side.
- Trenches that have been left open overnight should be inspected the following day by a qualified biological monitor and trapped animals removed as soon as possible, especially where state- or federally-listed threatened or endangered amphibians, reptiles, or small mammals occur. Untrained personnel should not attempt to remove trapped wildlife because of the potential to injure animals and the possibility of injury from venomous snakes. Required tools for removal will include snake tongs for removing snakes and a dip net for capturing and removing amphibians and small mammals. Many animals trapped in the trench will burrow under loose soil. To the extent possible, the biological monitor should disturb loose soil in the trench to uncover and remove trapped animals. Animals should be relocated at least 50 meters away from the open trench, in undisturbed habitat.
- When pipe has been laid in the trench, end caps should be placed on the open end(s) of the pipe to preclude animals from entering. Pipe staged outside the trench should be capped until placed in the trench or checked for wildlife before being placed into the trench.

Escape ramps allow trapped wildlife to leave the trench. Photo M. Watson.

- Most wildlife can be protected from entrapment by constructing silt fence completely around the open trench. Silt fence should be supported from sagging by t-posts, rebar, or stakes and buried at the base to preclude animals from moving below the fence. If construction of a silt fence is a required best management practice for erosion control, then, to preclude the need for a biological monitor, escape ramps, and concurrent backfilling, the below guidelines for silt fence installation and maintenance should be followed:
- Silt fence should be installed before ground-disturbing activities, such as clearing, grubbing, and trenching, occur;
- Silt fence should be constructed of a solid, synthetic, geotextile material and not mesh. Animals can climb mesh and mesh can ensnare wildlife;
- Silt fence should be constructed on both sides of and parallel to the entire length of open trench and on each end;
- Silt fence should be installed with 5-10 centimeters buried and a minimum height of 0.5 meter above ground level;
- Silt fence should be staked and maintained to remain taut throughout the life of the project;
- Silt fence should be constructed as close to the trench as possible and not include large patches of undisturbed habitat;
- Silt fence should be regularly maintained to ensure that the bottom of the fence remains buried and no holes or gaps occur in the fence.
- When feasible, the Department recommends burying power lines, which can significantly reduce wildlife mortality that occurs from electrocution of perching or nesting raptors (hawks, eagles, falcons) and from collision with aerial power lines by birds such as sandhill cranes (*Antigone canadensis*; see **NMDGF 2007 Powerline Project Guidelines**). Burying powerlines should follow the general trenching guidelines provided in this document.

High Priority Species Consideration

Dunes Sagebrush Lizard (*Sceloporus arenicolus*)

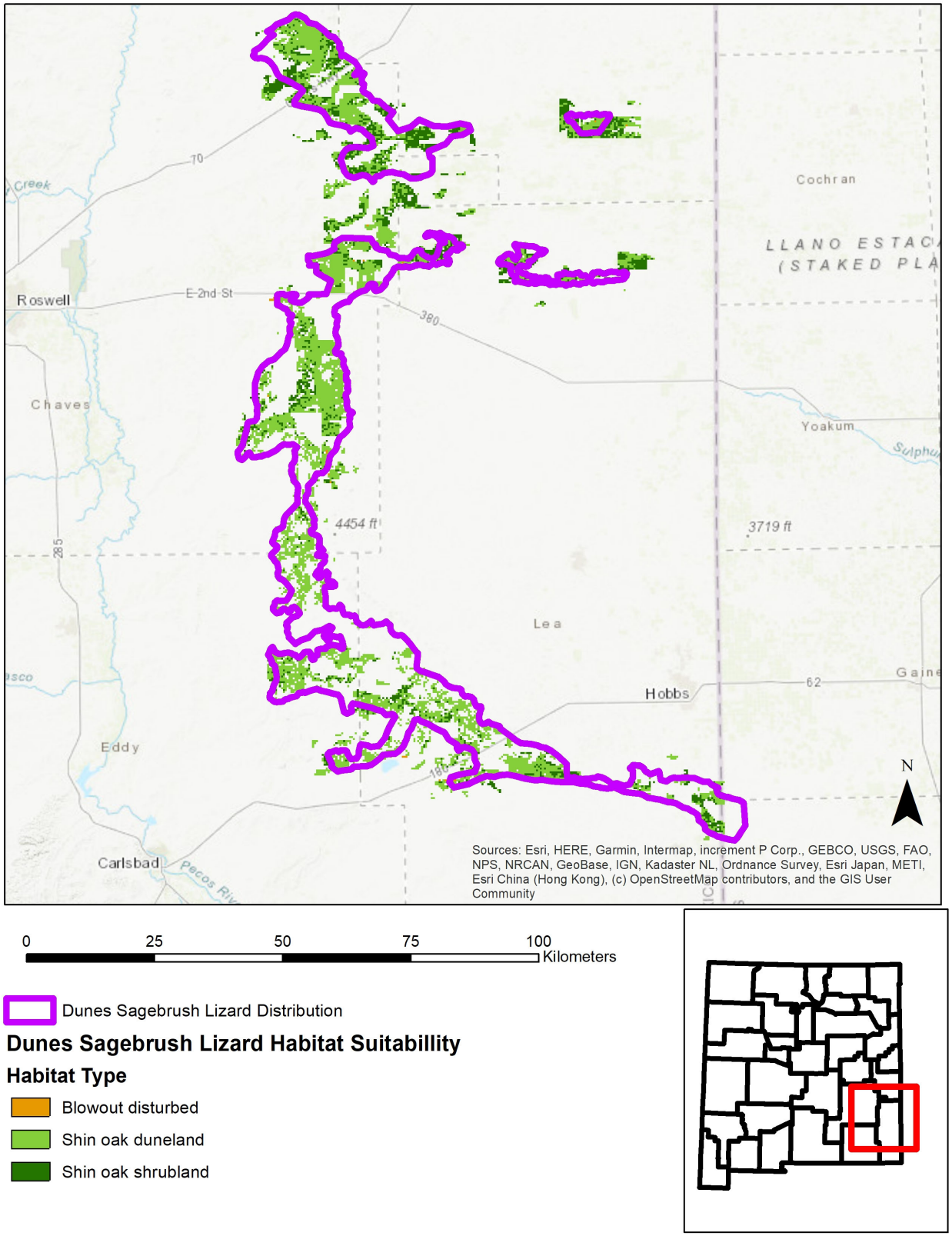
The dunes sagebrush lizard (*Sceloporus arenicolus*; DSL; see photo below) is a state endangered and narrowly-endemic species that only occurs in a narrow arc of sand dune-shinnery oak habitat in southeastern New Mexico and west Texas (see Map 1 below). The surface activity period for the DSL is late April to late September (Degenhardt et al. 2006). To preclude the need for federal listing, the Department strongly recommends that trenching projects planned to occur within known or potentially occupied habitat be mitigated by avoidance (i.e., re-routing trenching activities away from the sand dune-shinnery oak habitat). If complete avoidance of this habitat is not possible, trenching should only occur along existing road or pipeline rights-of-way and outside of the DSL activity period of late April to late September.

If trenching in known or potentially occupied habitat must occur during the DSL activity period, then the Department strongly recommends that qualified biological monitors, trained in reptile and amphibian identification and handling, be employed to search the entire length of open trench daily, between 10:00 A.M. and noon, for as long as the trench remains open. For effective searches and removal of trapped animals, approximately one biological monitor per mile of open trench will be needed. Trapped animals should be relocated a minimum of 50 meters away from the trench.

For trenching activities on Bureau of Land Management (BLM) lands within the distribution of the DSL (see Map 1), the use of a biological monitor to remove trapped wildlife is a BLM condition of approval for trenching projects. Also, the Lesser Prairie-Chicken-Dunes Sagebrush Lizard Candidate Conservation Agreement (CCA) and Candidate Conservation Agreement with Assurances (CCAA) requires CCA/A enrolled participants to use biological monitors to remove trapped animals from trenching projects within the distribution of the DSL. The CCA/CCAA is administered by the Center for Excellence (**CEHMM**).

To reduce costs and maximize effectiveness of employing a biological monitor, concurrent trenching and back-filling should occur, minimizing the amount of open trench at any time. During daily and longer shut-down periods, open trench between trenching and back-filling operations should be protected using one or more of the methods described above.

State endangered dunes sagebrush lizard (*Sceloporus arenicolus*). Photo C.W. Painter.



Map 1. Known distribution of the dunes sagebrush lizard (*Sceloporus arenicolus*; purple polygon) based on Laurencio and Fitzgerald (2010) and habitat suitability for the lizard based on Johnson et al. (2016).

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Table 1 Federally- and state-listed species and Species of Greatest Conservation Need in New Mexico vulnerable to trenching

Common Name	Scientific Name	Status
Western river cooter	*Pseudemys gorzugi*	State NM: Species of Greatest Conservation Need (SGCN) State NM: Threatened
Big Bend slider	*Trachemys gaigeae*	State NM: Species of Greatest Conservation Need (SGCN)
Reticulate Gila monster	*Heloderma suspectum suspectum*	State NM: Endangered State NM: Species of Greatest Conservation Need (SGCN)
Slevin's bunchgrass lizard	*Sceloporus slevini*	State NM: Species of Greatest Conservation Need (SGCN) State NM: Threatened
Dunes sagebrush lizard	*Sceloporus arenicolus*	State NM: Endangered State NM: Species of Greatest Conservation Need (SGCN)
Mountain skink	*Plestiodon callicephalus*	State NM: Species of Greatest Conservation Need (SGCN) State NM: Threatened
Western massasauga	*Sistrurus tergeminus*	State NM: Species of Greatest Conservation Need (SGCN)
New Mexico ridge-nosed rattlesnake	*Crotalus willardi obscurus*	Federal: Threatened State NM: Endangered State NM: Species of Greatest Conservation Need (SGCN)
Banded rock rattlesnake	*Crotalus lepidus klauberi*	State NM: Species of Greatest Conservation Need (SGCN)
Mottled rock rattlesnake	*Crotalus lepidus lepidus*	State NM: Species of Greatest Conservation Need (SGCN) State NM: Threatened
Boreal toad	*Anaxyrus boreas boreas*	State NM: Endangered State NM: Species of Greatest Conservation Need (SGCN)
Sonoran Desert toad	*Incilius alvarius*	State NM: Species of Greatest Conservation Need (SGCN) State NM: Threatened
Arizona toad	*Anaxyrus microscaphus microscaphus*	State NM: Species of Greatest Conservation Need (SGCN)
Boreal chorus frog	*Pseudacris maculata*	State NM: Species of Greatest Conservation Need (SGCN)
Eastern barking frog	*Craugastor augusti latrans*	State NM: Species of Greatest Conservation Need (SGCN)

Table 1 Federally- and state-listed species and Species of Greatest Conservation Need in New Mexico vulnerable to trenching, continued

Common Name	Scientific Name	Status
Western narrow-mouthed toad	*Gastrophryne olivacea*	State NM: Endangered State NM: Species of Greatest Conservation Need (SGCN)
Chiricahua leopard frog	*Lithobates chiricahuensis*	Federal: Threatened State NM: Species of Greatest Conservation Need (SGCN)
Lowland leopard frog	*Lithobates yavapaiensis*	State NM: Endangered State NM: Species of Greatest Conservation Need (SGCN)
Northern leopard frog	*Lithobates pipiens*	State NM: Species of Greatest Conservation Need (SGCN)
Plains leopard frog	*Lithobates blairi*	State NM: Species of Greatest Conservation Need (SGCN)
Rio Grande leopard frog	*Lithobates berlandieri*	State NM: Species of Greatest Conservation Need (SGCN)
Jemez Mountains salamander	*Plethodon neomexicanus*	Federal: Endangered State NM: Endangered State NM: Species of Greatest Conservation Need (SGCN)
Sacramento Mountain salamander	*Aneides hardii*	State NM: Species of Greatest Conservation Need (SGCN) State NM: Threatened