

## Species Spotlight

### The Dunes Sagebrush Lizard: an Endemic Lizard in an Endangered Ecosystem

By Daniel Leavitt, PhD candidate, Texas A&M University



*The Dunes Sagebrush Lizard's scale color patterns closely resemble the sand. This allows for them to sit and wait for their prey without compromising their position to visually cued predators. Photo by Michael T. Hill.*

In tough economic times, societies can lose sight of long-term goals in search of immediate economic gain. Jared Diamond in *Collapse* notes that societies that demonstrate this lack of vision for the future play a risky game. Let me introduce you to a lizard that exists in an oil field. Once again, the scene is set. I hope this society can find a way to meet both long- and short-term needs.

The Dunes Sagebrush Lizard (*Sceloporus arenicolus*) lives only in the sand dunes of southeastern New Mexico and west Texas. In fact, it has one of the most restricted ranges among North American lizards. The word endemic is all that resource managers need to raise awareness among the ranks. 'Endemism' describes organisms adapted to unique environmental characteristics that occur in a restricted geographic range (e.g., sand dunes). This endemism and the uncertainty about the future of its ecosystem demonstrate just a few reasons why the US Fish and Wildlife Service recently proposed to list the Dunes Sagebrush Lizard as an endangered species.

The dunes where you can find this psammophile (*psammo* = sand,

*phile* = lover) exist in the Mescalero-Monahans Shinnery Sands ecosystem, a place where sand dunes and dwarf oaks reign supreme. But the lizard is not the only endemic species here. In fact, this ecosystem is home to many other endemics including eleven beetles and three grasshoppers (the list is still growing!). By understanding this lizard's biology, it becomes clear why recent human-caused disruptions in the dunes are concerning to resource managers.

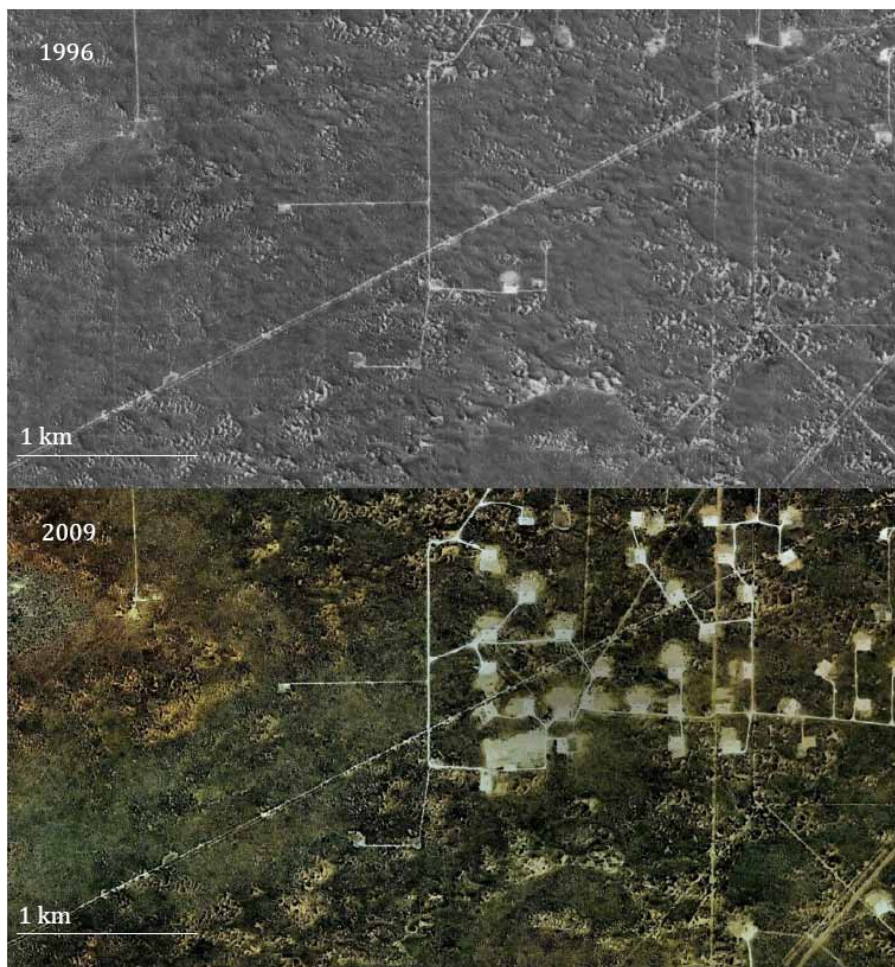
You might find Dunes Sagebrush Lizards in open patches of sand, called "blowouts", or on the periphery of large dune fields. Many of their

*The bumpy landscape found in the Mescalero-Monahans Shinnery Sands ecosystem west of Caprock, NM. Dwarf Shinnery Oak tops the hummocks and blowouts are formed where shifting sands open up vegetative cover. Photo by Daniel J. Leavitt.*



basic requirements are met in these locations. They are well adapted to living in and around sand. They bury themselves in the sand, lay eggs deep in the sand, and swim through the sand to avoid above-ground movement. However, the lizard also requires cover above the sand and seeks refuge beneath Shinnery Oak (*Quercus havardii*), dives into leaf litter for shelter, and basks atop grasses and on oak branches. Because they require the complimentary presence of open sand and Shinnery Oak cover, it is not hard to understand why they are endemic to this ecosystem.

But the future is uncertain for this ecosystem. Over the last 80 years, oil and gas exploration in the Permian Basin has driven economic prosperity for local communities, the states of New Mexico and Texas, and the nation. This economic prosperity has come with an associated ecological cost. The Mescalero-Monahans Shinnery Sands took thousands of years to form. Yet within a century we have dramatically altered the natural dynamics that maintain this



*The Eddy - Lea County Line, New Mexico in 1996 and 2009. In the 2009 photo new development of oil and gas wells are surrounded by well pads (white squares) and connected by roads. Imagery from United States Department of Agriculture.*

ecosystem through exploration and extraction of below-ground resources.

To extract oil resources at each well pad, the sands are flattened with bulldozers, then “caliche” (an underground calcium carbonate rock) is mined and smoothed out over the surface. The bulldozed sand pile is pushed aside and flattens out over the course of the following years. While creating one well pad may not make a difference to ecosystem dynamics, the development of a vast oil field results in habitat fragmentation.

My research on this lizard began in 2008. I have focused on their presence in the oil fields, the habitat requirements and structure

of the lizard communities, and the implications of protected status for conservation goals. Alongside Dr. Lee A. Fitzgerald (Texas A&M University), I have established a long-term comparative and experimental study to investigate the impacts of oil and gas development, and subsequent fragmentation, on populations of this lizard. Our study design allows us to compare our findings with baseline data for the Dunes Sagebrush Lizard, and the data from the first few years illuminates the extent of the problem.

Dunes Sagebrush Lizards are absent from 44% of the sites within the oilfields where they once existed, as compared to 100% presence outside of the oil field. At oil field locations where we do find them, populations

are very low and in possibly unsustainable numbers. Habitat loss and an increase in edge habitat appear to be the driving forces in the environment that are reducing this lizards’ presence in the ecosystem.

More research has begun by a collaborative team including behavioral ecologists, geneticists, and conservation biologists to explore the depth of the problems surrounding this lizard and its ecosystem. However, the pace of research, policy, and oil field development are not equal. Recent efforts in Texas and New Mexico to establish conservation agreements between land use cooperatives and agencies are just now at the beginning stages. The common goal is to ensure effective conservation of the ecosystem while reducing economic impacts of conservation measures. That is, shareholders in economic prosperity (set on satisfying immediate societal needs) must work with the shareholders in environmental prosperity (who focus on the long-term viability of Planet Earth). We have been progressing as a society for centuries. Let us not lose sight of our long-term goals for future generations.

### **Wanted: Volunteer Translators**

The Year of the Lizard campaign needs volunteers to translate the *State of the Lizard* into Spanish and French, for online publication: [www.yearofthelizard.org](http://www.yearofthelizard.org). If you are interested, please contact Dede Olson, [dedeolson@fs.fed.us](mailto:dedeolson@fs.fed.us).