



@unm.edu>  
12/13/2010 12:55 PM

To @fws.gov  
cc  
bcc  
Subject Re: Peer Review of the Proposed Listing of the Dunes Sagebrush Lizard

Hello :

Thanks for the invitation to participate in the peer review process for the listing of the Dunes Sagebrush Lizard. I look forward to contributing to the process.

Best Wishes,

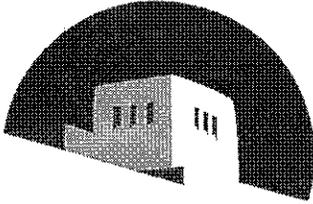
At 12:33 PM 12/13/2010, you wrote:

The US Fish and Wildlife Service is proposing to list the dunes sagebrush lizard ( *Sceloporus arenicolus* ) as Endangered throughout its range in southeastern New Mexico and adjacent southwest Texas. Because of your expertise in lizard ecology or conservation biology, we would like your review of this proposed rule. Peer reviewers will not be asked to provide recommendations on the classification of the species, but will be asked to comment specifically on the quality of any information and analyses used or relied on in the review; identify oversights, omissions, and inconsistencies; provide advice on reasonableness of judgments made from the scientific evidence; ensure that scientific uncertainties are clearly identified and characterized, and that potential implications of uncertainties for the technical conclusions drawn are clear; and provide advice on the strengths and limitation of the overall product. We will use the information received from the peer review in the final rule.

The proposed rule was published in the Federal Register today, and the peer review process will commence once all of the peer review panel has been determined.

Thank you for your interest,

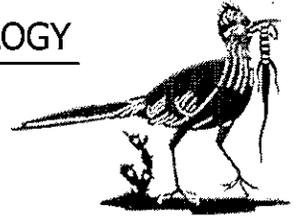
USFWS-NMESFO  
2105 Osuna NE  
Albuquerque, NM 87113



THE UNIVERSITY of NEW MEXICO

Department of Biology  
MSC03 2020  
1 University of New Mexico  
Albuquerque, NM 87131-0001

## THE MUSEUM OF SOUTHWESTERN BIOLOGY



U.S. Fish & Wildlife Service  
P.O. Box 1306  
Albuquerque, NM 87103-1306

Dear :

In response to an invitation from Field Supervisor of the US Fish and Wildlife New Mexico Ecological Services Field Office, I would like to submit this review of the proposed rule to list the Dunes Sagebrush Lizard (*Sceloporus arenicolus*) as endangered throughout its range.

To help you judge my comments I submit a short summary of my experience with conservation aspects of reptiles. I have taught Conservation Biology, Herpetology, and General Vertebrate Zoology within the Biology Department of the University of New Mexico since 1986 where I am a professor and curator of the Herpetology Division of the Museum of Southwestern Biology. I and several of my students worked on *Sceloporus arenicolus* in the 1990s. In addition I worked on the conservation biology of the Galapagos National Park from 1977 through 2004.

### Review:

The Dunes Sagebrush Lizard is in danger of extinction. As demonstrated by many of the studies reviewed in your proposed rule, *S. arenicolus* has a small geographic range and within that range its distribution is tightly coupled with Shinnery Oak. The size of an organism's geographic range has been shown to be the best predictor of likely extinction and organisms with small geographic ranges are more susceptible to extinction than organisms with larger geographic ranges (Payne & Finnegan 2007). In addition, organisms with specific ecological requirements are more susceptible to extinction than organisms with more general ecological requirements (Davies et al. 2004). Thus, even without consideration of anthropogenic effects, *S. arenicolus* warrants special consideration to ensure its persistence as a species. Unfortunately human activity throughout the geographic range of the Dunes Sagebrush Lizard has critically exacerbated those two components of its ecology to the point that extinction is a very real threat.

In summarizing the anthropogenic effects exacerbating the precarious status of *S. arenicolus* the proposed rule reviews five factors which I would like to address here.

### Factor A - The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range.

The proposal's summary is well done and truthfully summarizes what has happened in the past and how that has led to severe reductions in the population levels of *S. arenicolus*. A potential suggestion would be to move some of the effects of oil, gas, solar and wind energy development along with some of the OHV activity from this section to Factor B (Overutilization). I suggest this because those activities have two distinct effects - one is destruction and alteration of habitat which the proposed rule correctly covers here. The other is direct increases in mortality associated with vehicular and other activity. From an organism's point of view the effects of directly increased mortality that is purposeful ("Overutilization") are the same as directly increased mortality that is accidental (no real place for this in the five factors). Thus the vehicular activity that directly kills individuals or destroys their nests isn't really a habitat factor - it is a utilization (even if that utilization is accidental) factor. An alternative to this would be to categorize the direct (but accidental) killing of individuals within Factor C (Disease or Predation) and call it "accidental human predation." Some of this might seem like academic hair-splitting, but habitat alteration/destruction and mortality increase the probability of extinction in fundamentally different ways. Within the factors laid out in the proposed rule it seems most appropriate to me for the accidental mortality to be included as Commercial Overutilization because it is mortality caused by a commercial activity. However, as a biologist, I understand the biological consequences of mortality in contrast with the biological consequences of

habitat destruction/alteration but I may not understand the administrative or legal requirements of placing threats within the five predetermined factors.

I think that the proposed rule underestimates the potential harm from solar development. Most of the treatment of solar development is limited to roads and installation activity. However the large-scale solar facilities I have seen cover great areas with the panels themselves. Thus the installation of such large scale solar facilities would have additional impacts equal to Shinnery Oak removal for the areas covered by the solar arrays.

**Factor B - Overutilization for Commercial, Recreational, Scientific or Educational Purposes.** The propose rule summarizes the potential consequences of purposeful overutilization well. However, as mentioned above under Factor A, I think there is considerable overutilization that is accidental and that could be included here.

**Factor C - Disease or Predation.** The proposed rule summarizes the lack of knowledge regarding population-level effects of disease. The conclusion states that disease is not considered a threat now or in the foreseeable future. Given that we don't know the effects of disease, would it be more accurate for the rule to state that you can't make a conclusion about the effects of disease due to the lack of knowledge? As it is in the current form the proposed rule seems to suggest that if we don't know enough about a potential threat it is probably OK.

**Factor D - The Inadequacy of Existing Regulatory Mechanisms.** The proposed rule goes into great detail regarding existing agreements and the lack of regulatory mechanisms that actually protect habitat of *S. arenicolus*. The conclusion that existing regulatory mechanisms aren't sufficient is correct. I suspect they simply can't be sufficient and therefore listing the Dunes Sagebrush Lizard as endangered is absolutely necessary.

**Factor E - Other Natural or Manmade Factors Affecting Its Continued Existence.** The section on competition could include *Sceloporus undulatus* as a potential competitor to be complete, but I don't think that would alter the conclusion. Another common cause of anthropogenic extinctions relates to the presence of exotic or alien species. The proposed rule does not mention predation by nor competition with alien species. I suspect that alien species are not an important factor for *S. arenicolus*, but perhaps mentioning them would provide a complete picture. Exotic species of ants have been proposed as contributing to population declines of several species of lizards - including species in Texas and Oklahoma.

**Summary** - the proposed rule presents a scientifically supported conclusion that *Sceloporus arenicolus* is in danger of extinction, that a number of anthropogenic actions exacerbates the situation, and that existing regulatory mechanisms and actions have failed to reverse a pattern of declining populations. Listing this species as endangered is a necessary step that can improve the chances this species will persist.

*Davies, K.F., C.R. Margules, & J.F. Lawrence (2004). Ecology, 85 (1): 265-271.*

*Payne, J.L. & S. Finnegan (2007). The effect of geographical range on extinction risk during background and mass extinction. Proc. Nat. Acad. Sci. 104 (25): 10506-11.*

Best Wishes,

Department of Biology &  
Museum of Southwestern Biology  
University of New Mexico

To:  
From: Auburn Univesity  
Date: 27 January 2011  
Subject: Proposed rule to list dunes sagebrush lizard (*Sceloporus arenicolus*) as endangered throughout its range

I have read the proposed rule to list the dunes sagebrush lizard (*Sceloporus arenicolus*) as endangered (Federal Register, 2010, 75:77801-77817). I have examined the cited literature and note one correction: the citation of Whitfield et al. (2000) on page 77811 should be Gibbons et al. (2000). Copies of some of the literature were incomplete, but that did not present significant problems in assessing the proposal. The scientific evidence is sound and strongly supports the listing of this species as endangered.

The proposal does an excellent job in providing reasons why the shinnery oak habitat occupied by the dunes sagebrush lizard is essential for its survival. The proposal also presents a thorough analysis of causes of the degradation and destruction of this habitat.

In the discussion of "Competition" on page 77813, I suggest that it would have been useful to generally compare diet of the side-blotched lizard (*Uta stansburiana*) to that of the dunes sagebrush lizard in the shinnery oak habitat. These data are available in Degenhardt and Jones (1972) and Best and Gennaro (1985, Journal of Herpetology 18:291-301). It appears to me that these species generally ate the same categories of foods; thus, competitors for food resources.

I believe the assumptions and conclusions in the proposed rule are well supported. They are based upon reasonable interpretations and representations of the information produced by excellent scientific research. In my opinion, the dunes sagebrush lizard should be listed as endangered based upon the evidence presented in the proposed rule.



@duke.edu>  
02/14/2011 09:03 AM

To @fws.gov  
cc  
bcc  
Subject DSL

History:  This message has been replied to.

Hi

I apologize for responding to you at the last minute.

I have read the proposal and only have one minor comment. The time of divergence between *S. arenicolus* and *S. graciosus* may actually be older than the formation of the sands. Some new analyses of our data assuming a mitochondrial mutation rate of 2% (unpublished) suggests that the divergence within *S. arenicolus* among northern and central, and central and southern clades occurred closer to 200,000 ybp. This would place the divergence between *S. arenicolus* and *S. graciosus* at an even older date (which we don't have data for at the moment).

I am not familiar with how the peer review process for these proposal proceeds so please let me know if you need me to send comments in a more formal matter or if you need additional information or comments.

Best,

.....  
Department of Biology  
Box 90338  
Duke University  
Durham, NC 27708



@neo.tamu.edu>  
01/31/2011 08:13 PM

To @fws.gov>  
cc  
bcc  
Subject Re: review

History: This message has been replied to.

Nothing that says that it shouldn't be listed. Just some clarifications on some things. I think a bunch of the things I suggest would strengthen the listing package.

----- Original Message -----

From: @fws.gov>  
To: "" @tamu.edu>  
Sent: Monday, January 31, 2011 5:16:30 PM GMT -06:00 US/Canada Central  
Subject: Re: review

Do any of your concerns make you disagree with the overall conclusion? If so, please elaborate on those concerns.

Thanks,:

Fish and Wildlife Biologist  
USFWS-NMESFO  
2105 Osuna NE  
Albuquerque, NM 87113

@tamu.edu>

01/31/2011 04:06 PM  
To @fws.gov  
cc  
Subject review

Here is the review. Don't hesitate to ask questions about anything that I say.

--

Curator of Herpetology, Texas Cooperative Wildlife Collection  
Associate Editor, Journal of Herpetology  
Department of Wildlife and Fisheries Sciences  
Texas A&M University

<http://herpetology.tamu.edu/>

[attachment "Arenicolus listing package review.docx" deleted by  
/R2/FWS/DOI]

Page 77802 When talking about the range of the lizard you exclude Crane County. Which is listed by Dixon 2000 and Axtell 1988

Page 77803 Sand grain section—Sand grain work was poorly done (not random site, only a few sites were done, not from random blowouts, sites were not chosen throughout the range), more work needs to be done with this. To my knowledge no tests were done to see if breathing was inhibited by small sand grains and this any restriction because of this is highly speculative.

Page 77804 When talking about the width of the lizards range shouldn't you use Km instead of Ha?

Page 77804 You say that lizards were absent, but with the design of the study you can never say they were absent, you can just say not detected.

Page 77804 In regards to the resampling of sites done in 2008. No sites were visited that were from habitat that was perceived to be good that did not contain lizards in 1994-6. We have no way of knowing if any of these sites where lizards were called absent have been recolonized/colonized, or if they just became more abundant so they can be detected. I don't know if there would be any of these sites but I would suspect that maybe a small percentage. As it stands with this study you can only find status quo or decline.

Page 77804 In the Texas section you say one SDL was found in Gaines. We found a large population. I don't remember the exact number but we counted more than 40 in the search and took 5 specimens in 2006.

Page 77804 You paint a really grim picture of arenicolus in Texas (which may be true). Saying that they likely occur only near that sites that they were found in the 06-07 study. I would argue that they occur patchily from Kermit to Monahans and then from Kermit along 115 NE for about 20 miles that extends into Andrews County. Sampling coverage within this "occupied" habitat was poor due to road access and private land access issues.

Page 77804 In the Texas section, the two surveys from within Monahans State Park were done at inappropriate times (1255-1355 and 1815-1915) to suggest that they are extirpated and the number of person hours is less than that that is listed in their own protocol. I would say that their amount of survey time is inadequate to say anything about arenicolus there.

Page 77805 You talk a lot about prey base. I think too much emphasis is put on this. Sceloporus are generalist predators (although some are habitat specialists) that do fine in pretty much any habitat that has bugs (speaking about the genus in general). To my knowledge the prey base is not a factor in the decline of any Sceloporus sp. and until a proper diet study is conducted then we must assume that arenicolus are like their close relatives in diet and will eat most any insect that is small enough that they come across. Although unknown, the diets of similar species in the sands (e.g. Uta and S. consobrinus) are likely very similar and they are not adversely affected by the same factors that arenicolus are.

Page 77805 Uma comparison—A sceloporus example would be more appropriate, perhaps something with *S. woodi* that specializes on a sand ecosystem in Florida and is in decline as well.

Page 77805 You say they don't occupy 86 percent of historically occupied habitat. I see about 12 unique sites in Texas and only 5 of those were surveyed by Laurencio et al., the lizard was found at one of those sites and has since been found at another.

Page 77805 Extirpation at Crane—There is no evidence that O&G is responsible for the extirpation at Crane. They also postulate that OHV traffic could be responsible

Page 77806 Fragmentation—Isn't Leavitt's report about the effects of fragmentation available. That would be compelling evidence.

Page 77807 Pipelines—Pipelines also create new habitat when they bisect shinnery flats adjacent to occupied habitat

Page 77810 Scientific collecting permits are not needed to capture and keep dead or alive up to 6 arenicolus as long as you have a TX hunting license. However they can not be used commercially.

Page 77813 Climate Change is potentially a huge impact. I see the loss of the Crane County population more likely due to Climate Change than any other factor. It isn't a coincidence that Crane County is the most Southerly, lowest elevation site that the lizard is known from.

Page 77813 Competition—The side-blotch doesn't really outcompete the SDL. In the modified habitats you talk about the SDL is likely already absent from other factors and the *Uta* are filling the empty niche space left by SDL

Page 77813 Climate Change—you should contact \_\_\_\_\_ directly about some of his models about the effect of climate change on *Uta*. These predictions are pretty dire and arenicolus has a lower tolerance for heat.

Department of Biology  
208 Mueller Laboratory  
The Pennsylvania State University  
University Park, PA 16802

**RE: Peer Review for the U.S. Fish and Wildlife Service's Proposed Rule to List the Dunes Sagebrush Lizard (*Sceloporus arenicolus*) as Endangered Throughout its Range**

Because of the habitat specificity exhibited by Dunes Sagebrush Lizards, habitat alteration is a most pertinent factor affecting their populations. Many of the studies cited and conclusions drawn involve habitat alteration caused by oil and gas wells, herbicides, and pollution, all of which, it is suggested, are facilitated by inadequate regulation. My review, therefore, focuses on these aspects.

Quality of Information and Analyses

A fundamental relationship affecting any lizard's population density and distribution is that between the lizard and its habitat use. Fitzgerald *et al* (1997) provide strong evidence for the linkage between the Shinnery oak dune habitat and Dunes Sagebrush Lizard (Page 77803). Indeed, they conducted a survey among multiple habitat types, but found 100% of the Dunes Sagebrush Lizards in Shinnery oak dunes habitat. Furthermore, they found lizard density to vary among microhabitats within the Shinnery oak dunes habitat. The size of a blowout (bowl shaped depressions between sand dunes) affected the number of lizards found. Relatively, small blowouts were used by lizards less than expected and very large were used more than expected. Shinnery oak dunes, and specifically dune blowouts, are

associated with the Dunes Sagebrush Lizard. More importantly, Shinnery flats and other adjacent habitat compositions, which may include some Shinnery oak, did not contain the lizards. The title given to the Dunes Sagebrush Lizard of habitat specialist is based on sound scientific methodology and statistical analyses.

The studies examining how habitat alteration affected Dunes Sagebrush Lizard densities were also based on sound scientific methodology and statistical analyses. The negative relationship between oil well density and Dunes Sagebrush Lizards is important, and is better supported by the data than is currently explained in the proposed rule (Page 77806, column 1, last paragraph). One may question whether the negative relationship is caused by other factors that happen to be correlated with the placement of oil wells. Sais and Snell (1998) actually analyze the data to address this concern, and find that the negative effect of oil wells on Dunes Sagebrush Lizard density occurs even after accounting for the effects of other habitat variables (percent open sand, the number of blowouts, and the abundance of a competitor – the Side-Blotched Lizard *Uta stansburiana*).

The relationship between Shinnery Oak removal (through herbicide application) and reduced numbers of Dunes Sagebrush Lizards is also well supported by the data in Snell *et al.* (1997; Page 77809, column 1, paragraph 1). The experimental design and sample sizes (8 treated and 12 untreated sites) were more than adequate to address this relationship. Sensibly, if one takes the habitat away from a habitat specialist, the habitat specialist is negatively affected.

The conclusion that pollution is a threat to the Dunes Sagebrush Lizard has the weakest support among the threatening factors. The negative relationship between oil and gas well density and Dunes Sagebrush Lizard density, however, is well supported, and the effects of pollution caused by the oil and gas extraction could help explain this negative relationship. With regard to negative effects of pollution

on lizards, more support than that referenced in the proposed rule can be found in the literature. For instance, the belief that soil sulfate concentrations may be high enough to affect Dunes Sagebrush Lizards (juveniles and adults), although reasonable, may disregard another important life stage. It may be more reasonable to believe that high sulfate concentrations could affect embryonic development (Page 77812, column 1, paragraph 2). Dunes sagebrush lizards lay flexible-shelled eggs in the soil that absorb moisture from their surrounding environment throughout incubation. Sulfates make the soil more acidic and acidic embryonic conditions can have negative effects on development (Marco *et al.* 2005. Soil acidification negatively affects embryonic development of flexible-shelled lizard eggs. *Herpetological Journal* 15: 107-111).

#### Oversights, omissions, and inconsistencies

One possible oversight, or at least avenue of future research, involves the fact that Dunes Sagebrush Lizards select sites with relatively medium sized sand grains instead of finer grains (Page 77803, column 3, paragraph 2). There are no data referenced to support a reason for this preference, but finer sand grains are suggested to limit the lizard's ability to breathe while burrowed in the sand (something this species does regularly). I have another possible reason based on my experience with rearing Eastern Fence Lizards (*Sceloporus undulatus*) in the lab. I first reared juvenile lizards using a sand substrate in the terrariums, but many individuals began having problems with sand sticking and/or getting in their eyes. Once the problem occurred, these individuals could or would not open their eyes, which led to them not eating because they could not see their food, and subsequently starving to death.

A few minor problems were found with citations. Peterson and Boyd (1998) do show that Shinnery oak does not grow in areas with high amounts of calcium carbonate, however, the evidence is

not on page 6 as cited, but on page 7 of their article (Page 77807, column 1, paragraph 1). Painter (2010) is not in the literature cited (page 77804, column 1, paragraph 3). Sias and Snell (1997) also is not in the literature cited, but this may be a typographical error, intended to refer to Sias and Snell (1998) (Page 77805, column 3, paragraph 2).

### Reasonableness of Judgment

I focused on judgments within the proposed rule that I felt someone may be able to question, or that I questioned myself. Other judgments within the proposed rule were deemed reasonable. It is reasonable to conclude that areas within this dynamic system must be considered one complete system instead of multiple separate habitats. This is important because areas that are not occupied currently may go through habitat shifts that result in these areas becoming suitable habitat, as the opposite habitat shifts cause currently suitable habitat to become unsuitable. At least two references support this conclusion. Muhs and Holliday (2001) provide evidence of the changing of Shinnery flats to Shinnery Oak dunes in a constantly dynamic system (Page 77803, column 2, paragraph 4). Chan *et al.* (2008) also suggest that this dynamic system must be considered one complete system instead of multiple separate habitats based on genetic data of lizard populations in New Mexico (Page 77804, column 2, paragraph 2).

There are two instances where the conclusion may not reasonably match the supporting reference. Firstly, Boyd and Bidwell (2002) do not provide strong evidence for (or against) Shinnery oak reestablishing after Caliche is removed (Page 77807, column 1, paragraph 2). Boyd and Bidwell (2002) looked at the effects of fire on Shinnery oak habitat in Oklahoma, which does not consist of sand dunes. The soils in Oklahoma are likely different than the sand dunes in Texas and New Mexico in which the

Dunes Sagebrush Lizard inhabits. They mention that Shinnery oak has not reestablished on old fields after 70 years, but has on recently ploughed areas. Because the old fields were ploughed consistently 70 years ago, Boyd and Bidwell are arguing for the uncertainty of the effects of long-term disturbance, be it fire or ploughing. The Shinnery oak may not reestablish while the hard calcium carbonate exists, as Peterson and Boyd (1998) show, but it may not reestablish even after its removal. Secondly, Dramstad *et al.* (1996) describe what generally happens when habitat fragmentation occurs, but do not give any information specifically about *S. arenicolus*, hence the previous sentence beginning with "It is thought" (Page 77805, column 1, end of paragraph 2). Because the general statement about edge habitat having limited resources relies on indirect evidence, a hedge term seems more appropriate (i.e. "may have limited resources"). The citation refers to page 28, however, which was not included in the pdf I received (pages 19-24 only). The other uses of the Dramstad *et al.* (1996) reference are reasonable.

The conclusion that current regulations are not adequate to protect the Dunes Sagebrush Lizard is reasonable based on the non-comprehensive nature of the current regulations (Page 77811, column 2, paragraph 3). Currently, Shinnery oak habitat, which is strongly linked to the Dunes Sagebrush Lizard's existence, is not protected. Many of the protections that currently exist are based on "Agreements" that are not binding necessarily, and can change over time. Plus, these current protections only pertain to New Mexico, and much of the Dunes Sagebrush Lizard habitat is in Texas.

#### Overall Strengths and Limitations

In general, the scientific uncertainties, with regard to factors such as disease or predation (Factor C) and overutilization (Factor B), were identified and characterized. In light of these scientific uncertainties, these factors were reasonably considered not to be major threats to the Dunes Sagebrush

Lizard. Those factors regarded as threats – habitat alteration (Factor A), inadequate regulation (Factor D), and pollution (Factor E) – were supported by high quality data with minimal scientific uncertainty. Although there is some uncertainty pertaining to the role of pollution, the effects of habitat alteration through oil and gas extraction and herbicide application are well supported. Whether pollution caused by oil and gas extraction plays a role or not, the effects of pollution would only serve as a mechanism through which the negative relationship between oil and gas well density and Dune Sagebrush Lizard density occurs.