

Terrestrial Populations

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Species Conservation and the effects of Petroleum Extraction on BLM Lands

Rebecca Efroymson is leading ORNL's role in this collaboration between LLNL (Tina Carlson), BLM, and ORNL. We are using spatially explicit, individual-based models to study the effects of habitat loss and fragmentation on bird and mammal populations of conservation concern, including the prairie dog (LLNL) and the sage grouse (ORNL). One aspect of the project is to develop quantitative methods for optimizing the placement of wells to minimize harm to these populations.



Figure 1. Sage grouse (Source and more information:
<http://mountain-prairie.fws.gov/species/birds/sagegrouse/biologue.htm>).

Developing an Ecological Framework to Evaluate the Impacts of Releases at Upstream Exploration and Production Sites

We developed an ecological framework to evaluate the impacts of releases at petroleum exploration and production sites. The project team at ORNL is headed by Rebecca Efroymson and is using a case study at the Nature Conservancy's Tallgrass Prairie Preserve in Oklahoma. We collaborated with Tina Carlsen and Tanya Kostova at Lawrence Livermore National Laboratory. We developed a landscape model for birds or mammals, with help from Eric Carr, and evaluated the simulated effects of habitat loss and fragmentation on American badger populations. We found that the decline of population viability was steeper on fragmented landscapes, particularly for a species like the American badger that does not avoid poor or risky habitat. We also quantified Allee effects caused by the failure to find mates in disturbed landscapes, which suggests that the presence of unmated females defending territories might be an early warning sign that densities are too low (Efroymson et al. 2004, Jager et al. 2005).



Figure 2. Prairie vista.

References

- Efroymson, R., T. Carlson, H. Jager, T. Kostova, E. Carr, W. Hargrove, J. Kercher, and T. Ashwood. 2004. Toward a framework for assessing risk to vertebrate populations from brine and petroleum spills at exploration and production sites, Landscape ecology and wildlife habitat evaluation...ASTM STP 1458. L. Kaputcka et al., eds. ASTM International, W. Conshohocken, PA.
- Jager, H.I., E.A. Carr, and R.A. Efroymson. 2005. Simulated effects of habitat loss and fragmentation on a solitary, mustellid predator. Ecological Modelling. In press.
- Jager, H.I., R.A. Efroymson, K. Sublette, and T.A. Ashwood. 2005. Unnatural landscapes in ecology: Generating the spatial distribution of brine spills. Environmetrics 16: In press.
- Jager, H.I., T.L. Ashwood, B.L. Jackson, A.W. King. 2005. Spatial uncertainty analysis of population models. Ecological Modelling 185(1):13-27.
- Jager, H.I. and A.W. King. 2004. Spatial uncertainty and ecological models. Ecosystems 7:1-7.