SERDP
Strategic Environmental Research and Development Program

Conservation
CS-1395

Development and Application of a Physiological-Based Framework for Assessing the Biological Significance of Military Activities on Threatened and Endangered Animal Species

Background:

The land resources of the Department of Defense are essential for military training and testing activities and as important habitat for more than 300 federally protected plant and animal species. There is increasing concern that training and testing activities could be compromised by land-use restrictions designed to protect threatened and endangered species (TES) and their habitat. Presently, land use decisions often must be made where there is limited information available on the TES of concern and where the relationship between military activities and potential impacts on TES is poorly understood. Conventional population- or community-level surveys are the methods most commonly used to evaluate TES. These techniques can be expensive, time-consuming, and relatively insensitive to environmental stressors with long response times. Measurements also may provide only weak causal links between military activities and apparent effects. Improved, sensitive, and cost-effective methods are needed to objectively monitor and evaluate the potential effects of military activities on TES.

Objective:

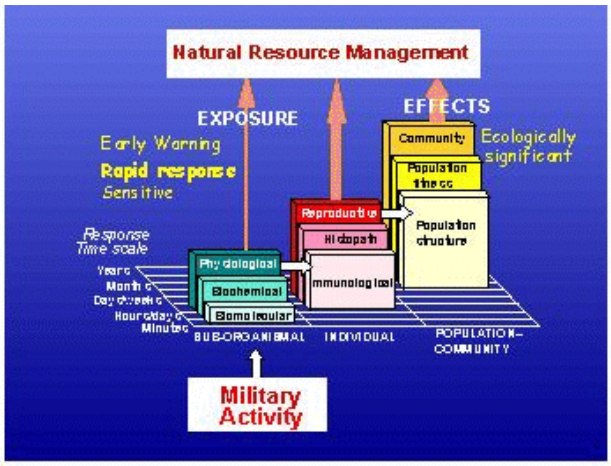
This project will develop and apply a bioassessment tool that can be used by natural resource managers across a wide variety of military installations to assess the fitness of TES populations by measuring a suite of sensitive and rapidly-responding physiological indicators, which are related to reproductive and population-level fitness.

Process/Technology Description:

Field investigations will be conducted at Eglin Air Force Base (AFB), FL and at Camp Shelby Training Site, MS on representative terrestrial TES from two major vertebrate groups, the gopher frog and the gopher tortoise. A suite of biomolecular, biochemical, physiological, histopathological, and immunological responses will be measured for both species to determine if these sensitive and early-warning bioindicators can be used to reliably predict effects of military activities on ecologically relevant responses such as reproductive integrity and population status. At Camp Shelby, a two-factor randomized design will be used to test for the effects of habitat disturbance on the health of the gopher tortoise. The effects of explosive residuals such as TNT and RDX on the health of the gopher frog will be assessed at Eglin AFB.

Expected Benefits:

This project will develop a bioassessment tool that will enable natural resource managers at military facilities to quickly and cost-effectively determine if certain activities are compromising the health or status of terrestrial TES. This tool will alleviate the reliance on conventional assessment methods that are generally insensitive and relatively expensive. Application of this tool will allow resource managers to determine if current activities are consistent with preserving the health and integrity of terrestrial TES. This approach also will provide a basis of determining if the management, recovery, and protection of TES are consistent with facility environmental management plans. (Anticipated Project Completion - 2008)



Hierarchical responses of organisms to military activities in relation to response time scale and level of biological organization illustrate the relationship of these responses to natural resource management.

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