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Gap Analysis Program History and Overview

"Gap analysis" is a scientific method for identifying the degree to which native animal species and natural plant communities are represented in our present-day network of conservation lands …

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KEEPING COMMON SPECIES COMMON

The concept for the Gap Analysis Program (GAP) was born in 1987 in response to the need to complement species-by-species management in dealing with broad-spectrum habitat loss. The need for clear, geographically explicit information on the distribution of native vertebrate species, their habitat preferences, and their management status was evident.

Following two years of methods development, the program was launched in 1989 as a research project exploring how to develop predictive information that can be used to manage the nation's biological diversity ("biodiversity") so that ordinary plant and animal species will not become threatened with extinction. Over the past fourteen years, important new and successful methods needed to manage the country's diversity of life forms have emerged, overcoming barriers to mapping elements of biological diversity across large areas – something that had never been done before.

A wide range of tools and procedures are now available, including standards for classifying natural vegetative communities, a consistent set of satellite images from which to render digital databases, and methods to apply GAP information to everyday resource decisions and long-range planning. Today, GAP is operational nationwide and has enjoyed substantial international interest.

GAP's mission is to promote biodiversity conservation by developing and sharing information on where species and natural communities occur and how they are being managed for their long-term survival – making it an important part of the overall National Biological Information Infrastructure (NBII). "Gap analysis" is a scientific method for identifying the degree to which native animal species and natural plant communities are represented in our present-day network of conservation lands. Those species and communities not adequately represented constitute "gaps" in conservation lands and efforts.

Mapping Natural Community and Species Distributions

The ability to successfully map natural communities and species in terrestrial as well as aquatic environments has required breakthroughs in science, technology, and effective partnering. To develop maps of natural plant assemblages, satellite imagery is combined with aerial photography, air video, field data, and expert knowledge to create state- and region-wide maps for use by land managers and planners. GAP partners include state and federal agencies, universities, businesses, and nonprofit organizations. The program develops standards – such as those used to classify natural vegetation communities or to predict the distribution of animal species – that provide a framework for individual states and other organizations to further develop creative techniques and tools.

"Predictive modeling" is used to map species that breed or use habitats in a given state. To predict their distributions, species are associated with mapped habitat characteristics using computerized GIS (geographic information system) tools. The resultant maps are checked for accuracy against verified checklists and published reports of species occurrences and peer-reviewed by experts species by species. GAP began by mapping distributions of amphibian, bird, mammal, and reptile species. Recognizing that biodiversity includes all life forms, the program is currently developing methods to extend its coverage to fish, mussel, crayfish, snail, and other species, and will include additional species as knowledge and resources allow.

Mapping Land Stewardship and Finding Conservation Gaps

GAP characterizes land and water management according to the steward's (resource manager's) intent to maintain biodiversity. Stewardship maps identify categories of land ownership, managing authority, and management intent using standardized criteria applied by the resource manager. The distribution of a species or a natural community is overlaid with a land stewardship map, and the extent of an element's representation in conservation lands can then be determined.

Products

GAP data and reports are distributed through state data distribution centers for the cost of shipping and handling. Data are also made available on CD-ROM and through the GAP Web site <gapanalysis.usgs.gov>. Current products include:

- Land Cover Maps: Produced from 30-meter satellite imagery, in digital GIS format, showing dominant vegetation types (for example, "Eastern Cottonwood Floodplain Forest").
- Species Distribution Maps: Depict the predicted distribution of each vertebrate species, in digital GIS format.
- Land Stewardship Maps: Indicate categories of ownership, managing authority, and management status for biodiversity conservation, in digital GIS format.
- State Project Reports: Offer analyses of the conservation status for each species and natural community, in digital form with graphic versions of all GIS maps.

Partnership Opportunities

GAP projects could not be conducted without the participation of nearly 500 cooperating state and federal agencies, academic and nonprofit institutions, and businesses. Nationwide cooperators include multiple Department of the Interior bureaus, the Department of Defense, the Environmental Protection Agency, and NatureServe. Partnerships often link entities that may not have previously worked together and provide benefits to all parties.

As part of the overall NBII Program, GAP investigators are helping many organizations apply GAP data to their projects and missions. Numerous GAP applications have been developed nationwide, ranging from forest management, conservation planning, and scientific research endeavors to business and industry applications. A sample of applications of GAP data can be accessed on the Gap Analysis Program Web site. These Web pages also provide general information on the program, a collection of GAP literature, state contacts, the status of GAP projects, and specific data availability.

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For More Information

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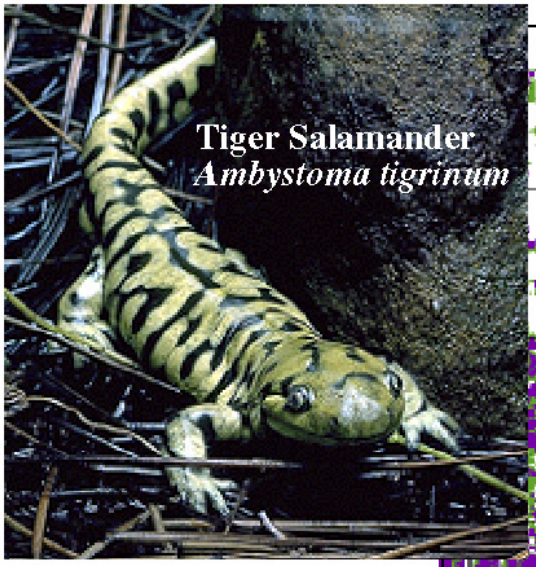

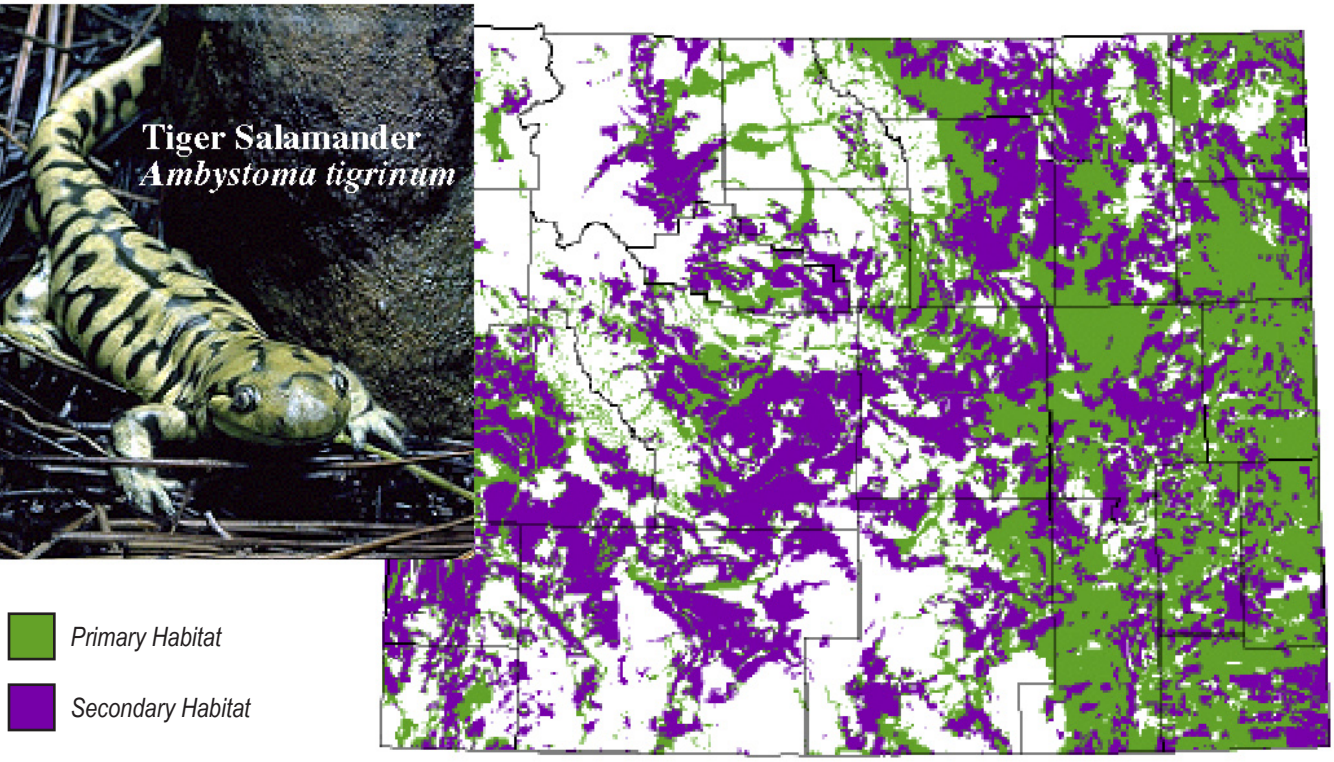

Example of Species Distribution Maps: modeled ranges of birds, mammals, reptiles, and amphibians.