

GLOBAL OWL PROJECT

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This project proposes a 5-year, worldwide project to resolve foundational aspects of taxonomy and conservation for the world's owls. During the last 14 years, 72 species of owls have been recognized, and the discovery of new species and new taxonomic assignments continues at a brisk rate. Formal, peer-reviewed field inventory protocols exist for very few owl species. Existing maps of owl distributions are coarse and rarely adequate for conservation planning. The rate of biodiversity loss occurring in forested environs is a significant global issue; some 197 of 216 (91%) of the currently known owl species are forest-related. Fifty-two owl taxa (25% of the owl species) are on the IUCN Red Data list. Owls have demonstrated their very pivotal roles in the management of forests, e.g., Spotted Owl (*Strix occidentalis*) of the western United States, and the Powerful Owl (*Ninox strenua*) and Sooty Owl (*Tyto tenebricosa*) of eastern Australia.

Work under this project is focused on six tasks:

- 1) Develop scientifically robust **inventory techniques** for locating owls and their nests;
- 2) Analyze the **molecular systematics and phylogeny** of owls using basically mtDNA but also ncDNA;
- 3) Acquire high-quality **recordings of owl vocalizations**, to assist in species identification;
- 4) Conduct analysis of the **morphological aspects** on new owl taxa found, to assist in identification;
- 5) Refine the **geospatial distributions** of the owl species; to aid in establishing conservation priorities;
- 6) **Distribute project information** via internet pages, publications, and symposia to a very wide audience, including national and international biodiversity programs.

These tasks are briefly described below:

1. This task is focused on developing scientifically-robust **inventory techniques** for locating owls and their nests. Undertaking inventory efforts is fundamental to natural resource conservation. Inventory methods will necessarily differ with the species of owl being surveyed, their habitats, nocturnal/diurnal habits, the tools and technology available, and the safety concerns of the surveyors. Products from this task will include practical methodologies and technologies for locating owls and their nests, as well as providing a globally-consistent framework from which to undertake comparative, demographic, or monitoring programs.
2. **Analyze molecular systematics and phylogeny** to fully develop the phylogenetic relationships in owls. DNA studies have become a powerful tool in most areas of biology, in order to understand the phylogeny, systematics, and phylogeography of species, their ecology, population structure, breeding biology, paternity, and other aspects. Under this task, we will amplify and sequence mainly the mitochondrial cytochrome b gene but will also include nuclear marker genes (intrn DNA). Since cyt b shows a good resolution at the genus level and since we already have a large database for this gene, we propose to use this gene as a platform in this study.
3. Acquire high-quality recordings of **owl vocalizations**. Along with coloration and plumage, the vocal patterns of nocturnal or crepuscular species significantly aid in identification. In all owls, vocalizations are inherited and therefore are of great taxonomic importance. Owls show little geographical dialect variation. Every vocalization in an owl's vocabulary has a precise meaning. The primary vocalizations of many owls are still not known with certainty. Work under this task will further the collection and analysis of high-quality recordings of owl vocabularies, with a particular focus on their territorial songs, as these have demonstrated to be of particular value in owl inventory programs.
4. Conduct detailed analyses on the **morphological aspects** of the owls. Of particular interest here is the provision of detailed descriptions of species and subspecies, a number of which will be new to science.
5. Refine Geographical Information System (GIS) data layers depicting the **geospatial distributions of the owls**. To date, only generalized maps of owl distributions have been produced; these maps are based mainly upon

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vague locations of observations that can be recent or old, well documented or suspect. Recent large-scale population or habitat changes may alter species ranges. Sponsors will combine GIS and GPS technologies, digitized spatial datasets, and formal peer review, to develop refined distribution maps for the species – and greatly enhance the suitability, consistency, and applicability of these maps for use in practical conservation planning. Importantly, these owl distribution maps will be developed in concert with recently published terrestrial ecoregion maps (Olson et al. 2001, *Bioscience* 51(11):933-938).

6. Distribute project information via **internet page(s), publications, and symposia** to a very wide audience, including national and international biodiversity programs (e.g., Convention on Biological Diversity). Work under this task will build upon/refine existing “Species Accounts”, include products from other tasks in the project, and place this information on web pages. Of a number of professional/scientific web sites, we will also utilize a web page with owl information designed for the public audience: www.owlpages.com. We expect to give formal presentations to national/international Biodiversity conventions and associated forums.

Approach: An international team of owl ecologists and systematists has been formed. Team Leaders have been identified for specific tasks and/or geographic regions. The team, staff, and students will undertake project tasks in differing regions of the world. Substantial coordination with ornithological societies, raptor organizations, and local researchers and biologists is expected and welcomed. **Inventory Methods:** A global field inventory form will be developed to support recording and refinement of field methods. Field equipment will be developed to provide consistency in inventory methods. A literature search for inventory methods will be undertaken prior to fieldwork for the owls. No additional field work will be conducted on the small number of owl species for which accepted inventory protocols exist. **Taxonomic work** will include the collection of blood/tissue samples from some 130+ additional owl taxa (the others have been collected already). **Vocalizations** of owls will be recorded with high-quality equipment. As the recording of owl calls has been undertaken in earnest in recent years, some 40 species have never been tape recorded, and the vocalizations of numerous additional taxa are not adequately documented. Further, many taxa currently considered subspecies will be elevated to species status once their vocalizations become known. **Morphological aspects** will be derived from voucher specimens, to aid in the description of new species or subspecies. With appropriate permits, field collection of owl specimens will occur in areas currently without clearly identified voucher specimens. Such voucher specimens will support morphological, vocal, and genetic assessments; voucher specimens will generally remain in their country of origin. The **distributional maps** of owl species will be based upon a review of observational accounts, voucher specimens, existing published/unpublished maps, habitat relationships, and scientific peer review. Digital databases of owl voucher specimens held in key museums will be established. Species accounts and other project components will be developed and published via **internet web pages**, symposia, and other forums.

Conservation efforts depend on knowledge of taxonomic status, distribution and abundance for each of the species. The completion of the phylogenetic assemblage of owl species is one objective of this project. Another key product from the project - *Inventory Techniques Manual for Owls of the World* - will find direct and widespread application under the forestry policy reforms and investments envisaged under such documents as the *2002 Revised Forest Strategy for the World Bank Group* as well as other banking and lending institutions (e.g., International Monetary Fund) and programs (e.g., Program on Forests - PROFOR). Owls have important cultural connotations, and this project will provide significant scientific and conservation advances, as well as providing a framework for global-scale examinations on other taxa.

Main Products: 1) a manual of *Inventory Methods for Owls of the World* to provide practical guidance to managers and others, as well as to strengthen the “environmental screens” required of international financial lending institutions; 2) digital databases of owl voucher specimens held in key museums; 3) phylogenetic tree of the owls; 4) gene sequences for mtDNA will be submitted to GenBank; 5) recordings of owl vocalizations (e.g., digital, audio, sonograms) to aid in species identification; 6) species accounts, range maps and related project information offered via web pages, 7) identification of conservation priorities and ecoregions needing more in-depth work on owls, and 8) monograph(s), and other publications in refereed journals.

Timeframe: Work under this project is planned for the timeframe of 2003-2008.

How You Can Help: We are actively pursuing funding for aspects of this project at this time; if you have insights into funding opportunities, or would like to contribute to this exciting global owl project in other ways, please contact David H. Johnson (djowl@aol.com).