



The Western Section of The Wildlife Society and Wildlife Research Institute

Western Raptor Symposium February 8-9, 2011 Riverside, California



Symposium
Sponsors



February 8 – 09:15-09:45 am Session: Overviews - Owls

Foundational Science on the Owls of Western United States

David H. Johnson, Director, Global Owl Project and WRI Research Associate, 6504 Carriage Drive, Alexandria, VA 22310; djowl@aol.com

The challenging work of owl research and conservation is best supported by a solid, transparent, and accessible foundation of science. In this paper I present summary information on the following topics: 1) Survey and monitoring techniques, 2) Vocalizations, 3) DNA, 4) Type specimens, 5) Distribution maps, and 6) bibliographies for 18 species of owls with distributions in the western US. The framework for survey and monitoring techniques includes: published survey methods, guidelines, or suggested methods based on species ecologies. DNA aspects include a review of papers that include the numbers of samples and types of genetic analyses. Vocalizations have two main components: a) a review of how many vocalizations have been recorded for a given owl species, and b) whether there are clean, clear recordings that are suited for surveys (if playback is used). The Global Owl Project has assembled .pdfs of all of the original descriptions of species and subspecies as they were first reported to science, and is now acquiring high-resolution photographs and museum collection data on the Type specimens. Distribution maps are critical to conservation, and detailed maps are always a challenge to prepare, and update – what is the status of maps for the owls? Bibliographies are fundamental, and this review will highlight the current status of an on-line, queryable, digital library for the owl literature. Species included in this presentation are: Barn Owl, Whiskered Screech Owl, Western Screech Owl, Flammulated Owl, Snowy Owl, Great Horned Owl, Barred Owl, Spotted Owl, Great Gray Owl, Northern Hawk Owl, Northern Pygmy Owl, Ferruginous Pygmy-Owl, Elf Owl, Burrowing Owl, Boreal Owl, Northern Saw-whet Owl, Long-eared Owl, and Short-eared Owl. I welcome additional insights from conference attendees with updates to the summary materials offered.

The authors and institutions that have provided the following presentations are happy to share their information, data, and opinions. However, these are not, necessarily, peer-reviewed presentations and the potential to take something out of context also exists. In order to avoid that, you are requested to contact the respective lead author(s) before using specific information contained in any of the following papers. Once you have done that, the proper citation is: "[Author(s). Date. Title.] Presented at the Western Raptor Symposium. Jeffrey L. Lincer and David Bittner (Co-Chairs). Hosted by Wildlife Research Institute and The Wildlife Society, Western Section. Riverside Convention center, Riverside, California, USA. February 8-9, 2011

Proyecto Mundial de Búhos

Projet Rapace Nocturne Global

全球猫头鹰计划

Progetto Mondiale dei Rapaci Notturmi



Projeto Global de Corujas

Mashrooahtul-bom-al-aalmiah

Глобальный совиный проект

Program Pelestarian Jenis Burung Hantu Global

www.globalowlproject.com

djowl@aol.com



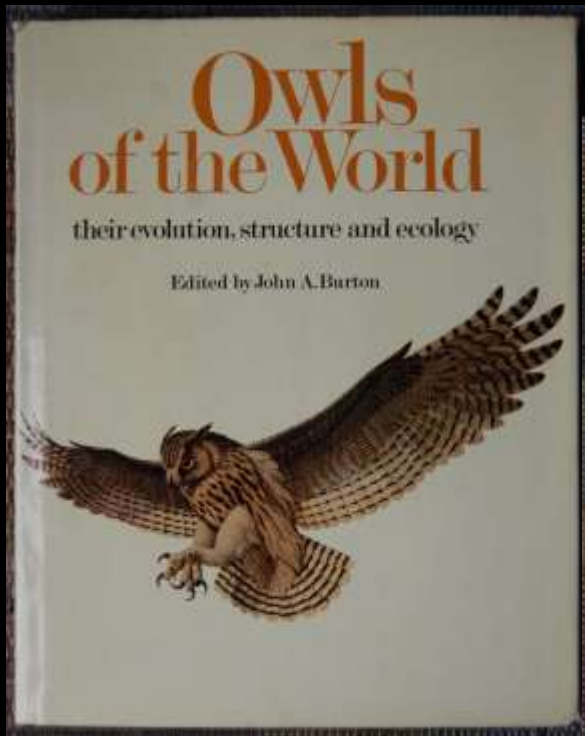
7 Tasks:

- 1) Develop/Record Survey Techniques**
- 2) Analyze the Molecular Systematics and Phylogeny (mtDNA and nuclear DNA)**
- 3) Acquire Recordings of Vocalizations**
- 4) Conduct Morphological Analysis**
- 5) Refine Species Distributions**
- 6) Examine Aspects of Myth and Culture**
- 7) Distribute Project information via the Internet and other formats**

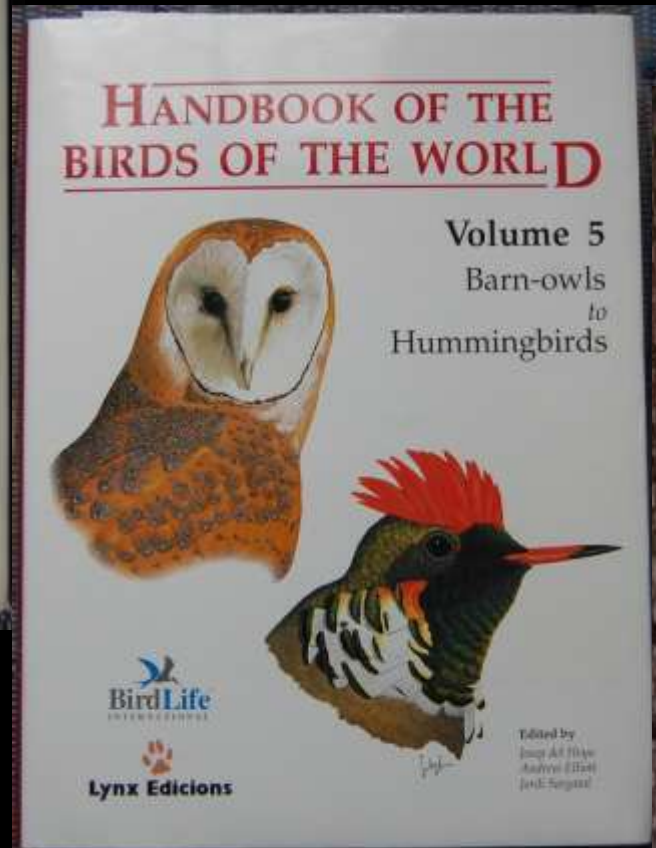
This presentation

- 1) Survey/Monitoring Techniques
- 2) DNA/genetic efforts
- 3) Recordings of Vocalizations
- 4) Morphological Analysis → *Original descriptions & Type Specimens*
- 5) Species Distributions
- 6) Examine Aspects of Myth and Culture
- 7) Distribute Project information via the Internet and other formats –
Bibliographies → citations & .pdfs

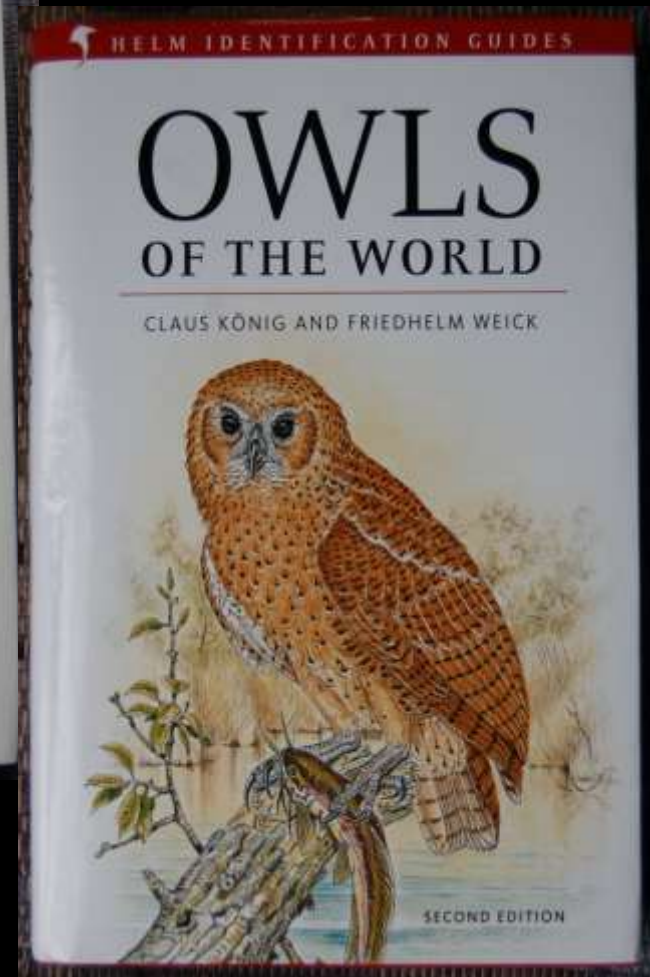
1973 → 133 sp.



1999 → 185 sp.



2008 → 251 sp.



18 owl species:

Barn Owl

Whiskered Screech Owl

Western Screech Owl

Flammulated Owl

Snowy Owl

Great Horned Owl

Barred Owl

Spotted Owl (MX, CA, N.)

Great Gray Owl

Northern Hawk Owl

Northern Pygmy Owl

Ridgway's Pygmy Owl

Elf Owl

Burrowing Owl

Boreal Owl

Northern Saw-whet Owl

Long-eared Owl

Short-eared Owl

**(other NA: E. Screech, Vermiculated Screech, Colima Pygmy,
Mottled, Stygian. Cape Pygmy Owl? Mountain Pygmy Owl?)**

Survey/Monitoring Methods

- a) published Protocols (w/ detection probabilities),
b) **Guidelines**, or c) further work needed

Barn Owl

Whiskered Screech Owl

Western Screech Owl

Flammulated Owl

Snowy Owl

Great Horned Owl

Barred Owl

Spotted Owl (MX, CA, N.)

Great Gray Owl

Northern Hawk Owl

Northern Pygmy Owl

Ridgway's Pygmy Owl

Elf Owl

Burrowing Owl

Boreal Owl

Northern Saw-whet Owl

Long-eared Owl

Short-eared Owl

Owls are
challenging:

For 15 of 18 owl species.....

**little data (BBS, CBC, Atlas,
etc.) exists, and no present
monitoring system provides
adequate data to determine a
long-term trend at the state
or regional level.**



Protocols – outline (Oakley et al 2003)

1. Background and objectives
2. Sampling design
3. Field methods
4. Data handling, analysis, and reporting
 - * *detection probability; * sensitivity to detect sig. changes in population size & productivity*
5. Personnel requirements and training
6. Operational requirements
7. References

Detection Probability

The *detection probability* reflects the proportion of owls that during a single survey effort, either vocalize on their own, or when within hearing range of broadcast calls, actually respond to the broadcast.

Goal is to record at least ~95% of the owls that are actually present on a site. Requires 3-10+ visits across the survey area to accomplish.

Helpful Literature

Conway & Simon. 2003. *Comparison of detection probability associated with Burrowing Owl survey methods.*

Flesch & Steidl. 2007. *Detectability and response rates of Ferruginous Pygmy-Owls.*

Franklin et al. 2010. *Monitoring the population ecology of Spotted Owls in NW California: Annual Results, 2009.*

Forsman et al. 2010. *Demographic trends of northern spotted owls: a meta-analysis, 1985–2008.*

Saurola. 2008. *Monitoring Birds of Prey in Finland: A Summary of Methods, Trends, and Statistical Power.*

MacKenzie et al. 2006. *Occupancy Estimation & Modeling.*

Thompson et al. 1998. *Monitoring Vertebrate Populations.*

Survey/Monitoring Methods

a) playback primary, b) playback helpful, c) no playback

Barn Owl

Whiskered Screech Owl

Western Screech Owl

Flammulated Owl

Snowy Owl

Great Horned Owl

Barred Owl

Spotted Owl (MX, CA, N.)

Great Gray Owl

Northern Hawk Owl

Northern Pygmy Owl

Ridgway's Pygmy Owl

Elf Owl

Burrowing Owl

Boreal Owl

Northern Saw-whet Owl ?

Long-eared Owl ?

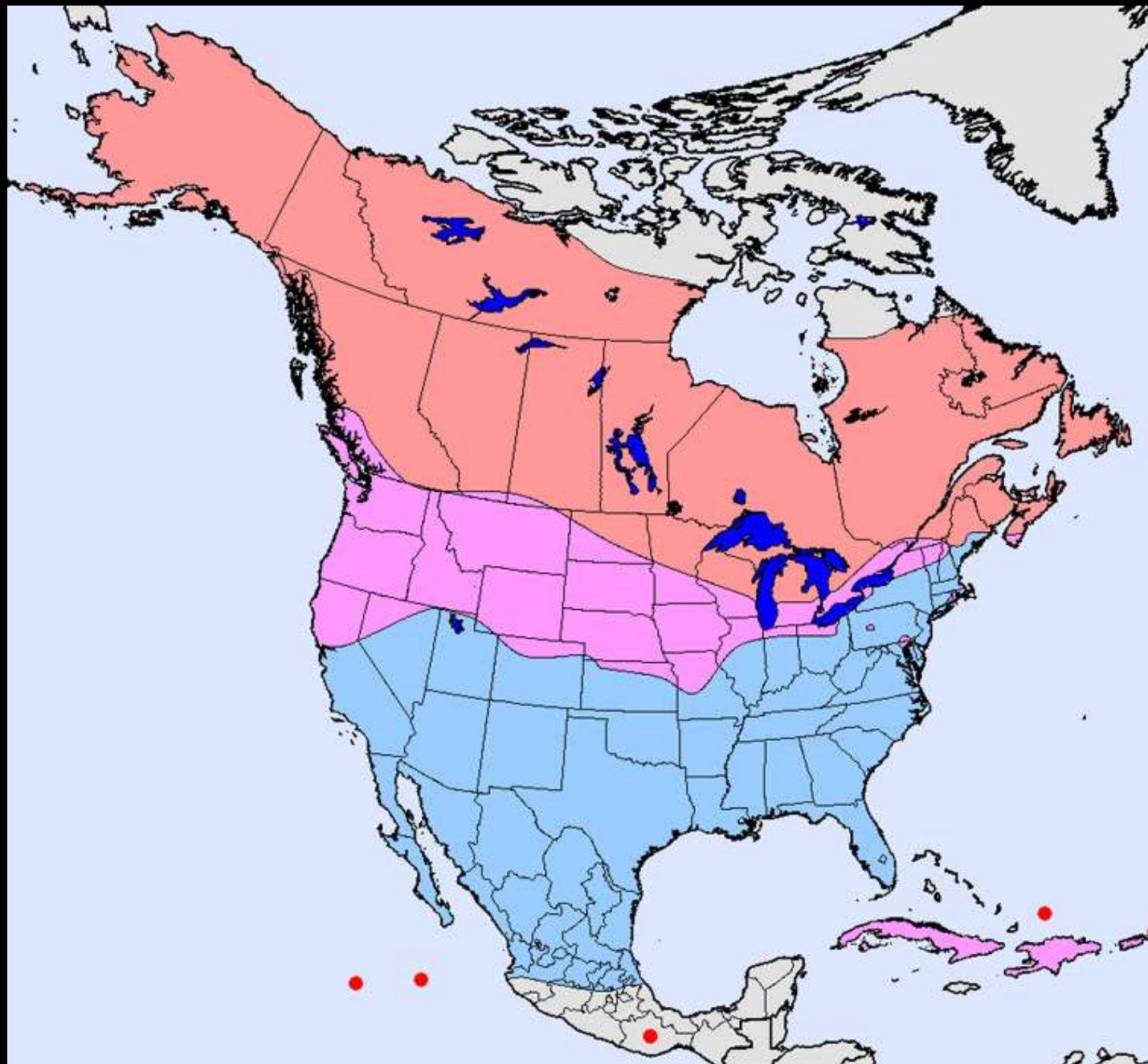
Short-eared Owl



Photo: Alan Stankevitz

Short-eared Owl

Asio flammeus

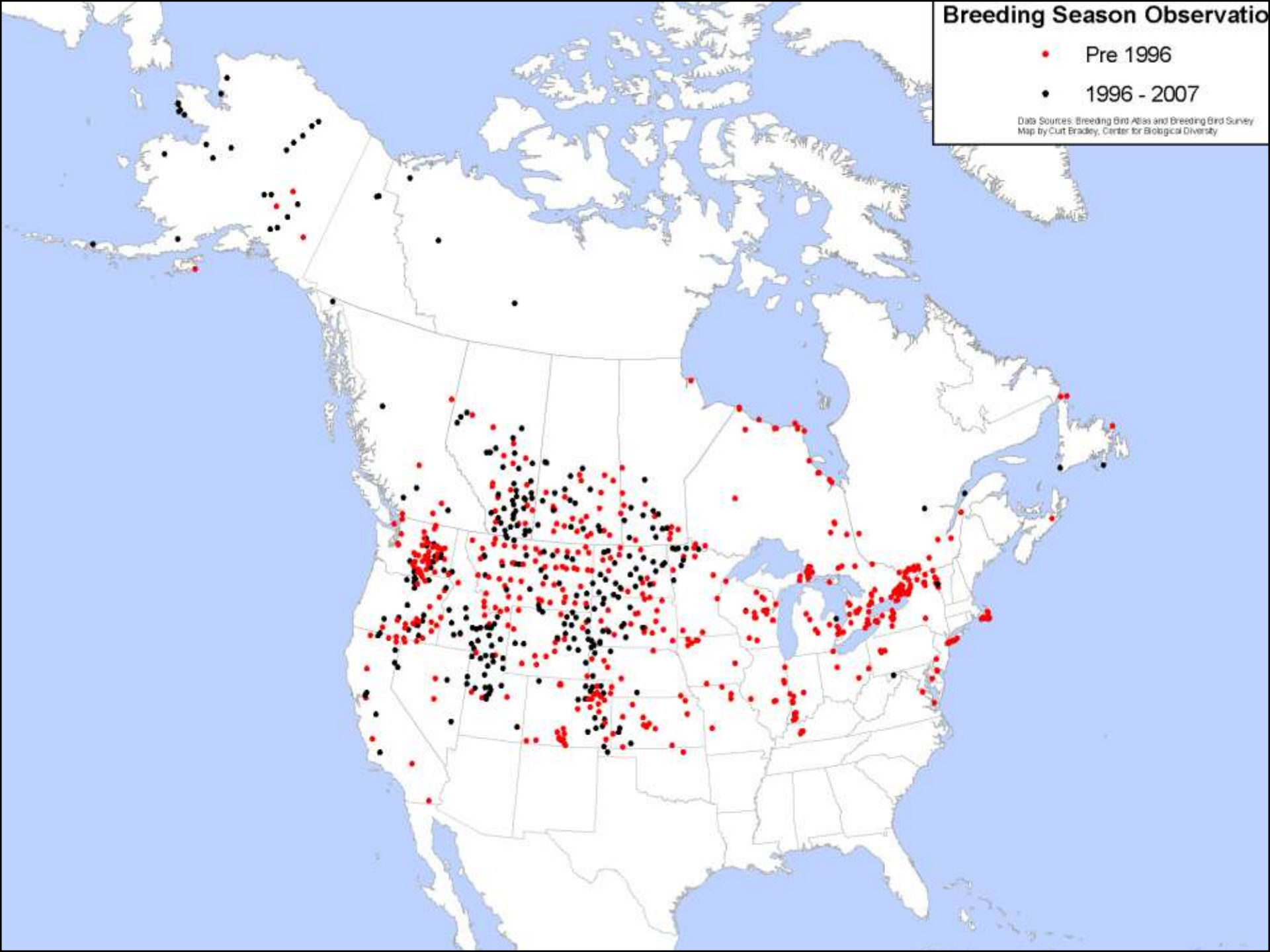


Map created by Terry Sohl,
Data from NatureServe

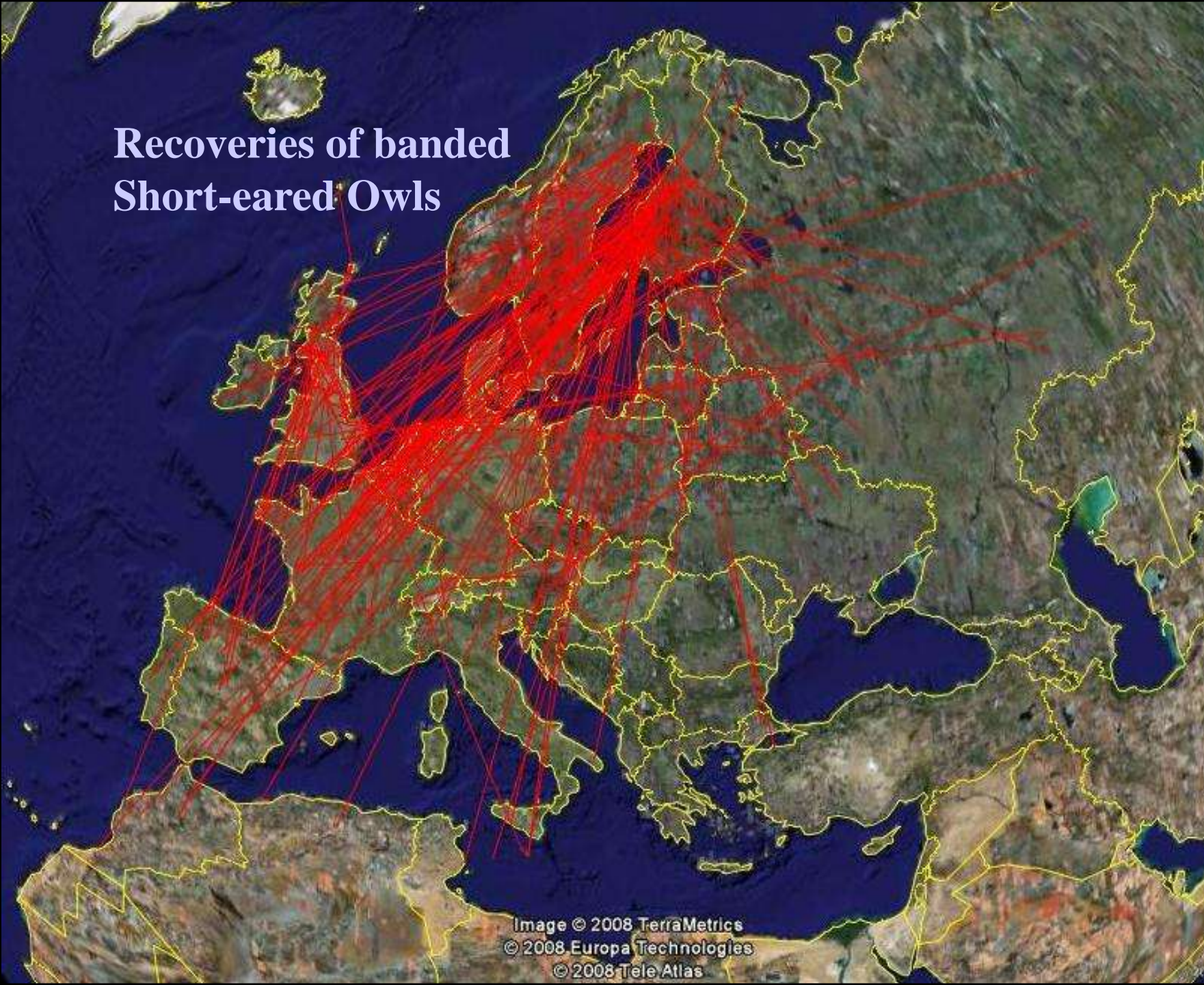
Breeding Season Observations

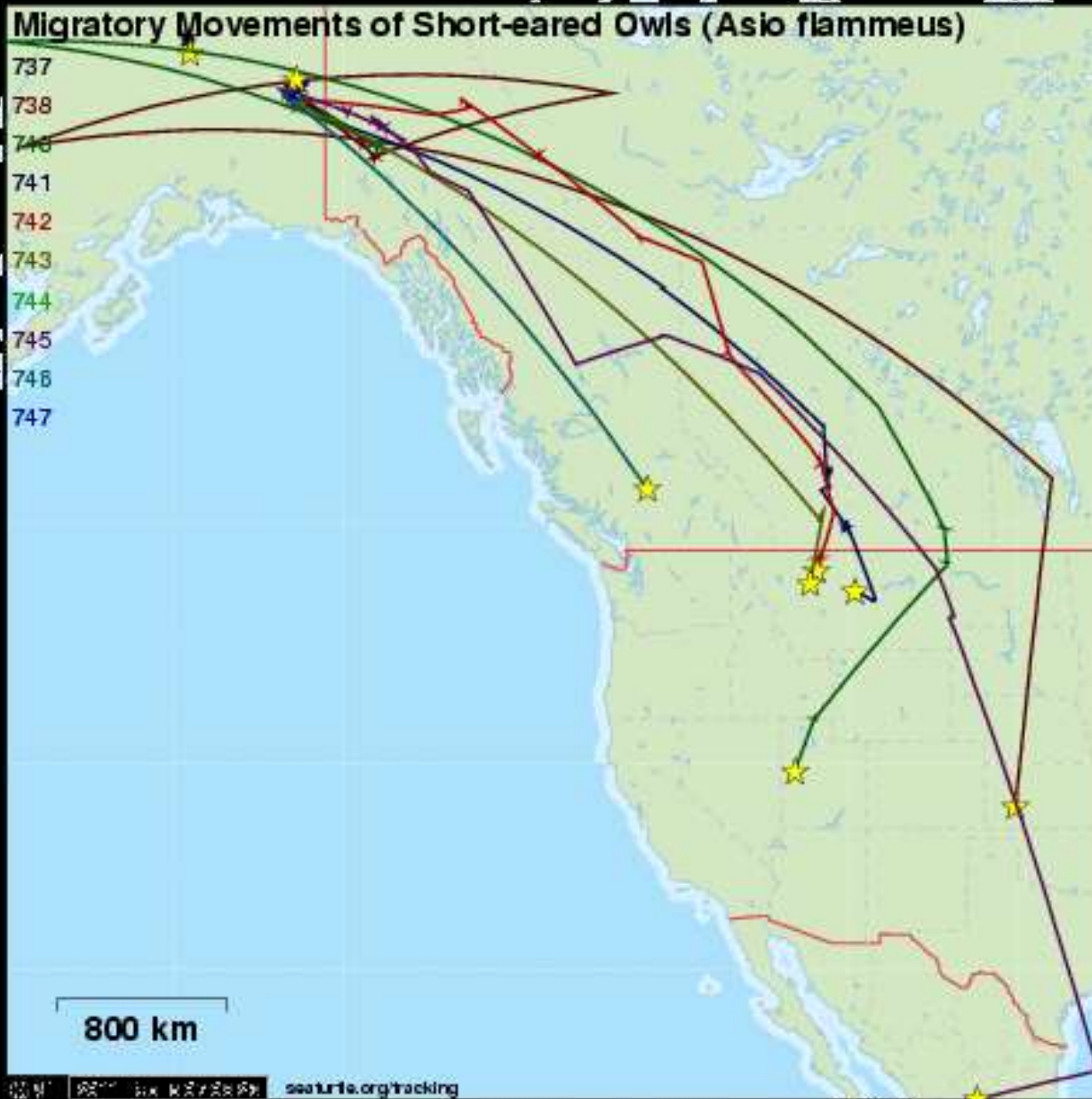
- Pre 1996
- 1996 - 2007

Data Sources: Breeding Bird Atlas and Breeding Bird Survey
Map by Curt Bradley, Center for Biological Diversity



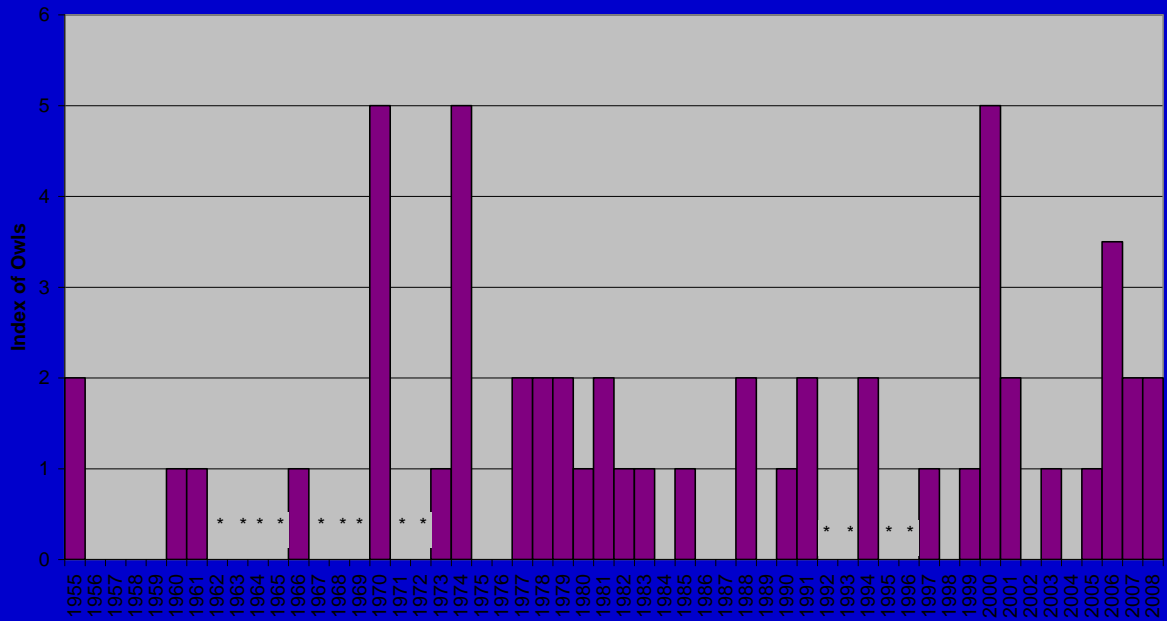
Recoveries of banded Short-eared Owls



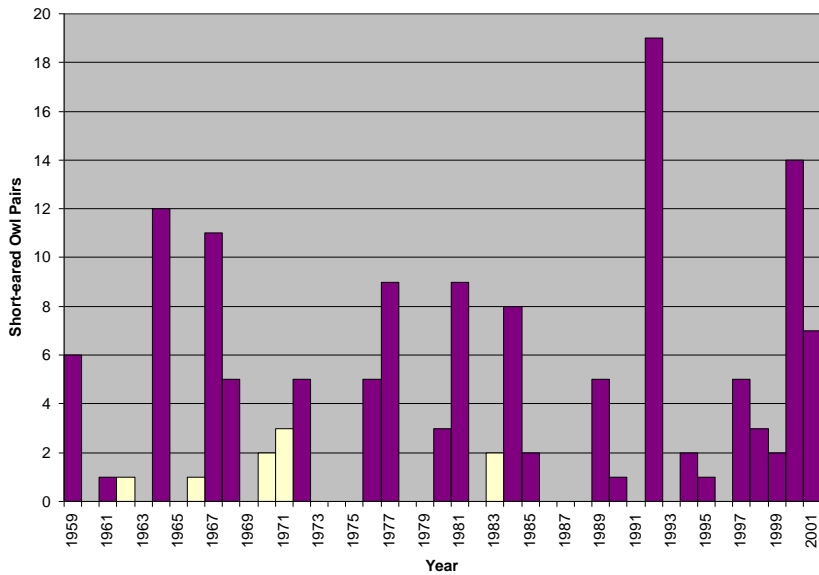


**Jim Johnson &
Travis Booms -
12 g solar PTTs
on 26 adult
SEOWs in 2009
& 2010, near
Nome, Tok &
Fairbanks,
Alaska.**

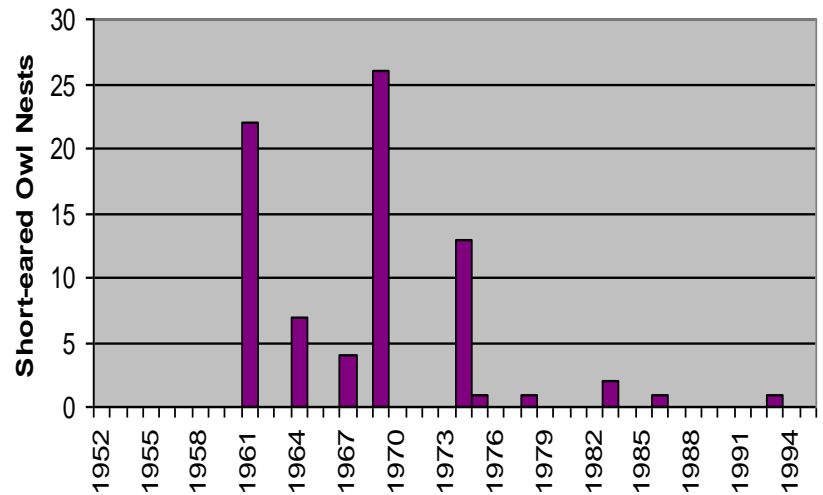
Short-eared Owls - Buena Vista Marsh, Wisconsin



Short-eared Owls - Austria (Peter 2006)



Short-eared Owls - Saskatchewan (Houston 1997)





North American Raptor Monitoring Strategy for the **SHORT-EARED OWL** *Asio flammeus*

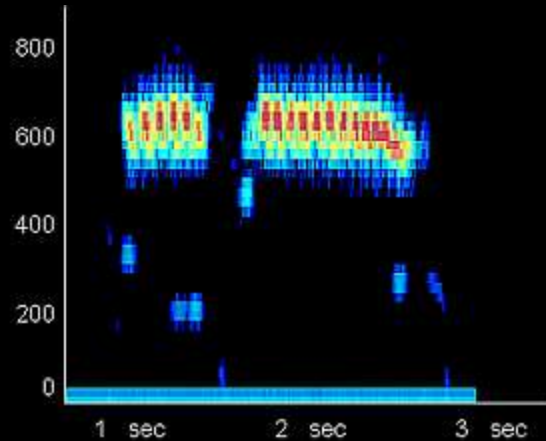
David H. Johnson, Mark R. Fuller, Rhonda Smith, James R. Duncan - 16 September 2008

Fixed points are visited by surveyors three times during each breeding season (in May, June, and July); to visually count owls seen during 2.5 hr observation periods (i.e., 2 hr before and 0.5 hr after sunset).

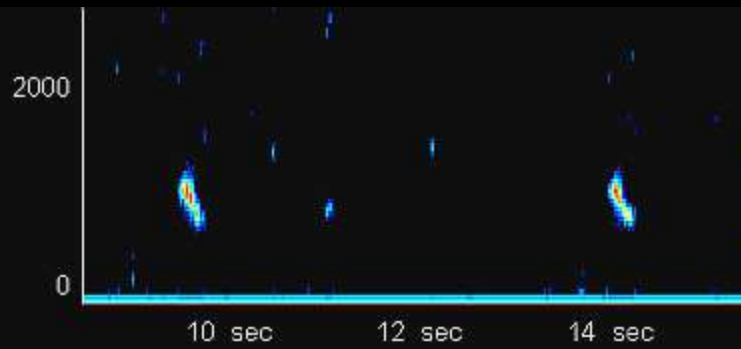
Vocalizations

- Owl vocalizations are the most important interspecific behavioral isolating mechanism in owls.
- To date, recordings of US owls are *OK*, but clear, high-quality recordings are exceedingly difficult to find & acquire. There is an urgent and pressing need for good quality recordings.

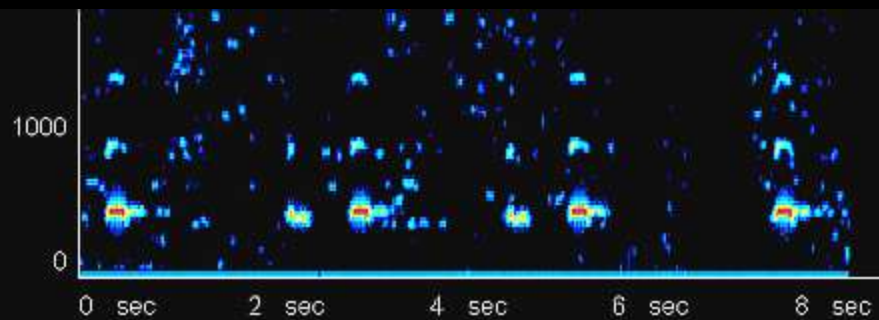
Example Sonograms of 3 Species



Western Screech-owl
Megascops kennicottii



Collared Scops Owl
Otus bakkamoena



Flammulated Owl
Psiloscopus flammeolus



Owls are geared for an audio world

Playback: imitate the calls of wild owls with similar *frequency, cadence, & volume*. Be mindful of the specific *behaviors* imbedded in the calls you are using.

Male – territorial and agitated calls; contact calls for solicitation of young

Female – defense of nest and young (contact or agitated calls)



photographer: Seyed Babak Musavi

Hardouin et al. 2006. *Athene noctua*. We used playback to investigate whether territory owners discriminated neighbours from strangers when playback occurred at the usual location for the

neighbour or at an unusual location. Male Little Owls responded significantly less to their neighbour's hoots played back from the usual location. However, responses to playback of a neighbour from an unusual location were similar to responses to playback of a stranger's hoots from either location. We conclude that Little Owls can discriminate between the hoots of neighbours & strangers.

Hardouin et al. 2009. *Otus scops*.

Paired males in good condition did not breed earlier or produce more & heavier fledglings; however, paired males with lower-frequency hoots did, even when...variation in body condition on hoot

characteristics was controlled for. ...we suggest that this relationship might be a product of their increased competitive ability during territorial establishment, where males with lower-pitch hoots acquire better territories, leading to the production of fitter offspring.



Burns, J. 2004. North American Owls – Journey through a shadowed world. Willow Creek Press. CD in back flap of book; by Berror Lab. of Bioacoustics, Ohio State Univ., Columbus, Ohio.

Cornell Lab. Of Ornithology. 2006. Voices of North American Owls. (2 CD set)

Woodbridge, B. 2002. Voices of Western Forest Raptors and Sound-alikes, Training & Field Survey CD. USFS. [N. Spotted, Great Gray, Long-eared Owls].

OwlCam.com Audio CD. 12 Barred Owl nesting vocalizations [male, female, young].

Phylogenetics and Systematics



From Sample to Sequence

Feathers

Blood

Muscle tissue

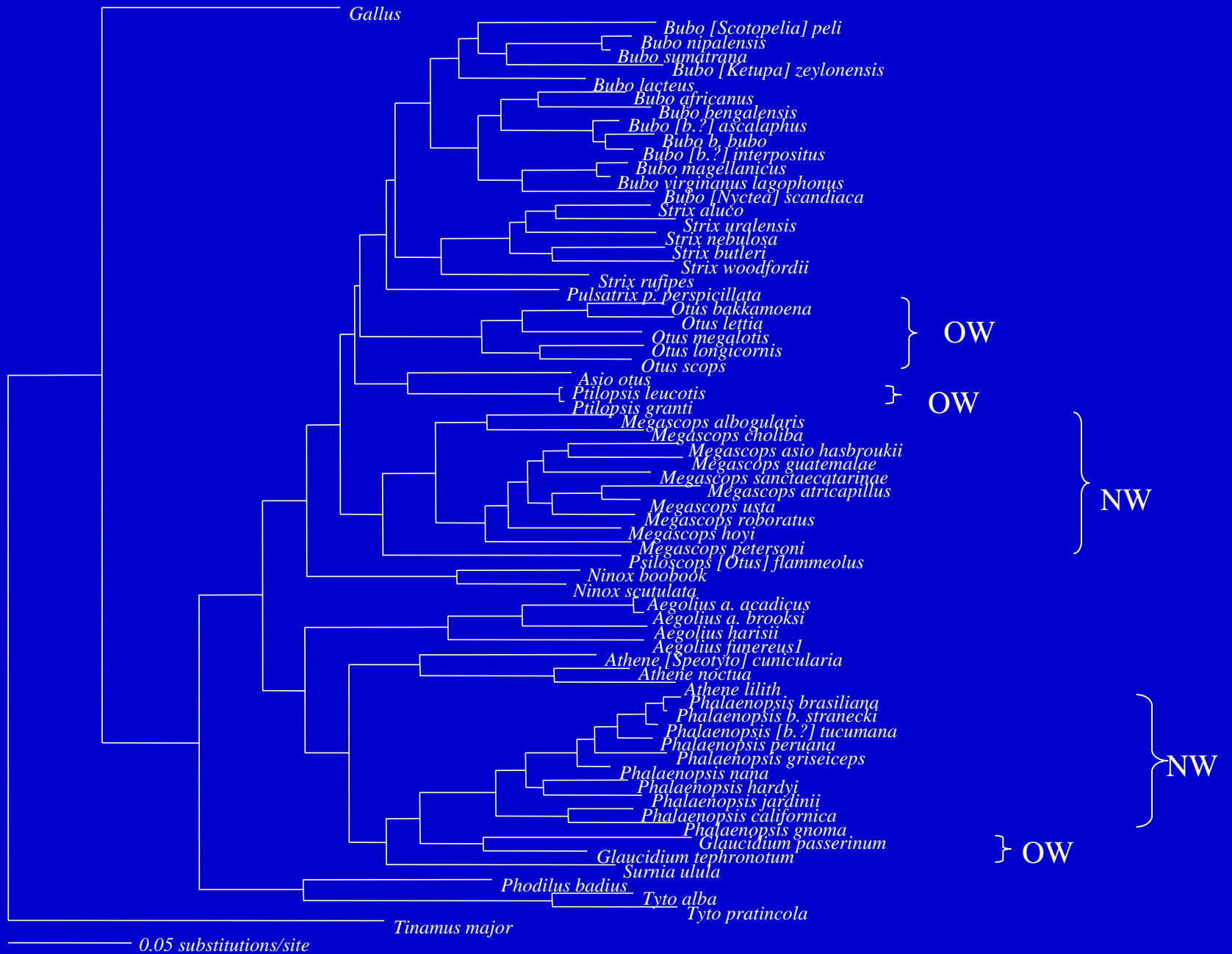
Isolation of total DNA

Polymerase Chain Reaction
(PCR) with specific primers

Cycle Sequencing 2 internal
fluorescent primers

Automatic DNA Sequencing

DNA Sequence



Genetic/DNA projects:

- a) rangewide comparisons, b) general assessment,
- c) further work needed

Barn Owl

Whiskered Screech Owl

Western Screech Owl

Flammulated Owl

Snowy Owl

Great Horned Owl

Barred Owl

Spotted Owl (MX, CA, N.)

Great Gray Owl

Northern Hawk Owl

Northern Pygmy Owl

Ridgway's Pygmy Owl

Elf Owl

Burrowing Owl

Boreal Owl

Northern Saw-whet Owl

Long-eared Owl

Short-eared Owl

Proudfoot, G.A. 2005. *Mitochondrial and Nuclear Assessment of Ferruginous Pygmy-Owl (Glaucidium brasilianum) Phylogeography.* PhD Dissertation.

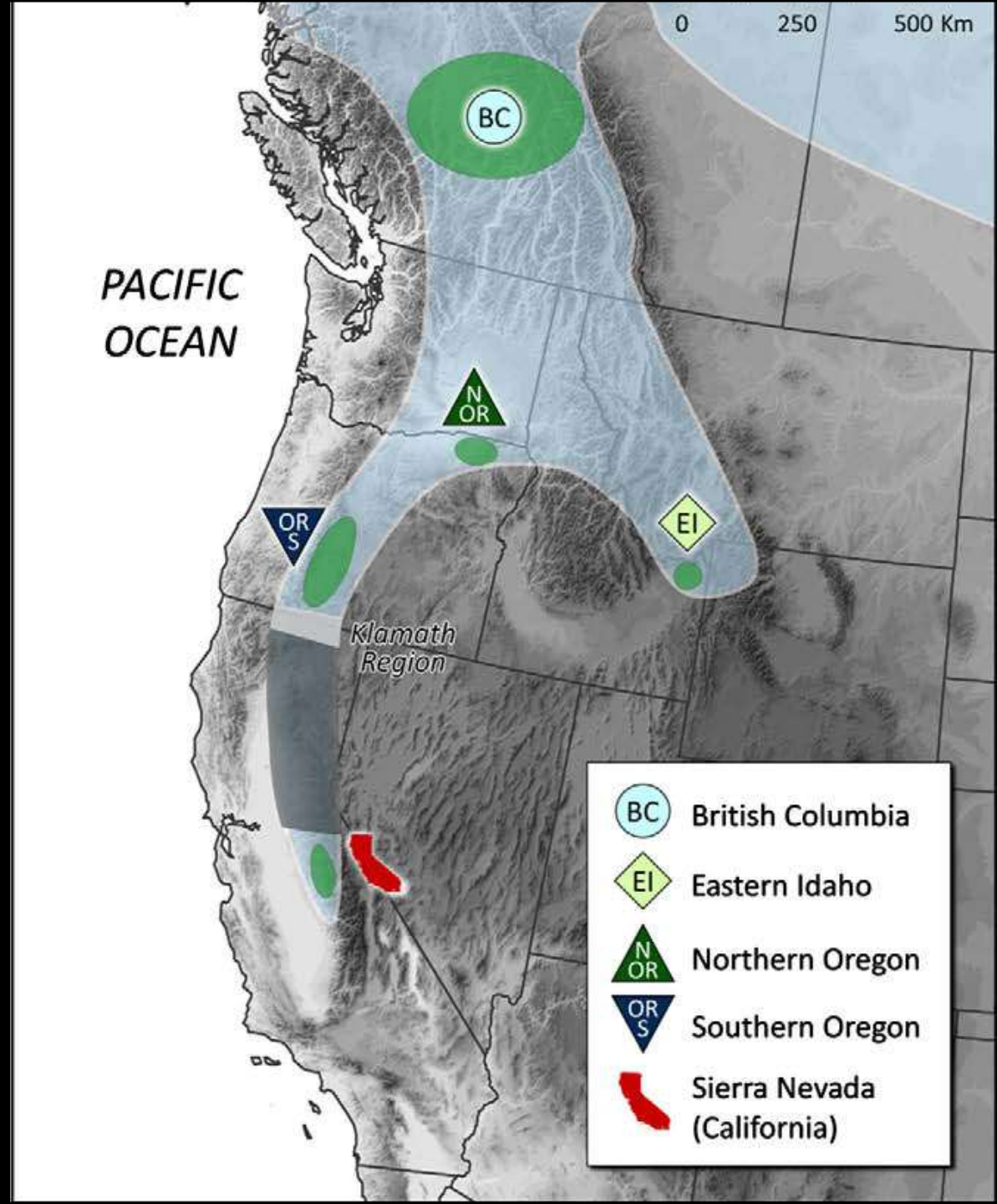
*** *G. ridgwayi* is separate from *G. brasilianum***



Hull et al. 2010.
*Range-wide genetic
differentiation
among North
American great
gray owls.* Molecular
Phylogenetics &
Evolution 56:212–221.

Separation for the
past 26,700 yrs.

Propose: *S. n.*
yosemitensis



Morphology –
original species
descriptions;
photos of type
specimens

CAROLI LINNÆI

EQUITIS DE STELLA POLARI,
ARCHIATRI REGII, MED. & BOTAN. PROFESS. UPSAL.;
ACAD. UPSAL. HOLMENS. PETROPOL. BEROL. IMPER.
LOND. MONSPEL. TOLOS. FLORENT. SOC.

SYSTEMA
NATURÆ

PER

REGNA TRIA NATURÆ,

SECUNDUM

CLASSES, ORDINES,
GENERA, SPECIES,

CUM

CHARACTERIBUS, DIFFERENTIIS,
SYNONYMIS, LOCIS.

TOMUS I.

EDITIO DECIMA, REFORMATA.

Cum Privilegio S^æ R^æ M^{ts} Suetia.

HOLMIÆ,

IMPENSIS DIRECT. LAURENTII SALVII,

1758.

Original descriptions of the owls were newly reported to science:

Barn Owl

Whiskered Screech Owl

Western Screech Owl

Flammulated Owl

Snowy Owl

Great Horned Owl

Barred Owl

Spotted Owl (MX, CA, N.)

Great Gray Owl

Northern Hawk Owl

Northern Pygmy Owl

Ridgway's Pygmy Owl

Elf Owl

Burrowing Owl

Boreal Owl

Northern Saw-whet Owl

Long-eared Owl

Short-eared Owl

Original literature describing the entire Order of Strigiformes (extant and fossil Genera, species and subspecies) 1758 - 2007

DATA
DVD

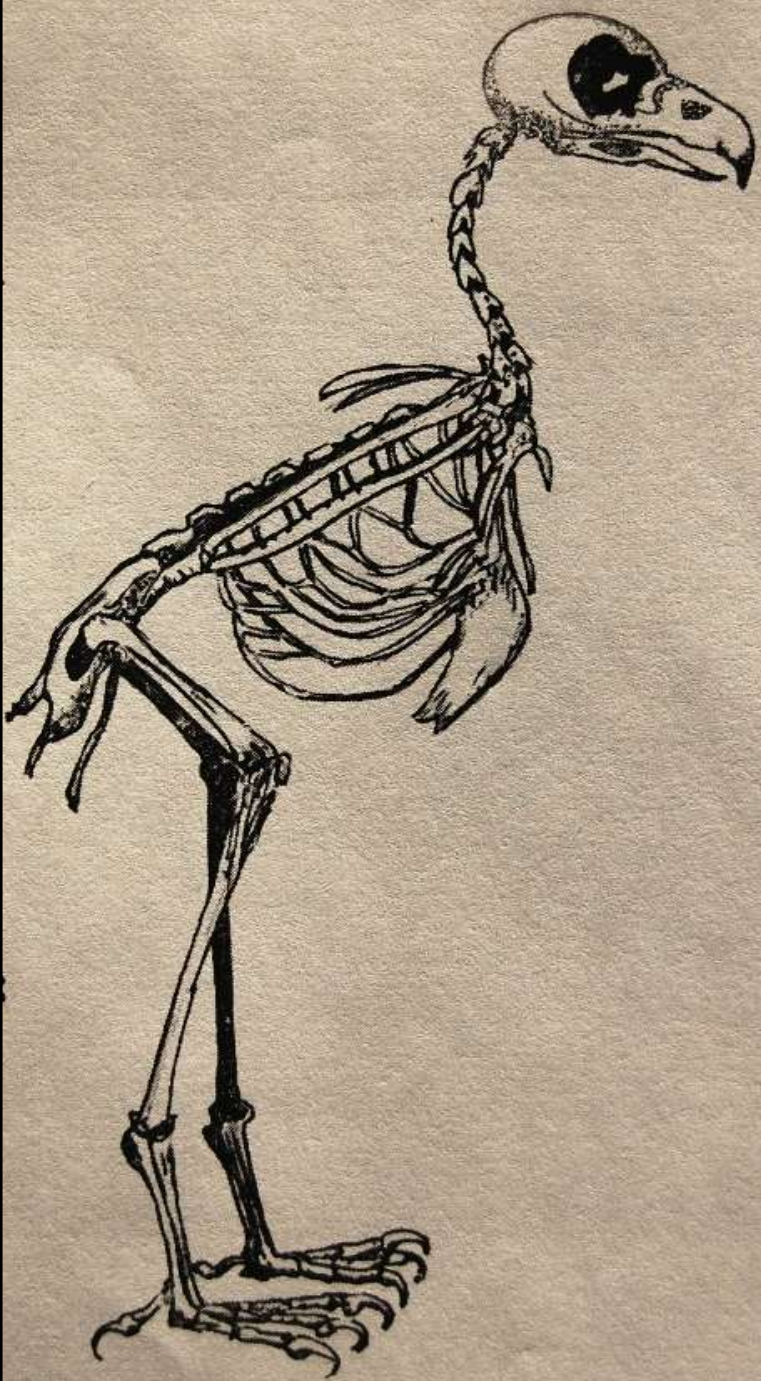
A. E. Sieradzki, David H. Johnson,
Paul Radley, Deane P. Lewis
and Fred Ruhe.



671 extant owl papers
103 fossil owl papers



Global
OWL
PROJECT



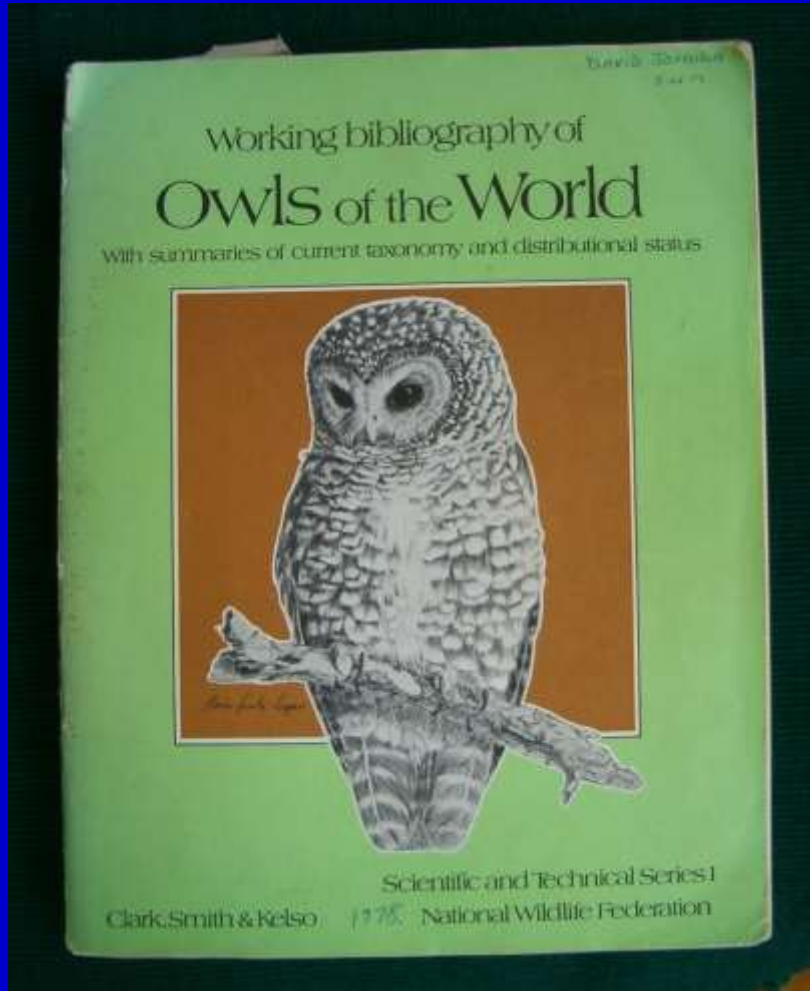
Photographs of Type Specimens



Glaucidium brasilianum intermedium, Phillips 1952 (on tag); accepted as Type for *G. b. ridgwayi*; now considered a full species: *G. ridgwayi*.



Bibliographies – citations and .pdfs



*** Develop a queryable, key-word driven, on-line accessible, bibliographic system for the literature on the worlds owls. Follow system developed by the Global Raptor Information Network (GRIN).**

*** Citations fully spelled out (NO abbreviations).**

*** include .pdfs for all publications possible.**

*** Keywords – either by author, or reviewer added (or both).**

Initially working on the Burrowing Owl literature (~1700), but also Snowy Owl (~910), Northern Hawk Owl (~450), and Little Owl (~2000). Rest of owls to follow!

Distribution Mapping

for survey/monitoring & conservation

- a. Breeding Season detailed, rangewide
- b. Breeding season detailed, regional/state level
- c. Historic Breeding
- d. Breeding season general, rangewide
- e. Breeding season general, regional/state
- f. year-round detailed
- g. year-round general

a) **Breeding season**, b) **Historic breeding ***, c) **general**

Barn Owl

Whiskered Screech Owl

Western Screech Owl

Flammulated Owl

Snowy Owl

Great Horned Owl

Barred Owl

Spotted Owl (MX, CA, N.)

Great Gray Owl

Northern Hawk Owl

Northern Pygmy Owl

Ridgway's Pygmy Owl *

Elf Owl

Burrowing Owl *

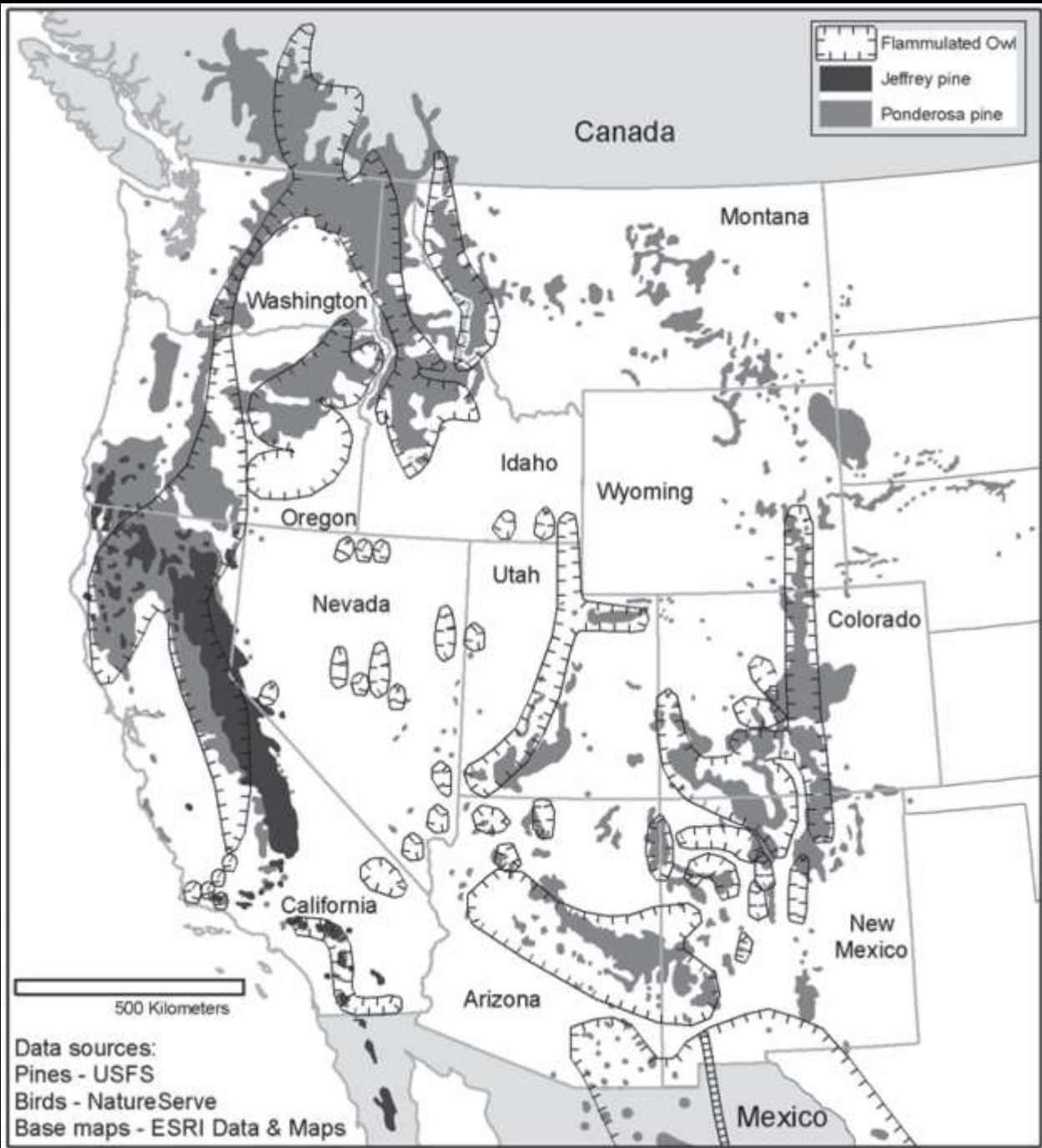
Boreal Owl

Northern Saw-whet Owl

Long-eared Owl

Short-eared Owl





Flammulated Owl. NatureServe map overlain on map of older Jeffrey & Ponderosa Pine habitat. Nelson et al. 2009. PIF.

Priorities:

- * **Survey/Monitoring Protocols**
- * **High-quality recordings of vocalizations** made easily available for survey & monitoring efforts
- * **Distribution Mapping** – edge-mapping state/regional maps, integration with habitat conditions, & integration of point locations (e.g., nest records, breeding season observations).
- * **Historic breeding** distribution maps.

