

Trigonometrical Survey and its institutional development provides the reader with fundamental understanding how the character of British cartography in India was contingent on cost and, most of all, practical and ideological compromise.

Archival synthesis and lucid narrative of the ideological, historical, and technological processes of British mapmaking sets a new empirical and theoretical standard for both the history of cartography and South Asian colonial studies. *Mapping an Empire* takes the analysis of maps and power to a higher level of empirical precision and detail. He details cartographic practices and explains these within the context of colonial demand and constraint with the accuracy of a historian and precision of a cartographer. The cartographic specialist will appreciate how Edney brilliantly integrates a profound understanding of the practical process of mapmaking with voluminous archival material. His ability to expose important practical details of colonial mapmaking—from the problems with manpower, expense, and time limits—reinforces the broader theme that cartography is a highly contested process within divided colonial administration and limited resources. In *Mapping an Empire*, these logistical constraints are superimposed on the cultural expectations of science to show how the very fabric of geographical knowledge—the map—is socially and politically constituted. For the colonial historian or cultural geographer interested in questions of empire and geography, Edney demystifies the colonial state in the process of imperial expansion and brings into focus the role of individuals and colonial institutions that have profound effects on how the British proceeded to map India. *Mapping an Empire* is both a monumental contribution to the history of British colonialism and a necessary addition to the libraries of geographers

interested in the history of geographical thought.

**Atlas of Oregon Wildlife: Distribution, Habitat, and Natural History.**

Blair Csuti, A. Jon Kimerling, Thomas A. O'Neil, Margaret M. Shaughnessy, Eleanor P. Gaines, and Manuela M. P. Huso. Corvallis: Oregon State University Press, 1997. 512 pages, 670 maps including full-color map insert, 442 illustrations. Hardbound, \$39.95. (ISBN 0-87071-395-7)

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The *Atlas of Oregon Wildlife: Distribution, Habitat, and Natural History* is a comprehensive publication featuring information on Oregon's 426 native terrestrial vertebrate species that breed in Oregon and 15 introduced species. In the heart of the atlas there are sections covering Amphibians, Reptiles, Breeding Birds, and Mammals, with a page dedicated to nearly each of the 441 species. Each page contains a two-color, 1:4,300,000 scale, range map with supporting textual information on Global Range, Habitat, Reproduction, Food Habits, Ecology, and other relevant facts. Reference to Order, Family, State and Federal Status, Global and State Rank and Species Length are also listed. Each page contains a finely created line-drawing of the featured animal. The maps display the probable ranges where each wildlife species could be found, using shaded relief and county boundaries as spatial reference. Csuti states, "The maps presented here serve as a guide to habitats and general distribution of each species." The breadth and depth of the information on wildlife presented in this atlas is evidence of a major collaborative effort. Many organizations are listed in the acknowledgments. The key contribut-

ing agencies include the National Biological Service, Oregon Department of Fish and Wildlife (ODFW), U.S. Environmental Protection Agency, Oregon Natural Heritage Program, and the Geosciences Department at Oregon State University.

The Atlas is well-organized with an extensive Introduction describing Oregon's wildlife and the methods used in compiling the range information. This section also includes a description of each of the 30 identified wildlife habitats of Oregon. Reference maps displaying the major transportation network, cities, and counties are conveniently located just before the species range maps. The atlas contains a glossary, an extensive reference section, a though index, and three appendices; (I) Checklist of Terrestrial Breeding Vertebrates, (II) Checklist of Wintering Birds, and (III) Winter Bird Distribution Maps.

The process used for the creation of most of the range maps started with the creation of a vegetation cover map derived from Landsat image interpretation. These vegetation cover types were then clustered into wildlife habitats based on habitation by similar groups of species. A full-color 1:750,000 scale Oregon Wildlife Habitat Map insert displays the habitat types and the

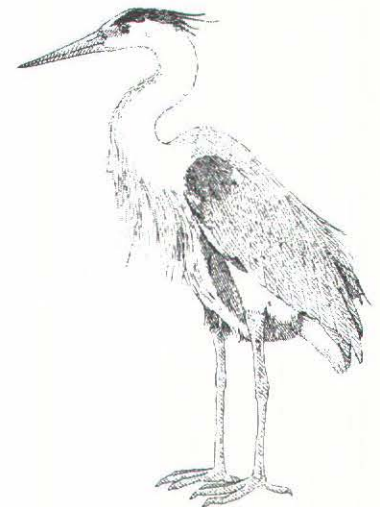


Figure 1. Great Blue Heron



vegetation cover boundaries. This mapping effort was part of the Oregon Wildlife Habitat Gap analysis project. The habitat types were then overlaid with geographic units of county, physiographic division, and a network of 441 equal-sized Environmental Monitoring and Assessment Program (EMAP) hexagons covering the state. The geographic units contained information on presence or absence of the species based on biological studies, museum records, and historical observations dating back to the journals of Lewis and Clark (1804-1806). This overlay process provided resultant range maps that were then reviewed by biologists, and whose input was used in cartographic fine-tuning of the final range maps.



Figure 2. Northern River Otter

Because of the characteristics of the species habitat or the available data, several methodologies were developed to create selected species maps by either modifying the ranges derived from the modeling method mentioned above or by using an entirely different approach. Some of the resultant maps from the modeling received additional attention by including major hydrographic features for species, like the northern river otter, that are closely associated with water, with the hydrography printed in a higher value ink. Other species such as the mallard duck or western pond turtle have a very discontinuous habitat which is denoted with a stippled area pattern for the range symbology. For marine birds a not-to-scale buffer off the coastline was generated to display their habitat. Two introduced species - the big

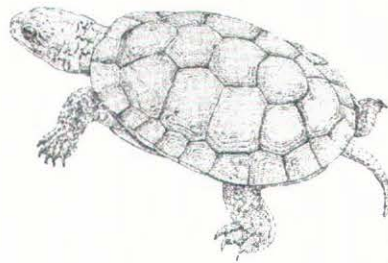


Figure 3. Western Pond Turtle

horn sheep and wild turkey - are based on maps directly from the ODFW using no GIS modeling. Other species ranges were modified with elevation data, for example, Townsend's mole was eliminated from the Coast Range. Some of the rare species are represented as point symbols plotted at known localities, the solitary sandpiper has one location. The mule deer and black-tailed deer are the only two subspecies that were mapped in the Atlas. The authors handled this problem by using two different values of ink, darker for east of the Cascades Range (mule deer) and lighter for west of the Cascades Range (black-tailed deer). The authors of this atlas truly need to be congratulated on successfully publishing in an easy-to-access and easy-to-use format a tremendous amount of geographic information system data on a subject of great interest to the Oregon public. In the introduction, Csuti touches on this basic function of the atlas, "While the information gathered for GAP Analysis is maintained as digital data in a geographic information system, this atlas provides a larger audience with access to current knowledge about Oregon's wildlife." The OSU Press is already gearing up for a second printing, attesting to the popularity of the subject matter and the quick acceptance of the Atlas.

The layout and design of the pages is clean and easy to read. The use of teal-colored ink for the title and subtitle makes navigating

through each page uncomplicated. The complementary use of range maps, species drawings, and descriptive text of micro-habitat conditions on a single page to communicate probable places where a species could be found, work very well together. The species drawings really help bring to life the atlas pages. With a little, or for some a lot of, imagination a reader can close their eyes and actually see a belted kingfisher perched on a branch over the quick-moving upper Deschutes River, watching and waiting for its next meal, or possibly a western pond turtle basking in the sun on a mudbank above a small pond in the Willamette Valley.

Interesting but less inspiring than the drawing and range map of the western pond turtle is the tie the atlas designers make between the atlas pages and the large-format Wildlife Habitat insert map. Stating which habitat type specifically is related to each species would have made a stronger connection. Even though the data represented on the insert map is the basis for most of the range maps in the atlas, its publication with the Atlas appears to be an afterthought. Unlike the maps on the Atlas pages, the insert map could be characterized as a GIS analysis product, produced on a medium-resolution inkjet plotter. The 1:750,000 map design is lacking in reference information, only displaying the county boundaries in addition to the habitat and vegetation types. This map could have been a great addition in helping meet one of the purposes the authors state: "They (the maps) can direct you to areas where field studies can determine if a species has found the right combination of habitat elements that enable it to establish and maintain a population." Having little or no spatial references diminishes its effective use as a location tool. Base GIS themes of major transportation, populated places and hydrography and elevation including shaded relief are



readily available from the Oregon State Service Center for GIS and could have been added as a subtle background to help with location.

As mentioned above there were actually several methods of compilation for the range maps. The need for a legend on each map to help clarify these different compilation methods would have been an aid in understanding the meaning of the different symbologies used. For example, the difference in the point symbols used in the solitary sandpiper (location from a scientific report) and the smooth general boundaries used for the big horn sheep (ODFW non-modeled range) in comparison to the very detailed range boundaries generated by the GIS modeling for the pronghorn are all very different in appearance but there is no legend to clarify the differences. By studying the introductory text, an explanation of the variation in symbology becomes clearer.

I feel there is a need to point out a minor issue in the citation regarding the first delineation of the physiographic divisions of Oregon. The author writes that "The physiographic provinces of Oregon were first delineated by Franklin and Dyrness (1973)...". Further searching reveals that Franklin and Dyrness *Vegetation of Oregon and Washington* (1969) cite Baldwin (1964) and Baldwin in *Geology of Oregon* (1964) cites Dicken's *Oregon Geography* "... The geology is discussed regionally following physiographic divisions outlined by Dicken (1955) ..." I hope future editions address this point.

Beyond the few weak points just covered the atlas is a great success. This atlas can be held up high as an example to many cartographers contemplating assembling a state wildlife atlas. In a broader context, this atlas serves GIS professionals as an excellent example of making accessible to a large audience a complex GIS database that was originally generated for a special-

ized research and planning project. The citizens of Oregon are very lucky to be the recipient of this comprehensive book. This atlas is an educational tool that could lead to a greater awareness and sensitivity among Oregon's human population of the other inhabitants in their state.

Note: To view the range map of the northern river otter you can go to the web site <<http://bufo.geo.orst.edu/brc/temp>> and open *nrottmap.gif*. It is also possible to obtain a copy of the map image through the ftp site <[bufo.geo.orst.edu](http://bufo.geo.orst.edu)>, and log on as anonymous. Change directories to *pub*, and "get" either the compressed tiff-format files, *nrottmap.zip* for PC users, or *nrottmap.tif.gz* for UNIX users.

### cartographic techniques

#### GIS Data Made Manageable for Cartographic Production

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#### Background:

The widespread adoption of Geographic Information Systems (GIS) technology by government agencies and the private sector has made vast quantities of digital data readily available to cartographers. Initially, the high cost of hardware and software, low to medium quality graphic output, and limited data sets made GIS less attractive to cartographers. The practice of scanning and tracing output from GIS plots or importing vector line work into graphics programs were the

primary options offered to transform GIS data into a computer format for the production of high-quality map products. Most cartography labs adopted the use of graphic arts applications such as Adobe Illustrator® or Macromedia Freehand® as digital tools for map production. Even though these software packages were fully capable of importing the points, lines, and polygons from the GIS, these programs could not take advantage of the useful attribute information that is maintained in the GIS database.

At the NACIS XVI annual meeting in San Antonio, many attendees were introduced to Avenza Software, Inc.'s MAPublisher® through a workshop. The MAPublisher software developers addressed the issue of maintaining the valuable attribute data and manipulation power of a GIS within Freehand or Illustrator. MAPublisher version 2.1 incorporated 38 filters designed to import vector and raster data with complete attribute tables intact for several major mapping software file formats: ESRI ArcView shape, ESRI ARC/INFO generate, MapInfo mid/mif, USGS DLG and SDTS, AutoCAD DXF and geo-referenced TIFF and JPEG. In addition to basic import capabilities, MAPublisher enabled the user to change the native projection of the imported files and create supplementary graphic databases.

In April of 1995, the Florida Resources & Environmental Analysis Center (FREAC) began the second *Water Resources Atlas of Florida (WRAF)*. The editors and cartographers found that most of the data previously submitted by the authors via hard-copy maps and tables were now maintained in extensive GIS data sets. MAPublisher performed beyond expectation when addressing these new data formats. All GIS points, lines, and polygons were imported with their accompanying geographic accuracy and attribute tables without error. However, some obstacles be-