

dynamics such as competition or predator-prey interactions. Finally, readers of this book (and potential users of spatial optimization) will be faced with somewhat dense discussions of integer and non-linear computer programming.

The methods described in *Spatial Optimization* are challenging, but they have potential for great utility in solving management conflicts. As such, I recom-

mend the book for readers who have a serious interest in resource management.

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The Amber Forest

By George Poinar Jr., and Roberta Poinar. Princeton University Press, Princeton, 2001. 239 pp., illus. U.S.\$29.95.

Historically, "the ancient Greek poets", says early 20th century gemmologist George Kunz, "the grains of amber were [considered] the tears annual shed over the death of the brother Phaethon by the Heliades after grief had metamorphosed them into poplars growing on the banks of Eridanus" (Kunz 1913 [1971], pages 55-56). We now consider amber not only as artifacts of past cultures, but evidence of life long before humanity. The most prolific investigator of the contents of amber is George Poinar (see *Quest for Life in Amber* and *Life in Amber*), and with Roberta Poinar, their most recent, colorful, tome is *The Amber Forest*.

The subtitle of this recent work, "a reconstruction of a vanished world", is a geographically restricted examination of amber found on the Caribbean island of Hispaniola. The amber, however, has a broader range, covering a time period from 15 to 40 million years ago. Collecting these samples are amber miners. And the mines "are little more than small, tortuous tunnels carved into the sides of the mountains or sometimes pits sunk deep into the ground" (page 6). The rewards are often sold to the highest bidder. By examining the collections, both in museums and in private hands, the Poinars illustrate unique snapshots of the past; features we more often than not could never see by other methods of fossilization.

The Amber Forest, however, is not a general read. It is a systematic look at the flora and fauna found in the fossilized sap. From plants and seeds, to insects (of all shapes, sizes, and types), to frogs, lizards and

snakes; all have left traces or whole bodies in amber. Who would not be moved at a specimen of *Sphaerodactylus*, a gecko lizard, in amber, skin and all, with a partially chewed leaf. "Could the notch on the leave have been made by an insect the gecko attempted to seize?" ponder the authors. Literally or metaphorically "frozen" bodies often lead us to these kinds of thoughts and questions.

Despite the group-by-group framework of this volume, the 171 black-and-white, and 171 colour photographs are spectacular. Kudos to nature for providing us with these examples of past life, and to the photographer for capturing these images. It is no wonder that many of these objects are often considered works of art. Supporting the text and photographs, are black-and-white illustrations of the inhabitants of this ancient tropical forest, as they appeared in life, as they interacted with other occupants of the same ecosystem.

Unfortunately, we are unable to fully realize the wealth of information available in samples of amber. Many of the finer specimens are sold privately and are not seen by scientifically trained eyes. What we do know, what *The Amber Forest* vividly illustrates, is that the possibilities of unveiling nature of the past are seemingly endless.

Literature Cited

Kunz, G. F., 1913 [1971]. *The Curious Lore of Precious Stones*. Dover Publications, Inc., New York. 406 pages.

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The Natural History of an Arctic Oil Field, Development and the Biota

Edited by Joe C. Truett and Stephen R. Johnson. 2000. Academic Press, San Diego. 422 pp., illus. U.S.\$ 69.95.

"Oil Exploration and Development ... result in environmental change". This excellent book describes and investigates these topics, but also further introduces and consolidates human activities

and oil development in ecological research and natural history; it sets new publication standards on this subject and polar research, e.g., to be followed in the Russian Arctic and elsewhere.

For the Alaskan Arctic, industrial development and oil production started 50 years ago. In 1968, the

Atlantic Richfield Company announced the discovery of a major oil accumulation near Prudhoe Bay, Alaska. But already in 1969, the U.S. government passed the National Environmental Policy Act (NEPA) requiring the full disclosure of the environmental costs of major development ventures. This needs to be seen in the context of Prudhoe Bay being among the largest oil and gas discoveries in the history of North America. Oil from the Alaskan Northern Slope contributes to the approximately 85% of the Alaskan state budget derived from taxes and royalties. Besides Prudhoe Bay having the oldest oil fields in Alaska's Arctic, Prudhoe Bay also provides over 20% of the USA oil production.

Based on "Oil Field Research", the book consists of 19 research papers (no abstracts) from 27 authors (contact addresses provided) which are mostly associated with universities or with international high-caliber research consultancies such as LGL Ltd. (including the editors) and others. Published by an international high-quality publisher (Academic Press), all of the papers are (externally) peer-reviewed except for the Introduction, North Slope Development and the Synthesis; this assures objectivity of the science presented. Research and publication costs were carried in part by BP Exploration (Alaska) and others, who also set up the focus of the book and authors.

This research publication describes almost all major aspects of wildlife (except for sea mammals, raptors and jaegers) related to oil development and production over the last 20 years and beyond. Divided into four parts, the chapters deal with fish, wildlife, communities, and habitats of the terrestrial and marine ecosystems. The book gives the reader a realistic overview about environmental assessment, industrial (Arctic) research, and governmental regulation and planning processes. It presents nicely and detailed the Environmental Training Programs required for (oil-) field personnel, and it shows the mitigation measures which oil companies undertake.

The "Boulder Patch", also a location of major oil and gas reserves off Prudhoe Bay, is THE most diverse marine area in the Beaufort Sea. Due to the oil development the Prudhoe Bay region has finally received more research attention than any other and similar locations, e.g. Arctic Canada and certainly Newfoundland (Hibernia) and Gulf of Mexico. As with any oil impact study the monitoring, pre-spill, and pre-development data are very crucial, but rarely available; some are presented in this book. For instance, research in Prudhoe Bay has resulted in major biological, long-term data sets (hopefully made available soon to the global community via Internet/WWW): 18 years of fish data in the Beaufort Sea, 14 years of Snow Geese research, and what may be the only long-term data set on shorebird migration. Prudhoe Bay has received a very

detailed geo-botanical mapping, including the most extensive benthic sampling done anywhere in the Beaufort Sea. Nine years of long-term studies on fish populations in the study area allow for strong capture-mark-recapture analysis and powerful results. Besides others, the study area has a wonderful long-term Polar Bear Satellite GPS study, and a very detailed description and summary of the Grizzly Bear population. Several Caribou herds exist in Alaska [e.g. Western Arctic Herd, Central Arctic Herd (CAH), Teshekpuk Lake Herd, Porcupine Herd], but only the CAH is really located within the Prudhoe Bay Oil Field area. The Caribou papers present a great summary of Caribou research, and they are a solid resource for references. It is shown that Caribou numbers increased in recent years. They do use oilfields to avoid mosquito harassment; but the impact of roads and elevated pipelines on Caribou migration and biology is unclear and currently in debate.

Changes brought by humans to the Arctic are normally centred around (i) addition of gravel, (ii) disruption of tundra surfaces, (iii) creation of impoundments, and (iv) introduction of elevated structures. Oil development clearly improves human access to wildlife, such as Grizzly Bears. If not regulated, this can result in increased (hunting) pressures and disturbances. The availability of garbage affects Arctic Foxes, which have high densities in the Prudhoe Bay area; a simple removal of these predators with traps remains doubtful. For the study area, the book reports dramatic increases of Black Brant in the 1980s, Red-necked Phalarope show high densities in impoundments, and Grizzly Bears are more productive on oil fields (but the offspring is also more likely to be killed). Although the oil production area "P Pad", built in the 1990s, is already much smaller than "A Pad" (built in the 1970s), much of the research presented still deals with the gravel (road) effects. Impoundments have indeed more nutrients than natural waterbodies; culverts can improve/restore fish migration. As a major impact of oil development, population increases are observed for several shorebird species, Black Brant, Snow Goose, Tundra Swan, Caribou, Grizzly Bear, Polar Bear, and probably Arctic Foxes; but Dunlins declined.

However, the study area of Prudhoe Bay was definitely not untouched and "virgin" before oil development occurred: Muskox were introduced, Polar Bears were hunted from the air between 1967 and 1974, strychnine was widely used to exterminate Wolves but also killed non-target animals such as Grizzly Bears and Squirrels. An historic shorebird hunt existed all over North America, and Eider Ducks and other wildlife were hunted by natives.

The papers of the book give excellent overviews or summaries, but sometimes they don't show methods in full detail. Some of the study objectives and

designs are somewhat worrisome for ecologists; for instance, studies presented have a strong focus on animal abundance and charismatic or huntable species. However, this appears to be in the interest of the general public. Low-level flying, viewshed effects, environmental ethics, and individual animal suffering due to oil development are not addressed. This might confirm that research designs were driven by questions directly of service to the oil industry, but not necessarily designed to investigate purely ecological and natural history research questions. Some sample sizes interpreted are quite small, power-tests to evaluate population trend statements are missing, and DISTANCE sampling to survey abundances was never applied. Studies dealing with ecosystem energy flux and predator-prey balances, (e.g., 'exploding' abundances of wildlife and predators), are somewhat lacking. Impoundment effects on ecosystems are unlikely to be fully understood with simple comparisons and experiments. Almost all papers include unpublished reports (grey literature) from over 20 years of consultant contracts, but perhaps they should be specifically quoted and marked in the research papers, as done elsewhere and in similar publications.

The photos in this book are beautiful (some enlargements would have been excellent); for my taste, some maps are a little repetitive in their content. Finally, it would have been nice to have an overview about research gaps, and urgently to be investigated conservation needs and threats for Prudhoe Bay, as well as a detailed list of all oil spills that have occurred.

Although not all ecological questions are fully investigated in this book and are sometimes referred to as "unstudied", some extremely important man-

agement questions are raised in this publication landmark: "The assumption of habitat limitation on the breeding grounds is not based on evidence, but rather is a conservative approach to shorebird conservation given the lack of basic population information on most species involved". That quote from the book is a classic statement valid for most migratory species, and might well summarize the current (lack of) knowledge in population studies. Here another "wildlife classic" raised in this book: does simple (bird) abundance equal (nesting) densities? Obviously, and as the book suggests, consistent and meaningful survey methods for better science and management are required. Despite the major research efforts presented, the following citation might prove to show how weak our knowledge can be even after long-term studies: "We believe that the presence and activities of humans in the oil fields have had little or no population-level impact on species ..., although data currently are insufficient to confirm this belief".

Nevertheless, the authors can be congratulated for their outstanding product. A complete index, and an Errata with only six (!) minor corrections, complement this excellent book and make it a perfect reference, description and template for similar studies and publications. What will the future bring for Prudhoe Bay and its oil development endeavors? With such type of research effort and publication one could rest assured indeed.

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MISCELLANEOUS

Finding Order in Nature: The Naturalist Tradition from Linnaeus to E. O. Wilson

Paul L. Farber. 2000 Johns Hopkins Introductory Studies in the History of Science. Johns Hopkins University Press, Baltimore. 136 pp., illus. Cloth U.S.\$39.95; paper U.S.\$15.95.

Paul Farber has done it again! In his latest book he tells succinctly how natural history has yielded the major unifying theory of the life sciences, uncovered some of the deepest insights into nature, led us to concern for the environment, and attracted public interest for more than two and a half centuries. Animals were named in *Genesis* but natural history did not emerge as a scientific subject until the eighteenth century.

Farber begins with a Swede, Linnaeus, his conception of order, and his view of creation as a balanced and harmonious system. Linnaeus's students,

his "apostles," amassed great collections. Although the Linnaean classification system was artificial, his binomial nomenclature became the universal world standard.

A Frenchman, Buffon, shared the birth-year of 1707 with Linnaeus, but outlived him by ten years. He developed the Jardin du roi, in Paris, as the foremost institution in its day for the study of the living world. Buffon's 36-volume encyclopedia of animals was the second most frequently owned item in private libraries in France. Buffon gave less emphasis to classification than did Linnaeus. He considered nature, not God, to be the generative power.

Collectors soon circled the globe to send back specimens to museums in major European cities.



Huettmann, Falk. 2002. "The Natural History of an Arctic Oil Field, Development and the Biota, eds. Joe C. Truett and Stephen R. Johnson [Review]." *The Canadian field-naturalist* 116(2), 347–349.
<https://doi.org/10.5962/p.363471>.

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