Nonconsumptive Outdoor Recreation: An Annotated Bibliography of Human-Wildlife Interactions

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By Stephen A. Boyle
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NONCONSUMPTIVE OUTDOOR RECREATION:

AN ANNOTATED BIBLIOGRAPHY OF HUMAN-WILDLIFE INTERACTIONS[1]

by

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ABSTRACT

Nonconsumptive outdoor recreation has increased greatly in recent years, and there is growing concern about the effects of such activities on wildlife and wildlife habitats. Unfortunately, information concerning these effects is scarce and widely scattered. To stimulate research and assist resource planners and managers in utilizing available information, an annotated bibliography of human-wildlife interactions is provided. The report reviews interactions between wildlife and humans participating in nonconsumptive outdoor recreation activities. The 536 citations consist of books, articles, government publications, organization reports, theses and dissertations, and selected Federal Aid Reports written since 1950, which primarily concern terrestrial vertebrates of North America. Included with each citation are an annotation summarizing relevant information and descriptors consisting of species names and subject keywords. Also provided are indexes to authors, species, keywords, and geographic regions; an annotated list of keywords; and a list of bibliographies on related topics.

The 1980 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (Lyons 1982) revealed that one of every two adult Americans participated in some form of wildlife- or fish-related outdoor activity during 1980. Nearly 83 million citizens either observed or photographed wildlife, or pursued other forms of "nonconsumptive" wildlife recreation. The effect of man's activities on wildlife and wildlife habitat is of concern to refuge managers, ecological service personnel, interpretive planners, and other Federal, State, and private resource managers. Trail-walking, picnicking, wildlife observing and photography, and horse-riding are among activities that affect wildlife. In fact, some authors have questioned the use of the term "nonconsumptive" to describe activities such as hiking and camping (Weeden 1976; Wilkes 1977). Recognizable effects of such activities on wildlife include changes in wildlife diversity or abundance, and altered habitat structure and utilization. Another concern is the ability of wildlife and habitat to recover from disturbance. Direct and indirect effects of man's activities on wildlife and wildlife habitat will no doubt increase in the future.

The U.S. Fish and Wildlife Service has a basic responsibility to perpetuate wildlife for the enjoyment of citizens of the United States. Simultaneous enjoyment and perpetuation of wildlife requires skillful management based on knowledge and experience. The purpose of this bibliography is to review and synthesize information on human-wildlife interactions into a format useful to resource managers.

Citations consist of material written since 1950 and primarily concern terrestrial vertebrates of North America; some reports of worldwide significance or about species of other continents but relevant to North American problems are also listed. Types of literature included are published books, technical and semitechnical articles, government agency

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publications, and conservation organization reports. Unpublished material has generally been excluded except for university theses and dissertations, and Federal Aid ("Pittman-Robertson") reports on file with the Fish and Wildlife Reference Service (FWRS), Denver Public Library.

Book titles were located in the Subject Catalog of the Library of Congress Catalog. Published journals were searched through Wildlife Review, Zoological Record, Applied Ecology Abstracts, and Biological Abstracts (by BIOSIS on-line computer search). Manual searches were made of the contents of the Journal of Wildlife Management, Journal of Mammalogy, and the Auk. Relevant bibliographies of published material were located in the Bibliographies Index and the index to the Council of Planning Librarians Exchange Bibliography Series. Government publications were located in the Monthly Catalog of U.S. Government Publications and computer searches of the FWRS collections were carried out. Dissertation Abstracts International was searched for Ph.D. Dissertations. Because literature on nonconsumptive recreational activities and wildlife is often concealed as short sections of reports dealing with other topics, we used literature cited sections of reports already located in addition to the indexes and bibliographies searched.

The citations are listed alphabetically by author and include annotations and descriptors. Style of citation follows 3rd CBE Style Manual (Council of Biology Editors 1972). Abbreviations follow BioSciences Information Service (BIOSIS) (1979); abbreviations for titles not listed in BIOSIS were constructed from National Clearinghouse for Periodical Title Word Abbreviations (1971, 1974). The annotations are not abstracts of the reports, but are intended to summarize information in each report relevant to the topic of this bibliography. The descriptors include common names of species and keywords. Species names refer to those mentioned in the report; common names follow Jones et al. (1979) for mammals, American Ornithologists' Union (1957) for birds, and Collins et al. (1978) for reptiles and amphibians. Subspecies are not identified except for certain threatened or endangered subspecies (for example, the California least tern, Sterna albifrons browni). Keywords refer to specific activities (hiking, climbing, etc.), broad habitat types (forests, rangeland, etc.), agency jurisdiction (e.g., Canadian National Parks), and selected subjects such as recreation management.

An annotated list of keywords appears in Appendix A. In addition to the numbered citations, a list of bibliographies on related topics is provided in Appendix B.

Four indexes are provided to assist the user in locating specific citations (numbers following index entries refer to citation numbers). Keywords are listed in the Keyword Index. The Author Index lists all senior and junior authors. The Species Index lists common and scientific names of species, some general terms (e.g., ungulates), and identifies species and subspecies considered by the U.S. Fish and Wildlife Service (1982) to be threatened or endangered. The Geographic Index lists nations, U.S. and Mexican States, and Canadian Provinces and Territories.

Most of the reports listed can be found in any university library. In citing reports with more limited distributions, such as conference proceedings, we attempted to include all relevant information to assist the user in obtaining the report from the publishing organization or through inter-library loan systems. Citations of reports from the FWRS include the "MIN" number assigned by FWRS; copies of these reports can be obtained from the Fish and Wildlife Reference Servive, Denver Public Library Administrative Center, 3840 York Street, Denver, Colo., 80205.

As more than 4,000 reports were examined, we feel the bibliography represents literature published through 1980. We hope the information presented here will improve understanding of man's "nonconsumptive" impact on wildlife and that this may lead to some application of the reported results.

ACKNOWLEDGMENTS

We thank C. Gifford, Morgan Library, Colorado State University, for assistance in designing literature searches and locating material; M. Wagers, Morgan Library, for conducting the BIOSIS computer searches; D. Price, Morgan Library, for help in locating dozens of documents through Inter-Library Loan; R. B. Bury, U.S. Fish and Wildlife Service, Fort Collins, for access to literature files concerning the environmental impact of off-road vehicles; and W. Lippincott, U.S. Soil Conservation Service, Lake Worth, Fla., for assistance in designing and implementing a computerized data storage system.

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BioSciences Information Service. 1979. Serial sources for the BIOSIS data base. BioSciences Information Service, Philadelphia, Pa. 312 pp.

Collins, J. T., J. H. Huheey, J. L. Knight, and H. M. Smith. 1978. Standard common and current scientific names for North American amphibians and reptiles. Misc. Publ. Soc. Study Amphib. Reptiles Herpetol. Circ. 7. 36 pp.

Council of Biology Editors. 1972. CBE style manual. 3rd ed. American Institute of Biological Sciences, Washington, D.C. 297 pp.

Jones, J. K., Jr., D. C. Carter, and H. H. Genoways. 1979. Revised checklist of North American mammals north of Mexico, 1979. Tex. Tech. Univ. Mus. Occ. Pap. 62. 17 pp.

Lyons, J. R. 1982. Nonconsumptive wildlife associated recreation in the U.S. in 1980. Trans. N. Am. Wildl. Nat. Resour. Conf. 47. In press.

National Clearinghouse for Periodical Title Word Abbreviations. 1971. NCPTWA word-abbreviation list, 1971 edition. Chemical Abstracts Service, Ohio State University, Columbus. 42 pp.

National Clearinghouse for Periodical Title Word Abbreviations. 1974. Word abbreviation list, cumulated supplement. Chemical Abstracts Service, Ohio State University, Columbus. 12 pp.

U.S. Fish and Wildlife Service. 1982. Endangered and threatened wildlife and plants. Pages 58-79 in Code of Federal Regulations, section 17.11. U.S. Gov. Print. Off. 1982-0-368-797.

Weeden, R. 1976. Nonconsumptive users: A myth. Alaska Conserv. Rev. 17(3):3, 15.

Wilkes, B. 1977. The myth of the nonconsumptive user. Can. Field-Nat. 91:343-349.

BIBLIOGRAPHY

1. Aasheim, R. 1980. Snowmobile impacts on the natural environment. Pages 191-200 in R. N. L. Andrews and P. F. Nowak, eds. Off-road vehicle use: A management challenge. Conference proceedings, 16-18 March 1980, Ann Arbor, Mich.

   Snowmobiling and its impacts on natural environments in Montana are described. Studies of impacts on deer and elk have produced conflicting results, but there is little doubt that additional stress on poor-condition animals in winter is undesirable. Animals accustomed to humans are less affected by snowmobiles than animals in more remote areas. Effects on small mammals and possible effects of packed snowmobile trails are discussed.

   OFF-ROAD VEHICLES, HARASSMENT, FORESTS, RECREATION MANAGEMENT, U.S. STATE PARKS AND LANDS, MAMMALS, MULE DEER, ELK

2. Aitchison, S. W. 1976. Human impact on the Grand Canyon. Down River 3(4):18-19.

   Impacts of boating in the Grand Canyon are discussed in relation to establishment of a carrying capacity for boating on the Colorado River. Fire, litter, trampling, toilet dumping, noise, movement of natural objects, and people presence are listed as sources of disturbance. Impacts on wildlife are considered.

   BOATING, CAMPING, RIVERS, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, MAMMALS, BIRDS, REPTILES

3. Aitchison, S. W. 1977. Some effects of a campground on breeding birds in Arizona. Pages 175-182 in Importance, preservation, and management of riparian habitat: A symposium, 9 July 1977, Tucson, Ariz. U.S. For. Serv. Gen. Tech. Rep. RM-43.

   In a 3-year study in Oak Creek Canyon, Arizona, bird populations were compared between a constructed campground and a more natural control area. When the campground was closed to campers, bird densities were similar but species composition was different. When the campground was opened for human use, the breeding bird population decreased in density and diversity.

   CAMPING, FORESTS, RECREATION MANAGEMENT, U.S. NATIONAL FORESTS, BIRDS

4. Aitchison, S. W., S. W. Carothers, and R. R. Johnson. 1977. Some ecological considerations associated with river recreation management. Pages 222-225 in Proceedings: River Recreation Management and Research Symposium, 24-27 January 1977, Minneapolis, Minn. U.S. For. Serv. Gen. Tech. Rep. NC-28.

   Human-wildlife relationships are among topics discussed in relation to an ecological study of the Colorado River in Arizona. Litter and organic wastes at campsites along the river may increase populations of noxious insects and vertebrates.

   BOATING, CAMPING, RIVERS, HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, MAMMALS, BIRDS, REPTILES

5. Altmann, M. 1958. The flight distance in free-ranging big game. J. Wildl. Manage. 22:207-209.

   Flight distance (the minimum distance a wild animal will tolerate approach before fleeing) is discussed as a quantitative measure of reactivity of game animals to intruding persons. In studies of moose and elk in Wyoming, flight distances varied by habitat type, social grouping, and reproductive and nutritional states.

   DISTURBANCE (GENERAL), TOURISM, FORESTS, FLIGHT DISTANCE, U.S. NATIONAL PARKS, ELK, MOOSE

6. American Association for the Advancement of Science, Committee on Arid Lands. 1974. Off-road vehicle use. Science 184:500-501.

   Impacts of off-road vehicle use including destruction of flora and fauna on arid lands in the United States are briefly reviewed. Problems

in regulation and management of vehicle use are discussed and detailed recommendations presented.

OFF-ROAD VEHICLES, DESERTS, RANGELAND, RECREATION MANAGEMENT, U.S. BLM LANDS, WILDLIFE (GENERAL)

7. Ames, N. 1974. Managing private and nonhunting uses of wildlife. Proc. Annu. Conf. West. Assoc. State Game Fish Comm. 54:107-112.

Private uses of game and nongame wildlife are described, and the history of management of nonhunting wildlife use is discussed. Efforts required in regulation and enforcement of private use management are considered.

RECREATION MANAGEMENT, WILDLIFE (GENERAL)

8. Ames, P. L., and G. S. Mersereau. 1964. Some factors in the decline of the osprey in Connecticut. Auk 81: 173-185.

Studies of osprey ecology in southern Connecticut revealed factors in the mortality of eggs and nestlings. Prevention of incubation due to human presence was common but the effects were not known. Incidents of disturbance by picnickers and boaters are mentioned, as well as accounts of removal of young by humans. No evidence of human-induced predation on osprey nests was found.

DISTURBANCE (GENERAL), PICNICKING, BOATING, COASTAL ZONES, WETLANDS, PREDATION, OSPREY

9. Amstrup, S. C., and J. Beecham. 1976. Activity patterns of radio-collared black bears in Idaho. J. Wildl. Manage. 40:340-348.

The impact of the investigators on black bear activities appeared to be negligible. Instrumented bears often withdrew from observers, but human-induced alterations of their behavior appeared to be short-lived.

RESEARCH IMPACTS, FORESTS, BLACK BEAR

10. Anderson, D. W., and J. O. Kieth. 1980. The human influence on seabird nesting success: Conservation implications. Biol. Conserv. 18:65-80.

Studies of brown pelicans and Heermann's gulls indicated that disturbances by recreationists, educational groups, and scientists could seriously disrupt seabird breeding on the coast of Baja California. Human disturbances lead to inter- and intra-specific behavioral imbalances in seabirds. Methods for minimizing disturbances are discussed.

RESEARCH IMPACTS, TOURISM, WILDLIFE VIEWING, COASTAL ZONES, PREDATION, RECREATION MANAGEMENT, THREATENED AND ENDANGERED SPECIES, HEERMANN'S GULL, BROWN PELICAN

11. Anderson, D. W., J. E. Mendoza, and J. O. Kieth. 1976. Seabirds in the Gulf of California: A vulnerable, international resource. Nat. Resour. J. 16: 483-505.

Seabird resources in the Gulf of California are described. Conservation problems, including tourism and resulting disturbance to nesting colonies, are discussed. Conservation measures are suggested.

TOURISM, WILDLIFE VIEWING, COASTAL ZONES, PREDATION, RECREATION MANAGEMENT, THREATENED AND ENDANGERED SPECIES, SEABIRDS

12. Anderson, J. M. 1978. Protection and management of wading birds. Pages 99-103 in A. Sprunt, IV, J. C. Ogden, and S. Winckler, eds. Wading birds. Natl. Audubon Soc. Res. Rep. 7.

The role of the National Audubon Society in the protection and management of wading birds is discussed, with emphasis on the Texas Gulf Coast. Among problems facing wading birds is human disturbance, especially during the nesting season. Sport fishing and boating are increasingly popular in coastal waterways where many colonial waterbirds nest.

BOATING, FISHING, WILDLIFE VIEWING, COASTAL ZONES, WETLANDS, FLIGHT DISTANCE, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL WILDLIFE REFUGES, WATERBIRDS

13. Anonymous. 1972. Fishline is fouling our flyways. Minn. Vol. 35(205):62-63.

Waterfowl mortalities caused by entanglement in fishing line are cited in this nontechnical article. Many waterfowl, particularly diving ducks, may become ensnared underwater and be undetected. The problem will continue until manufacturers develop biodegradable fishing line.

FISHING, LAKES, RIVERS, WETLANDS, RECREATION MANAGEMENT, WATERFOWL

14. Atkinson-Willes, G. 1969. Wildfowl and recreation: A balance of requirements. Br. Water Supply 11:5-15.

Reservoirs in Great Britain have helped compensate for the loss of waterfowl habitat through draining and development, but growing recreational needs are upsetting this balance. Some recreational activities cause less disturbance than others; these activities must be weighed against waterfowl conservation needs and compromise use plans developed on a large scale.

BOATING, PICNICKING, SWIMMING, TOURISM, WILDLIFE VIEWING, LAKES, WETLANDS, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, WATERFOWL

15. August, P. V., J. W. Clarke, M. H. Mc Gaugh, and R. L. Packard. 1979. Demographic patterns of small mammals: A possible use in impact assessment. Pages 333-340 in H. H. Genoways and R. J. Baker, eds. Biological investigations in the Guadalupe Mountains National Park, Texas. Symposium proceedings, 4-5 April 1975, Lubbock, Texas. U.S. Natl. Park Serv. Proc. Trans. Ser. 4.

Demographic patterns of small mammals can be useful in determining the effects of human use upon a given area. Comparisons of populations before and after periods of human use reveal changes associated with use which may serve as a measurement of disturbance. Preliminary results of pre-use studies in a National Park in Texas and applications to the measurement of human disturbance are discussed.

DISTURBANCE (GENERAL), DESERTS, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, RODENTS

16. Aune, K. E. 1981. Impacts of winter recreationists on wildlife in a portion of Yellowstone National Park, Wyoming. M.S. Thesis. Montana State University, Bozeman. 111 pp.

General responses of wildlife to winter recreationists in Yellowstone National Park were attention or alarm, flight, and, rarely, aggression. Responses varied with the species involved, nature of the disturbance, and time of season. Winter recreation activity was not a major factor influencing wildlife distributions, movements, or population sizes, although minor displacement of wildlife from areas adjacent to trails was observed. Management recommendations are presented.

CAMPING, HIKING, SKIING, OFF-ROAD VEHICLES, TOURISM, HARASSMENT, WILDLIFE VIEWING, FORESTS, LAKES, HUMAN HEALTH AND SAFETY, FLIGHT DISTANCE, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, WILDLIFE (GENERAL), ELK, BISON, COYOTE, MULE DEER, MOOSE

17. Baldwin, M. F. 1968. The snowmobile and environmental quality. Living Wilderness 32(104):14-17.

Recreational use of snowmobiles is examined in terms of effects on environmental quality through noise, fumes, and impacts on fish, wildlife, and trails. Harassment of wild game, nongame, and predators by snowmobile users is described. Policy recommendations are suggested and discussed.

OFF-ROAD VEHICLES, HARASSMENT, RECREATION MANAGEMENT, WILDLIFE (GENERAL)

18. Baldwin, M. F. 1970. The off-road vehicle and environmental quality. The Conservation Foundation, Washington, D.C. 52 pp.

Social and environmental effects of off-road vehicles, primarily snowmobiles are reported, including sections on trail and vegetation effects and fish and wildlife effects. Policies for management and control of off-road vehicles are suggested.

OFF-ROAD VEHICLES, FORESTS, RECREATION MANAGEMENT, REVIEW, WILDLIFE (GENERAL)

19. Baldwin, M. F., and D. H. Stoddard, Jr. 1973. The off-road vehicle and environmental quality. Second edition. The Conservation Foundation, Washington, D.C. 61 pp. plus foldout chart.

    This report updates an earlier edition describing the social and environmental effects of off-road vehicles, particularly snowmobiles. A section on fish and wildlife effects reviews literature describing harassment of wildlife, and legal responses to adverse impacts of off-road vehicles on wildlife. Policies for control of environmental impacts are suggested.

    HARASSMENT, OFF-ROAD VEHICLES, REVIEW, RECREATION MANAGEMENT, WILDLIFE (GENERAL)

20. Banks, R. C. 1969. The peregrine falcon in Baja California and the Gulf of California. Pages 81-91 in J. J. Hickey, ed. Peregrine falcon populations: Their biology and decline. University of Wisconsin Press, Madison.

    A recent lack of observations compared to earlier indications of abundance suggests that peregrine falcon numbers in Mexico have declined. Possible causes of the apparent decline include harassment and killing of peregrines by local fishermen and tourists, and other possible human disturbances.

    BOATING, FISHING, DISTURBANCE (GENERAL), HARASSMENT, TOURISM, COASTAL ZONES, THREATENED AND ENDANGERED SPECIES, PEREGRINE FALCON

21. Bansner, U. 1976. Mountain goat-human interactions in the Sperry-Gunsight Pass area, Glacier National Park. Unpublished report. University of Montana, Missoula. 46 pp.

    Mountain goat-human interactions in Glacier National Park were characterized as goat approaches to people and human approaches to goats. Attractants causing goats to approach people were identified, and overt aggressive behavior of goats toward humans noted in less than 5% of goat approaches. Goats generally approach people remaining quiet, but are frightened by sudden movements or appearances of people. Management recommendations are presented.

    CAMPING, HIKING, TOURISM, WILDLIFE VIEWING, TUNDRA, FORESTS, HUMAN HEALTH AND SAFETY, FLIGHT DISTANCE, PREDATION, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, MOUNTAIN GOAT

22. Barnes, V. G., Jr. 1967. Activities of black bears in Yellowstone National Park. M.S. Thesis. Colorado State University, Fort Collins. 116 pp.

    A study of black bears in Yellowstone National Park found that backcountry and roadside areas were utilized by two separate populations. Bearproof garbage containers affected bear use of campgrounds but not of roadside areas. Artificial food was the most important diet constituent of roadside area bears. Most black bear-human incidents occurred in campgrounds.

    CAMPING, TOURISM, WILDLIFE VIEWING, FORESTS, HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, BLACK BEAR

23. Bart, J. 1977. Impact of human visitations on avian nesting success. Living Bird 16:186-192.

    Analysis of data collected for the North American Nest Record Card Program, Cornell University Laboratory of Ornithology, revealed influences of human visitation on nest mortality rates for five species of birds. The data indicate a need to prevent predators from following human trails to bird nests.

    DISTURBANCE (GENERAL), PREDATION, WILDLIFE MANAGEMENT, AMERICAN ROBIN, RED-WINGED BLACKBIRD, EASTERN BLUEBIRD, MOURNING DOVE, BARN SWALLOW

24. Batten, L. A. 1977. Sailing on reservoirs and its effects on water birds. Biol. Conserv. 11:49-58.

    Observations at Brent Reservoir in Great Britain showed that some species of waterfowl and other waterbirds still used the reservoir despite increases in sailing activities. How-

ever, waterfowl use depended on the availability of a refuge area of the reservoir not accessible by boats.

BOATING, LAKES, WATERBIRDS, WATERFOWL

25. Bear, G. D., and G. W. Jones. 1973. History and distribution of bighorn sheep in Colorado. Colorado Division of Wildlife, Denver. 232 pp.

Available information on the history, distribution, population trends, and ecological factors for bighorn sheep herds in Colorado are summarized. Human influences are discussed for each of the herds; while few quantitative data are available, observations suggest that in many cases activities such as camping, hiking, and driving off-road vehicles influence sheep distributions and activities.

CAMPING, HIKING, HARASSMENT, OFF-ROAD VEHICLES, HORSEBACK RIDING, WILDLIFE VIEWING, FISHING, FORESTS, RANGELAND, TUNDRA, U.S. NATIONAL PARKS, U.S. NATIONAL FORESTS, BIGHORN SHEEP

26. Beeman, L. E. 1975. Population characteristics, movements, and activities of the black bear (Ursus americanus) in the Great Smoky Mountains National Park. Ph.D. Diss. University of Tennessee, Knoxville. 232 pp.

Among aspects of black bear population ecology studied were activities and movements of nuisance bears. Panhandler bears concentrated their activities around trail shelters, although they readily adapted to feeding on native foods when backpackers were less numerous in fall and early winter. Moving nuisance bears to other areas of the park has been only partially successful due to their homing abilities.

CAMPING, HIKING, TOURISM, FORESTS, HUMAN HEALTH AND SAFETY, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, BLACK BEAR

27. Beeman, L. E., and M. R. Pelton. 1976. Homing of black bears in the Great Smoky Mountains National Park. Pages 87-95 in M. R. Pelton, J. W. Lentfer, and G. E. Folk, eds. Bears--their biology and management. Third International Conference on Bear Research and Management, June 1974, Binghamton, N.Y. and Moscow, USSR. IUCN Publ. New Ser. 40, Morges, Switzerland.

Homing of nuisance black bears transported from their home ranges was studied in Great Smoky Mountains National Park. Bears seemed strongly motivated to return to their home ranges; the greater the distance transplanted the less likely they were to home. Reducing unnatural food sources available to bears is probably the best way to prevent wild bears from becoming nuisance animals.

CAMPING, HIKING, PICNICKING, TOURISM, WILDLIFE VIEWING, FORESTS, HUMAN HEALTH AND SAFETY, U.S. NATIONAL PARKS, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, BLACK BEAR

28. Behrend, D. F., and R. A. Lubeck. 1968. Summer flight behavior of white-tailed deer in two Adirondack forests. J. Wildl. Manage. 32:615-618.

Flight behavior in two populations of white-tailed deer was studied in New York. Observations along forest roads and around a lakeshore suggested that deer may be more sensitive to approach by vehicle than by canoe.

BOATING, OFF-ROAD VEHICLES, FORESTS, FLIGHT DISTANCE, WHITE-TAILED DEER

29. Belikov, S. E. 1976. Behavioral aspects of the polar bear, Ursus maritimus. Pages 37-40 in M. R. Pelton, J. W. Lentfer, and G. E. Folk, eds. Bears--their biology and management. Third International Conference on Bear Research and Management, June 1974, Binghamton, N.Y. and Moscow, USSR. IUCN Publ. New Ser. 40, Morges, Switzerland.

Observations of polar bears on Wrangel Island, USSR, revealed relationships of parturient and lactating females to man, other animals, other females, and young. Behavior of pregnant and lactating bears can markedly change when disturbed. Disturbance is especially critical in fall when females begin to den.

DISTURBANCE (GENERAL), COASTAL ZONES, HUMAN HEALTH AND SAFETY, FLIGHT DISTANCE, POLAR BEAR

30. Bell, J. N. 1963. Wild animals are wild. Natl. Wildl. 1(5):34-36.

Problems of human-wildlife interactions in National Parks are described in this popular article. Park visitors unaware of the potential hazards of confrontations with wildlife sometimes create dangerous situations by inappropriate behavior. Park visitors are entitled to wildlife viewing experiences, but must be educated about wildlife behavior and maintain respect for wild animals.

CAMPING, HARASSMENT, TOURISM, WILDLIFE VIEWING, HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, WILDLIFE (GENERAL)

31. Berger, D. D., and H. C. Mueller. 1969. Nesting peregrine falcons in Wisconsin and adjacent areas. Pages 115-122 in J. J. Hickey, ed. Peregrine falcon populations: Their biology and decline. University of Wisconsin Press, Madison.

The reproductive history of 14 falcon eyries along the upper Mississippi River are summarized. From 1955 to 1964 all known peregrine falcons disappeared from the study area; human activity increased very little during that time and is not considered important in the decline. One instance of disturbance to a peregrine eyrie by picnickers and rock climbers is mentioned.

CLIMBING, PICNICKING, FORESTS, RIVERS, THREATENED AND ENDANGERED SPECIES, PEREGRINE FALCON

32. Bergerud, A. T. 1974. The role of the environment in the aggregation, movement and disturbance behavior of caribou. Pages 552-584 in V. Geist and F. Walther, eds. The behavior of ungulates and its relation to management. Vol. 2. IUCN Publ. New Ser. 24, Morges, Switzerland.

Environmental factors in relation to caribou movement and disturbance are discussed. Behavior of caribou in response to human disturbance is related to the evolutionary history of caribou and their adaptations to past non-human disturbances. Management implications are discussed in terms of habitat requirements and the adaptability of caribou to human disturbance.

DISTURBANCE (GENERAL), TUNDRA, WILDLIFE MANAGEMENT, PREDATION, CARIBOU

33. Bergstrom, A. S. 1980. Preliminary investigations and management of the Indiana bat (Myotis sodalis) in New York State. Pages 217-219 in D. E. Wilson and A. L. Gardner, eds. Proceedings, Fifth International Bat Research Conference, 6-13 August 1978, Albuquerque, N.M. Texas Tech Press, Lubbock.

The Indiana bat is the only listed endangered mammal still found in the wild in New York. Human disturbance seems to be the greatest threat to these bats. The state management plan for the Indiana bat includes posting and law enforcement with regard to critical habitat protection, and regulation of spelunking activities to certain areas and times.

SPELUNKING, HARASSMENT, RESEARCH IMPACTS, FORESTS, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, INDIANA BAT

34. Berry, K. H. 1980. The effects of four-wheel vehicles on biological resources. Pages 231-233 in R. N. L. Andrews and P. F. Nowak, eds. Off-road vehicle use: A management challenge. Conference proceedings, 16-18 March 1980, Ann Arbor, Mich.

Effects of four-wheel vehicles used off roads are summarized. Impacts on wildlife habitat through effects on soil and vegetation are discussed and management problems related to biological resource degradation by off-road vehicles are discussed. Unpublished data from recent Bureau of Land Management studies of impacts on specific species are presented.

OFF-ROAD VEHICLES, CAMPING, DESERTS, RIVERS, WETLANDS, REVIEW, RECREATION MANAGEMENT, U.S. BLM LANDS, WILDLIFE (GENERAL), COUCH'S SPADEFOOT, FRINGE-TOED LIZARD, DESERT KANGAROO RAT, PRAIRIE FALCON

35. Berwick, S. H. 1968. Observations on the decline of the Rock Creek, Montana, population of bighorn sheep. M.S. Thesis. University of Montana, Missoula. 245 pp.

Among factors that may be responsible

for an observed decline in a Montana bighorn sheep population are human disturbance and harassment of sheep. Snowmobile use of an important segment of sheep winter range is increasing. It is suggested that harassment may be debilitating to winter-stressed animals.

OFF-ROAD VEHICLES, HARASSMENT, FORESTS, RANGELAND, WILDLIFE MANAGEMENT, U.S. NATIONAL FORESTS, BIGHORN SHEEP

36. Bird, D. M. 1978. Birds of prey: A plea for ethics. Ont. Nat. 17(5):16-23.

Problems facing birds of prey are described in this nontechnical article. Effects of man on raptors are discussed, including impacts of research, wildlife photography, and bird watching. Disturbances of birds by these activities can cause adults to abandon nests, and decrease survival of eggs and young through predation or exposure. Education of the public on the values of birds of prey is essential for their protection.

HIKING, CAMPING, BOATING, HARASSMENT, RESEARCH IMPACTS, WILDLIFE VIEWING, PREDATION, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, RAPTORS

37. Blodget, B. G. 1978. The effect of off-road vehicles on least terns and other shorebirds. Univ. Massachusetts, Amherst, Natl. Park Serv. Coop. Res. Unit Rep. 26. 79 pp.

The impact of off-road vehicles on a nesting colony of least terns and other migratory shorebirds was studied on outer Cape Cod, Massachusetts. Fencing of colonies reduced vehicle disturbance of nests. Frequent disturbance by vehicles and beachwalkers did not appear to cause nest abandonment or reduced hatchability of eggs. Management recommendations are developed based on these results.

HIKING, OFF-ROAD VEHICLES, COASTAL ZONES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, LEAST TERN, WATERBIRDS

38. Blokpoel, H. 1981. An attempt to evaluate the impact of cannon-netting in Caspian tern colonies. Colon. Waterbirds 4:61-67.

From studies of Caspian terns on Lake Huron, Ontario, it was found that visits to tern colonies resulted in losses of eggs to predation by gulls. Human activities at tern nesting colonies should be restricted until more is known about the nature and extent of human-induced nest losses.

DISTURBANCE (GENERAL), RESEARCH IMPACTS, LAKES, WILDLIFE MANAGEMENT, PREDATION, CASPIAN TERN

39. Blong, B. 1967. Desert bighorn and people in the Santa Rosa Mountains. Pages 66-70 in J. Yoakum, B. Browning, R. Miller, and A. S. Leopold, eds. California-Nevada Section, The Wildlife Society, 1967 Transactions. 14th Annual Meeting, 27-28 January 1967, Disneyland, Calif. California-Nevada Section, The Wildlife Society, Reno, Nev.

Loss of habitat in California through human encroachment is described as a serious threat facing bighorn sheep. Disturbance by hikers and picnickers caused sheep to abandon a key waterhole. Other sources of potential disturbance had no apparent effect on sheep.

HIKING, HORSEBACK RIDING, PICNICKING, WILDLIFE VIEWING, DESERTS, BIGHORN SHEEP

40. Boeer, W. J. 1977. Riparian mammals in Big Bend National Park and their interrelationships with visitor usages and impacts. M.S. Thesis. Texas A&M University, College Station. 122 pp.

Small mammals of the riparian corridor of the Rio Grande were inventoried and impacts on the corridor of increased human use were evaluated. Subjective impact evaluation data provide park managers with a way of monitoring future impacts.

BOATING, CAMPING, DESERTS, RIVERS, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, MAMMALS

41. Boeer, W. J., and D. J. Schmidly. 1977. Terrestrial mammals of the riparian corridor in Big Bend National Park. Pages 212-217 in Importance, preservation and management of riparian habitat: A symposium. 9 July 1977, Tucson, Ariz. U.S. For. Serv. Gen. Tech. Rep. RM-43.

Effects of human use (boating and camping) are among the impacts acting upon natural riparian communities in Big Bend National Park, Texas. Site impacts have occurred as a result of recreational use, but not to the point where ecological conditions, as indicated by the rodent fauna and vegetation, are in jeopardy.

BOATING, CAMPING, DESERTS, RIVERS, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, RODENTS

42. Bondello, M. C. 1976. The effects of high-intensity motorcycle sounds on the acoustical sensitivity of the desert iguana, Dipsosaurus dorsalis. M.A. Thesis. California State University, Fullerton. 38 pp.

Acoustical sensitivity of desert iguanas exposed to various levels and durations of motorcycle sounds was tested. Permanent sensitivity losses occurred in some cases, at a dose of less than one hour. Damaging effects of motorcycle sounds on desert iguanas, along with reported habitat destruction by off-road vehicles, indicates a potential detrimental impact of recreational vehicles on desert wildlife.

OFF-ROAD VEHICLES, DESERTS, DESERT IGUANA

43. Booth, C. J. 1978. Breeding success of red-throated divers. Br. Birds 71:44.

Human disturbance is discussed as a factor in nest losses of red-throated divers in Great Britain. Divers breed successfully in several areas where skuas and gulls are abundant, but where human disturbance has increased breeding success of divers has been reduced, presumably through human-induced nest predation. Disturbance causes adults to temporarily abandon eggs and young, leaving them vulnerable to predation.

RESEARCH IMPACTS, DISTURBANCE (GENERAL), WILDLIFE VIEWING, LAKES, PREDATION, FLIGHT DISTANCE, RED-THROATED DIVER

44. Bourget, A. A. 1970. Interrelationships of eiders, herring gulls, and black-backed gulls nesting in mixed colonies in Penobscot Bay, Maine. M.S. Thesis. University of Maine, Orono. 123 pp.

Effects of observer's presence on eiders and gulls during an ecological study were examined by comparing disturbed and undisturbed colonies. As a result of human disturbance the breeding cycles of eiders, black-backed gulls, and especially herring gulls were delayed by as much as one week. Hatching success of eiders appeared to be unaffected.

RESEARCH IMPACTS, COASTAL ZONES, COMMON EIDER, GREAT BLACK-BACKED GULL, HERRING GULL

45. Bowman, E. G. 1969. The grizzly bear in the National Parks. Am. For. 75 (7):16-18, 56-58; 75(8):16-18, 52-55.

This two-part nontechnical article examines grizzly bear-human conflicts in U.S. National Parks. The biology and behavior of bears and aspects of visitor behavior that lead to conflicts with bears are discussed. Management recommendations are presented aimed at maintaining bear populations in parks while assuring an acceptable degree of human safety.

CAMPING, HIKING, HORSEBACK RIDING, TOURISM, WILDLIFE VIEWING, FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, GRIZZLY BEAR

46. Brander, R. B. 1974. Ecological impacts of off-road recreation vehicles. Pages 29-35 in Outdoor recreation research: Applying the results. Papers from a workshop, 19-21 June 1973, Marquette, Mich. U.S. For. Serv. Gen. Tech. Rep. NC-9.

Potential impacts of snowmobiles on wildlife are inferred from a review of literature concerning snowmobile impacts on ecosystems. Future research needs and management goals are discussed.

OFF-ROAD VEHICLES, FORESTS, RECREATION MANAGEMENT, REVIEW, WILDLIFE (GENERAL)

47. Braun, C. E. 1971. Habitat requirements of white-tailed ptarmigan. Proc. Annu. Conf. West. Assoc. State Game Fish Comm. 51:284-292.

Studies of white-tailed ptarmigan in Colorado revealed distribution, habitat requirements, and other biological factors of this alpine grouse. Losses of habitat affecting ptarmigan include the destruction of willow communities through road construction, development of winter recreation sites, and unregulated use of snowmobiles.

OFF-ROAD VEHICLES, SKIING, TOURISM, TUNDRA, FORESTS, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, U.S. NATIONAL FORESTS, WHITE-TAILED PTARMIGAN

48. Braun, C. E., K. W. Harmon, J. A. Jackson, and C. D. Littlefield. 1978. Management of National Wildlife Refuges in the United States: Its impacts on birds. Wilson Bull. 90:309-321.

Management activities on refuges affecting birds are discussed, including recreational activities. Although fishing and boating on refuge waters can be regulated to ensure compatability with bird populations, frequently control of such activities is inadequate, resulting in disturbance of birds, loss of production of young, and displacement of waterbirds. Management recommendations are suggested.

BOATING, FISHING, WILDLIFE VIEWING, LAKES, RIVERS, WETLANDS, FORESTS, RANGELAND, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL WILDLIFE REFUGES, RECREATION MANAGEMENT, WATERFOWL, WATERBIRDS

49. Bray, O. E. 1967. A population study of black bears in Yellowstone National Park. M.S. Thesis. Colorado State University, Fort Collins. 97 pp.

Studies using marked black bears in Yellowstone National Park showed that separate black bear populations existed in roadside and backcountry areas. Bears were concentrated along roads, in campgrounds, and near dumps. Visitor use and number of bears counted during roadside censuses were strongly correlated. Bearproof garbage cans affected bear use of campgrounds but not of roadside areas.

CAMPING, TOURISM, WILDLIFE VIEWING, FORESTS, HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, BLACK BEAR

50. Britton, E. E. 1979. Evaluation of public use impacts upon nesting shorebirds and the beach habitat on Chincoteague National Wildlife Refuge. U.S. Fish and Wildlife Service, Chincoteague National Wildlife Refuge, Chincoteague, Va. 37 pp.

Impacts of off-road vehicles and pedestrians on nesting shorebirds, ghost crabs, and beach habitat are described. Vehicle traffic caused mechanical damage to beach environments, but was insignificant compared to destruction caused by natural forces. The use of exclosures to attract and protect colonies of least terns was tested and found to be successful in limiting vehicle disturbance.

HIKING, OFF-ROAD VEHICLES, COASTAL ZONES, WILDLIFE MANAGEMENT, U.S. NATIONAL WILDLIFE REFUGES, LEAST TERN, WATERBIRDS

51. Bryan, R. B., and M. C. Jansson. 1973. Perception of wildlife hazard in National Park use. Trans. N. Am. Wildl. Nat. Resour. Conf. 38:281-295.

Increased visitation to North American National Parks is resulting in more people-wildlife encounters, thus generating crucial management problems. Park management policies are subject to public opinions, which in turn depend on public perceptions. Results of a study to determine visitor perceptions of wildlife hazard in western National Parks are reported and management implications are discussed.

CAMPING, HIKING, TOURISM, WILDLIFE VIEWING, FORESTS, TUNDRA, RANGELAND, HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, THREATENED AND ENDANGERED SPECIES, CANADIAN NATIONAL PARKS, U.S. NATIONAL PARKS, WILDLIFE (GENERAL), GRIZZLY BEAR, BLACK BEAR, MOOSE, MULE DEER, ELK, MOUNTAIN LION

52. Buckley, P. A., and F. G. Buckley. 1978. Guidelines for protection and management of colonially nesting waterbirds. U. S. National Park Service, North Atlantic Regional Office, Boston, Mass. 52 pp. plus appendices.

This comprehensive review of protection and management of colonial waterbirds discusses the nature and effects of human disturbance at nesting colo-

nies. Impacts on the biology of birds are discussed in relation to the nature of disturbances. Protective measures include public education and restriction of activities.

HIKING, HARASSMENT, WILDLIFE VIEWING, RESEARCH IMPACTS, OFF-ROAD VEHICLES, COASTAL ZONES, PREDATION, REVIEW, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, WATERBIRDS

53. Budowski, G. 1976. Tourism and environmental conservation: Conflict, coexistence, or symbiosis? Environ. Conserv. 3:27-31.

Relationships between tourism and conservation are described as conflicting, coexisting, or symbiotic. Widespread environmental degradation has often resulted from tourism, as many places visited by tourists support fragile ecosystems. Proper attitudes and management schemes can lead to symbiotic relationships instead of conflicts.

TOURISM, RECREATION MANAGEMENT, WILDLIFE (GENERAL)

54. Buell, N. E. 1967. Refuge recreation: High standards equal quality. Living Wilderness 31(98):24-26.

The role of U.S. National Wildlife Refuges in providing recreational opportunities is discussed in this popular article. Planning for recreation on refuges is based on the view that quality of experience rather than quantity of use is most desirable to both visitors and protected wildlife. Responsibilities and approaches to recreation management are discussed.

BICYCLING, BOATING, CAMPING, HIKING, PICNICKING, SWIMMING, WILDLIFE VIEWING, FISHING, LAKES, WETLANDS, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, U.S. NATIONAL WILDLIFE REFUGES, WILDLIFE (GENERAL)

55. Burger, J. 1981. Effects of human disturbance on colonial species, particularly gulls. Colon. Waterbirds 4:28-36.

Direct and indirect ways that human activities affect colonial waterbirds, especially gulls, are discussed. Data from colonies in the eastern U.S. and Argentina are presented to analyze the effects of human disturbance on reproductive success. Since the effects of disturbance vary widely, investigators must evaluate how specific procedures affect the reproductive success of the birds studied.

DISTURBANCE (GENERAL), RESEARCH IMPACTS, LAKES, COASTAL ZONES, PREDATION, WILDLIFE MANAGEMENT, U.S. NATIONAL WILDLIFE REFUGES, GULLS, BIRDS

56. Burghardt, G. M., R. O. Hietala, and M. R. Pelton. 1972. Knowledge and attitudes concerning black bears by users of the Great Smoky Mountains National Park. Pages 255-273 in S. Herrero, ed. Bears--their biology and management. Second International Conference on Bear Research and Management, 6-9 November 1970, Calgary, Alberta. IUCN Publ. New Ser. 23, Morges, Switzerland.

Results of interviews administered to 700 park visitors concerning black bears are reported. A wide variety of scores were obtained from visitors. Question subject matter included demographic characteristics of persons interviewed, visitor bear knowledge, and visitor attitudes toward bears. While generalizations from the study are tenuous, the survey provided much data useful to the understanding of man-bear interactions.

CAMPING, HIKING, TOURISM, WILDLIFE VIEWING, FORESTS, HUMAN HEALTH AND SAFETY, U.S. NATIONAL PARKS, BLACK BEAR

57. Bury, R. B. 1978. Desert tortoises and off-road vehicles: Do they mix? Page 126 in Desert Tortoise Council: Proceedings, 1978 Symposium, 1-3 April 1978, Las Vegas, Nev. Desert Tortoise Council, San Diego, Calif. (Abstract only).

Desert tortoise populations in the Mojave Desert, California, were studied in relation to off-road vehicle use. Tortoise numbers and biomass were lower in vehicle-impacted areas than in control areas, and total number of burrows and percentage active burrows were less on impacted sites. Off-road vehicle use displaces or kills tortoises, collapses burrows, and destroys vegetation, and thus may be a

major factor in the decline of tortoises in the Mojave Desert.

OFF-ROAD VEHICLES, DESERTS, U.S. BLM LANDS, THREATENED AND ENDANGERED SPECIES, DESERT TORTOISE

58. Bury, R. B. 1980. What we know and do not know about off-road vehicle impacts on wildlife. Pages 110-122 in R. N. L. Andrews and P. F. Nowak, eds. Off-road vehicle use: A management challenge. Conference Proceedings, 16-18 March 1980, Ann Arbor, Mich.

Research concerning off-road vehicle impacts on wildlife is reviewed to illustrate the level of impacts and to provide guidance for more effective protection of wildlife in off-road vehicle areas. Effects on wildlife include direct mortality, damage to vegetation, disruption of soil, and noise harassment. Research and management recommendations are suggested.

OFF-ROAD VEHICLES, HARASSMENT, DESERTS, FORESTS, RANGELAND, REVIEW, RECREATION MANAGEMENT, WILDLIFE (GENERAL)

59. Bury, R. B., R. A. Luckenbach, and S. D. Busack. 1977. Effects of off-road vehicles on vertebrates in the California desert. U.S. Fish Wildl. Serv. Wildl. Res. Rep. 8. 23 pp.

Impacts of off-road vehicles on creosote shrub habitat and associated wildlife were studied in California. Diversity, density, and biomass of birds, reptiles, and small mammals were inversely related to the level of vehicle use. Widespread negative impacts of off-road vehicle use on wildlife must be recognized to manage resources in areas of vehicle use.

OFF-ROAD VEHICLES, DESERTS, WILDLIFE MANAGEMENT, MAMMALS, BIRDS, REPTILES

60. Bury, R. B., and R. W. Marlow. 1973. The desert tortoise: Will it survive? Natl. Parks Conserv. Mag. 47(6):9-12.

The biology of the desert tortoise and factors threatening its survival in southern California are discussed in this nontechnical article. Recreation and housing developments, deliberate killing, highway accidents, and off-road vehicles all are contributing to the destruction of the desert tortoise and its habitat. Comprehensive plans for preserving tortoise habitat and excluding destructive human activities are required to maintain desert tortoise populations.

OFF-ROAD VEHICLES, HARASSMENT, DESERTS, RECREATION MANAGEMENT, U.S. BLM LANDS, THREATENED AND ENDANGERED SPECIES

61. Bury, R. L. 1978. Impacts of snowmobiles on wildlife. Trans. N. Am. Wildl. Nat. Resour. Conf. 43:149-156.

Existing research on snowmobile-wildlife interactions and future research needs are discussed.

OFF-ROAD VEHICLES, FORESTS, REVIEW, WILDLIFE (GENERAL)

62. Bury, R. L., S. F. McCool, and R. C. Wendling. 1976. Research on off-road vehicles: A summary of selected reports and a comprehensive bibliography. Pages 234-272 in Proceedings of the Southern States Recreation Research Applications Workshop, 15-18 September 1975, Asheville, N.C. U.S. For. Serv. Gen. Tech. Rep. SE-9.

This report summarizes major published research findings concerning recreational use of off-road vehicles, including impacts on wildlife. An indexed bibliography is also included.

OFF-ROAD VEHICLES, BIBLIOGRAPHY, REVIEW, WILDLIFE (GENERAL)

63. Bury, R. L., R. C. Wendling, and S. F. McCool. 1976. Off-road recreation vehicles: A research summary, 1969-1975. Texas Agric. Exp. Sta., College Station, MP-1277. 84 pp.

A comprehensive review of research concerning off-road vehicles is presented. Sections cover administration and regulation, economics, safety, technology, and environmental effects including impacts on animals. An indexed bibliography includes 128 references.

OFF-ROAD VEHICLES, HARASSMENT, DESERTS, FORESTS, RANGELAND, BIBLIOGRAPHY, REVIEW, RECREATION MANAGEMENT, U.S. BLM LANDS, U.S. NATIONAL FORESTS, WILDLIFE (GENERAL)

64. Busack, S. D., and R. B. Bury. 1974. Some effects of off-road vehicles and sheep grazing on lizard populations in the Mojave Desert. Biol. Conserv. 6: 179-183.

The effects of 2 environmentally disruptive activities were determined using numbers and biomass of lizards. Vehicle use in the desert eliminates vegetation and adversely affects lizard populations.

OFF-ROAD VEHICLES, DESERTS, REPTILES

65. Busnel, R. G. 1978. Effects of noise on wildlife: Introduction. Pages 7-22 in J. L. Fletcher and R. G. Busnel, eds. Effects of noise on wildlife. Academic Press, New York, N.Y.

This introductory article reviews some aspects of animal behavior associated with noise, citing examples from scientific literature and anecdotal observations. Theoretical approaches and aspects of policy relating to noise effects and the conservation of wildlife are discussed.

DISTURBANCE (GENERAL), HARASSMENT, WILDLIFE MANAGEMENT, WILDLIFE (GENERAL)

66. Butcher, D. 1972. Snowmobiles and the National Parks. Am. For. 78(4):28-31, 46-49.

The author cites Congressional testimony, popular literature, and personal experiences to document environmental impacts of snowmobiles, including effects on wildlife. Habitat destruction and deliberate harassment of animals are noted. The author calls for the prohibition of snowmobiles and other off-road vehicles in National Parks to protect the environment and ensure the satisfaction of other park visitors.

HARASSMENT, OFF-ROAD VEHICLES, TOURISM, FORESTS, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, WILDLIFE (GENERAL), COYOTE

67. Call, M. W. 1979. Habitat management guides for birds of prey. U. S. Bur. Land Manage. Tech. Note 338. 70 pp.

Habitat management considerations for birds of prey on public lands are reviewed. Human activities that should be controlled in nesting and roosting areas include recreational activities; many areas preferred by humans for recreation are important raptor nesting sites as well. Management considerations include siting recreational developments away from important raptor habitats, and restricting human activities during the breeding season.

CAMPING, HIKING, OFF-ROAD VEHICLES, TOURISM, RESEARCH IMPACTS, DESERTS, FORESTS, RIVERS, RANGELAND, REVIEW, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, U.S. BLM LANDS, RAPTORS

68. Caras, R. 1969. In defense of the grizzly. Audubon 71(3):52-55.

This nontechnical article critically examines another article calling for the removal of grizzly bears from National Parks. Statistics on bear-inflicted visitor injuries are related to the large number of people who annually visit National Parks, and compared to the number of visitors injured and killed in other ways. It is concluded that the hazards faced by visitors from bears are slight, and do not justify elimination of bears from parks.

TOURISM, WILDLIFE VIEWING, FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, WILDLIFE MANAGEMENT, GRIZZLY BEAR

69. Carbyn, L. N. 1974. Wolf population fluctuations in Jasper National Park, Alberta, Canada. Biol. Conserv. 6:94-101.

While there is little evidence to suggest that human visitation of Jasper National Park has reduced wolf populations, incidents of disturbance have been noted including interference at den sites containing pups, impact of highway and trail construction on denning sites, and wolves killed on highways by vehicles.

HIKING, TOURISM, WILDLIFE VIEWING, FORESTS, CANADIAN NATIONAL PARKS, THREATENED AND ENDANGERED SPECIES, GRAY WOLF

70. Cardiff, S. W. 1978. Status of the elf owl in California. Calif. Dept. Fish Game Project W-054-R-10/WP03/J01. 16 pp. (MIN 047980108).

Results of a survey to locate breeding populations of elf owls in California are reported, and possible reasons for the apparent population decline noted. Habitat destruction through land use changes is the most serious threat to California elf owls, but disturbances due to camping, boating, and scientific collecting are also mentioned.

BOATING, CAMPING, RESEARCH IMPACTS, THREATENED AND ENDANGERED SPECIES, ELF OWL

71. Carson, R. D. 1966. Destruction of colonial birds on an island on Suggi Lake. Blue Jay 24:96-97.

The destruction of a colony of white pelicans, double-crested cormorants, and great blue herons in Saskatchewan is documented. The island was used as a campsite by a group of fishermen, who apparently killed some pelicans and indirectly caused losses of nestlings to California gull predation by disturbing nesting birds.

CAMPING, FISHING, HARASSMENT, LAKES, PREDATION, WHITE PELICAN, DOUBLE-CRESTED CORMORANT, GREAT BLUE HERON, CALIFORNIA GULL

72. Carter, L. J. 1974. Off-road vehicles: A compromise plan for the California desert. Science 183:396-398.

Off-road vehicle activities in the California desert are described, and potential and actual impacts on wildlife and other resources discussed. Management alternatives are considered in relation to minimizing impacts on desert resources.

OFF-ROAD VEHICLES, DESERTS, RECREATION MANAGEMENT, U.S. BLM LANDS, WILDLIFE (GENERAL)

73. Cauble, C. 1979. Glacier's beleaguered grizzlies. Natl. Parks Conserv. Mag. 53(8):22-25.

Aspects of grizzly bear-human encounters and management of bears and people in Glacier National Park, Montana, are described in this nontechnical article. Serious confrontations between bears and park visitors have dramatically increased in recent years, reflecting increased backcountry use and behavioral changes in bears which apparently are learning to associate food with man. Management of both bears and people is required to protect bear populations and provide for human safety.

CAMPING, HIKING, TOURISM, FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, GRIZZLY BEAR

74. Chapman, R. C. 1979. Human disturbance of wolf dens--a management problem. Pages 323-328 in R. M. Linn, ed. Proceedings of the First Conference on Scientific Research in the National Parks, 9-12 November 1976, New Orleans, La. Vol. 1. U.S. Natl. Park Serv. Trans. Proc. Ser. 5.

Aspects of human disturbance at wolf dens were studied in Alaska. Wolves at homesites were experimentally disturbed, and wolf responses documented. Results are discussed in relation to determination of the size of closed areas around wolf dens in Mount McKinley National Park.

CAMPING, HIKING, TOURISM, WILDLIFE VIEWING, RECREATION MANAGEMENT, TUNDRA, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, GRAY WOLF

75. Chester, J. M. 1976. Human wildlife interactions in the Gallatin Range, Yellowstone National Park, 1973-1974. M.S. Thesis. Montana State University, Bozeman. 114 pp.

Relationships between human use and the distribution, movements, and behavior of seven species of wildlife in the backcountry of the Gallatin Range, Yellowstone National Park, were investigated. Variation in the intensity of human use was rarely responsible for shifts in wildlife distribution. Wildlife belligerency toward humans was rare, although backcountry travelers tended to engage in activities which could increase detrimental encounters with wildlife.

CAMPING, HIKING, WILDLIFE VIEWING, FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, BLACK BEAR, GRIZZLY BEAR, ELK, BIGHORN SHEEP, MOOSE, COYOTE, MULE DEER

76. Chester, J. M. 1980. Factors influencing human-grizzly bear interactions in a backcountry setting. Pages 351-357 in C. J. Martinka and K. L. McArthur, eds. Bears--their biology and management. Fourth International Conference on Bear Research and Management, February 1977, Kalispell, Mont. Bear Biology Association.

Grizzly bear distribution and behavior and human behavior were studied in Yellowstone National Park, Wyoming. Grizzlies used areas with elevations greater than the study area's average trail elevation. On-trail grizzly observations peaked when grizzlies migrated to lower elevations. Some backcountry travelers engaged in activities that could encourage human-bear conflicts.

CAMPING, HIKING, FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, GRIZZLY BEAR

77. Choate, J. S. 1967. Factors influencing nesting success of eiders in Penobscot Bay, Maine. J. Wildl. Manage. 31:769-777.

Data recorded for 1,030 eider nests on five islands in Maine showed that predation by gulls was responsible for most nest losses. Human disturbance was indirectly responsible for lowered nesting success by increasing vulnerability of nests to gull predation.

DISTURBANCE (GENERAL), COASTAL ZONES, PREDATION, COMMON EIDER, GULLS

78. Chubb, M., and P. Ashton. 1969. Park and recreation standards research: The creation of environmental quality controls for recreation. Michigan State Univ., East Lansing, Dept. Park Recr. Resour. Tech. Rep. 5. 76 pp.

This report examines recreational carrying capacity in terms of controlling factors including wildlife. Problems of terminology and the use of the concept in Federal, State, and regional planning are discussed. Examples of recreation limited by or dependent on wildlife resources are given.

TOURISM, WILDLIFE VIEWING, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, WILDLIFE (GENERAL)

79. Clark, S. H. 1968. Breeding ecology and experimental management of the American eider in Penobscot Bay, Maine. M.S. Thesis. University of Maine, Orono. 171 pp.

During a study of eiders in Maine, nest success on islands tended to decline as visits per island increased. Predation on eider nests by herring gulls and black-backed gulls was frequent while disturbed eiders were away from nests.

RESEARCH IMPACTS, COASTAL ZONES, PREDATION, COMMON EIDER, HERRING GULL, GREAT BLACK-BACKED GULL

80. Clevenger, G. A., and G. W. Workman. 1977. The effects of campgrounds on small mammals in Canyonlands and Arches National Parks, Utah. Trans. N. Am. Wildl. Nat. Resour. Conf. 42: 473-484.

Small mammal studies in 2 National Parks in Utah indicated that campgrounds may have significant effects on populations of small mammals inhabiting them. Additional food available at campgrounds may be partly responsible for larger populations observed in campgrounds.

CAMPING, DESERTS, U.S. NATIONAL PARKS, DESERT COTTONTAIL, DEER MOUSE, COLORADO CHIPMUNK, ORD'S KANGAROO RAT, WHITE-TAILED ANTELOPE SQUIRREL, WOODRATS

81. Cline, D. R., C. Wentworth, and T. W. Barry. 1979. Social and economic values of marine birds. Pages 173-182 in J. C. Bartonek and D. N. Nettleship, eds. Conservation of marine birds of northern North America. Papers from the International Symposium, 13-15 May 1975, Seattle, Wash. U.S. Fish Wildl. Serv. Wildl. Res. Rep. 11.

Tangible and intangible benefits of marine birds to human societies are described. Seabirds provide recreational, scientific, and educational values to people as well as significant economic benefits. Increasing numbers of people are visiting marine bird viewing areas of North America, contributing significantly to regional economies. Evaluations of biological and economic impacts resulting from tourism are urgently needed.

DISTURBANCE (GENERAL), WILDLIFE VIEWING, TOURISM, COASTAL ZONES, WILDLIFE MANAGEMENT, RECREATION MANAGEMENT, SEABIRDS

82. Cobus, M. 1972. Moose as an aesthetic resource and their summer feeding behavior. Am. Moose Conf. Workshop 8: 244-273.

A moose herd in Sibley Provincial Park, Ontario, is described as an appreciative resource used by many campers who go there specifically to view moose. Responses of moose to the presence of humans and aspects of the resource users are discussed.

CAMPING, TOURISM, WILDLIFE VIEWING, LAKES, FORESTS, FLIGHT DISTANCE, CANADIAN PROVINCIAL PARKS, MOOSE

83. Cole, G. F. 1971. Preservation and management of grizzly bears in Yellowstone National Park. BioScience 21: 858-864.

General information is presented concerning numbers of grizzly bears and their relationships with humans in Yellowstone National Park. Conclusions are made concerning preservation of the bear population, elimination of unnatural food sources, transplanting troublesome bears, and management actions which could reduce hazards to park visitors and minimize the need to control bears.

CAMPING, HIKING, HARASSMENT, TOURISM, WILDLIFE VIEWING, FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, WILDLIFE MANAGEMENT, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, GRIZZLY BEAR

84. Cole, G. F. 1973. Management involving grizzly bears in Yellowstone National Park 1970-1972. U.S. Natl. Park Serv. Nat. Resour. Rep. 7. 11 pp.

Management to maintain the grizzly bear population under natural conditions and reduce bear injuries to humans was evaluated. Eliminating unnatural food sources and controlling bears resulted in reducing visitor injuries in developed park areas, and fewer bears using developed areas and warranting control. Most injuries from bears in backcountry seem to be preventable with accurate knowledge of female grizzly locations and appropriate control of hiking and camping.

CAMPING, HIKING, TOURISM, WILDLIFE VIEWING, FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, GRIZZLY BEAR

85. Cole, G. F. 1974. Management involving grizzly bears and humans in Yellowstone National Park, 1970-1973. BioScience 24:335-338.

A management program to reduce grizzly-induced injuries to humans and maintain more natural bear populations is evaluated. Data indicate that injury rates are reduced from previous levels, and that management has contributed toward restoring the grizzly population to more natural conditions. Yearly production of young is still adequate to replenish the population.

CAMPING, HIKING, FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, GRIZZLY BEAR

86. Cole, G. F. 1976. Management involving grizzly and black bears in Yellowstone National Park 1970-1975. U.S. Natl. Park Serv. Nat. Resour. Rep. 9. 26 pp.

Management to maintain grizzly and black bear populations under natural conditions and reduce bear injuries to humans is evaluated. Management involved eliminating unnatural food sources, controlling problem bears, regulating camping and hiking, and informing park visitors concerning precautions and the consequences of feeding bears. Data on injuries and bear populations indicate that management has been successful.

CAMPING, HIKING, TOURISM, WILDLIFE VIEWING, FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, GRIZZLY BEAR, BLACK BEAR

87. Cole, G. F. 1976. Progress in restoring a natural grizzly bear population in Yellowstone National Park. Pages 183-193 in Research in the parks:

Transactions of the National Park Centennial Symposium, 28-29 December 1971. U.S. Natl. Park Serv. Symp. Ser. 1.

Park management procedures and their effects on man-bear interactions are described. Management actions begun in 1970 and 1971 aimed to restore bears to the use of natural foods, and to reduce human injuries inflicted by bears. Management actions and a preliminary evaluation of the program results are discussed.

CAMPING, HIKING, TOURISM, WILDLIFE VIEWING, FORESTS, HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, GRIZZLY BEAR

88. Conover, M. R., and D. E. Miller. 1978. Reaction of ring-billed gulls to predators and human disturbances at their breeding colonies. Pages 41-47 in Proceedings, 1978 Conference of the Colonial Waterbird Group, 20-23 October 1978, New York, N.Y.

During studies of ring-billed gull colonies in Washington, observations of gull responses to predators and human disturbances were noted. When faced with a disturbance or predation, gulls may desert part or all of a nesting colony. The gulls' reaction depends on the nature of the disturbance, the timing of the disturbance relative to the breeding season, the number of gulls present, and other factors. Such unstable colonies may be an adaptation to fluctuating and unpredictable predation pressures.

DISTURBANCE (GENERAL), RESEARCH IMPACTS, LAKES, RIVERS, FLIGHT DISTANCE, RING-BILLED GULL

89. Cooke, A. S. 1980. Observations on how close certain passerine species will tolerate an approaching human in rural and suburban areas. Biol. Conserv. 18:85-88.

Data are presented on how close certain passerines tolerate an approaching human before flying away. Species were more approachable in suburban areas than in rural areas. In either area, small birds allowed a closer approach than larger species.

WILDLIFE VIEWING, URBAN ZONES, FLIGHT DISTANCES, PASSERINES

90. Cope, J. B. 1978. Can bats tolerate human invasion of their habitats? Pages 161-166 in C. M. Kirkpatrick, ed. Wildlife and people. Proceedings of the 1978 John S. Wright Forestry Conference, 23-24 February 1978, Purdue University, West Lafayette, Ind.

Interactions between humans and bats and reasons for recent bat population declines are noted. Because superstitions still color public opinions about bats, education is very important in bat conservation. Human disturbance of bats, especially at hibernating colonies in caves, is a major cause of population declines. Active conservation efforts by biologists, government officials, and the general public can assure the survival of endangered bat species.

SPELUNKING, RESEARCH IMPACTS, HARASSMENT, FORESTS, REVIEW, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, BATS, INDIANA BAT

91. Corbet, P. S. 1970. Snowmobiles: For pleasure, profit, and pollution. Ont. Nat. 8(2):10-12.

Impacts of snowmobiles on urban and rural environments, including effects on wildlife, are discussed in this nontechnical article. Snowmobiles compact snow, changing the physical and thermal properties and thus potentially affecting animals that live beneath snow in winter. Deliberate harassment of wildlife by snowmobilers is uncommon but may be significant. Effective legislation and enforcement are needed to control the impacts of snowmobiles on the environment.

OFF-ROAD VEHICLES, HARASSMENT, TOURISM, FORESTS, RECREATION MANAGEMENT, WILDLIFE (GENERAL)

92. Cornett, D. C., W. M. Longhurst, R. E. Hafenfeld, T. P. Hemker, and W. A. Williams. 1979. Evaluation of the potential impact of proposed recreation development on the Mineral King deer herd. Pages 474-480 in The Mitigation Symposium, 16-20 July 1979, Fort Collins, Colo. U.S. For. Serv. Gen. Tech. Rep. RM-65.

A study of the Mineral King deer herd in California assessed recreation impacts and formulated mitigation plans for proposed recreational developments. Existing impacts studied included effects of summer recreation activities such as hiking, camping, and horseback riding.

CAMPING, HIKING, HORSEBACK RIDING, TOURISM, FORESTS, FLIGHT DISTANCE, RECREATION MANAGEMENT, U.S. NATIONAL FORESTS, MULE DEER

93. Cowan, I. M. 1972. The status and conservation of bears (Ursidae) of the world--1970. Pages 343-367 in S. Herrero, ed. Bears--their biology and management. Second International Conference on Bear Research and Management, 6-9 November 1970, Calgary, Alberta. IUCN Publ. New Ser. 23, Morges, Switzerland.

The status of the genera and species of bears in the world is reviewed. Present evidence suggests that bears suffered little decline at the hand of man until the invention and proliferation of firearms. Human encroachment upon remaining bear populations is a worsening problem. Bear management practices are reviewed.

CAMPING, HIKING, HARASSMENT, WILDLIFE VIEWING, FORESTS, TUNDRA, COASTAL ZONES, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, WILDLIFE MANAGEMENT, REVIEW, U.S. NATIONAL PARKS, CANADIAN NATIONAL PARKS, BEARS

94. Cowan, I. M. 1974. Management implications of behavior in the large herbivorous mammals. Pages 921-934 in V. Geist and F. Walther, eds. The behavior of ungulates and its relation to management. Vol. 2. IUCN Publ. New Ser. 24, Morges, Switzerland.

Several topics concerning ungulate behavior and management are reviewed, including behavioral constraints on nonconsumptive use. Protection of breeding grounds, reducing disturbance to newborn young, and minimizing harassment from tourists and vehicles are suggested.

HARASSMENT, TOURISM, WILDLIFE VIEWING, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, PREDATION, REVIEW, UNGULATES

95. Craighead, F. C., Jr. 1976. Grizzly bear ranges and movement as determined by radiotracking. Pages 97-109 in M. R. Pelton, J. W. Lentfer, and G. E. Folk, eds. Bears--their biology and management. Third International Conference on Bear Research and Management, June 1974, Binghamton, N.Y. and Moscow, USSR. IUCN Publ. New Ser. 40, Morges, Switzerland.

Grizzly bear ranges and movements in the Yellowstone region have been greatly influenced by garbage dumps utilized as feeding areas; as a result, abrupt closure of the dumps diverted bears into campgrounds and altered seasonal movements. Problem grizzlies removed to other areas usually quickly returned and were eliminated. Movement patterns must be understood in order to make wise management decisions.

CAMPING, TOURISM, WILDLIFE VIEWING, FORESTS, HUMAN HEALTH AND SAFETY, WILDLIFE MANAGEMENT, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, U.S. NATIONAL FORESTS, GRIZZLY BEAR

96. Craighead, F. C., Jr., and J. J. Craighead. 1972. Data on grizzly bear denning activities and behavior obtained by using wildlife telemetry. Pages 84-106 in S. Herrero, ed. Bears--their biology and management. Second International Conference on Bear Research and Management, 6-9 November 1970, Calgary, Alberta. IUCN Publ. New Ser. 23, Morges, Switzerland.

Denning behavior of telemetered grizzly bears was studied in Yellowstone National Park. Observations suggested that grizzlies do not actively defend dens from other bears or humans if alternate courses of action are available. Most grizzlies apparently prefer to avoid humans; the most dangerous bears are those that have been wounded, sows with cubs, and those that have learned to associate food with humans.

DISTURBANCE (GENERAL), RESEARCH IMPACTS, FORESTS, HUMAN HEALTH AND SAFETY, FLIGHT DISTANCE, THREATENED AND ENDANGERED SPECIES, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS

97. Craighead, J. J. 1980. A proposed delineation of critical grizzly bear

habitat in the Yellowstone region. Bear Biol. Assoc. Monogr. Ser. 1. 20 pp.

Results of studies of grizzly bear ecology in and near Yellowstone National Park are reported, with an aim to the delineation of critical bear habitat. Interaction and competition between bears and man are described. Competition for space and habitat is becoming more severe as visitation increases and backcountry travel becomes more popular. In order to adapt man's activities to the presence of bears, management agencies must develop procedures to minimize competition between bears and man for space and habitat.

CAMPING, HIKING, TOURISM, FORESTS, HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, GRIZZLY BEAR

98. Craighead, J. J., and F. C. Craighead, Jr. 1971. Grizzly bear-man relationships in Yellowstone National Park. BioScience 21:845-857.

Results are reported of 12 years of research on grizzly bears and their relationships with man in Yellowstone National Park and surrounding national forests. The chance of injury from grizzly bears is very small, but grizzly attacks provide exciting news and generate an exaggerated public response, which in turn may initiate over-reactionary bear control measures harmful to bear-human coexistence. Management must be tailored to the facts of bear behavior, while visitors must be willing to accept a small risk.

CAMPING, HIKING, HARASSMENT, TOURISM, WILDLIFE VIEWING, FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, U.S. NATIONAL FORESTS, GRIZZLY BEAR

99. Cronan, J. M., Jr. 1957. Food and feeding habits of the scaups in Connecticut waters. Auk 74:459-468.

During studies of greater and lesser scaups along the Connecticut coast, human activity was observed to exert strong effects on scaup feeding activity. Many feeding areas were not used when boating and off-shore fishing were taking place. During mid-winter, human activity along the shore apparently kept scaups from using normal feeding areas.

BOATING, FISHING, DISTURBANCE (GENERAL), COASTAL ZONES, GREATER SCAUP, LESSER SCAUP

100. Davids, R. C. 1978. Polar bears aren't pets, but this town is learning how to live with them. Smithsonian 8(11):70-79.

This nontechnical article describes the biology and behavior of polar bears and reports problems of their presence near Churchill, Manitoba. Despite the dangers polar bears pose to town residents, citizens prefer to coexist with the bears. Plans for organized viewing of the bears and management actions to prevent human injury are discussed.

HARASSMENT, TOURISM, WILDLIFE VIEWING, COASTAL ZONES, TUNDRA, URBAN ZONES, HUMAN HEALTH AND SAFETY, WILDLIFE MANAGEMENT, POLAR BEAR

101. Day, G. I. 1971. Statewide investigations project: Javelina activity patterns. Ariz. Game Fish Dept. Project W-078-R-15/WP02/J09. 9 pp. (MIN 027-381147).

In studies of telemetered javelina (collared peccaries) in Arizona, the presence of humans and four-wheel-drive vehicles had pronounced effects on javelina herd behavior. The herds studied were believed to be under frequent stress in winter from human disturbance.

DISTURBANCE (GENERAL), OFF-ROAD VEHICLES, U.S. STATE PARKS AND LANDS, COLLARED PECCARY

102. Day, G. I. 1973. Statewide investigations: Javelina activity patterns. Ariz. Game Fish Dept. Project W-078-R-17/WP02/J09. 5 pp. (MIN 027680082).

Accidental and deliberate harassment of javelina (collared peccary) herds by various human activities had no observable adverse effects on the herds. After each disturbance the herds appeared to become increasingly wary.

DISTURBANCE (GENERAL), HARASSMENT, FLIGHT DISTANCE, U.S. STATE PARKS AND LANDS, COLLARED PECCARY

103. de Vos, A. 1960. Behavior of barren ground caribou on their calving grounds. J. Wildl. Manage. 24:250-258.

As part of an ecological study of caribou in the Northwest Territories, reactions of caribou to human disturbance were studied. The flight distance of alerted caribou varied greatly with environmental conditions and band size. Cows with calves were more alarmed by disturbances than were calfless individuals.

DISTURBANCE (GENERAL), TUNDRA, FLIGHT DISTANCE, CARIBOU

104. de Vos, A. 1967. Wildlife management in forests and ranges for aesthetical purposes. Pages 215-217 in Proceedings of the Society of American Foresters Meeting, 12-15 September 1966, Seattle, Wash. Society of American Foresters, Washington, D.C.

The history of forest management for aesthetic purposes is reviewed, including current examples of nongame wildlife management in forests and ranges. A need for greater interest in nongame wildlife and nonconsumptive use of forest resources is expressed.

FORESTS, RANGELAND, RECREATION MANAGEMENT, U.S. NATIONAL FORESTS, WILDLIFE (GENERAL)

105. Dean, F. C. 1976. Aspects of grizzly bear population ecology in Mount McKinley National Park. Pages 111-119 in M. R. Pelton, J. W. Lentfer, and G. E. Folk, eds. Bears--their biology and management. Third International Conference on Bear Research and Management, June 1974, Binghamton, N.Y. and Moscow, USSR. IUCN Publ. New Ser. 40, Morges, Switzerland.

Aspects of grizzly bear populations in Mount McKinley National Park, Alaska, are presented and related to current management problems. The potential for bear-human problems is increasing as visitation increases and backcountry travel becomes more popular.

CAMPING, HIKING, TOURISM, TUNDRA, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, GRIZZLY BEAR

106. DeForge, J. R. 1972. Man's invasion into the bighorn's habitat. Trans. Desert Bighorn Counc. 16:112-115.

From observations of a bighorn population in California, the author suggests that off-road vehicle use and other human disturbances caused a reduction in the number of sheep using the area.

DISTURBANCE (GENERAL), OFF-ROAD VEHICLES, DESERTS, BIGHORN SHEEP

107. DeForge, J. R. 1976. Stress: Is it limiting bighorn? Trans. Desert Bighorn Counc. 20:30-31.

The bighorn sheep is an ice-age mammal that has become highly specialized, evolving essentially outside the influence of man. Today, however, human encroachment on sheep habitats and disturbance of populations result in stress on bighorns, forcing them to adapt socially. Stress, frequently human-induced, appears to be a major limiting factor in the bighorn's struggle for survival.

DISTURBANCE (GENERAL), HARASSMENT, DESERTS, RANGELAND, WILDLIFE MANAGEMENT, BIGHORN SHEEP

108. Dekker, D. 1967. Disappearance of the peregrine falcon as a breeding bird in a river valley in Alberta. Blue Jay 25:175-176.

The author discusses possible factors in the disappearance of falcons from a region in Alberta. Robbing of young by falconers, pesticides, and disturbances by bird watchers and photographers are held to be partly responsible. The disappearance of falcons has been characterized by an apparent shortage of adult birds.

HARASSMENT, WILDLIFE VIEWING, THREATENED AND ENDANGERED SPECIES, PRAIRIE FALCON, PEREGRINE FALCON

109. Dekker, D. 1969. A plea for federal protection of the peregrine falcon. II. Can. Field-Nat. 83:410-411.

The author comments on the role of human disturbance in the decline of North American peregrine falcon populations. Continent-wide protection of falcons is urged as a step toward the preservation and ultimate recovery of peregrine falcons.

DISTURBANCE (GENERAL), THREATENED AND ENDANGERED SPECIES, WILDLIFE MANAGEMENT, PEREGRINE FALCON

110. DeMarchi, R. 1975. Report and recommendations of the workshop on California bighorn sheep. Pages 143-163 in J. B. Trefethen, ed. The wild sheep in modern North America. Boone and Crockett Club and the Winchester Press, New York, N.Y.

Objectives and procedures for management of California bighorn sheep for consumptive and nonconsumptive uses are described. Protection of bighorn sheep includes regulating off-road vehicles and human activities such as hiking, camping, picnicking, and sightseeing. Nonconsumptive recreational uses of bighorn sheep are recognized as valuable and important management criteria.

CAMPING, CLIMBING, HIKING, OFF-ROAD VEHICLES, WILDLIFE VIEWING, WILDLIFE MANAGEMENT, BIGHORN SHEEP

111. Denniston, R. H. 1956. Ecology, behavior and population dynamics of the Wyoming or Rocky Mountain moose, Alces alces shirasi. Zoologica 41:105-118.

This report of ecological studies of moose in Wyoming includes sections on man-moose interactions. Moose were found to be tolerant of close observers when no quick motions or loud noises were made. Cases of moose aggression toward people and automobiles are noted.

DISTURBANCE (GENERAL), FORESTS, HUMAN HEALTH AND SAFETY, FLIGHT DISTANCE, U.S. NATIONAL PARKS, MOOSE

112. DesGranges, J. L., and A. Reed. 1981. Disturbance and control of selected colonies of double-crested cormorants in Quebec. Colon. Waterbirds 4:12-19.

Double-crested cormorants nesting in mixed colonies with gulls in the St. Lawrence estuary were subjected to various disturbances. Visits to colonies by investigators resulted in significant losses of eggs and young to gull predation. Nests near the colony peripheries and those containing no hatched young suffered the greatest losses.

DISTURBANCE (GENERAL), RESEARCH IMPACTS, COASTAL ZONES, PREDATION, WILDLIFE MANAGEMENT, DOUBLE-CRESTED CORMORANT, GULLS

113. Dey, N. H. 1960. Statwide waterfowl management study: Color marking and field observation of Canada geese to determine breeding territorialism, family organization, and population dynamics. Utah Wildl. Resour. Div. Project W-029-R-14/WPG/J01. 8 pp. (MIN 437480118).

During population studies of nesting Canada geese in Utah, responses of geese to human disturbance were noted. Some nest desertions appeared to be caused by disturbance, but it is unclear whether the abandonments were related to the presence of the researchers or to low-flying aircraft from a nearby Air Force base.

RESEARCH IMPACTS, HARASSMENT, WETLANDS, LAKES, WILDLIFE MANAGEMENT, CANADA GOOSE

114. Ditton, R. B., D. J. Schmidly, W. J. Boeer, and A. R. Graefe. 1977. A survey and analysis of recreational and livestock impact on the riparian zone of the Rio Grande in Big Bend National Park. Pages 256-266 in Proceedings: River Recreation Management and Research Symposium, 24-27 January 1977, Minneapolis, Minn. U.S. For. Serv. Gen. Tech. Rep. NC-28.

Visitor usage patterns, biological conditions, and recreational impact parameters were measured over a 12-month period. Use levels and impact were strongly correlated, but recreational impact was not significantly related to biological health of the area as indicated by rodent fauna and vegetation.

BOATING, CAMPING, DESERTS, RIVERS, U.S. NATIONAL PARKS, RODENTS

115. Doan, K. H. 1970. Effect of snowmobiles on fish and wildlife resources.

Conv. Int. Assoc. Game Fish Conserv. Comm. 60:97-103.

Increases in demand for snowmobiles and potential impacts on fish and wildlife resources are reviewed. Impacts of snowmobiles are listed as benefits and liabilities; other sections discuss registration, regulation, and education of snowmobile users.

HARASSMENT, OFF-ROAD VEHICLES, FORESTS, RECREATION MANAGEMENT, WILDLIFE (GENERAL)

116. Dorrance, M. J., P. J. Savage, and D. E. Huff. 1975. Effects of snowmobiles on white-tailed deer. J. Wildl. Manage. 39:563-569.

In studies of white-tailed deer in Minnesota, deer responded to very low intensities of intrusion by man and snowmobiles. Displacement of deer from areas along trails occurred; in some cases changes in home range size and increased movement were observed. It is suggested that the observed disturbances could be detrimental to deer, especially during severe winters.

OFF-ROAD VEHICLES, FORESTS, U.S. STATE PARKS AND LANDS, WHITE-TAILED DEER

117. Douglas, C. L. 1976. Coordination of bighorn research and management in Joshua Tree National Monument. Trans. N. Am. Wild Sheep Conf. 2:1-15.

In Joshua Tree National Monument, California, decreases in annual precipitation over the last 20 years have caused a large decline in available water sources for bighorn sheep. Human presence worsens the problem when campers and hikers keep sheep away from waterholes and cause general harassment. Management actions to improve conditions for bighorn sheep are discussed.

CAMPING, HIKING, HARASSMENT, DESERTS, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, BIGHORN SHEEP

118. Doyle, P. 1974. Progress made by the snowmobile industry since 1971 in areas of environmental concern. Pages 77-85 in D. F. Holecek, ed. Proceedings of the 1973 Snowmobile and Off the Road Vehicle Research Symposium. Michigan State Univ., East Lansing, Dept. Park Recr. Resour. Tech. Rep. 9.

Results of two industry-funded studies are reported in support of claims that snowmobiles produce negligible impacts on the environment. One project in Wisconsin determined that telemetered deer and rabbits increased movements during snowmobile activity periods, but did not change home range size; another study found minimal impacts of snowmobile use on non-forest vegetation.

OFF-ROAD VEHICLES, HARASSMENT, FORESTS, RECREATION MANAGEMENT, U.S. STATE PARKS AND LANDS, WHITE-TAILED DEER, EASTERN COTTONTAIL

119. Drent, R. H., and C. J. Guiguet. 1961. A catalogue of British Columbia seabird colonies. British Columbia Provincial Museum, Victoria, Occ. Pap. 12. 173 pp.

Distribution and nesting habits of seabirds in British Columbia and impacts of human disturbance at colonies are discussed. The increase in the use of motorboats for fishing and touring along the coast has made colonies more accessible; as a result, curious sightseers often frighten adult birds from nests, leading to losses of eggs and young from predation by crows and gulls. Regulation of visitation and public education are necessary to prevent disturbance.

BOATING, TOURISM, WILDLIFE VIEWING, COASTAL ZONES, PREDATION, RECREATION MANAGEMENT, SEABIRDS, NORTHWESTERN CROW

120. Drury, W. H. 1979. Population dynamics in northern marine birds. Pages 123-139 in J. C. Bartonek and D. N. Nettleship, eds. Conservation of marine birds of northern North America. Papers from the International Symposium, 13-15 May 1975, Seattle, Wash. U.S. Fish Wildl. Serv. Wildl. Res. Rep. 11.

Theoretical aspects of marine bird population dynamics in relation to human disturbance are discussed. It is likely that even undisturbed populations fluctuate considerably due to specific species strategies and changes in the marine environment.

Goals are identified for improving knowledge of seabird populations to facilitate conservation efforts, including aspects of human-seabird interactions.

DISTURBANCE (GENERAL), HARASSMENT, OFF-ROAD VEHICLES, COASTAL ZONES, REVIEW, PREDATION, WILDLIFE MANAGEMENT, SEABIRDS

121. Duffy, C., and L. N. Ellison. 1979. Human disturbance and breeding birds. Auk 96:815-817.

Duffy questions the conclusions of previous investigators studying impacts of disturbance of breeding double-crested cormorants, and discusses methodological difficulties of studies of reproductive success relative to investigator disturbance; Ellison replies.

RESEARCH IMPACTS, COASTAL ZONES, PREDATION, DOUBLE-CRESTED CORMORANT, SEABIRDS

122. Duffy, D. C. 1978. Terns and skimmers in Connecticut and eastern Long Island, N.Y., 1972-76. Ibis 120:131. (Abstract only).

The status of common terns, roseate terns, least terns, and black skimmers in Connecticut and New York is reviewed. Recent censuses indicate that roseate terns are decreasing, while the other bird populations are stable. The least tern is most vulnerable to human disturbance since many of its colonies are located close to bathing beaches or other recreational areas. Many black skimmers also nest in areas susceptible to flooding and human disturbance.

DISTURBANCE (GENERAL), SWIMMING, COASTAL ZONES, URBAN ZONES, LEAST TERN, ROSEATE TERN, COMMON TERN, BLACK SKIMMER

123. Dunaway, D. J. 1970. Status of bighorn sheep populations and habitat studies on the Inyo National Forest. Trans. Desert Bighorn Counc. 14:127-146.

Included in this report of ecological studies of bighorn sheep in California are observations concerning possible impacts of recreation activities on sheep. Recreational use in sheep habitats has coincided with sheep population declines in some cases.

CAMPING, CLIMBING, HIKING, FORESTS, TUNDRA, U.S. NATIONAL FORESTS, BIGHORN SHEEP

124. Dunaway, D. J. 1971. Bighorn sheep habitat management on the Inyo National Forest, a new approach. Trans. Desert Bighorn Counc. 15:18-23.

A major factor in the decline of bighorn sheep populations in California appears to be excessive human use of sheep ranges. A zoological area is proposed to include two large bighorn sheep ranges; management objectives are to protect and maintain habitat and limit human use.

CAMPING, HIKING, FORESTS, TUNDRA, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL FORESTS, BIGHORN SHEEP

125. Dunaway, D. J. 1971. Human disturbance as a limiting factor of Sierra Nevada bighorn sheep. Trans. N. Am. Wild Sheep Conf. 1:165-173.

Disturbance caused by human recreation is suggested as a factor limiting populations of bighorn sheep in California. Three populations that have declined were in areas of increased recreational use; two other stable populations have suffered less disturbance by recreationists.

CAMPING, CLIMBING, HIKING, FORESTS, TUNDRA, U.S. NATIONAL FORESTS, BIGHORN SHEEP

126. Dunford, R. D. 1971. Summer behavior of American woodcock in central Maine. M.S. Thesis. University of Maine, Orono. 100 pp.

During studies of woodcock, several birds captured and radio-tagged failed to return to the field where they were originally captured. Human disturbance may have affected the pattern of use of diurnal and nocturnal sites.

RESEARCH IMPACTS, FORESTS, AMERICAN WOODCOCK

127. Dunstan, T. C. 1968. Breeding success of osprey in Minnesota from 1963 to 1968. Loon 40:109-112.

The author reports results of his own studies plus observations gathered

from several sources concerning osprey breeding success in Minnesota. Records indicate that human disturbance is a significant factor in reducing osprey productivity. Disturbances by direct shooting and by chilling or overheating of eggs when adults are frightened from nests are recorded.

DISTURBANCE (GENERAL), FORESTS, OSPREY

128. Dunstan, T. C. 1973. The biology of ospreys in Minnesota. Loon 45:108-113.

Results of 10 years of osprey research are summarized. While the effects of human disturbance on osprey productivity are difficult to evaluate, observations suggest that ospreys are sensitive to human interference, especially during incubation. Some nest abandonments have followed increased summer recreational use of the areas by boaters and fishermen.

BOATING, FISHING, RESEARCH IMPACTS, FORESTS, LAKES, OSPREY

129. Dunstan, T. C., J. E. Mathisen, and J. F. Harper. 1975. The biology of bald eagles in Minnesota. Loon 47:5-10.

Among aspects of the biology and behavior of bald eagles described are the effects of environmental contaminants and human disturbance on eagle productivity. An investigation by J. E. Mathisen showed that disturbance in the mid-1960's was within the tolerance limits of eagles, but another later study found evidence of reduced eagle productivity associated with disturbance. Increased snowmobile use is bringing more people into remote areas where eagles winter, and the effects on eagles are unknown.

DISTURBANCE (GENERAL), OFF-ROAD VEHICLES, FORESTS, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL FORESTS, BALD EAGLE

130. Dwernychuk, L. W., and D. A. Boag. 1972. How vegetative cover protects duck nests from egg-eating birds. J. Wildl. Manage. 36:955-958.

The importance of vegetative cover in protecting duck nests from avian predators was studied in Alberta. Human disturbance can lead to egg predation when adults are flushed from nests, but avian predators located even well-hidden artificial nests. Disturbance of vegetation around nests by humans apparently provides a visual clue aiding avian predators in locating unattended duck nests.

DISTURBANCE (GENERAL), LAKES, WETLANDS, PREDATION, WATERFOWL, RING-BILLED GULL, CALIFORNIA GULL, COMMON CROW, BLACK-BILLED MAGPIE

131. Eckstein, R. G., T. F. O'Brien, O. J. Rongstad, and J. G. Bollinger. 1979. Snowmobile effects on movements of white-tailed deer: A case-study. Environ. Conserv. 6:45-51.

Effects of snowmobiles on winter home ranges, movements, and activity patterns of white-tailed deer were studied in Wisconsin. Daily activity patterns, home range size, and habitat use were little affected by snowmobiles. The impact of snowmobiles on deer appears to be minimal, but routing trails away from deer concentration areas in winter is suggested.

OFF-ROAD VEHICLES, HARASSMENT, FORESTS, FLIGHT DISTANCE, RECREATION MANAGEMENT, U.S. NATIONAL FORESTS, WHITE-TAILED DEER

132. Eckstein, R. G., and O. J. Rongstad. 1973. Effects of snowmobiles on the movements of white-tailed deer in northern Wisconsin. Proc. Midwest Fish Wildl. Conf. 35:35-39.

Studies in northern Wisconsin evaluated the effects of snowmobile use on white-tailed deer in wintering yards. Movements and activities of telemetered deer were compared between a yard receiving snowmobile use and one with no use. Some deer showed avoidance of snowmobile trails while the machines were present, but no significant changes in home range size or daily movement patterns were observed.

OFF-ROAD VEHICLES, HARASSMENT, FORESTS, WHITE-TAILED DEER

133. Elder, J. M. 1977. Human interactions with Sierra Nevada bighorn sheep: The Mount Baxter herd. M.S. Thesis. University of Michigan, Ann Arbor. 93 pp.

A project begun in 1976 studied human disturbance of bighorn sheep in California. Human use of the area included backpacking and climbing. Hikers camped in very limited areas associated with the trail, water, and trees; climbers had the greatest potential effects on sheep. The levels of intrusion did not appear to be adversely affecting sheep, but if the number of users is allowed to increase the effects on sheep should be closely monitored.

CAMPING, CLIMBING, HIKING, WILDLIFE VIEWING, TUNDRA, RECREATION MANAGEMENT, BIGHORN SHEEP

134. Ellison, L. N., and L. Cleary. 1978. Effects of human disturbance on breeding of double-crested cormorants. Auk 95:510-517.

Studies in the St. Lawrence estuary assessed the influence of investigators on cormorants. Frequent visits to colonies during the breeding season caused nest abandonment and gull predation, and discouraged late-nesting birds from settling in disturbed colonies. Birds were less susceptible to disturbance in the second year of the study.

RESEARCH IMPACTS, TOURISM, PREDATION, COASTAL ZONES, DOUBLE-CRESTED CORMORANT, HERRING GULL

135. Enderson, J. H., and J. Craig. 1974. Status of the peregrine falcon in the Rocky Mountains in 1973. Auk 91:727-736.

Factors responsible for an apparent decline in the numbers of peregrine falcons in the central Rocky Mountains are discussed. Pesticides appear to be the major factor; human disturbances such as rock climbing, picnicking, and highways may be important locally but are not widespread enough to explain the general decline.

CLIMBING, PICNICKING, FORESTS, RANGELAND, THREATENED AND ENDANGERED SPECIES, PEREGRINE FALCON

136. Engel, J. M., F. R. Courtsal, R. L. Martin, J. R. Messerli, T. H. Hooper, R. E. Mumford, and L. E. Terry. 1975. Recovery plan for the Indiana bat. U.S. Fish and Wildlife Service, Washington, D.C. 34 pp. plus comments and a memorandum.

Data concerning the biology, ecology, and status of the endangered Indiana bat, and management plans to accomplish the recovery of the species, are outlined. Human disturbances to vulnerable winter populations are considered the major cause of population decline. Vandalism and inadvertent disturbance by spelunkers and biologists have been responsible for measurable declines in several instances.

HARASSMENT, SPELUNKING, RESEARCH IMPACTS, TOURISM, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, INDIANA BAT

137. Erwin, R. M. 1980. Breeding habitat use by colonially nesting waterbirds in two mid-Atlantic U.S. regions under different regimes of human disturbance. Biol. Conserv. 18:39-51.

Nesting habitat selection by four species of seabirds was compared between New Jersey and Virginia. Low seabird use of barrier islands along the more disturbed New Jersey coast suggests that human disturbance causes seabirds to nest in less preferred habitats. Effects of the habitat shift on seabirds are discussed.

HIKING, OFF-ROAD VEHICLES, COASTAL ZONES, PREDATION, U.S. NATIONAL PARKS, U.S. NATIONAL WILDLIFE REFUGES, HERRING GULL, BLACK SKIMMER, COMMON TERN, LEAST TERN

138. Evans, R. D., and C. W. Wolfe, Jr. 1967. Effects of nest searching on fates of pheasant nests. J. Wildl. Manage. 31: 754-759.

Data from 1,276 pheasant nests were analyzed to determine the effect of nest searching on nest fate. Nests where a visit resulted in the hen flushing had the highest abandonment rate, and nests where a hen was present during the visit but did not flush had the highest percent success. However, active nest visits compared to nests terminated before the visit suggested that nest visitation had a negligible effect on nest fate.

RESEARCH IMPACTS, RANGELAND, PREDATION, RING-NECKED PHEASANT

139. Evenden, F. G. 1975. Direct interactions between humans and birds. Pages 11-14 in Proceedings of the Symposium on Management of Forest and Range Habitats for Nongame Birds, 6-9 May 1975, Tucson, Ariz. U.S. For. Serv. Gen. Tech. Rep. WO-1.

Relationships between humans and birds through history and in modern times are discussed. Birds provide pleasure for modern man through sport hunting, viewing of captive birds, and seeking and watching wild birds. Bird watching is a healthful activity that has developed a demand for skills not previously deemed important. Damage caused by birds and human detriments to birds are also discussed.

TOURISM, WILDLIFE VIEWING, URBAN ZONES, REVIEW, BIRDS

140. Faro, J. B., and S. H. Eide. 1974. Management of McNeil River State Game Sanctuary for nonconsumptive use of Alaskan brown bears. Proc. Annu. Conf. West. Assoc. State Game Fish Comm. 54:113-118.

Increased nonconsumptive use of a game sanctuary had a measurable adverse impact on the number of brown bears present for viewing. After a limited permit system was implemented to restrict use, undesirable effects of public overuse seemed to be minimized.

CAMPING, WILDLIFE VIEWING, RIVERS, HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, THREATENED AND ENDANGERED SPECIES, U.S. STATE PARKS AND LANDS, GRIZZLY BEAR

141. Fetterolf, P. M. 1978. The human artifactor: Gull behavior in response to the scientist. Page 48 in Proceedings, 1978 Conference of Colonial Waterbird Group, 20-23 October 1978, New York, N.Y. (Abstract only).

Experiments at a herring gull colony (location not given) quantified the behavioral responses of adult and chick gulls to a researcher. Human disturbance had profound effects on gull behavior and was the major cause of egg and chick loss. Biases associated with disturbance-related mortality suggest that studies of gull breeding success may be seriously confounded by human disturbance effects.

DISTURBANCE (GENERAL), RESEARCH IMPACTS, HERRING GULL

142. Fetterolf, P. M. 1981. Reproductive success of minimally disturbed ring-billed gulls. Colon. Waterbirds 4:68. (Abstract only).

Reproductive success of ring-billed gulls was monitored during three breeding seasons (location not given). Investigator disturbance during incubation ranged from one 15-minute visit in 1980 to nest checks every second day in 1977 and 1978. Minimally disturbed reproductive success was at least 60% higher than the average from previous studies when disturbance was more severe.

DISTURBANCE (GENERAL), RING-BILLED GULL

143. Fialka, J. 1975. Running wild. Natl. Wildl. 13(2):36-41.

Impacts of off-road vehicle use on wildlife and habitat are described in this popular article, with special reference to the Back Bay National Wildlife Refuge, Virginia. Efforts of conservationists toward restriction of off-road vehicle use are discussed.

OFF-ROAD VEHICLES, COASTAL ZONES, RECREATION MANAGEMENT, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL WILDLIFE REFUGES, WILDLIFE (GENERAL)

144. Fisk, E. J. 1975. Least tern: Beleaguered, opportunistic and roof-nesting. Am. Birds 29:15-16.

The status of least tern colonies in the United States and problems confronting the species are discussed. Human disturbance through beach recreation and urban development appear largely responsible for population declines. Least terns commonly nest on roofs in urban areas.

OFF-ROAD VEHICLES, SWIMMING, HIKING, COASTAL ZONES, URBAN ZONES, WILDLIFE MANAGEMENT, LEAST TERN

145. Fleming, W. B. 1971. Statewide waterfowl management research: Parker Canyon Lake waterfowl. Ariz. Game Fish Dept. Project W-070-R-19/WP08/J01/FIN. 9 pp. (MIN 027380004).

At Parker Canyon Lake, Arizona, restriction in public use caused duck use of the lake to be 2.65 times higher than when public use was uncontrolled.

BOATING, LAKES, RECREATION MANAGEMENT, WATERFOWL

146. Florschuts, O., and N. F. Williamson. 1978. Public and wildlife use on beaches of Pea Island National Wildlife Refuge. U.S. Fish and Wildlife Service, Washington, D.C. 29 pp.

Shorebird populations and public use counts were compared between a Pea Island Refuge beach, open to off-road vehicles, and Cape Hatteras National Seashore, closed to vehicle use. Shorebirds were twice as numerous and bird species richness was higher on the Cape Hatteras beach.

OFF-ROAD VEHICLES, TOURISM, COASTAL ZONES, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, U.S. NATIONAL WILDLIFE REFUGES, WATERBIRDS

147. Foin, T. C. 1977. Research in Yosemite National Park: Part retrospect, part looking forward. Pages 63-67 in T. C. Foin, Jr., ed. Visitor impacts on National Parks: The Yosemite ecological impact study. University of California, Davis, Inst. Ecol. Publ. 10.

In a review of recent studies of visitor use impacts in Yosemite National Park, difficulties of generating useful general theories concerning environmental impacts of recreation are discussed. The dual mission of national parks is described and related to research activities. Recommendations are made to strengthen research in the parks through the establishment of dependable funding channels and the clear delineation of research objectives.

CAMPING, HIKING, TOURISM, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, MAMMALS, BIRDS

148. Foin, T. C., E. O. Garton, C. W. Bowen, J. M. Everingham, R. O. Schultz, and B. Holton, Jr. 1977. Quantitative studies of visitor impacts on environments of Yosemite National Park, California, and their implications for park management policy. J. Environ. Manage. 5:1-22.

Several sites were compared using measures of visitor use, vegetation structure, and animal populations in order to assess the relative impact of visitor use on meadow and forest environments. Indirect effects of visitor use on wildlife were deemed most important, but also most difficult to detect.

CAMPING, HIKING, FORESTS, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, BIRDS, MAMMALS

149. Freddy, D. J. 1977. Deer-elk investigations: Snowmobile harassment of mule deer on cold winter ranges. Colo. Div. Wildl. Project W-038-R-32/WP14/J11. 15 pp. (MIN 057780129).

Two semi-tame telemetered mule deer were experimentally harassed by one person, two persons, person plus a dog, and a snowmobile at various distances. Deer reactions to harassment were noted. Heart rate measured by telemetry was found to be a sensitive measure of disturbance.

DISTURBANCE (GENERAL), OFF-ROAD VEHICLES, HARASSMENT, FORESTS, WILDLIFE MANAGEMENT, MULE DEER

150. French, J. M. 1972. Distribution, abundance, and breeding status of ospreys in northwestern California. M. S. Thesis. Humboldt State University, Arcata, Calif. 58 pp.

Factors influencing breeding success, abundance, and distribution of ospreys were studied in northwestern California. Logging, vehicular traffic, shooting, and recreational activity were considered potentially disturbing to nesting ospreys. There was no indication that recreation activities, including sightseeing, camping, and swimming, were detrimental to breeding success of ospreys.

CAMPING, SWIMMING, TOURISM, COASTAL ZONES, FORESTS, RIVERS, WILDLIFE MANAGEMENT, OSPREY

151. French, J. M., and J. R. Koplin. 1977. Distribution, abundance, and breeding

status of ospreys in northwestern California. Pages 223-240 in J. C. Ogden, ed. Transactions of the North American Osprey Research Conference, 10-12 February 1972, Williamsburg, Va. U.S. Natl. Park Serv. Trans. Proc. Ser. 2.

Data are presented concerning abundance and reproduction of ospreys in California. Factors influencing fledgling productivity are discussed, including human disturbance. Logging and shooting were found to seriously affect nesting ospreys, but there was no indication that recreational activities including sightseeing, camping, fishing, and swimming were detrimental to breeding success of ospreys.

CAMPING, FISHING, SWIMMING, TOURISM, HARASSMENT, FORESTS, RIVERS, OSPREY

152. Fyfe, R. 1969. The peregrine falcon in northern Canada. Pages 101-114 in J. J. Hickey, ed. Peregrine falcon populations: Their biology and decline. University of Wisconsin Press, Madison.

Recent evidence suggests that the peregrine remains a common breeding bird in northern Canada, although a local decline in one area was attributed to human disturbance. Human interference with peregrines near northern settlements is a possible decimating factor.

DISTURBANCE (GENERAL), FORESTS, TUNDRA, THREATENED AND ENDANGERED SPECIES, PEREGRINE FALCON

153. Fyfe, R. W., and R. R. Olendorff. 1976. Minimizing the dangers of nesting studies to raptors and other sensitive species. Can. Wildl. Serv. Occ. Pap. 23. 17 pp.

Problems resulting from human interference with the nests of sensitive bird species, principally raptors, are discussed. These include desertion of nests by frightened adults with consequent threats to young, and problems related to mishandling and photographing young in nests. Possible solutions to problems are outlined.

RESEARCH IMPACTS, WILDLIFE VIEWING, PREDATION, THREATENED AND ENDANGERED SPECIES, RAPTORS

154. Gantzel, D. H. 1978. Great crested grebes breeding on rivers. Br. Birds 71:226-227.

The author compares 2 reports in the literature concerning river-breeding grebes in Great Britain: One from 1932 stating that boats greatly disturbed grebes, and another from 1977 which observes that grebes are remarkably tolerant of boats passing within a few meters. The author concludes that grebes seem to tolerate boats in narrow rivers where disturbance is unavoidable.

BOATING, RIVERS, LAKES, FLIGHT DISTANCE, GREAT CRESTED GREBE

155. Garber, D. P. 1972. Osprey nesting ecology in Lassen and Plumas Counties, California. M.S. Thesis. Humboldt State University, Arcata, Calif. 59 pp.

Nesting efforts of ospreys were studied in northeastern California. Major cases of nesting failure were high winds and eggshell breakage, but human disturbance was responsible for 33% of observed egg losses. In one case campers caused adult ospreys to abandon a nest with eggs. During fledgling counts young ospreys sometimes flew from nests, apparently for the first time. Such early flights may increase the incidence of injury and predation of fledglings.

CAMPING, RESEARCH IMPACTS, DISTURBANCE (GENERAL), FORESTS, LAKES, RIVERS, WILDLIFE MANAGEMENT, U.S. NATIONAL FORESTS, U.S. NATIONAL PARKS, OSPREY

156. Garber, D. P. 1972. Special wildlife investigations: Osprey study, Lassen and Plumas Counties, California. Calif. Dept. Fish Game Project W-054-R-03/WP03/J10. 38 pp. (MIN 047280122).

Human disturbance caused 36% of osprey egg and nestling losses at 15 nests studied in California. Campers parked near a nest caused ospreys to abandon the nest and eggs. There is evidence that gull predation on eggs occurred in the absence of adult ospreys.

DISTURBANCE (GENERAL), CAMPING, PREDATION, FORESTS, OSPREY, GULLS

157. Garton, E. O., C. W. Bowen, and T. C. Foin. 1977. The impact of visitors

on small mammal communities of Yosemite National Park. Pages 44-50 in T. C. Foin, Jr., ed. Visitor impacts on National Parks: The Yosemite ecological impact study. Univ. California, Davis, Inst. Ecol. Publ. 10.

Visitor use of meadow and forest sites in Yosemite National Park was related to the distribution and abundance of small mammals. Deer mouse populations apparently increase in response to human use of forested areas, while montane vole pouplations showed no relationship to human use except for gross habitat alterations such as meadow draining. Data for other small mammals were insufficient to determine relationships with human use.

CAMPING, HIKING, PICNICKING, TOURISM, FORESTS, WETLANDS, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, MAMMALS, DEER MOUSE, MONTANE VOLE

158. Garton, E. O., B. Hall, and T. C. Foin. 1977. The impact of a campground on the bird community of a lodgepole pine forest. Pages 37-43 in T. C. Foin, Jr., ed. Visitor impacts on National Parks: The Yosemite ecological impact study. Univ. California, Davis, Inst. Ecol. Publ. 10.

Bird communities of a forest campground and a similar forest area receiving light use were compared as a part of visitor impact studies in Yosemite National Park, California. Higher bird species diversity was observed in the campground and attributed to vegetation changes induced primarily by campers' activities. Bird species intolerant of human activity are probably driven from the developed recreational areas.

CAMPING, TOURISM, FORESTS, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, BIRDS

159. Gavrin, V. F. 1974. Effect of anxiety factor on game fowl population productivity. Pages 401-403 in I. Kjerner and P. Bjurholm, eds. Proceedings, XIth International Congress of Game Biologists, 3-7 September 1973, Stockholm, Sweden. National Swedish Environmental Protection Board, Stockholm.

Effects of stress on waterfowl and grouse was studied in the USSR. Recreational activities in bird habitats disturb daily activity patterns and alter the behavior of birds. Disturbance causes additional predation pressures and losses of young to starvation; disrupted timing of breeding lowers female fertility and increases the number of inferior birds in the population.

DISTURBANCE (GENERAL), LAKES, RIVERS, WETLANDS, PREDATION, RECREATION MANAGEMENT

160. Geist, V. 1963. On the behavior of the North American moose (Alces alces andersoni, Peterson 1950) in British Columbia. Behaviour 20:377-416.

Moose behavior is described based on observations from two summers and one winter in Wells Gray Provincial Park, British Columbia. Reactions of moose to human disturbance and stimuli to moose flight are described. Such stimuli seemed to be variable, depending to some extent on the animal involved.

DISTURBANCE (GENERAL), FORESTS, CANADIAN PROVINCIAL PARKS, MOOSE

161. Geist, V. 1971. A behavioral approach to the management of wild ungulates. Pages 413-424 in E. Duffey and A. S. Watt, eds. The scientific management of animal and plant communities for conservation. Blackwell Scientific Publications, Oxford.

The role of animal behavior in ungulate management and conservation is described. Behavioral knowledge of ungulates can be used in management through the learning ability of ungulates, social and ecological adaptations of animals, and knowledge of the effects of human disturbance on ungulate behavior. Much remains to be learned about ungulate behavioral responses to hunting, tourism, harassment, and other disturbances.

DISTURBANCE (GENERAL), HARASSMENT, TOURISM, WILDLIFE MANAGEMENT, UNGULATES

162. Geist, V. 1971. Bighorn sheep biology. Wildl. Soc. News 136:61.

In a letter to the editor, the author explains physiological and energetic concerns related to increased activity

of bighorn sheep following removal of old rams from populations. Harassment of sheep and other animals by a combination of hunting and hiking/wildlife viewing may be fatal, to sheep.

HIKING, WILDLIFE VIEWING, HARASSMENT, BIGHORN SHEEP

163. Geist, V. 1971. Is big game harassment harmful? Oilweek 22(17):12-13.

Harassment of North American big game is considered in terms of animal energy budgets and physical damage. Energy "costs" of harassment are calculated as energy expended above and beyond normal daily expenditures. Chronic harassment may result in reduced reproductive rates and increased mortality.

DISTURBANCE (GENERAL), HARASSMENT, UNGULATES

164. Geist, V. 1975. On the management of mountain sheep: Theoretical considerations. Pages 77-105 in J. B. Trefethen, ed. The wild sheep in modern North America. Boone and Crockett Club and the Winchester Press, New York, N.Y.

Management of bighorn sheep in relation to their biology is considered. The author suggests that energy expenditures by sheep due to human activities should be a major concern of game managers, and that management for consumptive and nonconsumptive uses of sheep are largely incompatible. Some approaches to management for nonconsumptive uses are described.

DISTURBANCE (GENERAL), HARASSMENT, WILDLIFE VIEWING, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, BIGHORN SHEEP

165. Geist, V. 1978. Behavior. Pages 283-296 in J. L. Schmidt and D. L. Gilbert, eds. Big game of North America: Ecology and management. Wildlife Management Institute and Stackpole Books, Harrisburg, Pa.

The relation of animal behavior to management practices is discussed, with harassment of big game extensively as an example. Harassment not only induces extra energy expenditures in animals, but also teaches inefficient foraging patterns. Hiking and game viewing are discussed in relation to benefits and detriments to game animals.

DISTURBANCE (GENERAL), HIKING, OFF-ROAD VEHICLES, WILDLIFE VIEWING, HARASSMENT, WILDLIFE MANAGEMENT, WILDLIFE (GENERAL), UNGULATES

166. Gerrard, J. M. 1973. The bald eagles in Canada's northern forests. Nat. Can. (Ottawa) 2(3):10-13.

Bald eagle populations and reasons for their decline are discussed in this nontechnical article. While shooting and poisoning continue to take their toll, human disturbance and pesticides appear to be increasingly important factors to bald eagle survival in northern Canada. Nearly all eagle nests in Saskatchewan are within 200 yards of water, and development of lakeshores for cottages and recreation can be expected to usurp a large proportion of potential nesting habitat if left uncontrolled.

DISTURBANCE (GENERAL), TOURISM, LAKES, FORESTS, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, BALD EAGLE

167. Gilbert, B. 1976. The great grizzly controversy. Audubon 78(1):62-92.

This popular article describes the history of human-grizzly bear interactions in the western United States, and the controversy surrounding grizzly management in Yellowstone National Park. Solution of management problems will require objective resolution of goals concerning areas suited or unsuited to grizzly bear habitation. Management of certain remote areas as inviolable grizzly sanctuaries is recommended.

CAMPING, HIKING, WILDLIFE VIEWING, TOURISM, FORESTS, HUMAN HEALTH AND SAFETY, WILDLIFE MANAGEMENT, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, GRIZZLY BEAR

168. Giles, J. W. 1963. Bear facts. Am. For. 69(7):26.

An incident in Yellowstone National Park is described in which a park visitor sleeping in a car was bitten on the arm by a black bear. In a sub-

sequent court case, it was ruled that the U.S. Government had used ordinary and reasonable care in providing for the safety of park visitors, and owed the visitor no compensation for the injury. The author suggests that park visitors should keep windows closed and doors locked while in bear country.

TOURISM, WILDLIFE VIEWING, FORESTS, HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, BLACK BEAR

169. Gill, J. D., R. M. DeGraaf, and J. W. Thomas. 1974. Forest habitat management for non-game birds in central Appalachia. U.S. For. Serv. Res. Note NE-192. 6 pp.

Management objectives and procedures to facilitate public enjoyment of nongame birds are discussed. Managing for people with slight to moderate knowledge of birds and to induce a high diversity of species to inhabit areas near trails and other human activity areas is recommended. Managed trails must also provide for the protection of bird habitats from trail users.

HIKING, WILDLIFE VIEWING, FORESTS, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL FORESTS, BIRDS

170. Gillett, W. H., J. L. Hayward, Jr., and J. F. Stout. 1975. Effects of human activity on egg and chick mortality in a glaucous-winged gull colony. Condor 77:492-495.

During studies of glaucous-winged gulls on Colville Island, Washington, the investigators' presence increased chick mortality in areas where they worked, but had no effect on egg mortality. The increase in chick losses resulted largely from chicks moving into adjacent territories and being attacked by neighboring adults when investigators entered the chicks' home territory.

RESEARCH IMPACTS, COASTAL ZONES, PREDATION, GLAUCOUS-WINGED GULL

171. Glinski, R. L. 1976. Birdwatching etiquette: The need for a developing philosophy. Am. Birds 30:655-657.

Examples of disturbance to nongame birds by bird watchers are used to indicate a need to manage bird watching. Disturbance may cause lowered survival and reproduction of birds due to increased energy expenditures, behavior alteration, abandonment of nests, or loss of eggs and young to chilling, overheating, or predation. A behavioral code for bird watchers is proposed to regulate personal activities.

HIKING, WILDLIFE VIEWING, HARASSMENT, RECREATION MANAGEMENT, PREDATION, BIRDS

172. Gochfeld, M. 1976. Waterbird colonies of Long Island, New York: 3. Cedar Beach ternery. Kingbird 26:63-80.

Direct human disturbance of a tern nesting colony in New York is a serious threat to tern survival. Bathers and picnickers sometimes prevent terns from incubating or feeding young, while vandals occasionally destroy eggs or shoot adults. Disturbance by bird watchers and banders can be serious, unless appropriate precautions are taken to reduce interference with birds' activities.

HIKING, OFF-ROAD VEHICLES, SWIMMING, WILDLIFE VIEWING, RESEARCH IMPACTS, COASTAL ZONES, RECREATION MANAGEMENT, COMMON TERN, ROSEATE TERN, LEAST TERN, BLACK SKIMMER

173. Gochfeld, M. 1978. Terns in traffic. Nat. Hist. 87(6):54-61.

Effects of various human disturbances on nesting common terns in New York are described. Tern populations on Long Island have been stable, but increasing recreational disturbances may soon cause declines. Terns in disrupted habitats are sometimes forced to nest in marginal habitats where tern productivity is lower.

BOATING, HIKING, HARASSMENT, SWIMMING, PICNICKING, TOURISM, COASTAL ZONES, URBAN ZONES, WETLANDS, PREDATION, RECREATION MANAGEMENT, U.S. STATE PARKS AND LANDS, COMMON TERN, SEABIRDS

174. Gochfeld, M. 1981. Differences in behavioral responses of young common terns and black skimmers to intrusion and handling. Colon. Waterbirds 4:47-53.

Behavioral responses to disturbance of young common terns and black skimmers were compared during studies at two colonies on Long Island, New York. Four factors found to influence behavioral responses of young to disturbance were species, age of chicks, weather, and extent or intensity of handling of chicks. Consequences of disturbance and methodological considerations for colonial bird studies are discussed.

DISTURBANCE (GENERAL), RESEARCH IMPACTS, COASTAL ZONES, HARASSMENT, PICNICKING, WILDLIFE VIEWING, PREDATION, COMMON TERN, BLACK SKIMMER, BIRDS

175. Godfrey, P. J., J. M. B. Brodhead, J. DiMaio, J. M. Gilligan, D. Reynolds, B. G. Blodget, and N. R. Wheeler. 1975. The ecological effects of off-road vehicles in Cape Cod National Seashore, Massachusetts (Phase II). Univ. Massachusetts, Amherst, Natl. Park Serv. Coop. Res. Unit Rep. 18. 133 pp.

Experimental results and observations are presented from several studies of off-road vehicle impacts, including effects on least terns and other shorebirds. Nesting terns tolerated a passing vehicle much more readily than pedestrians. People on foot pose a greater threat to nesting terns than people in vehicles.

OFF-ROAD VEHICLES, HIKING, TOURISM, HARASSMENT, COASTAL ZONES, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, LEAST TERN, WATERBIRDS

176. Godfrey, P. J., J. Brodhead, H. Walker, J. Gilligan, and A. Davis. 1975. Ecological effects of off-road vehicles in Cape Cod National Seashore, Massachusetts. (A preliminary report). Univ. Massachusetts, Amherst, Natl. Park Serv. Coop. Res. Unit Rep. 6. 121 pp.

Impacts of off-road vehicle use on coastal ecosystems in Massachusetts were studied by conducting controlled experiments. Preliminary results indicate that the most serious effects of vehicle traffic appear to be on the ecology of drift lines and nesting birds, particularly terns.

OFF-ROAD VEHICLES, TOURISM, HARASSMENT, COASTAL ZONES, U.S. NATIONAL PARKS, LEAST TERN, WATERBIRDS

177. Goering, D. K., and R. Cherry. 1971. Nestling mortality in a Texas heronry. Wilson Bull. 83:303-305.

The effect of frequent nest checking on reproductive success were studied at a heronry in Texas. Nests that were more frequently visited were at least as successful in producing offspring as those infrequently observed, suggesting that at least during the later stages of incubation human visitation is not necessarily detrimental to herons and other wading birds.

DISTURBANCE (GENERAL), RESEARCH IMPACTS, LAKES, WETLANDS, CATTLE EGRET, LOUISIANA HERON, SNOWY EGRET, BLACK-CROWNED NIGHT HERON, LITTLE BLUE HERON

178. Goldsmith, F. B. 1974. Ecological effects of visitors in the countryside. Pages 217-231 in A. Warren and F. B. Goldsmith, eds. Conservation in practice. Wiley and Sons, London, England.

Ecological effects of recreation are reviewed, including impacts on wildlife. Sections discuss carrying capacity, characteristics of ecosystems, succession, visitor distribution, effects of trampling, direct research on ecological effects of recreation, and management.

BOATING, HIKING, HORSEBACK RIDING, PICNICKING, SKIING, TOURISM, RECREATION MANAGEMENT, REVIEW, WILDLIFE (GENERAL)

179. Gooders, J. 1975. Wildlife and tourism. Birds Int. 1:21-23, 27.

Wildlife tourism is described as a modern and expanding business. Direct and indirect benefits of tourism to wildlife conservation are contrasted with impacts including disturbance to wildlife. The author suggests that tourism will continue to expand, and that steps should be taken to minimize disturbances to wildlife.

DISTURBANCE (GENERAL), TOURISM, RECREATION MANAGEMENT, WILDLIFE (GENERAL)

180. Goodson, N. J. 1978. Status of bighorn sheep in Rocky Mountain National Park.

M.S. Thesis. Colorado State University, Fort Collins. 190 pp.

During studies of bighorn sheep in Rocky Mountain National Park, Colorado, sheep interactions with people were noted. In areas where sheep were accustomed to seeing people, they tolerated people if approached gradually and not too closely; however, on several occasions sheep were driven from feeding areas or mineral licks by visitors. Sheep in backcountry areas were more wary.

HIKING, TOURISM, WILDLIFE VIEWING, FORESTS, TUNDRA, FLIGHT DISTANCE, U.S. NATIONAL PARKS, RECREATION MANAGEMENT, BIGHORN SHEEP

181. Gosnell, M. 1977. When you consider how benign bats really are, they deserve a much better fate. Natl. Wildl. 15(4):32-33.

This nontechnical article describes the plight of two North American endangered bats: The Indiana bat and the gray bat. Gray bats are extremely sensitive to human disturbance, especially when hibernating. While less sensitive to disturbance, the Indiana bat is also severely threatened by inadvertent and deliberate harassment of hibernating colonies. Much of the decline of these bat species can be prevented through management and public education.

HARASSMENT, SPELUNKING, TOURISM, FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, INDIANA BAT, GRAY BAT

182. Gottfried, B. M., and C. F. Thompson. 1978. Experimental analysis of nest predation in an old-field habitat. Auk 95:304-312.

Experimental nests containing Japanese quail eggs were studied in an old-field habitat in Ohio to determine the effects of human visits and other factors on nest predation. Daily visits did not affect the likelihood that predators would discover nests, indicating that visits to nests by investigators do not appear to affect nest success.

DISTURBANCE (GENERAL), RESEARCH IMPACTS, RANGELAND, PREDATION, JAPANESE QUAIL

183. Grace, E. S. 1976. Interactions between men and wolves at an arctic outpost on Ellesmere Island. Can. Field-Nat. 90:149-156.

In 1973 and 1974 the behavior of wolves in the vicinity of an arctic weather station in Canada was recorded, to determine wolf use of and response to human settlement. Wolves generally avoided humans and dogs and no evidence of wolf hostility toward humans was observed.

DISTURBANCE (GENERAL), TUNDRA, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, GRAY WOLF

184. Graham, H. 1966. Multiple use coordination on the San Gorgonio Bighorn Unit. Trans. Desert Bighorn Counc. 10:71-77.

Multiple use management of a California national forest area containing bighorn sheep is discussed. The author explains the rationale and methodology of multiple use, and describes various land uses and their coordination with bighorn management. Proposals for massive recreational developments have been rejected because of perceived incompatibility with preservation of key bighorn habitats.

CAMPING, HIKING, PICNICKING, TOURISM, WILDLIFE VIEWING, FORESTS, RANGELAND, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL FORESTS, BIGHORN SHEEP

185. Graham, H. 1971. Environmental analysis procedures for bighorn in the San Gabriel Mountains. Trans. Desert Bighorn Counc. 15:38-45.

Graphic analysis was used to evaluate bighorn habitat in California. Human use impacts were portrayed on overlays and compared to bighorn distributions and other habitat characteristics. Human recreational use has caused sheep to avoid certain areas. Light use has little effect on sheep distributions, but heavier use (500-900 visitor-days per summer season) causes bighorn to move from their historic range.

CAMPING, HIKING, SKIING, FORESTS, RANGELAND, RECREATION MANAGEMENT, U.S. NATIONAL FORESTS, BIGHORN SHEEP

186. Graham, H. 1980. The impact of modern man. Pages 288-309 in G. Monson and L. Sumner, eds. The desert bighorn: Its life history, ecology and management. University of Arizona Press, Tucson.

The history of man's relationship with bighorn sheep and current impacts of man on sheep are reviewed. Effects of hiking, horseback riding, motor vehicles, motorboats, ski lifts and tramways, aircraft, noises, and dogs are discussed. Human-caused habitat alterations are related to tolerance of sheep to intrusions.

BOATING, CAMPING, HIKING, HORSEBACK RIDING, OFF-ROAD VEHICLES, SKIING, TOURISM, WILDLIFE VIEWING, FORESTS, DESERTS, RANGELAND, FLIGHT DISTANCE, WILDLIFE MANAGEMENT, U.S. NATIONAL WILDLIFE REFUGES, U.S. NATIONAL FORESTS, U.S. NATIONAL PARKS, U.S. BLM LANDS, U.S. STATE PARKS AND LANDS, REVIEW, BIGHORN SHEEP

187. Grater, R. K. 1959. Recreational values of bighorn other than hunting. Trans. Desert Bighorn Counc. 3:53-57.

Recreational values of bighorn other than hunting include the benefits people derive from observing these unique and fascinating animals in their natural environment. Wildlife viewers and photographers enjoy aesthetic pleasures derived from encounters with bighorn. People seeking to view wildlife are drawn into new environments where new and unexpected values are encountered.

HIKING, WILDLIFE VIEWING, DESERTS, RANGELAND, FLIGHT DISTANCE, U.S. NATIONAL PARKS, U.S. NATIONAL WILDLIFE REFUGES, BIGHORN SHEEP

188. Graul, W. D. 1981. Population surveys of selected bird and mammal species in Colorado. Pages 84-129 in Colorado Division of Wildlife, Wildlife Research Report, January 1981, Part 1. Colo. Div. Wildl. Project FW-22-R/WP01/J03.

Nongame bird and mammal studies in Colorado included investigations of the effects of human disturbance on great blue herons. Disturbance at heronries was quantified as to the type of intrusion, location of intrusion relative to nests, and reactions of herons to the intrusion. The birds remained sensitive to disturbance throughout the breeding season, but none permanently abandoned the colony following disturbance. Birds were usually most active at times when human use of the areas was lowest.

HIKING, WILDLIFE VIEWING, BOATING, HORSEBACK RIDING, TOURISM, OFF-ROAD VEHICLES, LAKES, URBAN ZONES, FLIGHT DISTANCE, U.S. STATE PARKS AND LANDS, GREAT BLUE HERON

189. Gray, J. R. 1977. Kinds and costs of recreational pollution in the Sandia Mountains. New Mexico State Univ., Las Cruces, Agric. Exp. Sta. Bull. 651. 57 pp.

Environmental costs of recreation in the Sandia Mountains, New Mexico, were quantified by surveying recreationists, identifying associated pollutants and environmental impacts, and calculating costs of their control. Wildlife harassment, primarily by hikers, was among impacts that tended to restrict activities most in a cost analysis model. Nature study and hunter groups were determined as having the highest costs per hour.

HARASSMENT, OFF-ROAD VEHICLES, CAMPING, HIKING, PICNICKING, TOURISM, WILDLIFE VIEWING, FORESTS, RECREATION MANAGEMENT, U.S. NATIONAL FORESTS, WILDLIFE (GENERAL)

190. Greenhall, A. M. 1973. Indiana bat: A cave-dweller in trouble. Natl. Parks Conserv. Mag. 47(8):14-17.

The status of the endangered Indiana bat is reviewed and potential factors involved in recent population declines discussed in this nontechnical article. Disturbances of hibernating colonies by recreational spelunkers and inexperienced researchers have caused mortality of bats in several instances. Commercial development of caves for tourism has caused loss of habitat and roosting sites. A sound bat conservation program depends partly on an informed public.

HARASSMENT, RESEARCH IMPACTS, SPELUNKING, TOURISM, WILDLIFE VIEWING, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, INDIANA BAT

191. Greer, K. R. 1976. Managing Montana's grizzlies for the grizzlies. Pages 177-189 in M. R. Pelton, J. W. Lentfer, and G. E. Folk, eds. Bears--their biology and management. Third International Conference on Bear Research and Management, June 1974, Binghamton, N.Y. and Moscow, USSR. IUCN Publ. New Ser. 40, Morges, Switzerland.

This paper summarizes present management and control programs, known mortality data, and biological information on grizzly populations in Montana and the Yellowstone region. Management in Montana has been based on regulated hunting, studies of garbage dump closure, and man-caused bear mortality studies. Problems associated with various management practices are discussed.

FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, U.S. NATIONAL FORESTS, GRIZZLY BEAR

192. Grescoe, P. 1980. Learning to live with Old Griz. Int. Wildl. 10(4):4-11.

This popular article recounts recent problems with grizzly bears and visitors in National Parks, and summarizes research activities of Dick Russell in Jasper National Park and Steve Herrero in Banff National Park. Conditions under which bear attacks on humans are likely to occur are listed, and management activities carried out to date and necessary in the future are described.

CAMPING, HIKING, HARASSMENT, TOURISM, WILDLIFE VIEWING, FORESTS, TUNDRA, HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, THREATENED AND ENDANGERED SPECIES, CANADIAN NATIONAL PARKS, U.S. NATIONAL PARKS, GRIZZLY BEAR

193. Grier, J. W. 1969. Bald eagle behavior and productivity responses to climbing to nests. J. Wildl. Manage. 33:961-966.

Data are presented concerning behavior and productivity of bald eagles in response to climbing to nests in Ontario. No evidence was found of changes in bald eagle productivity resulting from single climbs to nests when young were from 2 to 11 weeks old.

DISTURBANCE (GENERAL), RESEARCH IMPACTS, WILDLIFE VIEWING, FORESTS, THREATENED AND ENDANGERED SPECIES, BALD EAGLE

194. Griffith, R. E. 1969. Environmental quality impact. Pages 5-8 in Proceedings of the International Snowmobile Conference, 20-21 May 1969, Albany, N.Y. U.S. Bureau of Outdoor Recreation, Ann Arbor, Mich. and Philadelphia, Pa., and New York State Conservation Commission, Albany.

A report of the committee on environmental quality is presented, including consideration of snowmobile effects on wildlife and wildlife habitat. A deficiency in snowmobile recreation planning has been a lack of concern for environmental impact, including harassment of wildlife and intrusion into big game winter ranges. The author recommends the protection of critical wildlife habitat and the establishment of laws regarding harassment of wildlife.

OFF-ROAD VEHICLES, HARASSMENT, FORESTS, RECREATION MANAGEMENT, WILDLIFE (GENERAL)

195. Grubb, T. G. 1976. Nesting bald eagles attack researcher. Auk 93:842-843.

While studying bald eagles on the Kodiak National Wildlife Refuge, Alaska, a researcher was attacked by a pair of eagles. While climbing a tree to reach an eagle nest, the researcher was struck with some force on the back by one of the eagles; both birds repeatedly flew very close but did not strike again.

RESEARCH IMPACTS, COASTAL ZONES, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL WILDLIFE REFUGES, BALD EAGLE

196. Guth, R. W. 1978. Forest and campground bird communities of Peninsula State Park, Wisconsin. Passenger Pigeon 40:489-493.

A study in Door County, Wisconsin, compared bird populations of mature forests, forest edge, and altered campground sites. Bird density and species diversity were least in forest sites, and greatest in campgrounds. Birds in campgrounds represented a

greater percentage of common and widespread species, whereas several rare forest species were absent.

CAMPING, FORESTS, RECREATION MANAGEMENT, U.S. STATE PARKS AND LANDS, BIRDS

197. Guth, R. W. 1979. The junk food guild: Birds and mammals on picnic grounds and in residential areas. Ill. Audubon Bull. 189:3-7.

Birds and mammals of the junk food guild benefit from human recreation by finding scraps of food in picnic grounds of parks and forest preserves. Experiments in urban areas near Chicago, Illinois, revealed aspects of foraging behavior and food selection by residential area birds.

PICNICKING, URBAN ZONES, MAMMALS, BIRDS

198. Haber, G. C. 1973. Eight years of wolf research at McKinley Park. Alaska 39 (4):7-9, 52-54, 56-57; 39(5):43-45, 50, 53-56.

These popular articles summarize research results and observations concerning wolves in Mount McKinley National Park, Alaska. Wolf social systems, behavior, and relationships to prey species and humans are discussed.

TOURISM, WILDLIFE VIEWING, TUNDRA, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, GRAY WOLF

199. Hamer, J. D. W. 1974. Distribution, abundance, and management implications of the grizzly bear and mountain caribou in the Mountain Creek watershed of Glacier National Park, British Columbia. M.S. Thesis. University of Calgary, Alberta. 164 pp.

Distribution and abundance of grizzly bears and caribou were studied in a remote and seldom-visited area of Glacier National Park, British Columbia. Since both species are wide-ranging and sensitive to human disturbance, their use as wilderness indicator species is recommended. Sensitivities of the species to human visitation are not specifically known, however; and recreational carrying capacities in wilderness should be calculated.

CAMPING, HIKING, TOURISM, FORESTS, TUNDRA, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, CANADIAN NATIONAL PARKS, GRIZZLY BEAR, CARIBOU

200. Hamerstrom, F. 1970. Think with a good nose near a nest. Raptor Res. News 4:79-80.

The author suggests the possibility that scent trails left by humans visiting raptor nests may attract predators. Methods to reduce nest predation caused by human disturbance are listed.

DISTURBANCE (GENERAL), RESEARCH IMPACTS, WILDLIFE VIEWING, PREDATION, RAPTORS

201. Hamerstrom, F., D. D. Berger, and F. N. Hamerstrom, Jr. 1965. The effect of mammals on prairie chickens on booming grounds. J. Wildl. Manage. 29:536-542.

Studies in Wisconsin examined reactions of greater prairie chickens on booming grounds to mammalian predators and humans. Prairie chickens were disturbed most by people, including farmers, fishermen, and bird watchers. Persons on foot walking towards or near the booming ground appeared to cause birds to flush from a greater distance than from any other mammal. Birds were disturbed more by dogs and livestock than by native foxes and deer.

HIKING, FISHING, WILDLIFE VIEWING, RANGELAND, FLIGHT DISTANCE, GREATER PRAIRIE CHICKEN

202. Hammond, M. C., and W. R. Forward. 1956. Experiments on causes of duck nest predation. J. Wildl. Manage. 20:243-247.

Sources of bias in duck nesting studies are examined, including the possibility of increased nest predation due to human disturbance.

DISTURBANCE (GENERAL), RESEARCH IMPACTS, WETLANDS, PREDATION, U.S. NATIONAL WILDLIFE REFUGES, WATERFOWL, SHOVELER, BLUE-WINGED TEAL

203. Hancock, D. 1966. David Hancock re-

ports on the bald eagle research project. Can. Audubon 28:88-92.

This nontechnical article describes observations and research results obtained from a study of bald eagles in British Columbia. Human visitation to nests caused little mortality the year of the visits, but in the following year nests visited previously showed a 65% reduction in number of young produced. More research is needed on the effects of nest disturbance to understand the impacts of recreational activities and biological research on nesting eagles.

DISTURBANCE (GENERAL), RESEARCH IMPACTS, WILDLIFE VIEWING, COASTAL ZONES, FORESTS, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL FORESTS, BALD EAGLE

204. Hand, J. L. 1980. Human disturbance in western gull Larus occidentalis livens colonies and possible amplification by intraspecific predation. Biol. Conserv. 18:59-63.

Human disturbances are affecting reproduction of western gulls at several colonies in the Gulf of California. Breeding adults that lose chicks or eggs apparently practice conspecific predation, amplifying the effects of human disturbance. These combined effects may pose a threat to the survival of this endemic population.

DISTURBANCE (GENERAL), TOURISM, COASTAL ZONES, PREDATION, WESTERN GULL

205. Hanson, D. 1980. Of parachutes and peregrines. Audubon 82(6):62-65.

This popular article describes recent National Park Service actions regarding the management of skydivers in Yosemite National Park. Skydiving off of 3,600-foot high El Capitan, an overhanging cliff, threatened the Sierra Nevada's only known pair of nesting peregrine falcons. An attempt to manage skydiving through a legalized permit system was rescinded after several serious injuries occurred and illegal jumping continued.

CLIMBING, SKYDIVING, FORESTS, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, PEREGRINE FALCON

206. Hanson, D. G. 1975. Non-feathered friends for the seabird sanctuary. Conserv. News 40(1):2-6.

Activities at a seabird sanctuary and rehabilitation center in Florida are described in this popular article. Birds injured by fishing gear are commonly treated at the center; pelicans seem especially prone to such injuries. Bird collisions with powerlines, plate glass, and vehicles are also common sources of injury, and some birds treated at the center have been victims of deliberate cruel actions by humans.

FISHING, HARASSMENT, COASTAL ZONES, THREATENED AND ENDANGERED SPECIES, WILDLIFE MANAGEMENT, BROWN PELICAN, SEABIRDS, WATERBIRDS

207. Harms, D. R. 1980. Black bear management in Yosemite National Park. Pages 205-212 in C. J. Martinka and K. L. McArthur, eds. Bears--their biology and management. Fourth International Conference on Bear Research and Management, February 1977, Kalispell, Mont. Bear Biology Association.

A management program was implemented in 1975 to reduce conflicts between park visitors and black bears in Yosemite National Park. Bear damage patterns monitored before and during the management program indicate that the program is achieving its objectives.

CAMPING, HIKING, SKIING, SWIMMING, FORESTS, HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, BLACK BEAR

208. Harris, M. P. 1973. Seabirds and tourism. Pages 300-302 in P. Jackson, ed. World wildlife yearbook 1972-73. World Wildlife Fund, Morges, Switzerland.

Impacts of tourism on seabirds are discussed in this nontechnical report. As people in the more affluent countries have gained more leisure time and air travel has become less expensive, many previously remote seabird colonies have suffered disturbance by tourists. As the economic value of wildlife-based tourism is recognized, however, many countries are beginning to actively protect and conserve seabirds as an economic resource.

TOURISM, WILDLIFE VIEWING, COASTAL ZONES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, SEABIRDS

209. Hartman, G. W. 1972. Biology of dump nesting in wood ducks. M.A. Thesis. University of Missouri, Columbia. 72 pp.

Disturbance of wood ducks by trapping and handling, boats, and fishermen is documented. The flight distance of birds seemed to vary with stage in the nesting cycle and level of noise associated with the disturbance.

DISTURBANCE (GENERAL), BOATING, FISHING, RESEARCH IMPACTS, WOOD DUCK

210. Harvey, M. J. 1975. Endangered Chiroptera of the southeastern United States. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29:429-433.

Causes of population declines in four species of endangered bats include loss of habitat, direct killing, and disturbance of hibernating and maternity colonies by spelunkers. Repeated disturbances of hibernating bats with resultant loss of energy reserves may be a major factor in bat mortality. Visitation to caves containing hibernating bats should be discouraged.

RESEARCH IMPACTS, SPELUNKING, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, INDIANA BAT, GRAY BAT, VIRGINIA BIG-EARED BAT, OZARK BIG-EARED BAT

211. Harvey, M. J. 1980. Status of the endangered bats Myotis sodalis, M. grisescens, and Plecotus townsendii ingens in the southern Ozarks. Pages 221-223 in D. E. Wilson and A. L. Gardner, eds. Proceedings, Fifth International Bat Research Conference, 6-13 August 1978, Albuquerque, N.M. Texas Tech Press, Lubbock.

Current status of three endangered bats in the southern Ozarks and management practices to protect critical habitats are described. Because all three endangered bats are suffering from human disturbance of colonies in caves, preventing disturbance by regulating cave visits is recommended.

SPELUNKING, FORESTS, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL FORESTS, U.S. NATIONAL PARKS, INDIANA BAT, GRAY BAT, OZARK BIG-EARED BAT

212. Harvey, M. J., M. L. Kennedy, and V. R. McDaniel. 1978. Status of the endangered Ozark big-eared bat (Plecotus townsendii ingens) in Arkansas. Proc. Ark. Acad. Sci. 32:89-90.

The Ozark big-eared bat is one of three bat taxa endemic to Arkansas now considered in danger of extinction throughout a significant portion of their range. The authors state "the species is very intolerant of human disturbance and will sometimes vacate a cave if disturbed."

SPELUNKING, OZARK BIG-EARED BAT

213. Hayden, A. H. 1972. Wild turkey study: Seasonal turkey range requirements. Pa. Game Comm. Project W-046-R-19/WP02/J04. 4 pp. (MIN 377380744).

During studies of turkey population movements and distribution in Pennsylvania, disturbance of turkeys by snowmobilers was noted. Observations and track counts indicated that turkeys avoided areas of high snowmobile use and shifted to heavy cover types of dense spruce and pine.

OFF-ROAD VEHICLES, FORESTS, TURKEY

214. Heinzman, G. 1961. The American bald eagle: Despite protection, this wary bird cannot co-exist with man. Nat. Hist. 70(6):18-21.

The author summarizes recent research findings and observations of bald eagles in Florida. Studies of nest sites revealed a circle around nests with a radius of 150 to 300 yards within which human presence caused eagles to flee. Reasons for eagle population declines in Florida are cited.

DISTURBANCE (GENERAL), WILDLIFE VIEWING, FORESTS, WETLANDS, THREATENED AND ENDANGERED SPECIES, BALD EAGLE

215. Hendee, J. C., and D. R. Potter. 1971. Human behavior and wildlife management: Needed research. Trans. N. Am. Wildl. Nat. Resour. Conf. 36:383-396.

Broad problem areas and specific questions about human behavior aspects of

wildlife management are identified. Research should be directed toward various aspects of hunter behavior, nonconsumptive uses of wildlife, wildlife economics, and political-legal issues. As nonconsumptive use of wildlife increases, managers are challenged to both gain support from and supply satisfaction to appreciative users.

CAMPING, WILDLIFE VIEWING, TOURISM, WILDLIFE MANAGEMENT, WILDLIFE (GENERAL)

216. Herbert, R. A., and K. G. S. Herbert. 1965. Behavior of peregrine falcons in the New York City region. Auk 82: 62-94.

Results are reported of studies of peregrine falcons in the lower Hudson River Valley, New York, from 1930 to 1960. By 1961 the falcon population was extirpated following several years of persecution by humans. Disturbance resulted in abandonment of clutches and persistent renesting.

DISTURBANCE (GENERAL), HARASSMENT, FORESTS, URBAN ZONES, THREATENED AND ENDANGERED SPECIES, PEREGRINE FALCON

217. Herbert, R. A., and K. G. S. Herbert. 1969. The extirpation of the Hudson River peregrine falcon population. Pages 133-154 in J. J. Hickey, ed. Peregrine falcon populations: Their biology and decline. University of Wisconsin Press, Madison.

Among factors responsible for the elimination of peregrine falcons from the Hudson River Valley, New York, was extreme persecution by humans. Shooting and trapping of adults, robbing of young and disruption of breeding adults by falconers, and the construction of a highway and recreation facilities in the valley all contributed to the extirpation.

HARASSMENT, TOURISM, FORESTS, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, PEREGRINE FALCON

218. Herren, H. 1969. The status of the peregrine falcon in Switzerland. Pages 231-238 in J. J. Hickey, ed. Peregrine falcon populations: Their biology and decline. University of Wisconsin Press, Madison.

The decline in the numbers of breeding peregrine falcons in Switzerland and possible reasons for the decline are discussed. Human disturbances including camping and rock climbing have caused some losses. Some eyries have been abandoned due to noise and other human disturbances.

CAMPING, CLIMBING, DISTURBANCE (GENERAL), THREATENED AND ENDANGERED SPECIES, PEREGRINE FALCON

219. Herrero, S. 1970. Human injury inflicted by grizzly bears. Science 170:593-598.

Grizzly bear attacks on humans in National Parks of North America are examined. Hiking, camping, or provocation of the bear preceded attacks in 98% of cases. Opinion surveys indicated that the public favored more effective management of people and bears, rather than elimination of bears, as a solution to man-bear problems.

CAMPING, HIKING, HARASSMENT, FORESTS, HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, CANADIAN NATIONAL PARKS, GRIZZLY BEAR

220. Herrero, S. 1970. Man and the grizzly bear. BioScience 20:1148-1153.

Data are examined relating to grizzly bear-human interactions. Circumstances related to attacks and man's values and attitudes relating to grizzly bears are discussed. The author contends that human-bear coexistence is possible, and is especially valuable in Glacier and Yellowstone National Parks.

CAMPING, HIKING, FORESTS, HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, CANADIAN NATIONAL PARKS, GRIZZLY BEAR

221. Herrero, S. 1976. Conflicts between man and grizzly bears in the National Parks of North America. Pages 121-145 in M. R. Pelton, J. W. Lentfer, and G. E. Folk, eds. Bears--their biology and management. Third International Conference on Bear Research and Man-

agement, June 1974, Binghamton, N.Y. and Moscow, USSR. IUCN Publ. New Ser. 40, Morges, Switzerland.

Data on visitor injuries and deaths inflicted by grizzly bears in National Parks are analyzed. Situations preceding attacks and age and sex classes of bears involved are discussed. Attacks usually occurred in backcountry and involved sudden surprise of females with cubs at close range. Ways of avoiding attack and successful management programs are described.

CAMPING, HIKING, HARASSMENT, WILDLIFE VIEWING, FORESTS, HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, CANADIAN NATIONAL PARKS, THREATENED AND ENDANGERED SPECIES, GRIZZLY BEAR

222. Herrero, S. 1978. People and grizzly bears: The challenge of coexistence. Pages 167-179 in C. M. Kirkpatrick, ed. Wildlife and people. Proceedings of the 1978 John S. Wright Forestry Conference, 23-24 February 1978, Purdue University, West Lafayette, Ind.

The history of bear-man interactions, bear danger to people, and management strategies to reduce bear hazards to people and promote natural populations of grizzly bears are reviewed. Improper disposal of garbage and provocation are two circumstances leading to bear-human conflicts which can be controlled; however, a small risk to anyone entering grizzly habitat will always be present. Attitudes and values concerning the grizzly bear will ultimately decide its future.

CAMPING, HIKING, HARASSMENT, TOURISM, WILDLIFE VIEWING, FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, CANADIAN NATIONAL PARKS, GRIZZLY BEAR

223. Hess, D. 1968. The big cat. Colo. Outdoors 17(1):1-6.

This popular article profiles the biology and history of the mountain lion in Colorado, including an examination of tales of man-killing lions. Only one instance of a boy killed by a lion in Washington is considered authentic. Although lions have been known to trail humans, probably due to curiosity, their fear of man prevents them from attacking humans.

FORESTS, RANGELAND, HUMAN HEALTH AND SAFETY, MOUNTAIN LION

224. Hicks, L. L. 1977. Human disturbance of the Mt. Baxter herd of Sierra Nevada bighorn sheep. M.S. Thesis. University of Michigan, Ann Arbor. 57 pp.

Studies in California described and quantified human-bighorn sheep interactions and determined the extent of human disturbance of sheep. Distance, herd size, and juxtaposition were important factors in bighorn reactions to humans. Sheep were not permanently displaced by humans in the study area. Management recommendations include trail alterations and some human activity restrictions.

CAMPING, HIKING, CLIMBING, TUNDRA, RECREATION MANAGEMENT, BIGHORN SHEEP

225. Hicks, L. L., and J. M. Elder. 1979. Human disturbance of Sierra Nevada bighorn sheep. J. Wildl. Manage. 43: 909-915.

Direct observations, pellet transects, and hiker interviews were used to assess use overlap and nature of interactions between humans and bighorn sheep in California. Distance, juxtaposition, and herd size and composition were important factors in reaction of sheep to humans. Bighorn-human encounters were not adversely affecting the bighorn pouplation; nevertheless, limitation of human use of the study area is recommended.

CAMPING, CLIMBING, HIKING, WILDLIFE VIEWING, FORESTS, TUNDRA, RECREATION MANAGEMENT, U.S. NATIONAL FORESTS, BIGHORN SHEEP

226. Hinman, R. 1974. The impact of oil development on wildlife populations in northern Alaska. Proc. Annu. Conf. West. Assoc. State Game Fish Comm. 54: 156-164.

Potential impacts of oil and gas development on wildlife in northern Alaska are discussed. One major problem has been animal-man confrontations, largely involving bears. Inad-

vertent and deliberate harassment of animals by aircraft may have important effects on big game and nesting raptors.

DISTURBANCE (GENERAL), HARASSMENT, FORESTS, TUNDRA, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, WILDLIFE (GENERAL), BEARS, RAPTORS, GRAY WOLF

227. Holroyd, J. C. 1967. Observations of Rocky Mountain goats on Mount Wardle, Kootenay National Park, British Columbia. Can. Field-Nat. 81:1-22.

Behavior of mountain goats in British Columbia is described, including reactions to man. Goat responses to human presence varied according to season, herd size, and other circumstances. Goats were rarely aggressive toward the author, although two incidents are described in which a goat appeared to threaten him.

DISTURBANCE (GENERAL), FORESTS, RANGELAND, FLIGHT DISTANCE, HUMAN HEALTH AND SAFETY, CANADIAN NATIONAL PARKS, MOUNTAIN GOAT

228. Hooper, R. G. 1977. Nesting habitat of common ravens in Virginia. Wilson Bull. 89:233-242.

In a study of raven nesting habitats in Virginia, relationships of nesting ravens to human activity were examined. Behavior of ravens in response to human pressure was variable depending on the situation. Human activity should be restricted near active nests, despite the observed tenacity of some nesting pairs. Most birds would not be affected by recreational activity farther than 200 meters from nests.

CLIMBING, HIKING, HARASSMENT, RESEARCH IMPACTS, TOURISM, WILDLIFE VIEWING, FORESTS, RECREATION MANAGEMENT, COMMON RAVEN

229. Hooper, R. G., H. S. Crawford, and R. F. Harlow. 1973. Bird density and diversity as related to vegetation in forest recreational areas. J. For. 71:766-769.

Breeding bird populations as related to understory density were studied in National Forest recreation areas in the southern Appalachians. Clumping of understory shrubs was determined to be important to birds in open, park-like recreational areas. Recommendations for managing forest recreational areas for diverse bird populations are discussed.

CAMPING, WILDLIFE VIEWING, FORESTS, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL FORESTS, BIRDS

230. Hoover, B. 1973. Off-road vehicle problems on federal lands. Proc. Annu. Meet. Assoc. Midwest Fish Wildl. Comm. 40:37-49.

Problems associated with recreational use of off-road vehicles are discussed. Damage to natural resources includes habitat destruction and direct impacts on wildlife. Instances of inadvertent and deliberate harassment of game animals are provided. Regulatory legislation and management procedures are discussed in detail.

OFF-ROAD VEHICLES, HARASSMENT, FORESTS, RANGELAND, RECREATION MANAGEMENT, U.S. BLM LANDS, U.S. NATIONAL FORESTS, WILDLIFE (GENERAL)

231. Horejsi, B. 1976. Some thoughts and observations on harassment and bighorn sheep. Pages 149-155 in Proceedings of the Biennial Symposium of the Northern Wild Sheep Council, 10-12 February 1976, Jackson, Wyo.

Harassment and its possible effects on bighorn sheep are discussed. Active harassment results in visible responses by sheep, while passive harassment produces no visible response but may have psychological and physiological effects on sheep. Harassment has significant impacts on individuals and populations, leading to a variety of conditions which reduce fitness. Minimizing harassment of sheep should be given top priority among management objectives.

HARASSMENT, HIKING, TOURISM, WILDLIFE VIEWING, RESEARCH IMPACTS, FLIGHT DISTANCE, PREDATION, RECREATION MANAGEMENT, BIGHORN SHEEP

232. Houston, C. S. 1962. Hazards faced by colonial birds. Blue Jay 20:74-77.

Several nesting colonies of birds in Saskatchewan and reasons for declines or destruction of bird populations are described. Human disturbances including boating, taking of eggs, and recreation associated with resorts were responsible for population declines in several instances. Disturbance may lead to mortality of young through accidental breaking of eggs by fleeing adults, or exposure of eggs and young to heat, cold, or predation.

BOATING, TOURISM, HARASSMENT, LAKES, WETLANDS, PREDATION, WHITE PELICAN, DOUBLE-CRESTED CORMORANT, CALIFORNIA GULL

233. Houston, D. B. 1971. Ecosystems of National Parks. Science 172:648-651.

Management of U.S. National Parks is aimed at preserving park ecosystems in as pristine a condition as possible, and primarily involves preventing or compensating for human influences. So-called nonconsumptive uses such as sightseeing may in fact alter energy and geochemical pathways, disturbing park vegetation and wildlife. Managers must realize that these areas have a finite capacity for absorbing human disturbances.

CAMPING, TOURISM, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, WILDLIFE (GENERAL)

234. Hubbard, W. P., and S. Harris. 1960. Notorious grizzly bears. Sage Books, Denver, Colo. 205 pp.

A popular account of grizzly bear biology, behavior, and encounters with man is provided. Numerous accounts of bear attacks on humans and descriptions of individual bears noted for their depredations on livestock or humans are given.

DISTURBANCE (GENERAL), HIKING, FORESTS, RANGELAND, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, GRIZZLY BEAR

235. Huff, D. E., and P. J. Savage. 1972. A correlation of deer movements with snowmobile activity in Minnesota during winter. Proc. Midwest Fish Wildl. Conf. 34:42-49.

Studies of telemetered white-tailed deer in Minnesota compared deer activities between areas of high and no snowmobile use. The size of deer home ranges was much reduced at the high use area, and snowmobile use appeared to force deer into less preferred habitats where nighttime radiant heat loss was greater.

OFF-ROAD VEHICLES, FORESTS, RECREATION MANAGEMENT, U.S. STATE PARKS AND LANDS, WHITE-TAILED DEER

236. Hume, R. A. 1976. Reactions of goldeneyes to boating. Br. Birds 69:178-179.

Powerboating, water skiing, and sailing are implicated as sources of disturbance of goldeneyes on a reservoir in Great Britain. Observations of goldeneyes taking flight in reaction to powerboats and people on shore are reported.

DISTURBANCE (GENERAL), BOATING, LAKES, FLIGHT DISTANCE, COMMON GOLDENEYE

237. Humphrey, S. 1969. Disturbances and bats. Okla. Underground 2(2):42-44.

The habits of cave-dwelling bats in western Oklahoma are described, with emphasis on their vulnerability to disturbance. The most common species in the area are very sensitive to human intrusion, especially in summer. Researchers and cave visitors have caused declines in some Oklahoma bat populations, although factors involved in the declines are not well understood. Recommendations are suggested to preserve bat populations while allowing human use of caves.

SPELUNKING, RESEARCH IMPACTS, WILDLIFE VIEWING, RECREATION MANAGEMENT, TOWNSEND'S BIG-EARED BAT, CAVE BAT, BRAZILIAN FREE-TAILED BAT

238. Humphrey, S. R. 1978. Status, winter habitat, and management of the endangered Indiana bat, Myotis sodalis. Fla. Sci. 41:65-76.

The known number of living Indiana bats has declined 28% in the last 15 years due to natural catastrophes, destruction of habitat, and disturbance by biologists and spelunkers. Human visits to a hibernating colony cause arousal and flight, with resulting

loss of fat reserves necessary to sustain the bats through winter hibernation and spring migrations. Management recommendations to preserve and restore populations are provided.

RESEARCH IMPACTS, SPELUNKING, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, INDIANA BAT

239. Humphrey, S. R., and T. H. Kunz. 1976. Ecology of a Pleistocene relict, the western big-eared bat (Plecotus townsendii), in the southern Great Plains. J. Mammal. 57:470-494.

Life histories, ecological relationships, and limiting factors of the western (Townsend's) big-eared bat were studied in Oklahoma and Kansas. These bats are extremely sensitive to disturbance, and this fact together with the small population sizes and severe ecological limitations of the big-eared bat, indicate that visitation of nursery colonies by humans is a serious threat to the species' survival in the Great Plains.

SPELUNKING, RESEARCH IMPACTS, FORESTS, RANGELAND, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, TOWNSEND'S BIG-EARED BAT

240. Hunt, G. L., Jr. 1972. Influence of food distribution and human disturbance on the reproductive success of herring gulls. Ecology 53:1051-1061.

In a study of herring gull reproduction in Maine, gull productivity was found to be controlled by different factors operating on eggs and chicks. Egg hatching success was inversely related to amount of disturbance by picnickers, who caused adults to abandon nests and expose eggs to excessive solar radiation. Chick mortality was related to factors other than human disturbance.

PICNICKING, COASTAL ZONES, HERRING GULL

241. Hunt, G. L., Jr. 1979. Management of seabird resources in the Channel Islands National Monument. Page 400 in Abstracts. 2nd Conference on Scientific Research in the National Parks. (Abstract only).

Management of seabird nesting colonies in Channel Islands National Monument, California, is described. Human disturbance to nesting birds is minimized by controlling access to colonies.

DISTURBANCE (GENERAL), COASTAL ZONES, U.S. NATIONAL PARKS, SEABIRDS

242. Iowa State Conservation Commission. 1970. Food and feeding habits of diving ducks: Ecology and harvest of diving ducks of the Keokuk Pool. Iowa State Conserv. Comm. Project W-108-R-03/FIN. 12 pp. (MIN 147380272).

Human disturbance resulting from barge traffic, outboard motorboats, hunters, and fishermen seemed to be the most important factors causing duck movements on the Keokuk Pool, Iowa.

BOATING, FISHING, RIVERS, WETLANDS, WATERFOWL

243. Isakovic, I. 1974. Effects of land use and outdoor recreation on game populations. Pages 351-356 in I. Kjerner and P. Bjurholm, eds. Proceedings, XIth International Congress of Game Biologists, 3-7 September 1973, Stockholm, Sweden. National Swedish Environmental Protection Board, Stockholm.

An overview of man's effect on game populations through land use and outdoor recreation is provided. Recreationists fleeing from polluted urban environments make demands on nature that must be harmonized with the capacity of the land to absorb them. Plans to control impacts of tourism must be worked out, especially in areas where it is no longer possible to reserve large areas of land for protection.

DISTURBANCE (GENERAL), TOURISM, RECREATION MANAGEMENT, WILDLIFE (GENERAL)

244. Janssen, R. 1978. Noise and animals: Perspectives of government and public policy. Pages 287-301 in J. L. Fletcher and R. G. Busnel, eds. Effects of noise on wildlife. Academic Press, New York, N.Y.

Impacts of human-caused noise on wildlife and domesticated animals must be determined so that proper decisions can be made by policy-makers. An animal-response model to quantify the

effects of noise on animals is presented. Wildlife exposures to noise are generally involuntary and come from mobile sources such as airplanes and recreational vehicles.

BOATING, OFF-ROAD VEHICLES, FLIGHT DISTANCE, RECREATION MANAGEMENT, U.S. BLM LANDS, WILDLIFE (GENERAL)

245. Jarvinen, J. A., and W. D. Schmid. 1971. Snowmobile use and winter mortality of small mammals. Pages 131-141 in M. Chubb, ed. Proceedings of the 1971 Snowmobile and Off the Road Vehicle Research Symposium, 14-15 June 1971, East Lansing, Mich. Michigan State Univ., East Lansing, Dept. Park Recr. Resour. Tech. Rep. 8.

Trapping results in Minnesota showed increased winter mortality of small mammals beneath snowmobile-compacted snowfields. It is suggested that compaction inhibits mammal movements beneath snow and subjects subnivean organisms to greater temperature stress.

OFF-ROAD VEHICLES, FORESTS, MAMMALS

246. Jehl, J. R., Jr. 1973. Studies of a declining population of brown pelicans in northwestern Baja California. Condor 75:69-79.

Large-scale reproductive failures of Baja California brown pelican colonies were found during studies from 1969 through 1971. Thin-shelled eggs are the major cause of reproductive failure, but human disturbance is also important. Tourists in yachts and other pleasure craft visit some colonies, usually inadvertently disturbing breeding pelicans. The Mexican and United States governments could improve the chances for the birds' survival by limiting access to breeding colonies.

BOATING, TOURISM, RESEARCH IMPACTS, WILDLIFE VIEWING, COASTAL ZONES, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, BROWN PELICAN

247. Jehl, J. R., Jr. 1977. History and present status of ospreys in northwestern Baja California. Pages 241-245 in J. C. Ogden, ed. Transactions of the North American Osprey Research Conference, 10-12 February 1972, Williamsburg, Va. U.S. Natl. Park Serv. Trans. Proc. Ser. 2.

Although osprey populations on the west coast of Baja California, Mexico, have remained fairly stable since 1946, human interference is a continual threat to birds nesting in the area, particularly on the offshore islands. Increasing visits by pleasure boats bring curious sightseers who may cause losses of eggs to gull predation by flushing adults from nests.

TOURISM, WILDLIFE VIEWING, COASTAL ZONES, PREDATION, OSPREY, GULLS

248. Jenni, D. A. 1969. A study of the ecology of four species of herons during the breeding season at Lake Alice, Alachua County, Florida. Ecol. Monogr. 39:245-270.

The effects of the investigator on herons were evaluated during studies of heron ecology in Florida. Some losses occurred from flushing adults from nests with subsequent loss of young, but indirect effects may have been more important. Nestlings often regurgitated when disturbed, and the youngest nestlings frequently died of starvation. However, production data and other observations suggest that the impact of the investigator on heron survival was not great.

RESEARCH IMPACTS, WETLANDS, PREDATION, SNOWY EGRET, CATTLE EGRET, LITTLE BLUE HERON, LOUISIANA HERON

249. Johnson, A. S. 1972. Man, grizzly and National Parks. Natl. Parks Conserv. Mag. 46(2):10-15.

Problems of human-grizzly bear interactions in Yellowstone and Glacier National Parks are discussed in this nontechnical article. The history of confrontations is outlined and recent bear management practices are critically reviewed, particularly the feeding of garbage to bears in Yellowstone. New Park Service programs to attain wild, independent grizzly populations in parks are commended.

CAMPING, HIKING, HARASSMENT, TOURISM, WILDLIFE VIEWING, FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, WILDLIFE MANAGEMENT, RECREATION MANAGEMENT, U.S. NATIONAL PARKS

250. Johnson, R. F., Jr. 1976. Mortality factors affecting a white pelican population, Chase Lake National Wildlife Refuge, North Dakota. M.S. Thesis. Michigan Technological University, Houghton. 74 pp.

Mortality factors responsible for low fledging rates of white pelicans in North Dakota were studied. Nest abandonment related to water conditions and sibling rivalry were major causes of poor reproduction. Predation, accidents, and physical stress do not cause significant mortality in an undisturbed situation, but may become significant with extensive and repeated human disturbance.

DISTURBANCE (GENERAL), FISHING, LAKES, PREDATION, U.S. NATIONAL WILDLIFE REFUGES, WHITE PELICAN

251. Johnson, R. F., Jr., and N. F. Sloan. 1975. Fishing gear--a deadly hazard. Inl. Bird-Banding News 47:115-117.

During studies of a white pelican population at Chase Lake National Wildlife Refuge, North Dakota, several birds were observed to have suffered problems from fishing gear. Birds were observed entangled with fishing line, 1 had a lure embedded in its wing muscles, and 1 incubating adult was seen with a fish stringer trailing from its pouch.

FISHING, LAKES, U.S. NATIONAL WILDLIFE REFUGES, WHITE PELICAN

252. Johnson, R. F., Jr., and N. F. Sloan. 1976. The effects of human disturbance on the white pelican colony at Chase Lake National Wildlife Refuge, North Dakota. Inl. Bird-Banding News 48:163-170.

Human disturbance of a white pelican colony was studied in North Dakota. Predation on eggs and young by gulls was severe when adult birds were kept away from nests for long periods. Temperature stress to young and stress caused by trampling and pod movement of older young were also important effects of human disturbance.

DISTURBANCE (GENERAL), LAKES, WETLANDS, PREDATION, U.S. NATIONAL WILDLIFE REFUGES, WHITE PELICAN, CALIFORNIA GULL, RING-BILLED GULL

253. Jonkel, C. 1970. The behavior of captured North American bears. BioScience 20:1145-1147.

Observations of wild black bears, grizzly bears, and polar bears held in snares indicate that only the grizzly bear is unusually aggressive. Bears appear prone to forming strong habits, suggesting that bear behavior research can provide a basis for management.

HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, THREATENED AND ENDANGERED SPECIES, BEARS, GRIZZLY BEAR, BLACK BEAR, POLAR BEAR

254. Jonkel, C. 1979. Living with grizzlies. Pages 133-137 in R. Lockwood, ed. Wildlife survival. Proceedings of the 2nd Symposium on Endangered North American Wildlife and Habitat, 1-6 June 1977, St. Louis, Mo. The Wild Canid Survival and Research Center, Inc., St. Louis, Mo.

The status of grizzly bears and problems of coexistence with man in North America are described. To coexist with grizzlies people must learn to be tolerant of bears and to conduct outdoor activities in ways that reduce the possibilities of conflicts with bears. Increasing human use of National Parks and other areas containing grizzly populations are creating new conflicts between humans and bears.

HIKING, CAMPING, FISHING, FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, GRIZZLY BEAR

255. Jonkel, C. J., and C. Servheen. 1977. Bears and people: A wilderness management challenge. West. Wildlands 4(2):22-25.

When grizzly bear-human contacts are frequent and do not result in harm to the bear, bears can become conditioned to humans and may learn to exploit such encounters to gain food. Such dangerous behavior is becoming a problem in North American National Parks. Regulated hunting outside of preserves prevents such conditioning; the answers within parks are some restrictions on backcountry use plus informing people about bear behavior and how to avoid confrontations.

HIKING, CAMPING, WILDLIFE VIEWING, TOURISM, FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL FORESTS, U.S. NATIONAL PARKS, CANADIAN NATIONAL PARKS, GRIZZLY BEAR

256. Jorgensen, P. 1974. Vehicle use at a desert bighorn watering area. Trans. Desert Bighorn Counc. 18:18-24.

Desert bighorn and human activity were observed at a watering area in California, where an unpaved road crossed a creek used as a water source by bighorn. Bighorn activity at the site decreased about 50% on days when vehicle traffic was present; vehicles and bighorn tended to utilize the area at about the same time of day. The evidence suggests that sheep are forced to use less preferred bedding sites as a result of human disturbance.

CAMPING, HIKING, OFF-ROAD VEHICLES, PICNICKING, DESERTS, FLIGHT DISTANCE, U.S. STATE PARKS AND LANDS, BIGHORN SHEEP

257. Juenemann, B. G. 1973. Habitat evaluations of selected bald eagle nest sites on the Chippewa National Forest. M.S. Thesis. University of Minnesota, St. Paul. 170 pp.

Human disturbance levels were among factors evaluated in relation to bald eagle nest sites in Minnesota. An indirect relationship between years of apparent nest activity and disturbance was found. Ratios of nest productivity to nest activity were also related to levels of human disturbance, indicating a need for management of disturbances during eagle incubation periods.

DISTURBANCE (GENERAL), FORESTS, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, U.S. NATIONAL FORESTS, BALD EAGLE

258. Kahl, J. R. 1972. Osprey management on the Lassen National Forest. Pages 7-13 in J. Yoakum, ed. Cal-Neva Wildlife 1972. Transactions of the Annual Meeting for the Western Section of The Wildlife Society and the California-Nevada Chapter of the American Fisheries Society, 28-29 January 1972, San Luis Obispo, Calif.

The Lassen National Forest contains part of the largest known breeding population of ospreys in the western U.S. Human disturbance by recreationists caused some losses of eggs and young from nests studied, and increasing numbers of people seek the area of the colony for recreation. Management actions being implemented include restrictions on human activities near nests during the breeding season.

CAMPING, OFF-ROAD VEHICLES, HIKING, LAKES, FORESTS, RECREATION MANAGEMENT, U.S. NATIONAL FORESTS, OSPREY

259. Kesteloot, E. 1967. Perturbations causes par la presence humaine. (Disturbance due to the presence of humans.) Pages 237-243 in Towards a new relationship of man and nature in temperate lands. Part 1: Ecological impact of recreation and tourism upon temperate environments. IUCN Tenth Technical Meeting, 26-30 June 1966, Lucerne, Switzerland. IUCN Publ. New Ser. 7, Morges, Switzerland.

Causes and mechanisms of human disturbance of wild animals are discussed. The disturbing presence of humans is through sight, sound, and scent; reactions of animals to these stimuli vary. The effects on animals of the growing number of people interested in stalking, observing, photographing, or feeding wildlife are discussed.

HIKING, WILDLIFE VIEWING, HARASSMENT, WILDLIFE (GENERAL)

260. Klein, D. R. 1971. Reaction of reindeer to obstructions and disturbances. Science 173:393-398.

Reactions of reindeer to snowmobiles in Scandinavia are discussed in this description of human impacts on reindeer. It is suggested that observations of Scandinavian reindeer may aid in managing impacts of industrialization on caribou in North America.

OFF-ROAD VEHICLES, TUNDRA, CARIBOU

261. Klein, D. R. 1972. Problems in conservation of mammals in the north. Biol. Conserv. 4:97-101.

Oil development, tourism, and expanding human populations are threatening

many of the large mammals of the arctic and subarctic regions. Oil development in particular may affect northern mammals through obstruction of movements, harassment by aircraft and other disturbances, and the increased human populations associated with industrial development.

DISTURBANCE (GENERAL), HARASSMENT, TOURISM, COASTAL ZONES, TUNDRA, WILDLIFE MANAGEMENT, THREATENED AND ENDANGERED SPECIES, MAMMALS

262. Klein, D. R. 1974. The reaction of some northern mammals to aircraft disturbance. Pages 377-383 in I. Kjerner and P. Bjurholm, eds. Proceedings, XIth International Congress of Game Biologists, 3-7 September 1973, Stockholm, Sweden. National Swedish Environmental Protection Board, Stockholm.

The increasing use of low-flying aircraft in remote areas has generated concern for the effects of aircraft disturbance on wildlife. A study in Alaska is in progress to determine the effects of aircraft on caribou and other species. Definition of aircraft conditions leading to disturbance provides a basis for the establishment of regulations to govern the use of aircraft over critical ungulate habitat.

DISTURBANCE (GENERAL), HARASSMENT, TUNDRA, FLIGHT DISTANCE, CARIBOU, UNGULATES

263. Kleinstauber, K. 1969. The status of cliff-nesting peregrines in the German Democratic Republic. Pages 209-216 in J. J. Hickey, ed. Peregrine falcon populations: Their biology and decline. University of Wisconsin Press, Madison.

Cliff-nesting pairs of peregrine falcons in East Germany declined significantly from 1954 to 1965, possibly due in part to food shortages following World War II. The decline was characterized by superannuation of peregrines, to which human-caused stresses may have contributed. Roads, tourists, photographers, and rock climbers all may contribute to psychological stresses of peregrines.

CAMPING, CLIMBING, TOURISM, WILDLIFE VIEWING, THREATENED AND ENDANGERED SPECIES, PEREGRINE FALCON

264. Klinghammer, E. 1978. Man and animals: Towards a sympatric relationship with wild animals. Pages 180-187 in C. M. Kirkpatrick, ed. Wildlife and people. Proceedings of the 1978 John S. Wright Forestry Conference, 23-24 February 1978, Purdue University, West Lafayette, Ind.

Problems of human-wildlife interactions are discussed in relation to behavior of wildlife and humans. Human attitudes toward animals, responses of animals to humans, and special relationships between humans and animals are discussed. Various options for the management of wildlife in relation to human interests are evaluated.

HARASSMENT, WILDLIFE VIEWING, REVIEW, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, WILDLIFE MANAGEMENT, WILDLIFE (GENERAL)

265. Klukas, R., J. C. Ogden, T. Hines, W. B. Robertson, J. A. Kushlan, and H. W. Campbell. 1979. American crocodile recovery plan. U.S. Fish and Wildlife Service, Washington, D.C. 35 pp.

Current status of the American crocodile in Florida and detailed management plans are discussed. Reasons for recent crocodile declines include disturbance of nesting sites by boaters, destruction of nests by vandals, accidental highway kills, and poaching.

BOATING, COASTAL ZONES, WETLANDS, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS

266. Koford, C. B. 1953. The California condor. Natl. Audubon Soc. Res. Rep. 4. 154 pp.

Reactions of nesting adult condors to human disturbance are among behavioral aspects of the California condor described. Reactions to disturbance vary depending on stage of incubation, time since nesting began, previous disturbance, and other factors. Nesting adults are aware of humans in sight within 500 yards of the nest, and behavior is altered under such conditions. It is impossible to photograph nesting condors without disturbing them.

DISTURBANCE (GENERAL), RESEARCH IMPACTS, WILDLIFE VIEWING, FORESTS, RANGELAND,

FLIGHT DISTANCE, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, U.S. NATIONAL FORESTS, CALIFORNIA CONDOR

267. Kury, C. R., and M. Gochfeld. 1975. Human interference and gull predation in cormorant colonies. Biol. Conserv. 8:23-34.

Observations of behavioral interactions between double-crested cormorants, great black-backed gulls, and herring gulls in Maine, and between king shag and dolphin gulls in Argentina, indicate that certain predictable interactions occur when breeding birds are disturbed. Disturbance impacts can be minimized in colonies where human access is carefully regulated.

DISTURBANCE (GENERAL), TOURISM, COASTAL ZONES, RECREATION MANAGEMENT, PREDATION, DOUBLE-CRESTED CORMORANT, DOLPHIN GULL, GREAT BLACK-BACKED GULL, HERRING GULL, KING SHAG, SEABIRDS

268. Lavigne, G. R. 1976. Winter response of deer to snowmobiles and selected natural factors. M.S. Thesis. University of Maine, Orono. 68 pp. plus supplement.

Snowmobile trails enhanced deer mobility during periods of deep snow in Maine, and probably reduced deer energy expenditure in winter; deer used snowmobile trails most extensively near major bedding areas. Disturbance by snowmobiles did not cause deer to abandon preferred bedding and feeding sites. Deer responses to snowmobiles varied from running out of sight to staying in place, depending on conditions of the encounter.

OFF-ROAD VEHICLES, FORESTS, FLIGHT DISTANCE, WILDLIFE MANAGEMENT, WHITE-TAILED DEER

269. Laycock, G. 1977. Everybody's favorite bear. Audubon 79(3):6-19.

This popular article describes the biology of black bears and provides accounts of human-bear encounters in parks and elsewhere. Bear damage to private property and both legal and illegal killing of bears are among problems associated with human-bear interactions. Educating the public about bear behavior and role in ecosystems is necessary to assure their conservation.

TOURISM, WILDLIFE VIEWING, FORESTS, HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, BLACK BEAR

270. Leatherman, S. P., and P. J. Godfrey. 1979. The impact of off-road vehicles on coastal ecosystems in Cape Cod National Seashore: An overview. Univ. Massachusetts, Amherst, Natl. Park Serv. Coop. Res. Unit Rep. 34. 34 pp.

Impacts of off-road vehicles were tested by experiments on beaches, dunes, salt marshes, and tidal flats on Cape Cod, Massachusetts. It was concluded that there is no carrying capacity for vehicle impacts on coastal ecosystems, since even low-level use can result in severe environmental degradation. Management recommendations are presented based on the research results. A bibliography on the effects of off-road vehicles on coastal ecosystems is included.

OFF-ROAD VEHICLES, COASTAL ZONES, WETLANDS, RECREATION MANAGEMENT, BIBLIOGRAPHY, U.S. NATIONAL PARKS, WILDLIFE (GENERAL), WATERBIRDS

271. Lenington, S. 1979. Predators and blackbirds: The "uncertainty principle" in field biology. Auk 96:190-192.

From field studies in New Jersey and a review of literature, the author concludes that human activities, particularly research activities, significantly increase predation on red-winged blackbird nests. Predators may follow human scents to nests, or repeated flushing of adults may attract predators to nest locations.

DISTURBANCE (GENERAL), RESEARCH IMPACTS, PREDATION, WETLANDS, RANGELAND, REVIEW, RED-WINGED BLACKBIRD

272. Leresche, R. E. 1966. Behavior and calf survival in Alaskan moose. M.S. Thesis. University of Alaska, Fairbanks. 85 pp.

Aspects of moose behavior studied in Alaska included responses of moose to human disturbance. Reactions of moose

varied from rapid flight to complete disinterest, depending on the situation. Flight distances, details of behavior, and instances of moose aggression toward humans are described.

DISTURBANCE (GENERAL), FORESTS, LAKES, WETLANDS, HUMAN HEALTH AND SAFETY, FLIGHT DISTANCE, MOOSE

273. Liddle, M. J. 1975. A selective review of the ecological effects of human trampling on natural ecosystems. Biol. Conserv. 7:17-36.

Literature concerning ecological effects of trampling is reviewed. Most work has focused on effects on vegetation, but impacts on wildlife are also mentioned. The author suggests types of research needed in the future and presents a model showing events and relationships that occur as a result of trampling.

HIKING, REVIEW, WILDLIFE (GENERAL)

274. Liddle, M. J., and H. R. A. Scorgie. 1980. The effects of recreation on freshwater plants and animals: A review. Biol. Conserv. 17:183-206.

Impacts of recreation on freshwater plants and animals are reviewed. Impacts of boating include wash, pollution from outboard motors, and sewage. Shore-based activities such as swimming can result in trampling and pollution from sewage and various chemicals. Effects of management for recreation are also considered.

BOATING, FISHING, HIKING, PICNICKING, SWIMMING, WILDLIFE VIEWING, LAKES, RIVERS, WETLANDS, REVIEW, RECREATION MANAGEMENT, WILDLIFE (GENERAL)

275. Lieb, J. W., and A. S. Mossman. 1974. Elk drowning. Murrelet 55:39-40.

While studying elk in Prairie Creek Redwoods State Park, California, an investigator followed a disturbed elk for some distance and eventually observed the elk swim into the ocean and drown. The elk apparently was new to the area and unaware of other possible escape routes.

RESEARCH IMPACTS, DISTURBANCE (GENERAL), COASTAL ZONES, FORESTS, U.S. STATE PARKS AND LANDS, ELK

276. Light, J. T., Jr. 1970. A progress report on bighorn habitat management in the San Bernardino National Forest. Trans. Desert Bighorn Counc. 14:9-13.

Bighorn sheep range in the San Bernardino National Forest, California, is being managed to perpetuate sheep habitat and forest environments along with providing for public recreational opportunities. Proposed expansion of an existing ski area may adversely affect sheep habitat and cause disturbance to the sheep population; impact studies recently initiated will determine impacts and provide measures to protect bighorn habitat and forest environmental quality.

HIKING, SKIING, TOURISM, FORESTS, RANGELAND, RECREATION MANAGEMENT, U.S. NATIONAL FORESTS, BIGHORN SHEEP

277. Light, J. T., Jr. 1971. An ecological view of bighorn habitat on Mt. San Antonio. Trans. N. Am. Wild Sheep Conf. 1:150-157.

Ecological analysis of a California bighorn sheep range revealed relationships between bighorn habitat use and human disturbance associated with a ski resort and a summer cabin. It was found that bighorn use did not occur where human use was heavy and sheep were forced into less satisfactory habitats.

HIKING, SKIING, TOURISM, FORESTS, RANGELAND, FLIGHT DISTANCE, RECREATION MANAGEMENT, U.S. NATIONAL FORESTS, BIGHORN SHEEP

278. Light, J. T., Jr. 1973. Analysis of bighorn habitat in the San Gabriel Mountains. Trans. Desert Bighorn Counc. 17:53-58.

Information is presented on bighorn habitat use and effects of man on bighorn sheep in the San Gabriel Mountains, California. Projected recreation use levels in summer are expected to surpass what bighorns will tolerate, displacing sheep from preferred habitats. Management guidelines proposed for the area include limitations on number of recreationists and the location of travel routes to minimize human-bighorn encounters.

CAMPING, HIKING, WILDLIFE VIEWING, OFF-ROAD VEHICLES, TOURISM, FORESTS, RANGE-

LAND, FLIGHT DISTANCE, RECREATION MANAGEMENT, U.S. NATIONAL FORESTS, BIGHORN SHEEP

279. Lime, D. W., and C. T. Cushwa. 1969. Wildlife esthetics and auto campers in the Superior National Forest. U.S. For. Serv. Res. Pap. NC-32. 8 pp.

Auto campers in Minnesota were interviewed to determine the importance of wildlife esthetics to National Forest visitors. Although wildlife was described as esthetically important to many of the auto campers surveyed, it was not the prime motivational factor in attracting them to the National Forest. Most visitors sought a remote setting affording a maximum contrast to the usual urban environment.

CAMPING, TOURISM, WILDLIFE VIEWING, FORESTS, HUMAN HEALTH AND SAFETY, U.S. NATIONAL FORESTS, WILDLIFE (GENERAL)

280. Lime, D. W., and G. H. Stankey. 1971. Carrying capacity: Maintaining outdoor recreation quality. Pages 174-184 in Recreation Symposium proceedings, 12-14 October 1971, Syracuse, N.Y. U.S. Forest Service, Northeastern Forest Experiment Station, Upper Darby, Pa.

Impacts on physical resources are a factor in determining recreational carrying capacity. The abundance, behavior, and survival of wildlife is often influenced by recreational activity.

DISTURBANCE (GENERAL), BOATING, CAMPING, HIKING, RECREATION MANAGEMENT, WILDLIFE (GENERAL)

281. Lindzey, J. S. 1967. Highlights of management. Pages 245-259 in O. H. Hewitt, ed. The wild turkey and its management. The Wildlife Society, Washington, D.C.

In a chapter discussing management of turkeys, the author states "turkeys are not compatible with heavily used recreation areas and even occasional use in some areas may cause nest abandonment."

DISTURBANCE (GENERAL), FORESTS, RECREATION MANAGEMENT, TURKEY

282. Lochmiller, R. L. 1978. Birding! Va. Wildl. 39(12):10-11.

This popular article describes bird watching activities and outlines ways to minimize disturbance of birds. Avoiding the use of recorded bird calls of rare birds, keeping a good distance from nests, avoiding handling of young, and avoiding large groups in critical habitats are suggested.

HARASSMENT, WILDLIFE VIEWING, RECREATION MANAGEMENT, BIRDS

283. Lock, A. R., and R. K. Ross. 1973. The nesting of the great cormorant Phalacrocorax carbo and the double-crested cormorant Phalacrocorax auritus in Nova Scotia in 1971. Can. Field-Nat. 87:43-49.

It is suggested that great cormorants, nesting on bare rock in Nova Scotia, are more susceptible to human disturbance than double-crested cormorants, which were found to nest in trees. Human intrusion may lead to greater predation on eggs and chicks while adults are away from nests. The daily presence of boats near cormorant nesting colonies caused little disturbance.

BOATING, DISTURBANCE (GENERAL), COASTAL ZONES, PREDATION, DOUBLE-CRESTED CORMORANT, GREAT CORMORANT

284. Lodico, N. J. 1973. Environmental effects of off-road vehicles: A review of the literature. U.S. Dept. Inter. Res. Serv. Branch, Off. Libr. Serv. Bibliogr. Ser. 29. 109 pp.

Technical articles, conferences and symposia, and popular articles concerning environmental effects of off-road vehicle use are reviewed. Effects on animals of snowmobiles, motorcycles, all-terrain vehicles, and four-wheeled vehicles are discussed. A bibliography of 103 citations is included.

OFF-ROAD VEHICLES, HARASSMENT, RECREATION MANAGEMENT, REVIEW, U.S. BLM LANDS, U.S. NATIONAL FORESTS, WILDLIFE (GENERAL)

285. Lucas, R. C. 1978. Impact of human pressure on parks, wilderness, and

other recreation lands. Pages 221-239 in K. A. Hammond, G. Macinko, and W. B. Fairchild, eds. Sourcebook on the environment: A guide to the literature. University of Chicago Press, Chicago, Ill. and London, England. 613 pp.

Several selected types of recreational impacts on wildlands and parks are reviewed, including physical and biological changes associated with recreational activities. Most literature reviewed is concerned with impacts on landscapes, vegetation, and soils, but effects of recreation on wildlife are also mentioned.

DISTURBANCE (GENERAL), TOURISM, REVIEW, WILDLIFE (GENERAL)

286. Lucas, R. C., and G. H. Stankey. 1974. Social carrying capacity for backcountry recreation. Pages 14-23 in Outdoor recreation research: Applying the results. Papers from a workshop, 19-21 June 1973, Marquette, Mich. U.S. For. Serv. Gen. Tech. Rep. NC-9.

Recreational carrying capacity in wildlands is determined by management objectives, visitor attitudes and perceptions, and visitor impacts on biological-physical resources including wildlife. The authors suggest that resource management in backcountry, especially for fish and wildlife, could be intensive. Carrying capacity research is reviewed.

BOATING, CAMPING, HIKING, WILDLIFE VIEWING, RECREATION MANAGEMENT, REVIEW, WILDLIFE (GENERAL)

287. Luckenbach, R. A. 1978. An analysis of off-road vehicle use on desert avifaunas. Trans. N. Am. Wildl. Nat. Resour. Conf. 43:157-162.

Research in California and elsewhere is reviewed showing the detrimental impacts of off-road vehicle use on desert birds. Breeding populations as well as winter visitant and migrant species can be affected. Approaches to management in relation to desert avifaunas are discussed.

CAMPING, OFF-ROAD VEHICLES, DESERTS, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, REVIEW, BIRDS

288. Luckenbach, R. A. 1980. Studies of desert vertebrate communities: Responses to disturbed environments. Ph.D. Diss. University of California, Berkeley. 209 pp.

Results of four studies of desert vertebrate communities in California are reported and impacts of off-road vehicles on California desert vertebrates are reviewed. Vehicle-impacted areas had reduced ground cover, fewer species and lower densities of breeding birds, lizards, and rodents, and fewer large mammal tracks.

RESEARCH IMPACTS, WETLANDS, PREDATION, CANADA GOOSE, HERRING GULL, THAYER'S GULL

289. Luckenbach, R. A. 1982. Ecology and management of the desert tortoise (Gopherus agassizii) in California. Pages 1-37 in R. B. Bury, ed. North American tortoises: Conservation and ecology. U.S. Fish Wildl. Serv. Wildl. Res. Rep. 12.

Surveys in California documenting the distribution and abundance of the desert tortoise and a review of the ecology of the species indicated factors contributing to its decline. Human impacts include collection and removal of tortoises, highway accidents, and effects of off-road vehicles through direct mortality and habitat destruction. Management efforts include a proposal for a reserve in the Mojave Desert to limit human impacts.

OFF-ROAD VEHICLES, HARASSMENT, DESERTS, RANGELAND, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, U.S. BLM LANDS, DESERT TORTOISE

290. Lussenhop, J. 1977. Urban cemeteries as bird refuges. Condor 79:456-461.

Studies of cemetery bird communities in Chicago, Illinois, found that larger, more heterogeneous cemeteries supported more bird species than the surrounding city. Complete development of the cemeteries would reduce the number of bird species present; recreational pressures tend to limit the value of urban cemeteries as bird refuges.

HIKING, DISTURBANCE (GENERAL), FORESTS, URBAN ZONES, BIRDS

291. MacArthur, R. A., R. H. Johnston, and V. Geist. 1979. Factors influencing heart rate in free-ranging bighorn sheep: A physiological approach to the study of wildlife harassment. Can. J. Zool. 57:2010-2021.

Heart rates of unrestrained female bighorn sheep were measured by telemetry in Alberta. In all ewes studied heart rate varied positively with activity level and inversely with distance to a road. Responses to other stimuli varied. Findings are discussed in relation to ecology and bioenergetics of bighorn sheep.

DISTURBANCE (GENERAL), TOURISM, HARASSMENT, FORESTS, BIGHORN SHEEP

292. MacCarter, D. L. 1972. Reproductive performance and population trends of ospreys of Flathead Lake, Montana. M.S. Thesis. Humboldt State University, Arcata, Calif. 80 pp.

Human disturbance is discussed as a possible influence on osprey reproductive success at Flathead Lake, Montana. The greatest potential disturbance was from researchers climbing to nests, but there were no apparent losses of eggs or chicks due to research activities. Recreation activities associated with summer resorts take place primarily after osprey eggs have hatched; disturbance did not appear to be an important factor.

BOATING, PICNICKING, SWIMMING, HARASSMENT, TOURISM, WILDLIFE VIEWING, FORESTS, LAKES, OSPREY

293. Mace, R. U. 1974. Application of vehicle restrictions in wildlife management. Proc. Annu. Conf. West. Assoc. State Game Fish Comm. 54:205-210.

Problems associated with increased use of remote habitats by persons using off-road vehicles are described; these include harassment of wildlife by vehicles during winter and other critical seasons, and physical destruction of habitat by vehicles. Regulatory measures and difficulties of enforcement are discussed.

OFF-ROAD VEHICLES, HARASSMENT, FORESTS, RANGELAND, RECREATION MANAGEMENT, WILDLIFE (GENERAL), ELK

294. MacInnes, C. D. 1980. Comment: Observer-induced predation is real. J. Wildl. Manage. 44:222-224.

The author clarifies a method for estimating undisturbed waterfowl nest predation reported in an earlier study of Canada goose nest predation at McConnell River, Northwest Territories. Further study of the problem of visitor-induced bias in nesting studies is suggested.

RESEARCH IMPACTS, WETLANDS, PREDATION, CANADA GOOSE, HERRING GULL, THAYER'S GULL

295. MacInnes, C. D., and R. K. Misra. 1972. Predation on Canada goose nests at McConnell River, Northwest Territories. J. Wildl. Manage. 36:414-422.

Predation by jaegers and gulls on nests of Canada geese was increased by human disturbance of nests. Partial clutch losses, responsible for 55% of all observed losses, probably did not occur in the absence of disturbance by humans. Predation losses of eggs would have been small (about 10%) without human disturbance.

RESEARCH IMPACTS, WETLANDS, PREDATION, CANADA GOOSE, HERRING GULL, THAYER'S GULL, PARASITIC JAEGER

296. Maffei, E. J. 1978. Golf courses as wildlife habitat. Trans. Northeast Fish Wildl. Conf. 35:120-129.

Golf courses are excellent examples of open space remnants providing wildlife habitat in urban areas. Studies of a Massachusetts golf course identified habitat types, wildlife species present, and management potentials. Active and passive uses of wildlife by people on golf courses include hunting and fishing, bird watching, and photographing wildlife in natural surroundings.

WILDLIFE VIEWING, URBAN ZONES, WILDLIFE MANAGEMENT, WILDLIFE (GENERAL)

297. Mallette, R. D. 1978. Endangered wildlife program: California condor activity study, Santa Barbara County. Calif. Dept. Fish Game Project E-001-R-01/WP05/J1.7. 6 pp. (MIN 0478800-45).

In a study of condor activity in California, potential disturbance factors were noted and recommendations made to protect condors. Among potential sources of disturbance were vehicle use of forest access roads, backcountry hiking, and disturbance by the investigators.

HIKING, WILDLIFE VIEWING, RESEARCH IMPACTS, RANGELAND, RECREATION MANAGEMENT, THREATENED AND ENDANGERED SPECIES, CALIFORNIA CONDOR

298. Mallette, R. D., and D. P. Garber. 1970. Special wildlife investigations: Raptor survey. Calif. Dept. Fish Game Project W-054-R-02/WP03/J06/FIN. 41 pp. (MIN 047180252).

Included in this report of raptor investigations are results of an osprey breeding study in California. Disturbance of osprey nests and young by campers and sportsmen are included in a list of factors influencing osprey nesting success.

CAMPING, DISTURBANCE (GENERAL), FORESTS, OSPREY

299. Manuwal, D. A. 1978. Effect of man on marine birds: A review. Pages 140-160 in C. M. Kirkpatrick, ed. Wildlife and people. Proceedings of the 1978 John S. Wright Forestry Conference, 23-24 February 1978, Purdue University, West Lafayette, Ind.

Human impacts on seabirds and strategies for protection and preservation of seabirds are discussed. Human intrusions to colonies are probably most detrimental during breeding, when eggs and young are vulnerable to exposure and predation. Effects of field research and visitation during nonbreeding periods may also be significant in some cases. Reserves and refuges in the U.S. and Canada now protect many important breeding areas.

DISTURBANCE (GENERAL), RESEARCH IMPACTS, WILDLIFE VIEWING, HARASSMENT, COASTAL ZONES, REVIEW, PREDATION, RECREATION MANAGEMENT, U.S. NATIONAL WILDLIFE REFUGES, SEABIRDS

300. Manuwal, D. A., and R. W. Campbell. 1979. Status and distribution of breeding seabirds of southeastern Alaska, British Columbia, and Washington. Pages 73-91 in J. C. Bartonek and D. N. Nettleship, eds. Conservation of marine birds of northern North America. Papers from the International Symposium, 13-15 May 1975, Seattle, Wash. U.S. Fish Wildl. Serv. Wildl. Res. Rep. 11.

Seabird population estimates and changes in numbers are reviewed for a portion of the North American Pacific Coast. In general reliable population estimates are lacking and changes in numbers are difficult to detect. The remote locations of many colonies may provide some protection from human interference. Recommended areas for future research include studies of the effects of human disturbance on seabird colonies.

DISTURBANCE (GENERAL), COASTAL ZONES, URBAN ZONES, REVIEW, SEABIRDS

301. Manville, R. H. 1962. A plea for bat conservation. J. Mammal. 43:571.

A serious problem facing bat populations is their destruction by humans out of ignorance or malice. Persons visiting caves sometimes disturb bats; vandals often kill bats for no specific purpose. When the entire population of a species is concentrated in a few hibernating colonies, as may be true for the gray bat, disturbance may hasten their extinction.

SPELUNKING, RESEARCH IMPACTS, HARASSMENT, BATS, GRAY BAT

302. March, D., and C. Adams. 1973. A Front Range concept: The need for the Noddles-Rampart-South Platte recreation area. Wildlife-2000, Aurora, Colo. 112 pp. plus appendices.

Results of a comprehensive study of wildlife, motorized recreation vehicles, and forest management in central Colorado are reported. Impacts of off-road vehicles on wildlife are severe, especially when engine noise is loud. Human recreational activities have accelerated habitat changes which threaten vital watersheds and the wildlife which inhabit them.

OFF-ROAD VEHICLES, HARASSMENT, CAMPING, HIKING, HORSEBACK RIDING, WILDLIFE VIEWING, FORESTS, RECREATION MANAGEMENT,

WILDLIFE MANAGEMENT, U.S. NATIONAL FORESTS, WILDLIFE (GENERAL)

303. Markham, B.J., and S.H. Brechtel. 1978. Status and management of three colonial waterbird species in Alberta. Pages 55-64 in Proceedings, 1978 Conference of the Colonial Waterbird Group, 20-23 October 1978, New York, N.Y.

Present status and management of the white pelican, double-crested cormorant, and great blue heron in Alberta are described. A major management problem is human disturbance of breeding colonies. Harassment causing adults to leave nests can result in nest desertion, abandonment of colonies, and increased mortality of young from predation or exposure. Protective legislation and a public education program have been enacted to limit human disruption of colonies.

DISTURBANCE (GENERAL), HARASSMENT, WILDLIFE VIEWING, LAKES, RIVERS, PREDATION, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, WHITE PELICAN, DOUBLE-CRESTED CORMORANT, GREAT BLUE HERON

304. Marsh, J. 1970. Bears and the public in our National Parks: A survey of attitudes to bears and their management. Can. Audubon 32:43-45.

The problem of bear-man conflicts in Canadian National Parks and results of a visitor attitude survey are discussed in this nontechnical article. Park visitors varied greatly in their knowledge of bears, and expressed a variety of views concerning bear management. The encouragement of safer public behavior and a more realistic assessment of potential bear hazards are suggested.

CAMPING, HIKING, FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, CANADIAN NATIONAL PARKS, BLACK BEAR, GRIZZLY BEAR

305. Marsh, J. S. 1972. Bears and man in Glacier National Park, British Columbia, 1880-1980. Pages 289-296 in S. Herrero, ed. Bears--their biology and management. Second International Conference on Bear Research and Management, 6-9 November 1970, Calgary, Alberta. IUCN Publ. New Ser. 23, Morges, Switzerland.

Behavior and attitudes of park visitors toward grizzly bears were examined from the literature, ecological studies, and public opinion surveys. Changes in the park environment since 1880 have led to changes in both human and bear behavior. Fear and ignorance expressed by early park visitors has slowly given way to observational enthusiasm. Management actions based on visitor attitudes and desires and bear biology are suggested.

CLIMBING, HIKING, HARASSMENT, WILDLIFE VIEWING, TOURISM, FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, WILDLIFE MANAGEMENT, RECREATION MANAGEMENT, CANADIAN NATIONAL PARKS, GRIZZLY BEAR, BLACK BEAR

306. Martinka, C. J. 1971. Status and management of grizzly bears in Glacier National Park, Montana. Trans. N. Am. Wildl. Nat. Resour. Conf. 36:312-322.

Results of grizzly bear ecology studies in Glacier National Park and additional data on bear-human confrontations and bear management actions are summarized. Most human-bear incidents occurred in backcountry and involved sows with young or bears attracted to unnatural food sources. Intensive management of bears and park visitors has been accompanied by declining human injury rates.

CAMPING, HIKING, HARASSMENT, WILDLIFE VIEWING, TOURISM, FORESTS, HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, GRIZZLY BEAR

307. Martinka, C. J. 1974. Population characteristics of grizzly bears in Glacier National Park, Montana. J. Mammal. 55:21-29.

Studies of grizzly bear population characteristics in Glacier National Park revealed information on impacts of park visitors on grizzlies. Present levels of visitation do not appear to have adverse impacts on grizzly populations. The major impact from visitation is the occasional need to remove or destroy problem bears; such problems have been related to improper

garbage disposal and human encounters with maternal grizzlies.

CAMPING, HIKING, TOURISM, FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, GRIZZLY BEAR

308. Martinka, C. J. 1974. Preserving the natural status of grizzlies in Glacier National Park. Wildl. Soc. Bull. 2: 13-17.

A bear management program in Glacier National Park included visitor information, travel restrictions, removal of unnatural food, and bear control. Fewer human injuries and bear deaths occurred during the time of program implementation than in previous years.

CAMPING, HIKING, WILDLIFE VIEWING, FORESTS, HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, GRIZZLY BEAR

309. Martinka, C. J. 1976. Ecological role and management of grizzly bears in Glacier National Park, Montana. Pages 147-156 in M. R. Pelton, J. W. Lentfer, and G. E. Folk, eds. Bears--their biology and management. Third International Conference on Bear Research and Management, June 1974, Binghamton, N.Y. and Moscow, USSR. IUCN Publ. New Ser. 40, Morges, Switzerland.

Ecology and management of grizzly bears in Glacier National Park are described. The history of man-bear interactions in western North America and reasons for bear population declines are discussed. Current objectives are to protect visitors and maintain natural bear populations; management involves visitor travel restrictions in backcountry and bear control.

CAMPING, HIKING, FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, GRIZZLY BEAR

310. Martinka, C. J. 1976. Grizzly bear population studies in Glacier National Park, Montana. Pages 195-206 in Research in the parks: Transactions of the National Park Centennial Symposium, 28-29 December 1971. U.S. Natl. Park Serv. Symp. Ser. 1.

Data are reported from studies of grizzly bear status, dynamics, habitat relationships, and management in Glacier National Park. Present levels of park visitation do not appear to be sufficient to have adverse effects on the grizzly population, although human activities in areas adjacent to the park are a potential source of impacts to peripheral segments of the park's bear population. A wild, free-ranging grizzly population offers the least opportunity for conflict with man.

TOURISM, FORESTS, HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, GRIZZLY BEAR

311. Massey, B. W. 1971. Special wildlife investigations: A breeding study of the California least tern. Calif. Dept. Fish Game Project W-054-R-03/WP02/J05. 26 pp. (MIN 047280121).

Studies of a California least tern colony indicated that protection from human disturbance was a necessity for management of the colony. Pedestrians and cyclists in the vicinity of colonies disturbed nesting terns.

BICYCLING, HIKING, SWIMMING, HARASSMENT, COASTAL ZONES, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, U.S. STATE PARKS AND LANDS, CALIFORNIA LEAST TERN

312. Mathisen, J. E. 1968. Effects of human disturbance on nesting of bald eagles. J. Wildl. Manage. 32:1-6.

Bald eagle nesting success in Minnesota was studied in relation to intensity of several forms of human disturbance, including recreation activities. Human disturbance did not appear to significantly affect nest occupancy or nesting success.

BOATING, DISTURBANCE (GENERAL), FORESTS, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL FORESTS, BALD EAGLE

313. Mathisen, J. E., D. J. Sorenson, L. D. Frenzel, and T. C. Dunstan. 1977.

Management strategy for bald eagles. Trans. N. Am. Wildl. Nat. Resour. Conf. 42:86-92.

The authors describe a management plan applied to a breeding population of bald eagles in the Chippewa National Forest, Minnesota. The strategy calls for a detailed management plan for each eagle territory, including buffer zones surrounding nests to minimize disturbance. Some eagle pairs are more tolerant of human disturbance than others, and management can be adjusted to accommodate the sensitivity of individual nesting pairs.

DISTURBANCE (GENERAL), FORESTS, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL FORESTS, BALD EAGLE

314. McArthur, K. L. 1981. Factors contributing to effectiveness of black bear transplants. J. Wildl. Manage. 45: 102-110.

Transplants of black bears in Glacier National Park, Montana, were evaluated to assess the effectiveness of the technique in controlling nuisance bears. Female bears return to the areas from which they were trapped more frequently than males; transient bears may make up a large proportion of the nuisance bear population because their knowledge of wide areas may include sources of human-provided food. Transplanting can be an effective management tool but it fails to address situations that cause nuisance behavior.

CAMPING, TOURISM, WILDLIFE VIEWING, FORESTS, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, BLACK BEAR

315. McCool, S. F. 1978. Snowmobiles, animals, and man: Interactions and management issues. Trans. N. Am. Wildl. Nat. Resour. Conf. 43:140-148.

Examples of recent research on snowmobile-wildlife interactions are cited as evidence that effects of snowmobiles on ecosystems have not been identified. Reasons why research has not been effective in influencing land management policy are discussed.

OFF-ROAD VEHICLES, FORESTS, REVIEW, RECREATION MANAGEMENT, WILDLIFE (GENERAL)

316. McIntyre, J. 1977. Spring calls the loons. Minn. Vol. 40(231):22-26.

This popular article reviews the status of common loons in Minnesota and describes conservation efforts. The Minnesota population is compared with that of New Hampshire, where growing numbers of tourists, boaters, and lakeshore developments have reduced the number of loons considerably. Effects of boaters and campers on nesting loons are described, including the loss of eggs and young to predators while parents are disturbed.

BOATING, CAMPING, TOURISM, LAKES, PREDATION, COMMON LOON

317. McIntyre, J. M. W. 1975. Biology and behavior of the common loon (Gavia immer) with reference to its adaptability in a man-altered environment. Ph.D. Diss. University of Minnesota, St. Paul. 243 pp.

Loons are subject to hazards from pollutants and increased recreational use of lakes because of their aquatic habits and conflict with man for habitat. Biological factors of loons were studied to assess their ability to adapt to these environmental changes. Their potential for maintaining stable populations in Minnesota are described based on the research results.

BOATING, CAMPING, LAKES, FORESTS, WILDLIFE MANAGEMENT, U.S. NATIONAL FORESTS, COMMON LOON

318. McIntyre, J. W. 1979. Minnesota common loon survey report - 1978. Pages 123-125 in S. A. Sutcliffe, ed. Proceedings of the Second North American Conference on Common Loon Research and Management, 14-16 January 1979, Syracuse, N.Y. Audubon Society of New Hampshire, Meredith.

The loon population in Minnesota seems to be healthy and stable. The Minnesota loon population, high in comparison to populations in the northeastern U.S., may reflect a greater abundance of suitable habitat plus lessened recreational pressure. While cottage developments and canoeing are common in northern Minnesota, the total human population is lower than in the east and many Minnesota lakes are virtually undisturbed in summer.

BOATING, TOURISM, WILDLIFE VIEWING, LAKES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL FORESTS, COMMON LOON

319. McIntyre, J. W. 1979. Status of common loons in New York from a historical perspective. Pages 117-121 in S. A. Sutcliffe, ed. Proceedings of the Second North American Conference on Common Loon Research and Management, 14-16 January 1979, Syracuse, N.Y. Audubon Society of New Hampshire, Meredith.

Human use of lakes and attitudes toward loons are discussed and the status of loons in New York evaluated by comparing recent survey data with historical nesting records. Causes for observed recent declines involve recreational pressures associated with boating, camping, and shoreline development. High human use of lakes on the two major summer holidays, Memorial Day and July 4th are especially hazardous to loon reproduction.

BOATING, CAMPING, TOURISM, LAKES, WILDLIFE MANAGEMENT, COMMON LOON

320. McKeating, G. B., ed. 1975. Nature and urban man. Can. Nat. Fed., Ottawa, Spec. Publ. 4. 134 pp.

This report contains 19 papers from the Canadian Nature Federation Conference, 21-27 August 1974, University of Western Ontario. Relationships of urban dwellers to nature are discussed, including aspects of urban wildlife management.

URBAN ZONES, WILDLIFE VIEWING, WILDLIFE MANAGEMENT, WILDLIFE (GENERAL)

321. McKnelly, P. K. 1980. Turkey Bay off-road vehicle area: Its use and monitoring system. Pages 91-99 in R. N. L. Andrews and P. F. Nowak, eds. Off-road vehicle use: A management challenge. Conference proceedings, 16-18 March 1980, Ann Arbor, Mich.

Management and impact monitoring of a Federally administered off-road vehicle recreation area in Kentucky and Tennessee are discussed. Hunter harvests and observations of wildlife in the area suggest that conspicuous birds and mammals still inhabit or venture into the area, but there has not been sufficient research to assess the impacts of off-road vehicles on wildlife.

OFF-ROAD VEHICLES, FORESTS, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, WILDLIFE (GENERAL), TURKEY

322. McMillan, J. F. 1954. Some observations on moose in Yellowstone Park. Am. Midl. Nat. 52:392-399.

Among observations reported are notes concerning responses of moose to human presence and various noises.

DISTURBANCE (GENERAL), TOURISM, LAKES, WETLANDS, FLIGHT DISTANCE, U.S. NATIONAL PARKS, MOOSE

323. McReynolds, H. E., and R. E. Radtke. 1978. The impact of the motorized human on the wildlife of forested lands. Pages 102-117 in C. M. Kirkpatrick, ed. Wildlife and people. Proceedings of the 1978 John S. Wright Forestry Conference, 23-24 February 1978, Purdue University, West Lafayette, Ind.

Effects of off-road vehicles on wildlife of forested lands are reviewed. Cases for and against the use of snowmobiles, motorcycles, and four-wheel-drive vehicles in forests are presented. Few reliable data on off-road vehicle impacts on wildlife are available, but it is probable that indirect effects and unintentional harassment of wildlife have produced the greatest damage.

OFF-ROAD VEHICLES, HARASSMENT, FORESTS, REVIEW, RECREATION MANAGEMENT, WILDLIFE (GENERAL)

324. Mech, L. D. 1970. The wolf: The ecology and behavior of an endangered species. The Natural History Press, Garden City, N.Y. 384 pp.

This thorough description of wolf ecology and behavior includes a section on relations with humans. There is no basis for the popular belief that healthy wild wolves in North America pose any danger to humans, and popular tales of adoptions of infants by wolves can be similarly rejected. The preservation of wolf populations requires wilderness for habitat and

public attitudes based on an understanding of natural processes.

HARASSMENT, FORESTS, RANGELAND, TUNDRA, HUMAN HEALTH AND SAFETY, WILDLIFE MANAGEMENT, WOLVES, GRAY WOLF

325. Merrill, E. H. 1978. Bear depredations at backcountry campgrounds in Glacier National Park. Wildl. Soc. Bull. 6: 123-126.

Ecological and human-use factors of backcountry campgrounds were studied in Glacier National Park to discover reasons for black bear and grizzly bear depredation. A high number of bear incidents occurred in deteriorating campgrounds within 5 km of developed areas, and which had large party limits and nearby fishing. Changes in campground management practices are suggested.

CAMPING, HIKING, FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, BLACK BEAR, GRIZZLY BEAR

326. Metcalf, L. 1979. The breeding status of the common loon in Vermont. Pages 101-110 in S. A. Sutcliffe, ed. Procceedings of the Second North American Conference on Common Loon Research and Management, 14-16 January 1979, Syracuse, N.Y. Audubon Society of New Hampshire, Meredith.

A survey of the current and former breeding status of the common loon was carried out in Vermont. Recreational use of lakes in Vermont is causing serious disruptions of loon breeding and the population in the state is unstable. An incident of nest failure due to disturbance of incubating loons by nest watchers is described. Careful monitoring and protection of loon nests from disturbance are suggested.

BOATING, WILDLIFE VIEWING, LAKES, RECREATION MANAGEMENT, COMMON LOON

327. Mickelson, P. G. 1975 Breeding biology of cackling geese and associated species on the Yukon-Kuskokwim Delta, Alaska. Wildl. Monogr. 45. 35 pp.

From this study of cackling Canada geese, brant, emperor geese, white-fronted geese, and spectacled eiders, it was estimated that losses to avian predators (mostly glaucous gulls) were doubled by the presence of the researcher. Human presence and the sound of boats caused parents to temporarily desert nests and young, leaving them vulnerable to predators.

RESEARCH IMPACTS, BOATING, WETLANDS, PREDATION, BRANT, SPECTACLED EIDER, CANADA GOOSE, EMPEROR GOOSE, WHITE-FRONTED GOOSE, GLAUCOUS GULL

328. Mihalic, D. A. 1974. Visitor attitudes toward grizzly bears in Glacier National Park, Montana. M.S. Thesis. Michigan State University, East Lansing. 131 pp.

Grizzly bear-human coexistence problems in Glacier National Park were studied by investigating visitor attitudes and perceptions relating to grizzly bears through interviews with park visitors. Such information can be useful both to scientists studying bear-man interactions, and to park managers who must allow visitor use with a minimum of hazard and at the same time preserve natural grizzly bear populations.

CAMPING, HIKING, TOURISM, WILDLIFE VIEWING, FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, GRIZZLY BEAR

329. Miller, A. H., I. I. McMillan, and E. McMillan. 1965. The current status and welfare of the California condor. Natl. Audubon Soc. Res. Rep. 6. 61 pp.

Among factors bearing on the mortality and welfare of California condors are disruption of breeding at nests by humans, and other man-caused disturbances. Condors may abandon nests in disturbed areas, although when approached they frequently show no outward signs of alarm and may at times seem tame. Condors have been frequently seen foraging near a well-used recreation area, but do not nest or roost near centers of disturbance.

DISTURBANCE (GENERAL), PICNICKING, WILDLIFE VIEWING, RANGELAND, FORESTS, FLIGHT DISTANCE, RECREATION MANAGEMENT, U.S. NATIONAL FORESTS, THREATENED AND ENDANGERED SPECIES, CALIFORNIA CONDOR

330. Miller, F. L. 1978. Interactions between men, dogs and wolves on Western Queen Elizabeth Islands, Northwest Territories, Canada. Musk-Ox 22:70-72.

Observations of wolves with humans and dogs at remote sites in northern Canada and implications for the survival of wolves are discussed. Many arctic wolves are fearless of man, and while wolves pose no danger to humans they are sometimes shot out of fear and ignorance when they approach humans. Recent declines in prey species and expanding developments contribute to wolves feeding on garbage, increasing the frequency of interactions with man.

HARASSMENT, TUNDRA, COASTAL ZONES, HUMAN HEALTH AND SAFETY, FLIGHT DISTANCE, THREATENED AND ENDANGERED SPECIES, GRAY WOLF

331. Mills, H. 1977. Osprey feeding problems on the New Jersey coast. Pages 105-108 in J. C. Ogden, ed. Transactions of the North American Osprey Research Conference, 10-12 February 1972, Williamsburg, Va. U.S. Natl. Park Serv. Trans. Proc. Ser. 2.

Observations and notes concerning ospreys in southern New Jersey are provided. Declines in populations and reproductive rates are documented; reasons for declines are discussed. Various kinds of serious disturbance by humans have hastened the decline of ospreys.

DISTURBANCE (GENERAL), WILDLIFE VIEWING, COASTAL ZONES, OSPREY

332. Moen, A. N. 1976. Energy conservation by white-tailed deer in the winter. Ecology 57:192-198.

The importance of various energy strategies are considered for a herd of white-tailed deer in Minnesota. In winter, deer conserved energy behaviorally, increasing activity during warmer weather. Unnecessary deer losses may be prevented by minimizing wintertime disturbances such as harassment by snowmobiles.

OFF-ROAD VEHICLES, SKIING, HARASSMENT, FORESTS, WHITE-TAILED DEER

333. Mohr, C. E. 1972. The status of threatened species of cave-dwelling bats. Bull. Natl. Speleol. Soc. 34: 33-47.

Reductions of insectivorous bat populations have recently reached alarming proportions. Disturbance by scientists engaged in research activities, and inadvertent disturbance by spelunkers, have been identified as factors in declines. Conservation proposals include regulation of visitation to bat caves by scientists and spelunkers, and enactment of legislation for the protection of bats.

SPELUNKING, HARASSMENT, RESEARCH IMPACTS, TOURISM, REVIEW, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, U.S. STATE PARKS AND LANDS, BATS, BRAZILIAN FREE-TAILED BAT

334. Mohr, C. E. 1973. The status of threatened species of cave-dwelling bats. Natl. Speleol. Soc. News 31 (12):216.

Alarming reductions in bat populations throughout the United States and the role of human disturbance in mortality of bats are described in this nontechnical article. Inadvertent disturbances by spelunkers and researchers may arouse hibernating bats, causing them to consume vital energy stores, and increase the rates of accidental injury and death to young bats loosed from precarious perches. Conservation efforts are discussed.

SPELUNKING, RESEARCH IMPACTS, PREDATION, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, BATS, TOWNSEND'S BIG-EARED BAT, INDIANA BAT, GRAY BAT

335. Mohr, C. E. 1976. The world of the bat. Living World Books, Lippincott Co., Philadelphia, Pa. and New York, N.Y. 162 pp.

This nontechnical book includes a chapter entitled "Bats and man", describing bat-human interactions. Control of nuisance bats is warranted in some instances, but the increasing disturbance of hibernating colonies by recreational spelunkers and researchers has critically reduced many populations of bats and especially threaten sensitive endangered species such as the Indiana bat.

SPELUNKING, RESEARCH IMPACTS, TOURISM, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, WILDLIFE MANAGEMENT, BATS, INDIANA BAT

336. Mohr, C. E. 1977. Survival: A tale of two bats. Pages 349-366 in B. Sloane, ed. Cavers, caves, and caving. Rutgers University Press, New Brunswick, N.J.

The author describes his experiences observing and researching the Indiana bat and the gray bat in this popular account. Both species are declining, and a variety of natural catastrophes and human disturbance seem to be responsible. Losses of summer habitat to water projects, development of caves for tourism, and more causal visitation by spelunkers all threaten these endangered bats.

SPELUNKING, HARASSMENT, TOURISM, FORESTS, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, INDIANA BAT, GRAY BAT, BATS

337. Moment, G. B. 1968. Bears: The need for a new sanity in wildlife conservation. BioScience 18:1105-1108.

The author maintains that the National Park Service is not obligated to preserve bear populations in parks where the bears prove dangerous to visitors, and suggests removing bears, especially grizzlies, from the more popular National Parks. Remote reserves for bears are suggested as alternatives to managing bears in parks.

CAMPING, HIKING, FORESTS, HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, BLACK BEAR, GRIZZLY BEAR

338. Moment, G. B. 1969. Bears and conservation: Realities and recommendations. BioScience 19:1019-1020.

The author reiterates and clarifies points made in an earlier publication concerning the incompatibility of grizzly bears and visitors in National Parks. Removal of bears from parks is suggested, along with the creation of remote bear preserves.

CAMPING, HIKING, FORESTS, HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, GRIZZLY BEAR, BLACK BEAR

339. Moment, G. B. 1970. Man-grizzly problems--past and present: Implications for endangered species. BioScience 20:1142-1144.

Man-grizzly bear problems are reviewed and arguments for various management schemes discussed. The author contends that grizzly bears should be removed from certain parks to make the parks more suitable for hiking and camping, and bear refuges established in more remote areas.

CAMPING, HIKING, FORESTS, HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, GRIZZLY BEAR

340. Monson, G. 1966. The place of refuges in desert bighorn management. Trans. Desert Bighorn Counc. 10:21-23.

A review of the status of desert bighorn sheep revealed that sheep are present as a small number of scattered individuals, contributing to a fragile population. Refuges are essential to the future existence of the desert bighorn, providing subsidiary benefits as human recreational areas as well as opportunities to control disturbances.

HIKING, PICNICKING, WILDLIFE VIEWING, DISTURBANCE (GENERAL), DESERTS, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, BIGHORN SHEEP

341. Morgantini, L. E., and R. J. Hudson. 1979. Human disturbance and habitat selection in elk. Pages 132-139 in M. S. Boyce and L. D. Hayden-Wing, eds. North American elk: Ecology, behavior and management. University of Wyoming, Laramie.

Studies of big game habitat selection in Alberta showed that behavioral factors including human disturbance can affect elk habitat selection. Heavy use of marginal sectors of potentially available habitat and occasional spatial overlap with bighorn sheep appeared to be a direct result of human activity, particularly vehicluar activity and hunting.

HARASSMENT, TOURISM, FORESTS, RANGELAND, ELK, BIGHORN SHEEP

342. Morris, R. D., and R. A. Hunter. 1976. Factors influencing desertion of colony sites by common terns (Sterna hirundo). Can. Field-Nat. 90:137-143.

Factors affecting the breeding biology of five common tern colonies in Ontario were studied. Human disturbance is one of several factors considered explanations for three observed colony desertions. None of the colonies studied were subjected to extensive disturbance, and the potential disturbance of the investigators did not seem important. Experimental work is required to determine actual causes of desertions.

DISTURBANCE (GENERAL), RESEARCH IMPACTS, LAKES, COMMON TERN

343. Morriss, D. J. 1954. Correlation of wildlife management with other uses on the Pisgah National Forest. J. For. 52:419-422.

Management for multiple uses, including recreation, of the Pisgah National Forest in North Carolina is described. Use by wildlife of areas managed for public day use and camping is discussed. It is suggested that deer and other wildlife are best managed by small land areas.

CAMPING, TOURISM, FORESTS, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL FORESTS, WILDLIFE (GENERAL), WHITE-TAILED DEER

344. Mundy, R. K., and D. R. Flook. 1973. Background for managing grizzly bears in the National Parks of Canada. Can. Wildl. Serv. Rep. Ser. 22. 35 pp.

Information is reported as a basis for management of Canadian National Parks to maintain grizzly bear populations as well as an acceptable degree of public safety. Presented are biological data, a discussion of incidents of bear-human interactions, and management recommendations.

CAMPING, HIKING, WILDLIFE VIEWING, FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, CANADIAN NATIONAL PARKS, GRIZZLY BEAR

345. Munro, W. T., and R. W. Campbell. 1979. Programs and authorities of the Province of British Columbia related to marine bird conservation. Pages 247-250 in J. C. Bartonek and D. N. Nettleship, eds. Conservation of marine birds of northern North America. Papers from the International Symposium, 13-15 May 1975, Seattle, Wash. U.S. Fish Wildl. Serv. Wildl. Res. Rep. 11.

Authority and programs for the protection and study of seabirds in British Columbia are described. Besides environmental pollutants and logging operations, boating enthusiasts and recreationists are a potential threat to many coastal seabird colonies. Unintentional disturbance of nesting seabirds by people visiting islands can do serious damage to seabird populations.

BOATING, DISTURBANCE (GENERAL), PICNICKING, WILDLIFE VIEWING, COASTAL ZONES, PREDATION, RECREATION MANAGEMENT, SEABIRDS

346. Munthe, K., and J. H. Hutchison. 1978. A wolf-human encounter on Ellesmere Island, Canada. J. Mammal. 59:876-878.

A wolf-human encounter in the Canadian arctic is described. Two scientists engaged in fieldwork on Ellesmere Island were approached by six wolves; while the wolves stood a few meters away the scientists threw clods of mud and a backpack at the wolves. One animal leapt toward one of the persons, grazing her cheek but not injuring her; afterward the wolves retreated. The authors report that this is the second substantiated report in the literature of unprovoked wolf aggression toward humans.

TUNDRA, COASTAL ZONES, HUMAN HEALTH AND SAFETY, FLIGHT DISTANCE, THREATENED AND ENDANGERED SPECIES, GRAY WOLF

347. Murie, A. 1961. A naturalist in Alaska. Devin-Adair Co., New York, N.Y. 302 pp.

In a chapter entitled "Of bears and men", the author describes grizzly bear-human encounters. Several close encounters of the author with grizzlies always ended in escape without injury, usually with the bear fleeing.

Most unprovoked bear-human incidents end in this manner, despite popular stories which are often exaggerated.

HIKING, WILDLIFE VIEWING, FORESTS, TUNDRA, HUMAN HEALTH AND SAFETY, FLIGHT DISTANCE, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, GRIZZLY BEAR

348. Murie, A. 1981. The grizzlies of Mount McKinley. U.S. Natl. Park Serv. Sci. Monogr. Ser. 14. 251 pp.

Results of 20 years of research and observations on grizzly bears in Mount McKinley National Park, Alaska, are reported. One chapter concerning grizzlies and man details some of the frequent interactions between park visitors and grizzlies. People involved often gain a thrill from viewing grizzlies closely, but the bears may suffer from harassment or be induced to attack.

HARASSMENT, TOURISM, WILDLIFE VIEWING, TUNDRA, WETLANDS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, GRIZZLY BEAR

349. Murphy, J. R. 1962. Aggressive behavior of a bald eagle. Auk 79:712-713.

A deliberate attack upon a human by a bald eagle is reported. While photographing a bald eagle nest in Yellowstone National Park, a naturalist suffered a superficial laceration, presumably a scratch by a talon, when one of the nesting eagles swooped near him. The attack is interpreted as an act of territorial defense, although reports of eagle attacks are rare.

RESEARCH IMPACTS, WILDLIFE VIEWING, FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, BALD EAGLE

350. Murphy, J. R. 1965. Nest site selection by the bald eagle in Yellowstone National Park. Utah Acad. Sci. Arts Let. Proc. 42(Part 2):261-264.

Along with proximity to water and food sources, human disturbance is suggested as an important factor determining bald eagle nest site selection in Yellowstone National Park. Instances of apparent disruption of bald eagle nesting by human intrusions are cited.

BOATING, CAMPING, SWIMMING, TOURISM, WILDLIFE VIEWING, FORESTS, LAKES, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, BALD EAGLE

351. Nelson, M. 1966. Problems of recreational use of game ranges. Trans. Desert Bighorn Counc. 10:13-20.

Problems facing desert bighorn sheep caused by recreational use of sheep ranges are discussed. Aspects of picnicking, camping, hiking and climbing, and boating are discussed, and related to what little is known about tolerance of sheep to human intrusion. The loss of animals to human disturbance should not be risked if management can prevent the overlapping of human recreation with sheep habitat.

BOATING, CAMPING, HIKING, CLIMBING, PICNICKING, WILDLIFE VIEWING, DESERTS, RANGELAND, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL WILDLIFE REFUGES, U.S. STATE PARKS AND LANDS, BIGHORN SHEEP

352. Nelson, R. W. 1970. Observations on the decline and survival of the peregrine falcon. Can. Field-Nat. 84:313-319.

Factors involved in the decline of peregrine falcons throughout the world are discussed, including effects of human disturbance. The literature reviewed suggests that peregrine falcons are capable of tolerating human intrusions in some cases, although nest desertion is common when birds are disturbed prior to and during egg-laying.

DISTURBANCE (GENERAL), REVIEW, THREATENED AND ENDANGERED SPECIES, PEREGRINE FALCON

353. Neumann, P. W., and H. G. Merriam. 1972. Ecological effects of snowmobiles. Can. Field-Nat. 86:207-212. .

Studies in Ontario showed that snowmobile use caused significant changes in snow structure and wildlife behavior. Snowmobile use affected snowshoe hare and red fox mobility and distribution, and caused significant damage to browse plants.

OFF-ROAD VEHICLES, FORESTS, URBAN ZONES, RECREATION MANAGEMENT, SNOWSHOE HARE, RED FOX

354. Newman, J. R., W. H. Brennan, and L. M. Smith. 1977. Twelve-year changes in nesting patterns of bald eagles (Haliaeetus leucocephalus) on San Juan Island, Washington. Murrelet 58:37-39.

On San Juan Island in Puget Sound, Washington, nest sites described 12 years previously were inventoried to determine changes in bald eagle nesting patterns. Over the 12-year period, the number of bald eagle nests increased 100% while human activities on the island also increased significantly. Most nests are now much closer to human activity; nests nearest the highest concentrations of buildings have alternate nests associated with them.

DISTURBANCE (GENERAL), COASTAL ZONES, THREATENED AND ENDANGERED SPECIES, BALD EAGLE

355. Nichols, L. 1975. Report and recommendations of the Dall and stone sheep workshop group. Pages 208-266 in J. B. Trefethen, ed. The wild sheep in modern North America. Boone and Crockett Club and the Winchester Press, New York, N.Y.

Among suggested guidelines for the management of Dall and stone sheep is the establishment of reserves or refuges for nonconsumptive public use of sheep. The need for research concerning the effects of disturbance of sheep by snowmobiles and all-terrain vehicles is recognized.

DISTURBANCE (GENERAL), OFF-ROAD VEHICLES, WILDLIFE VIEWING, FORESTS, TUNDRA, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, DALL SHEEP

356. Nisbet, I. C. T. 1973. Terns in Massachusetts: Present numbers and historical changes. Bird-Banding 44:27-55.

Data concerning numbers of four species of terns and causes of declines in some species are discussed. Human disturbance, especially beach driving, is an obvious adverse factor for the least tern, and may also be an important factor for the arctic tern. Other factors appear to be responsible for changes in common tern and roseate tern numbers.

OFF-ROAD VEHICLES, DISTURBANCE (GENERAL), COASTAL ZONES, LEAST TERN, ARCTIC TERN, COMMON TERN, ROSEATE TERN

357. Nisbet, I. C. T. 1978. Direct human influences: Hunting and the use by birds of man's waste deposits. Ibis 120:134. (Abstract only).

In addition to hunting and waste disposal, direct human effects on seabirds include disturbance by biologists conducting seabird research. Access to seabird colonies should not be prohibited; rather, controlled visitation should be encouraged. The protection and conservation of seabird colonies depends in part on public support, and education is necessary to achieve these ends.

RESEARCH IMPACTS, DISTURBANCE (GENERAL), WILDLIFE VIEWING, COASTAL ZONES, URBAN ZONES, RECREATION MANAGEMENT, SEABIRDS

358. Nisbet, I. C. T. 1979. Conservation of marine birds of northern North America--a summary. Pages 305-315 in J. C. Bartonek and D. N. Nettleship, eds. Conservation of marine birds of northern North America. Papers from the International Symposium, 13-15 May 1975, Seattle, Wash. U.S. Fish Wildl. Serv. Wildl. Res. Rep. 11.

The author draws on information presented at the symposium to make a case for seabird conservation and to propose priorities for action. The vulnerability of the resource, past and present threats, and the practicability of conservation are discussed. Human disturbance is a factor that can be expected to worsen as tourism increases. Disturbance by recreationists and naturalists poses special problems for seabird conservation since public education will also increase public interest.

DISTURBANCE (GENERAL), TOURISM, WILDLIFE VIEWING, COASTAL ZONES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, SEABIRDS

359. Noake, D. W. 1967. Camping as a factor in the ecological impact of tourism and recreation. Pages 224-229 in To-

wards a new relationship of man and nature in temperate lands. Part 1: Ecological impact of recreation and tourism upon temperate environments. IUCN Tenth Technical Meeting, 26-30 June 1966, Lucerne, Switzerland. IUCN Publ. New Ser. 7, Morges, Switzerland.

Camping has become a major part of tourism and recreation in recent years. Many modern campers seek only inexpensive vacations or overnight accommodations, harboring little interest in nature. Terrain damage, soil and water pollution, and disruption of peripheral natural habitats are frequent results of excessive camping pressure. Wildlife can be exposed to harmful substances in trash and debris left at campsites, or suffer harassment from campers or their pets.

CAMPING, TOURISM, HARASSMENT, RECREATION MANAGEMENT, WILDLIFE (GENERAL)

360. Noble, L. B. 1972. Man and grizzly bear in Banff National Park, Alberta. M.A. Thesis. University of Calgary, Alberta. 119 pp.

The influence of man's activities on grizzly bears in Banff National Park was studied from the literature, field observations, and interviews with park managers and residents. Since 1940 grizzlies have become common in some areas of the park, although the evidence suggests that heavy recreational use since that time may have affected bear populations. Improper garbage disposal has attracted grizzlies to areas of high human use, increasing the risk of man-bear incidents.

HIKING, CAMPING, WILDLIFE VIEWING, TOURISM, FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, CANADIAN NATIONAL PARKS, GRIZZLY BEAR

361. Norman, R. K., and D. R. Saunders. 1969. Status of little terns in Great Britain and Ireland in 1967. Br. Birds 62:4-13.

Increasing pressures on little tern (least tern) colonies in Great Britain and Ireland pose a major threat to an already declining population. Human disturbance appears to be the most significant factor in known colony declines. Picnicking, boating, and fishing, as well as deliberate harassment and vandalism, contribute to disturbance of least terns along seacoasts. Protection measures must involve restriction of human activity and thus depend on public education.

CAMPING, SWIMMING, PICNICKING, HIKING, BOATING, HARASSMENT, RESEARCH IMPACTS, COASTAL ZONES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, LEAST TERN

362. Norris-Elye, L. T. S. 1951. The black bear as a predator of man. J. Mammal. 32:222-223.

An instance of an apparently unprovoked attack by a black bear upon 3 small children in Manitoba is described. While the children were left unattended in a cabin, the bear entered and carried a seven-year-old girl into nearby bushes, where it killed her and fed on parts of the body. The bear remained in the area until killed.

FORESTS, HUMAN HEALTH AND SAFETY, BLACK BEAR

363. Noyes, J. H., and D. R. Progulske, eds. 1974. A symposium on wildlife in an urbanizing environment. Holdsworth Natural Resources Center, Amherst, Mass., Plann. Resour. Develop. Ser. 28. 128 pp.

This report contains 33 papers on urban wildlife, from a symposium in Springfield, Mass., 27-29 November 1973. Topics covered include loss of wildlife habitat through urbanization, management of urban wildlife, and human-wildlife conflicts in urban areas.

URBAN ZONES, WILDLIFE VIEWING, WILDLIFE MANAGEMENT, WILDLIFE (GENERAL)

364. Ogden, J. C. 1978. Status and nesting biology of the American crocodile, Crocodylus acutus, (Reptilia, Crocodilidae) in Florida. J. Herpetol. 12: 183-196.

The most important factor limiting populations of the American crocodile in Florida appears to be human activities, including shooting, disturbance to animals, and habitat loss through development. It is suggested that human-caused mortality of adult crocodiles may equal or exceed recruitment

of adults into the breeding population.

DISTURBANCE (GENERAL), COASTAL ZONES, WETLANDS, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, AMERICAN CROCODILE

365. Ohmann, L. F. 1974. Ecological carrying capacity. Pages 24-28 in Outdoor recreation research: Applying the results. Papers from a workshop, 19-21 June 1973, Marquette, Mich. U.S. For. Serv. Gen. Tech. Rep. NC-9.

The concept of recreational carrying capacity is reviewed and defined in terms of management objectives for specific areas. Site factors that must be considered include flora and fauna, especially where they are the basis for recreational use of the area.

DISTURBANCE (GENERAL), RECREATION MANAGEMENT, WILDLIFE (GENERAL)

366. Olendorff, R. R. 1973. The ecology of the nesting birds of prey of northeastern Colorado. U.S. IBP Grassl. Biome Tech. Rep. 211. Natural Resource Ecology Laboratory, Colorado State University, Fort Collins. 223 pp.

In this detailed report on the biology of nesting raptors on a shortgrass prairie region of Colorado, dangers of raptor nesting studies to eggs and young are discussed including trampling, cooling and overheating of eggs, predation, desertion, missed feedings, mishandling of young, and premature fledging. Effects of land use on nesting Swainson's hawks were evaluated; lands posted against trespassing showed increased hawk fledging success.

DISTURBANCE (GENERAL), RESEARCH IMPACTS, RANGELAND, PREDATION, WILDLIFE MANAGEMENT, U.S. NATIONAL FORESTS, RAPTORS, SWAINSON'S HAWK

367. Olsen, D. L., D. R. Blankinship, R. C. Erickson, R. Drewien, H. D. Irby, R. Lock, and L. S. Smith. 1980. Whooping crane recovery plan. U.S. Fish and Wildlife Service, Washington, D.C. 206 pp.

This recovery plan presents information on the history, biology, and status of the whooping crane, and detailed management plans aimed at restoring the whooping crane to nonendangered status. Among factors believed responsible for the near extinction of the species are various forms of indirect and direct human disturbance. Whoopers seem to tolerate some disturbance, but only for short periods of time and if no obvious threats occur.

DISTURBANCE (GENERAL), BOATING, WILDLIFE VIEWING, LAKES, WETLANDS, THREATENED AND ENDANGERED SPECIES, WILDLIFE MANAGEMENT, U.S. NATIONAL WILDLIFE REFUGES, CANADIAN NATIONAL PARKS, WHOOPING CRANE

368. Olsen, J., and P. Olsen. 1980. Alleviating the impact of human disturbance on the breeding peregrine falcon II. Public and recreational lands. Corella 4:54-57.

Some potential sources of disturbance to peregrine falcons are outlined, including breeding disruption by campers, hikers, climbers, and boats. Future research needs and management practices for alleviation of disturbances are suggested.

BOATING, CLIMBING, CAMPING, HIKING, RECREATION MANAGEMENT, THREATENED AND ENDANGERED SPECIES, REVIEW, PEREGRINE FALCON

369. Olsen, P., and J. Olsen. 1978. Alleviating the impact of human disturbance on the breeding peregrine falcon. I. Ornithologists. Corella 2:1-7.

The impact of ornithologists (including photographers, egg collectors, and bird watchers) on nesting peregrine falcons is discussed. Suggestions are made for minimizing bias in field studies due to disturbance and for alleviating breeding disruption.

WILDLIFE VIEWING, RESEARCH IMPACTS, RECREATION MANAGEMENT, THREATENED AND ENDANGERED SPECIES, REVIEW, PEREGRINE FALCON

370. Owen, R.B., Jr., and J.W. Morgan. 1975. Influence of night-lighting and banding on woodcock movements. Wildl. Soc. Bull. 3:77-79.

Effects of disturbance on woodcock in Maine were studied by simulating banding operations on telemetered birds. Disturbance did not appear to directly increase mortality of woodcock from injury or predation. Flushing birds changed their daily movement patterns; disturbed birds tended to avoid the site of disturbance for at least a week.

DISTURBANCE (GENERAL), HARASSMENT, RESEARCH IMPACTS, FORESTS, PREDATION, AMERICAN WOODCOCK

371. Page, P. J. 1971. Special wildlife investigations: Second progress report of the San Joaquin River rookery study. Calif. Dept. Fish Game Project W-054-R-03/WP03/J05/SP2. 25 pp. (MIN 047380842).

Human disturbance and adverse weather reduced nesting success of great blue herons on the San Joaquin River in California. The presence of fishermen caused herons to abandon nests. A case of fledgling mortality due to disturbance by the investigators is recorded.

DISTURBANCE (GENERAL), RESEARCH IMPACTS, FISHING, RIVERS, WETLANDS, GREAT BLUE HERON

372. Paynter, R. A., Jr. 1951. Clutch-size and egg mortality of Kent Island eiders. Ecology 32:497-507.

In a study of nesting eiders on Kent Island, New Brunswick, human disturbance of eiders appeared to increase mortality of eggs. Presence of the researcher caused eiders to temporarily abandon nests, leaving eggs vulnerable to predation by gulls.

RESEARCH IMPACTS, COASTAL ZONES, PREDATION, COMMON EIDER, HERRING GULL

373. Pelton, M. R. 1972. Use of foot trail travellers in the Great Smoky Mountains National Park to estimate black bear (Ursus americanus) activity. Pages 36-42 in S. Herrero, ed. Bears --their biology and management. Second International Conference on Bear Research and Management, 6-9 November 1970, Calgary, Alberta. IUCN Publ. New Ser. 23, Morges, Switzerland.

Index trails were hiked by researchers to collect data on bear activity in Great Smoky Mountains National Park. Additional data were collected from bear survey forms distributed to backpackers. While bear activity appeared to be independent of visitor use on a park-wide scale, local densities of bears seemed to be affected by people. Visitors and poachers are probably the greatest factors influencing bear concentrations.

CAMPING, HIKING, TOURISM, FORESTS, U.S. NATIONAL PARKS, BLACK BEAR

374. Pelton, M. R., C. D. Scott, and G. M. Burghardt. 1976. Attitudes and opinions of persons experiencing property damage and/or personal injury by black bears in the Great Smoky Mountains National Park. Pages 157-167 in M. R. Pelton, J. W. Lentfer, and G. E. Folk, eds. Bears--their biology and management. Second International Conference on Bear Research and Management, 6-9 June 1974, Binghamton, N.Y. and Moscow, USSR. IUCN Publ. New Ser. 40, Morges, Switzerland.

Questionnaires were mailed to 231 persons involved in black bear damage or injury incidents in Great Smoky Mountains National Park, 1968-1973. Of 119 respondents, 68% stated they received information concerning possible problems with bears before the incident occurred, and 93% had food with them at the time of the incident. Suggestions and comments offered by respondents are listed.

CAMPING, HIKING, TOURISM, WILDLIFE VIEWING, FORESTS, HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, BLACK BEAR

375. Penland, S. T. 1976. The natural history and current status of the Caspian tern (Hydroprogne caspia) in Washington State. M.S. Thesis. University of Puget Sound, Tacoma, Wash. 101 pp.

Status, distribution, and aspects of biology of the Caspian tern were studied in Washington State. Human activity, affecting terns directly and indirectly, appears to be the greatest hazard to tern survival. Nest abandonment in response to disturbance was observed; mortality of eggs and especially chicks due to human presence

can seriously impair the breeding success of the colony. Management recommendations are suggested.

RESEARCH IMPACTS, HIKING, WILDLIFE VIEWING, COASTAL ZONES, PREDATION, RECREATION MANAGEMENT, CASPIAN TERN

376. Penny, J. R. 1971. Off-road vehicles on the public lands in California. Pages 95-110 in M. Chubb, ed. Proceedings of the 1971 Snowmobile and Off the Road Vehicle Research Symposium, 14-15 June 1971, East Lansing, Mich. Michigan State Univ., East Lansing, Dept. Park Recr. Resour. Tech. Rep. 8.

Among effects of off-road vehicle use cited are impacts on desert bighorn sheep and the destruction of nests of upland game birds. Management problems and potential solutions are discussed.

OFF-ROAD VEHICLES, DESERTS, RANGELAND, U.S. BLM LANDS, BIGHORN SHEEP, GALLINACEOUS BIRDS

377. Petit, M. G. 1978. Imperiled bats of Eagle Creek Cave. Nat. Hist. 87(3): 50-55.

A colony of Mexican free-tailed bats in Arizona and factors affecting their survival are discussed in this nontechnical article. The population is decreasing by about 10% per year; other populations of the subspecies are also declining. The major cause of the decline may be pesticides, but harassment of maternal colonies is also taking a toll. Preventing human disturbance and limiting pesticide use are necessary to save the bats.

HARASSMENT, SPELUNKING, DESERTS, BRAZILIAN FREE-TAILED BAT

378. Picozzi, N. 1970. Breeding performance and shooting bags of red grouse in relation to public access in the Peak District National Park, England. Biol. Conserv. 3:211-215.

Red grouse (willow ptarmigan) brood numbers on moors where people had unrestricted access were compared with counts from similar moors where access was limited. Grouse breeding was no less on unrestricted access moors, and numbers taken by hunters showed no decline associated with public access.

HIKING, TOURISM, RANGELAND, RECREATION MANAGEMENT, WILLOW PTARMIGAN

379. Platt, J. B. 1977. The breeding behavior of wild and captive gyrfalcons in relation to their environment and human disturbance. Ph.D. Diss. Cornell University, Ithaca, New York. 173 pp.

Nesting gyrfalcons in the Yukon Territory, Canada, were experimentally disturbed by helicopter overflights. There was an inverse relationship between the percentage of birds disturbed and the altitude of the helicopter above the nest. Gyrfalcons did not appear distressed by the sound of an unseen helicopter but watched aircraft passing up to 2 km away. No pair was known to have abandoned nesting efforts because of helicopter overflights.

DISTURBANCE (GENERAL), TUNDRA, GYRFALCON

380. Plunkett, R. L. 1979. Major elements of a five-year comprehensive plan of research and management for the Great Lakes and northeastern United States populations of the common loon, Gavia immer. Pages 154-162 in S. A. Sutcliffe, ed. Proceedings of the Second North American Conference on Common Loon Research and Management, 14-16 January 1979, Syracuse, N.Y. Audubon Society of New Hampshire, Meredith.

A comprehensive plan to restore and maintain stable populations of the common loon in the northeastern U.S. is presented. One major research need is to study human disturbance as a mortality factor of summer breeding populations. Management programs include enforcing regulations to minimize unnecessary disturbance of loons, and restricting human activities where they interfere with loon breeding processes.

BOATING, HARASSMENT, DISTURBANCE (GENERAL), TOURISM, LAKES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, COMMON LOON

381. Poole, A. 1981. The effects of human disturbance on osprey reproductive success. Colon. Waterbirds 4:20-27.

Effects of visits to osprey nests by researchers, trapping of breeding adults, and other human activities near nests were studied on the Atlantic coast from New York City to Boston, Massachusetts, and in Everglades National Park, Florida. No evidence was found of adverse effects on osprey reproduction from nest visits, although climbing nest trees may increase raccoon predation on young or eggs. Nests exposed to nearly continuous human activity produced young at rates equivalent to wilderness nests.

RESEARCH IMPACTS, DISTURBANCE (GENERAL), URBAN ZONES, COASTAL ZONES, PREDATION, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, OSPREY

382. Portnoy, J. W. 1974. Some ecological and behavioral aspects of a nesting population of red-shouldered hawks (Buteo lineatus lineatus). M.S. Thesis. University of Massachusetts, Amherst. 61 pp.

Hawks reacted to human disturbance during incubation by abandoning clutches at four nests. A hypothesis is presented linking an apparent decline of red-shouldered hawks to factors including sensitivity to human disturbance during nesting.

DISTURBANCE (GENERAL), FORESTS, RED-SHOULDERED HAWK

383. Portnoy, J. W. 1977. Colonial waterbird population status and management on the north Gulf of Mexico coast. Pages 38-43 in Proceedings, 1977 Conference of the Colonial Waterbird Group, 20-23 October 1977, Dekalb, Ill.

Seabird and wading bird abundance and protection in the extensive wetlands of the north Gulf Coast is discussed. Certain species nesting in popular recreational areas such as beaches may require active protection during their most vulnerable reproductive stages, but widespread protection will be best accomplished by public education through news media and informative messages posted at colonies.

DISTURBANCE (GENERAL), WILDLIFE VIEWING, COASTAL ZONES, WETLANDS, LAKES, RIVERS, RECREATION MANAGEMENT, SEABIRDS, WATERBIRDS

384. Portnoy, J. W. 1977. Nesting colonies of seabirds and wading birds: Coastal Louisiana, Mississippi, and Alabama. U.S. Fish Wildl. Serv. Biol. Serv. Program FWS/OBS-77/07. 126 pp.

Results of seabird and wading bird surveys on a portion of the U.S. Gulf Coast are presented. Vandalism and unintentional human disturbance appears to be common at some colonies; only 11% of the colonies studied were protected by posting or restricted access. Most intruders seen were curious and unaware of the potential disturbance caused by their presence. Adequate posting, legal protection, and public information efforts could reduce disturbance.

HIKING, FISHING, RESEARCH IMPACTS, HARASSMENT, DISTURBANCE (GENERAL), WILDLIFE VIEWING, COASTAL ZONES, WETLANDS, PREDATION, RECREATION MANAGEMENT, THREATENED AND ENDANGERED SPECIES, SEABIRDS, WATERBIRDS

385. Primack, M. 1980. ORV's in our National Seashores. Natl. Parks Conserv. Mag. 54(11):4-7.

This nontechnical article describes damage to natural environments caused by off-road vehicle use of Atlantic seashores. Impacts of vehicles on arctic terns and loggerheads are mentioned. The author calls for the National Park Service to re-evaluate and limit off-road vehicle use in National Seashores.

OFF-ROAD VEHICLES, COASTAL ZONES, RECREATION MANAGEMENT, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, ARCTIC TERN, LOGGERHEAD

386. Purdy, K. G., and W. W. Shaw. 1980. Progress report: Recreational use of desert bighorn habitat in Pusch Ridge Wilderness. Trans. Desert Bighorn Counc. 24:52-56.

Preliminary results are reported of research in progress concerning recreation impacts on bighorn sheep in Arizona. The study seeks to quantify recreation use, determine interactions of recreationists and sheep, and assess impacts.

CAMPING, HIKING, DESERTS, FORESTS, U.S. NATIONAL FORESTS, BIGHORN SHEEP

387. Rabinowitz, A., and M. D. Tuttle. 1980. Status of summer colonies of the endangered gray bat in Kentucky. J. Wildl. Manage. 44:955-960.

Since the gray bat is almost entirely restricted to caves year-round, large colonies are extremely vulnerable to sudden destruction. Alarming declines in numbers of gray bats in Kentucky and elsewhere have been related to human disturbance. Commercial development of caves, deliberate harassment and killing of bats, and inadvertent disturbance of roosting and hibernating bats by spelunkers continue to threaten this critically endangered species.

SPELUNKING, HARASSMENT, TOURISM, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, GRAY BAT

388. Racey, P. A., and R. E. Stebbings. 1972. Bats in Britain--a status report. Oryx 11:319-327.

Results of a survey of members of the Mammal Society in Great Britain confirmed earlier reports of a serious decline in bat numbers in Europe and America. Disturbance and destruction of bats by humans along with loss of habitat are major causes of the decline. Two species of bats in Britain are in danger of extinction; the survival of these cave-dwelling bats depends on disturbance-free underground roosts and hibernacula.

HARASSMENT, DISTURBANCE (GENERAL), RESEARCH IMPACTS, SPELUNKING, FORESTS, WILDLIFE MANAGEMENT, BATS

389. Ratcliffe, D. A. 1969. Population trends of the peregrine falcon in Great Britain. Pages 239-269 in J. J. Hickey, ed. Peregrine falcon populations: Their biology and decline. University of Wisconsin Press, Madison.

Population changes and possible causes of the post-1950 peregrine falcon decline in Great Britain are discussed. Examples of disturbance caused by rock climbing and tourist outings near falcon eyries are cited, but such activities may be responsible for local declines only and are not significant factors in the national decline.

CLIMBING, HARASSMENT, TOURISM, COASTAL ZONES, FORESTS, URBAN ZONES, THREATENED AND ENDANGERED SPECIES, PEREGRIN FALCON

390. Ream, C. H. 1968. Research on loon productivity and pesticide residues. U.S. Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife, Final Report. 25 pp.

Reasons for a decline in the reproductive rate of common loons were investigated in Minnesota. A major cause for the decrease was the use of island campsites by canoeists. Pesticide residues were determined to be a potential danger to loons in some lakes.

BOATING, CAMPING, LAKES, U.S. NATIONAL FORESTS, COMMON LOON

391. Ream, C. H. 1976. Loon productivity, human disturbance, and pesticide residues in northern Minnesota. Wilson Bull. 88:427-432.

The most important factor in recent declines of common loon reproduction in Minnesota seems to be the increasing number of canoeists in the area. Campers frighten loons off nests, leaving eggs and young vulnerable to predation.

BOATING, CAMPING, LAKES, PREDATION, U.S. NATIONAL FORESTS, COMMON LOON

392. Ream, C. H. 1979. Human-wildlife conflicts in backcountry: Possible solutions. Pages 153-163 in R. Ittner, D. R. Potter, J. K. Agee, and S. Anschell, eds. Recreational impact on wildlands. Conference proceedings, 27-29 October 1978, Seattle, Wash. U.S. For. Serv. R-6-001-1979.

Increasing backcountry recreational use and diminishing wildlands contribute to growing pressures on wildlife in backcountry areas. The extent of human impacts and possible solutions are reviewed. Deliberate harassment sometimes occurs, but the major impact of humans on wildlife results from unintentional disturbance. Management of people, wildlife, and habitats may be necessary to reduce human-wildlife conflicts.

BOATING, CAMPING, HARASSMENT, HIKING, TOURISM, WILDLIFE VIEWING, REVIEW, HUMAN

HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, WILDLIFE (GENERAL)

393. Reese, J. G. 1977. Nesting success of ospreys in central Chesapeake Bay. Pages 109-113 in J. C. Ogden, ed. Transactions of the North American Osprey Research Conference, 10-12 February 1972, Williamsburg, Va. U.S. Natl. Park Serv. Trans. Proc. Ser. 2.

Factors affecting nesting success of ospreys in Chesapeake Bay, Maryland, are discussed. People-related disturbances include industrial expansion, commercial and recreational fishing and crabbing, and boating. These activities are increasing and seriously affect osprey nesting success.

BOATING, FISHING, WILDLIFE VIEWING, HARASSMENT, COASTAL ZONES, OSPREY

394. Reeves, R. H. 1952. Wild turkey management in Arizona. Proc. Annu. Conf. West. Assoc. State Game Fish Comm. 32: 106-109.

In a general discussion of management and research on wild turkeys in Arizona, human disturbance of nests is listed among detrimental effects of human activities on turkey populations.

DISTURBANCE (GENERAL), FORESTS, WILDLIFE MANAGEMENT, TURKEY

395. Reid, N. J. 1967. Public view of wildlife. Pages 77-80 in Towards a new relationship of man and nature in temperate lands. Part 1: Ecological impact of recreation and tourism upon temperate environments. IUCN Tenth Technical Meeting, 26-30 June 1966, Lucerne, Switzerland. IUCN Publ. New Ser. 7, Morges, Switzerland.

Techniques for providing public viewing of wildlife in U.S. National Parks are discussed. Sound ecological management of park resources can greatly improve wildlife viewing, and special viewing facilities and devices are suggested for increasing viewing opportunities. Park roads are often major viewing points in National Parks. Visitors should be encouraged to adjust their schedules to take advantage of seeing wildlife at their most active times.

WILDLIFE VIEWING, TOURISM, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, WILDLIFE (GENERAL)

396. Retfalvi, L. I. 1965. Breeding behavior and feeding habits of the bald eagle (Haliaeetus leucocephalus L.) on San Juan Island, Washington. M. For. Thesis. University of British Columbia, Vancouver. 180 pp.

Studies of bald eagle breeding behavior in Washington determined reasons for the general decline in eagle numbers. Eagles subjected to prolonged human presence appeared to become accustomed to humans, and were less easily frightened from nests by human presence. Disturbance by interested tourists and the author may have been responsible for some nest abandonments, but the destruction of habitat poses the greatest threat to the bald eagles.

PICNICKING, RESEARCH IMPACTS, WILDLIFE VIEWING, FORESTS, COASTAL ZONES, FLIGHT DISTANCE, THREATENED AND ENDANGERED SPECIES, BALD EAGLE

397. Reynolds, H. V., III. 1969. Population studies of the golden eagle in south-central Montana. M.S. Thesis. University of Montana, Missoula. 69 pp.

During population studies of golden eagles in Montana, effects of human disturbance on nesting eagles were assessed. Comparisons of data from different years when intensity of human disturbance varied suggest that banding activities and repeated visits to nests did not influence eagle nest occupancy or productivity.

DISTURBANCE (GENERAL), RESEARCH IMPACTS, WILDLIFE VIEWING, FORESTS, RANGELAND, GOLDEN EAGLE

398. Richens, V. B., and G. R. Lavigne. 1978. Response of white-tailed deer to snowmobiles and snowmobile trails in Maine. Can. Field-Nat. 92:334-344.

Studies of deer responses to snowmobiles in Maine revealed that deer were not driven from the area by snowmobiles and frequently followed snowmo-

bile trails where the snow was firmer. It is suggested that snowmobiles could be used to manage deer in winter by providing trails where walking in snow is easier and inducing winter movements to suitable habitats.

HARASSMENT, OFF-ROAD VEHICLES, FORESTS, WILDLIFE MANAGEMENT, WHITE-TAILED DEER

399. Riegelhuth, R. 1966. Grizzly bears and human visitation. M.S. Rep. Colorado State University, Fort Collins. 80 pp.

Data obtained by questionnaire responses from 16 parks and wilderness areas indicated that backcountry use by non-hunting recreationists is not an important factor in grizzly bear survival. Besides attraction to garbage dumps, respondents reported no increased grizzly use of visitor concentration areas. Unprovoked grizzly attacks on humans are always possible, though extremely rare.

HIKING, CAMPING, TOURISM, FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, CANADIAN NATIONAL PARKS, U.S. NATIONAL FORESTS, GRIZZLY BEAR

400. Riley, G. A., and R. T. McBride. 1972. A survey of the red wolf (Canis rufus). U.S. Fish Wildl. Serv. Spec. Sci. Rep.--Wildl. 162. 15 pp.

Red wolves and their relationship with their environment are described. A major limiting factor of the red wolf is habitat destruction through agricultural and industrial developments. Waterfowl and deer hunters occasionally kill wolves, but in general red wolves live near humans and are quite tolerant of man.

HARASSMENT, FORESTS, RANGELAND, WETLANDS, FLIGHT DISTANCE, RED WOLF

401. Robert, H. C., and C. J. Ralph. 1975. Effects of human disturbance on the breeding success of gulls. Condor 77: 495-499.

The effects of human disturbance on a colony of western gulls on southeast Farallon Island, California, were studied. Overall mortality of young was higher on a disturbed plot than on an undisturbed plot, and hatching failure was directly proportional to the amount of disturbance.

DISTURBANCE (GENERAL), COASTAL ZONES, PREDATION, WESTERN GULL

402. Robertson, R. J., and N. J. Flood. 1980. Effects of recreational use of shorelines on breeding bird populations. Can. Field-Nat. 94:131-138.

Studies at six lakes in southern Ontario investigated effects on breeding birds of disturbance caused by recreational use of shorelines. Levels of disturbance were rated according to density of cottages, proximity of roads, and boat traffic adjacent to the shorelines. Disturbed areas had more birds but lower species diversity than more natural areas.

BOATING, PICNICKING, FORESTS, LAKES, PREDATION, BIRDS, COMMON LOON, EASTERN KINGBIRD

403. Rodgers, J.A., Jr., and J. Burger. 1981. Concluding remarks: Symposium on Human Disturbance and Colonial Waterbirds. Colon. Waterbirds 4:69-70.

The authors summarize and comment on information presented at the Symposium on Human Disturbance and Colonial Waterbirds, October 1980, Ottawa, Canada. Nonscientific human activities, including recreation, are often responsible for significant disturbances at nest colonies; research activities can produce similar effects. Suggestions for minimizing disturbance of colonial waterbirds are presented.

HARASSMENT, HIKING, OFF-ROAD VEHICLES, PICNICKING, RESEARCH IMPACTS, WILDLIFE VIEWING, COASTAL ZONES, LAKES, PREDATION, RECREATION MANAGEMENT, WATERBIRDS

404. Rogers, L. L., D. W. Kuehn, A. W. Erickson, E. M. Harger, L. J. Verme, and J. J. Ozoga. 1976. Characteristics and management of black bears that feed in garbage dumps, campgrounds or residential areas. Pages 169-175 in M. R. Pelton, J. W. Lentfer, and G. E. Folk, eds. Bears--their biology and management. Third International Conference on Bear Research and Management, June 1974, Binghamton, N.Y. and Moscow,

USSR. IUCN Publ. New Ser. 40, Morges, Switzerland.

Sex, weight, age, and breeding condition were recorded for 126 black bears captured at garbage dumps, campgrounds, and residential areas in northern Michigan. Bears captured at garbage dumps, where food was more abundant, tended to be heavier than bears of the same age and sex at other areas. Young males may be less attached to specific areas than other bears, and thus may be less likely to home after being transported.

CAMPING, URBAN ZONES, FORESTS, HUMAN HEALTH AND SAFETY, WILDLIFE MANAGEMENT, RECREATION MANAGEMENT, BLACK BEAR

405. Rongstad, O. J. 1980. Research needs on environmental impacts of snowmobiles. Pages 220-227 in R. N. L. Andrews and P. F. Nowak, eds. Off-road vehicle use: A management challenge. Conference proceedings, 16-18 March 1980, Ann Arbor, Mich.

Results of studies of effects of snowmobiles on lakes, vegetation, and wildlife are reported, but sources are not cited. Direct effects on wildlife manifested by changes in activity patterns or movements appear to vary greatly; habitat alterations such as destroying cover or forage may be more important. Impacts of snowmobiles could be greatly reduced by keeping snowmobiles on marked trails.

OFF-ROAD VEHICLES, HARASSMENT, FORESTS, LAKES, REVIEW, RECREATION MANAGEMENT, WILDLIFE (GENERAL)

406. Rost, G. R. 1975. Response of deer and elk to roads. M.S. Thesis. Colorado State University, Fort Collins. 51 pp.

Responses of deer and elk to roads on winter ranges in Colorado were studied by counting fecal pellet groups along transects perpendicular to roads. Deer and elk apparently avoided areas near roads, particularly areas within 200 meters of roads. Deer avoided even dirt roads, some of which were used only by four-wheel drive vehicles, trailbikes, and hikers.

OFF-ROAD VEHICLES, HIKING, FORESTS, RECREATION MANAGEMENT, U.S. NATIONAL FORESTS, MULE DEER, ELK

407. Rybar, P. 1973. Remarks on banding and protection of bats. Period. Biol. 75: 177-179.

In a study of the activity of bats in Czechoslovakia, banding activities were found to be the reason about 50% of banded individuals left the hibernating colony. Banding not only induces considerable experimental error into population studies, but also increases the activity of bats and drives some from hibernating colonies. Banding should be used only in special cases due to the potential impacts of disturbance.

RESEARCH IMPACTS, DISTURBANCE (GENERAL), BATS

408. Satchell, J. E. 1976. The effects of recreation on the ecology of natural landscapes. European Committee for the Conservation of Nature and Natural Resources, Council of Europe, Nat. Environ. Ser. 11. 117 pp.

This report reviews European literature concerning public recreational demand, the effects of recreation on natural ecosystems, and management strategies for minimizing impacts of public pressures. Discussions include recreational impacts on wildlife of coastal, grassland, mountain, forest, and other ecosystems. The concept of carrying capacity and case studies of impact management in Europe are described.

BOATING, CAMPING, CLIMBING, HIKING, HORSEBACK RIDING, PICNICKING, SKIING, SWIMMING, TOURISM, WILDLIFE VIEWING, COASTAL ZONES, FORESTS, LAKES, RANGELAND, TUNDRA, WETLANDS, REVIEW, RECREATION MANAGEMENT, WILDLIFE (GENERAL)

409. Sather, J. H. 1952. Wildlife survey and investigations: Muskrat investigations. Neb. Game Parks Comm. Project W-015-R-08/WP13. 11 pp. (MIN 267480399).

During population studies of muskrats in Nebraska, behavioral responses of female muskrats to human disturbance were noted. Adult females that were disturbed while suckling young attempted to deposit the young on separate feeding platforms.

BOATING, RESEARCH IMPACTS, LAKES, WETLANDS, WILDLIFE MANAGEMENT, MUSKRAT

410. Sauer, P. R., S. L. Free, and S. D. Brown. 1969. Movement of tagged black bears in the Adirondacks. N.Y. Fish Game J. 16:205-223.

Homing and dispersal of black bears were trapped from campsites and town dumps in New York were studied. Nuisance animals tended to move back in the direction from which they were transferred, and 22 of 52 bears relocated returned home. Public education on proper refuse disposal or higher bear harvests would be more effective remedies for bear problems than trapping and relocating nuisance bears.

CAMPING, FORESTS, URBAN ZONES, HUMAN HEALTH AND SAFETY, WILDLIFE MANAGEMENT, BLACK BEAR

411. Sawyer, L. E. 1979. Maine Audubon Society loon survey 1978. Pages 81-99 in S. A. Sutcliffe, ed. Proceedings of the Second North American Conference on Common Loon Research and Management, 14-16 January 1979, Syracuse, N.Y. Audubon Society of New Hampshire, Meredith.

A survey of lakes in Maine provided information on loon populations, habitat alterations, and nest failures. Most respondents reported medium to heavy lakeshore development; high levels of development were generally correlated with heavy recreational use by boaters. Nest failures were attributed most often to fluctuating water levels and human disturbance.

BOATING, TOURISM, DISTURBANCE (GENERAL), RECREATION MANAGEMENT, COMMON LOON

412. Schallenberger, A. 1980. Review of oil and gas exploitation impacts on grizzly bears. Pages 271-276 in C. J. Martinka and K. L. McArthur, eds. Bears--their biology and management. Fourth International Conference on Bear Research and Management, February 1977, Kalispell, Mont. Bear Biology Association.

A review of grizzly bear literature indicates that exploration and development will be generally detrimental to bears. Construction of roads and increased use of land by people appear to have the greatest impacts. Procedures to determine and minimize impacts are described.

OFF-ROAD VEHICLES, HARASSMENT, FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, WILDLIFE MANAGEMENT, GRIZZLY BEAR

413. Schmid, W. D. 1971. Modification of the subnivean microclimate by snowmobiles. Pages 251-255 in A. O. Haugen, ed. Proceedings of the Snow and Ice in Relation to Wildlife and Recreation Symposium, 11-12 February 1971, Ames, Iowa. Iowa Cooperative Wildlife Research Unit, Iowa State University, Ames. 280 pp.

Compaction of snow by snowmobiles alters the mild subnivean microclimate and promotes densification of snow. The stress of winter temperatures may increase for organisms that live within or beneath compacted snowfields.

OFF-ROAD VEHICLES, FORESTS, MAMMALS

414. Schmid, W. D. 1972. Snowmobile activity, subnivean microclimate and winter mortality of small mammals. Bull. Ecol. Soc. Am. 53(2):37. (Abstract only).

Compaction of snowfields by snowmobiles alters the mild subsnow microclimate, potentially affecting organisms that live within or beneath the snow by increasing temperature stress or restricting movement. Experimental manipulation of a snowfield showed that winter mortality of small mammals was significantly increased by snowmobile compaction.

OFF-ROAD VEHICLES, FORESTS, MAMMALS, WILDLIFE (GENERAL)

415. Schmidly, D. J., and R. B. Ditton. 1979. Assessing human impacts in two National Park areas of western Texas. Pages 139-152 in R. Ittner, D. R. Potter, J. K. Agee, and S. Anschell, eds. Recreational impact on wildlands. Conference proceedings, 27-29 October 1978, Seattle, Wash. U.S. For. Serv. R-6-001-1979.

Recreactional impacts were studied at Big Bend National Park and Amistad Recreational Area, Texas. Human use at designated campsites and effects of use on terrestrial rodents and vegetation were monitored in riparian habitats. Present levels of use have had

little impact on these biological parameters. Management implications of the study are discussed.

BOATING, CAMPING, RIVERS, DESERTS, RANGELAND, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, RODENTS

416. Schmidly, D. J., and R. B. Ditton. 1979. Relating human activities and biological resources in riparian habitats of western Texas. Pages 107-116 in Strategies for protection and management of floodplain wetlands and other riparian ecosystems. Proceedings of the Symposium, 11-13 December 1978, Callaway Gardens, Ga. U.S. For. Serv. Gen. Tech. Rep. WO-12.

Recreational and wildlife values of riparian habitats along the Rio Grande in Texas are discussed. Human impacts, including recreational activities of boating and camping, are reported and discussed in terms of land use.

BOATING, CAMPING, DESERTS, RIVERS, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, WILDLIFE (GENERAL)

417. Schnell, J. H. 1979. Habitat management series for unique or endangered species, report no. 18: Black hawk (Buteogallus anthracinus). U.S. Bur. Land Manage. Tech. Note 329. 25 pp.

Information on the status, life history, and habitat of the black hawk is reviewed. Human disturbance from recreationists is not a widespread factor at present but probably will seriously affect black hawk populations in the future as recreational demand increases. Peak human use of riparian habitats often coincides with the most critical hawk nesting stages; premium nest site locations are often favored by recreationists as well. Control of human disturbance by active management is recommended.

CAMPING, HIKING, TOURISM, DESERTS, RANGELAND, RIVERS, RECREATION MANAGEMENT, U.S. BLM LANDS, BLACK HAWK

418. Schoenfeld, C. A., and J. C. Hendee. 1978. Wildlife management in wilderness. Wildlife Management Institute and Boxwood Press, Pacific Grove, Calif. 172 pp.

A section on people-wildlife conflicts describes potential impacts on wildlife from increasing recreational use of wilderness areas. Frequently used campsites may attract animals that become habitual scroungers of garbage; more subtle impacts include animals forced from home ranges and harassed by recreationists. Dangerous animals also threaten the safety of humans. Decisions concerning how to as well as whether to make wilderness safe for visitors must be faced by wilderness managers.

BOATING, CAMPING, HARASSMENT, HIKING, HORSEBACK RIDING, OFF-ROAD VEHICLES, WILDLIFE VIEWING, HUMAN HEALTH AND SAFETY, FLIGHT DISTANCE, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, THREATENED AND ENDANGERED SPECIES, WILDLIFE (GENERAL)

419. Schreiber, R. W. 1975. Bad days for the brown pelican. Natl. Geogr. Mag. 147:111-123.

Once abundant along much of the warmer United States coastline, brown pelicans have been greatly reduced in numbers and face an uncertain future even in Florida, the pelicans' last U.S. stronghold. While birds are beginning to recover from the apparent effects of chemical contaminants, disturbance to colonies and entanglement of birds in fishing gear pose continually increasing threats to this endangered species.

DISTURBANCE (GENERAL), FISHING, COASTAL ZONES, THREATENED AND ENDANGERED SPECIES, BROWN PELICAN

420. Schreiber, R. W. 1979. Reproductive performance of the eastern brown pelican, Pelecanus occidentalis. Nat. Hist. Mus. Los Ang. Cty. Contrib. Sci. 317. 43 pp.

Effects of investigator disturbance were evaluated during studies of brown pelicans in Florida. Disturbance was found to bias reproduction data because of reduced hatching success and productivity. Effects of human disturbance were more pronounced during the pre-egg and incubation periods than at other times. Observations of adult pelican reactions to human disturbance revealed that pelicans habituated to intrusion if it was carried out in a routine pattern.

RESEARCH IMPACTS, DISTURBANCE (GENERAL), COASTAL ZONES, FLIGHT DISTANCE, PREDATION, THREATENED AND ENDANGERED SPECIES, BROWN PELICAN

421. Schreiber, R. W. 1982. A brown study of the brown pelican. Nat. Hist. 91 (1):38-42.

Although brown pelicans are beginning to recover from the effects of chemical contaminants in the environment, human disturbance poses a continuing threat. Human visitation to pelican colonies causes reduced productivity from behavior alterations, exposure of young and eggs, and predation by gulls and crows. More than 700 brown pelicans die each year in Florida alone by becoming entangled in fishing gear.

DISTURBANCE (GENERAL), FISHING, COASTAL ZONES, PREDATION, THREATENED AND ENDANGERED SPECIES, BROWN PELICAN, GULLS, CROWS

422. Schreiber, R. W., and R. W. Risebrough. 1972. Studies of the brown pelican. Wilson Bull. 84:119-135.

From brown pelican studies in Florida, it was concluded that high levels of mortality in pelican colonies accompany human visitation due to egg breakage, predation on eggs and young when parents flee from nests, temperature stress on eggs and naked young, and possible disruption of adult nesting behavior. The status of brown pelicans in the United States is reviewed.

DISTURBANCE (GENERAL), COASTAL ZONES, THREATENED AND ENDANGERED SPECIES, BROWN PELICAN

423. Schreiber, R. W., and E. A. Schreiber. 1973. Florida's brown pelican population: Christmas Bird Count analyses. Am. Birds 27:711-715.

Analysis of Christmas Bird Count data for the brown pelican indicates that a stable population of pelicans currently exists in Florida. However, several factors could severely affect this stability in a short period of time, including human disturbance in nesting colonies, mortality caused by fishing gear, and disturbance by boat traffic at diurnal and nocturnal roosts.

BOATING, DISTURBANCE (GENERAL), FISHING, COASTAL ZONES, THREATENED AND ENDANGERED SPECIES, BROWN PELICAN

424. Schroder, H. 1969. The decline of tree-nesting peregrines in the German Democratic Republic. Pages 217-224 in J. J. Hickey, ed. Peregrine falcon populations: Their biology and decline. University of Wisconsin Press, Madison.

By 1964 tree-nesting peregrine falcons in East Germany had declined to 30% of their numbers in 1939. The decline occurred despite a great increase in food resources and a general decrease in habitat disturbance and persecution by man. Measures suggested for the protection of remaining peregrines include restrictions on recreational activities and active management of nest sites.

CLIMBING, HARASSMENT, TOURISM, WILDLIFE VIEWING, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, PEREGRINE FALCON

425. Schroeder, G. J. 1972. Results of a two-year investigation of the ospreys of northern Idaho. M.S. Thesis. University of Idaho, Moscow. 63 pp.

Investigations of ospreys in northern Idaho determined that human disturbance was not detrimental to ospreys overall, although occasional shootings and nesting failures due to disturbance occurred. Recreational boating occurring frequently near two osprey nests did not prevent successful fledging of young.

BOATING, DISTURBANCE (GENERAL), HORSEBACK RIDING, WILDLIFE VIEWING, FORESTS, LAKES, RIVERS, U.S. NATIONAL FORESTS, OSPREY

426. Schultz, R. D., and J. A. Bailey. 1978. Responses of National Park elk to human activity. J. Wildl. Manage. 42: 91-100.

Responses of elk in Rocky Mountain National Park, Colorado, to human activities were studied in 1974-1975. The elk, which experienced little or no hunting, were very visible and were disturbed little if any by normal on-road visitor activities.

HIKING, TOURISM, WILDLIFE VIEWING, FORESTS, U.S. NATIONAL PARKS, ELK

427. Scott-Williams, B. W. 1967. Effects of visitor use on the ecosystems of Rocky Mountain National Park, Colorado, U.S.A. Pages 116-117 in Towards a new relationship of man and nature in temperate lands. Part 1: Ecological impact of recreation and tourism upon temperate environments. IUCN Tenth Technical Meeting, 26-30 June 1966, Lucerne, Switzerland. IUCN Publ. New Ser. 7, Morges, Switzerland.

Results of visitor impact studies in Rocky Mountain National Park, Colorado, are summarized. Much of the information is concerned with changes in plant communities and landforms, but observations of visitor effects on wildlife are also noted. Visitors have altered the behavior of small mammals and birds by feeding them at roadside turnouts and parking areas.

WILDLIFE VIEWING, TOURISM, TUNDRA, FORESTS, U.S. NATIONAL PARKS, MAMMALS, BIRDS

428. Servheen, C. W. 1975. Ecology of the wintering bald eagles on the Skagit River, Washington. M.S. Thesis. University of Washington, Seattle. 96 pp.

Bald eagle distributions in winter on the Skagit River, Washington, were related to habitat factors including human activity. Eagles initially utilized areas isolated from a road and receiving little human use, and only when food became less available in these areas were areas with more human activity utilized.

HIKING, DISTURBANCE (GENERAL), FORESTS, RIVERS, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, BALD EAGLE

429. Severinghaus, C. W., and B. F. Tullar. 1975. Wintering deer versus snowmobiles. Conservationist 29(6):31.

Potential and observed effects of snowmobiles on wintering deer are discussed. Studies are cited in which deer were observed fleeing from approaching snowmobiles from as far as three quarters of a mile. Energy expenditure calculations demonstrate the danger of snowmobile harassment to deer already hard-pressed by winter conditions. Snowmobiles should not be permitted in deer wintering areas, and established trails should be kept at least one half mile from such areas.

OFF-ROAD VEHICLES, HARASSMENT, FORESTS, FLIGHT DISTANCE, RECREATION MANAGEMENT, WHITE-TAILED DEER, MULE DEER

430. Shea, D. S. 1973. A management-oriented study of bald eagle concentrations in Glacier National Park. M.S. Thesis. University of Montana, Missoula. 78 pp.

Observations of bald eagles congregating in Glacier National Park, Montana, revealed that the greatest threat to eagles in the park was disturbance caused by park visitors. Management recommendations include the protection of certain areas from visitor disturbances such as snowmobiling and boating, and the establishment of designated areas where viewing and photography can be managed.

BOATING, HIKING, OFF-ROAD VEHICLES, TOURISM, WILDLIFE VIEWING, FORESTS, LAKES, RIVERS, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, BALD EAGLE

431. Sheridan, D. 1979. Off-road vehicles on public land. Council on Environmental Quality, Washington, D.C. 84 pp.

This report describes off-road recreation vehicle use and associated management problems. Impacts of vehicle use on public lands, including effects on wildlife, are discussed and several examples are cited. Federal policies regarding off-road vehicle use are examined, and management recommendations are suggested.

OFF-ROAD VEHICLES, HARASSMENT, COASTAL ZONES, DESERTS, FORESTS, RANGELAND, RECREATION MANAGEMENT, U.S. BLM LANDS, U.S. NATIONAL FORESTS, U.S. NATIONAL WILDLIFE REFUGES, WILDLIFE (GENERAL)

432. Shoesmith, M. W. 1978. Wildlife management conflicts in urban Winnipeg. Pages 49-57 in C. M. Kirkpatrick, ed. Wildlife and people. Proceedings of

the 1978 John S. Wright Forestry Conference, 23-24 February 1978, Purdue University, West Lafayette, Ind.

Urban wildlife managment problems in Winnipeg, Manitoba, include damage to vegetation by deer and beavers, wildlife on airport runways and roads, and moose on a golf course. Most city dwellers are ignorant of or apathetic towards management of specific areas for wildlife. Ways to manage for wildlife, reduce conflicts between animals and humans, and provide opportunities for people to enjoy urban wildlife are discussed.

HARASSMENT, WILDLIFE VIEWING, URBAN ZONES, HUMAN HEALTH AND SAFETY, WILDLIFE MANAGEMENT, WILDLIFE (GENERAL), WHITE-TAILED DEER

433. Shoesmith, M. W., and W. H. Koonz. 1977. The maintenance of an urban deer herd in Winnipeg, Manitoba. Trans. N. Am. Wildl. Nat. Resour. Conf. 42:278-285.

Over one-half million people and a flourishing herd of 200 deer coexist in the urbanized Winnipeg area, mostly on private land. Accidental deaths on streets and highways are the greatest causes of deer mortality. Harassment by people, including snowmobile riders, motorists, bicycle riders, horseback riders, and children with guns and bows and arrows, occurs but the deer have adapted well to the presence of humans.

HARASSMENT, OFF-ROAD VEHICLES, BICYCLING, HORSEBACK RIDING, WILDLIFE VIEWING, FORESTS, RIVERS, URBAN ZONES, WILDLIFE MANAGEMENT, WHITE-TAILED DEER

434. Shugart, G. W., W. C. Scharf, and F. J. Cuthbert. 1978. Status and reproductive success of the Caspian tern (Sterna caspia) in the U.S. Great Lakes. Pages 146-156 in Proceedings, 1978 Conference of the Colonial Waterbird Group, 20-23 October 1978, New York, N.Y.

Reproductive success and status of breeding colonies of Caspian terns along Lake Michigan were studied. The success of Lake Michigan colonies was low compared to data from other studies because of storm wash damage and abandonment of eggs following human disturbance. Suggestions to minimize human interference of breeding terns include less disruptive research techniques and limited access to colonies by the public.

BOATING, RESEARCH IMPACTS, LAKES, PREDATION, RECREATION MANAGEMENT, CASPIAN TERN

435. Shult, M. J. 1972. American bison behavior patterns at Wind Cave National Park. Ph.D. Diss. Iowa State University, Ames. 191 pp.

Encounters with humans resulted in various responses by bison depending on the degree of harassment. Examples of possible effects of bison behavior on the American Indians of the Great Plains are presented.

HARASSMENT, TOURISM, WILDLIFE VIEWING, RANGELAND, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, BISON

436. Sibley, F. C. 1969. Effects of the Sespe Creek project on the California condor. U.S. Bureau of Sport Fisheries and Wildlife, Endangered Wildlife Research Station Administrative Report. Patuxent Wildlife Research Center, Laurel, Md. 19 pp.

The effects on the California condor of a proposed multipurpose water project providing water storage, recreation, and fish and wildlife enhancement are evaluated. The project area is a major condor roosting area; disturbance from construction activities and human use of the completed project will likely be severe enough to result in the extinction of the already critically endangered condor. Noise, visible movement, and frequency are important factors in the effects of disturbance on condors.

BOATING, DISTURBANCE (GENERAL), HARASSMENT, HIKING, SWIMMING, TOURISM, WILDLIFE VIEWING, LAKES, FORESTS, RANGELAND, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, U.S. NATIONAL FORESTS, CALIFORNIA CONDOR

437. Simmons, G. 1974. Brown pelican on the brink. Natl. Parks Conserv. Mag. 48 (12):21-23.

Status and protection of brown pelicans in Florida are discussed in this

nontechnical article. While pelicans are beginning to recover from the effects of environmental contaminants, human disturbance still threatens the Florida populations. Disruption of breeding colonies by curious visitors and injuries suffered from fishing equipment continue to depress pelican populations.

DISTURBANCE (GENERAL), WILDLIFE VIEWING, COASTAL ZONES, FISHING, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, U.S. NATIONAL WILDLIFE REFUGES, BROWN PELICAN

438. Singer, F. J. 1975. Behavior of mountain goats, elk, and other wildlife in relation to U.S. Highway 2, Glacier National Park. Glacier National Park, West Glacier, Mont. 96 pp.

Behavior, habitat use, and disturbance of elk, mountain goats, and other wildlife were studied in relation to a highway in Glacier National Park, Montana. Habituation to the highway made elk more vulnerable to poaching. Mountain goat-human interactions occurred frequently near a salt lick; goat reactions were avoidance of and/or flight from humans. Highway design and construction are discussed.

TOURISM, WILDLIFE VIEWING, FORESTS, TUNDRA, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, ELK, MOUNTAIN GOAT, GRIZZLY BEAR

439. Singer, F. J. 1977. Dominance, leadership, and group cohesion of mountain goats at a natural lick, Glacier National Park, Montana. Pages 107-113 in W. Samuel and W. G. MacGregor, eds. Proceedings of the First International Mountain Goat Symposium, 19 February 1977, Kalispell, Mont. Province of British Columbia, Ministry of Recreation and Conservation, Fish and Wildlife Branch. 243 pp.

Social behavior of mountain goats visiting a natural mineral lick near a highway in Glacier Natioal Park was observed. Older animals led most group movements; the stress of visitors and vehicles may have caused greater reliance on productive females for leadership. Observations suggested that goats habituated to traffic and visitor disturbances.

TOURISM, WILDLIFE VIEWING, HARASSMENT, TUNDRA, U.S. NATIONAL PARKS, MOUNTAIN GOAT

440. Singer, F. J. 1978. Behavior of mountain goats in relation to U.S. Highway 2, Glacier National Park, Montana. J. Wildl. Manage. 42:591-597.

A study was conducted in 1975 on mountain goats crossing a highway to visit a mineral lick in Glacier National Park, Montana. Collision hazards and high disturbance during crossings suggested that a goat crossing should be constructed and visitors should be restricted from the crossing area.

TOURISM, WILDLIFE VIEWING, FORESTS, TUNDRA, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, MOUNTAIN GOAT

441. Singer, F. J., and S. P. Bratton. 1980. Black bear/human conflicts in the Great Smoky Mountains National Park. Pages 137-139 in C. J. Martinka and K. L. McArthur, eds. Bears--their biology and management. Fourth International Conference on Bear Research and Management, February 1977, Kalispell, Mont. Bear Biology Association.

Over 1,000 reports of black bear-human incidents in Great Smoky Mountains National Park were evaluated. Improper food storage, regulations violations, and high levels of visitor use at certain campsites, shelters, roads, and trails were factors contributing to bear-human conflicts.

CAMPING, HIKING, TOURISM, FORESTS, HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, BLACK BEAR

442. Skiba, G. T. 1981. Ecological evaluation of the Dinosaur National Monument bighorn sheep herd. M.S. Thesis. Colorado State University, Fort Collins. 107 pp.

Human disturbance is one of several factors discussed relating to bighorn sheep ecology in Dinosaur National Monument, Colorado/Utah. An apparent sheep population decline has coincided with an increase in whitewater rafting through important sheep habitat, but observations suggest that sheep are not seriously disturbed by people on

foot or in rafts. Management recommendations include considerations for location of campsites to minimize sheep disturbance.

BOATING, CAMPING, DESERTS, RIVERS, FLIGHT DISTANCE, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, BIGHORN SHEEP

443. Sloan, N. F. 1973. Status of breeding colonies of white pelicans in the United States through 1972. Inl. Bird-Banding News 45:83-96.

Results of a 1971-1972 comprehensive survey of white pelican breeding colonies are reported. The survey was conducted by questionaires mailed to ornithologists and refuge managers. Human interference of nesting was an important factor in breeding success at several colonies. A need to reduce mortality rates of young pelicans is recognized.

DISTURBANCE (GENERAL), COASTAL ZONES, LAKES, WILDLIFE MANAGEMENT, U.S. NATIONAL WILDLIFE REFUGES, WHITE PELICAN

444. Smith, E. L. 1981. Effects of canoeing on common loon production and survival on the Kenai National Wildlife Refuge, Alaska. M.S. Thesis. Colorado State University, Fort Collins. 53 pp.

Impacts of recreational canoeing on common loons in Alaska were studied by comparing loon production, survival, and behavior between lakes receiving high and low use. Loon production was similar between high and low use areas, although changes in loon behavior due to canoeing were evident. Impacts of canoeing apparently have not reached critical levels.

BOATING, CAMPING, LAKES, U.S. NATIONAL WILDLIFE REFUGES, COMMON LOON

445. Snow, C. 1972. Habitat management series for endangered species, report no. 1: American peregrine falcon Falco peregrinus anatum and Arctic peregrine falcon Falco peregrinus tundrius. U.S. Bur. Land Manage. Tech. Note 167. 35 pp.

The distribution, biology, and decline of the peregrine falcon in the United States is described. Human disturbance is an important factor at some eyries, especially in the western U.S. Rock climbing near eyries during the nesting season usually causes falcons to abandon nesting activities. Some falcons are so sensitive to disturbance that they may not breed if humans have been anywhere near their eyries.

CLIMBING, HARASSMENT, RESEARCH IMPACTS, THREATENED AND ENDANGERED SPECIES, U.S. BLM LANDS, REVIEW, PEREGRINE FALCON

446. Snow, C. 1973. Habitat management series for endangered species, report no. 5: Southern bald eagle Haliaeetus leucocephalus leucocephalus and northern bald eagle Haliaeetus leucocephalus alascanus. U.S. Bur. Land Manage. Tech. Note 171. 58 pp.

Biological and management information concerning bald eagles in the United States is reviewed. Human disturbance is discussed as a possible limiting factor. Protective measures instituted have included the establishment of buffer zones around nests within which human activities are restricted. Recommended management practices include the regulation of human recreational activities around nests.

DISTURBANCE (GENERAL), WILDLIFE VIEWING, CAMPING, FORESTS, REVIEW, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL FORESTS, BALD EAGLE

447. Snow, C. 1973. Habitat management series for endangered species, report no. 6: San Joaquin kit fox Vulpes macrotis mutica, related subspecies and the swift fox, Vulpes velox. U.S. Bur. Land Manage. Tech. Note 238. 24 pp.

Status, biology, and habitat factors are described for the San Joaquin kit fox and the swift fox. In general, loss of suitable habitat appears to be a limiting factor for the kit fox; populations in the Mojave and Colorado deserts are seriously affected by habitat disturbance caused by off-road vehicle use. Management recommendations include support for research on the effects of off-road vehicles on kit fox habitats.

OFF-ROAD VEHICLES, DESERTS, U.S. BLM LANDS, THREATENED AND ENDANGERED SPECIES, REVIEW, KIT FOX, SWIFT FOX

448. Snow, C. 1973. Habitat management series for unique or endangered species, report no. 7: Golden eagle Aquila chrysaetos. U.S. Bur. Land Manage. Tech. Note 239. 52 pp.

The distribution, life history, and habitat requirements of the golden eagle are reviewed. The tolerance of nesting golden eagles to human interference appears to vary greatly. Although populations in the western U.S. are currently stable, human pressures from increasing development and recreational use of eagle habitats could become a serious factor. Management recommendations include the restriction of human activity in areas of eagle concentrations during breeding periods.

DISTURBANCE (GENERAL), RANGELAND, DESERTS, FORESTS, REVIEW, RECREATION MANAGEMENT, U.S. BLM LANDS, GOLDEN EAGLE

449. Snow, C. 1974. Habitat management series for unique or endangered species, report no. 13: Ferruginous hawk Buteo regalis. U.S. Bur. Land Manage. Tech. Note 255. 23 pp.

The status, biology, and limiting factors of ferruginous hawks on public lands are reviewed. Nest desertions following human disturbance may be a significant factor limiting reproduction. Egg collectors and researchers have noted that even one visit within sight of a nest may cause desertion and abandonment of eggs. Human activity from resource development and recreation may become an important factor if it occurs before young have hatched.

DISTURBANCE (GENERAL), RESEARCH IMPACTS, RANGELAND, DESERTS, RECREATION MANAGEMENT, U.S. BLM LANDS, REVIEW, FERRUGINOUS HAWK

450. Snyder, H. A., and N. F. R. Snyder. 1974. Increased mortality of Cooper's hawks accustomed to man. Condor 76: 215-216.

Recovery patterns from 235 banded Cooper's hawk nestlings suggest that familiarity with man renders a hawk more likely to die from predation by man, especially shooting. Birds with frequent exposure to man from banding activities or observation from blinds were recovered more frequently after being killed by humans than birds with little exposure to man; such birds apparently have less fear of humans and are more vulnerable to human predation.

DISTURBANCE (GENERAL), PREDATION, RESEARCH IMPACTS, COOPER'S HAWK

451. Sojda, R., Jr. 1978. Effects of snowmobile activity on wintering pheasants and wetland vegetation in northern Iowa marshes. M.S. Thesis. Iowa State University, Ames. 72 pp.

Effects of dispersed snowmobile use on ring-necked pheasants and marsh vegetation were studied in Iowa. No effects of snowmobiling on pheasant movements or behavior were found. Observed vegetation changes did not appear to seriously alter wildlife habitat.

OFF-ROAD VEHICLES, WETLANDS, RING-NECKED PHEASANT

452. Sowl, L. W., and J. C. Bartonek. 1974. Seabirds--Alaska's most neglected resource. Trans. N. Am. Wildl. Nat. Resour. Conf. 39:117-126.

Actual and potential conflicts of seabird conservation with other activities are described. Among disturbances affecting seabird colonies are activities of people in aircraft, boats, and on foot. Disturbances of cliff-dwelling colonies almost invariably result in panic flight of adult birds, causing loss of eggs and young to predators or from accidents. Methods and responsibilities of management are discussed.

DISTURBANCE (GENERAL), BOATING, HARASSMENT, COASTAL ZONES, WILDLIFE MANAGEMENT, PREDATION, SEABIRDS

453. Speight, M. C. D. 1973. Outdoor recreation and its ecological effects: A bibliography and review. Univ. College London, England, Discuss. Pap. Conserv. 4. 35 pp.

Literature concerning outdoor recreation and its ecological effects are presented as a bibliography and review; much European literature is cited. The first section reviews eco-

logical effects of recreation activities, including effects on animals. The second section reviews the use of ecological data for management of natural areas and wildlife.

BOATING, FISHING, CAMPING, HARASSMENT, HIKING, OFF-ROAD VEHICLES, PICNICKING, RESEARCH IMPACTS, SKIING, TOURISM, WILDLIFE VIEWING, COASTAL ZONES, FORESTS, LAKES, RANGELAND, URBAN ZONES, WETLANDS, BIBLIOGRAPHY, REVIEW, WILDLIFE (GENERAL)

454. Sprunt, A., IV. 1978. Conservation and management of wading birds: Introductory remarks. Page 61 in A. Sprunt, IV., J. C. Ogden, and S. Winckler, eds. Wading birds. Natl. Audubon Soc. Res. Rep. 7.

Threats to wading bird populations include loss of wetland habitat, chemical pollution of the environment, and disturbance of nesting colonies. Increasing affluence and leisure time, especially in the United States, are responsible for greater numbers of weekend boaters who disturb bird colonies through unthinking curiosity, or more overtly to photograph birds.

DISTURBANCE (GENERAL), BOATING, WILDLIFE VIEWING, WETLANDS, COASTAL ZONES, WILDLIFE MANAGEMENT, WATERBIRDS

455. Stace-Smith, R. 1975. The misuse of snowmobiles against wildlife in Canada. Nat. Can. (Ottawa) 4(4):3-8.

This nontechnical article describes the nature and extent of harassment of wildlife by snowmobiles in Canada. Deliberate harassment is emphasized, but unintentional and indirect disturbances of wildlife by recreational snowmobiling are also discussed.

OFF-ROAD VEHICLES, HARASSMENT, FORESTS, RANGELAND, WILDLIFE (GENERAL), COYOTE

456. Stalmaster, M. V. 1976. Winter ecology and effects of human activity on bald eagles in the Nooksack River Valley, Washington. M.S. Thesis. Western Washington State College, Bellingham. 100 pp.

Human disturbance of bald eagles in Washington was studied by observation and by simulation of human disturbances. Human activity on or near the river where eagles roost and feed affects eagle distributions, and threatens the population by disturbing and displacing eagles and affecting the population's food supply. Recommendations for management include control of boating and other recreational activities within buffer zones around nests.

BOATING, WILDLIFE VIEWING, FORESTS, RIVERS, FLIGHT DISTANCE, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, BALD EAGLE

457. Stalmaster, M. V., and J. R. Newman. 1978. Behavioral responses of wintering bald eagles to human activity. J. Wildl. Manage. 42:506-513.

Tolerance of wintering bald eagles in Washington to disturbance was determined by relating eagle distributions to human activity and measuring flight distances of eagles from simulated human disturbances. Human activity had adverse effects on eagle distribution and behavior. Management recommendations aimed at reducing human-caused disturbance are suggested.

BOATING, DISTURBANCE (GENERAL), FORESTS, RIVERS, FLIGHT DISTANCE, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, U.S. NATIONAL FORESTS, BALD EAGLE

458. Stebbings, R. E. 1970. Bats in danger. Oryx 10:311-312.

An urgent need to protect bats is described. Declines in almost every species of bat in temperate zones worldwide can be traced to disturbance of hibernating colonies by spelunkers and researchers, among other factors. Conservation proposals include the regulation of caving activities to minimize disturbance of bats.

SPELUNKING, HARASSMENT, RESEARCH IMPACTS, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, BATS

459. Stebbins, R. C. 1974. Off-road vehicles and the fragile desert. Am. Biol. Teach. 36:294-304.

Impacts of off-road vehicle use in California deserts are described, including threats to wildlife. Specific impacts discussed include habitat al-

teration through destruction of vegetation, soil compaction, noise, pollutants, and maiming and killing of ground-dwelling animals. Mitigation methods are discussed.

OFF-ROAD VEHICLES, DESERTS, PREDATION, RECREATION MANAGEMENT, U.S. BLM LANDS, THREATENED AND ENDANGERED SPECIES, MAMMALS, BIRDS, REPTILES, DESERT TORTOISE, FRINGE-TOED LIZARD, DESERT HORNED LIZARD

460. Steiner, A. J., and S. P. Leatherman. 1978. A preliminary study of the environmental effects of recreational usage on dune and beach ecosystems of Assateague Island. Univ. Massachusetts, Amherst, Natl. Park Serv. Coop. Res. Unit Rep. 44. 101 pp.

Field studies evaluated the relationships between nesting terns and other shorebirds and recreational uses of beach habitat. Loss of vegetation cover and changes in topographic features were also measured. Nesting and feeding shorebirds did not appear to be affected by human use of the beach. An enclosure was used to protect nesting shorebirds from off-road vehicles.

OFF-ROAD VEHICLES, TOURISM, COASTAL ZONES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL WILDLIFE REFUGES, U.S. NATIONAL PARKS, WATERBIRDS, LEAST TERN

461. Steiner, A. J., and S. P. Leatherman. 1979. An annotated bibliography of the effects of off-road vehicle and pedestrian traffic on coastal ecosystems. Univ. Massachusetts, Amherst, Natl. Park Serv. Coop. Res. Unit Rep. 45. 87 pp.

This bibliography provides an overview of the major types of impacts, management strategies, research methods, and legislation associated with impacts of off-road vehicles and pedestrians in coastal zones. Ten subject categories are listed, including one on wildlife. A list of bibliographies, key word index, and author index are included.

HIKING, TOURISM, OFF-ROAD VEHICLES, COASTAL ZONES, WETLANDS, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, U.S. NATIONAL WILDLIFE REFUGES, BIBLIOGRAPHY, WILDLIFE (GENERAL)

462. Steinhart, P. 1980. Driving out the desert. Audubon 82(6):82-87.

This nontechnical article describes impacts of off-road vehicles on the deserts of California and problems associated with regulation of vehicles on Federal lands. Impacts on wildlife include physical destruction, effects of noise, and habitat degradation.

OFF-ROAD VEHICLES, DESERTS, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, U.S. BLM LANDS, WILDLIFE (GENERAL)

463. Stephenson, R. O. 1974. Characteristics of wolf den sites. Alaska Dept. Fish Game Project W-017-R-06/WP14/J06/FIN. 29 pp. (MIN 507480466).

Studies of wolf den site characteristics in the Brooks Range of Alaska and potential effects of human disturbance at den sites are discussed. Incidents of wolf-human interactions and factors important in determining wolf responses to humans are noted. It is suggested that in areas where wolves are shy of humans, prolonged human presence within 3.2 km of dens may affect wolf behavior and cause den abandonment.

CAMPING, HIKING, TUNDRA, FLIGHT DISTANCE, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, GRAY WOLF

464. Stevens, D. R. 1982. Bighorn sheep management in Rocky Mountain National Park. Proc. Bienn. Conf. North. Wild Sheep Goat Counc. 3, in press.

One objective of bighorn sheep management in Rocky Mountain National Park, Colorado, has been to reduce the effects of park visitors on sheep. Visitor use of critical sheep habitats has been reduced by trail closures, and initial analysis indicates that disturbance of sheep has been reduced.

HIKING, TOURISM, WILDLIFE VIEWING, FORESTS, TUNDRA, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, BIGHORN SHEEP

465. Stieglitz, W. O., and R. L. Thompson. 1967. Status and life history of the Everglade kite in the United States. U.S. Fish Wildl. Serv. Spec. Sci. Rep. --Wildl. 109. 21 pp.

The Florida Everglade kite has been reduced to a population of about 20 birds inhabiting freshwater marshes in southern Florida. Loss of marshland habitat to water developments and other land uses is the most serious threat to the population; other threats include shooting and nesting losses due to human disturbance as more people seek recreation in the dwindling marshes of southern Florida.

DISTURBANCE (GENERAL), HARASSMENT, WETLANDS, REVIEW, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL WILDLIFE REFUGES, EVERGLADE KITE

466. Stokes, A. W. 1970. An ethologist's views on managing grizzly bears. BioScience 20:1154-1157.

Food shortages and social intolerance probably limit bear numbers; removal of artificial food sources may cause bears to move to campgrounds and disperse outside park boundaries. Bears should be removed from trouble spots to unsaturated habitat.

CAMPING, HIKING, FORESTS, HUMAN HEALTH AND SAFETY, WILDLIFE MANAGEMENT, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, GRIZZLY BEAR

467. Strang, C. A. 1980. Incidence of avian predators near people searching for waterfowl nests. J. Wildl. Manage. 44:220-222.

On the Clarence Rhode National Wildlife Range in Alaska, parasitic jaegers were apparently attracted to waterfowl nests when people were near. Observations are noted of parasitic jaegers, long-tailed jaegers, and glaucous gulls taking eggs from exposed nests when people were nearby. Methods for estimating nest predation without biases caused by human intrusion are discussed.

DISTURBANCE (GENERAL), WETLANDS, PREDATION, U.S. NATIONAL WILDLIFE REFUGES, GLAUCOUS GULL, LONG-TAILED JAEGER, PARASITIC JAEGER, WATERFOWL

468. Stuart, T. W. 1977. Multiobjective analysis of wilderness travel in grizzly bear habitat using parametric linear programming. Ph.D. Diss. University of California, Berkeley. 252 pp.

Overnight backcountry use of grizzly bear habitat in Glacier National Park, Montana, was modelled using parametric linear programming. This approach had theoretical and practical advantages over other methods of multiobjective analysis. Management objectives concerning bear-human relationships were explored.

CAMPING, HIKING, FORESTS, HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, GRIZZLY BEAR

469. Stuart, T. W. 1978. Management models for human use of grizzly bear habitat. Trans. N. Am. Wildl. Nat. Resour. Conf. 43:434-441.

Two backcountry travel management models are discussed, incorporating various aspects of human use of grizzly bear habitat. Development and potential uses of the models are described.

CAMPING, HIKING, FORESTS, HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL FORESTS, GRIZZLY BEAR

470. Stuart, T. W. 1980. Exploration of optimal backcountry travel patterns in grizzly bear habitat. Pages 25-32 in C. J. Martinka and K. L. McArthur, eds. Bears--their biology and management. Fourth International Conference on Bear Research and Management, February 1977, Kalispell, Mont. Bear Biology Association.

Trade-offs among backcountry management objectives were studied for Glacier National Park, Montana. Two management models are presented which identify optimal backcountry use for various combinations of objectives.

CAMPING, HIKING, FORESTS, HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, GRIZZLY BEAR

471. Sutcliffe, S. A. 1978. Changes in status and factors affecting common loon populations in New Hampshire. Trans. Northeast Fish Wildl. Conf. 35:219-224.

Studies of common loons in New Hampshire indicated a decreasing population, revealed by a major decline of lake utilization by loons during the past 50 years. Loss of suitable nesting habitat through lakeshore development and increased human disturbance of nesting loons appear to be the major reasons for the decline. Disturbances by slower boat traffic may be more severe than momentary disturbances caused by motorized craft.

BOATING, TOURISM, WILDLIFE VIEWING, LAKES, RECREATION MANAGEMENT, COMMON LOON

472. Sutcliffe, S. A. 1979. Common loon status in New Hampshire. Pages 111-116 in S. A. Sutcliffe, ed. Proceedings of the Second North American Conference on Common Loon Research and Management, 14-16 January 1979, Syracuse, N.Y. Audubon Society of New Hampshire, Meredith.

Studies in New Hampshire documented a 3-year decrease in successful loon nestings; among causes of nest failure were human disturbances. Patrols and educational efforts may have reduced impacts of human disturbance, but several cases of nest predation might have resulted from human disturbance flushing adults from nests.

DISTURBANCE (GENERAL), LAKES, PREDATION, RECREATION MANAGEMENT, COMMON LOON

473. Swenson, J. E. 1975. Ecology of the bald eagle and osprey in Yellowstone National Park. M.S. Thesis. Montana State University, Bozeman. 146 pp.

Relationships of bald eagles and ospreys to human disturbances were examined during studies in Yellowstone National Park. Ospreys nesting on Yellowstone Lake had significantly lower nest success and productivity per occupied nest than ospreys nesting along streams, and the difference appeared to be related to human disturbance. Bald eagle reproduction did not appear to be affected by human disturbance. Management recommendations are presented.

BOATING, CAMPING, HIKING, TOURISM, FORESTS, LAKES, RIVERS, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, BALD EAGLE, OSPREY

474. Swenson, J. E. 1979. Factors affecting status and reproduction of ospreys in Yellowstone National Park. J. Wildl. Manage. 43:595-601.

Reproduction of ospreys in Yellowstone National Park was higher along streams with little human disturbance than on Yellowstone Lake, where humans were more concentrated. Reproduction at active nests more than 1 km from a backcountry campsite on Yellowstone Lake was comparable to that for nests near streams. Since undisturbed ospreys reproduced at a rate allowing population stability, the elimination of disturbance by visitor management should allow the declining lake population to stabilize.

CAMPING, HIKING, BOATING, FISHING, WILDLIFE VIEWING, LAKES, RIVERS, FORESTS, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, OSPREY

475. Tarshis, I. B. 1971. An unusual fatality of a yearling Canada goose. Jack-Pine Warbler 49:128.

An incident of a Canada goose fatality from fishing line is reported from Michigan. A goose at the Seney National Wildlife Refuge was observed with a lump in the throat and breathing with difficulty; when the bird died it was found to have swallowed a mass of vegetation containing monofilament fishing line, which had caught on the bird's tongue. Fishermen frequently lose lines and tackle in the aquatic vegetation of the refuge.

FISHING, LAKES, RIVERS, U.S. NATIONAL WILDLIFE REFUGES, CANADA GOOSE

476. Taylor, R. J., and E. D. Michael. 1971. Predation on an inland heronry in eastern Texas. Wilson Bull. 83:172-176.

A heronry of little blue herons, anhingas, green herons, and common egrets was studied in Texas. The investigators could give no explanation for the observed complete nesting failure, but suggested that human activity in the heronry may have been partly responsible.

DISTURBANCE (GENERAL), LAKES, WETLANDS, PREDATION, ANHINGA, COMMON EGRET, GREEN HERON, LITTLE BLUE HERON

477. Tevis, L., Jr. 1959. Man's effect on bighorn in the San Jacinto-Santa Rosa Mountains. Trans. Desert Bighorn Counc. 3:69-76.

Human encroachment threatens the largest continuous population of bighorn sheep in California. Changes in land use toward real estate development threaten to destroy sheep habitat and eradicate vital waterholes. Despite the risk of increased disturbance to sheep, promotion of the herd's recreational value to tourists, photographers, and sightseers is seen as the way to generate public support for sheep conservation efforts.

TOURISM, WILDLIFE VIEWING, DESERTS, RANGELAND, URBAN ZONES, RECREATION MANAGEMENT, BIGHORN SHEEP

478. Thelander, C. G. 1973. Special wildlife investigations: Bald eagle reproduction in California, 1972-1973. Calif. Dept. Fish Game Project W-054-R-06/WP02/J05/8A. 18 pp. (MIN 04748-0284).

Human disturbances interfere with nest selection and occupancy of bald eagle in California, posing a major threat to the already endangered population. A territory in a recreation area used by boaters, campers, and off-road vehicles was abandoned by eagles in 1972, possibly due to human disturbance.

BOATING, CAMPING, HIKING, OFF-ROAD VEHICLES, FORESTS, LAKES, THREATENED AND ENDANGERED SPECIES, BALD EAGLE

479. Thompson, R. W. 1980. Population dynamics, habitat utilization, recreational impacts and trapping of introduced Rocky Mountain goats in the Eagle's Nest Wilderness Area, Colorado. Proc. Bienn. Symp. North. Wild Sheep Goat Counc. 2:459-464.

Recreation impacts on mountain goats were assessed by simulating disturbances and observing goat-human interactions in Colorado. Flight distance of goats was greatest for nanny-subadult groups, and averaged 82.6 m for all groups. The typical flight intensity was a slow walk away from the human. It is concluded that recreational impacts on the goat population are slight.

DISTURBANCE (GENERAL), HIKING, FORESTS, TUNDRA, FLIGHT DISTANCE, U.S. NATIONAL FORESTS, MOUNTAIN GOAT

480. Thornburg, D. D. 1973. Diving duck movements on Keokuk Pool, Mississippi River. J. Wildl. Manage. 37:382-389.

Human disturbance from hunting, boating, and other activities was found to be the primary cause of mass movements of ducks on the Keokuk Pool of the Mississippi River. The ducks adapted to human disturbance by deviating from typical patterns of diurnal activity. Intensive human activity at preferred feeding sites resulted in flights to less disturbed areas. Restrictions on boating activities in some areas of the pool may eventually be necessary.

BOATING, HARASSMENT, RIVERS, WETLANDS, RECREATION MANAGEMENT, WATERFOWL

481. Thorne, T., G. Butler, T. Varcalli, K. Becker, and S. Hayden-Wing. 1979. The status, mortality, and response to management of the bighorn sheep of Whiskey Mountain. Wyo. Game Fish Dept., Game Fish Res. Lab. Wildl. Tech. Rep. 7. 213 pp.

Ecological aspects of bighorn sheep studied in Wyoming included responses of sheep to encounters with humans. Sheep responses to humans varied with sex, age, and activity of sheep, environmental factors, and the nature of the disturbance. All mountain recreationists may stress sheep they encounter; stress induced by such passive harassment might be the most serious consequence of man-sheep encounters. Management recommendations include control of human-sheep interactions.

CAMPING, HIKING, WILDLIFE VIEWING, FISHING, CLIMBING, RESEARCH IMPACTS, TUNDRA, FORESTS, RANGELAND, FLIGHT DISTANCE, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL FORESTS, BIGHORN SHEEP

482. Tibbs, A. L. 1967. Summer behavior of white-tailed deer and the effects of weather. M.S. Thesis. Pennsylvania State University, State College. 93 pp.

During research on summer behavior of white-tailed deer in Pennsylvania, responses of deer to the presence of the

observer and various other disturbances were noted. The observer on a 20-foot high observation tower did not appear to significantly affect deer behavior. Deer response to disturbance was inversely related to its regularity.

DISTURBANCE (GENERAL), RESEARCH IMPACTS, FORESTS, FLIGHT DISTANCE, WILDLIFE MANAGEMENT, U.S. STATE PARKS AND LANDS, WHITE-TAILED DEER

483. Titus, J. R. 1979. Response of the common loon (Gavia immer) to recreational pressure in the Boundary Waters Canoe Area, northeastern Minnesota. Ph.D. Diss. State University of New York, Syracuse. 160 pp.

In this Minnesota recreation area, loon pairs in high use areas produced more young than those in low use areas. However, while human use appears to reduce the breeding success of individual pairs in areas of high human impact, the size of the adult breeding population has increased 35% in the last 25 years. The extent to which loons may be habituating or adapting to human disturbance remains unknown.

BOATING, CAMPING, LAKES, FORESTS, FLIGHT DISTANCE, U.S. NATIONAL PARKS, U.S. NATIONAL FORESTS, COMMON LOON

484. Titus, J. R., and L. W. VanDruff. 1981. Response of the common loon to recreational pressure in the Boundary Waters Canoe Area, northeastern Minnesota. Wildl. Monogr. 79. 59 pp.

Results are reported of a field study to evaluate the impact of outdoor recreationists on nesting and breeding success of the common loon in Minnesota. The authors conclude that human use of the Boundary Waters Canoe Area slightly reduces the nesting and breeding success of loons in high impact areas, but since some loons are undisturbed and others habituate to human use the adult breeding population has not declined in the past 25 years.

BOATING, CAMPING, WILDLIFE VIEWING, FORESTS, LAKES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL FORESTS

485. Tracy, D. M. 1977. Reactions of wildlife to human activity along Mount McKinley National Park Road. M.S. Thesis. University of Alaska, Fairbanks. 260 pp.

Reactions of 5 species of wildlife to human and vehicle activity on the park road in McKinley National Park were studied. Avoidance was observed for some bears, foxes, and possibly caribou; many other animals were attracted to the road. Of the ungulates studied, females with young were the most easily disturbed. Many animals appeared habituated to human activities. Management recommendations based on the study results are presented.

HARASSMENT, TOURISM, WILDLIFE VIEWING, FORESTS, TUNDRA, HUMAN HEALTH AND SAFETY, FLIGHT DISTANCE, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, CARIBOU, MOOSE, DALL SHEEP, GRIZZLY BEAR, RED FOX, GRAY WOLF, WOLVERINE, BIRDS

486. Trapp, J. L. 1973. Mute swans entangled in fishing line. Jack-Pine Warbler 51:91-92.

Two cases of mute swans becoming entangled in fishing line are reported from Scotland. One swan had a hook and line embedded in its mouth; the other swan had a line protruding from its throat and apparently internally embedded. Neither case was fatal. In waters that are fished heavily or contain many snags, lost lines and hooks become potential hazards for foraging waterfowl.

FISHING, LAKES, RIVERS, MUTE SWAN, WATERFOWL

487. Trapp, J. L. 1978. Effects of human disturbance on a red-faced cormorant nesting colony. Pac. Seabird Group Bull. 5(2):88. (Abstract only).

Human disturbance of nesting red-faced cormorants was investigated in the Aleutian Islands, Alaska. Nesting success rates and the number of young per successful nest were both significantly lower in a disturbed colony than in a nearby undisturbed colony. Disturbance frightened adult cormorants from nests, causing increased predation of eggs and young by glaucous-winged gulls.

DISTURBANCE (GENERAL), COASTAL ZONES, PREDATION, U.S. NATIONAL WILDLIFE REFUGES, RED-FACED CORMORANT, GLAUCOUS-WINGED GULL

488. Tremblay, J., and L. N. Ellison. 1979. Effects of human disturbance on breeding of black-crowned night herons. Auk 96:364-369.

Visits by researchers to black-crowned night heron colonies just before or during laying resulted in abandonment of nests and egg predation. Mortality of young was also caused by later disturbance. Settlement of late-nesting herons was apparently discouraged by frequent colony visits. Recommendations for minimizing effects of intrusion are suggested.

RESEARCH IMPACTS, COASTAL ZONES, PREDATION, BLACK-CROWNED NIGHT HERON

489. Trivelpiece, W., S. Brown, A. Hicks, R. Fekete, and N. J. Volkman. 1979. An analysis of the distribution and reproductive success of the common loon in the Adirondack Park, New York. Pages 45-55 in S. A. Sutcliffe, ed. Proceedings of the Second North American Conference on Common Loon Research and Management, 14-16 January 1979, Syracuse, N.Y. Audubon Society of New Hampshire, Meredith.

Studies of the common loon in New York revealed that the Adirondack loon population is low in density but high in productivity. Loons appeared to avoid human disturbance by selecting secluded lakes accessible only by trail, or lakes on private land with restricted access. The existence of many undisturbed lakes in the region is believed responsible for the high reproductive rates observed.

BOATING, HIKING, CAMPING, LAKES, RECREATION MANAGEMENT, U.S. STATE PARKS AND LANDS, COMMON LOON

490. Tuttle, M. D. 1979. Status, causes of decline, and management of endangered gray bats. J. Wildl. Manage. 43:1-17.

Summer colonies of the endangered gray bat were censused and population data related to estimated levels of human disturbance. A strong association was observed between population declines and disturbance by people in caves. Management requires that both hibernation caves and summer caves be protected from disturbance; adequate protection will require public education to be effective.

SPELUNKING, HARASSMENT, FORESTS, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, GRAY BAT

491. U.S. Council on Environmental Quality. 1972. National Parks. Pages 311-335 in Environmental Quality. 3rd Annual Report, Council on Environmental Quality, Washington, D.C.

Environmental problems facing U.S. National Parks are discussed. Heavy visitor use and poorly planned developments within and adjacent to parks are eroding the quality of visitor experiences and affecting park ecosystems. Feeding of wild animals and harassment of wildlife by tourists are examples of visitor impacts on wildlife compounded by overcrowded conditions. Proposals for changes in park management are discussed.

CAMPING, TOURISM, WILDLIFE VIEWING, REVIEW, HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, WILDLIFE (GENERAL)

492. U.S. Council on Environmental Quality. 1974. Off-road vehicles. Pages 207-210 in Environmental Quality. 5th Annual Report, Council on Environmental Quality, Washington, D.C.

The effects of off-road vehicles on environmental quality are discussed. When misused, off-road vehicles damage soils and vegetation, disturb wildlife, and destroy wildlife habitat. Progress is being made towards regulation and control of off-road vehicles, but usage continues to grow at an unprecedented rate and few really effective controls have been accomplished.

OFF-ROAD VEHICLES, DESERTS, RANGELAND, FORESTS, REVIEW, RECREATION MANAGEMENT, WILDLIFE (GENERAL)

493. U.S. Department of Agriculture, Forest Service, Eastern Region. 1977. Final environmental impact statement: Off-road vehicles, Allegheny National For-

est. U.S. For. Serv. USDA-FS-R9-FES-ADM-76-04. 216 pp.

This final statement describes proposed actions and environmental impacts relating to the regulation of off-road vehicle use in the Allegheny National Forest, Pennsylvania. Control of off-road vehicles will have favorable impacts on wildlife by reducing harassment, minimizing snow compaction, and providing protection for critical habitats, endangered species, and especially sensitive areas. Alternatives to the proposed action are discussed.

OFF-ROAD VEHICLES, HARASSMENT, FORESTS, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, U.S. NATIONAL FORESTS, WILDLIFE (GENERAL)

494. U.S. Department of the Interior. 1971. Off road recreation vehicles: A Department of the Interior task force study. U.S. Department of the Interior, Washington, D.C. 123 pp.

This task force study report includes discussions of impacts of off-road vehicles on wildlife. Several examples of harassment, indirect disturbance, and habitat destruction are cited. The report concludes that severe environmental damage can result from unregulated off-road vehicle use, but that little factual information exists regarding long-range or irreparable environmental effects. Departmental policies are proposed.

OFF-ROAD VEHICLES, HARASSMENT, DESERTS, FORESTS, RANGELAND, WETLANDS, REVIEW, RECREATION MANAGEMENT, U.S. BLM LANDS, WILDLIFE (GENERAL)

495. U.S. Department of the Interior. 1974. Final environmental impact statement: Proposed Barstow-Las Vegas motorcycle race. U.S. Dept. Inter. FES 74-59. U.S. Bureau of Land Management, California State Office, Sacramento. (Not consecutively paged).

This impact statement includes a discussion of impacts on wildlife of a proposed cross-country motorcycle race in California and Nevada. Effects are categorized as losses of wildlife habitat, losses to animal populations, and effects of noise; these are discussed along with impacts on specific habitats. Potential for recovery varies considerably among different different habitats. It is estimated that 77 species of birds, mammals, and reptiles will be affected by the race and associated activities.

OFF-ROAD VEHICLES, DESERTS, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, U.S. BLM LANDS, BIRDS, MAMMALS, REPTILES

496. U.S. Department of the Interior, Bureau of Outdoor Recreation. 1974. Final environmental statement: Departmental implementation of Executive Order 11644 pertaining to use of off-road vehicles on the public lands. U.S. Bur. Outdoor Recr. FES 74-2. Washington, D.C. 116 pp.

This final statement reviews the impacts of implementation of an Executive Order providing for the controlled use of off-road vehicles on public lands. Effective control of off-road vehicle use would reduce impacts on public land resources, including wildlife. Destruction and displacement of wildlife, habitat destruction, and harassment are important effects of off-road vehicles on wildlife. Alternatives to the proposed action are evaluated.

OFF-ROAD VEHICLES, HARASSMENT, DESERTS, RANGELAND, FORESTS, TUNDRA, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. BLM LANDS, U.S. NATIONAL PARKS, U.S. NATIONAL WILDLIFE REFUGES, WILDLIFE (GENERAL)

497. U.S. Department of the Interior, Bureau of Outdoor Recreation. 1976. Draft environmental impact statement: Departmental implementation of Executive Order 11644 pertaining to use of off-road vehicles on public lands. U.S. Bur. Outdoor Recr. Inter. DES 76-27. Washington, D.C. 78 pp. plus appendices.

This draft statement reviews the proposed implementation of an Executive Order establishing policies and procedures for the regulated use of off-road vehicles on public lands. The proposed action will benefit wildlife by reducing harassment and habitat degradation caused by off-road vehicles. Various alternatives to the proposed action are also evaluated.

OFF-ROAD VEHICLES, HARASSMENT, PREDATION, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, U.S. BLM LANDS, U.S. NATIONAL PARKS, U.S. NATIONAL WILDLIFE REFUGES, WILDLIFE (GENERAL)

498. U.S. Department of the Interior, National Park Service. 1981. Revised draft environmental impact statement: Grizzly bear management program, Yellowstone National Park, Idaho, Montana, Wyoming. U.S. National Park Service, Rocky Mountain Regional Office, Denver, Colo. 130 pp.

This draft statement, preliminary to a final statement, reviews grizzly bear management alternatives and impacts in Yellowstone National Park. The continuation of the present management program is proposed, aimed at maintaining a wild, free-ranging grizzly population and minimizing bear-human conflicts by reducing the availability of unnatural food sources and regulating visitor distributions in the park. Impacts of the proposed plan on bears and park visitors are evaluated.

CAMPING, HIKING, TOURISM, WILDLIFE VIEWING, FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, U.S. NATIONAL FORESTS, GRIZZLY BEAR

499. U.S. Department of the Interior, National Park Service, Rocky Mountain National Park. 1980. Environmental assessment: Snowmobile route designation in the West Unit, Rocky Mountain National Park. U.S. National Park Service, Rocky Mountain Regional Office, Estes Park, Colo. 41 pp. plus appendices.

Policies and procedures concerning the designation of snowmobile routes in Rocky Mountain National Park are evaluated. Harassment of wildlife is one of several impacts assessed for the proposed action and alternatives. Snowmobile activities in the park and adjacent areas may affect elk and mule deer on winter ranges, and bald eagles wintering on Grand Lake.

OFF-ROAD VEHICLES, HARASSMENT, FORESTS, LAKES, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, WILDLIFE (GENERAL), ELK, MULE DEER, BALD EAGLE

500. U.S. Environmental Protection Agency. 1971. Effects of noise on wildlife and other animals. U.S. Environ. Prot. Agency, Off. Noise Abate. Control NTID300.5. 74 pp.

Demonstrated and suspected effects of noise on wildlife and domestic animals are reviewed in this comprehensive report. Sources of noise potentially disturbing to wildlife include industries, automobiles, aircraft, and recreational vehicles.

URBAN ZONES, HARASSMENT, WILDLIFE (GENERAL)

501. U.S. Fish and Wildlife Service, Division of Wildlife Services. 1976. Survey of the southern bald eagle in Arizona. U.S. Fish Wildl. Serv. Endang. Spec. Rep. 1. 33 pp.

During surveys of bald eagle nest sites and observations of breeding birds in Arizona, various disturbances to nesting birds were observed. Hiking and climbing near nests caused a high level of disturbance, and four nests were abandoned probably due to these factors. River floating did not appear to disturb nesting eagles greatly. Horseback riding appeared to have the least effect of any activity, perhaps due to eagle habituation to ranch and farm workers on horseback.

HIKING, CLIMBING, BOATING, HORSEBACK RIDING, DESERTS, RANGELAND, RIVERS, FLIGHT DISTANCE, RECREATION MANAGEMENT, BALD EAGLE

502. U.S. Senate, Committee on Interior and Insular Affairs, Subcommittee on Parks and Recreation. 1971. Hearing: Snowmobiles and other off-road vehicles. U.S. Government Printing Office, Washington, D.C. 109 pp.

This transcription of the 1971 Senate Hearing on off-road vehicles includes statements and related information submitted during the hearing concerning the use and impacts of off-road vehicles on public lands. Statements and appended articles describe direct and indirect effects of off-road vehicles on wildlife and habitat, management actions to minimize impacts, and future needs regarding legislation and enforcement.

OFF-ROAD VEHICLES, HARASSMENT, WILDLIFE VIEWING, TOURISM, FORESTS, DESERTS, RANGELAND, FLIGHT DISTANCE, RECREATION MANAGEMENT, U.S. BLM LANDS, U.S. NATIONAL FORESTS, U.S. NATIONAL PARKS, U.S. NATIONAL WILDLIFE REFUGES, WILDLIFE (GENERAL)

503. Vermeer, K. 1973. Some aspects of the nesting requirements of common loons in Alberta. Wilson Bull. 85:429-435.

A significant inverse correlation was found between number of breeding loons and the amount of human disturbance occurring at lakes. It is suggested that because loons appear to be intolerant of human disturbance they may serve as indicators of the wilderness quality of lakes.

BOATING, CAMPING, TOURISM, LAKES, COMMON LOON

504. Vincenty, J. A., III. 1974. Special wildlife investigations: Study of factors affecting nesting raptor populations in urban areas, Sacramento County, California--1974. Calif. Dept. Fish Game Project W-054-R-06/ WP03/J6.1. 23 pp. (MIN 047580042).

A study to determine factors affecting raptor breeding success in California documented fledgling success, disturbances, and nest failures for 53 raptor nests. Of 10 known nesting failures 9 were caused by human disturbance, including construction activities, nest robbing, and vandalism.

DISTURBANCE (GENERAL), URBAN ZONES, KESTREL, BURROWING OWL, RAPTORS

505. Vollmer, A. T., B. G. Maza, P. A. Medica, F. B. Turner, and S. A. Bamberg. 1976. The impact of off-road vehicles on a desert ecosystem. Environ. Manage. 1:115-129.

The effects of operating a 4-wheel drive truck on a study plot in the Mojave Desert, California, were evaluated. Numbers and kinds of rodents in control and treated areas were similar before and after the experiment. Counts of whiptails were also unaffected, but counts of gridiron-tailed (zebratail) lizards were much lower in the treated area.

OFF-ROAD VEHICLES, DESERTS, RODENTS, REPTILES, WESTERN WHIPTAIL, ZEBRATAIL LIZARD, SIDE-BLOTCHED LIZARD

506. Wagar, J. V. K. 1954. Recreation and wildlife problems of the central Rocky Mountains. J. For. 52:186-190.

Recreation based on wildlife resources in the central Rocky Mountains is discussed in terms of noneconomic value to participants. Problems such as value mensuration, financing of research, land ownership, and need for development are discussed.

FORESTS, RECREATION MANAGEMENT, U.S. NATIONAL FORESTS, WILDLIFE (GENERAL)

507. Wall, G., and C. Wright. 1977. The environmental impact of outdoor recreation. Univ. Waterloo, Ontario, Dept. Geogr. Publ. Ser. 11. 69 pp.

A comprehensive review of environmental impacts of outdoor recreation is presented, including a chapter on wildlife impacts. Sections describe disturbance of wildlife, loss and gain of habitats, and changes in populations and species composition. The nature and scope of research on wildlife impacts are critically evaluated.

BOATING, CAMPING, HIKING, HARASSMENT, OFF-ROAD VEHICLES, PICNICKING, SWIMMING, WILDLIFE VIEWING, REVIEW, WILDLIFE (GENERAL)

508. Walter, H. 1978. Impact of human activity on wildlife. Pages 241-262 in K. A. Hammond, G. Macinko, and W. B. Fairchild, eds. Sourcebook on the environment: A guide to the literature. University of Chicago Press, Chicago, Ill. and London, England.

Literature concerning human impacts on wildlife is reviewed. Effects of human population expansion and utilization of energy and resources are emphasized, but nonconsumptive uses are also mentioned. Sections discuss general surveys, attitudes toward wildlife, changes in wildlife population levels, species diversity, and wildlife conservation, among others.

HIKING, URBAN ZONES, REVIEW, WILDLIFE MANAGEMENT, THREATENED AND ENDANGERED SPECIES, WILDLIFE (GENERAL)

509. Wanek, W. J. 1971. Observations on snowmobile impact. Minn. Vol. 34 (199):1-9.

Preliminary findings of research concerning environmental impacts of snowmobiles are summarized, including reactions of deer and other animals to snowmobile use. Impacts on physical environments, soils, and plants are also discussed.

OFF-ROAD VEHICLES, FORESTS, WILDLIFE (GENERAL), WHITE-TAILED DEER

510. Ward, A. L. 1973. Elk behavior in relation to multiple uses on the Medicine Bow National Forest. Proc. Annu. Conf. West. Assoc. State Game Fish Comm. 53:125-141.

Elk behavior in relation to multiple uses including recreation was studied in Wyoming. Elk apparently kept a distance of at least 0.8 km from people engaged in camping, hiking, picnicking, and other out-of-vehicle activities.

CAMPING, HIKING, PICNICKING, FORESTS, U.S. NATIONAL FORESTS, ELK

511. Ward, A. L., J. J. Cupal, A. L. Lea, C. A. Oakley, and R. W. Weeks. 1973. Elk behavior in relation to cattle grazing, forest recreation, and traffic. Trans. N. Am. Wildl. Nat. Resour. Conf. 38:327-337.

Studies of telemetered elk in Wyoming revealed that logging and recreation roads with moving vehicles had little effect on elk movements. Elk preferred to stay about 0.8 km from people who were camping and picnicking. In planning recreational facilities in elk habitat, efforts should be made to keep human concentration areas at least 0.8 km from elk feeding sites and to provide buffer zones with adequate cover.

CAMPING, HIKING, PICNICKING, TOURISM, WILDLIFE VIEWING, FORESTS, RANGELAND, FLIGHT DISTANCE, RECREATION MANAGEMENT, U.S. NATIONAL FORESTS, ELK

512. Watkins, T. H. 1969. Infernal machines on the public lands. Cry Calif. 4(2): 6-19.

Environmental degradation caused by off-road vehicle use on public lands in California is described in this nontechnical article. Effects of motorcycles and other vehicles on wildlife are difficult to measure, but the California Department of Fish and Game is quoted as citing adverse effects through harassment of wildlife by indiscriminate use of off-road vehicles. New policies and laws are required to protect public lands from unacceptable damage due to off-road vehicle use.

OFF-ROAD VEHICLES, HARASSMENT, TOURISM, DESERTS, FORESTS, RANGELAND, RECREATION MANAGEMENT, U.S. NATIONAL FORESTS, U.S. BLM LANDS, WILDLIFE (GENERAL)

513. Watson, A. 1979. Bird and mammal numbers in relation to human impact at ski lifts on Scottish hills. J. Appl. Ecol. 16:753-764.

Studies of skiing areas in Scotland related numbers of birds and mammals to levels of human disturbance in all seasons. Spring densities and breeding success of rock ptarmigan and red grouse (willow ptarmigan) did not differ between disturbed and undisturbed areas; disturbed areas attracted several alien species.

HIKING, SKIING, TOURISM, TUNDRA, MAMMALS, BIRDS, ROCK PTARMIGAN, WILLOW PTARMIGAN

514. Watson, A., N. Bayfield, and S. M. Moyes. 1970. Research on human pressures on Scottish mountain tundra, soils, and animals. Pages 256-266 in W. A. Fuller and P. G. Kevan, eds. Productivity and conservation in northern circumpolar lands. IUCN Publ. New Ser. 16, Morges, Switzerland.

Impacts of human traffic at newly constructed ski areas in Scotland are reported. Soil erosion and damage to vegetation were observed, although populations of rock ptarmigan, red grouse (willow ptarmigan), and other birds were initially unaffected. Less daytime use of developed areas by red deer was observed.

HIKING, SKIING, TOURISM, TUNDRA, MAMMALS, BIRDS, RED DEER, ROCK PTARMIGAN, WILLOW PTARMIGAN

515. Weaver, R. A., and J. Hall. 1971. Big game investigations: Bighorn sheep in Joshua Tree National Monument and adjacent areas. Calif. Dept. Fish Game Project W-051-R-16/SP. 56 pp. (MIN 047180256).

Factors found to be limiting bighorn sheep populations in Joshua Tree National Monument were available water and human disturbance. Human presence in vehicles or while camping displaces sheep from critical watering areas.

CAMPING, HIKING, TOURISM, DESERTS, U.S. NATIONAL PARKS, BIGHORN SHEEP

516. Weber, W. C. 1972. Birds in cities: A study of populations, foraging ecology and nest-sites of urban birds. M.S. Thesis. University of British Columbia, Vancouver. 2 vols., 269 pp.

Results are reported of an ecological study of urban birds in Vancouver, British Columbia, Ottawa, Ontario, and Sacramento, California. Bird densities decreased with increasing urbanization, but were much higher than in nonurban habitats during winter. Near-ground nests were almost entirely absent, probably due to cat predation and human disturbances.

DISTURBANCE (GENERAL), HARASSMENT, WILDLIFE VIEWING, URBAN ZONES, WILDLIFE MANAGEMENT, BIRDS

517. Weeden, R. 1976. Nonconsumptive users: A myth. Alaska Conserv. Rev. 17(3):3, 15.

Several examples of adverse impacts on wildlife from recreationists and scientists are cited to support the contention that nonconsumptive users of wildlife do not exist.

DISTURBANCE (GENERAL), SWIMMING, WILDLIFE VIEWING, RESEARCH IMPACTS, WILDLIFE (GENERAL)

518. Wehausen, J. D., L. L. Hicks, D. P. Garber, and J. Elder. 1977. Bighorn sheep management in the Sierra Nevada. Trans. Desert Bighorn Counc. 21:30-32.

Bighorn sheep in the Sierra Nevada have recently been managed based on the hypothesis that human disturbance has had a significant adverse influence on their population. Subsequent fieldwork indicating that human disturbance was not an important factor has led to management revisions. However, caution is still advised due to the unknown effects of increased human disturbance and other factors.

CAMPING, CLIMBING, HIKING, WILDLIFE VIEWING, FORESTS, TUNDRA, RECREATION MANAGEMENT, U.S. NATIONAL FORESTS, BIGHORN SHEEP

519. White, P. S., and S. P. Bratton. 1980. After preservation: Philosophical and practical problems of change. Biol. Conserv. 18:241-255.

Following protection of natural areas, natural and human-caused changes continue to affect species and ecosystems. Direct and indirect human disturbances are the greatest threats to protected lands; management is required to protect natural reserves from overuse. Major management issues in Great Smoky Mountains National Park are discussed, including ecological damage due to visitor pressure.

HIKING, CAMPING, SWIMMING, FISHING, TOURISM, FORESTS, LAKES, RIVERS, RECREATION MANAGEMENT, U.S. NATIONAL PARKS, WILDLIFE (GENERAL)

520. Whitlock, S. C. 1950. The black bear as a predator of man. J. Mammal. 31: 135-138.

The author provides eyewitness accounts of an apparently unprovoked black bear attack on a small child in northern Michigan. The bear carried a three-year-old girl from the porch of a remote cabin into nearby woods, killed her, and devoured portions of the body. The bear was shot soon afterwards and appeared physiologically normal, except for lack of any fat and pronounced thinness. Apparently it was driven by hunger to prey on the child.

FORESTS, HUMAN HEALTH AND SAFETY, BLACK BEAR

521. Wilbur, S. R. 1974. The literature of the California least tern. U.S. Fish Wildl. Serv. Spec. Sci. Rep.--Wildl. 175. 18 pp.

Literature concerning the endangered California least tern is reviewed. Human disturbance of breeding terns and alteration of beach habitat have been primarily responsible for the continuing decline of the species. Construction of summer homes and cottages, use of beaches for recreation, and development of nearshore areas have caused many colonies to disappear and profoundly influenced remaining colonies.

DISTURBANCE (GENERAL), TOURISM, SWIMMING, COASTAL ZONES, URBAN ZONES, REVIEW, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, CALIFORNIA LEAST TERN

522. Wilbur, S. R. 1978. The California condor, 1966-76: A look at its past and future. U.S. Fish Wildl. Serv. N. Am. Fauna 72. 136 pp.

Studies of the California condor from 1966 to 1976 revealed information on the distribution, status, and reasons for decline of the critically endangered condor. Reactions of condors to human disturbance are described as they involve flying, roosting, feeding, and nesting behavior. A recovery plan in operation is described calling for the protection of surviving birds from man-caused mortality and disturbance as well as other steps to reduce mortality and promote a stable condor population.

DISTURBANCE (GENERAL), HARASSMENT, WILDLIFE VIEWING, FORESTS, DESERTS, RANGELAND, FLIGHT DISTANCE, THREATENED AND ENDANGERED SPECIES, RECREATION MANAGEMENT, U.S. NATIONAL FORESTS, CALIFORNIA CONDOR

523. Wilbur, S. R., W. D. Carrier, B. K. Muldowney, R. D. Mallette, J. C. Borneman, and W. H. Radtkey. 1974. California condor recovery plan. U.S. Fish and Wildlife Service, Washington, D.C. 63 pp.

Former and current status, reasons for decline in numbers, habitat requirements, and biology of the endangered California condor are presented. A detailed management plan for the recovery of the species is outlined. A basic requirement for nesting sites is protection from human encroachment; disturbance may cause condors to avoid otherwise suitable habitat, or induce nest failure.

DISTURBANCE (GENERAL), HIKING, DESERTS, RANGELAND, FLIGHT DISTANCE, THREATENED AND ENDANGERED SPECIES, WILDLIFE MANAGEMENT, U.S. NATIONAL FORESTS, CALIFORNIA CONDOR

524. Wilkes, B. 1977. The myth of the nonconsumptive user. Can. Field-Nat. 91:343-349.

The concept that some outdoor recreation activities are nonconsumptive of the resource base is examined and rejected. Impacts of such activities on vegetation, wildlife, and the quality of the environment are noted. User restrictions, a proposed theory for non-use planning, and justification for landscape preservation are discussed.

BOATING, CAMPING, HIKING, OFF-ROAD VEHICLES, PICNICKING, SWIMMING, TOURISM, WILDLIFE VIEWING, RECREATION MANAGEMENT, CANADIAN NATIONAL PARKS, CANADIAN PROVINCIAL PARKS, WILDLIFE (GENERAL)

525. Williams, L. E., Jr., D. H. Austin, T. E. Peoples, and R. W. Phillips. 1971. Laying data and nesting behavior of wild turkeys. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 25: 90-106.

Effects of human disturbance on nesting turkeys were noted during studies in Florida. Seven nests were deserted after the hens were flushed by investigators; 4 other recorded flushes did not result in nest desertion. The authors believe the disturbance they caused would be greater than that exerted normally by fishermen or hikers, although disturbance of turkeys and other wildlife is an increasingly important concern for resource managers.

DISTURBANCE (GENERAL), RESEARCH IMPACTS, FORESTS, FISHING, FLIGHT DISTANCE, U.S. STATE PARKS AND LANDS, TURKEY

526. Wilson, L. O. 1969. The forgotten desert bighorn habitat requirement. Trans. Desert Bighorn Counc. 13:108-113.

An important but often-neglected habitat requirement of bighorn sheep is

space. A review of the literature shows that bighorn are generally intolerant of human disturbance. Management of developments, livestock grazing, other ungulates, and recreational activities should take into account adverse effects of these activities on bighorn sheep.

CAMPING, HIKING, BOATING, TOURISM, WILDLIFE VIEWING, DESERTS, RANGELAND, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, BIGHORN SHEEP

527. Wilson, L. O. 1975. Report and recommendations of the desert and Mexican bighorn sheep workshop group. Pages 110-143 in J. B. Trefethen, ed. The wild sheep in modern North America. Boone and Crockett Club and the Winchester Press, New York, N.Y.

Guidelines for management of desert bighorn sheep are presented. Human activities such as hiking, camping, picnicking, and sightseeing must be regulated in areas occupied by bighorn sheep. Camping should not be permitted within sight of any desert bighorn watering site or near high use areas.

CAMPING, HIKING, PICNICKING, WILDLIFE VIEWING, DESERTS, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, BIGHORN SHEEP

528. Wishart, W. 1975. Report and recommendations of the Rocky Mountain bighorn workshop group. Pages 165-207 in J. B. Trefethen, ed. The wild sheep in modern North America. Boone and Crockett Club and the Winchester Press, New York, N.Y.

Objectives and methods for bighorn sheep management in the Rocky Mountain States are outlined. A section discussing human disturbance to sheep includes recommendations for the prohibition of off-road vehicle use on or near bighorn sheep habitat and prohibition of recreational use of critical areas such as where sheep are lambing or rutting.

CAMPING, HIKING, OFF-ROAD VEHICLES, SKIING, WILDLIFE VIEWING, FORESTS, TUNDRA, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, BIGHORN SHEEP

529. Wood, R. L. 1979. Management of breeding loon populations in New Hampshire. Pages 141-146 in S. A. Sutcliffe, ed. Proceedings of the Second North American Conference on Common Loon Research and Management, 14-16 January 1979, Syracuse, N.Y. Audubon Society of New Hampshire, Meredith.

Loon population declines in areas of human activity are attributable to reproductive failures, resulting in territories becoming unoccupied as mature birds die leaving no offspring. Protection of loons still remaining on lakes with human activity is essential, requiring active public support as well as collection of relevant scientific data. Major causes of nest losses, including human disturbance, are discussed along with appropriate management concerns.

BOATING, FISHING, HARASSMENT, TOURISM, WILDLIFE VIEWING, LAKES, FLIGHT DISTANCE, PREDATION, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, COMMON LOON

530. Wright, G. A., and D. W. Speake. 1975. Compatibility of the eastern wild turkey with recreational activities at Land Between the Lakes, Kentucky. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29:578-584.

Effects of recreational activities on telemetered wild turkeys were studied in Kentucky. Turkeys did not frequent an off-road vehicle use area and were not known to inhabit areas closer than 1 km to campgrounds. Foot-trail traffic had an adverse effect on the use of an area by turkeys. Management implications are discussed.

CAMPING, HIKING, OFF-ROAD VEHICLES, FORESTS, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, TURKEY

531. Young, J., and A. Boyce. 1971. Recreational use of snow and ice in Michigan and some of its effects on wildlife and people. Pages 193-196 in A. O. Haugen, ed. Proceedings of the Snow and Ice in Relation to Wildlife and Recreation Symposium, 11-12 February 1971, Ames, Iowa. Iowa Cooperative Wildlife Research Unit, Iowa State University, Ames.

Trends in skiing and snowmobiling and possible environmental impacts are described. No adverse impacts due to skiing are reported; possible impacts

of snowmobiling on wildlife include noise, destruction of forage and cover, compaction of snow, and direct harassment.

OFF-ROAD VEHICLES, SKIING, HARASSMENT, FORESTS, U.S. STATE PARKS AND LANDS, WILDLIFE (GENERAL)

532. Youngman, R. E. 1977. Great crested grebes breeding on rivers. Br. Birds 70:544-545.

The author notes that great numbers of crested grebes in Britain have increased markedly, and that as suitable breeding habitat on standing water appears to be used up grebes are moving to rivers. It is noted that grebes appear much more tolerant of boats on rivers heavily used for recreation than on standing water.

BOATING, RIVERS, LAKES, FLIGHT DISTANCE, GREAT CRESTED GREBE

533. Zardus, M. J., and D. J. Parsons. 1980. Black bear management in Sequoia and Kings Canyon National Parks. Pages 195-200 in C. J. Martinka and K. L. McArthur, eds. Bears--their biology and management. Fourth International Conference on Bear Research and Management, February 1977, Kalispell, Mont. Bear Biology Association.

Ready availability of human food is recognized as the cause of black bear-human conflicts in 2 National Parks in California. The current bear management program seeks to eliminate unnatural food sources in an effort to allow bears to lead as natural a life as possible.

CAMPING, HIKING, FORESTS, HUMAN HEALTH AND SAFETY, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. NATIONAL PARKS, BLACK BEAR

534. Zarn, M. 1974. Habitat management series for unique or endangered species, report no. 10: Spotted owl Strix occidentalis. U.S. Bur. Land Manage. Tech. Note 242. 22 pp.

The status, life history, and habitat requirements of the spotted owl are reviewed. Human disturbance factors do not appear to be important for the spotted owl, but information is scant and the effects of human activities have not been adequately determined. Increasing recreational use of mountain habitats and greater accessibility of remote areas through the use of off-road vehicles will increase human contact with spotted owls and may introduce additional stress factors.

HIKING, OFF-ROAD VEHICLES, FORESTS, RECREATION MANAGEMENT, REVIEW, SPOTTED OWL

535. Zarn, M. 1974. Habitat management series for unique or endangered species, report no. 12: Osprey Pandion haliaetus carolinensis. U.S. Bur. Land Manage. Tech. Note 254. 41 pp.

The status, biology, and limiting factors of ospreys on public lands are described. While ospreys sometimes successfully nest in close proximity to humans, deliberate harassment and shooting are common in some areas. Recreationists who carry out their activities close to nesting ospreys may keep parent birds off the nest and cause losses of eggs and young to exposure. Management recommendations include actions to limit human disturbance of breeding ospreys.

CAMPING, FISHING, HARASSMENT, WILDLIFE VIEWING, TOURISM, LAKES, FORESTS, RIVERS, RECREATION MANAGEMENT, WILDLIFE MANAGEMENT, U.S. BLM LANDS, U.S. NATIONAL FORESTS, REVIEW, OSPREY

536. Zook, M. 1963. Don't feed the bears. Natl. Parks Mag. 37(189):7-9.

The author describes incidents of property damage and injuries to park visitors inflicted by bears and recommends that visitors refrain from feeding bears or approaching them too closely.

CAMPING, HIKING, TOURISM, WILDLIFE VIEWING, FORESTS, HUMAN HEALTH AND SAFETY, THREATENED AND ENDANGERED SPECIES, U.S. NATIONAL PARKS, BLACK BEAR, GRIZZLY BEAR

APPENDIX A

ANNOTATED LIST OF KEYWORDS

Bibliography--Lists of references

Bicycling--Non-motorized bicycle travel

Boating--Canoeing, rowing, powerboating, and water skiing

Camping--Overnight use of organized campgrounds and backcountry

Canadian National Parks--Lands administered by Parks Canada

Canadian Provincial Parks--Provincial Parks and lands

Climbing--Rock climbing and mountaineering

Coastal Zones--Continental seashore areas and offshore islands

Deserts--Desert and other arid habitats

Disturbance (General)--Human disturbance of wildlife from unspecified activities

Fishing--Fishing and fishermen as they affect terrestrial wildlife

Flight Distance--Distance to which an animal can be approached before it flees

Forests--Forest habitats

Harassment--Intentional disturbance of wildlife by humans

Hiking--Dayhiking, backcountry trekking, beach-walking, etc.

Horseback Riding--Riding horses and pack horses

Human Health and Safety--Safety and health of humans as affected by wildlife

Lakes--Lake and lakeshore habitats, including reservoirs

Off-road Vehicles--Snowmobiles, all-terrain vehicles, 4-wheel-drive vehicles, and motorcycles used off roads

Picnicking--General day-use activities

Predation--Predation induced or enhanced by human activities

Rangeland--Rangeland, farmland, and old-field habitats

Recreation Management--Management of recreationists, regulation of activities, etc., with regard to wildlife

Research Impacts--Impacts of researchers and their activities on wildlife

Review--Analytical or descriptive reviews of literature, research efforts, etc.

Rivers--Rivers, streams, and riparian habitats

Skiing--Snow skiing: downhill and touring

Skydiving--Parachuting from aircraft or cliff faces

Spelunking--Recreational cave touring

Swimming--Swimming and general beach and shore use

Threatened and Endangered Species--As listed by the U.S. Fish and Wildlife Service, January 1982

Tourism--Organized tours, recreational development, and on-road vehicle use

Tundra--Alpine and arctic tundra habitats

U.S. BLM Lands--Lands administered by the U.S. Bureau of Land Management

U.S. National Forests--National Forests and other lands administered by the U.S. Forest Service

U.S. National Parks--National Parks, Monuments, Seashores, and other lands administered by the U.S. National Park Service

U.S. National Wildlife Refuges--Refuges and other lands administered by the U.S. Fish and Wildlife Service

U.S. State Parks and Lands--State Parks and other State-owned lands

Urban Zones--Urban and suburban areas as wildlife habitats

Wetlands--Swamps, marshes, and other wetland habitats

Wildlife Management--Management of wildlife relating to non-consumptive human activities

Wildlife Viewing--Wildlife observation or photography; bird watching

APPENDIX B

BIBLIOGRAPHIES ON RELATED TOPICS

Albrecht, J., and D. Smith. 1977. Environmental effects of off-road vehicles: A selected bibliography of publications in the University of Minnesota Forestry Library. Univ. Minnesota, St. Paul Campus Libraries, For. Libr. Bibliogr. Ser. 2. 9 pp.

Bury, R. L. 1976. Off-road recreation vehicles: Research results, administrative reports, and technical articles, 1970- 1975. Council of Planning Librarians, Monticello, Ill., Exch. Bibliogr. 1067. 23 pp.

Conrad, A. H. 1978. Wilderness preservation, planning, and management: An annotated bibliography. Council of Planning Librarians, Monticello, Ill., Exch. Bibliogr. 1516. 54 pp.

Leedy, D. H. 1975. Highway-wildlife relationships. Vol. 1. A state-of-the-art report. Fed. Highw. Admin., Off. Res. Develop. FHWA-RD-76-4. 183 pp.

Leedy, D. H., T. M. Franklin, and E. C. Hekimian. 1975. Highway-wildlife relationships. Vol. 2. An annotated bibliography. Fed. Highw. Admin., Off. Res. Develop. FHWA-RD-76-5. 417 pp.

Leedy, D. L. 1979. An annotated bibliography on planning and management for urban-suburban wildlife. U.S. Fish Wildl. Serv. FWS/OBS-79/25. 256 pp.

Neil, P. H., R. W. Hoffman, and R. B. Gill. 1975. Effects of harassment on wild animals--an annotated bibliography of selected references. Colo. Div. Wildl. Spec. Rep. 37. 21 pp.

Potter, D. R., K. M. Sharpe, and J. C. Hendee. 1973. Human behavior aspects of fish and wildlife conservation: An annotated bibliography. U.S. For. Serv. Gen. Tech. Rep. PNW-4. 288 pp.

Ream, C. H. 1980. Impact of backcountry recreationists on wildlife: An annotated bibliography. U.S. For. Serv. Gen. Tech. Rep. INT-84. 62 pp.

Sidhu, S. S., and A. B. Case. 1977. A bibliography on the environmental impact of forest resource roads: A list. Newfoundland Forest Research Centre, St. John's, Info. Rep. N-X-149. 28 pp.

Stankey, G. H., and D. W. Lime. 1973. Recreational carrying capacity: An annotated bibliography. U.S. For. Serv. Gen. Tech. Rep. INT-3. 45 pp.

Wall, G. 1977. Impacts of outdoor recreation on the environment. Council of Planning Librarians, Monticello, Ill., Exch. Bibliogr. 1363. 19 pp.

Webb, R. H., and H. G. Wilshire. 1978. An annotated bibliography of the effects of off-road vehicles on the environment. U.S. Geol. Surv. Open File Rep. 78-149. 15 pp.

Wilkinson, P. F. 1978. Environmental impact of outdoor recreation and tourism: A bibliography. Vance Bibliographies, Monticello, Ill., Publ. Admin. Ser.: Bibliogr. P-57. 90 pp.

AUTHOR INDEX

SPECIES INDEX
(*Denotes threatened or endangered species)

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A list of current *Special Scientific Report – Wildlife* follows.

225. Scalation of the American Alligator, by Charles A. Ross and Charles D. Roberts. 1979. 8 pp.

(Reports 226 and 227 are in one cover)

226. Waterfowl Status Report, 1975, compiled and edited by James R. Goldsberry, Sharon L. Rhoades, Lonnie D. Schroeder, and Morton M. Smith. 1980. 86 pp.
227. Waterfowl Status Report, 1976, compiled and edited by William W. Larned, Sharon L. Rhoades, and K. Duane Norman. 1980. 88 pp.
228. Effects of Environmental Contaminants on Reptiles: A Review, by Russell J. Hall. 1980. 12 pp.
229. The Rocky Mountain Population of the Western Canada Goose: Its Distribution, Habitats, and Management, by William B. Krohn and Elwood G. Bizeau. 1980. 93 pp.
230. Breeding Biology and Relation of Pollutants to Black Skimmers and Gull-billed Terns in South Carolina, by Lawrence J. Blus and Charles J. Stafford. 1980. 18 pp.
231. The Canada Goose (*Branta canadensis*) – An Annotated Bibliography, compiled by Scott R. Craven. 1981. 66 pp.
232. Metabolism of Pesticides: Update III, by Calvin M. Menzie. 1980. 709 pp.
233. Relative Attractiveness of Different Foods at Wild Bird Feeders, by Aelred D. Geis, 1980. 11 pp.
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