

**BLACK-FOOTED FERRET RECOVERY:
A PROGRESS REPORT**

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Black-Footed Ferret Recovery: A Progress Report

Black-footed ferrets (*Mustela nigripes*) are the most endangered mammal in North America. In 1920, numbers were estimated at more than 500,000, but today only 17 are known to exist. Formerly occupying all or parts of 12 states and two Canadian provinces, ferrets were unintended victims, as prairie dogs (*Cynomys* sp.), their primary food source, were poisoned as agricultural "pests." Between 1851, when the species was first described to science, and 1981, only one small population was studied (South Dakota 1964–1974) until it became extinct. This study included unsuccessful captive breeding with nine ferrets. In all, about 90 different ferrets were seen, including 11 litters (Casey et al. 1986). It was learned that ferrets are fatally susceptible to canine distemper (*Morbillivirus*). Hope for species recovery faded after 1974 as years passed without a verified ferret sighting. Discovery of another ferret population near Meeteetse, Wyoming, in fall, 1981, brought renewed hope that ferrets could be restored to healthy numbers.

Recovery efforts have used many conservation biology concepts and techniques. The Meeteetse ferrets were discovered serendipitously: a ranch dog killed a dispersing adult male ferret (Ballew 1986, among other accounts). The ferret population was found nearby occupying 37 white-tailed prairie dog (*C. leucurus*) colonies (ca 3000 ha in 200 sq km). Study of the ferrets over the next four years was conducted to minimize intrusion and maximize ac-

quisition of data needed for species recovery (Clark 1984). Ferrets were observed directly, tracked in snow, and radio collared (Wood 1986). Techniques were developed to locate ferrets, and extensive searches have been conducted over several states; no other ferrets or recent signs have been found.

Spotlight surveys each summer revealed peak annual numbers of the nocturnal ferret. Summer 1984 searches located 129 individuals: 43 adults (25 females, 13 males, and five unknowns) and 86 young in 25 litters (Forrest et al. 1986). Capture/mark/recapture studies each fall showed that counts were similar and suggested the population was stable or increasing.

Ferret losses annually were high (about 50% to more than 90%). This meant that some ferrets, instead of being lost to natural causes each fall and winter, could be removed for captive breeding with progeny later released to the wild. In both 1983 and 1984, this idea was strongly recommended by researchers as a recovery option (Carr 1986). A workshop in the fall of 1984 took stock of the emerging knowledge about the Meeteetse ferrets, reviewed captive breeding and management experience, described agency roles in ferret recovery, presented ferret survey techniques, and indicated needs and direction for ferret research and management (Anderson and Inkleby 1985).

Captive breeding was again called for to begin in the fall of 1984. No action was taken despite available fa-

cilities at U.S. Fish and Wildlife Service's (FWS) Patuxent captive breeding center, U.S. National Zoo, and elsewhere.

By early July 1985, counts showed a much lower population than in all previous years (58, including 13 litters). About this time, sylvatic plague (*Yersinia pestis*) was found in the prairie dogs. Many ferrets were seen only once, unlike observations in past years when ferrets, once located, could be located repeatedly. Mark/recapture population estimates showed only 31 ± 8 ferrets in early September, 16 ± 5 in early October, and about six by November. The loss of about 150 ferrets between fall 1984 and fall 1985 was documented. During July through September 1985, ferrets were lost at the rate of one every two to three days. Despite field documentation of a major population decline, the formal organizational apparatus managing the ferrets did little to rescue ferrets until most were lost. The probable cause of ferret loss was later diagnosed as canine distemper, probably brought in by other mammals. By mid-October 1985, six ferrets were live-captured and placed in a Wyoming Game and Fish Department (WGF) facility. Two ferrets carried canine distemper, and because all six were housed together, all six died. Six more ferrets (four females and two males) were captured by November 1985, and were quarantined individually. They now appear healthy but failed to breed in 1986. In summer 1986, one male, two females with two litters with 10 young, and one unknown



Figure 1. Adult female black-footed ferret hunting for prairie dogs in tall grass near Meeteetse, Wyoming (photo by Tim W. Clark).

individual (14 total) were found in the wild (Biggins 1986). A WGF ferret management plan called for capture of all wild ferrets; the three adults, three young males, and five young females had been captured by September.

Other conservation biology concepts and techniques have been applied. The taxonomic status of the population was assessed from ferret skeletal remains found in the field studies. As well, the species' overall systematic, paleontological, and biogeographic characteristics were investigated. Anderson et al. (1986) found that 21 Pleistocene and Holocene faunas showed ferret remains, and that 68 museums held 412 specimens. Comparison of recent remains from Meeteetse and elsewhere with Pleistocene specimens showed no significant differences in morphology.

The FWS's Denver Wildlife Research Center (DWRC) led radio-tagging studies of the Meeteetse ferrets

(Biggins et al. 1986). Ferrets were primarily nocturnal, and a small degree of dispersal was concentrated in early fall. WGF oversaw capture, immobilization, and care of ferrets (Thorne et al. 1986).

The Meeteetse data allowed population viability assessments. A genetic examination estimated that 214 ferrets were needed for short-term genetic fitness (Groves and Clark 1986). Lacy and Clark (in press) estimated that the population is significantly homozygous, but how this affects species adaptability is unknown. Harris et al. (in press) constructed a stochastic computer simulation of a ferret population with environmental variation and concluded that about 120 ferrets showed a 95 percent chance of persisting to over 100 years.

The Meeteetse studies also focused on ferret habitat and its history. A quantitative model was developed to compare other prairie dog complexes with Meeteetse as a

basis for identifying transplant sites (Houston et al. 1986). In Montana, for example, eight major complexes (about 11,000 ha in 180 colonies) were assayed using the model and designated as potential transplant sites (Clark et al., in press). Ferret recovery will require maintaining many small, carefully managed ferret populations as a metapopulation, because some may be highly susceptible to local extinction.

The Captive Breeding Specialist Group of the International Union for the Conservation of Nature and Natural Resources (IUCN) is now advising WGF and FWS by reviewing facilities, resources, personnel, support, and plans as well as participating directly with the animals. At their initiative, a workshop on Reproductive Biology of Black-Footed Ferrets and Small Population Biology as They Relate to Conservation was held in the summer of 1986 (Seal, in press).

Legally, the ferret management and recovery program was the FWS's re-

sponsibility. In early 1982, FWS transferred lead agency status to WGF. WGF established an Advisory Team, consisting of representatives of WGF, FWS, the U.S. Forest Service, the Bureau of Land Management, Wyoming State Lands Board, plus a rancher who had ferrets on his land. Later, they established a Black-Footed Ferret Coordinator position. WGF retained all authority for management decisions and implementation. Field research, not represented on the Advisory Team, was carried out by two groups: Biota Research and Consulting, a private firm with funding from the New York Zoological Society's Wildlife Conservation International, Wildlife Preservation Trust International, World Wildlife Fund-U.S., National Geographic Society, Charles A. Lindbergh Fund, and other conservation organizations; and the FWS's DWRC.

Reflecting on this program, Carr (1986) observed: "The mandate to save this animal is clearly there in the Endangered Species Act. But implementing that mandate has required a frustrating but persistent give-and-take between citizens and the mandated agencies." Clarke and McCool (1985) noted: "Whether policies succeed or fail in their objectives largely depends upon the nature of the organizations mandated to carry out those policies." How this formal organizational apparatus responded to recommendations to captive breed ferrets in 1983 and 1984 and to the declining ferret population in 1985 needs examination. It has been suggested that the apparatus was more "role oriented" than "task oriented"—i.e., more interested in procedural bureaucratic rectitude than in successful accomplishment of the recovery task (Bogan 1985). The ferret case is an episode in conservation history that already contains many lessons for the future—biology, organizations, policy. Some practical suggestions for more efficient and effective organizational structures and decision-making procedures have been made

(Clark 1985). To deal best with the uncertainty, complexity, and hostility of endangered species programs, participants must avoid cumbersome, rigid, risk-averse bureaucracies. Instead, organic organizational tools such as parallel organizations and coordinators can tailor programs to specific, changing needs.

The Meeteetse ferret recovery effort has included three phases: I, the first four years of field work, in which baseline population, behavior, and habitat parameters were determined and calls for captive breeding made; II, the ongoing captive breeding effort; and III, the ongoing effort to locate more wild ferrets and secure transplant sites to receive future captive-produced ferrets. If phases II and III are successful, ferret recovery will be a reality. The fate of the species now depends on the captive ferrets and any wild ferrets that may exist.

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References and Notes

- Anderson, E.; Forrest, S.C.; Clark, T.W.; Richardson, L. Paleobiology, biogeography, and systematics of the black-footed ferret, *Mustela nigripes* (Audubon and Bachman), 1851. *Great Basin Nat. Memoirs* 8:11–62;1986.
- Anderson, S.H.; Inkley, D.B., editors. *Black-Footed Ferret Workshop*. Cheyenne, WY: Wyoming Games and Fish Department; 1985.
- Ballew, H. Stalking the prairie bandit. *Orion Nat. Quarterly* 4:44–55;1986.
- Biggins, D., personal communication; 1986.
- Biggins, D.; Schroeder, M.H.; Forrest, S.C.; Richardson, L. Activity of radio-tagged black-footed ferrets. *Great Basin Nat. Memoirs* 8:135–140;1986.
- Bogan, M.A. Needs and direction for future black-footed ferret research. In: S. Anderson and D. Inkley, eds. *Proc. Black-footed Ferret Workshop*. Cheyenne, WY: Wyoming Game and Fish Department;1985:28. 1–28.5. See also: May, R.M. The cautionary tale of the black-footed ferret. *Nature* 320:13–14;1986. Also: Weinberg, D. Decline and fall of the black-footed ferret. *Nat. Hist.* 95:62–69;1986.
- Carr, A. III. Introduction: The black-footed ferret. *Great Basin Nat. Memoirs* 8: 1–7;1986.
- Casey, D.; Duwaldt, J.; Clark, T.W. Annotated bibliography of the black-footed ferret. *Great Basin Nat. Memoirs* 8:185–208; 1986.
- Clark, T.W. Strategies in endangered species conservation: A research view of the ongoing black-footed ferret conservation studies. In: *Symposium on Issues in Technology and Management of Impacted Western Wildlife*. Steamboat Springs, CO: 1982:145–154.
- Clark, T.W. Organizing for endangered species recovery. Paper presented at Wildlife Management Direction in the Northwest through 1990. Missoula, MT: Northwest Sec. of The Wildlife Soc.;1985. For a theoretical framework, see: Argyris, C.; Schon, D. A. Organizational learning: A theory of action perspective. Reading, MA: Addison-Wesley Publ. Co.; 1978.
- Clark, T.W.; Grensten, J.; Gorges, M.; Crete, R.; Gill, J. Analysis of black-footed ferret translocation sites in Montana. *Prairie Nat.*; in press.
- Clarke, J.N.; McCool, D. Staking out the terrain: Power differentials among natural resource management agencies. Albany, NY: State University New York Press; 1985.
- Forrest, S.C.; Biggins, D.E.; Richardson, L.; Clark, T.W.; Campbell, T.M. III; Thorne, E.T. Black-footed ferret population attributes. Meeteetse, Wyoming 1981–1986; unpublished report.
- Groves, C.R.; Clark, T.W. Determining minimum population size for recovery of the black-footed ferret. *Great Basin Nat. Memoirs* 8:150–159;1986.
- Harris, R.; Clark, T.W.; Shaffer, M. Estimating extinction probabilities for the black-footed ferret. In: U.S. Seal, ed. *Reproductive Biology of Black-Footed Ferrets and Small Population Biology as They Relate to Conservation*. New Haven, CT: Yale University Press; in press.

They Relate to Conservation. New Haven, CT: Yale University Press; in press.

Seal, U.S., editor. *Reproductive Biology of Black-Footed Ferrets and Small Population Biology as They Relate to Conservation*. New Haven, CT: Yale University Press; in press.

Thorne, E.T.; Schroeder, M.H.; Forrest, S.C.; Campbell III, T.M.; Forrest, L.R.; Be-

Houston, B.R.; Clark, T.W.; Minta, S.C. Habitat suitability index model for the black-footed ferret: A method to locate transplant sites. *Great Basin Nat. Memoirs* 8:99-114;1986.

Lacy, R.C.; Clark, T.W. Genetic variability in black-footed ferret populations: Past, present, and future. In: U. S. Seal, ed. *Reproductive Biology of Black-Footed Ferrets and Small Population Biology as* litsky, D.; Williams, E.S. Capture, immobilization, and care of black-footed ferrets for research. In: S. Anderson, D. Inkley, eds. *Black-footed ferret workshop*. Cheyenne, WY: Wyoming Game and Fish Department; 1986:9.1-9.8.

Wood, S., editor. *The black-footed ferret*. *Great Basin Nat. Memoirs* 8;1986.

Leading Academics Back Conservation

A group of 10 distinguished scientists released a statement at the National Forum on Biodiversity held in Washington, D.C., in October that warned: "The extinction crisis is a threat to civilization second only to the threat of thermonuclear war." The statement continues: "By allowing the loss of up to a quarter of all the kinds of organisms in the world during the next several decades, we are greatly limiting the possibilities for the ecologically sound and sustainable development of many regions. While a majority of the species threatened with extinction are still completely unknown, the results of their loss could be an unprecedented human tragedy."

The scientists, all ecologists and evolutionary biologists, blame the crisis on a variety of causes including "steadily increasing human overpo-

pulation, overexploitation of renewable resources, careless destruction of the systems that supply us with renewable resources, failure of both rich and poor to develop ecologically sound development strategies for poor nations, and generally inadequate understanding of biological systems by the public in general, and by decision-makers in particular."

The scientists also expressed concern about the consequences of claims of economists and social scientists, who, without accurate background information, argue that there is no problem. They stressed the importance of consulting natural scientists "when issues of development, resource use, economic policy, and the like are being considered by governments." The statement concludes: "People had better start listening soon, or it will be too late."

The group, calling themselves "The Club of the Earth," includes Society for Conservation Biology Board members Jared Diamond, Paul R. Ehrlich, Peter H. Raven, and Edward O. Wilson. All are members of both the United States National Academy of Sciences and the American Academy of Arts and Sciences.

Similar concerns were echoed recently by scientists participating in the "International Conference on Protection of the Environment and the Defence of World Peace" that met in Varna, Sweden, in August. The group launched a movement they call a world "Ecoforum for Peace," to encourage the world's scientific and political communities in their efforts to promote appropriate development on a sound ecological basis, while creating the trust among nations necessary to achieve these aims.

U.S. Congress Takes Action on Biological Diversity

The U.S. Office of Technology Assessment (OTA) has recently completed an assessment of the technologies pertaining to the conservation of biological diversity and

of the institutions developing and applying these technologies. Requested by Congress, this report concludes with a range of options for congressional action to maintain and promote biological diversity conservation. Copies can be obtained from the U.S. Government Printing Office or from OTA Publications Office, Washington, D.C. 20510-8025.

Susan Shen

Office of Technology Assessment
Washington, DC

U.S. International Assistance and Biological Diversity

During the past two years the U.S. Agency for International Development (AID) has been examining its program to determine the best way to implement the U.S. strategy on the Conservation of Biological Diversity. Congress recently amended the Foreign Assistance Act to require AID to support activities related to the conservation of biological diversity in the 1987 fiscal year. AID is now in the process of determining the program changes needed to meet this requirement, focusing particularly on how to leverage existing financial resources.

Areas likely to receive emphasis are establishment and management of conservation areas in developing countries, wildlife management and conservation programs, and programs related to the identification and cataloging of wild plants and animals in the tropics. Formal announcement of the programs is expected by early 1987.

Mark Shaffer

Agency for International Development
Washington, DC

Where in the World Do We Need More Protected Areas?

Today 425 million hectares of the Earth's land, 3% of its surface, have protected status. One hundred twenty-four countries have estab-

NORTHERN ROCKIES CONSERVATION COOPERATIVE is a nonprofit corporation whose goal is creative, cooperative, practical problem-solving in the conservation of nature. Although its focus is on species and ecosystems in the northern Rocky Mountains, it seeks exemplary projects with national and international significance. The work of the Cooperative is basic and applied ecological research; educational activities; organization and management development, research, and consulting; and policy research and analysis. It conducts active independent programs in these four areas and offers these services to existing agencies and conservation and business organizations. NRCC's staff, board, and associates present and publish papers on a wide variety of topics. These are reprinted and distributed in this series.

Paper Number:

1. Clark, T. W., and D. Zaunbrecher. 1987. The Greater Yellowstone Ecosystem: The ecosystem concept in natural resource policy and management. *Renewable Resources Journal* 5(3):8-16.
2. Barmore, W. J., Jr. 1987. The distribution and abundance of ungulates in the northern Yellowstone ecosystem in pristine times and today. Talk presented at the Greater Yellowstone Coalition's Scientific Conference on The Northern Yellowstone: Issues and Alternatives for Ecosystem Management. Lake Hotel, Yellowstone National Park, May 29, 1987.
3. Clark, T. W. 1986. Professional excellence in wildlife and natural resource organizations. *Renewable Resources Journal* 4(2):8-13.
4. Clark, T. W. 1986. The ecosystem-economics connection in northwestern Wyoming's future. Paper presented at Wyoming Outdoor Council Annual Meeting: Public Land Management and Western Communities, Lake Lodge, Yellowstone National Park, June 13-15, 1986.
5. Clark, T. W. 1985. Wyoming grizzly bears: 150 years of journal, oral history, and newspaper accounts (ca. 1800-1950). Paper presented at Grizzly Bear Conference, sponsored by Murie Audubon Society, Casper, Wyoming, May, 1985.
6. Clark, T. W. 1987. Black-footed ferret recovery: a progress report. *Conservation Biology* 1(1):8-11.
7. Clark, T. W., E. Anderson, C. Douglas, and M. Strickland. 1987. *Martes americana*. *Mammalian Species* No. 289:1-8.
8. Clark, T. W. Organizing for endangered species recovery. Paper presented at Wildlife Management Directions in the NW through 1990, NW Section meeting, The Wildlife Society, Sheraton Hotel, Missoula, Montana, April 2-5, 1985.
9. Clark, T. W. 1987. Restoring balance between the endangered black-footed ferret (*Mustela nigripes*) and human use of the great plains and intermountain west. *Journal of the Washington Academy of Sciences* 77(4):168-173.

10. Clark, T. W., and S. R. Kellert. In Press. Toward a policy paradigm of the wildlife sciences. *Renewable Resources Journal*.
11. Laundre, J. W., T. W. Clark, and D. P. Streubel. 1987. Behavior, ecology, and conservation of mountain lions in fragmented habitat. A progress report for the 1986-1987 field season, Idaho State University, Pocatello, ID.
12. Clark, T. W., and J. R. Cragun. In Press. Organization and management of endangered species programs. In *The management of viable populations: theory, applications, and case studies*. B. A. Wilcox, P. F. Brussard, and B. Marcot, eds. Island Press, 1988.