Endangered Species UPDATE

Including a Reprint of the latest USFWS Endangered Species Technical Bulletin

March/April 1998
Vol. 15 No. 2

School of Natural Resources and Environment
THE UNIVERSITY OF MICHIGAN

Insert: January/February 1998 U.S. Fish and Wildlife Service Endangered Species Bulletin

Letter from the Editor

As a journal focused on the conservation of endangered and threatened species, we need to broaden our scope to include marine issues. This includes both publishing quality articles that highlight this area of research and attracting readers for whom marine conservation is a priority.

Thanks to the David and Lucile Packard Foundation, we are able to do just that–begining this summer, *Endangered Species UPDATE*s will include a new section entitled *Marine Matters*. Recently, the Pew Foundation conducted a survey investigating attitudes toward marine issues and conservation. Two main points were highlighted: (1) people are deeply concerned about our oceans and seas, and (2) there is not enough information available for decision makers and general public on these topics. Toward that end, the *UPDATE* is developing *Marine Matters* as a forum for discussion and exchange of ideas focused specifically on marine issues. To jumpstart *Marine Matters*, this issue features an overview article by Tundi Agardy, Senior Director for Marine Programs at Conservation International.

Since 1983, the *Endangered Species UPDATE* has been providing scientists, policymakers, educators, and business people with quality up-to-date information on endangered species issues. Over the years, the *UPDATE* has changed and expanded to meet the growing needs of our audience. It is time again for such a change.

We hope the instillation of *Marine Matters* will stimulate active dialogue on marine conservation issues. Therefore, we not only look forward to receiving your comments on the new section, but also your paper submissions on your work and expertise.

Sincerely,

M. Elsbeth McPhee,
Editor

Endangered Species UPDATE

A forum for information exchange on endangered species issues
March/April 1998 Vol. 15 No. 2

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Subscription Information: The *Endangered Species UPDATE* is published six times per year, plus occasional special issues, by the School of Natural Resources and Environment at The University of Michigan. Annual rates are $28 for regular subscriptions, and $23 for students and senior citizens (add $5 for postage outside the US). Send check or money order (payable to The University of Michigan) to:

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Cover: Scottish fishing boats. Photograph by Tundi Agardy.

The *Endangered Species UPDATE* was made possible in part by the Boone and Crockett Club, Chevron Corporation, U.S. FWS Division of Endangered Species Region 3, and Walt Disney World Company.

Seas of Trouble

Tundi Agardy

Abstract

Coastal ecosystems and the great biological diversity they support are threatened the world over. Being the downstream recipients of degrading impacts caused by poor land use practices, and simultaneously coming under increasing pressure to supply natural resources and space to accommodate human needs, the global ocean is affected both directly and indirectly. Multiple and cumulative threats have already undermined the functioning of many marine systems; unless we change our attitudes towards and use of the seas, a marine biodiversity crisis is inevitable.

In the nearly four decades since Rachel Carson wrote *The Sea Around Us*, the world's marine ecosystems have undergone a silent, slow, and largely unnoticed transformation. Once thought to be so vast as to be largely immutable and so rich in resources as to be inexhaustible, the global ocean is now recognized to be in a state of crisis brought about by multiple chronic threats. While there is reason for hope, the ubiquitous nature of marine degradation is certainly cause for concern among conservationists, even terrestrial ones.

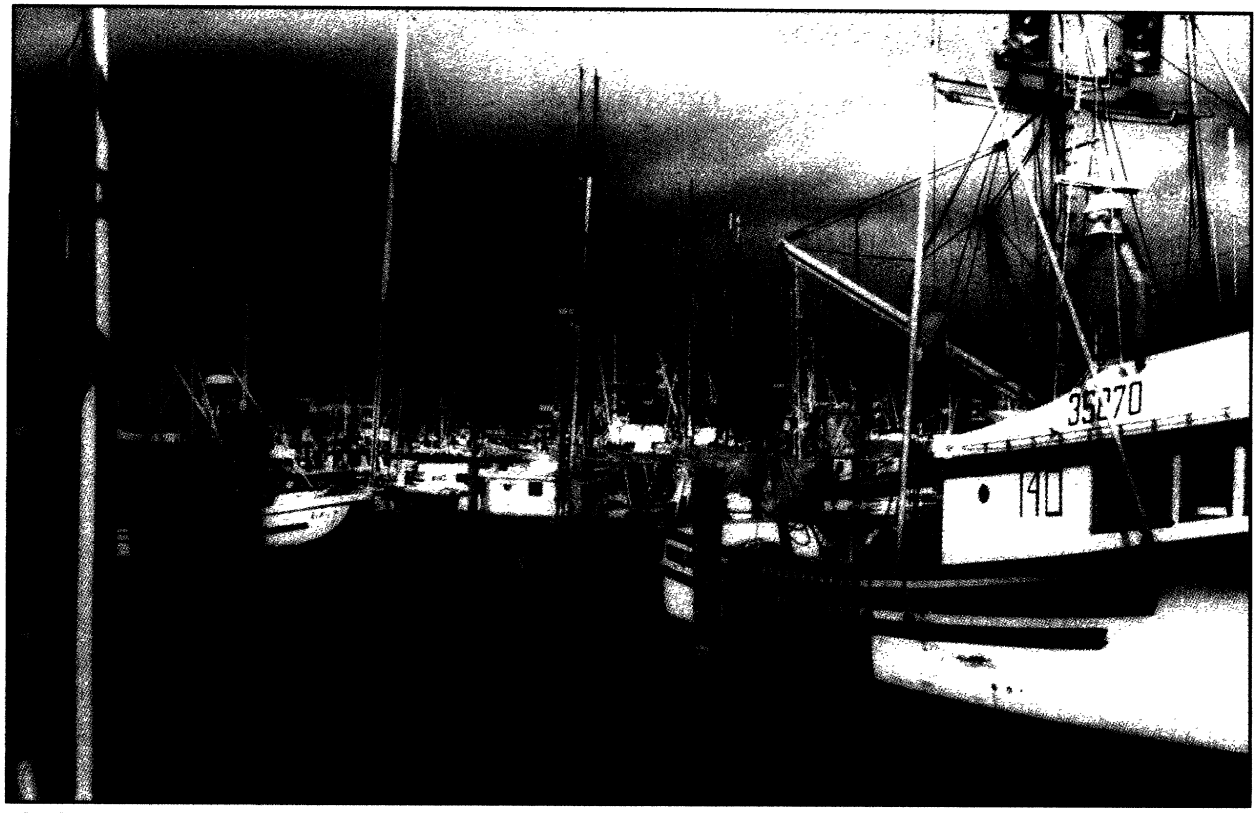
If there is now a growing awareness about the state of the oceans, it is largely thanks to public concern about the highly endangered, and charismatic, great whales, sea turtles and pinnipeds. These flagship species share some common traits that make them vulnerable to over-exploitation: slow growth rates, low reproductive rates, and/or extremely low survivorship of offspring. Despite this inherent vulnerability, harvesting occurred at such high levels that populations crashed, and are only beginning to recover. For some species like the northern right whale (*Eubalaena glacialis*), recovery has been impeded by environmental factors, even though whaling has totally ceased. For other endangered species, like the green and hawksbill sea turtles (*Chelonia mydas* and *Eretmochelys imbricata*), the threat of unsustainable harvest is still acute in many parts of the world.

Environmental groups have seized upon the ability of these charming species to capture public attention, and have designated many of them flagships symbolizing the plight of entire marine ecosystems. In addition to sharing some natural history traits that make them vulnerable to over-exploitation, they also share a reliance on a series of disparate intact habitats to survive. One couldn't designate a better choice for an umbrella species than the leatherback sea turtle (*Dermochelys coriacea*), for instance, because the animal requires tropical beaches, coastal migration corridors, and the nutrient rich waters of temperate and subpolar continental shelves for survival. So as far as flagships go, leatherbacks, humpback whales, blue whales, and the like are a good choice for illustrating marine issues–but if and only if the public is urged to look beyond the plight of individual endangered species and consider the ecosystems that support these species.

Over-exploitation affects many organisms beyond the highly touted flagship species. Though the list of marine endangered and threatened species pales in comparison to that for terrestrial and freshwater systems, we are slowly coming to realize that marine biodiversity is indeed being lost at alarming rates as genetically unique populations of marine organisms are extirpated through overharvest. Even for cosmopolitan species, this reduction in genetic diversity is damaging, even if largely invisible.

Our drive to exploit the living resources of the ocean stems from an increasing reliance on fish protein to feed ourselves and our livestock, just as poor agricultural practices deplete our potential to meet this demand from terrestrial sources. The over-exploitation, however, stems not merely from need but from the tragedy of the global commons - that is, the inability of governments to adequately regulate use of common property resources. Commercial fishing operations, particularly the large scale industrial and factory trawler fisheries, have been singled out as the villains in non-sustainable harvesting, but the truth is that even artisanal fishing can be devastating to marine populations given the sometimes high levels of fishing effort.

In effect, the exploitation problem is a function of three factors: 1) how much fish or fishery resource we remove from the ecosystem (the over-exploitation problem in its narrowest definition) and how this re-



Fishing boats docked in Seattle, Washington. Photograph by Tundi Agardy.

moval affects the target stock; 2) how we harvest those resources and its attendant effects on food webs and habitats; and 3) which fish we take, keeping in mind the important roles that certain species play in supporting or stabilizing biotic communities. When we look at these three factors simultaneously we can see why the National Academy of Sciences singled out fishing as the major cause of marine biodiversity loss in its 1995 report.

Therefore, while the United Nations Food and Agricultural Organization estimates nearly three-quarters of the world's commercially important fish stocks are over-fished or on the brink of being over-fished, the crisis actually stems not purely from how much fish we take from the sea, but how we harvest them. Fishing methods commonly used to catch highly valued fish species selectively impact many other species–not only fish, but also sea turtles, sea birds, porpoises, and the like. These incidentally-caught and wasted species constitute a higher percentage of catch than the targeted fish - in some cases, nearly 30 times more by weight. Even worse, many of these incidentally caught species are already endangered–and this indirect threat is sometimes the most important factor impeding recovery.

Scientists evaluating the effect of wasteful fishing practices on ocean ecology no longer consider the methods that replaced the vilified giant drift nets (walls of death, as they were popularly known) to be less harmful. Longlining and large scale net fishing often result in massive by-catch, while bottom trawling, a common method for harvesting shrimp, scallops, flounder and other seemingly plentiful species, is perhaps even more devastating to marine ecosystems than large scale long-lining or drift-netting. Bottom trawling rakes the ocean bottom, kills the plants and animals that reside there, and interrupts key ecological processes.

To be fully aware of the extent of the fisheries crisis, we must appraise how much and in what manner we remove fish from the seas. We must also consider which fish species are being taken and how their removal affects ecosystem health and productivity. By concentrating our harvesting on predator species that sit atop the food chain, our fishing practices dramatically affect biological communities. For instance, fisheries selectively targeting mako shark, swordfish, or bluefin tuna have been shown to cause cascading effects down food webs, leading to decreased diversity and/or productivity. Removal of such apex predators need not be intensive to result in these effects, since many of these species are naturally rare or widely dispersed to begin with. For this reason, even recreational fisheries that target these species can affect wider marine biodiversity.

Interestingly, moving down the food chain and concentrating fishing

around the base of the food web also has significant effects. In many commercial fisheries around the world, decreases in the abundance of valuable apex predators and other species high in the food chain have caused fishermen to target less valuable resources lower down. Because of their lower inherent value, such fishing is undertaken with increased intensity–such that entire trophic levels are impacted. Decline in abundance of primary consumers removes an important source of food for organisms higher in the food web and again causes cascading effects. Such altered ecosystems are unable to function normally and replenish lost resources. Whether it is swordfish or herring we're after, fishing affects marine systems in ways that are not only damaging to nature but to future fisheries as well.

There are several other ways beyond fishing in which we directly impact marine ecosystems and the species that support and depend on them. Perhaps the most insidious, and ubiquitous, is the conversion of coastal habitat: infilling of wetlands, urbanization of the coastline, creation of ports out of natural harbors, siting of industrial centers in the coastal fringe. Even small scale and seemingly innocuous habitat alteration–such as the building of sea walls and jetties to protect beachfront property, can have dramatic effects when the cumulative impact of many such activities is considered. Whether large scale or small, habitat alteration is dramatically undermining the functioning of marine systems, especially as much of this development is taking place in the ecologically most important areas: estuaries and wetlands that serve as feeding areas, nurseries, and crucial places for maintaining hydrological balances. A recent and alarming trend has been the conversion of such critical habitats for aquaculture operations, in which overall biodiversity is compromised in the interest of maximizing production of a single species. For this reason and others besides, mariculture and aquaculture is by no means the solution to the fisheries crises described above, at least given current practices.

We impact the seas indirectly as well. Land based sources of pollution enter watersheds and eventually find their way to coastal waters. Such pollutants include nutrients in the form of agricultural fertilizers and sewage, pesticides, heavy metals, hydrocarbons, and debris. The effect

Rivers and streams carry land-based sources of pullution collected from run-off, including organics such as animal waste and fertilizers, toxics such as pesticides, heavy metals, and hydrocarbons, and debris. Photograph by Tundi Agardy.

of nutrient pollution is to cause an imbalance in coastal systems known as eutrophication - this in turn spurs algal blooms and, consequently, fish kills. Eutrophication is prevalent the world over, and is considered by many coastal ecologists to be the most critical threat to marine ecosystems. However, toxins such as heavy metals and organochlorides also exact a heavy toll on wildlife and ecosystems- and the persistent nature of many of these chemicals means recovery from this pollution is most often slow and sometimes incomplete. Add to this constant onslaught from run-off the direct dumping of pollutants that still occurs in most coastal countries, and we create a lethal soup of nearshore waters.

Diversion of freshwater from estuaries is the opposite sort of phenomenon, with similarly disastrous consequences. Such freshwater is removed from rivers for irrigation, as a source of drinking water, and for hydroelectric generation. The brackish nature of estuaries makes them suitable as habitat for the young of many marine species, and the "salinization" of such areas of fresh- and saltwater mixing renders them unable to fulfill these important ecological functions.

Alien species also constitute a form of pollution. Species that are not indigenous to an area are often released inadvertently through ship ballast discharges, as is the case for the zebra mussel which wreaked havoc on North American aquatic systems and the western Atlantic ctenophore called Mnemiopsis that contributed to the ecological collapse of the Black Sea. Alien species are also deliberately introduced, in poorly planned mariculture projects or unsuccessful biological control manipulations. These introductions cause a restructuring of the biotic community as the exotics outcompete natives for food and space, and the end result is usually greatly reduced biodiversity.

Lastly, there are large scale impacts such as global climate change, which in many ways turn out to be the most difficult to assess. Warming of the world's seas degrades marine ecosystems and affects species in many ways; by changing relative sea level faster than most biomes can adapt; by stressing temperature-sensitive organisms such as corals and causing their death or morbidity (in corals this is most often evidenced by coral bleaching); by changing current patterns and thus interfering with important physio-biotic processes; and by causing increased incidence of transmission of pathogens. In most if not all cases, global climate change impacts act in negative synergy with other threats to marine organisms, and can be the final straw in dooming ecosystem viability and integrity.

This picture of the global ocean certainly looks bleak, especially when we acknowledge that many or all of these impacts affect coastal ecosystems simultaneously. Yet 1998 has been declared the International Year of the Ocean, and decision makers around the world are waking up to the fact that treating ocean ecosystems and threats to them as " out of sight, out of mind" is a dangerous path on which to keep treading. We can indeed avert further degradation of marine systems, and continued endangerment of marine populations and species, if we more effectively highlight the state of the oceans and the implications of these conditions. But if we choose not to be diligent and ignore our seas of trouble, we will be affecting the long term prospects for our own survival as well as that of nature.

Dr. Tundi Agardy is Senior Director for Marine Programs at Conservation International, a Washington, DC-based non-governmental organization dedicated to conserving global biodiversity.

Island Habitats: A Stronghold of Carnivore Biodiversity in Agriculturally Modified Environments

Kirk Johnson

Abstract

*With the advent of European settlement over 100 years ago, the northern Great Plains became the site of extremely rapid landscape change. Mixed-grass prairies in what is now North Dakota quickly fell to the plow for cropland, while short-grass prairies and riparian habitats in the state's drier west were utilized for livestock production. This combined with the disappearance of decline of prey species such as the bison (*Bison bison*), caused a retreat of formerly endemic mammalian carnivores like the gray wolf (*Canis lupus*), and the black bear (*Ursus americanus*), to isolated "island-like" habitats such as the Pembina Escarpment and the Turtle Mountains in the northern part of the state, while remnant transient populations of the puma (*Puma concolor*) persisted in those ecoregions and in the "Badlands" of southwestern North Dakota. Over the last twenty years, sightings, sign and mortalities of these three predators has increased, suggesting the possibility of juvenile dispersal from established breeding populations of pumas, wolves, and black bears in Manitoba, Minnesota, and South Dakota. Rural landowners in North Dakota and elsewhere on the Great Plains may increasingly face the dilemma of balancing economic interests with federal and state laws designed to protect and subsequently reestablish these native carnivores in suitable habitat islands and peninsulas. How North Dakotans resolve these land use issues has implications for other Great Plains states where carnivore dispersion is also taking place.*

Over the past 100 years the Great Plains states have witnessed the complete disappearance of large native mammalian carnivores, such as the gray wolf (*Canis lupus*), the black bear (*Ursus americanus*), the puma (*Puma concolor*), and the grizzly bear (*Ursus arctos horribilus*), from their original mixed and short-grass prairies. Both the prairies and riparian waterways that sustained these species were either extensively modified by overgrazing or were broken up by the plow. Several unique subspecies, such as the "buffalo" wolf that preyed mostly upon bison (*Bison bison*), and the plains grizzly bear immortalized by the Lewis and Clark Expedition, became extinct. By 1900, only a few individuals of each species hung on in remote isolated habitats, such as the Badlands of North and South Dakota. At the present time within North Dakota, several isolated island-like habitats that still exist in a sea of agriculture may prove to be natural recovery areas for residual populations of pumas, wolves, and black bears. Such natural recovery may prove to be a model for other Great Plains states facing similar issues.

The principles of biogeography apply to three distinct ecoregions within North Dakota. One of the tenets of biogeography is that over time endemic species in isolated habitats will gradually lose genetic diversity without migration corridors that connect to other populations. North Dakota has three island-like geographic provinces surrounded by a mixed or short-grass biome intensively modified by farming, ranching, or industry.

The Pembina Gorge is one such riparian habitat island approximately 150 square kilometers in area covered with deciduous forests that lies within the larger Pembina River Valley and Escarpment of northeastern North Dakota. This twenty kilometer long canyon is over three and a half kilometers wide and lies just south of Walhalla, North Dakota. For the last six years it has been the scene of increasing reports of black bear sightings, sign, and mortalities (Schultz 1997). Black bears have also been reported within the Turtle Mountains of north-central North Dakota and southern Manitoba (Allen 1997). This roughly circular hilly region seemingly spared in the last Wisconsin-phase glaciation period that ended approximately 10,000 years ago, and rises to 760 meters (2500 feet), over 150 meters above the surrounding plain (figure 1).

Both the Pembina Gorge and the Turtle Mountains have aspen, oak, birch, ash, and edible shrub species more typical of deciduous parklands within northern Minnesota and southern Canada, than the mixed grass prairie and agricultural fields of eastern North Dakota. These small deciduous forest remnants with seasonal mast production are optimal black bear habitat. From these presumably easily saturated environments, juvenile black bears may be dispersing into less suitable human-modified agricultural regions. In the

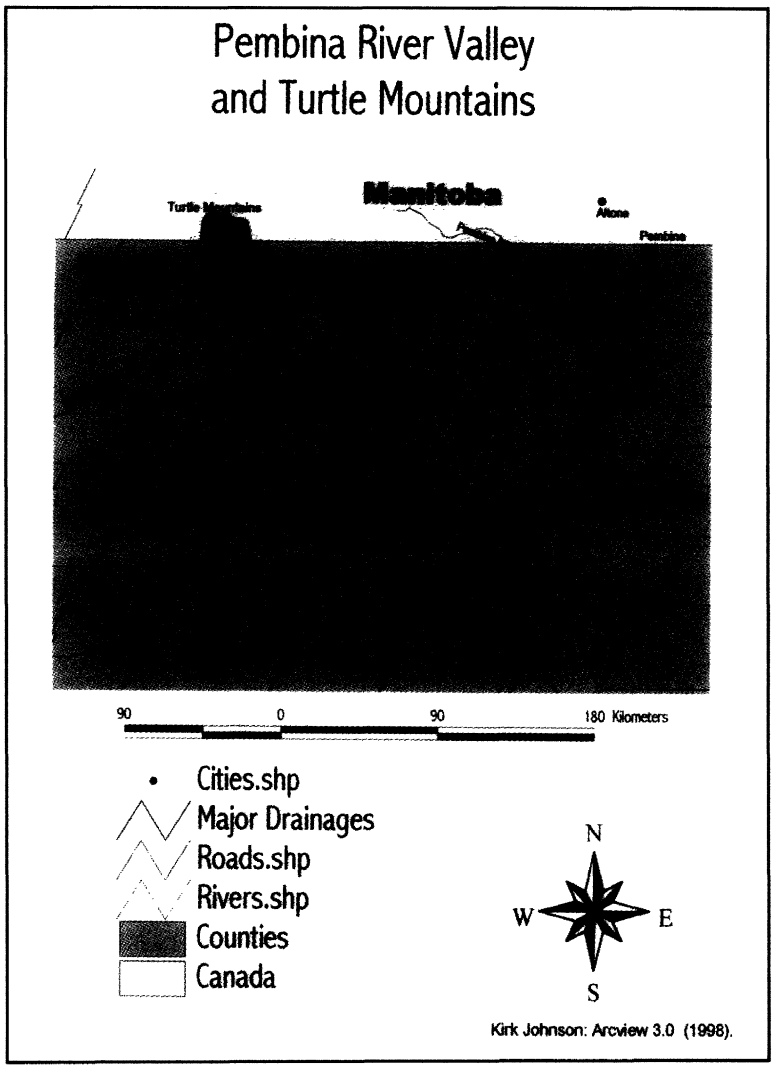


Figure 1. Pembina River Valley and Turtle Mountains.

last two years alone, two small black bears have been shot on the outskirts of the northeastern North Dakota communities of Cavalier and Pembina (Schultz 1997; Walker 1997). Possible explanations for such aberrant behavior include: (1) such bears are young, wandering juveniles (less than two years old) and are not experienced in foraging for wild foods, or (2) recent mast food crops were meager, and the youngsters were driven by hunger to raid urban waste disposal sites.

In the fall of 1996, a hunter claimed to have seen a large adult black bear in the Willow Lake region of the southern Turtle Mountains (Hagen 1997). A second report east of Bottineau, ND., on the outskirts of the hills produced some physical evidence, including a two-inch plaster cast of bear tracks; this bear reportedly was seen foraging plum and blackberry bushes (Hagen 1997).

Other historic residents may also be staking a permanent claim to these hills. Since the 1950s, over twenty reports of puma sightings, tracks, or mortalities have been confirmed by state and federal wildlife professionals (Allen 1997; Kraft 1997). Eleven of these reports have been cited in the 1990s alone (Allen 1997). This may be evidence of a breeding population in the Turtle Mountains (Allen 1997).

With sufficient numbers of ungulates such as white-tailed deer (*Odocoileus virginianus*) as a prey base, the adaptable cats may reclaim some of their historic haunts in North Dakota as long as forested peninsulas exist between protected forestlands in Canada's Turtle Mountain Provincial Park and private woodlots in North Dakota. Studies of puma dispersal through land corridors in California suggest that these felids will use corridors that are located along natural travel routes with ample woody cover, and that are greater than 400 meters in width for distances exceeding one kilometer or more (Beier 1995). As with black bears, such cats may be transient juveniles following wooded valleys from southern Manitoba's estimated resident population of fifty felines (Nero and Wrigley 1977). In 1973, a small male puma was killed on a farm near Stead, Manitoba, a small community northeast of Winnipeg (Nero and Wrigley 1977). Annual reports of ten to fifty pumas continue to be compiled at Manitoba's Department of Natural Resources (Tischendorf and Henderson 1995).

Evidence of such dispersal into North Dakota is demonstrated by recent reports. In August of 1996, federal Animal Damage Control (ADC) officers verified an attack on an adult mare that was badly injured by a raking across her ribs and back. The wide spacing of the of claw marks confirmed that it was from a puma (Huffman 1997). A state game warden verified a sighting of a cat in 1993 that had a long tail and was golden in color (Hagen 1997). Unconfirmed puma tracks have also been reported near Neche, a tiny community in extreme northeastern North Dakota (Icelandic State Park 1997).

Gray wolves also appear to be expanding their range. A likely wolf corridor into North Dakota is from a southern Manitoba wolf population that extends within one hundred kilometers of the North Dakota border

(Light and Fritts 1994). Manitoba's Riding Mountain National Park, 150 kilometers north of the Turtle Mountains, contains up to seventy-five individuals in several packs (Light and Fritts 1994). So called "brush wolves," have been sighted between the 640 hectare (1600 acre) Lake Metigoshe State Park and the International Peace Garden along the border of North Dakota and Canada (Hagen 1997). Such smaller wild canids may be wolf-coyote hybrids, occurrences of which have been proven among the gray wolf (*Canis lupus*) population in Minnesota. On the Canadian side of the Turtles a black wolf mortality was recently confirmed (Hagen 1997). Steve Allen, a furbearers biologist with North Dakota's Game and Fish Department, listed seven confirmed wolf deaths since 1958 within North Dakota, with five of these occurring since 1981 (Allen 1997; Light and Fritts 1994).

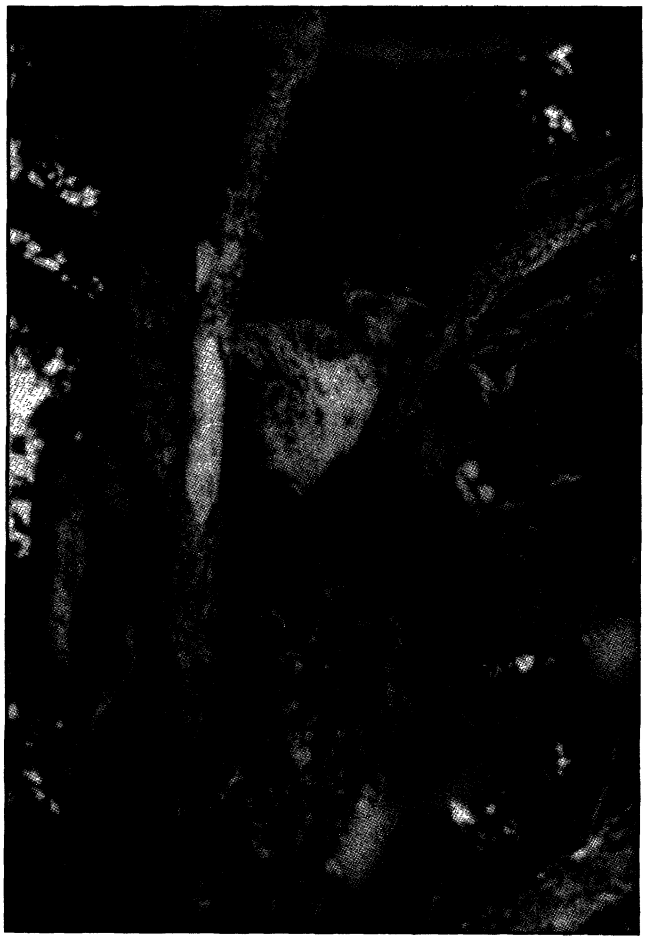
Since 1981, five other juvenile wolves were also killed in eastern South Dakota (Light and Fritts 1994). U.S. Fish and Wildlife analysis of skull morphometrics of seven of these ten recent Dakota mortalities seemed to indicate the expanding Minnesota population as their point of origin (Light and Fritts 1994). Nearly all of these wolves were solitary, under two years of age, and were killed in the winter, indicating recent juvenile dispersal (Light and Fritts 1994). A likely riparian route into eastern North Dakota is through the Sheyenne National Grasslands along the Sheyenne River (Huffman 1997).

Southwestern North Dakota was historically populated by pumas, wolves, and some grizzlies, but few black bears due to a lack of mast and suitable edible grasses and berries. This area is a sparsely-populated, semi-arid short-grass prairie ecoregion of the Great Plains interspersed by the cottonwood and willow bottomlands of the Missouri River and tributaries. Dispersing juvenile pumas may enter this Badlands country through a riparian corridor stretching down to South Dakota's Missouri River Breaks region (Benzon 1996). The Little Missouri River, a tributary of the Missouri, contains some of the most rugged eroded butte and canyonlands terrain, of which 29,200 hectares are protected within the north and south units of Theodore Roosevelt National Park. Park officials report an average of 2-3 sightings per year of the big cat in the park (McKay 1997). In July of 1997, according to an official park report, two pumas were observed for about twenty minutes by a party of five from a vehicle (McKay 1997).

Such reports in the Badlands are not confined to the park, however. According to a North Dakota Game and Fish Department report, in early January of 1991 a 37 kilogram, 1-year-old female puma was shot by coyote hunters in a barn in Golden Valley County (Tisch- endorf and Henderson 1995). This was likely the first wild puma mortality recorded in North Dakota since 1902, according to State Game and Fish Department records.

The Badlands may occasionally harbor dispersing young solitary gray wolves as well, possibly from Canada. In 1992, in Dunn County, ND., a black wolf reportedly attacked a horse with rider, and was killed by the rider (Huffman 1997; Kraft 1997). The wolf's dried carcass still weighed 46 kilograms nine days after its death (Huffman 1997). A U.S. Fish and Wildlife agent indicated the black color phase is common among wolves from Canada and Montana (Kraft 1997). This 1992 mortality is the most recent one recorded in the state (Kraft 1997). Current ADC policy on dealing with wolf depredation is to attempt to live capture the animals, and either turn them over to the U.S. Fish and Wildlife Service for relocation, or transport individuals to zoos (Huffman 1997).

Wolves in the lower 48 states are



Puma (*Felis concolor*) in Yellowstone National Park.

listed as a threatened species in Minnesota, and endangered or experimental elsewhere under the Endangered Species Act. Private landowners in North Dakota may view solitary nomadic wolves more positively if such natural dispersers were listed as experimental individuals that can be eliminated under Section 10(a)(1)(B) of the Endangered Species Act, which allows for the incidental take of endangered and threatened species by non-federal entities (Dohner and Smith 1997; Allen 1997). Landowners may fear a loss of control over private lands by federal decrees prohibiting the taking of an essential individual, thus promoting ill will. While wolf dispersal occurs into North Dakota, state and federal wildlife professionals agree that no current breeding population likely exists within the state (Allen 1997; Kraft 1997).

The two other formerly native large predators in North Dakota, the puma and the black bear, both are protected as "furbearers" under North Dakota state law, with closed hunting seasons (Allen 1997). It seems clear, however, that since the State Game and Fish Department has indicated that a breeding population of the bears may exist in the Turtle Mountains and the Pembina Escarpment, stricter enforcement of such laws with penalties for unwarranted mortalities is needed. The two recent black bear killings indicate the need for stronger state legislation while providing for landowner compensation in proven cases of livestock depredation.

Legal protection came too late for the plains grizzly bear in southwestern North Dakota; the last known specimen was killed in 1907 in the Killdeer Mountains, a range of hills northeast of the Badlands. If breeding populations of the puma, wolf, and black bear are to become a reality in these three ecoregions of North Dakota, private landowners should be encouraged to cooperate in protecting their forestlands, prairies, and streams through the use of such measures as easement agreements and the Conservation Reserve Program. Entrenched negative attitudes against these native predators will not change, however, if rural landowners feel they have no control over the natural recovery process, and fears exist over public safety and livestock depredation. Both federal and state wildlife officials should frequently consult with landowners affected by large carnivores that may take up residence on their property.

Landowners who feel they have a voice in the decision-making process regarding local implementation of takings provisions in the Endangered Species Act and similar state statutes will likely view restoring these large predators much more favorably. To develop even minimal breeding populations of pumas, wolves, and black bears will be dependent on cultivating favorable public opinion regarding such restoration and maintaining these crucial habitats and corridors. If these difficult tasks can be accomplished, North Dakota may restore a residual breeding population of these charismatic carnivores, and provide a model to other Great Plains states facing similar natural recovery issues.

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AZA Species Survival Plan© Profile: De Brazza's Monkey

Curtis Eng

The American Zoo and Aquarium Association (AZA) currently sponsors 84 Species Survival Plans (SSPs), programs that manage captive populations of endangered and threatened animals. One SSP, however, was awarded to a species not yet officially listed–the De Brazza's monkey (*Cercopithecus neglectus*). Unlike many programs whose immediate goal is to prevent extinction, the De Brazza program is proactively working to prevent future need for drastic down-to-the-wire conservation.

The De Brazza's monkey is one of the most unusual species in a group of old world monkeys commonly known as guenons (Nowak 1991; Macdonald 1993). De Brazza's monkeys, also known as swamp monkeys, are primarily found in flooded forests and swamps throughout equatorial Africa. Though good swimmers, De Brazza's are considered arboreal, spending 70% of the time in the understory and 20% on the ground (Gautier-Hion 1988). Unlike other primates, De Brazza's rarely use group calls, and social alarm calls are absent (Maté et al. 1995). Not only are they the only species of guenon that does not respond to alarm calls of other monkey species, they actively avoid any contact with other animals. In rare encounters that do occur, they utilize predatory behaviors of silence and concealment (McGraw 1994). Only when fully threatened will males shake branches and bark to divert attention from the group (Gautier-Hion 1988).

Their diet is omnivorous, primarily consisting of fruits and seeds with supplements of leaves, arthropods, flowers and mushrooms (Staaden 1996). Once a food source has been located, they will visit the source repeatedly, resulting in not even a half-eaten fruit being left behind (Rowe 1996). On occasion, however, they will also eat small birds and mammals (personal observation).

Generally believed to be polygamous, there have been reports of monogamous behavior in certain troops. In the late 1970's, Gautier-Hion and Gautier (Gautier-Hion 1988) investigated a colony in Gabon, finding small, intimate groups of three to four members, consisting of a male, female, and their offspring–a social grouping indicative of monogamy. In contrast, troops in Kenya have been documented to number up to 16 members with a dominant male and several females–a social structure indicative of polygamy (Wahome 1993).

In addition, De Brazza's are strongly sexually dimorphic. On average, males reach 7.8. kg and females 4.5 kg (Nowak 1991). Males become sexually mature at 4 years of age but do not generally breed until 6-8 years. Females mature at 3 years and breed at 4-5 years. (Brennan 1989; Harvey 1985). There is generally a single offspring, although twins have rarely occurred. The gestation period lasts between 177 and 187 days with an interbirth interval of 12 months (Brennan 1989).

As with most other species, human intrusion is the primary threat to the De Brazza's monkey's survival. Agricultural needs, hunting, logging and living space requirements for a growing human population have resulted in fragmentation of the De Brazza's limited primary habitats. In addition, low fertility rate and high infant mortality make it difficult for De Brazza's to

De Brazza's monkey. Photograph by Curtis Eng.

respond to strong anthropogenic forces (Brennan 1989). Approximately 23% of females and 20% of males die before reaching one year of age (Staaden 1996).

Because of superior hiding tactics, population counts are difficult in the wild (Wolfheim 1983). Quris (1976) estimated an approximate population density of 28 De Brazza's monkeys per square kilometer in Gabon, and the CBSG IUCN/SSC Supplement to Global Captive Action Plan for Primates suggested over 100,000 *C. neglectus* in Africa (Discussion Edition, 15 September 1991). The World Conservation Union (IUCN) gives the De Brazza's monkey a conservation rank of 3 out of 6, with Degree of Threat rated as 1 (i.e. low risk of extinction at present time) and Taxonomic Distinctiveness rated as 2 (i.e. no more then one close relative). It is considered an Appendix II species as defined by the Convention on International Trade in Endangered Species (CITES), while the U.S. Fish and Wildlife Service has not listed this species (Staaden 1996).

Cooperative management of the North American captive population of De Brazza's Monkey began in 1996 with the publication of the first regional studbook. In December of that same year, the AZA approved a petition to manage this species under an SSP. In August 1997, the De Brazza's monkey management team met to determine specific breeding recommendations in an effort to slow the loss of genetic diversity that occurs naturally, over time, in populations of limited size.

As of June 1995, the International Species Information System (ISIS) listed 208 captive De Brazza's monkeys located at 58 institutions throughout the world. The known number of wild-born founders, however, is only 12. Unfortunately, there is a large number of unknown animals at various institutions that are probably wild-born, yet cannot be included as founders. Without the inclusion of these individuals, the captive population has a relatively low Founder Genome Equivalent (FGE) (3.910). If all unknowns were assumed to be wild-born, the FGE would jump dramatically to 21.869. In addition, the SSP committee has calculated an effective population size (Ne) of 31.5, and a mean inbreeding coefficient of 0.035. Using a breeding strategy based on mean kinship values, 15 pairings were recommended from the 85 animals considered for breeding. The group's goal was to maintain at least 90% genetic diversity for 100 years (Staaden 1996). Unfortunately, there has been minimal reproductive success in captivity. Unlike wild females, who have on average produced approximately 2.45 offspring each, the average female in captivity has produced only 1.69 offspring (Brennan 1989).

Relative to other big interest animals, such as gorilla, chimpanzee and elephant, little research has been conducted on the basic biology and husbandry of this animal. Areas of needed research include: 1) accurate assessment of the size of wild populations, 2) further investigation and differentiation of varying colonies of De Brazza's monkeys, 3) evaluation of nutritional requirements, and 4) determination of ways to increase reproductive success in captivity. The development of a De Brazza SSP, however, is an important step for increasing awareness and interest in these unique primates.

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NEWS FROM ZOOS

Rare Maned wolf puppy debuts at the Los Angeles Zoo nursery

Savannah, a female South American maned wolf puppy (*Chrysocyon brachyurus*), is an unusual animal with an unusual companion–Elsa, a yellow Labrador retriever from Guide Dogs of America. The canine duo were hand-raised together in the Los Angeles Zoo nursery, and made their official debut in April.

Maned wolf pup with yellow Labrador retriever companion. Photograph by Tad Motoyama, courtesy of Los Angeles Zoo.

Savannah is the first maned wolf born in a U.S. zoo this year. She is the first pup for a three-year-old female from the Fossil Rim Wild Life Center in Glen Rose, TX and male from the Baton Rouge Zoo. When her mother was not able to care for her (common in first-time litters), Elsa was brought in to help the lone wolf pup learn how to be a canine. "Although providing a companion of the same species has been done before at zoos, this is the first time that a potential guide dog has been raised with a wolf puppy," said Mammal Curator Michael Dee. "Kelley Greene, an animal keeper in the Zoo nursery, also volunteers for Guide Dogs of America. A litter was born two days after the maned wolf, and she thought one of the puppies would make a good companion for the lonely wolf."

There are approximately 75 endangered maned wolves in North American zoos. Adult females come into heat once a year, and after a gestation of 60 to 66 days give birth to a litter of one to five pups. At birth, pups weigh a few ounces. Fully grown, they weigh 5O pounds and have a life expectancy of l2 to l6 years. Maned wolves are nocturnal and solitary by nature. In the wild they eat birds, small reptiles, insects, mammals, honey, plants, and assorted fruits. They are native to the grasslands of central and eastern Brazil, eastern Bolivia, Paraguay and north eastern Argentina. Their long legs elevate them so they can spot prey in the tall grass and run through the grass to catch their prey. Their longer hind legs facilitate climbing up hills; running down a hill is not as easy. In the wild this can be a deadly disadvantage, when poachers chase them downhill.

Endangered Gorillas born at Woodland Park Zoo

Woodland Park Zoo welcomes the arrival of two endangered Western lowland gorillas (*Gorilla gorilla gorilla*): a female born to 12-year-old Jumoke (Juh-MOH-kee) and 19-year-old Vip on January 3, and another female born to 28-year-old Amanda and Vip on March 18. They are significant for the Gorilla Species Survival Plan© (SSP) because Amanda is a founder animal and Vip's only other relative in North America is his 33-year-old mother. These combined circumstances make the baby gorilla's genes particularly valuable. This is the seventh successful gorilla birth at the Zoo.

Amanda is on long-term loan to Woodland Park from the Toronto Zoo and arrived in Seattle four years ago. Captive born in the Netherlands, Vip arrived from Franklin Park Zoo, Boston, in October 1996. In addition to Vip's gorilla group, the zoo has a second group: a 30-year-old female; 30-year-old male; 7-year-old female; and 2-year-old female. The youngest, Jumoke's first offspring, was hand raised by Zoo staff and volunteers. She was eventually introduced to the Zoo's other gorilla group with whom she successfully socialized.

Information for News From Zoos *is provided by the American Zoo and Aquarium Association.*

Recent Publications

Potions, Poisons, and Panaceas: An Ethnobotanical Study of Montserrat

by David Eric Brussell. 1998. Southern Illinois University Press. 176 pp.

David Eric Brussell has compiled a unique ethnobotanical catalog of flora found on the Caribbean island of Montserrat. *Potions, Poisons, and Panaceas* is full of rich information about the plants and the role they play in Caribbean culture, economy, history and folklore.

Fire Effects on Rare and Endangered Species and Habitats

Proceedings of a Conference Held at Coeur d'Alene, Idaho, November 13-16, 1995. 250 pp.

At this conference, nearly 50 papers were given dealing with all aspects of the ecology and management of rare and endangered species with respect to fire. The papers focus on the effects of post-fire rehabilitation and reseeding, the effects of fire suppression and prescribed burning, economic impacts of rare species management, and individual species studies (including northern spotted owl, California gnatcatchers, and more).

Primates

by Barbara Sleeper. 1997. Chronicle Books. 176 pp.

Barbara Sleeper, joined by photographer Art Wolfe, beautifully describes and illustrates over 100 species of primate. *Primates* invites us to share the unique world of these animals, both biologically and visually.

Edible and Medicinal Plants of the West

by Gregory L. Tilford. 1997. Mountain Press Publishing Company. 238 pp.

Edible and Medicinal Plants of the West is a full-color, photographic guide to the identification, edibility, and medicinal uses of over 250 plant species ranging from California to the Great Lakes. Tilford provides a thorough introduction to the world of herbal medicine for everyone interested in plants, personal well-being, and a healthy environment.

New England's Mountain Flowers: A High Country Heritage

by Jeff Wallner & Mario J. DiGregorio. 1997. Mountain Press Publishing Company. 221 pp.

Exploring 85 of New England's rarest mountain flowers, Wallner and DiGregorio describe the lore of each flower in both natural and human history. *New England's Mountain Flowers* delves into plant survival strategies, ecology, and threats to the habitats of mountain flora.

In the Dust of Kilimanjaro

by David Western. 1997. Island Press. 250 pp.

In the Dust of Kilimanjaro is the story of one man's true struggle to protect Kenya's wildlife. In this autobiography, conservationist David Western presents a history of African wildlife conservation and an intimate glimpse into his life as a global spokesperson and one of Kenya's most prominent citizens.

The Science of Conservation Planning: Habitat Conservation Under the Endangered Species Act

by Reed F. Noss, Michael A. O'Connell, and Dennis D. Murphy. 1997. Island Press. 272 pp.

In *The Science of Conservation Planning*, Noss, O'Connell and Murphy explore the role of the scientists in the planning process and present a framework and guidelines for applying science to regional habitat-based conservation planning. Topics of discussion include history and background of planning efforts, principles of conservation biology that apply to conservation planning, and specific recommendations for all parties involved.

The Evolution of National Wildlife Law, Third Edition

by Michael J. Bean and Melanie J. Rowland. 1997. Praeger Publishers. 568 pp.

Two decades after its first publication, this book remains the standard reference for anyone seeking to understand the statutes, regulations, and court decisions governing wildlife law. Topics include species conservation; wildlife, land, and water issues; and intergovernmental wildlife conservation.

Crane Music: A Natural History of American Cranes

by Paul A. Johnsgard. 1998. University of Nebraska Press. 136 pp.

Paul Johnsgard is an authority on crane biology and behavior. In *Crane Music*, he describes the seasonal migrations, natural habitats, breeding biology, call patterns, and mating behaviors for the sandhill crane and whooping crane, as well as the birds' importance in religion and mythology.

You do interesting work!
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The *Endangered Species UPDATE* is designed and published as a forum for information exchange on endangered species issues. The *UPDATE* welcomes articles related to species protection in a wide range of areas including, but not limited to, research and management for specific endangered or threatened species, theoretical approaches to species conservation, policy and legislation related to species conservation, and strategies for habitat protection and preserve design. In addition, book reviews, editorial comments, and announcements of current events and publications are welcome.

The *Endangered Species UPDATE* accepts several kinds of manuscripts. These include:

1. Feature Article—on research, management activities and policy analyses for endangered species, theoretical approaches to species conservation, and habitat protection. Manuscripts should be approximately 3000-4000 words with abstract.
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Manuscript Submissions and Specifications

The manuscript should be submitted on a disk or by e-mail. Regardless of how you submit the manuscript, please send us a hard copy, a short author's byline, a daytime phone and fax number and an e-mail address. If you are using Microsoft Word for Macintosh or WordPerfect, please save as version 5.1. For other programs, save the the document in a rich text format (RTF). Send disks and hard copies of the manuscript to Editor, Endangered Species UPDATE, School of Natural Resources, University of Michigan, Ann Arbor, MI 48109-1115. If submitting by e-mail, please send as an attachment to esupdate@umich.edu.

Photographs, Illustrations, and Other Visuals

Photographs, line drawings, and other graphics are encouraged. The issue is printed in black and white so black and white prints are preferred. Any color prints should be chosen with the final black and white print in mind (i.e., no photos that rely on color for contrast). We can also accept slides. Copyrighted material must include written permission for use in the *UPDATE*, signed by the copyright holder. The author's and photographer's name should be written on the back of all photos. Computer-generated illustrations should be produced on a 600 dpi laser printer. In the case of all photographs and illustrations, a caption should be included, and they should be clear enough to be reduced 50 percent.

Citations, Acronyms, etc.

Literature citations in the text should be as follows: (Buckley & Buckley 1980b; Pacey 1983). The Literature Cited section must be typed and follow the format used in the journal Conservation Biology. For example:

Balmford, A., N. Leader-Williams, and M. J. B. Green. 1995. Parks or arks: where to conserve large threatened mammals? Biodiversity and Conservation **4**:595-607.

For other abbreviations and details consult the Editor.

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Bulletin Board

Rain Forests on Fire

In October, 1997 massive fires burned in Brazil and Southeast Asia destroying the habitats of some of the world's most diverse animal and plant assemblages. In southeast Asia, over two million acres burned, causing a thick, yellow haze that also risked the health of millions of humans; in Brazil the number of destructive fires increased by 28% in 1997, causing an urgent need for international action to conserve the world's dwindling rain forests.

A recent report, Rain Forests on Fire: Conservation Consequences published by World Wildlife Fund, recommends four key actions by governments and the private sector to help prevent future disasters. They are: 1) banning the use of fire for clearing land and preventing the conversion of diverse natural forests to single species plantations; 2) strengthening forest protected areas to include at least 10% of each forest type in effectively managed protected areas; 3) scaling back or halting the massive logging concessions planned for Borneo and the Amazon and Congo Basins; and 4) encouraging forestry operations to follow strict environmental and social guidelines such as those set out by the Forest Stewardship Council.

The report can be obtained from the World Wildlife Fund, Global Forest Program, 1250 Twenty-Fourth Street, NW, Washington, DC 20037-1175; Tel.: (202) 293-4800.

Rainforests: Past and Future

April 24-27. The Cooperative Research Centre for Tropical Rainforest Ecology and Management and the Smithsonian Tropical Research Institute announce an exciting conference, "Rainforests: Past and Future", which will be held at James Cook University, Queensland, Australia. The symposium will bring together scientists researching across a range of disciplines to discuss the origin, maintenance and conservation of tropical forest communities. Registration is $300. For more information, contact: Kerry Moore, Conference Organizer, Cooperative Research Centre for Tropical Rainforest Ecology and Management, P.O. Box 6811, Cairns 4870 QLD Australia; Tel.: 61 7 40421254; Fax: 61 7 40 421247; E-mail: kerry.moore@jcu.edu.au.

Directory for Medicinal Plant Conservation

The Directory for Medicinal Plant Conservation is now available on the Internet. The directory includes 139 medicinal plant projects and institutions, based on more than 80 countries worldwide, which are characterized by their status, objectives, activities, geographic interest, databases, publications, funding resources, and contact address. The searchable database can be accessed at http: //www.dainet.de/genres/mpc-dir.

Announcements for the Bulletin Board are welcomed. Some items from the Bulletin Board have been provided by Jane Villa-Lobos, Smithsonian Institution.

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