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Proceedings of the National Petroleum Reserve - Alaska Raptor Disturbance and Mitigation Workshop

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February 2-3, 1999
Fairbanks, Alaska

Cover photos:

Top: Peregrine Falcon

Center: Rough-legged Hawk

Bottom: Bluffs along the Colville River, Alaska

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**Proceedings of the
National Petroleum Reserve-Alaska
Raptor Disturbance and
Mitigation Workshop**

February 2-3, 1999
Fairbanks, Alaska

*Edited by David A. Yokel
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Fairbanks, Alaska 99709

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INTRODUCTION

Purpose

In August 1998, the Bureau of Land Management (BLM) completed a Final Integrated Activity Plan/Environmental Impact Statement (EIS) for the Northeast National Petroleum Reserve - Alaska (NE NPR-A). A Record of Decision (ROD) for the plan was issued in October 1998. That decision included a statement saying BLM would develop, in cooperation with adjacent landowners, a Colville River Management Plan to address subsistence, wildlife, recreation, paleontology and other issues. Prior to beginning this plan, the BLM would conduct a raptor workshop to consider not only oil and gas development, on which the EIS focused, but also the entire spectrum of activities in NE NPR-A that may affect raptor population status or trends. The intent of the workshop would be to empanel nationally recognized experts in raptor management to review the scientific literature on disturbance to raptors and identify potential additional mitigation measures. Any such measures that result from this workshop and are accepted by the BLM would be immediately relevant to the area of NE NPR-A, and they would serve as a framework for raptor protection in all of the Colville River Special Area (CRSA) as well as guidance for raptor protection throughout the NPR-A (Figure 1).

Agenda

I. Purpose of workshop. (Dave Yokel) See above.

II. Overview of raptor use of the NPR-A. (Ted Swem and Bob Ritchie)

This presentation focused on NE NPR-A and the CRSA. It established why this area is important to raptors, and in what stages of the life cycle. The potential adverse impacts of human activities to raptors and their habitat were described.

III. Overview of the BLM's ROD for NE NPR-A EIS. (Dave Yokel)

This presentation covered the plans for oil/gas lease sales and all current stipulations relevant to raptor conservation.

IV. Literature review.

Panelists reviewed past studies of raptor disturbance and applied them to the situation in NE NPR-A.

V. Impacts to the NPR-A's raptor populations.

The panel discussed impacts likely to affect raptors in the NPR-A, despite restrictions and stipulations applied through the ROD. The panelists addressed the difficulty in quantifying these impacts.

VI. Formulate additional stipulations.

The panel suggested additional stipulations or restrictions on authorized activities that could be implemented to provide additional protection to raptors while still allowing those other activities.

VII. Analysis of residual impacts.

The panel assessed residual impacts and environmental risks that would remain after implementing existing and new stipulations and restrictions.

VIII. Additional Raptor Studies Needed.

A program of study that would be necessary to assess the future health of raptor populations in the NPR-A and the efficacy of management efforts directed at raptor conservation was described.

Attendees

Panel Members:

Skip Ambrose, U.S. Fish and Wildlife Service (USFWS)

Jim Bednarz, Arkansas State University

Mike Kochert, U.S. Geological Survey, Snake River Field Station

Bob Ritchie; ABR, Inc.

Ted Swem, USFWS

Figure 1. The National Petroleum Reserve - Alaska, with the Northeast Planning Area and the Colville River Special Area.

Robert Suydam, North Slope Borough (NSB), Department of Wildlife Management

Kim Titus, Alaska Department of Fish and Game (ADFG)

Clayton White, Brigham Young University

BLM Staff:

Herb Brownell, facilitator

Dan Gullickson, support

Sharon Wilson, support

Dave Yokel, workshop organizer

Audience:

Andrew Cassel, TV Fox 7 Prime News

Ross Coen, Northern Alaska

Environmental Center

Mark Hanley, Anadarko Petroleum Corporation

Mike Joyce, ARCO

Philip Martin, USFWS

John Wright, ADFG

PRELIMINARY INFORMATION

Raptor Use of the Colville River (Ted Swem)

The North Slope of Alaska is an area comparable in size to the state of Idaho, but includes only eight villages totaling about 6500 residents. The North Slope can be divided into three physiographic provinces: the *arctic coastal plain*, the northernmost, is very flat and characterized by a lot of standing surface water; the *foothills* province is rolling terrain characterized by fairly continuous tussock-sedge and dwarf-shrub tundra; and the *Brooks Range* is the southernmost and mountainous.

The Colville River, which makes up much of the eastern boundary of the NPR-A, rises in the Brooks Range and crosses through the other two provinces on its way to the Beaufort Sea. It is the North Slope's largest river both in terms of length and total watershed area. For most of its length, the Colville bisects the foothills province, affecting the for-

mation of the landscape in its vicinity. The meandering river and its oxbows create cliffs and huge expanses of gravel and sand alluvium in an otherwise nearly continuous landscape of tussock tundra. Medium-height shrub communities exist on cliff tops and in stringers down the sides. Tall shrubs (willows and alders) grow along alluvial areas. The increased diversity of habitat types created by the river results in an increased diversity and abundance of bird species around the river and its associated ponds and shrubs. Of special note are several species of passerines, but ptarmigan, waterfowl, jaegers, plovers and other shorebirds are also present.

The character of the bluffs changes throughout the river's length. At the upriver end there are many rocky outcrops and ledges, but each is small with room for only one pair of nesting raptors. These outcrops are typically separated by several miles. Bluffs remain as isolated outcrops all the way to Umiat, but after Killik Bend they exist as series of cliffs on both sides of the river. Some are large enough for several pairs of raptors of different species. A significant change in the terrain occurs near Umiat. Downstream of there the bluffs occur only on the left bank (left-hand side when facing downstream), become largely unconsolidated dirt, are much longer and higher, and are steep-faced with triangular-peaked tops. Here the raptors nest on the tops and along ridges forming the triangular peaks; the steep bluff faces have no ledges or other suitable nesting platforms. Farther downriver, triangular peaks become smaller and almost disappear into a vertical face. At Ocean Point, the height of bluffs decreases to become unsuitable as cliff-nesting habitat.

Overall, the cliffs of the Colville River support a phenomenal concentration of nesting raptors. Studies of these populations began in 1952 and continued intermittently until 1978, after which they were conducted annually. The species of note are the arctic peregrine falcon (about 60-65 pairs), gyrfalcon (highly variable numbers of 8-26 pairs) and rough-legged hawk (about 100 pairs). This diverse

and high-density community of raptors is matched at few other places on earth. Clearly, this area is of global importance to raptor conservation.

Peregrine falcons prey on most species of migratory birds in the area. As a result they were affected by pesticides, especially DDT, when it was used more heavily in the southern ranges of these migrant prey species. Gyrfalcons select different prey, including ptarmigan and ground squirrels, which are resident year-round and were never exposed to DDT. Gyrfalcon populations never declined as did peregrines. Similarly, rough-legged hawks prey almost entirely on rodents, which are also resident. However, these hawks migrate in the non-breeding season to temperate areas where their prey could be exposed to pesticides. Nonetheless, their population along the Colville River did not suffer the declines observed in peregrine falcons.

About three-quarters of gyrfalcons nest under overhangs, because they begin egg-laying during cold weather in April or May and need the thermal protection. Such cliffs are relatively rare on the Colville. Rough-legged hawks initiate laying near the end of May, nest on open, rocky bluff faces, and build nests of sticks. Peregrine falcons lay their eggs in the beginning of June and nest in the open, often on bare dirt, but occasionally may use abandoned rough-legged hawk nests.

The abundance and diversity of nesting raptors along the Colville is limited by suitable nesting sites and availability of prey. Basically, wherever there is a cliff with an appropriate substrate, there will be one or more raptor nests. The spacing between nests is related to the species involved. Generally, individuals are more tolerant of close nesting proximity with heterospecifics than with conspecifics.

Do these monitoring surveys cause disturbance reactions by raptors that decrease their reproductive success? Data for rough-legged hawks has been examined to address this by

comparing nests that were visited on both the first and second trip of the year with those visited only on the second trip. There was no statistically significant difference, but there was a slight trend suggesting that disturbed nests were less successful. However, this monitoring program usually involved at most a single disturbance per nest per year, nests were never disturbed for more than 70-80 minutes, and no monitoring was done in inclement weather. Disturbances that are repeated, of longer duration, during adverse weather, late in the nesting cycle, or of multiple events would be more harmful.

One significant cause of nest failure results when cliff faces slough off, which sometimes destroys nests. About one-fourth of the nest failures observed during surveys were due to such cliff erosion. Would extraction of gravel from the river bed for development make this situation worse?

As the number of peregrines has increased over the last 25 years, this species is ranging farther out for prey, with incidental observations suggesting out to at least six miles on both sides of the river. In earlier surveys, females remained at the nest. Now females are hunting more. Frequently, during the entire length of the biologist's nest visit, the male peregrine won't be seen and sometimes there are no adults. The average number of young fledged per nest has decreased, which may reflect a depressed prey base due to increased numbers of foraging falcons.

Raptor Use of the NPR-A, and Human Impacts to Raptors on the North Slope (Bob Ritchie)

Outside of the Colville River corridor, raptor densities in the NPR-A are much lower. However, this is a vast area and overall it still contains a significant number of birds. The coastal plain, being very flat, has very little habitat for cliff-nesting raptors, although occasional pings (dome-shaped rises caused by below-

ground frost action) may attract them. Snow in early summer may also discourage raptors from nesting. In the few locations where rivers create sandy bluffs of sufficient height, some golden eagles, rough-legged hawks and peregrine falcons may nest. The coastal plain is much better known for its use by waterfowl and shorebird species.

Farther south, in the northern foothills province with its vast expanses of tussock tundra habitat, there are no rock outcrops and again very little cliff-nesting habitat. This area is used by golden eagles, mostly subadults, that are not breeding. Yet in some areas, rivers (e.g. Ikpikpuk River) create low bluffs in mud and silt, and provide nesting habitat for peregrines and golden eagles. In some areas of stabilized sand dunes, bluffs are 75 to 100 feet high. The only exposed rocks are at the heads of creeks where some gyrfalcons and golden eagles may be found.

In the southern foothills, raptor cliff-nesting habitat in the form of river bluffs is more abundant. Peregrine falcon density has greatly increased in this region over the last 20 years. In the mountains of the Brooks Range, golden eagles enter the picture as a dominant breeding species. Finally, an unusual habitat occurs in rare instances in mountain river valleys, where groves of poplars provide a very limited substrate in which some gyrfalcons use stick nests of other species.

Impacts that humans have on raptors can at times be positive, especially when humans create nesting habitat where it is otherwise absent. On the coastal plain in areas of current development, some raptors now nest on buildings and pipelines. However, along with these artificial nesting substrates come new dangers, such as collisions with vehicles or power lines, and incineration in flare pits. Some mortality from these causes, although only a few cases, has been documented in the Prudhoe Bay oil fields.

Loss of habitat that will occur with oil and gas

development is another negative impact. Long-term habitat change occurs when gravel is placed on top of tundra for drilling and building pads. Flooding along some roads causes impoundments on one side and drying of the tundra on the other. Roads also cause dust that affects vegetation. These types of habitat changes can reduce or alter the prey base. Also, predation on raptor nests may increase as gulls, foxes and bears are attracted to areas of human development.

Perhaps the most serious impact to raptors would be disturbance causing nest abandonment or failure, and possibly reduced reoccupancy of sites in following years. Activities of seismic, geological and maintenance crews, depending on when they occur, can disturb raptors. Subsistence and recreational users can have the same effects. There has been increased traffic (rafts, jetboats and airboats) on the rivers. Increased human presence may lead to illegal shooting of raptors, but there has been no evidence of this along the Colville River. Finally, low-flying aircraft are known to cause disturbance at nests.

The BLM's Plan and Record of Decision for NE NPR-A (Dave Yokel)

The Naval Petroleum Reserves Production Act of 1976 (NPRPA) gave the Secretary of the Interior the authority to designate special areas within the NPR-A to protect certain surface resources during petroleum exploration. One of the three areas designated the following year was the Colville River Special Area, noted for its importance to cliff-nesting raptors.

In 1997, the BLM announced it would develop a plan to allow oil and gas lease sales in NE NPR-A, an area of about 4.6 million acres, bounded on the east by the Colville River. Approximately one-third of the CRSA (the lowest reaches) is within this planning area. The ROD for this plan states that all of the area along the Colville River within the NE

NPR-A (including cliff-nesting habitat) will be offered for petroleum leases.

During the planning effort, a "land use emphasis area" (LUEA) was described for that area most important to raptors: the Colville River and two of its tributaries, the Kikiakrorak and Kogosukruk Rivers (Figure 2). This LUEA extended one mile from the river bluffs or banks, except that it extended only from the left bank in the case of the Colville River. The Colville River's bed and the lands extending out from the right bank are owned by the State of Alaska or the Arctic Slope Regional Corporation (ASRC). Another LUEA was described extending one-half mile from the right bank of the Ikpiukuk River (Figure 2). This area was meant to protect subsistence activities, but its associated development restrictions would indirectly benefit raptors. Under the stipulations set forth in the ROD, permanent oil and gas facilities will be prohibited within these two LUEAs.

Other stipulations prohibit pesticide use throughout NE NPR-A and restrict aircraft and motorized ground-vehicle use near most cliff-nesting habitat. Appendix A presents the complete wording of stipulations in the ROD that are directly related to raptor protection. In addition, the CRSA is to be expanded to include the Kikiakrorak and Kogosukruk Rivers, and permanent roads connecting any part of the NE NPR-A to a road system outside NE NPR-A are prohibited.

These decisions represent mitigation that arose during the EIS process to protect raptors from human activities the BLM will permit in NE NPR-A. The remainder of this workshop should explore the need for, and describe, additional mitigation.

LITERATURE REVIEW

During this portion of the discussion, it was envisioned that panel members would review relevant studies from outside the NPR-A for

types of disturbances to raptors, impacts of those disturbances, types of mitigation applied, and results of that mitigation. The purpose for this is that very little such study has been done within the NPR-A (e.g. Haugh, 1982). From there the panel would have determined which of these studies, in whole or in part, were relevant to the situation in the NPR-A. This would be the basis for suggesting necessary, effective mitigation measures for the impacts that could be expected.

However, few appropriate data have ever been collected under circumstances ecologically similar to the NPR-A and the discussion that ensued did not follow this model. Rather than stating explicitly the knowledge gained from individual past studies, the available information was implicit in recommendations made by panelists later in the agenda. The main two points made from review of past studies were that raptor reproduction can be depressed by either disturbance in the vicinity of nests or by the reduction of foraging habitat. There was also discussion about whether foraging habitat closer to nests was of greater value than that farther away. There were no specific studies to reference for this, but optimal foraging theory clearly demonstrates that profitability of food increases with decreased energy expended for travel to foraging sites or for transport of prey (Orians and Pearson, 1979). Hegner (1982) provides some tests of this theory with data on an avian species. The basic principles and predictions of central-place foraging theory should also apply to raptors and thus it follows that foraging habitats closer to nests are of greater value to raptors than those of equal prey value farther from nests.

Those publications and reports that were referenced by panelists are included with a more complete list under "Suggested References" below. Many of these are from Alaska outside of the NPR-A, with several more from western Canada, Idaho, New Mexico and other areas in the Lower 48 states.

Figure 2. The Colville River Raptor, Passerine and Moose Land Use Emphasis Area.

LIKELY FUTURE IMPACTS TO RAPTORS IN THE NPR-A

Of all current or possible future human activities in the NPR-A, oil and gas exploration and development may have the greatest potential for impacting raptors and other surface resources. For this reason, these activities were given the greatest attention in the NE NPR-A EIS. They again received considerable effort in this workshop, but it was recognized that several other potentially adverse activities also occur. Panelists tried to develop a comprehensive list of potentially adverse activities:

- geological surveys by helicopter (summer)
- archaeological surveys, by boat or helicopter
- biological surveys, by boat or helicopter
- paleontological surveys, by boat or helicopter
- sand and gravel extraction
- guided hunting
- guided recreation (boating, ecotours, etc.)
- non-guided hunting, whether recreational or for subsistence
- non-guided recreation
- recreational flying of small fixed-wing aircraft
- falconry

When these activities occur on BLM-administered lands, the BLM has authority to permit the first seven activities listed above or is co-operatively involved when surveys are done by other agencies. In either case, the BLM may apply restrictions on how they are conducted. However, the BLM has no authority to manage the last four activities on the list. Recreational flying, or any other aircraft use not associated with a BLM permit for land use, is regulated by the Federal Aviation Administration. Falconry and non-guided hunting are regulated by the Alaska Board of Game and the Federal Subsistence Board, but these regulations concern harvest limits and do not address their disturbance to raptors.

In addition, where the Colville River is the boundary of the NPR-A, the legal boundary

is the highest high-water mark on the left bank. The river itself and most or all of the gravel or sand bars along it are outside BLM-administered lands (owned by the State of Alaska or ASRC) and beyond BLM authority. Any research survey, guided hunting or guided recreation by boat along the river could potentially occur without requiring a BLM permit as long as the use did not extend above the highest high-water mark on the left bank. Nevertheless, these uses could still have impacts on raptors nesting on the cliffs above.

With the above list of activities, and then including oil and gas exploration and development, the panel developed a list of all impacts to raptors or their habitat that might occur. The list was divided into higher and lower priority for panel discussion based primarily on the relative potential for adverse impact to raptors, and secondarily on the ability of the panel to suggest some effective, additional mitigation. Since raptors are dependent on these cliff habitats in the NPR-A only during the breeding season, and most raptors migrate south for the remainder of each year, most of the impacts below would affect raptor populations through reduced reproductive success. However, a few could influence adult survival.

Higher priority:

Impacts to raptor behavior through disturbance:

- aircraft of all types
- research survey activity (geology, archaeology, paleontology, biology) on foot near or under bluffs
- recreational boating, backpacking or camping near nests
- hunters camping and scouting for game on cliff tops
- longer-term camping associated with research surveys
- construction activities
- hazardous materials clean-up activities
- road development indirectly increases disturbance through greater access for people

Lower priority:

Impacts to raptor behavior through disturbance:

- human presence at developed facilities that have created raptor nesting habitat
- seismic exploration in the vicinity of nests

Impacts to raptor habitat:

- covering habitat with sand or gravel for pads or roads
- erosion of nest bluffs due to sand or gravel mining
- contaminants, e.g. oil spills, old barrel caches
- seismic exploration trails and ice road construction: physical impacts to vegetation and soils, possibly affecting prey base
- facility development resulting in increased perches or nest sites

Impacts to raptor populations through increased mortality:

- illegal shooting or capture of raptors
- increased predator populations (gulls/foxes/bears) attracted to human garbage
- hazards to raptors at developed facilities, e.g. trash, accidents with power lines or vehicles

DEVELOPMENT OF MITIGATION MEASURES

Population Objective

The panel felt uncomfortable with suggesting additional restrictions on human activities without having a stated objective for the raptor populations that are meant to benefit from these measures. They asked the BLM what that objective was.

The fiscal year 1981 Appropriations Act for the Department of the Interior directs the Secretary of the Interior to provide maximum protection of surface resources during petroleum exploration and development within any of the NPR-A's three special areas. To do this,

the Secretary is directed to apply any conditions, restrictions and prohibitions deemed necessary or appropriate to mitigate reasonable, foreseeable and significantly adverse effects. The Secretary signed a ROD for NE NPR-A, implementing all manners of protection that were deemed necessary and appropriate as a result of the EIS process. However, the Secretary also directed the BLM to hold a workshop of raptor experts to see if there should be any additional protection for raptors, and to develop a cooperative plan for the Colville River Special Area. The Secretary has delegated to BLM his authority for choosing additional protection recommended during this workshop. The panel was encouraged to set its own objective for raptor populations and then suggest adequate protection to meet that objective. It would then be up to the BLM to decide on the use of any suggested mitigation in light of management, legal and political constraints.

The BLM is primarily tasked with habitat management rather than population management, and as a result does not have clearly defined population goals for any animal species. The objectives of maintaining healthy or sustainable populations can be found in some of the relevant laws that provide the BLM's mandate. The Endangered Species Act provides very clear direction to the BLM for species listed, so the agency's objective for species that have not been listed (or recently delisted as with the Arctic Peregrine Falcon) is to conserve their populations to at least a level at which no reasonable petition could be submitted to have them listed as threatened or endangered.

The panelists agreed that merely maintaining raptor populations above the listing level was not adequate. However, there was some debate about whether they, as scientists, should be involved in setting population goals. This might involve more advocacy than science. Nonetheless, conversation continued toward an objective for raptor populations along the Colville River. The Snake River Birds of Prey

Management Plan (USDOI, BLM, 1995), with its habitat and population conservation, protection and enhancement goals, was suggested as a good example of what could be done for the NPR-A.

Could the Colville raptor populations be reduced from what they are now and still be considered satisfactory? If the population is either reproducing at some level or is recruiting from other areas, would that be adequate? If population levels decline, is the population as healthy? Is it going to be as resistant to disturbance? What is the lowest number of peregrines for a viable population? The panelists did not think it possible to provide scientific evidence that guarantees all of their suppositions. They could provide a few studies and expert opinions, but where would the burden of proof be? The panel wasn't even sure that with major funding and studies the answers could be obtained.

Despite these uncertainties, the panel agreed on an objective to guide their efforts in developing mitigation measures in addition to those the BLM established in the ROD. The panel's stated objective for Colville River raptor populations was to *maintain current, documented population and productivity levels*. This objective would require that no downward trend from the current population levels should occur as a result of activities permitted by the BLM or from other activities on BLM-administered or surrounding lands.

Mitigation and Residual Impacts

Impacts to Raptor Behavior through Disturbance:

Disturbance of nesting raptors can have serious adverse impacts on reproductive success. Every time a disturbed adult leaves the nest, it causes an impact. The adult expends energy that could otherwise be used in maintenance of itself or in the care of young. Nestlings are left unprotected from the weather and predators. These impacts are cumulative,

and can result in higher mortality of young raptors or even complete nest failure.

The reactions of raptors to human disturbance varies within and among species. Some individual birds react to none but the closest disturbances and others may habituate to disturbance. Along the Colville River, rough-legged hawks generally display more vocal distress in reaction to disturbance than peregrines or gyrfalcons. Disturbed gyrfalcons may fly up to three miles away from the nest. The permanent impacts of these reactions are not quantitatively known, nor is it known if such impacts are significant at the population level. Generally, the worse the weather, the less the reaction by a disturbed bird. Conversely, the worse the weather, the more danger to eggs or young birds whose parent leaves the nest, allowing them to chill.

Many studies have documented disturbance by aircraft, and all types of aircraft cause some level of disturbance. Overall, aircraft represent a major problem, but the BLM's stipulation requiring aircraft to maintain an altitude of at least 1500 feet above ground level (AGL) when within one-half mile of cliffs identified as raptor nesting sites is probably adequate. The problems associated with this stipulation are: ensuring that pilots understand AGL means above nest level, not above the river; how to enforce this stipulation; and how to get voluntary compliance from those pilots/aircraft not associated with a BLM permit for land use. The BLM should pursue strategies to alleviate these problems, including some form of education for the general flying public.

A different problem, and perhaps one that is more tractable, is disturbance by humans on foot, whether walking on or under a bluff, or at a campsite in close proximity to a bluff. This includes hunters, recreational users and all types of resource inventory or research activity conducted on foot. For example, an unknowing or unscrupulous photographer may climb a bluff and take photos of a screaming

adult raptor for several hours on a bad-weather day, keeping the adult off the nest. Geologists visit bluffs to gather samples from visible rock strata; some are considerate of the raptors' needs and some are not. The Ocean Point dinosaur excavation operation is scheduled earlier each year. The attitude of the project leader toward nesting raptors differs from person to person, and the present leader seems to put excavation first and is secondarily concerned with possible impacts. Regardless of the reason for human presence, the commonality is that these impacts are caused by raptors reacting to human presence, usually over the short term.

Two forms of action should be taken to resolve the problem: 1) establish camps where they will not disturb raptors, and 2) limit the visits by humans to cliffs with nest sites. Panelists suggested and then discussed several different possibilities for managing camps. Encourage recreational users and hunters to use gravel bars for camping, rather than cliff tops. Require camp placement on the opposite side of the river from bluffs. Downstream of Umiat, allow camping on the right bank only. Direct people to designated campsites away from bluffs. Require a minimum distance between camps and nest sites; distances discussed were 1000, 800, 500, 200 and 150 meters.

Camping on the top of bluffs would probably occur only rarely, because for the most part people would prefer gravel bars due to ease of access from boats and desire to avoid insects. Whatever use of bluffs that does occur by recreational users or hunters could not be mitigated with stipulations, because these are not likely to be activities the BLM can regulate. However, the BLM could develop some educational material to try to influence these activities.

There are several factors that are important in determining where it may be appropriate to camp. If a cliff is very tall, raptors near its top may not be disturbed by campers below. With shorter cliffs, disturbance is more likely.

Where the river is narrow, a camp across the river from a nest site is more likely to cause disturbance than if the river is wider.

To require campers to remain across the river from bluffs, or to allow camping only in designated areas might preclude camping in many of the choice spots or cause boaters to travel excessive distances between camps in some river reaches. Requiring camps to remain a long distance (800-1000 m) from nest sites might cause some of the same problems. It would also be ineffective if some campers aren't aware of where nests are located. For these reasons it would be more reasonable to stipulate only that camps remain some distance less than 800 m from cliffs.

Raptor biologists have camped along the Colville River as close as 200 meters from nests without disturbing birds. Response to disturbance varies from raptor pair to raptor pair. Also, the birds may adapt to campers; after all, some peregrines live in large cities. Urban populations of peregrines, however, have poorer productivity and may not represent viable populations. The successful peregrine populations in England are not urban, but they do see many more people than those on the Colville River. So populations can certainly adapt to humans over time, but probably the existing population goes extinct when humans move in, and eventually is replaced by colonizers that are more tolerant of human activities. Under current use levels along the Colville River, a stipulated distance of 150 meters may be adequate to protect some raptor pairs. If visitation increases in the future, however, the distance restriction would probably need to be increased. It would likely be difficult to implement such an increase in the future.

After considerable discussion, it was decided that a 150- or 200-meter setback for camps was probably not adequate. Because the available literature suggests that 500 m is the distance where disturbance drops off significantly in most situations, the following stipulation was

recommended: Campsites are to be located ≥ 500 m from any raptor nest site.

For longer-term camping that occurs within one mile of raptor nests, such as that associated with resource inventory or research activities, the impacts would vary depending on the size of the camp, number of people involved, and the nature of their activities. It was recommended to use the same stipulation, but with a possibility for exceptions (either increased or decreased distance) on a case-by-case basis. In addition, these work parties would be required to follow the "code of conduct" (see Appendix B).

The issue of regulating campsite locations brings up a question for the Colville River, the bed of which is outside of the NPR-A. Can the BLM do anything about research or other camps on state or private land? Perhaps this issue could be resolved through cooperative management of the area.

Despite the stipulation restricting campsite location, there would still be residual impacts for which we do not currently have adequate knowledge to predict or quantify. These would involve the attraction of predators to raptor nests and reduced but still present disturbance effects.

With the issue of campsite locations resolved, the next impact to address is the approach to cliffs by people on foot. The intent is to minimize the number of cliffs visited each summer and the number of visits per cliff. Because people on foot are such a significant disturbance factor, a substantial effort to reduce this impact is needed. The question remains though, as to what restriction is both reasonable and enforceable? There are often gaps between stipulations and enforcement.

For example, geologists may collect samples of rocks from cliffs, and there may be several companies and agencies involved in such work. However, there is presently no limit to the number of such groups per year, the num-

ber of people in them, nor the number of repeated visits to cliffs by them. If the different entities could share the samples and information collected with one another, they would need to intrude on any particular nest site only once. But private companies may not see this as reasonable because of their efforts to keep data confidential from one another to maintain a competitive edge.

The panel discussed trying to limit the number of people in any one party, but did not feel comfortable in developing a stipulation to address this. They did develop three other stipulations to apply to work parties that require access to cliffs where raptors may nest. First, all permitted activities would be required to submit for approval an operational plan that would include dates, locations and schedule of visits to cliff sites, when dates are from April 15 through August 15 (March 15 through August 15 when gyrfalcon nests are involved). The purpose of this would be to allow the BLM to stipulate changes to minimize impacts to cliff-nesting raptors by repeated visits.

Second, as a general rule, the cumulative number of visits per nesting season from April 15 through August 15 (March 15 through August 15 when gyrfalcon nests are involved) to any cliff would be limited to three by all permitted entities. A visit is defined as each day in which work is done at or near a cliff, whether the duration of work is minutes or hours. The work could involve excavation or collection of fossils or artifacts, collection of rock samples, or any other permitted activity. The BLM could maintain the flexibility to negotiate the number of visits if the detailed operational plan explained that there would be no other way to accomplish the necessary work. This cumulative number would not include visits by agency personnel or activities not regulated by BLM, so the total number of visits per season could end up being much higher, perhaps as many as 12. However, all visits by permittees and agency personnel should be coordinated and shared to the maximum extent possible to reduce impacts.

Finally, the BLM in consultation with the USFWS would develop a "code of conduct" as a stipulation and educational tool that explains how to visit cliffs while protecting raptors. This code of conduct should explain when there might be exceptions to distance rules, or emergency situations when rules can be stretched. A draft outline of precautionary measures related to human activity near nests that could serve as a basis for developing a current set of guidelines is provided in Appendix B. The BLM would incorporate these guidelines for operating around cliffs or nests in the NPR-A into all permits. It would provide a general standard of behavior for all visitors and users of the NPR-A, but would be especially critical in the CRSA. Permits would state that failure to follow these guidelines may result in permit cancellation or denial of the permit in the following year. These guidelines should also be adhered to by agency personnel and could be provided to recreational users, hunters or others that may use the area for activities not regulated by the BLM.

Even with these restrictions on cliff visits in place, there would remain some nest disturbance. Decreased rates of food provision to young or increased chilling of eggs or young could still cause lower productivity at some sites or even nest abandonment, but these impacts should be minimal.

Although surveys of raptor populations by biologists are necessary to measure population health, they, too, may cause an impact on those same raptor populations. It would not be prudent to halt these studies, but there are ways that their effects can be mitigated. First, raptor biologists must coordinate their activities with the USFWS, BLM, ADFG and NSB. The purpose of this is to ensure that biologists eliminate redundant efforts and thus minimize their impacts by doing no more monitoring than necessary. Second, agency biologists must follow the code of conduct during cliff visits. Third, biologists should generally follow the restriction on campsite placement, but with exceptions when necessary to con-

duct certain studies. There may be residual impacts associated with these studies, such as lower productivity or even nest abandonment, but it is expected that these would remain negligible. Biologists should conduct a controlled study of disturbance levels and the resultant number of abandoned nests or young fledged, to determine the effects of disturbance from research and monitoring.

Construction activities, whether developing facilities or building roads, can cause very serious disturbance effects, both during construction and afterward as a result of increased human presence. For this reason the panel recommended increasing the buffer in which permanent oil and gas facilities are prohibited from $\frac{1}{2}$ mile to one mile along the Ikpihpuk River from the mouth of the Titaluk River to the point upstream where the Ikpihpuk River is no longer the western border of the NE NPR-A. In addition, each nest site found within NE NPR-A, but outside any development setback, should be considered for its own one-mile-radius setback buffer if development is proposed nearby. This protection should be applied on a case-by-case basis, with input from a biologist knowledgeable of the habits and behavior of raptors. The level of protection needed may vary with topography, vegetation and the sensitivity of individual birds to human activity. If it is decided by the BLM that no setback area be established for a nest site, construction within one mile of that nest should be prohibited from April 15 through August 15, except beginning March 15 in the case of a gyrfalcon nest. Off-road foot traffic within one mile of nests should be prohibited during the same period, both during and after construction, with case-by-case exceptions for essential activities. With these stipulations the only residual impact of construction would be the associated habitat loss or alteration (see Impacts to Raptor Habitat section) and the possibility of bird strikes by vehicles.

Hazardous materials or solid waste clean-up activities are very similar to construction activities in their disturbance effects on nesting

raptors, but are sometimes different in their urgency. Emergency clean-up may be a necessary disturbance of raptors, but is mitigated under existing spill plans. However, the cleanup of old drum sites, military sites, etc., should be planned with nesting raptors in mind. If occurring within one mile of raptor nests, clean-up activities should be prohibited from April 15 through August 15, except beginning March 15 in the case of a gyrfalcon nest. With this stipulation, the residual impact would be the same as that for construction: the associated habitat loss or alteration.

If facility development results in the creation of raptor nesting habitat (possibly a positive impact; see next section), it may place raptors in situations of disturbance by human activity (potentially an adverse impact). No mitigation is offered for this possibility.

The final impact to raptor behavior through disturbance considered by the panel was seismic exploration in the vicinity of nests. The panel determined that this activity was already adequately mitigated in the ROD, except that the stipulation presented for the Colville River area should be applied to raptor nests throughout the planning area and all of the NPR-A.

Impacts to Raptor Habitat:

In the foreseeable future for NE NPR-A, covering habitat with sand and gravel for construction pads, drilling pads or roads will impact a small fraction of the area. The panel initially concluded that this amount of loss of raptor foraging habitat may be negligible. However, the CRSA was identified over 20 years ago as a truly unique area, and most panelists felt that a more conservative stance than the one-mile setbacks in the EIS was warranted. In addition, some areas or habitat types are more valuable to raptors than others. It is reasonable to assume that habitat closer to nests is more important, because the cost of ranging farther out for prey is more expensive in terms of energetics and time off the nest. Also, there are some habitat types

that produce relatively higher densities of prey species than others.

The panel acknowledged that current information on the foraging habits of the raptors and habitat types along the Colville River and throughout NE NPR-A is not adequate to reach any definitive resolution. It would be ideal to study and map the habitat and use by raptors of the whole region. That way we could better understand the ecosystem and make recommendations for the best placement of any development. We need to study pairs of raptors and see what areas they use, since they may not always use areas that biologists hypothesize to be the best foraging habitat. Perhaps studies of prey use would also add to our knowledge. At the Snake River Birds of Prey National Conservation Area in Idaho, biologists refined foraging area boundaries as their knowledge grew. The BLM may want to take a similar step-wise process in the CRSA, using the best science available at each step and then continually monitoring to assess the decisions made. For the CRSA, heavily populated by raptors, this means managing for maximum protection, or with intense scrutiny, until more details are known about populations and their use of the area. During this study period, petroleum exploration and development could occur, but with conservative management in order to minimize impacts to raptors.

To protect nest sites and the more important foraging areas throughout NE NPR-A other than along the Colville River, the prohibition on construction within one mile of any nest site (see above) should be implemented, as warranted on a case-by-case basis. Another protection for the long term would be to require that upon abandonment of structures within the CRSA, all structures be removed without exception and the sites be rehabilitated. The current stipulations in the EIS would make structure removal at the discretion of the BLM. If future data show that important foraging areas extend beyond the CRSA, or cover less area than the CRSA, the

boundaries for application of this stipulation could be adjusted. However, this installation removal would be at an expense to the environment from the massive amount of fuel needed for the heavy equipment required to do the work. The panel decided that if a wider setback for development were applied along the Colville River, this removal requirement would be unnecessary.

It was proposed that the BLM increase the *no permanent facilities area* to two miles along the Colville River. This would improve the probability of protecting the foraging habitat and of meeting the panel's proposed population objectives. There was some debate as to whether this extended prohibition would improve protection for raptors. Some panelists thought that in certain circumstances, activities could occur within the two-mile zone and not affect individual raptor nests or a significant amount of foraging habitat. Even if effects occur, it may be too difficult to scientifically demonstrate them and thus show there cannot be some facilities without impacts. Others agreed with these arguments in part, but countered that it is due to our currently incomplete knowledge that a two-mile setback is justified. The width could be reduced in the future if justified when more complete knowledge is gained. A consensus was reached that a two-mile setback along the Colville River is the best way to balance these issues in the near term, pending adequate further study. This was recommended as a stipulation, and the panel included it as the first of four major points to result from the workshop in a letter to the BLM's State Director for Alaska (Appendix C).

In addition, and again considering the current lack of adequate knowledge, the panel encouraged the BLM to require developers to make all reasonable and practicable efforts to locate facilities outside the CRSA. If necessary to construct within the CRSA, site selection should generally be located as distant from raptor nests as feasible, but consistent with the following, final restriction. Within 15 miles

of nest sites, the BLM should prohibit alteration of limited, high-quality habitat that could detrimentally and significantly reduce prey availability. Of particular concern are ponds, lakes, wetlands and riparian habitats. This last restriction would not preclude construction, but only shift it on the landscape. The CRSA is suggested as a starting point for these stipulations. Raptor experts should review the original rationale for its designated boundaries, and the areas adjacent to the CRSA, regardless of ownership, should be studied to determine their importance as raptor foraging habitat.

The source of sand and gravel for construction is also of concern. The extraction of these materials from active river channels in the vicinity of nest bluffs may increase the natural rate of bluff erosion (Woodward-Clyde Consultants, 1980a), which is already a significant factor in raptor nest failure. The BLM should prohibit removal of sand and gravel from cliffs and the channel below. Any extraction from an active channel within the vicinity of a bluff should be permitted only if a prior hydrological study indicates no potential impact to the bluff. Because the Colville River is mostly outside BLM jurisdiction, this is another area that requires cooperative management.

Seismic exploration, overland moves and ice road construction may cause physical impacts to vegetation and soils that may result in prey base declines, although perhaps only minor and short-term declines. For the most part these activities are adequately mitigated under the ROD, but the restriction recommended for construction within 15 miles of nest sites (see above) should also be applied here. If so, the residual impacts from these activities should be only minor prey-base changes. Current knowledge is not adequate to quantify these changes.

Facility development may result in increased perches and nest sites, which increase the area of suitable habitat for raptors. This may lead to increased raptor populations in the area

overall, if those populations are in fact limited by nesting support structures and not by prey populations. In this case the impact on raptors would be a positive one, and would not require mitigation.

Impacts to Raptor Populations through Increased Mortality:

Some panelists working in other areas of Alaska or other states have experienced instances of illegal shooting of raptors. Despite regular monitoring by biologists, there is no evidence that direct shooting of raptors occurs along the Colville River, suggesting that it would be even more unlikely elsewhere in the NPR-A. Nonetheless, the BLM should work in conjunction with the USFWS to educate the public on the reasons, both legal and conservation oriented, for not killing raptors.

The construction of facilities for human habitation can often result in increased populations of animals (e.g. gulls, foxes and bears) that may prey on raptor eggs, nestlings or even adults. These predator increases are caused by attraction to human garbage or direct feeding. Both of these problems are addressed in the ROD, but it is important that the two relevant stipulations be implemented as written. This has not always been the case at other North Slope facilities.

Facility development can also present new hazards to raptors through accidents with power lines, vehicles or trash. When a bird moves in to use habitat that has been created through development, the bird is for the most part on its own. Two exceptions would be the protection of nests and the construction of power lines so as to prevent electrocution.

Summary of Recommended Stipulations, Educational Efforts and Residual Impacts

Stipulations:

Campsites shall be located ≥ 500 m from any raptor nest site.

All authorized users shall submit for approval an operational plan that include dates, locations and schedule of visits to cliff sites, when dates are between April 15 and August 15 (March 15 through August 15 when gyrfalcon nests are involved).

The cumulative number of visits to any cliff per nesting season (April 15 through August 15, except beginning March 15 when gyrfalcon nests are involved) by all authorized users shall be limited to three. Exceptions may be granted if a detailed operations plan documents why the necessary work can be done no other way.

All authorized users shall follow the guidelines provided by the BLM for conduct around raptor nest sites. Failure to follow these guidelines may result in permit cancellation or denial of the permit in the following year.

Raptor biologists must coordinate their activities with the BLM, USFWS, ADFG and NSB; follow the guidelines for conduct near raptor nests; and follow the above restrictions on campsite placement with exceptions when necessary to conduct certain studies.

Permanent oil and gas facilities are prohibited within one mile of the Ikpikpuk River from the mouth of the Titaluk River to the point upstream where the Ikpikpuk River is no longer the western border of the NE NPR-A.

On a case-by case basis, permanent oil and gas facilities may be prohibited within one mile of any raptor nest site found within NE NPR-A, but outside any other development setback. This protection should be applied on a case-by-case basis with input from a biologist knowledgeable of the habits and behavior of raptors. The level of protection needed may vary with topography, vegetation and the sensitivity of individual birds to human activity.

If construction or non-emergency hazardous materials or solid waste clean-up efforts are permitted within one mile of raptor nests,

these activities shall be prohibited during the period April 15 through August 15, except beginning March 15 when gyrfalcon nests are involved. Off-road foot traffic shall be prohibited within one mile of nests during the same period, both during and after construction or cleanup, with case-by-case exceptions for essential activities.

Permanent oil and gas facilities shall be prohibited within two miles of the bluffs along the Colville River.

All reasonable and practicable efforts shall be made to locate permanent facilities outside the CRSA. If necessary to construct within the CRSA, site selection should generally be located as distant from raptor nests as feasible, but consistent with the following: Within 15 miles of nest sites, alteration of limited, high-quality habitat that could detrimentally and significantly reduce prey availability shall be prohibited. Of particular concern are ponds, lakes, wetlands and riparian habitats.

Outside the Colville River Raptor, Passrine and Moose LUEA, motorized ground-vehicle use for seismic exploration or overland moves shall be minimized within one mile of any raptor nest from April 15 through August 15, except beginning March 15 in the vicinity of gyrfalcon nests. Such use shall be prohibited within $\frac{1}{2}$ mile of nests during the same period, unless authorized by the BLM. The BLM shall consult with the USFWS to plan travel routes to minimize disturbance to raptors.

The removal of sand and gravel from cliffs shall be prohibited. Any extraction from an active channel shall be prohibited unless preceded by a hydrological study, approved by the BLM, that indicates no impact to river bluffs.

If a raptor builds a nest on a human-constructed facility, that nest shall be protected from destruction throughout that nesting season.

If seismic exploration, overland moves or ice road construction occurs within 15 miles of a

raptor nest site within the CRSA, alteration of limited high-quality habitat that could detrimentally and significantly reduce prey availability shall be prohibited. Of particular concern are ponds, lakes, wetlands and riparian habitats.

Unless otherwise agreed to in writing by the authorized officer, power lines shall be constructed in accordance with standards outlined in "Suggested Practices for Raptor Protection on Power Lines: the State of the Art in 1996" (APLIC, 1996). The holder shall assume the burden and expense of proving that pole designs not shown in the above publication are "raptor safe." Such proof shall be provided by a raptor expert approved by the authorized officer. The BLM reserves the right to require modifications or additions to all power line structures, should they be necessary to ensure the safety of large perching birds. Such modifications and/or additions shall be made by the holder without liability or expense to the United States.

Education:

The BLM should:

- work in conjunction with the USFWS to educate the public on the reasons, both legal and conservation oriented, for not killing raptors.
- ensure that pilots understand AGL means above nest level (top of bluffs), not above the river.
- pursue strategies to ensure compliance with the aircraft restrictions by authorized users and to inform the general flying public of why they should want to comply.
- develop educational material to influence hunters and recreational users of the Colville River area to follow the same guidelines provided to authorized users for conduct around raptor nest sites.

Residual Impacts:

Implementation of all the above stipulations and educational efforts would reduce the adverse impacts of human activities on nesting raptors in the NPR-A, but there would remain residual impacts that cannot currently be predicted or quantified for lack of adequate knowledge. These would involve reduced but still present disturbance effects, the attraction of predators to raptor nests, the possibility of bird strikes by vehicles or other accidents at facilities, and prey-base changes. Besides direct mortality in some cases, these could lead to decreased rates of food provision to young or increased chilling of eggs or young, causing lower productivity at some sites or even nest abandonment. To answer some of the remaining questions on disturbance impacts, biologists should conduct a controlled study on the effects of disturbance levels on the number of abandoned nests or young fledged.

COLVILLE RIVER BASIN-WIDE PROTECTION

The previous summary of residual impacts refers only to those impacts from authorized activities on BLM-administered lands. The panel remained very concerned that most of the Colville River bed and right bank, and the foraging habitat south and east of there, may not have similar protection for raptors because it is owned and managed by the State of Alaska or Arctic Slope Regional Corporation. They thought that since the Colville River basin is critical to raptors on Alaska's North Slope and is globally important as well, the BLM needs to make some effort to ensure that the state and ASRC side is protected in the same manner as the BLM side. This is just as critical as the buffers recommended for BLM lands, and might be accomplished through a Memorandum of Understanding, a land exchange, or some other instrument. The Colville River Management Plan, called for in the ROD and intended to be developed in cooperation with adjacent landowners, could lead to that kind of protection.

The panel concluded that the best way to guarantee long-term protection of raptors along the Colville River would be a land exchange wherein the BLM would obtain those lands along the river's right bank, and then apply to them the same stipulations for raptor protection as in the NPR-A. They suggested that there were other federal lands on Alaska's North Slope that were of greater economic value and that the state and ASRC might be willing to exchange lands along the Colville River for them. The panel agreed to include this issue in the letter they would present to the BLM's State Director for Alaska (Appendix C).

FUTURE RAPTOR STUDIES NEEDED

The ROD states that monitoring will be undertaken to determine the status of various resources, ensure compliance with and enforcement of plan decisions, and measure the effectiveness of protective measures. A Research and Monitoring Team, including representatives from federal, state and NSB agencies, the oil industry, environmental groups and academia, would be established to help guide this effort. Little other guidance was included in the EIS or ROD to demonstrate a comprehensive plan for monitoring.

The panel feared that this might go the way of other plans, calling for monitoring but ultimately failing to implement a program that would adequately answer the important management questions that arise. In past cases this has been caused by both incomplete planning at the outset and insufficient funding for monitoring during plan implementation. The panel wanted to take this opportunity to remind the BLM of its responsibility in this very important arena. They also developed the following list of monitoring and research needs to provide the BLM and the future Research and Monitoring Team with general directions relevant to raptors.

Monitoring Needs:

- raptor nesting population trends
- reproductive success & productivity
- inventory of raptors throughout the NPR-A
- prey base population levels
- level of different human uses in the area
- assess stipulation compliance by authorized users
- implementation monitoring, i.e, were the decisions in the ROD implemented as planned?

Research Needs:

- home range size for gyrfalcons, peregrines, rough-legged hawks
- raptor habitat map of planning area; determination of habitat types
- use of various prey species by the different raptor species
- controlled experiments: impacts of facilities closer to nest (Is the two-mile setback necessary?); simulated camping (Is the 500 m setback optimal?); other disturbances

SUGGESTED REFERENCES

- Amaral, M. 1982. Recommended restrictions for protection of Peregrine Falcons in Alaska - a summary of opinions. In: W.M. Ladd and P.F. Schempf (eds). Proc. Symp. and Workshop Raptor Manage. and Biol. in Alaska and Western Canada. USFWS, FWS/AK/PROC-82. Anchorage, AK. 335 p.
- Asherin, D.A. and D.N. Gladwin, eds. 1988. Effects of aircraft noise and sonic booms on fish and wildlife: a research needs workshop. USFWS, National Ecology Research Center, Fort Collins, CO. NERC 88-23. 90 pp.
- Avian Power Line Interaction Committee (APLIC). 1996. Suggested practices for raptor protection on power lines: The state of the art in 1996. Edison Electric Institutes/Raptor Research Foundation, Washington D.C.
- Awbrey, F.T. and A.E. Bowles. 1990. The effects of aircraft noise and sonic booms on raptors: a preliminary model and a synthesis of the literature on disturbance. NSBIT Technical Operating Report No. 12. Prepared for the U.S. Air Force, Wright-Patterson AFB, Ohio.
- Bednarz, J.C. 1984. The effect of mining and blasting on breeding Prairie Falcon (*Falco mexicanus*) occupancy in the Caballo Mountains, New Mexico. Raptor Research 18:16-19.
- Capodice, J. 1976. Sagwon Bluffs Peregrine Falcon habitat management plan. BLM, Fairbanks, AK 53 p.
- Ellis, D.H.; C.H. Ellis, and D.P. Mindell. 1991. Raptor responses to low-level jet aircraft and sonic booms. Environmental Pollution 74: 53-83.
- Fyfe, R.W. and R.R. Olendorff. 1976. Minimizing the dangers of nesting studies to raptors and other sensitive species. Can. Wildl. Serv., Occasional Paper No. 23.
- Haugh, J.R. 1982. Responses of raptors to exploration and construction activities in the National Petroleum Reserve in Alaska. In: W.M. Ladd and P.F. Schempf (eds). Proc. Symp. and Workshop Raptor Manage. and Biol. in Alaska and Western Canada. USFWS, FWS/AK/PROC-82. Anchorage, 335 p.
- Hayden, T.J. and J.C. Bednarz. 1991. The Los Medanos Cooperative Raptor Research & Management Program, Final Report 1988-1990. Unpubl. report supported by DOE, BLM, Univ. New Mexico and Hawk Mountain Sanctuary Association. Contract No. 59-WRK-90469-SD.
- Hegner, R.E. 1982. Central place foraging in the White-fronted Bee-eater. Anim. Behav. 30:953-963.
- Knight, R.L. and S.A. Temple. 1995. Wildlife and recreationists: coexistence through management. Pp. 327-333 In: R.L. Knight and K.J. Gutzwiller, eds. Wildlife and recreationists: coexistence through research and management. Island Press, Covelo, Calif. 372 pp.
- Marzluff, J.M.; B.A. Kimsey, L.S. Schueck, M.E. McFadzen, M.S. Vekasy and J.C. Bednarz. 1997. The influence of habitat, prey abundance, sex, and breeding success on the ranging behavior of Prairie Falcons. Condor 99:567-584.
- Meese, R.J. and Mark Fuller. 1989. Distribution and behavior of passerines around peregrine (*Falco peregrinus*) eyries in western Greenland. Ibis 131:27-32.
- Morehouse, T.A.; R.A. Childers and L.E. Leask. 1978. Fish and wildlife protection in the planning and construction of the Trans-Alaska Oil Pipeline. USFWS, FWS/OBS-78/70: 1-131.
- Mossop, D.; W. Nelson, A. Nelson and R. Hayes. 1978. Birds of prey and the Dempster Highway Transportation Corridor. Confidential Rep. to Yukon Wildl. Branch, Yukon Territory. 48 p.

- Nelson, R.W. 1979. An assessment of the impact of northern activities upon certain raptors. Unpubl. rep. Prep. for Foothills Pipelines (Yukon) Ltd. 93 p.
- Olsen, J. and P. Olsen. 1978. Alleviating the impact of human disturbance on the breeding Peregrine Falcon. 1. Ornithologists. Corella 2: 1-7.
- Olsen, J. and P. Olsen. 1980. Alleviating the impact of human disturbance on the breeding Peregrine Falcon. Public and recreational lands. Corella 4:54-57.
- Orians, G.H. and N.E. Pearson. 1979. On the theory of central place foraging. pp. 154-177 In: D.J. Horn, R.D. Mitchell and G.E. Stairs (eds). Analysis of ecological systems. Ohio State Univ. Press: Columbus, Ohio.
- Platt, J.B. 1975. A study of diurnal raptors that nest on the Yukon-North Slope, with special emphasis on the behavior of Gyrfalcons during experimental overflights by aircraft. Chapter 2 In: Ornithological studies conducted in the area of the proposed gas pipeline route: Northwest Territories, Yukon Territory and Alaska, 1974. Can. Arctic Gas Study, Ltd. Biol. Rep. Ser. Vol. 30.
- Postovit, H.R. and B.C. Postovit. 1987. Impacts and mitigation techniques. Pages 183-208 In Natl. Wildl. Fed. Raptor Manage. Tech. Manual, Sci. Tech. Ser. No. 10.
- Richardson, C.T. and C.K. Miller. 1997. Recommendations for protecting raptors from human disturbance: a review. Wildlife Society Bulletin 25(3): 634-638.
- Roseneau, D.G.; C.E. Tull and R.W. Nelson. 1981. Protection strategies for Peregrine Falcons and other raptors along the planned Northwest Alaska gas pipeline route. Vol. I. Unpubl. rep. Prepared for Northwest Alaska Pipeline Company. 218 p.
- Ritchie, R.J. 1987. Response of adult Peregrine Falcons to experimental and other disturbances along the Trans-Alaska Pipeline System, Sagavanirktok River, Alaska, 1985, 1986. Unpubl. report for Alyeska Pipeline Service Company, Anchorage, AK; prepared by Alaska Biological Research (ABR), Fairbanks, AK. 91 p. + appendices.
- Ritchie, R.J.; S.M. Murphy and M.D. Smith. 1998. Peregrine Falcon (*Falco peregrinus anatum*) surveys and noise monitoring in Yukon MOAs 1-5 and along the Tanana River, Alaska, 1995-1997. A compilation of final annual reports, 1995-1997. Prepared for the U.S. Air Force Research Laboratory, Alaska Cooperative Fish and Wildlife Research Unit, and the Oregon Cooperative Wildlife Research Unit.
- Swem, T. 1996. Aspects of the breeding biology of Rough-legged Hawks along the Colville River, Alaska. M.S. Thesis. Boise State Univ., Boise, ID. 78 pp.
- Suter, G.W. and J.L. Jones. 1981. Criteria for Golden Eagle, Ferruginous Hawk, and Prairie Falcon nest site protection. Raptor Res. 15:12-18.
- USDOI. 1996. Effects of military training and fire in the Snake River Birds of Prey National Conservation Area. BLM/IDARNG Research Project Final Report. USGS-BRD. Snake River Field Station, Boise, Idaho. 130 pp.
- USDOI, BLM. 1995. Snake River Birds of Prey National Conservation Area - Management Plan. Bruneau Resource Area, Lower Snake River District Office. Boise, Idaho. iv + 170 pp.
- Weir, D.N. 1982. Cliff nesting raptors of the Kisaralik River, western Alaska. pp 138-152 In W.N. Ladd and P.F. Schempf (eds.) Proc. Symp. & Workshop on raptor management in Alaska and western Canada. USFWS. FWS/AK/PROC-82. Anchorage, AK. 335 pp.

Weir, D.N. 1988. Impact of prolonged surface mining on numbers of Alaskan predators. In B. Clark (ed.) Proceedings of an advanced policy workshop on environmental management and impact assessment. Centre for Environmental Management and Planning, Aberdeen Univ., Aberdeen, Scotland.

White, C.M. and S.K. Sherrod. 1973. Advantages and disadvantages of the use of rotorwinged aircraft in raptor surveys. Raptor Research 7:97-104.

Windsor, J. 1977. The response of Peregrine Falcons to aircraft and human disturbance. Can. Wildl. Serv., Mackenzie Valley Pipeline Investigation, Ottawa, Ontario. 87 p.

Woodward-Clyde Consultants. 1980a. Gravel removal studies in arctic and subarctic floodplains in Alaska - Technical Report. USFWS. FWS/OBS-80-08. Anchorage, Alaska. xxiii + 403 pp.

Woodward-Clyde Consultants. 1980b. Gravel removal studies in arctic and subarctic floodplains in Alaska - Guidelines Manual. USFWS. FWS/OBS-80-09. Anchorage, Alaska. 169 pp.

Additional reference source:

Raptor Information System
USGS Forest and Rangeland Ecosystem
Science Center
Snake River Field Station
970 Lusk Street
Boise, ID 83706
(208)426-5218
<http://www.ris.idbsu.edu>
library@eagle.idbsu.edu

LIST OF ACRONYMS

ADFG - Alaska Department of Fish and Game

AGL - Above Ground Level

ASRC - Arctic Slope Regional Corporation

BLM - Bureau of Land Management

CRSA - Colville River Special Area

EIS - Environmental Impact Statement

LUEA - Land Use Emphasis Area

NE NPR-A - Northeast portion (planning area) of the NPR-A

NPR-A - National Petroleum Reserve-Alaska

NPRPA - Naval Petroleum Reserves Production Act of 1976

NSB - North Slope Borough

ROD - Record of Decision
(for NE NPR-A EIS)

USFWS - U.S. Fish and Wildlife Service

APPENDIX A

Stipulations Directly Related to Raptor Protection (as numbered in ROD)

Taken from the Northeast National Petroleum Reserve - Alaska Integrated Activity Plan/Environmental Impact Statement Record of Decision (ROD), October 1998

Permanent oil and gas facilities (definition): Production facilities, pipelines, roads, airstrips, production pads, docks and other bottom-founded structures, seawater-treatment plants, and any other structure associated with an oil and gas operation that occupies land for more than one winter season. It does not include material sites or seasonal facilities such as ice roads and ice pads.

24. The following restrictions apply to overland moves, seismic work, and any similar use of heavy equipment (other than actual excavations as part of construction) on unroaded surfaces during the winter season:

b. Motorized ground-vehicle use will be minimized within the Colville River Raptor, Passerine, and Moose Area LUEA from April 15 through August 5, with the exception that use will be minimized in the vicinity of gyrfalcon nests beginning March 15. Such use will remain $\frac{1}{2}$ mile away from known raptor-nesting sites, unless authorized by the AO. The BLM shall consult with FWS to plan travel routes to minimize disturbance to raptors.

39. Permanent oil and gas facilities, including roads, airstrips, and pipelines, are prohibited within and adjacent to the waterbodies listed below at the distances identified to protect fish and raptor habitat, cultural and paleontological resources, and subsistence and other resource values. Setbacks include the bed of the waterbody

and are measured from the bank's highest high water mark.

- a. Ikpikpuk River: a $\frac{1}{2}$ -mile setback from the bank of the Ikpikpuk River within the planning area (fish, raptors, subsistence, cultural, and paleontological resources).
- f. Colville River: a 1-mile setback from the western bluff (or bank if there is no bluff) of the Colville River extending the length of the river as described in the Colville River Raptor, Passerine, and Moose LUEA. This restriction does not apply within $1\frac{1}{2}$ mile of the Umiat airstrip (fish, raptor, passerine, moose, paleontological, subsistence, scenic, and recreational resources).
- h. Kikiakrorak River: a 1-mile setback from each bluff (or bank if there is no bluff) of the Kikiakrorak River downstream from T.2 N, R. 4 W, Umiat Meridian (raptor, passerine, and moose resources).
- i. Kogosukruk River: a 1-mile setback from each bluff (or bank if there is no bluff) of the Kogosukruk River (including the four tributaries off the southern bank) downstream from T.2 N., R.3W., Umiat Meridian (raptor, passerine, and moose resources).

On a case-by-case basis, essential pipeline and road crossings will be permitted, in consultation with appropriate Federal, State, and NSB regulatory and resource agencies, through setback areas in those instances where no other suitable sites are available. Stream crossings will be sited perpendicular to the main channel flow; lake crossings will be at the narrowest point. Pipeline and road crossings are prohibited in the setback around Teshekpuk Lake, with no exceptions. Road crossings are prohibited in the setback adjacent to the Colville River with no exceptions.

56. Aircraft shall maintain an altitude of at least 1,500 feet AGL when within $\frac{1}{2}$ mile of cliffs identified as raptor nesting sites from April 15 through August 5, unless doing so would endanger human life or violate safe flying practices. Aircraft shall maintain an altitude of 1,500 feet AGL when within $\frac{1}{2}$ mile of known gyrfalcon nest sites from March 15 to April 15. Permittees shall obtain information from BLM necessary to plan flight routes near gyrfalcon nests.
71. Use of pesticides without the specific authority of the AO is prohibited.

APPENDIX B

Recommended Conduct near Possible Nests of Eagles, Hawks and Falcons, NPR-A

Taken from the Raptor Project, NPR-A,
USFWS, late 1970s

Cliffs, outcrops, and high soil banks are critical to nesting birds of prey. Treat all of these habitats as possible raptor nesting areas; approach them with great care. If your work must entail visiting or approaching these habitats, follow these suggestions:

I. Ground Parties

A. APPROACH CLIFFS FROM THE MOST VISIBLE AVENUE (beginning at approximately one mile), and talk or make noise (not excessive) so that birds may hear and see you at a distance.

B. If a raptor nest is located, DO NOT VISIT THE NEST SITE; besides disturbing birds or damaging the nest, your activity could guide predators to the area.

C. If raptors are occupying cliffs which you must visit, refrain from lengthy stays; your presence can affect feeding schedules, incubation, and increase egg and young loss due to exposure. Allow your schedule to be flexible, visiting cliffs only on good weather days, or IF CLOSE WORK IS NECESSARY, CONDUCT YOUR WORK AFTER AUGUST 1.

D. Do not camp within one mile of possible nesting areas.

II. Boating

A. DO NOT LAND AT THE BASE OF CLIFFS. Follow instructions described herein.

B. RESTRICT THE USE OF MOTORS IN CLIFF AREAS, ESPECIALLY ALONG THE COLVILLE RIVER.

III. Aircraft

A. AVOID LOW FLIGHTS (less than 500') in regions of cliffs. If weather permits, fly at 1500' and away from these areas; avoid the use of the Colville River as a flight corridor.

B. If a cliff must be approached, do so along a visible path - NEVER APPROACH FROM A BLIND SIDE OR FROM BEHIND - reducing chances for surprise encounters with nesting birds.

C. IF RAPTORS ARE OBSERVED, CUT YOUR VISIT SHORT; do not take numerous passes (more than three) in front of cliff areas.

D. DO NOT LAND ON TOP OF CLIFFS, since activities above sites appear to be more harmful than those below. Land approximately one mile from the base of cliffs.

Finally, SCREAMING ADULT BIRDS ARE ADEQUATE PROOF OF YOUR DISTURBANCE. Attempts to photograph, climb to nests, or otherwise negligently harass nesting birds of prey are not in the best interests of these species. In the cases of the PEREGRINE FALCON and GOLDEN EAGLE, SUCH ACTIVITIES ARE IN DIRECT VIOLATION OF THE ENDANGERED SPECIES ACT (16 USC 688 cc) and THE BALD EAGLE ACT (16 USC 668), respectively. Furthermore, AIRCRAFT HARASSMENT OF ANY OF THESE SPECIES IS A VIOLATION OF THE AIRBORNE HUNTING ACT (16 USC 742 j-1).

In summary, key points to remember are:

1. AVOID CLIFF AREAS WHENEVER POSSIBLE.
2. CONDUCT SURVEYS AT KNOWN NESTING AREAS AFTER AUGUST 1.
3. IF BIRDS OF PREY ARE LOCATED, BE CAUTIOUS IN YOUR APPROACH AND QUICK IN YOUR WORK.
4. LEAVE AN AREA IMMEDIATELY IF DISTURBANCE IS APPARENT.

APPENDIX C
**Panel's Letter to the State Director of the Bureau of Land Management
in Alaska**

United States Department of the Interior
FISH AND WILDLIFE SERVICE
NORTHERN ALASKA ECOLOGICAL SERVICES
101 12th Avenue, Box 19, Room 110
Fairbanks, AK 99701
May 18, 1999

Sally Wisely
Acting Alaska State Director
Bureau of Land Management
222 West 7th Avenue, #13
Anchorage, Alaska 99513-7599

Dear Ms. Wisely:

On behalf of the participants of the Raptor Disturbance and Mitigation Workshop for the National Petroleum Reserve-Alaska, I am writing this letter to summarize and reiterate the major recommendations for raptor management we developed at the workshop. As stated in the draft workshop proceedings, we were to present a resolution on long-term management of raptors along the Colville River to the Alaska Bureau of Land Management State Director.

In the Record of Decision for the Integrated Activity Plan/Environmental Impact Statement for the Northeast National Petroleum Reserve-Alaska, the BLM was directed to conduct a workshop of Raptor experts to review scientific literature on disturbance to raptors and identify potential additional mitigation measures relative to the Colville River. The workshop was convened in Fairbanks on February 2-3, 1999, and eight individuals with extensive experience in raptor research, management, and conservation attended. We reviewed specific protection measures for nesting raptors recommended by BLM, and also reviewed previous Acts, Public Laws, and Rule-makings relative to the Colville River area. We offer the following comments.

The Colville River has long been recognized as one of the most ecologically unique areas for nesting raptors in North America, comparable to the BLM's Snake River Birds of Prey National Conservation Area. Nowhere else in the Nearctic, and probably in the entire circumpolar Arctic, can one find such a diversity and density of nesting raptors. Alaska is the only state with Arctic Peregrine Falcons, Gyrfalcons, and Rough-legged Hawks, and the Colville River has the highest concentration of these species anywhere in the state. All of the recognition given this area in previous legislation is warranted. Unfortunately, we believe the proposed Activity Plan provides only minimum protection to this truly unique and ecologically important area.

The intent of the National Petroleum Reserve Protection Act of 1976 was to allow for development of petroleum resources while providing protection for three unique ecological areas: the Utukok River Uplands, the Teshekpuk Lake area, and the Colville River area. Language within this Act and implementing regulations states: "All activities, including but not limited to pe-

troleum exploration, within these special areas shall be conducted in a manner which will assure *maximum protection* of the resource values to the extent consistent with the requirements of the Act" (FR Vol.42, No.107). The Final EIS for Oil and Gas Leasing in NPR-A (1983) further states: "The Act authorized the Secretary of the Interior to designate additional special areas calling for *extraordinary protection* of surface values within them" (emphasis added).

The major points generated from the workshop and discussed in the draft workshop proceedings dealt with 1) the no-development buffer along the Colville River, 2) the need to extend protection and management to the east bank of the Colville, 3) the need to continue the long-term Raptor monitoring effort, and 4) the need for the BLM to develop a management plan for the Colville River Special Area. The plan needs to address the entire river basin, including the east side of the river, and it needs to include a research and monitoring plan for raptors in the Special Area.

The proposed one-mile no-development buffer along the Colville River may not be adequate, and a minimum two-mile buffer should be used until more is known about the breeding ecology of the nesting raptors along the Colville River. One of the most salient points to come out of the workshop was how little is known about these arctic-nesting species. Habitat requirements (especially related to foraging areas) and sensitivity to disturbance are virtually unknown, particularly for Gyrfalcons and Rough-legged Hawks. The proposed one-mile protected area ("No Permanent Oil and Gas Facilities") along the west bank of the river may provide protection for nest sites of these species, but no consideration is given to total habitat requirements, which includes both nest sites and foraging areas. The long-term viability of these populations depends upon maintaining suitable, undisturbed nest sites as well as quality foraging habitat.

We recommend that the BLM actively pursue measures necessary to protect the east side of the Colville River, and that these measures become part of the Management Plan. As you are aware, federal land is limited to the left (westerly) side of the downriver portion of the Colville River. Previous legislation suggested that conservation easements, land exchanges, agreements with other land owners, or other appropriate measures should be undertaken to protect habitat on the right (easterly) side of the river. Much of the land on the right side is owned by the State of Alaska and Native corporations. As recognized in previous legislation, these lands are equally important to nesting raptors, and we urge you to pursue appropriate arrangements to protect these lands.

During the comment period for this EIS, the BLM received several letters from agencies, organizations, and individuals knowledgeable about the Colville River and raptors. Recommendations in letters from the Fish and Wildlife Service, Raptor Research Foundation, and 38 raptor experts were remarkably similar, and much like the recommendations of this panel: we all believe that development of a long-term management plan for the Colville River basin identifying raptors as a priority planning resource is essential and long overdue. Further, we all believe that a one-mile buffer may not be an adequate buffer for raptors nesting along the Colville River, and, in the absence of data, management of this area should be conservative. Not one letter from a raptor expert supported the one-mile buffer zone; each recommended a larger zone.

It is our opinion that the proposed Activity Plan and recommended protection measures for raptors along the Colville River provide neither "maximum protection" nor "extraordinary

protection" for this truly unique and ecologically important area. We request that you reconsider the current one-mile protected area along the west bank of the Colville River. Until we know more about these northern-nesting species, and until a management plan for the Colville River Special Area is completed, we should take every precaution to insure that our actions are not detrimental to the well-being of raptors along the Colville River.

In the leasing, exploration, and development of NPR-A, we strongly urge you to include provisions that provide BLM the flexibility to establish buffer zones along the Colville River as deemed appropriate following development of a management plan for the Colville River Special Area. We believe a provisional buffer zone of two miles or more may be appropriate along the Colville River; however, until we know more about the nesting requirement of these arctic-nesting species, we should allow for flexibility in future management decisions. All potential lessees should be aware of this possibility.

We appreciate the opportunity to assist BLM in managing and protecting the resources of the Colville River Special Area, and we appreciate your consideration of our recommendations for this truly special area. We would be happy to discuss our views in more detail and assist in any way possible.

Sincerely,
Skip Ambrose
Workshop Panel Representative

Raptor Workshop Panel:

Mr. Skip Ambrose, U.S. Fish and Wildlife Service
Dr. Clayton M. White, Brigham Young University
Mr. Michael Kochert, Biological Resources Division, USGS
Mr. Bob Ritchie, ABR, Inc.
Dr. James Bednarz, Arkansas State University
Dr. Kim Titus, Alaska Department of Fish and Game
Mr. Ted Swem, U.S. Fish and Wildlife Service
Mr. Robert Suydam, Department of Wildlife Management, North Slope Borough

cc: Raptor Workshop Panel
Robert Schneider, Northern Field Manager, BLM Fairbanks
Dave Yokel, Biologist, Northern Field Office, BLM Fairbanks

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