United States Department of the Interior

FISH AND WILDLIFE SERVICE

Anchorage Fish and Wildlife Field Office
605 West 4th Avenue, Room G-61
Anchorage, Alaska 99501-2249

In Reply Refer to:
AFWFO

MAR 28 2013

Mr. Don Kuhle
U.S. Army Corps of Engineers
P.O. Box 6898
Joint Base Elmendorf Richardson, Alaska 99506-0898

Subject: Notice of Intent to Prepare a Draft Environmental Impact Statement (DEIS) for the Donlin Gold Project, Alaska. Scoping Comments (ER 12/890)

Dear Mr. Kuhle:

The U.S. Fish and Wildlife Service (Service) has reviewed the Corps of Engineers (Corps) request for scoping comments related to preparation of an Environmental Impact Statement (EIS) for the proposed Donlin Gold project located northeast of Bethel, Alaska.

The Service is participating as a cooperating agency in preparation of the EIS. Comments and recommendations made by the Service are provided in accordance with the:

- National Environmental Policy Act (NEPA)
- Endangered Species Act (ESA)
- Marine Mammal Protection Act
- Migratory Bird Treaty Act
- Bald and Golden Eagle Protection Act
- Fish and Wildlife Coordination Act
- Alaska National Interest Lands Conservation Act
- National Wildlife Refuge System Administration Act

The Service recommends the Corps EIS fully evaluate potential direct, indirect, and cumulative effects of all aspects of the project on marine mammals, resident and anadromous fish, species listed under the ESA, and migratory birds, including bald and golden eagles. Effects on both fish and wildlife populations and habitat should be evaluated. The Service further recommends that all potential effects of the project on the Yukon Delta National Wildlife Refuge be fully evaluated. Specific scoping issues are identified and additional information, resources, and references on wildlife and subsistence resources are provided in Attachments 1 and 2.

For questions regarding these recommendations please contact Mr. Phil Brna at the Anchorage Fish and Wildlife Field Office at 907-271-2440 or via e-mail at phil_brna@fws.gov.

Sincerely,

Socheata Lor
Acting Field Supervisor
Anchorage Fish and Wildlife Field Office

Attachments (2)

cc: (via email)
A. Shearer, USACE
M. Cobbs, BLM
M. Jen, EPA
D. Hinnah, PHMSA
J. Bruno, ADNR
G. Mendivil, ADEC
H. Scannell, ADFG
E. Thomas, Village of Crooked Creek
R. Golley, Native Village of Chuathbaluk
D. Cannon, Native Village of Napaimute
B. Charles, Knik Tribe
T. Breslford, URS
B. Platte, USFWS
C. Sterne, USFWS
J. MacCracken, USFWS
J. Spegon, USFWS
K. O'Reilly-Doyle, USFWS
K. Murphy, USFWS
K. Klein, USFWS
L. Verbrugge, USFWS
P. Brna, USFWS
S. Matsuoka, USFWS
T. Doolittle, USFWS
T. Kron, USFWS

Attachment 1

The Service recommends the EIS analyze biological and physical data based on the data gap analysis, and evaluate potential effects of the project including: the mine site and associated facilities, pipelines, power lines, ports, storage areas, stream crossings, material sites, and transportation corridors. The EIS should analyze direct, indirect and cumulative effects to fish, wildlife and their habitats resulting from all components and phases (construction, operation, and closure) of the project. Project alternatives should be evaluated in the EIS to identify potential opportunities to avoid and minimize adverse impacts. The EIS should identify potential compensatory mitigation for impacts which cannot be avoided or minimized.

The following is a summary of issues of concern to the Service that should be addressed in the EIS. This is not an exhaustive list that identifies every issue for inclusion in the EIS, rather it is a list of issues which the Service believes other cooperating agencies or members of the public may not have identified, or which deserve specific emphasis, either because of our responsibilities under Federal law or the importance to fish, wildlife and their habitat. Our scoping comments begin with general recommendations, followed by issues related to specific components of the project: the mine site, pipeline, barge transportation, contaminants, hydrology, climate change, the Yukon Delta National Wildlife Refuge, and mitigation.

General Recommendations - The EIS should analyze potential impacts of the proposed project and all associated infrastructure on fish and wildlife including: endangered species or their designated critical habitat; marine mammals; anadromous and resident fish; migratory birds (including bald and golden eagles, species of conservation concern (USFWS 2008) and bird concentrations); and animal and plant species important to local subsistence users.

1. Eagle take permits may be necessary for activities that result in removal of nests, loss of habitat, and disturbance of birds during construction, operation, and maintenance of the project. The EIS should identify the presence of eagles or their nests in the project area, and analyze potential impacts of the proposed project on both bald and golden eagles which are protected under the Bald and Golden Eagle Protection Act. Additional information can be found at: http://alaska.fws.gov/eaglepermit/index.htm.
2. The EIS should address impacts to threatened or endangered species (Map 1). A total of 2,830 mi^2 in the Kuskokwim Shoals is designated as critical habitat for the threatened Steller's Eider (http://alaska.fws.gov/fisheries/endangered/spst_ Final Designation.htm). The Kuskokwim Shoals unit includes an area where large concentrations of Steller's eiders and other Alaska-breeding eider species occur. In addition, Kuskokwim Bay is an important fall staging area for king eiders based on birds implanted with satellite transmitters (Oppel et al. 2008). King eiders undergoing wing molt were also located in Kuskokwim Bay (Phillips et al. 2006). Increased vessel traffic and fuel or other toxic spills from vessel traffic may have adverse effects on staging birds.

3. The EIS should identify streams, lakes, and other aquatic habitats that support anadromous or resident fish that may be affected by the proposed project.
4. Vegetation clearing timing windows should be incorporated in the EIS for minimization of project effects on migratory birds (http://alaska.fws.gov/fisheries/fieldoffice/anchorage/pdf/veg etation_clearing.pdf).
5. The EIS should address presence and potential impacts of the project on all birds protected under the Migratory Bird Treaty Act and especially to birds of conservation concern and bird concentrations. The Service has several datasets on waterfowl that may be applicable to evaluation of the proposed project.
    a. The Service has conducted aerial waterbird surveys of wetlands around Alaska for many years. These surveys provide abundance, distribution, and trend information for many waterbird species. Resulting data are available in geographic information system (GIS) geodatabases (Map 2).
    b. A series of spring aerial surveys of breeding waterbirds were conducted on the Yukon Delta National Wildlife Refuge (Platte and Butler 1993), Tanana/Kuskokwim area (Platte 2003), and Kenai/Susitna area (Platte et al. 2012), all of which are regionally located around project components.
    c. Trumpeter swan census data have been collected every 5 years with population size, trend, and distribution data; the last census occurred in 2005 (Conant et al. 2007). Beginning in 2010, survey designs were changed to sample habitat. Locations of trumpeter swans observed during the 2005 census are shown on Map 2.
    d. The Southwest Alaska Spring Steller's eider aerial survey has been conducted annually, in mid-May, from 1992-2012 (except 1995, 1996, 1999, 2006; Larned 2001). This survey monitors distribution and abundance of waterbirds in the nearshore marine environment from the mouth of the Kuskokwim River to Cold Bay.
    e. Harlequin ducks are an important species for the Service, but we are unaware of information on harlequin duck distribution in the project area. The EIS should identify streams in the vicinity of the project that provide suitable breeding habitat for harlequin ducks. If breeding habitat is present, analysis should include potential effects on harlequin ducks due to disturbance and changes in stream water quality.
6. The EIS should address presence, utilization, and potential project effects on subsistence resources located in the Kuskokwim Delta (Attachment 2). The Kuskokwim Delta is comprised of shifting channels and shallow mud flats that change with tides. Contaminants upriver or in the Kuskokwim Delta may affect coastal communities and habitat along the Yukon Delta National Wildlife Refuge and Nelson Island. Critical eel grass habitat for herring (a key subsistence fish species for Kuskokwim Delta communities) exists in the Kuskokwim Delta region and around Nelson Island. Harm to these eel grass beds from hydrocarbons or other contaminants could destroy herring spawning habitat and impact a key source of subsistence food for these communities. Yukon-Kuskokwim Delta coastal communities harvest filter feeding clams and mussels, an important part of the subsistence diet that can accumulate contaminants.

Mine Site and Facilities – The EIS should analyze potential direct, indirect, and cumulative impacts on fish, wildlife, habitat, water, and subsistence activities from the mine site and associated facilities.

1. The EIS should address potential impacts of water impoundments on migratory birds. Poor water quality could negatively impact migrating waterbirds, especially if impoundments are used as roosting or staging sites.
    a. Twelve birds of conservation concern have been surveyed around the facility (Table 1). Whimbrel and olive-sided flycatcher breed at higher densities near the mine site in comparison to other areas in Alaska. The facility and the surrounding area may be of regional importance in supporting populations of these species.
2. The EIS should discuss effects on migratory birds in the surrounding area from blasting and explosive use. The magnitude and timing of explosives use could disturb birds using the area, particularly during the breeding season (Barrick Cowal 2010). Avoidance and minimization such as use of seasonal timing restrictions should be analyzed.
3. The EIS should analyze potential risk of bird strikes with towers, power transmission lines, or other above ground infrastructure. Vertical structures should be evaluated for potential bird collisions during spring and fall migration when larger numbers of birds are at risk.
4. The EIS should address effects of transportation corridors on fish, wildlife, and subsistence resources including: impacts associated with access roads and potential public use; changes in wildlife movement or migration patterns; habitat fragmentation; and increased pressure on subsistence species.
5. The EIS should address impacts on the subsistence lifestyle from the proposed open pit mine operating in relative proximity to otherwise pristine intact ecosystems. Analysis should include cumulative effects of historic, current, and proposed mines in the region including the NYAC and Red Devil mines.
6. The EIS should analyze seismic activity and potential impacts from a failed tailings dam including effects to subsistence food and water resources. Worst case scenarios, potential alternatives, and mitigation measures should be analyzed.

Natural Gas Pipeline - The EIS should analyze potential direct, indirect, and cumulative effects on fish, wildlife, habitat, and subsistence activities from the natural gas pipeline.

1. The EIS should analyze pipeline effects on fish, wildlife and their habitats including habitat fragmentation, stream crossings, bisected wildlife migratory routes, and disturbance to fish and wildlife from pipeline inspection and maintenance activities.
2. The EIS should identify streams crossed by the pipeline that support anadromous or resident fish species.
3. The EIS should describe potential effects on fish and habitat from temperature changes related to cold pipeline crossings of streams. The cold pipe may produce aufeis and create fish passage issues.

4. The EIS should analyze effects on fish, wildlife, and habitat of increased human use of the pipeline route for local travel by ATVs and snow machines in areas that were previously inaccessible.
5. The EIS should address presence and potential effects from pipeline activities on all birds protected under the Migratory Bird Treaty Act, especially birds of conservation concern. Literature reviews and surveys will be necessary to determine which species and habitats are at risk of disturbance from pipeline construction, operation, and maintenance. The following are examples of issues that should be further analyzed in the EIS:
    a. Census data indicate trumpeter swans occur in the vicinity of the proposed pipeline crossing of the Kuskokwim River. There is potential for disturbance of trumpeter swans and their nesting habitat from pipeline construction across the Kuskokwim River and in the Cook Inlet area. Swans also occur in the Susitna lowlands at the eastern side of the pipeline.
    b. Five raptor species classified as species of conservation concern were documented along the pipeline route (Table 1). Donlin's Environmental Evaluation Document indicates that abundance of these species is difficult to determine (EED, ARCADIS 2012). We recommend that adequate surveys be conducted to assess raptor use of the project area and that the EIS evaluate project impacts on important raptors.

Barge Transportation - The EIS should analyze potential direct, indirect, and cumulative effects on fish, wildlife, habitat, and subsistence activities from the proposed riverine and marine transportation system, including ports and barges.

1. The EIS should evaluate aquatic habitat, currents, circulation patterns, and tides throughout the fuel and cargo transport zones to determine areas of potential impacts, and to identify potential avoidance and minimization measures.
2. The EIS should analyze effects of potential ice breaking associated with ship traffic in winter and spring.
3. The EIS should evaluate impacts from bank erosion caused by barge traffic on aquatic resources. For example, increased bank erosion from barge traffic may have impacts on salmon and whitefish rearing habitat along the Kuskokwim River. These impacts may negatively affect fish populations and subsistence food resources.
4. The EIS should consider effects on fish habitat and migration, wildlife and subsistence users from increased sedimentation due to dredging and construction of ports. Dredging of the Kuskokwim River may be necessary to accommodate the size and frequency of planned barge traffic.
5. The EIS should identify Pacific walrus habitat and potential effects of barge traffic or contaminant spills on walrus and subsistence users. Walrus are an important subsistence food hunted by many Yukon-Kuskokwim Delta coastal communities. Walrus feeding areas occur in the nearshore zone of many Kuskokwim Delta communities. These areas could potentially be affected by spills anywhere along the river due to the flow of coastal currents.

6. The EIS should analyze effects on migratory birds from increased barge traffic in the Kuskokwim River and marine waters. The Bering Sea and the Gulf of Alaska have numerous foraging areas of regional or global importance for sea ducks, seabirds, breeding seabird colonies, as well as important migratory stopover areas for shorebirds.
    a. On the Kuskokwim River upstream of Napaskiak, there are 14 bird species of conservation concern breeding in riparian habitats of both the river and its tributaries (Harwood 2000, 2002; Table 2). Many of these species breed at exceptionally high densities compared to other parts of their breeding ranges (Cotter and Andres 2000); thus, habitat adjacent to the transportation corridor is likely of at least regional importance in supporting populations of these species.
    b. Downriver of Napaskiak there are 23 species of birds of conservation concern identified in Donlin's Environmental Evaluation Document (ARCADIS 2012) (Table 1). This includes 13 of the 20 shorebirds of conservation concern in Alaska, most of which have significant portions of their global populations breeding or migrating through the Yukon-Kuskokwim Delta. Kuskokwim Shoals is an important staging and feeding area for waterfowl during spring and fall migration (Larned and Tiplady 1996).
7. The EIS should evaluate other reasonably foreseeable projects in the region and it should evaluate practicable alternatives that would minimize disturbance of wildlife in the region. For example, a proposed portage road between the Yukon and Kuskokwim Rivers should be considered as a shipping alternative to barging materials and fuel up the Kuskokwim to determine whether that would minimize regional impacts from cumulative development.

Contaminants – The EIS should analyze potential direct, indirect, and cumulative impacts on fish, wildlife, habitat, and subsistence activities from contaminants.

1. The EIS should analyze effects on all aspects of the environment from risk of failure to manage and treat Donlin Mine wastewater in perpetuity. The necessity to treat all water discharged from the site in perpetuity, in order to avoid impacts from acid mine drainage and leaching of toxic metals into the area's rivers and streams, should be fully evaluated. This is particularly true, because according to our interpretation of what Donlin representatives have stated, the potential for acid mine drainage will increase about 60 years after mine closure, when the natural buffering capacity of the native rock is exhausted and the pit lake is full. The EIS should analyze scenarios where site water is not treated prior to discharge, model how far downstream acid mine drainage and metal impacts would extend, and evaluate severity of potential impacts on the environment.
2. The EIS should describe and evaluate chemical management plans to ensure safe usage, storage, and transport of all toxic chemicals.
3. The EIS should include analysis of potential effects of contaminants and toxins in the airshed on the ecosystem, drinking water supply, and subsistence resources. Many villages get their water directly from adjacent rivers. The potential for aerial contaminants, either allowed or accidental, poses additional issues for aquatic and terrestrial habitats, and would

extend the scope of concern to include many other resources, such as berry harvest areas, lichen and upland tundra, and inland forest resources.

4. Impacts of fugitive dust, particulate and dust contamination on flora in the vicinity of the mine should be analyzed in the EIS. Mitigation should be analyzed to reduce fugitive dust at the mine and along transportation corridors. Villagers from regional subsistence communities have expressed concern for particulate and dust contamination across the landscape both for accumulation on moose and caribou browse and for contamination of berries and greens that are harvested in the Kuskokwim River region and eaten in large quantities throughout the year.
5. Contaminants analysis in the EIS should consider potential impacts to aquatic organisms important to the food chain and ecosystem functioning. Contaminants may impact birds indirectly through their food sources or directly through contact with toxic pit or tailings facility water or spills, or could affect egg laying and nesting success. Most communities in the Yukon Kuskokwim Delta region harvest duck and goose eggs as an important part of their subsistence diet in the spring. Accumulation of toxins in eggs of bottom feeding waterfowl is a concern. Subsistence foods are not directly replaceable with beef or chicken or farm raised berries if subsistence foods are contaminated.
6. The EIS should quantify the potential amount of fugitive mercury emissions to air per year, from the tailings and other project areas, during the mine operation period. Some fugitive mercury emissions must occur, because mercury trapping technologies cannot be 100% efficient. The EIS analysis should determine the quantity of mercury potentially released, and model the deposition zone in which the mercury would settle to area lands and waters. Potential impacts on fish, wildlife and people need to be described.
7. The EIS should evaluate potential effects on migratory birds from increases in mercury and other toxic chemicals from mine activities. Mercury levels are already elevated in fish in the middle Kuskokwim River (Matz 2012). Northern wetlands are hotspots for converting mercury into toxic methyl mercury. Many bird species occurring in the area are prone to toxic mercury exposures through methylation and bio-magnification of mercury in wetland systems. Bird species such as bald eagles, loons, swallows, and even rusty blackbirds have been found to be exposed to high levels of methyl mercury in other parts of their range either from atmospheric deposition or point sources (Evers et al. 2005, Edmonds et al. 2010). Thus, even small to modest increases in mercury in the area from the mine may increase mercury exposures in birds to levels which reduce survival and reproductive success. Based on the surveys described in Donlin's Environmental Evaluation Document (ARCADIS 2012), there are 26 bird species of conservation concern that occur in the project planning area (Table 1). Many birds breed at high densities or occur in large migratory concentrations down river of the mine facility, often in concentrations of regional or global significance. Thus, downstream impacts of contamination from mine activities or transport of fuel could have significant impacts on regional or globally important bird habitat. These impacts have the potential to influence migratory bird subsistence resources of the area, which have an important role in the culture of the region.
8. Cumulative levels of mercury in biota from all sources should be addressed in the EIS.

Bioaccumulation of methylmercury has already reached a level of public health concern in some predatory fish species in the Kuskokwim River drainage (Matz 2012). Current state public health guidelines recommend that women of childbearing age limit their consumption of some fish species in this drainage, to avoid potential health impacts to the developing fetus (see www.epi.alaska.gov/eh/fish). Mercury inputs and methylation rates in Alaskan rivers are expected to increase with climate change (Schuster et al 2011). While project related levels of mercury input may or may not have significant effects when considered alone, both allowed and accidental inputs of additional mercury must be evaluated in the context of the existing environment. Project related increases of mercury in fish have the potential to affect local human welfare, given the critical role subsistence fisheries play in this area. Fear or loss of confidence in the safety of subsistence foods could result in a shift away from subsistence toward market foods, resulting in decreased status (Murphy 1997. This effect may not be limited to the project area, but could extend downstream for a currently undetermined geographic extent.

9. The EIS should consider the annual consumption quantities of locally harvested subsistence foods when assessing risk of contamination for communities on the Yukon and Kuskokwim rivers. Lower 48 EPA fish consumption guidelines are not relevant to Alaska subsistence foods consumption levels and should not be used; rather guidance from the Alaska Division of Public Health should be used. Bioaccumulation in long-lived fish consumed for subsistence is of particular concern. Whitefish is eaten year round by people in all Kuskokwim communities. Both broad and humpback whitefish are quite long-lived bottom feeders with one broad whitefish aged at approximately 40 years. Burbot and burbot liver are also eaten frequently on the Kuskokwim and test results indicated elevated levels of mercury. Northern pike, also a long-lived resident fish, is known to bio-accumulate toxins due to its location on the food chain. People in many communities on the Kuskokwim eat dried pike, which concentrates bioaccumulative chemicals and is eaten in larger quantities then fresh fish. The Service and the Alaska Division of Public Health have collaborated to provide site-specific pike consumption guidelines to some Kuskokwim River villages based on how subsistence foods were eaten (fresh vs. dried and typical quantities eaten) (see www.epi.alaska.gov/eh/fish).
10. The EIS should evaluate potential impacts to migratory birds associated with organic waste. Increases in anthropogenic waste (garbage), if not properly managed, could lead to increases in populations of gulls, ravens, and foxes which in turn could lead to increased nest predation on other bird species. Organic waste should be managed to reduce attractants to scavengers.
11. The EIS should address the feasibility and risks to the environment associated with towing three shipments of four barges per day, from breakup to freeze-up, on the Kuskokwim River. The EIS should analyze the risks associated with transport of toxic chemicals on the river barges, including plausible accident scenarios. Specifically, the EIS should consider the risk of cyanide spills during transport to the mine site, and the risk of pure elemental mercury spills during transport from the site. Chemicals such as cyanide (NICNAS 2010),

and mercury (Davis et al. 2003) can have adverse effects on subsistence lifestyles, migratory birds, and fish.

12. The EIS should evaluate presence and potential impacts on migratory birds from shipping disturbance and potential fuel contaminants. The proposed route from Dutch Harbor through Bristol Bay to the Jungjuk port site has the potential for fuel spills that could have significant impacts to migratory birds. There are a large number of sea ducks, particularly black scoters, long-tailed ducks, and common eiders utilizing Kuskokwim Shoals. In the fall, mudflats are used by godwits and other shorebirds, as well as thousands of foraging northern pintails. The coastal area from the mouth of the Kuskokwim River to the south side of Nelson Island is the most important area for fall staging shorebirds on the west coast of North America. It supports hundreds of thousands, if not millions, of shorebirds, including virtually the entire North American-breeding population of bar-tailed godwits that stage there before flying non-stop to New Zealand and Australia.
13. The EIS should analyze potential effects of fuel spills on subsistence resources and users. Fuel spills that affect the Yukon-Kuskokwim Delta coast may have critical impacts to coastal villages, including contamination of water, contamination of critical subsistence resources, and long-term contamination of wildlife and habitats. The EIS should analyze possible scenarios, and explore whether spills directly affecting coastal villages might require evacuation or even permanent relocation.
14. The geographic scope of analysis in the EIS should include all areas of potential contamination, including the Kuskokwim River delta and the shallow waters of the Bering Sea. Any project related contamination has the potential for negative impacts on Kuskokwim River fisheries, Yukon River fisheries, Pacific walrus populations, and all four Pacific waterbird and shorebird flyways. In their study of the Yukon Delta, Thorsteinson et al. note, "The delta is characterized as a 'pass-through' system or exporting-type estuary . . .The majority of river-borne particulate matter and dissolved nutrients are transported offshore with the Yukon River plume into the inner shelf waters of the northern Bering Sea " (Thorsteinson et al. 1989:iii). Although that study was focused on the Yukon Delta specifically, the same processes are true for the Kuskokwim Delta. Contaminants affecting upriver Kuskokwim resources may eventually impact lower Kuskokwim, coastal, and near-shore resources. Impacts in the Kuskokwim Shoals may extend to Yukon River salmon populations and marine mammals, including Pacific walrus (Garlich-Miller et al. 2011) through their temporary residence in the shoals (Murphy et al. 2009). Pacific walrus are dependent on benthic invertebrates as prey (Rausch et al. 2007); contamination of benthic invertebrates could potentially affect Pacific walrus. Negative impacts to coastal habitats could affect a large portion of North American waterfowl and shorebird populations, including populations from all North American Flyways, as well as the East Asian-Australasian Flyway.

Hydrology – The EIS should analyze potential direct, indirect, and cumulative effects on fish, wildlife, habitat, and subsistence activities from project related hydrologic changes to the Kuskokwim River watershed.

1. The EIS should include delineation of all wetlands potentially affected by the project, include an assessment of wetland functional values, and fully evaluate impacts on wetlands.
2. The EIS should consider impacts from project water management on fish, wildlife, habitat, and subsistence resources. Baseline hydrology, hydrologic balance, and project related changes in the hydrology of the area surrounding the mine should be analyzed in the EIS. Groundwater pumping and dewatering of streams and wetlands in the vicinity of the mine may affect fish spawning, rearing, and overwintering habitat, migratory birds and other animals.
3. The EIS should include a water resource analysis that evaluates all disturbances (e.g. surface hardening and soil compaction from roads, airstrip, overall facility footprint, overburden removal, permafrost disturbance, etc.) that may influence water storage capacity and infiltration rates related to groundwater. The following are examples of issues that should be further analyzed in the EIS:
    a. Baseflow during winter provides critical refugia and incubation for juvenile salmon and other fish in the lower reaches of Crooked Creek; changes in baseflow could have a direct impact on survival of these fish. Changes in timing, magnitude and duration of discharge, as well as changes that alter physical (temperature, chemical or geomorphological) components of streams could have detrimental effects on aquatic and riparian biological communities, and may affect communities farther downstream in the Kuskokwim.
    b. Disruption of seasonal migration of various species of fish may be affected and channel-forming flows may be altered by the project, which could result in indirect loss of habitat complexity (similar to what has been observed on the Tuluksak River as a result of past mining).
4. The EIS should consider effects on subsistence users from changes in the watershed and hydrologic regime due to barge transportation. The Kuskokwim River is difficult to navigate even with small flat bottom skiffs. Constantly shifting channels cause silt, mud and gravel buildup in different areas depending on water flow. Ocean tide and wind influence occurs approximately 40 miles upriver from the delta and causes constant shifting of sand bars in the lower river. Known gravel bar areas where small boats often run aground are in important known confluences with salmon spawning tributaries and in-river rainbow smelt spawning. The following are examples of effects on subsistence users that should be further analyzed in the EIS:
    a. A shallow gravel bar is located near the confluence of the Tuluksak and Kuskokwim Rivers. The Yukon Delta National Wildlife Refuge is currently faced with managing critically low Chinook salmon returns on the Tuluksak River. Dredging, barge grounding, or spills in this area would result in additional impacts to that Chinook stock.
    b. Rainbow smelt are an important subsistence fish providing some of the first early fresh fish in the spring. Their exact spawning locations are uncertain but one known area of congregation is near a shallow gravel area below the village of Kalskag.

Gravel areas along the Kuskokwim are of likely importance for numerous fish species and potential project related dredging to deepen channels for barge traffic should be evaluated in the EIS.

c. Bering cisco, an important subsistence fish species to communities on the Yukon Delta coast, is endemic to western Alaska with only three known spawning populations which include both the Yukon and Kuskokwim Rivers. Recent research is only beginning to shed light on their spawning locations and habits. Potential project related dredging for barge traffic or accidental contamination of nearby tributary rivers could potentially impact populations of this important subsistence fish species.

Climate Change - The EIS should assess potential climate change effects associated with the project including: greenhouse gas emissions associated with the project; changes in the carbon cycle due to manipulation of natural carbon sinks and sources; and climate-related biological changes over time. The EIS should also evaluate effects of climate change on the project (i.e. water management, need for dredging to accommodate barge traffic, revegetation, reclamation, and water treatment in perpetuity).

1. The EIS should include analysis of potential increase in permafrost thaw and erosion of river banks with increased barge traffic. Permafrost thaw is currently causing slumping and weakening of some bank areas along the Kuskokwim River. The rate of thaw may increase with climate change in the region. Frequent large barge traffic wakes may exacerbate erosion problems.
2. Climate change analysis should include impacts of permafrost thaw to the structural integrity of impoundments. The mine pit and tailings impoundment are proposed in a region of discontinuous permafrost. Because of permafrost conditions, especially in light of global climate change, even near-future climate change predictions make the structural security of containment structures an important issue. The EIS should evaluate the probability of failure to maintain the tailings impoundment and to treat water in perpetuity, and the consequences of such a failure.
3. The EIS should include analysis of changes in environmental conditions over time, changes in surrounding habitat during the reclamation and restoration phase of the project, and adaptive management in response to changes of temperature and precipitation.
4. The EIS should include analysis of climate change induced effects on precipitation, snow pack, stream flows, and culvert sizing and effects on the project. Analysis should consider changes in the hydrologic regime on the Kuskokwim River on planned barge traffic, need for dredging, water management, and water treatment. The EIS should include analysis of climate-driven habitat changes, and changes in biomes, and analyze cumulative impacts of the project, other reasonably foreseeable development in the region, changes in human population, increases in demand for subsistence resources, and climate-driven changes. The Service recommends that an analysis similar to the Chuitna Integrated Hydrologic Effects Model be developed for this project (Prucha et.al.2011).

Yukon Delta National Wildlife Refuge - The Service recommends that the EIS fully analyze potential project effects on lands and waters within the Yukon Delta National Wildlife Refuge. The Yukon Delta National Wildlife Refuge is the second largest Refuge in the United States. It was created to protect and maintain internationally significant waterfowl, shorebird, marine mammal, and salmonid populations, subsistence use, and other resources. The Refuge and its fish and wildlife resources could be impacted by the project through higher levels of disturbance, harvest, and risk of contamination, especially given the interconnectedness of the delta aquatic ecosystem. This low-lying delta ecosystem is connected through a vast network of freshwater streams, rivers, ponds, lakes, and groundwater. It contains a vast and unique coastline providing significant feeding grounds for fish and wildlife resources. Coastal systems and tidal influences reach more than100 km inland. The Yukon and Kuskokwim rivers export vast amounts of water, nutrients, and other materials into the Bering Sea. Recent increases in the extent and frequency of storm surges have increased the geographic extent of coastal impacts.

1. The EIS should analyze the internationally significant coastal habitats and Wilderness Area resources managed by the Yukon Delta National Wildlife Refuge. The Refuge hosts the largest active delta habitat in North America, the Nunivak Wilderness (including marine, shoreline, dune, visual, and subsistence resources), shallow water resources such as eelgrass beds and estuarine waters, coastal villages, waterfowl and shorebird nesting and molting habitat, salmon rearing habitat, and marine mammal habitat. These areas will be at higher risk of disturbance and contaminants as a result of the project. For example, although seabird nesting takes place largely on cliffs above waterline, seabirds would be subject to both visual and noise disturbance from increased barge traffic, as well as potential contamination from fuel or other spills, or contamination of marine food resources. Marine mammals would not always be present in the area, but their food resources would be subject to contamination and disturbance throughout the year.
2. The EIS should analyze streams and habitats in the Refuge that may be impacted by the project. Refuge streams and wetlands which support anadromous or resident fish, or other aquatic species, may be at risk from changes in water quality, increases in harvest, and increased barge traffic on the Kuskokwim River.
3. The EIS should analyze indirect project effects on Refuge subsistence resources and uses. Subsistence hunters that reside within the Refuge boundary have Customary and Traditional Use Determination status under the Federal hunting regulations for the mining area. The project may impact these subsistence hunters. Berry picking and other plant harvest is also a critical part of subsistence use in this region. A decrease in hunting and gathering opportunities in the proposed project area may result in a compensatory increase in hunting and other subsistence activities within the Refuge.
4. The EIS should analyze potential effects of increased disturbance on subsistence species such as caribou and moose. Project activities including increases in air, barge, and vehicular traffic, increased human access, and the physical presence of the road and pipeline, may result in both long- and short-term, disturbance of the Mulchatna Caribou Herd (MCH) or

other caribou herds. The MCH continues to define their range and has been located near the Crooked Creek area in the past. It is likely the herd will need to shift their range northward as climate changes, making this corridor potentially even more important to survival of the herd. Construction and utilization of the proposed road and pipeline has the potential to interrupt caribou movement. Increased access along the road, pipeline, and unofficial routes, and increases in human population may also result in increased hunting pressure, both from locals and others. Constriction of movement options, combined with increased disturbance and hunting pressure, may cause increased energetic stress upon caribou, reduce opportunities for use of high quality graze, or increased predation pressure. Moose that utilize the Refuge may be disturbed by the mine and barge traffic. Moose currently utilizing the proposed project area may be displaced. Some level of negative impact to the local moose population may be inevitable through loss of habitat, increased human access, and increased hunting pressure.

5. The EIS should analyze coastal resources within the Yukon Delta National Wildlife Refuge that may be impacted by project related disturbance and fuel spills.
    a. The EIS should analyze spectacled eiders, Steller's eiders, and their critical habitat. The central coast of the Yukon-Kuskokwim Delta also serves as a breeding ground for about 80% of the world's population of emperor geese (Eisenhower and Kirkpatrick 1977). In addition, virtually the entire Pacific population of Steller's eiders (i.e., 70-100 thousand birds) stage on the Kuskokwim Shoals in the spring and low thousands (including an apparently disproportionate number of Alaska-breeding birds) molt in the waters just off this shoreline in the fall. Due to their low population size and restricted breeding locations, spectacled eiders, Steller's eiders, and emperor geese are especially vulnerable to catastrophic events, such as oil spills. It is possible that Kittlitz's murrelets, a candidate for listing under the Endangered Species Act, may nest on Nunivak Island. This area provides habitat or migration corridors for the Pacific walrus and harbor seal, spotted seal, bearded seal, and beluga whales that are protected under both the Marine Mammal Protection Act and ANILCA on the Refuge. Etolin Straights is a primary migration route for Pacific walrus, which have been documented as sensitive to noise and physical disturbances from vessel traffic, and to oil spills (Garlich-Miller et al. 2011).
    b. The EIS should analyze existing subsistence opportunities within the Refuge, potential effects of increased hunting from increased human population associated with the mine, and associated changes to harvest limits per capita. The EIS should include cumulative effects of human population from the Bethel Census area (including the area from the coast to inland of the project area) which has been increasing at a rate of roughly 1% per year. Increased populations, both associated with the project and ancillary activities, may result in increased subsistence and recreational harvest demands, which could potentially result in lower per capita harvest opportunity on the Refuge. The EIS should include analysis of cumulative effects that may negatively impact opportunities for subsistence harvest within the Refuge such as: surrounding resource development, increased access and traffic,

climate change related habitat changes, and potential changes to subsistence opportunities within the Refuge.

Mitigation - The EIS should include analysis of measures to avoid and minimize impacts to fish, wildlife, habitats, and subsistence activities, and to provide compensatory mitigation for impacts which cannot be avoided or minimized.

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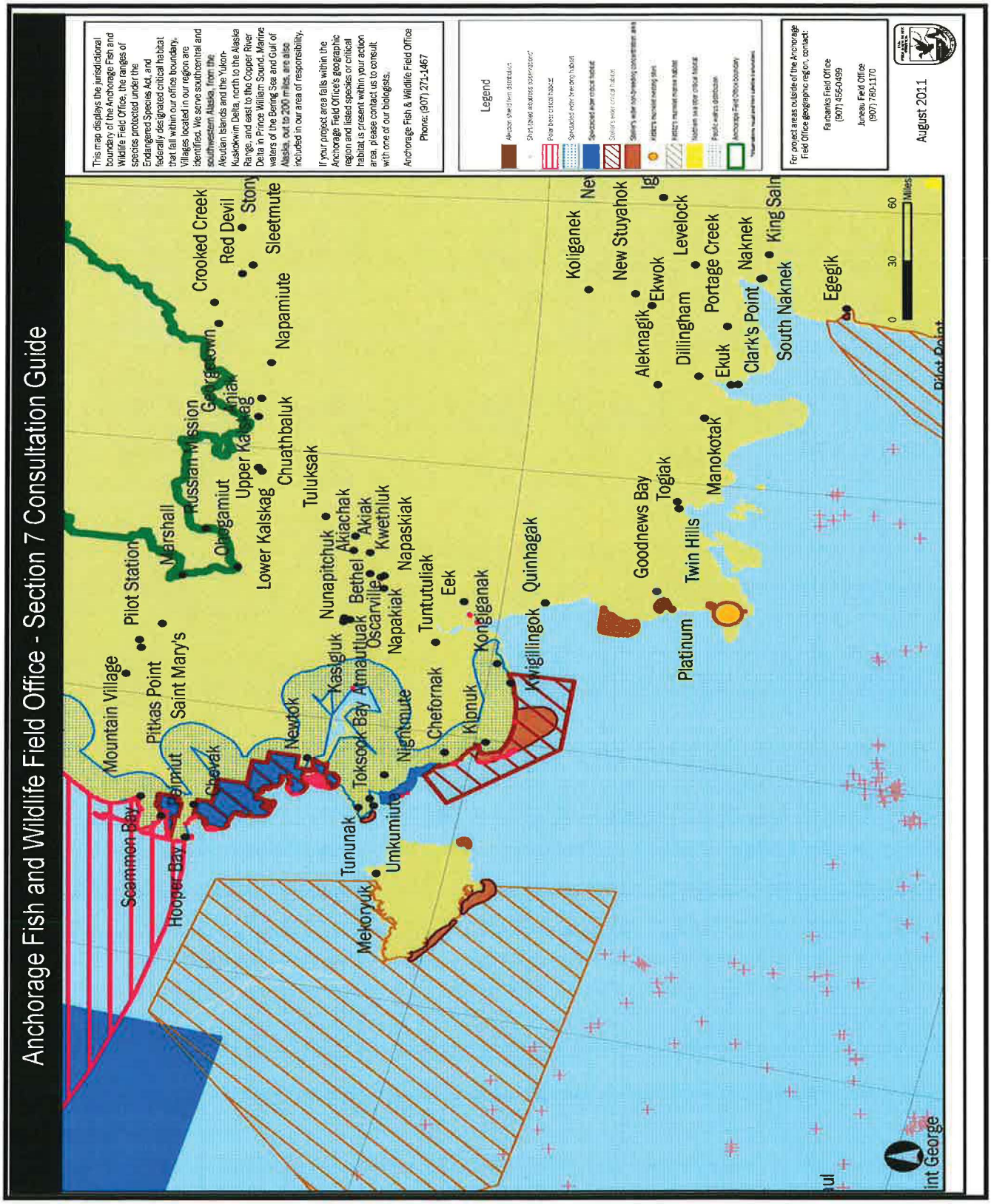
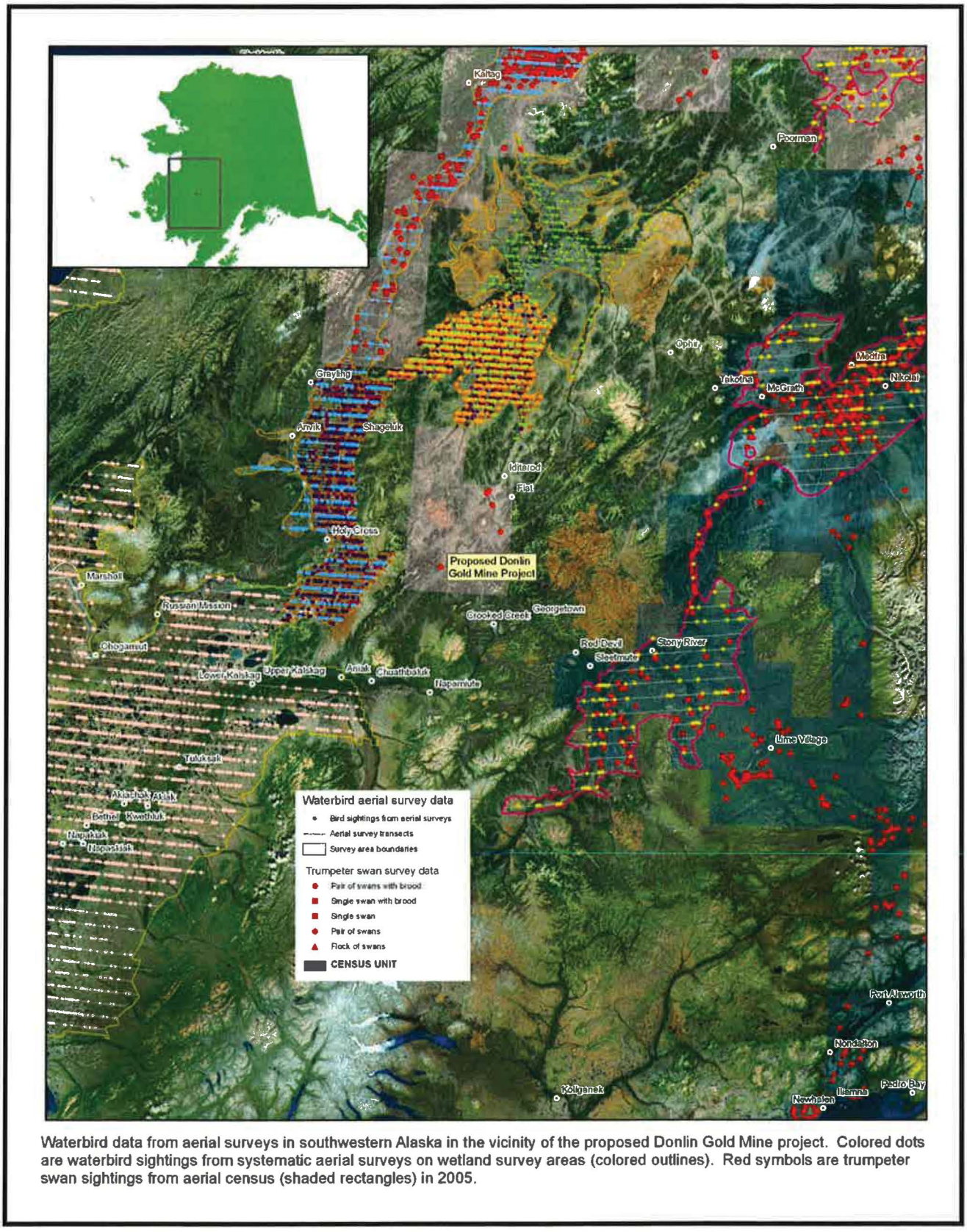
Map 1. Ranges of species protected under the Endangered Species Act



Map 2. Service Generated Data on Waterbirds. Data were made available by Bob Platte at the USFWS Regional Office in Anchorage, Alaska.



Waterbird data from aerial surveys in southwestern Alaska in the vicinity of the proposed Donlin Gold Mine project. Colored dots are waterbird sightings from systematic aerial surveys on wetland survey areas (colored outlines). Red symbols are trumpeter swan sightings from aerial census (shaded rectangles) in 2005.

Table 1. Non-game birds of conservation concern detected within the planning area of the Donlin Gold Project.

	Facility	Transportation Corridor		Pipeline[2]
Species of concern		Below Napaskiak	Above Napaskiak[1]	
Red-throated Loon		x	*	
Yellow-billed Loon		x		
Bald Eagle	x	x	*	x
Golden Eagle	x	x	*	x
Gyrfalcon	x	x		x
Peregrine Falcon	x	x	*	x
American Golden Plover	x	x		
Solitary Sandpiper		x	*	*
Lesser Yellowlegs		x	*	*
Whimbrel	x	x	*	
Bristle-thighed Curlew	?	x		
Hudsonian Godwit		x	*	*
Bar-tailed Godwit		x		
Dunlin		x		
Black Turnstone		x		
Red Knot		x		
Western Sandpiper		x		*
Rock Sandpiper		x		*
Short-billed Dowitcher	x	x	*	*
Arctic Tern		x	*	*
Short-eared Owl				x
Olive-sided Flycatcher	x		*	*
Varied Thrush	x	x	*	*
Blackpoll Warbler	x	x	*	*
Rusty Blackbird	x	x	*	*
McKay's Bunting		*		
Total number of species	**12**	**23**	**14**	**16**

Species detected from the surveys described in the Environmental Evaluation Document (ARCADIS 2012) are denoted by 'x'; species detected based on other surveys or information are denoted by '*'. Species of concern are based on evaluations by Alaska Department of Fish and Game (2006), Alaska Shorebird Group (2008), Audubon Alaska (Kirchhoff and Padula 2010), Boreal Partners in Flight (in prep.), or the U.S. Fish and Wildlife Service (2008).

Table 2. Average numbers of birds counted per survey stop along 8 Breeding Bird Survey routes along the Kuskokwim River, Alaska (Harwood 2000, 2002). Non-game species of conservation concern are in bold. Data were made available by Kristine Sowl, Yukon Delta National Wildlife Refuge.

Species	Birds / stop		Species	Birds / stop
Northern Waterthrush	2.5008		Ruby-crowned Kinglet	0.0177
Fox Sparrow	1.4714		Boreal Chickadee	0.0152
Bank Swallow	1.4192		Pacific Loon	0.0152
Yellow Warbler	1.3729		Cackling Goose	0.0143
Gray-cheeked Thrush	1.1894		Northern Shoveler	0.0143
Blackpoll Warbler	1.1136		Greater Scaup	0.0118
Redpoll sp.	0.8519		Belted Kingfisher	0.0109
Wilson's Warbler	0.7576		Long-tailed Jaeger	0.0109
Varied Thrush	0.7407		Northern Pintail	0.0101
Alder Flycatcher	0.7180		Pacific Golden-Plover	0.0093
Yellow-rumped Warbler	0.6221		**Whimbrel**	0.0093
Orange-crowned Warbler	0.5774		Bohemian Waxwing	0.0084
American Tree Sparrow	0.5278		Common Loon	0.0084
Tree Swallow	0.4377		Downy Woodpecker	0.0084
Wilson's Snipe	0.4192		Red-tailed Hawk	0.0084
American Robin	0.2668		Ruffed Grouse	0.0076
Swainson's Thrush	0.1692		Bonaparte's gull	0.0067
Rusty Blackbird	0.1540		Great-horned Owl	0.0059
Gray Jay	0.1439		Semipalmated Plover	0.0059
White-crowned Sparrow	0.1439		**Bald Eagle**	0.0051
American Wigeon	0.1431		**Red-throated Loon**	0.0042
Lesser Yellowlegs	0.1212		Three-toed Woodpecker	0.0042
Spotted Sandpiper	0.1162		**Hudsonian Godwit**	0.0034
Solitary Sandpiper	0.0884		Osprey	0.0034
Lincoln's Sparrow	0.0732		Red-breasted Merganser	0.0034
Common Goldeneye	0.0715		Red-necked Phalarope	0.0034
Common Raven	0.0682		White-winged Crossbill	0.0034
Black-capped Chickadee	0.0581		Hermit Thrush	0.0025
Pine Grosbeak	0.0581		**Peregrine Falcon**	0.0025
Mew Gull	0.0564		Eastern Yellow Wagtail	0.0025
Green-winged Teal	0.0480		Cliff Swallow	0.0017
Sandhill Crane	0.0471		Greater White-fronted Goose	0.0017
Savannah Sparrow	0.0471		Lapland Longspur	0.0017
Tundra Swan	0.0463		Parasitic Jaeger	0.0017
Olive-sided Flycatcher	0.0412		Rough-legged Hawk	0.0017
Arctic Warbler	0.0387		Common Merganser	0.0008
Red-necked Grebe	0.0379		**Golden Eagle**	0.0008
Dark-eyed Junco	0.0362		Harlequin Duck	0.0008
Glaucous Gull	0.0362		Merlin	0.0008
Least Sandpiper	0.0362		Northern Goshawk	0.0008
Arctic Tern	0.0328		Northern Harrier	0.0008
Short-billed Dowitcher	0.0295		Northern Shrike	0.0008
Mallard	0.0236		Sharp-shinned Hawk	0.0008
Greater Yellowlegs	0.0202		Willow Ptarmigan	0.0008

Attachment 2 - Additional Literature

The U.S. Fish and Wildlife Service, Office of Subsistence Management has provided additional research that may be useful in the analysis of the EIS. The following in a list of subsistence uses of fish and wildlife resources. The list includes villages located in Kuskokwim Bay and the lower and middle Kuskokwim River. This information was collected as part of a strategic planning process at the Fisheries Resource Monitoring Program at the Office of Subsistence Management, USFWS, in Anchorage, Alaska. Many of the following reports are available at the Fisheries Resource Monitoring Program website (http://alaska.fws.gov/asm/fis.cfml?fissel=5) or at the ADF&G Division of Subsistence website (http://www.adfg.alaska.gov/sf/publications/)

2001–2003 study years: Nonsalmon fish subsistence harvest surveys—**Bethel** (Whitefish species are lumped, no use area mapping, no local knowledge)

Simon, Jim, Tracie Krauthoefer, David Koster, Michael Coffing, and David Caylor. 2007. Bethel subsistence fishing harvest monitoring report, Kuskokwim Fisheries Management Area, Alaska, 2001-2003. ADF&G Division of Subsistence, Technical Paper No. 330. OSM 01-024

2001–2003 study years: Nonsalmon fish subsistence harvest surveys—**Aniak and Chuathbaluk** (Whitefish species are lumped, use areas mapped but timeframe unknown, no local knowledge)

Krauthoefer, T., T. Simon, M. Coffing, M. Kerlin, and W. Morgan. 2006. The harvest of nonsalmon fish by residents of Aniak and Chuathbaluk, Alaska, 2001-2003. ADF&G Division of Subsistence Technical Paper No. 299. Juneau. OSM 01-112

2005–2006 study years

Salmon and nonsalmon fish local knowledge—**Quinhagak, Goodnews Bay, and Platinum**

LaVine, R., M.J. Lisac and P. Coiley-Kenner. 2007. Traditional ecological knowledge of 20th century ecosystems and fish populations in the Kuskokwim Bay Region. U.S. Fish and Wildlife Service, Office of Subsistence Management, Fisheries Resource Monitoring Program. Final Report for OSM 04-351. Anchorage.

2005–2009 study years: Nonsalmon fish harvest surveys and local knowledge—**Eek, Tuntutuliak, and Nunapichuk** (Whitefish species are lumped, use area mapping but time frame unknown, emphasis on local knowledge.)

Ray, L., C. Brown, A. Russell, T. Krauthoefer, C. Wassillie, and J. Hooper. 2010. Local knowledge and harvest monitoring of nonsalmon fisheries in the Lower Kuskokwim River Region, Alaska 2005–2009. ADF&G Division of Subsistence Technical Paper No. 356. Juneau. OSM 06-351

2006 study year: Salmon and nonsalmon fish harvest surveys and local knowledge—**Mekoryuk**

Drozda, R. M. 2010. Nunivak Island subsistence cod, red Salmon and grayling fisheries—past and present. U.S. Fish and Wildlife Service, Office of Subsistence Management, Fisheries Resource Monitoring Program, Final Report for OSM 05-353. Anchorage.

2006–2007 study years: Local knowledge of climate change—**Toksook Bay, Tanunak, Nightmute, and Newtok** Fienup-Riordan, Ann. 2010. Yup'ik perspectives on climate change: "The world is following its people." Etudes Iniut Studies 34(1):55–70. Quebec.

Fienup-Riordan, A., and A. Reardon. 2012. Ellavut/Our Yup'ik world and weather: continuity and change on the Bering Sea coast. University of Washington Press. Seattle.

2007 study year : Comprehensive subsistence harvest surveys—**Lime Village** (Whitefish described by species, use area mapping for 2007 study year, no local knowledge)
Holen, Davin, Terri Lemons. 2010. Subsistence harvests and uses of wild resources in Lime Village, Alaska, 2007. ADF&G Division of Subsistence Techncial Paper No. 355.

2009 study year: Comprehensive subsistence harvest surveys Donlin Creek Mine Project Phase 1—**Aniak, Chuathbaluk, Crooked Creek, Lower Kalskag, Red Devil, Sleetmute, Stony River, Upper Kalskag** (Whitefish described by species, use area mapping for 2009 study year and lifetime, no local knowledge.)
Brown, C.L., J.S. Magdanz, D.S. Koster. 2012. Subsistence harvests in 8 communities in the central Kuskokwim River drainage, 2009. ADF&G Division of Subsistence, Technical Paper No. 365. Juneau.

2011 study year: Comprehensive subsistence harvest surveys Donlin Creek Mine Project Phase 2—**Akiak, Georgetown, Kwethluk, Napaimute, Oscarville, Tuluksak** with **Galena, Marshall, Mountain Village, Nulato, Ruby** being investigated as possible indexes of subsistence harvests for the region. (Whitefish described by species, use area mapping for 2011 study year, no local knowledge)
ADF&G Division of Subsistence
Report in preparation.

2011 study year: Salmon harvest survey and local knowledge—**Chefornak, Kipnuk, Mekoryuk, Newtok, Nightmute, Toksook Bay, and Tununak**
Wolfe, R.J., C. Stockdale, and C. Scott. 2011. Salmon harvests in coastal communities of the Kuskokwim Area, southwest Alaska. AYK-SSI. Anchorage.

2011 study year: Comprehensive subsistence harvest surveys Donlin Creek Mine Project Phase 3—**Napakiak, Napaskiak, McGrath, Takotna, Nikolai, Russian Mission, Anvik, Galena** (Whitefish described by species, use area mapping for 2011 study year, no local knowledge.)
ADF&G Division of Subsistence
Report in preparation.

2012 study year: Nonsalmon fish subsistence harvest surveys and local knowledge—**Lime Village and Nikolai** ADF&G Division of Subsistence
OSM 12-352
Research underway.

2013 upcoming: Donlin Creek Mine Project Comprehensive subsistence harvest survey—**Bethel** (Whitefish described by species, use area mapping for 2012 study year, no local knowledge)
ADF&G Division of Subsistence
Research to begin in 2013.