



Yukon-Kuskokwim Delta: Yukon River Basin, Alaska (USA)

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Abstract

The combined Delta of the Yukon and Kuskokwim Rivers of Western Alaska create the largest expanse of wetlands on North America's west coast. The dendritic streams and rivers mingle with a myriad of lakes and wetlands and create a lush 11 million ha delta in the poorly drained coastal plain. The intertidal mudflats of the delta cover more than 311,000 ha. The diversity and biomass of breeding waterfowl, shorebirds, and other waterbirds is among the highest in the world.

Keywords

Yukon river · Kuskokwim river · Wetlands · Coastal plain · Western alaska · Yukon-Kuskokwim Delta National Wildlife Refuge · Waterfowl · Shorebirds · Salmon

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Introduction

The combined Delta of the Yukon and Kuskokwim Rivers (Fig. 1) of western Alaska creates the largest expanse of wetlands on North America's west coast. The dendritic streams and rivers mingle with a myriad of lakes and wetlands and create a lush 11 million ha delta in the poorly drained coastal plain. Within the coastal plain, the two rivers converge to within 40 km of each other, but then diverge and each empty into the Bering Sea some 640 km apart from each other. At 3,185 km, the Yukon is North America's third longest river, with only the Mississippi/Missouri and Mackenzie/Peace rivers longer (Hall et al. 1994). The Yukon, which means "great river" in Gwich'in, is the largest river or watershed in Alaska and Yukon territories. At 1,150 km, the Kuskokwim River is the nation's longest free-flowing river. The intertidal mudflats of the delta cover more than 311,000 ha. The diversity and biomass of breeding waterfowl, shorebirds, and other waterbirds is among the highest in the world.

Hydrology

The headwaters of the Yukon River arise in British Columbia and Yukon territories. Major tributaries in the Yukon include the Teslin, Pelly, White, and Fortymile Rivers. Major tributaries in Alaska include the Charley, Porcupine, Black, Chandalar, Tanana, Tozitna, Nowitna, Melozitna, Koyukuk, and Innoko Rivers.

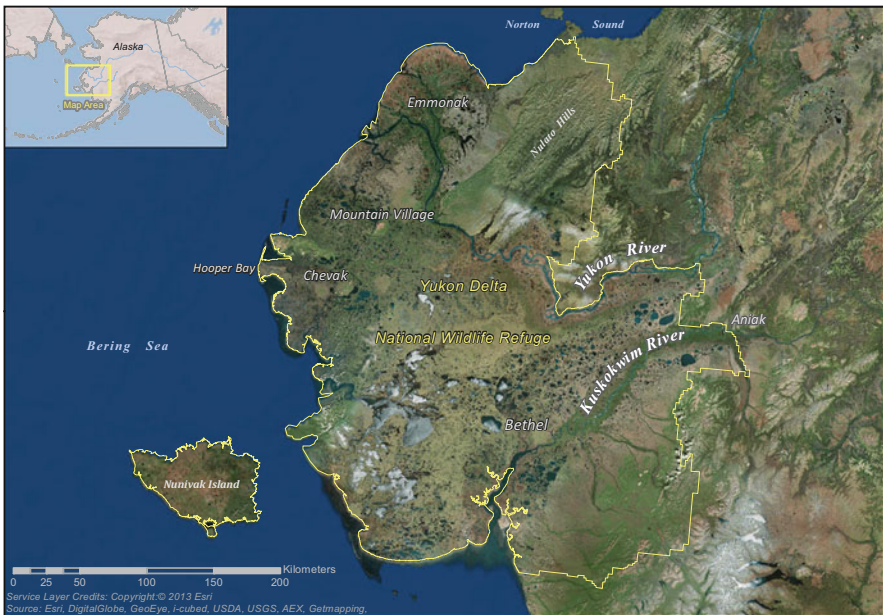


Fig. 1 Location of the Yukon Delta National Wildlife Refuge in Alaska on the coastal plain delta of the Yukon and Kuskokwim Rivers

The watershed drainage is 850,000 km² in size (Brabets et al. 2000), with 60% in Alaska and 40% in Canada, which is roughly equivalent to the size of Texas. The average flow of the river is 6,400 m³/s.

The Kuskokwim River (or Kusquqvak in Central Yup'ik) is the ninth largest river in the United States by average discharge volume at its mouth (20,420 m³/s) and 17th largest by watershed drainage area (124,000 km²) (Kammerer 1990). The river's source is at the North Fork near Medfra.

Wetlands

The majority of this ecoregion consists of tens of thousands of lakes, herbaceous wetlands (freshwater and coastal), and thermokarst features set in a matrix of peat plateaus carpeted by dwarf shrub and lichen. Low and tall shrub wetlands dominate riparian areas. Trees, including spruce, poplar, and willow, are limited to the banks of major rivers.

An earthcover mapping project was initiated in 2005 and completed in 2011, using Landsat images from summer 2002 to 2005 (Ducks Unlimited 2011). The study area consisted of 10.9 million ha, which included the Y-K Delta and the boreal forest areas of the Nulato Hills. The classification system is based on the Alaska Earth Cover scheme, derived from Viereck et al. (1992).

Forest cover types made up 6% of the area, with closed deciduous (<60% treed) and woodland needleleaf composing more than 70% of the overall class. Forest cover was found adjacent to floodplains of larger rivers and the Nulato Hills. Paper birch *Betula papyrifera* and poplar were the most common trees.

Tall/low shrub cover types made up 15% of the area, with willow *Salix* spp. and alder *Alnus* spp. dominating and sweetgale *Myrica gale* as a subdominant. Tall shrubs were found primarily in the floodplains, hills, or volcanic slopes, less so in the lowlands.

Dwarf shrub cover types made up 36% of the area with the majority found in peat lowlands. Permafrost was near the surface under most of these poorly drained lowland dwarf shrub communities. Common shrubs included dwarf birch and ericaceous shrubs such as *Ledum*, *Vaccinium*, and *Empetrum*. Herbaceous species often included *Eriophorum*, *Carex aquatilis*, *Calamagrostis*, *Rubus chamaemorus*, and *Petasites frigidus*. Dwarf shrub lichen peatland was the most extensive community in the lowlands. Vast stretches of flat to gently rolling peat plateaus covered with dwarf shrub lichen extend southward from the floodplain of the Yukon River toward the coast and from the western slopes of the Nulato Hills to the coast. Dwarf shrub peatland communities tended to occur in areas less favorable to the growth of lichen, such as in young floodplain basins, adjacent to drainages, or in river bends near the coastal plain – all areas prone to occasional flooding. Dwarf shrub peatland was also found on large hummocks or plateaus raised up out of wetland bog areas by thermokarst action. Coastal dwarf shrub was observed in the brackish zone of the coastal meadows above the tidal marshes.

Moss/graminoid class was defined as having <25% water, <25% shrub cover, and >40% herbaceous cover and made up 3% of the landcover. This community was common in drained lake basins and other depressions on saturated peat soils in the lowlands and floodplains. *Sphagnum* moss cover was often continuous.

Wet graminoid communities occurred throughout the lowlands in wet areas around the edges of lakes, in drained basins, in water tracks, and on floodplains where wetlands form in wet depressions, oxbows, and abandoned channels. This community made up 6.6% of the scene and is seasonally flooded. The dominant sedges were *Carex aquatilis* and *Eriophorum angustifolium* with other sedges present. Marsh species may be present, but not dominant.

Freshwater emergent marsh was mapped throughout the lowlands in small patches in and around lakes and in wet areas of floodplains. This class included graminoid-dominated marshes as well as forb-dominated marshes and made up 5.3% of the area. *Carex utriculata* and *Arctophila fulva* were dominant in the marsh communities of the Y-K Delta.

Coastal herbaceous communities (Fig. 2) made up 3% of the landcover. The lower coastal salt marsh is dominated by *Carex ramenskii* and/or *C. subspathacea* and is regularly inundated by tides. The upper coastal salt marsh occurs at a slightly higher elevation; this cover type is drier and is flooded less frequently, usually only at extreme high tides or storm surges. *C. rariflora* is the dominant sedge with other grasses and sedges present. Coastal graminoid occurs on upper beaches or natural levees bordering tidal sloughs. *Leymus mollis* was generally the principal grass, but other common grasses included *Poa eminens* and *Calamagrostis deschampsoides*.

Water made up 21% of the scene, while Barren (rock, gravel, sandbars) and other made up 3%.



Fig. 2 Yukon-Kuskokwim River Delta brackish marsh (Photo credit: D. Fehringer, Ducks Unlimited)

Biodiversity

The Yukon and Kuskokwim have viable salmon runs for five species of salmon. The Yukon River has one of the world's longest runs with adults reaching spawning beds in tributaries in Alaska, Yukon, and British Columbia. Villages along the Delta have historically dried, smoked, and frozen fish for both human and sled dog consumption.

The wetlands provide unique habitat for waterbirds. Historically one to two million ducks breed in the Delta. Nearly the entire population of emperor *Chen canagica* and cackling *Branta hutchinsii* geese nest in a narrow zone of coastal habitat and half of the continental population of black brant *Branta bernicla nigricans* (King and Lensink 1971). A large proportion of the Pacific flyway white-fronted goose *Anser albifrons* and tundra swan *Cygnus columbianus* populations also nest and stage on the Delta. Wrangle Island lesser snow geese *Chen caerulescens* migrate through the Delta on route to Russia.

Dramatic declines in breeding sea ducks, as well as brant and cackling geese, may be related to warmer winter conditions, less snow cover, and greater survival of predatory red fox (*Vulpes vulpes*). Population estimates of long-tailed duck have declined by nearly 50% over the past 30 years (Schamber et al. 2009). Nest success averaged 30%, while duckling survival to 30 days old averaged only 10%. Average population decline was estimated at 19% (Schamber et al. 2009). Number of spectacled eiders nesting near the Kashunuk River in the Delta has declined over 75% in the last 20 years and was linked to red fox predation (Ely et al. 1994).

The Delta provides breeding habitat for approximately 14 million shorebirds. Dominant shorebird species include bar-tailed godwits *Limosa lapponica*, dunlins *Calidris alpina*, western sandpipers *C. mauri*, northern phalaropes *Phalaropus lobatus*, red phalaropes *P. fulicarius*, black turnstones *Arenaria melanocephala*, and ruddy turnstones *A. interpres* (King and Lensink 1971). Lesser sandhill crane *Grus canadensis* and arctic *Gavia arctica* and red-throated loons *Gavia stellata* are dominant nesting species. Coastal habitats provide staging area for bristle-thighed curlews and whimbrels during late summer and in migration (King and Lensink 1971).

Riparian habitats support some of the only North American populations of primarily Eurasian breeding landbirds like yellow wagtail *Motacilla tschutschensis*, bluethroat *Luscinia svecica*, and northern wheatear *Oenanthe oenanthe*, as well as high-priority North American breeding landbirds like gray-cheeked thrush *Catharus minimus*, rusty blackbird *Euphagus carolinus*, blackpoll warbler *Setophaga striata*, and golden-crowned sparrow *Zonotrichia atricapilla* (Harwood 1999).

Conservation Status

The Yukon River or its tributaries flow through several protected lands that include Innoko, Nowitna, and Yukon Flats National Wildlife Refuges and Yukon-Charley Rivers National Preserve, before flowing into the Yukon Delta National Wildlife

Refuge. The Kuskokwim River flows into the Yukon Delta National Wildlife Refuge below Aniak.

US President Theodore Roosevelt first set aside southwestern Alaska refuge lands in 1909. President Jimmy Carter signed the Alaska National Interest Lands Conservation Act into law in 1980, officially creating the Yukon Delta National Wildlife Refuge at 77,500 km² and encompassing the Y-K Delta wetland complex. This refuge is the second largest in the United States, only slightly smaller in size than Arctic National Wildlife Refuge. Extraction industries are not compatible with refuge objectives and are excluded.

The Yukon River Inter-Tribal Watershed Council, a cooperative joint venture with over 70 bands of First Nations from Yukon and Alaska, oversees water quality and water rights in their traditional lands. Association of Village Council Presidents and the Tanana Chiefs Conference promote viable hunting and fishing for the health of the people and lands. The Delta itself has approximately 25,000 residents, 85% Alaskan native, either Yup'ik or Athabascan. Subsistence fishing, hunting, and gathering are a traditional way of life that continues.

Historically both rivers have minor pollution from placer gold and silver mining and waste water and debris from human settlements along the river. The Yukon River was one of the principal means of travel for gold prospectors during the 1896–1903 Klondike Gold Rush. Because of the refuge status under the Fish and Wildlife Service, extraction industries are excluded. Potential oil spills exist on coastal areas from deepwater platform accidents or shipping accidents. Transport of barge material up the rivers also is a possible means of pollution.

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