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- [wilderness flyfishing](#)
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- [King Salmon River](#)
- [Upper Nushagak](#)
- [Little King Salmon](#)
- [South Fork](#)
- [Unnamed Tributary](#)
- [watch videos](#)
- [wildlife](#)
- [arts & letters](#)
- [extraordinary services](#)
- [season reports](#)
- [photo galleries](#)
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- [gear & flies](#)
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Wilderness Flyfishing: South Fork

South Fork of the Arolik River is located outside of Quinhagak in Kuskokwim Bay region of Western Alaska. [Map of Arolik River](#). The Arolik is not widely known. It is one of Alaska's truly wild Salmon, Char, & Trout fisheries. There are obviously no dams, or roads. The Inaccessible South Fork of the Arolik, which I prefer to fish, has been fished less than one dozen times ever. The South Fork is not a river that could sustain the pressure of large groups. It is quite clear and relatively shallow and the spawning salmon are quite vulnerable. It is where Lee Bowers, an accomplished wilderness trip leader for Outward Bound said "this is the wildest place I've ever been!" It is probable that I have floated it and the main Arolik more than anyone alive.

The main branch of the Arolik gets some use from fly fishing groups of rafters in July and August. The groups fly in to Arolik Lake, row and drag a raft 9 miles down the creek to the confluence with the South Fork then floating to the estuary some 30 miles downstream. In 2001, Richard Voss and I undertook what we believe to be the second raft descent of the South Fork. Since then I have taken about 2 groups per year down it and we have ironed out some of the logistic challenges. But make no mistake it is a truly wild trip and physically demanding for the first 2-3 days when we are in the South Fork mountains. The fishing ranges from Alaskan-good to Alaskan-extraordinary depending upon the run timing and weather. Quoting from the log of July 31, 2002, Richard Voss and I both agreed we'd had the best day of fishing of our lives.



I take only small, very lightly loaded rafts down this river and we wade a great deal. We see other fly fishers once or twice per trip in the lower river and not at all in the South Fork. I only take anglers on the South Fork who have proven themselves on a prior Alaska trip with me. Not because the fishing or camping is uniquely tough, it isn't, but rather because it is quite a remote spot where there are no float plane or wheel plane airstrips for at least 5 days. It is not a place for someone to realize he or she would rather be somewhere else. In spite of its difficulty most everyone I've ever taken there dreams about the place for years after because it is profoundly wild to the point of defining wilderness.



[Listen to Mark Rutherford interview on "Dirtbag Diaries" with Fitz Cahall](#)

Client Words

"The kids and young men had a great time... Are there any other rivers we should consider next year? The length of river and time we spent on..."

- Dave Combs (regarding Mark's help setting up a do it yourself trip)

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What makes the Arolik an Extreme Fly Fishing trip? From the floatplane pond, the portage to the South Fork where we make our first camp consumes an afternoon of demanding walking, dragging rafts across tundra, carrying river duffels, and lining the rafts down a small creek. The second day will involve some more lining the rafts down shallow river channels. Still the rewards of exquisite fly fishing on untouched Alaskan waters from the moment we arrive at our first camp until the confluence compensate for the extreme efforts.

Ready for an unforgettable fishing adventure? Call me at (877) 628-6796 or email me at mark@wildriverfish.com.

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- [extraordinary services](#)
- [season reports](#)
- [11' Season Report](#)
- [10' Season Report](#)
- [09' Season Report](#)
- [08' Season Report](#)
- [07' Season Report](#)
- [06' Season Report](#)
- [05' Season Report](#)
- [04' Season Report](#)
- [03' Season Report](#)
- [02' Season Report](#)
- [photo galleries](#)
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[South Fork - Mark & Sam Heller](#)

July 24-30.

South Fork. Marc & Sam Heller



In perfect summer weather the floatplane dropped us off. Then Marc, his son Sam, and I completed the portage to the South Fork. If the portage has ever been done more smoothly I can't remember when. By 3:00 pm young Sam was throwing flies at trophy Rainbows and Dolly Varden Char. Of the many fine fly fishers that it has been my fortune to take to Alaska, this young man ranks high with his serious fly fishing passion. Before long we were filleting his fish for dinner.

Sam and Marc fished pink fly patterns for the first three days until that pattern was all gone, lost to their many dozens of trout, char, and Grayling. Sam has come back a second year with father Marc wanting to go "more remote" in the heart of the Salmon season. While others might argue that the first three weeks in August are the best weeks to fish Alaska, the last week of July often has better weather and the King, Sockeye, Pink, and Chum salmon are still in their prime with enough Coho on certain to make it wonderful.

July 25. After awakening to the sound of a brown bear galloping through the shallows chasing a chum salmon we had coffee and hiked to a small bald, tundra hilltop to



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Client Words

"I think of you often (not surprising since pictures of our trip are on my desktop), and given your journaling skills and vast experience, y..."

- Mark Heller

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scan the huge glacial cirque surroundings. It seems to me this overlook was likely a viewpoint for early man hunting herds of Pleistocene Bison and Mastodon. A little later we loaded our raft and rounded a bend sighting a Brown bear, perhaps it was our morning "wake up" bruin. Again that day around noon I got to watch the large male Brown bear (boar) that resides on Island mountain. He fed toward the pool where Marc and Sam were casting for Char and early Coho so we slipped away leaving the prime fishing water to him.



We camped on an island adjacent to where hundreds of sockeye were paired up, courting, spawning, and aggressively chasing intruders or flies. Sam and Marc learned that this is where the egg imitations and particularly trout beads are the tool of choice. After a couple of drawn out battles with big male sockeye the fun is gone from swinging leeches past Sockeye. Here is where a bead drifted through properly will catch just the Char and Rainbow Trout, in fact many dozens of Char and Trout. After a break for dinner the fishing moved downriver for Kings. Sam will have memories for a lifetime from his battles that night with the "King" of Salmon!

Over the course of the trip, and around various campfires Marc & I renewed our portable love of discussing books. We covered: "Adrift" by Steven Callahan, Lincoln's biography "Team of Rivals" by Doris Goodwin, the work Greg Mortenson has done building schools in Pakistan in "Three cups of Tea" by Mortenson & David Relln etc. Young Sam claimed we'd had some of the exact same conversations last summer! Well even if we had, they seemed vivid and brand new to Marc and me! We shared our excitement about this current Alaskan river adventure in light of the great adventure authors we love, especially Redmond O'Hanion. Sam smiled patiently at our memory lapses from behind his novel, "The River Why" by David James Duncan. It was on his school summer reading list. Good school!





Passing through the coastal mountains onto the coastal plain we camped among thousands of spawning Chum Salmon. Sam and I explored braided side channels afoot after setting up camp. Sam threw mice and loved the visual stimulus of watching the surface tension break with the bulge of trout and Char behind the mouse. It's easy to overdo it in the braids and one's adrenal glands get depleted by the fish, plus one needs to stay vigilant for the brown bears whose fresh tracks are everywhere. They dash off around the bend or behind a screen of willows as they hear you singing the "Hey Bear Anthem"! Sam and I did this type of thing using the buddy system for obvious reasons.

July 27 "fished through challenging riffles, runs, holes, creek mouths, and pools as we left the mountains so I had lots of time to admire Sam's casting". It's a wonderful thing watching a young man double haul with confidence; adjusting details reflexively without thinking about the cast, just laying it out. Some of us, like me, learned a "remedial" double haul later in life and it shows!" By days end I had recorded for Sam, "15 Rainbow Trout to 22", 8 Dolly Varden Char, 1 Arctic Grayling, and 1 Chum Salmon, 1 Pink Salmon, and 1 Coho Salmon. Not easy fishing today".



The days of travel begin to wear on one, no matter how fine the weather. Travel through the glaciated alpine headwaters meant dragging the boat through dozens of riffles. We've now spent 3 long days casting and wading, followed by late nights with a bit more fishing... It all gradually wears and we find ourselves in the camp chair lingering by the fire with ones face tilted to catch the last sun rays of the day. In the morning if a cup of coffee is offered while you are in the tent dressing, it is accepted, and you recline back onto the sleeping bag and time slows down. Today we know we'll travel through the tundra, and probably contend with some wind. We will certainly catch a few fish and each night it will probably be easier to sleep than the last as the wild country, the noises, and the routine become familiar.

As the raft proceeds across the coastal plain winding among gravel bars and islands

we are more focused on the urgent tasks at hand and less on what tomorrow will bring. To deal with the wind we pull up our hood. We automatically check for our wading belt and tighten it. We watch out for each other, and we know where our bear spray is. By now we have each lost grand fish and landed others.

On day 5 the field journal says " weather magnificent... the fishing for Rainbow Trout was out of this world!" Perhaps 50 trout landed and many more lost, "I wonder why relatively few Dolly Varden Char were hooked? Some Chum released and 1 brite Coho." Sam had been casting the very heavy Conehead leech. His right arm was "played out" by late afternoon when we entered the lower gradient waters of the coastal plain favored by Coho. Switching to his left he practiced a functional double haul, something many of us can't do left handed at all, and promptly whacked a fine brite Coho just about dinner time. Pretty neat.

A sign that Sam's energy reserves were about "tapped out" was that he ate ¾ of that fresh salmon by himself. Marc & I looked on in amazement. After dinner we watched rainbows compete for salmon spawn in the clear waters by camp.



Our final days were spent among the Coho in the lower river. Many, many fish were available to us. For Sam they came to the Pink Polly Wog like candy. For Marc they took a leech on the swing. It was indeed a fine, near perfect week when all 5 Pacific Salmon were present in good condition.

When we left to fly home the last few songbirds were still calling from their bankside nesting territories with vigor. The Orange Crowned Sparrow belted out his 3 note call, but few remained who answered. Another summer season had turned, slipped away, with marsh sedges curing and White-front geese trading across the wetlands in gathering numbers.

For those who will be fishing with Mark next year:

Planning the trip takes time: Start the process as soon as you can. Deploy your dollar resources thoughtfully on quality tackle and outerwear, more is not better, be fit, travel with essentials as "carry on bags", and if we are doing a low water trip- or a portage- be prepared to work hard to get to the best wild trout and salmon fishing in Alaska!

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June 26th - July 3rd, 2010

South Fork with Kenny Gangloff and Matt Bain

Without a breath of wind our float plane lifted off Aleknagik Lake and we flew west for 20 minutes. Upon emerging from a mountain pass we were looking down at Pungokepuk Lake in the photograph. We continued another forty minutes where we found the landward edge of the Bering Sea fog bank parked precisely over the pond we wanted to land the float plane in. We circled, the fog lifted and we darted in, unloaded the Beaver and said goodbye to Rick.

The portage to the South Fork was smooth. We made camp, rested, and then we strung our fly rods, Matt for the first time ever. Matt Bain would learn to fly-fish in Kenny Gangloff's experienced company over the course of 60 miles and ten thousand casts.

Some miles down the South Fork a pool forms at the bedrock bluff outcropping of Island Mountain. A large raptor nest was seen above the pool occupied by 3 large nestlings who seemed well cared for although there was no adult ever seen in the vicinity of the nest.

From well above the nest on the bluff Kenny & I got a peak view into the nest and could see an entire ptarmigan, unplucked. I have puzzled over the identity of this nest for many years. It is nearly always in use and never have I seen an adult in the vicinity? The chicks are large, surely rough legged hawk or eagle size at least, they are not mere Redtails.

They young birds have oversize beaks, all the better to tear ptarmigan flesh with I suppose, but what species are they? Kenny and I carefully collected some photographs that later in the winter we could analyse and compare to life histories of Bering Sea region raptors.

From our second camp we watched and photographed 2 juvenile coastal Brown Bears graze in the uplands. 4 weeks from now the tundra blueberry shrubs will have ripe blueberries but now the forage makes lean grazing on sedges and grass for the young bears. They were not particularly happy looking bears, for whatever that observation is worth. Their heads hung a bit low, they were lean, seemed



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- John Markoff

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disconsolate. They were presumably weaned just 2-3 months past and were, we supposed, trying to figure life out without adult guidance. "Still they have each other, and the companionship might be useful in this lonely land. Plus if they can eke out another few weeks of grazing then the first Chum Salmon will begin spawning and life will be swell.

Here on June 28, 2010 in the reach just below the twin bears our fishing really turned on and the daily logs became lopsided with Rainbow trout outnumbering Grayling, and Dolly Varden by a large margin, a ratio that would be maintained all the way to the tidelands.

We hoped, that by descending the river day by day we'd eventually intercept the leading edge of the King Salmon migration, as well as Sockeye and Chum. The first Sockeye of the season was spotted later today at a staging area where a major tributary enters on river left.

The chorus of songbirds from morning to night is almost deafening. Kenny and Matt and I stalked for hours with our telephoto lenses documenting tundra birdlife.

From the first through third day the "Fishing was good everywhere that we found deep river water for cover." If you consider that the higher reaches of many Bering Sea salmon and rainbow trout streams are above timberline and there is no woody debris for cover from Bald Eagles, then it follows that the fishing can be scant except where "in river" structure like deep channels, and flood scoured holes provide cover.

Natural insect feed is less abundant in the headwaters. Until salmon begin to spawn up stream one hunts for the big trout which themselves came to spawn in May with heavily weighted leeches, sculpin, and smolt patterns.

From the log of June 28: "We've come 20 miles so far and passed through the mountains onto the coastal plain. A red fox was seen from camp and a Merlin falcon later along the river. Kenny is dialed into the trout fishery and Matt is working on his cast".

Can you imagine learning to cast a fly rod with a weighted Conehead leech size 2? Most of us learned to cast with a dry fly and then had to "un-learn" that in order to really begin to catch large predatory trout on streamers. Still most of our casting was learned under more ideal conditions. Matt is learning on big fish by throwing big flies.

The first salmon of the 2010 season was landed by Kenny Gangloff on June 29. It was a fine bright male Sockeye of eight to ten pounds among a pod of salmon in some minor holding water. He hooked it on his five weight fly rod and then all hell broke loose while it ran and jumped and porpoised and in all ways the fish really had the upper hand. Matt & I watched entranced at the thought of fresh salmon for dinner. Indeed we ate Sockeye that night prepared with fresh Ginger! Again from the log of June 29: "There were a lot of trout caught but no grayling!"

Now in the second one half of the trip, the lower river meanders like vast loops of tangled fly line across the flood plain. One casts from the raft watching the surroundings pass while mending and retrieving. We were watching the Cranes and Swans, White Fronted Geese, Green Wing Teal, and shore birds, warblers, Jaegers and terns, the list goes on. Comes as a shock, while one is casting and quietly appreciating the beauty and the wildlife riches of the Bering Sea coastal plain that a savage Chum salmon fresh from the salt, smashes the fly. After a battle which generally runs in the salmon's favor the strong Chum were released with "thanks" that our fly rods were still unbroken by their peculiar savagery.

From the journal "Rainbow Trout being taken and released both in the common 14 inch size class and the rare 24 inch and above class. I read the journal entry for June 30, 2010 and was reminded that as we released a large Rainbow Trout it regurgitated 2 salmon fry about one and one half inches long. Kenny released trout in the 26-28 inch class and Matt as well". Kenny, the provider, continued to feed us fresh Sockeyes.

Camps in the lower river are notable for the Beaver lodges nearby and the shocking rifle shot "Crack" as the Beaver slaps it's tale at mid night. It is pretty humorous to see the young beaver of the year try this same tale slapping with great vigor for such a small creature. This can go on all night as does the winnowing of Snipe while

they perform their aerial courtship displays. There is a small slough in the lower river, which if your not looking closely you will pass by. Here Matt & Kenny waded ashore and sight cast to dozens, perhaps hundreds of staging Sockeye, Chum, and now Pink Salmon!

Swans traded across the sky as we finished our fishing on a lazy layover day just upstream of the estuary. The birdlife was now truly coastal. Shorebirds worked the sand bars. Greenwing Teal raised broods in sloughs while Parasitic Jaegers and Arctic terns dominated the sky.

Kenny Gangloff and Matt Ball were terrific company this past summer. I'm looking forward to seeing them throwing the big streamers and hunting for camivorous trout in Alaska again some day!

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Tundra River - Doug and Daryl

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July 7th - 14th, 2010

A South Fork Adventure

Father and son Doug and Daryl Witmore, and I loaded a week's provisions, some fly rods, and a raft, then flew west an hour from Dillingham. We had packed very light and our gross weight in the Dehavailland Beaver was only 1050 pounds which is 100 pounds below the average. The skies were fair. We landed and we had a cool breeze while we portaged and then lined the rafts to the South Fork. Perhaps we should have spent more time on the portage but Daryl was so strong, the gear manageable and so we pushed fairly hard, likely setting a new overland record for the portage.

Father and son each landed 2 fine rainbows before our first camp at the "Raptor Pool" and Daryl lost a very large "Old Growth Trout". At the raptor pool a pair of large Grayling finished out the day. Our camp below Island Mountain was fine and after all the logistics we had earned ourselves a river!

From the log of July 8, 2010: We had typical Bering Sea "Fair Weather" consisting of a foggy morning, clearing mid day, followed by evening rain showers. At the Raptor Pool I watched an adult Golden Eagle dropping off prey at the nest with 2 chicks. I'd been watching the nest since Richard Voss and I discovered the cliff in 2003 but I was never able to get a look at the adults. This is the nest that Kenny Gangloff and I photographed last week with an adult ptarmigan laid out for the young to feast on.

Daryl caught a fine Sockeye in the Raptor pool where a mixed school of Churn and Sockeye were staged along with resident Rainbows and Grayling. As we passed down river the log records nearly 40 fished hooked but only a fraction landed as the guys learned the fishery and the techniques of swinging leeches effectively. As we closed out the afternoon amid towering cumulous clouds we passed through a developing "waterspout", like a tornado in miniature lifting water from the river perhaps 50 feet in the air. We camped on a pool with Salmon, Trout, and Char.

On Day 3, July 9, 2010 we passed below the strangest cloud layer. High winds aloft had formed it to look like warped grey marble layer cake. Then a Gyr falcon tore past with a sound like ripping silk while chasing a shorebird. This all as we left the mountains behind on a big mileage travel day bound for the coastal plain. The fly that fished best today was a "smolt" pattern tied like a Deceiver fished under a strike



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- John Markoff

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indicator. The notes say that the salmon fry we did see are about 1.5-2 inches long and not terribly abundant. 12 Rainbow and a handful of Sockeye and Chum salmon were touched today

Snipe winnowing at all hours of the day and night, and Long-tailed Jaegers hunted past camp. Over breakfast Doug told stories of horse packing, Lama packing, and even goat packing with young Daryl on annual mountain outings. The fishing started out slowly with a trout and salmon or two in the bigger holes and then mile upon mile it got better through the epicenter of all the trout activity to our 4th camp. Fettuccine and pesto sauce for supper. The notes from the day close with "an awful lot of trout and salmon hooked today but no Char" and last week on this river closed out with but one enigmatic Char taken in 7 days. So curious, the Dolly Varden, some years common in mid summer but this year not so far.

July 11th, 2010. A perfect Alaskan day. Foggy am, burning off by mid afternoon. Many Rainbows to 22 inches, too many Chum salmon, and a couple of Pink and Sockeye Salmon! A notable chrome bright Sockeye for Doug! Daryl cast backhand from the boat as we traveled and has a fine touch with a fly rod. The first adult Dolly Varden Char of the trip was a lovely 20 inch fish quite fresh from the salt, with an empty stomach which we know because we killed it and ate it for dinner.

In the lower river the fishing was exceptional. The log states that "certainly no more than 5 minutes elapsed all day without a fish on. Doug caught a Jack King, Rainbows, and Dolly Varden. The morning fog burned off by 8:30 pm! Hard to believe that our Alaska summer is past the zenith. The songbirds are quieter in the evening now. Of the thousands of salmon we've seen in the river this week not a single one is yet spawning. A few Chum were seen constructing redds so the "table is set" but the "main course" (eggs) for which all the rainbow and Arctic Grayling are gathered has not been served.

We lay over for 2 days in the lower river which is "dense with fish, Chums in particular continuously porpoising, slapping down hard." There is widespread speculation about why the Chum jump and slap their side down so hard upon landing. Perhaps, some say, to loosen the skeins of eggs? But I've come to believe that it is communication specific to the species, advertising their vigor, to other Chum that here is an exceptionally fit individual to choose as a mate!

We watched with binoculars as a loon (red throated perhaps) flew by with a 4 inch fish crosswise in its mandibles and as a family of Green Winged Teal with downy young fed in the wetland.

On departure day July 14, as coastal fog crowded the mountains, we strained to hear our airplane for minutes and the waiting stretched into hours. Such a joy at the end of an expedition to hear far off, the throb of the nine cylinder Pratt & Whitney radial Beaver engine.

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Wild River Country



June 26th - July 3rd, 2011

Murphy and Oster South Fork

Flying west out of Dillingham we watched the spruce tree line recede behind us and we passed beyond into a tundra landscape of low heather, sphagnum moss, and willow lined salmon streams. Linda & John Murphy & Eric Oster had come to fish in solitude for Rainbow Trout, Arctic Grayling and if the timing was also right for King Salmon and Sockeye Salmon. Access to the South Fork generally exacts some toll on participants and rafting gear. That day we individually paid our toll by working hard to push, pull, and finally to row our two rafts across a magnificent post glacial landscape. By late evening we were camped on the South Fork. A glass of wine. A ration of Ibuprofen, then rods were strung up and 8 days of fishing began. The first float of a river in the season is such a special adventure because there is no information as to how spring floods have changed the river and of course the salmon are just entering the system so one strains to see the first bright fish. There is no fly shop for 250 miles so we will be the first to know how the fishery is doing!

Linda Murphy with her Pelican box full of Canon digital SLR cameras and lenses was focused on the landscape, the light, and nature. She has come all this way to spend a week enjoying the tundra landscape while her husband John fly will fish his way across the same landscape. One wonders how Linda's experience, the non-fishing spouse will compare to the fly caster?





Our third participant, Eric Oster has left his work in the financial hub of the universe, NY/NY to “step up” his angling from New England Small Mouth Bass and native Brook Trout to carnivorous Rainbows and perhaps tackle testing Salmon. With a week of travel ahead and the unknown vagaries of weather, insects, salmon run timing we went to sleep that first night eager to experience what our future held in store.

From the log of June 27: “Cool and showery with temperatures in the low 50’s, Barometer steady at 29.30. Eric and John searching through fly patterns until they found success with Rainbow Trout & Grayling taking the olive egg sucking leech.” We passed through the territories of: “Yellow Crowned Sparrows, Swainsons Thrushes, Harriers, and Jaegers” as we rafted. Then at camp in the evening the marine layer burned off and “the Bank Swallows had a good feed of Caddis. A Kingfisher flew past camp shrieking”

Arctic Grayling and Rainbow trout came to the net as the rolling tundra hills and mountains receded and the two rafts rowed down river. Fishing in June for the resident trout and Grayling is similar to searching for springtime trout on the bigger rivers of the American west. One throws streamers, smolt, and various leech-based attractors while one is ready to switch to a caddis when Grayling are active on the surface.

Wooly buggers and bead head nymphs can be productive but whichever choice, one keeps moving and switching flies until you find fish. While you move you throw to the deepest runs and into the woody debris, searching, searching, searching. The rainbows in particular are widely distributed compared to their later seasonal focus on spawning salmon.

As we passed Deer Creek, Grayling were taken on the surface, and then where we camped among the feeding Bank Swallows the trout fishing picked up. We know that each mile should fish better than the last until we descend close to the estuary.



From day 1- day 4 we saw no other signs of mankind. No camps or tracks on the beaches. We seemed to be the first group of 2011.



John, Linda, & Eric all had fine camp skills which made the daily routine easy and smooth for us all. We noted as we rafted and cast and photographed between our second and third camp that a historic Bald Eagle nest on river left had 2 adults in attendance. John caught a really fine rainbow at our third camp. Olly Merrill, our terrific guide and “right hand man” took a lovely twenty-two inch rainbow in our fourth camp with USFWS tag # 35051 behind its dorsal fin. 7 Rainbow and 17 Grayling taken on day four. We were becoming more efficient as we searched for the trout.

On that 4th morning we awoke to a hard frost and clear skies! We descended down river by raft passing from the uplands characterized by rolling hills and small mountains with alpine tundra through a pass onto the coastal plain. For the second one half of the trip we’d meander across the flood plain and the river would become an increasingly rich fishery as nutrients accumulated. As we left the mountains a diminutive Merlin (falcon) screeched her territorial alarm overhead. A pair of Tundra Swans flew past along the right riverbank and Linda took a notable Grayling at camp.

From the log of June 30, 2011: “First Sockeye Salmon seen but not caught... We fished mouse patterns most of the day”, throwing them at the wooded banks and stripping them back trying to make them seem both helpless and delectable. Eric was in my boat and he took 8 Rainbow Trout. However no Arctic Grayling were brave enough to take the rodent from Eric. A white Starlight Leech with an orange head took fish as well for both boats.



I noted in the log that we discovered a freshly killed Beaver carcass, first thing in the morning. A Beaver carcass must be rare to find in the wild, as I’ve never seen one in over 35 seasons on Alaskan rivers. Beaver meat is so rich and fat that whatever predator killed it most certainly enjoyed the delicacy after we departed. In the late evening sun we laughed at the spectacle of an epic rock-skipping contest between participants but in retaliation the local Beaver colony slapped the water with their tails for most of the remaining nighttime. Finally on July 1 we hooked the first King Salmon of 2011.



By day 5 we’d become such an efficient team that camp was packed effortlessly and we were on the water fishing for 8 hours. John & Linda fished with me and John took a really fine Rainbow in excess of twenty-four inches. We passed pods of Sockeye in the lower river, perhaps five hundred fish combined. Of King / Chinook we saw about 25 and of Chum salmon perhaps 50.

Some Chum were in spawning coloration while the other salmon were bright. Now we had fishable numbers of salmon aggregated into holding water which is somewhat more important for catching Sockeye than Kings.

Kings fresh from the salt are relatively aggressive and big leeches and marabou attractors will elicit a chase and a strike. Not to make Kings sound easier than they are because one must be fishing for them mid channel in deeper runs, but the Sockeye is usually tougher to stimulate a strike response from. Yet when fresh Sockeye are "laid up" in a pod the alpha fish will attack the fly often enough. We took both species in the lower river, which after a week of focus on the resident trout and grayling species made for great diversity.

One afternoon as we floated, the shrieking of an Adult Goshawk defending her nest on the lower river surprised us. Here on the coastal plain, seventy-five miles west of the tree line, the largest of the North American forest hunting raptors had chosen to nest. The Black Cottonwood tree she'd built the nest in was barely 20 feet tall and the nest itself was only 10 feet above the ground. At least one chick was in the nest. We departed leaving her to tend her family. Later in the autumn I confirmed with a USFWS biologist that similar Cottonwood tree Goshawk nesting has been reported in the Yukon Kuskokwim delta to the north but that this was a first for this region.

Final day on the river: "Erik caught everything!" 3 species of salmon, 2 Arctic Grayling, and 7 Rainbow Trout. Linda wore a huge smile along with her sun hat. And her camera captured the last of John's fish and the estuary landform. John Murphy had a fine day too. Everyone worked hard all day with a smile. Who wouldn't smile? The weather was stellar. The songbirds were singing all day plus the Semipalmated Sandpipers & Yellow Legs were shrieking from their sand bars. The Goshawk passed us tearing through the willows on the hunt. What a fine week!

Wild River Guides

2011 Season Report



August 2nd - 8th, 2011

Roark Group South Fork Trip



From the log of August 2, 2011: "Fog and drizzle which kept us pinned down in Dillingham yesterday cleared as we flew west... The portage went well. We portaged Bob Roark across the tundra in an inflated raft.... Dragging two rafts down the creek was about as good as it gets, which is to say no new injuries occurred and any old injuries that were aggravated were manageable. This particular portage is a somewhat more humbling experience for anglers in their sixth and seventh decade contrasted with younger athletes.

The portage behind us... We made camp and strung up fly rods... Dolly Varden Char, Rainbow Trout, and King Salmon were taken and released. Barometer falling.

Morning dawned on August 3'd with a quartet of Red Foxes scampering about like puppies on the cut-bank about 300 feet upstream of camp. Chuck Ogilby flushed a Caribou from the willows near camp while fishing and then we shoved off to take advantage of a fine day for travel.





As we rowed, waded, and fished the guys discovered that Dolly Varden were in the upper river in good numbers. Bob hooked a large King in the pool below the Golden Eagle nest. Sockeye and Chum, Grayling and Rainbow Trout made up the day's species account.



As I later reviewed the photos taken in the week and read the entries in the log, I was struck by how big a role the weather played in our experience. First it was fair weather and then it was not fair weather, though not wholly foul either. Photographs show blobs of water droplets that partially obscure the faces, the fish, and the landscape. It was a week that we often kept our hoods up and let it just blow by.

It's hard to overstate what a profound experience it is to travel with men who've spent several decades of their lives together. All those trail miles they'd covered, all the ski tracks they made, streams fished, avalanche chutes traversed, horse packing rodeos and the Rocky Mountain weather blowing through it all. Here on a little known tundra river Ken Helfenbein, Dennis Donald, and Chuck Ogilby have come together to celebrate Bob Roark's 60th birthday. This trip is Bob's dream. He wanted to float down river once more through the coastal mountains of Alaska to fish for Char, Trout, and with luck some early Coho Salmon. For three of these past decades Bob has been "in a chair," a wheelchair, though that has not kept him from adventuring widely across the planet.



What Bob told me was: he's incredibly fortunate that his spinal chord injury was very low (T12-L1) allowing him to maintain a strong core and abdominals. I knew from snippets of the birthday stories that he'd kayaked extensively down wild Arctic and African rivers as well as the Grand Canyon of the Colorado River, that he'd contracted malaria twice while practicing medicine in Africa, and that it's tough to follow his tracks down through the Colorado Rockies on his mono-ski.

The men's stories stretched back to early Tenth Mountain hut days in the Rockies and branched out across the globe. The raft passed through the tundra landscape, the wind blew across with nothing to stop it. Out on the wide tundra they had time on their hands, fly rods, and friendships.

From the Log of August 4, 2011: Chuck hooked, played briefly, and lost the first Coho Salmon of the trip. Weighted streamers took Sockeye, Dolly's, Rainbow, and Chum. We "made up" for the extra day that we'd laid over in Dillingham by going twice the planned mileage, nearly twenty miles. The weather was "not entirely unfavorable". The wind was channeled by hilly terrain as we passed through the mountains. In the evening it rained quite hard. However campfire pizza has never tasted so good (followed with a splash of Merlot) as the pizza did that night. By the next morning the rains had passed and the weather was fair with no bugs and just a bit of a breeze.



In the middle reach of the river just after exiting the coastal mountains the Char and Rainbow Trout fishing was quite good. The larger Dolly Varden were morphing into their spawning colors. There were 20-22 inch fish with orange kypes, fins edged with creamy white, and pink spots against olive backs. Good numbers of smaller Char of 16 -18 inches were olive backed and silver sided with less distinct markings. One of the guys released a ten-pound King Salmon that was bright silver sided with a bronze back. A fine Coho was kept for sushi on that third night.

The river gradient flattened as we travelled. Camp beaches changed over the week from being coarse boulders and cobble in the mountains, to pea gravel in the middle reach, to sand and silt in the oxbow meanders. At dinner I asked the guys to report the numbers of fish caught and released for the record. They were overwhelmed by the demand and managed to weasel out of quantifying the experience, by using terms like "oodles of Rainbow and gobs of Char". Everyone caught Coho, but they were not "easy Coho". Those would come tomorrow. There were lot's of casts between salmon takes, deep slow swings, with more wading, and repositioning the boat, and then casting again. It massively understates the case to say that those Coho so fresh from the sea were great fun.





That evening as small flocks of white fronted geese traded across the horizon we shared a campfire with a party of anglers whose camp we'd passed by on August 3'd. They recounted a horrific experience. They'd originally planned to be dropped at a different river but the weather prevented that. So they chose to work it out as best they could, without maps, on this unfamiliar river! At some point on day three they made an incorrect channel choice, which sent them down a narrow side-channel for many miles. Those miles stretched into two long days. They rowed among beaver

sloughs and barely navigable flowages. The scuddy weather, the presence of Brown bears, and the experience of being lost without maps was awful. However they'd made it out in good health to tell a story with a fine ending. That evening more fish were hooked in the low angle twilight and a dram of rum shared between the two groups. We were all happy to be alive along a river full of fish.

We rafted the final miles. Coho were taken and released. A final camp was made and then broken early in the morning. The river meandered broadly across the estuary before arriving at the Bering Sea. Some Sandhill Cranes and shore birds traded across the low flat horizon. It seems entirely appropriate that since this was a trip with Bob Roark that there was a challenging portage to the "pick up spot" on the beach. Chuck and Ken, with Dennis and Bob broke yet another trail together.



Wild River Guides 2011 Season Report

July 20th - 27th, 2011

Burke Group South Fork Trip



Seven strong, young anglers flew west and made a relatively fine afternoon of portaging, dragging, and rowing to the first camp on the South Fork. The log refers to “a little combat rafting” down the creek but the water level was up so; “how bad could it have been?” We watched a healthy Brown Bear leave the creek carrying a fish and hustle off to hide from us. Harlequin ducks and Common Mergansers flushed and Arctic Terns greeted us with rasping shrill cries. Air temperature cool and there were few bugs.

Before the week was over I would appreciate what an amazing bunch of anglers and outdoorsmen I was travelling with. That night we gathered some firewood, set up tents, and put together some fly rods. Adam released 2 Rainbow Trout and 1 Sockeye Salmon and then we slept in preparation for what was to come tomorrow.

From the log of July 21, 2010: “Overcast but the river level dropped overnight, water gin clear”. We decided to walk further up the South Fork. If there was ever a group with strong legs who were eager to explore this is the group. We hiked upriver across the tundra looking for pool and riffle structures that might hold salmon and were not disappointed.



The South Fork like other Alaskan rivers normally fishes better as one descends toward the more nutrient rich lower river. However the Burke group was comprised largely of anglers with great breadth of fly-fishing experience and creativity so the results from the upper river would have one think that it was the prime water.



On day two Adam Burke and Dave Balducci released 13 Rainbows, some Char & Grayling, and 3 species of salmon from my boat. The log recorded similar results from the other 2 rafts. For some anglers, Chris Beard and Jordan Bunnell, for instance it was their first experience fly-fishing for Arctic Grayling and Dolly Varden Char.



It's good to remember how remarkable it is to see your first Grayling dorsal fin, or the improbably Pink Spots against the olive and chrome side of a Dolly Varden Char.

An Alaska fly-fishing river trip with family or friends focuses on the fishing but it obviously has so much more depth to the experience than the fish. For three days the Burke party travelled through the mountain dominated tundra landscape under fairly ideal conditions. On the fourth day we exited the mountains and began casting the mouse to woody debris and cut banks as the river began to meander across the flood plain. I fished that day with Seth Arentsen and Jason Robertson. A bit of sun, a bit of wind, lots of fish, few insects.





From the log of July 23, 2011: "The first Chum Salmon were seen constructing redds. The fishing was staggering with sea bright Dolly's and typical Rainbows, plus some really healthy Arctic Grayling."

The river was broad enough to allow our 3 rafts to fish and float together and watch the fishing unfold as different anglers experimented with different flies and techniques from the mouse to leeches fished deep. Again from the log: "Adam... Very few minutes pass between fish. Dave Balducci, strong on the oars and generous.... took time to set up Jason/Robo with a sink tip with perfect loop to loop and knot connections"



From my own reflections; I find that so much of what is profound about a trip like this is the people. Indeed we are travelling through a stunning landscape, and generally the fishery can be counted on to provide great experiences, but our success really depends upon how well we work together to solve the problems that confront us. A group that can enjoy the spirit of interdependence and cooperation elicited by the sometimes-harsh demands of bush travel will enjoy the rewards.

We camped on the coastal plain at a notable salmon pool having a tent site where Yupik Eskimo people have traditionally come to hunt Moose and Caribou in the autumn. On that evening Jay Vann, an exceptional trout & salmon angler, took a 12 year old Rainbow Trout with USFWS Togiak Wildlife Refuge tag # 33450 at the camp pool.



From this point forward we were never more than a few dozen miles from the Bering Sea and the river gradient flattened. On the morning of July 24, 2010 "Jordan began with two fine Jack King Salmon". The notes go on to say it was a really long day of fishing with mention of vast numbers of Char released. There are a few anglers in every crowd who'd rather catch fewer trout but catch them exclusively on dry flies. This is a rare position to maintain in Alaska where so much of the fishery is for carnivorous trout and char but it can work if the dry fly is a mouse and if the angler is an animal.



From the log of July 24, 2010: "Adam took a twenty inch Rainbow Trout on the mouse with much hilarity... the entire gang rallied to see the fish and watch the release. Also that he took the same grayling 25 times with a mouse...what was that fish thinking"

From the log of July 24, 2011: "Seth switched to the mouse and took an exceptional Rainbow Trout!" Seth reported: "He was the fish of my life and getting him on the mouse and being able to share it with my friends made it even sweeter."....

Later Jay provided a fine salmon for sushi. As we travelled downstream we observed our surroundings and the fishery change. We'd seen Chums constructing redds and likewise observed Kings with white colored tails. In local guide jargon "White Tail" is slang for a spawning King. It refers to the change in skin color caused by the powerful tail thrusts a King Salmon produces to push big cobble and gravel aside and create a redd for spawning. The tail is highly visible and a cue that Chinook eggs could be feeding the local resident fish. The season has changed more toward autumn with fewer territorial calls of male songbirds, notably the Golden Crowned Sparrow, whose song dominated the tundra airwaves just a few weeks ago.



Unquestionably this type of travel takes a toll on the participants. One's exposure to the sun and wind is continual which makes the moments for relaxation at days end stand in sharp contrast. There is much to be said for tasty appetizers at days end and a chance to get out of the waders! Perhaps a beverage.

Seth Arentsen said after some time had passed: "I think what I took back the most from this trip was experiencing the entire wild river system. Starting where the river is only a stream. Turning that bend in to see a Grizzly bear waiting for a salmon to feed on. I was awestruck by the how vibrantly red the Sockeye were, missiles just tearing around the river. Seeing the system in its entirety opened my eyes to how significant the salmon run is to the entire ecosystem, everything starts and ends with those salmon... Surprisingly, it wasn't all of the fish we caught,



the great meals we ate, the stories that were told, or laughs we had. It was the culmination of all of these things in a setting so pristine, so unmolested...”



Over the course of sixty miles and seven days; lot's of enduring memories, images, and stories were laid down like song tracks on a favorite album. The Burke guys earned their successes and conversely sometimes the rain turned “sideways”, and perhaps water came over-top the waders. Those memories too, are forever intertwined with the trophy moments.

Fishery notes: The Burke group caught and released 9 species of native fish in a week and collected some fly fishing observations of 3 species which were unusual in my experience on Alaska's western Bristol Bay rivers. The range of North America's most primitive, or perhaps a better term is “ancestral” Char, the Lake Trout was extended down the South Fork to within 3 miles of brackish water (about 60 river miles below it's typical lake habitat). The Starry Flounder was taken on a fly upriver, in fresh water, several miles above normal brackish water. One iconic Rainbow Trout was taken on a fly below the normal brackish water/ fresh water junction although the tide was ebbing which perhaps explains the trout's presence in the estuary about 500 feet above the Bering Sea mud flats.



Comprehensive Conservation Plan

Togiak National Wildlife Refuge



Comprehensive Conservation Plan

Togiak *National Wildlife Refuge*

September 2009

Prepared by
U.S. Fish and Wildlife Service
Region 7
Anchorage, Alaska

Togiak National Wildlife Refuge
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Revised Comprehensive Conservation Plan

for the

Togiak National Wildlife Refuge

August 2009

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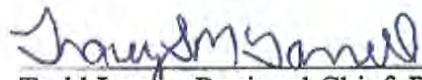
Submitted By:



Paul Liedberg, Refuge Manager
Togiak National Wildlife Refuge

7/14/09
Date

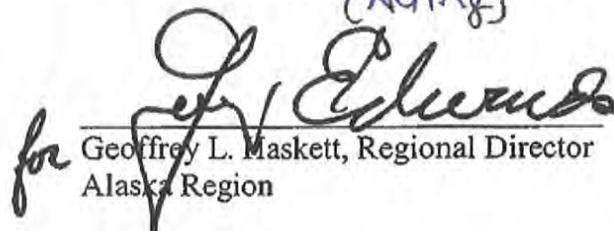
Concur:



Todd Logan, Regional Chief, Refuges
(Acting)

8/3/09
Date

Approved:

for 

Geoffrey L. Maskett, Regional Director
Alaska Region

AUG 4 2009
Date

for planning and management, and authorizes studies and programs related to wildlife and wildland resources, subsistence opportunities, and recreational and economic uses. ANILCA also provides specific direction for the management of designated Wilderness areas and Wild and Scenic Rivers in the State of Alaska beyond the direction provided in the Wilderness Act and in the Wild and Scenic Rivers Act. How ANILCA influences management of the Refuge is described throughout this Plan.

1.4.2 Policy Guidance

Programmatic guidance and policy documents provide additional direction for the management of national wildlife refuges throughout the System. These documents include the following:

- U.S. Fish and Wildlife Service Manual chapters
- Director's orders
- National policy issuances
- Handbooks
- Director's memoranda
- Regional directives

1.4.3 State of Alaska Coordination

The Alaska Department of Fish and Game (ADF&G) has responsibility for managing resident fish and wildlife populations in Alaska. On refuge lands, the Service and ADF&G share the responsibility for conservation of fish and wildlife resources and their habitats, and both are engaged in extensive fish and wildlife conservation, management, and protection programs. In 1982, the Service and ADF&G signed a Master Memorandum of Understanding that defines the cooperative management roles of each agency (see Appendix C). This memorandum sets the framework for cooperation between the two agencies.

At the direction of the Boards of Fisheries and Game, the State of Alaska establishes fishing, hunting, and trapping regulations throughout the state. These regulations apply to Federal public lands unless superseded by refuge specific regulations or Federal subsistence regulations. The state is divided into 26 game management units (GMUs); most of these are further divided into subunits. Management objectives are developed for populations within the GMUs. The Refuge overlaps with parts of GMUs 17B, 17C, 18, and almost all of unit 17A. Management objectives are discussed in Chapters 2 and 3.

The Alaska Department of Natural Resources (DNR) and its subdivisions are also key management partners. DNR manages all state-owned land, water, and surface and subsurface resources except for fish and game. The DNR Division of Mining, Land, and

Water manages the state's water and land interests within and adjacent to the Refuge. In addition, the DNR developed a Special Use Land designation for "...*State of Alaska shorelands and waters within the Togiak National Wildlife Refuge and lower Goodnews River.*" (Appendix C) See page C-10 for the State's current management guidelines.

Further discussion of coordination with the State of Alaska is included in Appendix C.

1.5 Refuge Purposes and Vision Statement

1.5.1 *Refuge Purposes*

That portion of the Refuge designated as the Cape Newenham National Wildlife Refuge in 1969 was given the broad purpose "... for the protection of wildlife and their habitat . . ." in Public Land Order 4583, dated Jan. 23, 1969. In addition, Sections 303(1)(B) and 303(6)(B) of ANILCA set forth the purposes for which Alaska Maritime and Togiak Refuge (including the former Cape Newenham Refuge) were established and shall be managed, including the following:

- (i) To conserve fish and wildlife populations and habitats in their natural diversity, including the following:
 - [Togiak Refuge] salmonids, marine birds and mammals, migratory birds, and large mammals (including their restoration to historic levels)
 - [Alaska Maritime Refuge] marine mammals, marine birds and other migratory birds, the marine resources upon which they rely, bears, caribou, and other mammals
- (ii) To fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats
- (iii) To provide, in a manner consistent with purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents
- (iv) [Alaska Maritime Refuge] To provide, in a manner consistent with subparagraphs (i) and (ii), a program of national and international scientific research on marine resources

To ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in paragraph (i), water quality and necessary water quantity within the Refuge

[Togiak Wilderness Area] To secure an enduring resource of wilderness, to protect and preserve the wilderness character of areas within the National Wilderness Resource Preservation System, and to administer this wilderness for the use and

2.4.9 Cooperation and Coordination with Others

2.4.9.1 Federal, State, and Local Governments

The Refuge will continue to work closely with those Federal, state, and local governments and agencies whose programs affect, or are affected by, the Togiak Refuge; state and local government input will be sought during the development of regulatory policies addressing management of the Refuge System (Executive Order 13083, Federalism). When possible, the Service will participate in interagency activities (such as joint fish and wildlife surveys and co-funded research), cooperative agreements, and sharing data, equipment, and/or aircraft costs to meet mutual management goals and objectives.

The Refuge and the State of Alaska will cooperatively manage the fish and wildlife resources within Togiak Refuge. The Master Memorandum of Understanding between the Service and the Alaska Department of Fish and Game (dated March 13, 1982) defines the cooperative management roles of each agency (see Appendix C). In this agreement, the Alaska Department of Fish and Game agreed to “recognize the Service as the agency with the responsibility to manage migratory birds, endangered species, and other species mandated by Federal law, and on Service lands in Alaska to conserve fish and wildlife and their habitats and regulate human use.” Correspondingly, the Service agreed to “recognize the right of the Alaska Department of Fish and Game as the agency with the primary responsibility to manage fish and resident wildlife within the State of Alaska.” Further discussion of intergovernmental cooperation regarding the preservation, use, and management of fish and wildlife resources is found in 43 CFR 24 (Department of the Interior Fish and Wildlife Policy: State and Federal Relationships).

The Service does not require refuge compatibility determinations for state wildlife management activities on a national wildlife refuge pursuant to a cooperative agreement between the state and the Service where the refuge manager has made a written determination that such activities support fulfilling the refuge purposes or the System mission. When the activity proposed by the state is not part of a cooperative agreement or the state is not acting as the Service’s agent, a special use permit may be required, and a refuge compatibility determination will need to be completed before the activity may be allowed. Separate refuge compatibility determinations addressing specific proposals will be required for state management activities that propose predator management, fish and wildlife control (with the exception of emergency removal of individual rogue animals), reintroduction of species, nonnative species management, pest management, disease prevention and control, fishery restoration, fishery enhancement, native fish

introductions, nonnative species introductions, construction of facilities, helicopter and off-road vehicle access, or any other unpermitted activity that could alter ecosystems on the Refuge.

The Service will cooperate with other state agencies such as the Department of Natural Resources and the Department of Transportation and Public Facilities on matters of mutual interest and may enter into informal and formal management agreements.

2.4.9.2 Tribes and Native American Organizations

The Service's Native American Policy (USFWS 1994) identifies general principles that guide the Service's government-to-government relationships with tribal governments in the conservation of fish and wildlife resources. Additional guidance has been provided by Executive Order 13084, Consultation and Coordination with Indian Tribal Governments, issued May 14, 1998, and the Department of the Interior-Alaska Policy on Government-to-Government Relations with Alaska Native Tribes issued January 18, 2001 (USDI 2001). The Togiak Refuge will maintain government-to-government relationships with tribal governments. The Refuge will also work directly with regional and village corporations and respect Native American cultural values when planning and implementing refuge programs.

This plan revision was developed with the assistance of representatives of five local Native American tribes.

2.4.9.3 Owners of Refuge Inholdings and Adjacent Lands

The Refuge will work cooperatively with inholders and adjacent landowners, providing information on refuge management activities and policies. The Refuge will consult periodically with them regarding topics of mutual interest; will respond promptly to concerns over refuge programs; and will participate in cooperative projects (e.g., water quality monitoring and fish and wildlife management).

2.4.9.4 U.S. Fish and Wildlife Service Jurisdiction over Waters within Togiak Refuge

Where the United States holds title to submerged lands beneath waters within the Togiak Refuge and the Alaska Maritime National Wildlife Refuge, the Service has jurisdiction over certain activities on the water.

In 1980, under ANILCA, the U.S. Congress established the Togiak and Alaska Maritime National Wildlife Refuges. These areas of land and water may contain both navigable and non-navigable waters. Where waterbodies are non-navigable within the Refuges' boundaries, the Service has management authority over most activities on non-navigable waterbodies where adjacent uplands are federally owned. State laws and regulations apply everywhere on

the lands and waters of the Refuge unless they conflict with or are preempted by Federal laws or regulations, or both.

The Service's statutory authority to manage these lands and waters comes from ANILCA; the Service manages these lands pursuant to the Refuge Administration Act. Under provisions of ANILCA, the Service manages the federal subsistence program on all inland waters within and adjacent to the external boundaries of the Refuge (50 CFR 100.3(b)).

2.4.9.5 Other Constituencies

The Refuge will inform local communities, special interest groups, and others who have expressed an interest in or are affected by refuge programs about refuge management policies and activities. Togiak Refuge will seek input from these constituents when issues arise that may affect how the Refuge is managed. When appropriate, local residents and other stakeholders will be asked to participate in refuge activities so their expertise and local knowledge can be incorporated into refuge management.

2.4.10 Ecosystem and Landscape Management

Species do not function alone; they function together in the environment as part of an ecosystem. The Refuge will manage the resources of Togiak Refuge by employing ecosystem-management concepts. Individual species are viewed as integral to the diversity of those ecosystems and are indicators of the healthy functioning of the entire ecosystem. When the Service identifies species to use as indicators of the health of an ecosystem, it will do so through a rigorous peer-reviewed scientific process involving experts from other federal agencies and the Alaska Department of Fish and Game.

Inventorying, monitoring, and maintaining a comprehensive database of selected ecosystem components are critical for making refuge management decisions and for ensuring the proper long-term ecosystem stewardship. This includes regular and recurring monitoring of status and trends of ecosystem components such as fish, wildlife, plants, climatic conditions, soils, and waterbodies. All monitoring will employ appropriate disciplines, new technologies, and scientific capabilities whenever practical.

2.4.10.1 Air Quality

The Service's authorities for air quality management are included in several laws. The most direct mandates to manage air resources are found in the Wilderness Act and the Clean Air Act.

The Service is required by the Clean Air Act to preserve, protect, and enhance air quality and air quality-related values on Service lands. Air quality-related values include visibility, plants, animals, soil, water quality, cultural and historical resources, and virtually all

3. Affected Environment

3.1 Geographic and Ecosystem Setting

3.1.1 The Bristol Bay and Kodiak Ecosystem

The Togiak Refuge lies within the Bristol Bay and Kodiak Ecosystems. This ecosystem encompasses approximately 60,615 square miles of southwestern Alaska from the Kodiak Archipelago to the Togiak Refuge and includes the southernmost part of the Kuskokwim Bay area south of Bethel and Yukon Delta National Wildlife Refuge.

This ecosystem is one of Alaska's most productive regions for fish and wildlife. The ecosystem's large, diverse, and productive fishery resources are its driving force. Salmon are the principle mode by which nutrients from the ocean are transported to this system. As salmon return to spawn and die, their bodies provide the critical nutrients to support the primary producers in the food chain such as micro invertebrates, insects, and vegetation, which in turn provide food and shelter for the next generation of young salmon. At the same time, salmon supply food for animals much higher in the food chain such as bears, foxes, birds, and people.

These salmon are the driving force behind not only the ecosystem, but also the area's culture and economy. Local people have relied on, and continue to rely on, this ecosystem to provide not only food and income, but also a way of life. The region's commercial and recreational fisheries provides millions of dollars in income and thousands of jobs for people from Alaska, other states, and other countries throughout the Pacific.

The management of the Refuge plays an important role in the continuing function of the Bristol Bay and Kodiak Ecosystem by providing a healthy environment for fish, wildlife, and people.

3.2 Land Status

This plan applies to the Togiak Refuge and Hagemester Island of the Alaska Maritime Refuge. In this document, the two units are referred to as Togiak Refuge or the Refuge. Management direction discussed in this plan applies only to lands under the jurisdiction of the Service within the boundaries of Togiak Refuge and Hagemester Island.

The land status on Togiak Refuge continues to change because refuge lands selected by the State of Alaska, Native corporations, and individuals are in the process of being conveyed, rejected, or relinquished. In addition, some private lands within the boundary have been acquired from willing sellers, primarily within the Togiak Wilderness area.

Figure 3-1 shows, in general, the status of lands within the Togiak refuge and Hagemeister Island. Of the 4,899,000 acres of land within the Togiak Refuge boundary, approximately 4,124,000 acres are under Service jurisdiction. Approximately 2,000 acres are under the jurisdiction of other Federal agencies, primarily a military withdrawal at Cape Newenham under the jurisdiction of the U.S. Air Force.

The State of Alaska has approximately 3,200 acres of selected lands within the boundary that have not yet been adjudicated. In addition, the Alaska Department of Natural Resources developed a Special Use Land Designation for “...*State of Alaska shorelands and waters within the Togiak National Wildlife Refuge and lower Goodnews River.*” (Appendix C) See page C-11 for the State’s current management guidelines.

Currently, private entities, including Native corporations and individual Native Alaskans, have selected approximately 228,000 acres that have not yet been adjudicated and approximately 546,000 acres that have been conveyed. Included in those acres are 330 Native allotment parcels. The Alaska Native Allotment Act of 1906, as amended, allowed individual Natives to select as many as four parcels of land totaling 160 acres. At this time, 328 of those claims have been conveyed. There are five remaining parcels to be adjudicated. A 1998 amendment to ANCSA (Section 432 of Public Law 105-276 [43 U.S.C 1629g]) allowed for certain Alaska Native Vietnam veterans to have a renewed opportunity to apply for Native allotments. Eight allotments totaling 879 acres have been selected within the Togiak Refuge. One Alaska Native Vietnam veteran allotment of 82 acres has been conveyed on the refuge.

Hagemeister Island includes 73,884 acres within the Alaska Maritime refuge boundary. Of that, the U.S. Fish and Wildlife Service manages 73,080 acres. Native corporations have selected approximately eight acres that have yet to be adjudicated. There are five conveyed Native allotments on the island totaling 796 acres.

3.3 Physical Environment

3.3.1 Area of Influence

The Refuge’s area of influence includes the Bering Sea, coastal lands and inland waters, and other lands adjacent to the Refuge, including lands within the Yukon Delta Refuge, the Wood-Tikchik State Park, and portions of the middle Kuskokwim River basin. The geology, water, and soils of the Refuge have a variety of physical features, including glacial lakes and moraines. Interior lands and waters are linked to the bays by several rivers. The refuge boundary encompasses all, or portions of, 35 major rivers, 25 major lakes, and hundreds of smaller lakes, ponds, and streams. These features, combined with the influence of the Bering Sea, affect the

climate and weather of the refuge and provide habitat and migration pathways for fish, wildlife, and plants.

3.3.2 Climate

The Refuge is located in a transitional climatic zone, and weather conditions are widely variable throughout the Refuge at any given time. Both the maritime climate of the Bering Sea and the continental climate of interior Alaska affect the Refuge, with the majority of the year being overcast or cloudy. Temperatures in the area range from an average minimum of four degrees Fahrenheit to an average maximum of 60 degrees Fahrenheit. Fall is the wettest time of year, while the least precipitation occurs in spring. Average annual precipitation averages 25 inches. Annual snowfall ranges from 60 inches along the coast to more than 150 inches in the mountains.

Major climatic changes have occurred in recent decades with visible and measurable consequences in Alaska. The effects of these changes on Alaskan flora and fauna challenge Service mandates to conserve the fish, wildlife, plant resources, and refuges in its trust. Forest, tundra, marine, and freshwater ecosystems are all vulnerable to a changing climate, which can influence Alaska's biodiversity in a myriad of complex and unpredictable ways, and will likely transform Service trust resources and lands in ways we do not currently understand. Alaska has experienced the largest regional warming of any state in the U.S. Temperature records for 25 stations across Alaska from 1949 to 1998 document seasonal mean temperature increases throughout the entire state. Seasonally, increases were highest in winter and spring and lowest in summer; fall was the only season in which slight decreases were observed. Much of this warming appears to have occurred during a sudden arctic atmospheric and ocean regime shift around 1977. Climate projections for Alaska suggest a continuation of the warming trends of recent decades. Changes are expected to be greatest during winter months. Because ice and snow have greater reflectivity, reduced snow and sea-ice extent reveals darker land and ocean surfaces, increasing absorption of the sun's heat and causing further regional warming. While northern and western Alaska may experience increases in precipitation, southeast Alaska may experience a decrease. Permafrost thawing is projected to accelerate under future warming, with as much as the top 30 feet of discontinuous permafrost projected to thaw by the end of the 21st century. The accelerated mass loss of Alaskan glaciers that began by the end of the 1980s is likely to continue into the future.

3.3.3 Landforms

A variety of landforms occur throughout the Refuge, including jagged peaks, cirque lakes, wide U-shaped valleys, broad coastal wetlands, and sea cliffs. The most prominent landforms are the

Ahklun and Wood River mountains; the Kanektok, Goodnews, and Togiak river basins; and the coastal lowlands of the Nushagak Peninsula.

3.3.4 Geology and Soils

A variety of events have shaped the landscape, rocks, soils, and minerals of the area. All of these physical features in turn affect fish, wildlife, and their habitats. Over the last two million years, ice sheets repeatedly covered much of the Refuge. Glaciers scoured the broad U-shaped valleys of the Kanektok, Goodnews, and Togiak drainages.

The glaciers deposited silt, sand, gravel, cobbles, and boulders on the Refuge, commonly in unsorted glacial drift. Moraines appear in many places as broad ridges curving across modern drainages, in places damming lakes behind them. Water and wind have transported and formed surficial deposits. Alluvium, consisting of floodplain mud, silt, sand, gravel, cobbles, and boulders, is found along streams. Colluvium, mainly loose, frost-broken rubble, is present throughout the Refuge.

The parent materials for refuge soils vary considerably: along valleys and floodplains, the parent material consists of glacial gravel and outwash; on the uplands, it is decomposed bedrock and colluvium; and along most of the coastal areas, the parent material consists of silty alluvium.

Several deposits of valuable minerals lie within and near the Togiak Refuge boundary, with only a few on refuge administered lands. Most of these deposits are of gold, mercury, and platinum, with the majority found in the upper Arolik basin, the lower Goodnews River and its tributaries, and near the Salmon River.

One of the unique geological features found within the refuge boundary is a dormant tuya located northeast of the village of Twin Hills. A tuya is a low, flat-topped volcano that forms as the volcano erupts beneath a glacier. Because of the thick layer of ice above the volcano, lava flows extend outward, rather than building up the more familiar volcanic cone-shaped mountain.

According to Bureau of Land Management (BLM) resource assessments for the region, it is unlikely that there are oil or gas deposits within the Refuge. Portions of the Nushagak Peninsula and the northwestern area of the Togiak Refuge near Quinhagak (much of which is privately owned) have been classified as having low potential for hydrocarbons. However, these areas of low potential are thought to comprise volcanic deposits and/or igneous intrusions, which are not favorable for hydrocarbon generation and accumulation. The remaining refuge areas are classified as having no hydrocarbon potential (Gibson et al. 1988).

3.3.5 Water

3.3.5.1 Rivers and Lakes

Three major river systems (Kanektok, Goodnews, and Togiak rivers; see Figure 3-2) drain waters into Kuskokwim and Bristol bays. The Kanektok River (Figure 3-3) begins at Kagati Lake in the Ahklun Mountains and flows southwest for about 90 miles before emptying into Kuskokwim Bay. This river and its tributaries drain an estimated 870 square miles. The upper portions of the Kanektok River flow through a mountain valley, while the lower portion flows through flat tundra. Numerous gravel bars and islands occur along the length of the river, particularly where the channel meanders across the coastal plain.

The Goodnews River (Figure 3-4) consists of three river forks, which drain approximately 1,050 square miles. The North Fork flows from Goodnews Lake for approximately 25 miles before leaving the Togiak Refuge and an additional 22 miles before entering into Goodnews Bay. The Middle Fork is a 42-mile tributary that parallels the North Fork. The rivers have fine-to-medium gravel and cobble bottoms. Gravel bars and islands are not as numerous as on the Kanektok and are scarce when the water level rises. The South Fork is the shortest of the three forks at approximately 25 miles long.

The Togiak River (Figure 3-5) is the largest drainage basin in the Refuge, flowing southwestward from Togiak Lake about 55 miles before draining into Togiak Bay. This river's watershed covers an area of about 1,765 square miles. The river varies in size and depth, and is more than 500 feet wide in many places. The river is primarily a single channel, currents are swift, and occasional gravel bar islands are present. Five major tributaries drain into the Togiak River: the Gechiak, Pungokepuk, Nayorurun (Kashaiak), Kemuk, and Ongivinuck drainages.

Lakes in the Refuge range in size from potholes and beaver ponds to the 13-mile long Togiak Lake. About 70 percent of the lakes are less than 100 acres in size, and 22 percent range from 100 to 500 acres.

3.3.6 Water Quality

Waters within the Refuge are known for their clarity and unspoiled conditions. Nutrients in the water increase for periods of time as spawning salmon decompose and when snowmelt or rain increase runoff from marsh and tundra vegetation. Runoff in the region varies widely depending on changes in topography and climate conditions. Freeze-up on the Refuge usually occurs between late October and late November; break-up usually occurs in early to mid-May.

Pollution from litter, motors, petroleum products, previous mining, and human waste may also occur on the Refuge. The amount of pollution from these sources is of concern to people who live in and visit the Refuge.

Sampling efforts have collected baseline physical, biological, and chemical data for waters throughout the Togiak Refuge. Analyses indicate water quality remains high and has been affected very little by human activities (MacDonald 1996; Collins 2001).

3.3.6.1 Heavy Metal Contamination

Areas within and adjacent to the Refuge have a long history of mining and mineral extraction. One of the largest platinum deposits in the United States is located south of Goodnews Bay. These deposits are privately owned and have been actively mined sporadically during the past 100 years. Because parts of these operations have taken place upstream from waters within the Togiak Refuge, the possible contamination of these waters from heavy metals associated with mining and metal extraction are of concern.

In 1990, the Service conducted a study to determine the level of contaminants from platinum mining in the Salmon River. This study found no significant increases in samples collected from mined areas or from fish samples (Jackson 1990). Additional water quality sampling is being conducted in the area by BLM and ADF&G. There are very few data for other portions of the Refuge, and it is unknown whether natural mineral deposits and/or historic mining activities within or upstream of the Refuge have contributed heavy metals to watersheds within the Refuge.

Human Waste Contamination—Potential degradation of Togiak Refuge water quality due to improper disposal of human waste by visitors along the Kanektok, Goodnews, and Togiak rivers has been a concern for many years.

Waste from warm-blooded animals (including humans) contributes a variety of intestinal bacteria that are pathogenic to humans. Fecal indicator bacteria are used to assess the quality of water because they are correlated to the presence of several waterborne disease-causing organisms. The presence of *E. coli* in water is direct evidence of fecal contamination from warm-blooded animals and indicates the possible presence of pathogens (Dufour 1977).

In 1990, Togiak Refuge staff collected water samples from several sites throughout the Togiak Refuge and had these analyzed by a private laboratory in Anchorage, Alaska. These tests were conducted to identify and enumerate fecal coliform and fecal streptococci bacteria. Results indicate that these bacteria were present but at levels well below allowable Environmental Protection

subsistence use permits are not required, ADF&G annually conducts door-to-door surveys in all villages to collect subsistence salmon use information. When combined, these sources of information provide the most accurate estimates of fish harvest and escapement within the Kanektok, Goodnews, and Togiak River drainages.

We estimate the level of unguided angling effort is estimated by trip reports that are required to be completed by air taxis for each group they transport to or from the Refuge. Sport fishing guides report the number of clients fishing in a particular area, the number of hours fished, and the number of each species caught and kept. For smaller fisheries and tributary streams, guide use reports provide the most accurate estimate of guided angling effort, catch rates, and harvest.

Togiak Refuge River Rangers collect information on all recreational and subsistence activities occurring in the Kanektok, Goodnews, and Togiak river drainages. The information they collect translates into “use days,” which would include anglers and the number of guides and pilots accompanying them and even the camp personnel present on the river. These estimates provide the level of effort per day and allow a breakdown between wilderness (upper river) and nonwilderness (lower river) levels of activity. This information provides the most accurate and reliable estimates of the type and level of public uses occurring throughout the Kanektok, Goodnews, and Togiak river drainages.

Anadromous Fish

Anadromous fish are those species that migrate up rivers from the ocean to spawn in fresh water. There are several anadromous species that occur within the Refuge. Five species of Pacific salmon—chinook, sockeye, chum, pink, and coho—and Dolly Varden char migrate up the numerous rivers throughout the Bristol Bay and Kuskokwim Bay regions. These species are key components of the ecosystem, the economy, and people’s lifestyles.

Salmon—The salmon runs that return to the Refuge are the single most important driving force behind the region’s ecosystem and economy. Because of this, commercial harvest, escapement past the fishery into the rivers, recreational harvest, and subsistence harvest of this resource have been well studied and documented. The estimates of returning and spawning populations presented here are based on an average of data reported by ADF&G from 1993 through 1999 (Burkey et al. 2001; Weiland et al. 2001). The spawning population is considered to be the average estimated escapement; the returning population is based on the average total run estimate (escapement and harvest) for each species. From 1980 to 2003 (years where complete estimates are available), estimates of

salmon bound for rivers within the Togiak Refuge showed the normal variability in abundance expected in wild fish stocks.

Other than the environmental factors encountered during their life cycle (predation, environment, availability of food), the largest factor affecting salmon abundance in the waters within the Togiak Refuge is the regulated commercial harvest in the near shore waters of the Bering Sea. This accounts for approximately 60 percent of the known run. Additional harvests by subsistence fishermen in both the rivers and the near shore marine area accounts for less than two percent of the total run. The recreational harvest (those fish intentionally harvested or that are estimated lost as a result of the recreational fishery) consist of less than one percent of the run. ADF&G, along with the cooperation and support of the Service and other organizations, has carefully monitored the commercial, subsistence, and recreational harvests of salmon and has implemented management plans and other actions over the years to ensure that these salmon populations remain healthy and viable (Burkey et al. 2001, Weiland et al. 2001).

Char—Three species of char are found within the Refuge: Dolly Varden, Arctic char, and lake trout. Dolly Varden are an important component of the subsistence harvest and recreational harvest throughout the Refuge. Most streams and lakes with ocean access contain both Dolly Varden and Arctic char, and certain streams on Hagemeister Island also support Dolly Varden (Gwinn 2005). Arctic char have not been found on Hagemeister. Dolly Varden migrate down the Togiak, Kanektok, Goodnews, and other rivers in late May. They reside in near shore marine areas and return to freshwater during July through September to spawn and overwinter. Dolly Varden do not necessarily return to their home waters to overwinter. Some fish may migrate from the ocean into one stream to spawn and then migrate back to the ocean and enter a different river to overwinter, usually in a lake. This complex life cycle means it is very difficult to determine population size or trends, or estimate likely effects of sport and subsistence fisheries. Recent genetic research strongly suggests tributaries of the Togiak River support genetically distinct populations of Dolly Varden (Crane et al. 2003).

More Dolly Varden are caught in the recreational fishery than any other species in Kanektok, Goodnews, and Togiak rivers. When the recreational and subsistence catch and harvest data are combined, it suggests populations are supporting large catches and annual average harvests of tens of thousands of fish for each of these three rivers (USFWS 1990; BBNA and ADF&G 1996; Dunaway and Sonnichensen 2001).

Resident and Freshwater Fish

Resident, or freshwater fish, are another important component of the ecosystem. Arctic char, rainbow trout, Arctic grayling, lake trout, pike, burbot, blackfish, and round whitefish are considered resident fish. These fish rely on the supply of nutrients that salmon bring from the ocean, nutrients that are consumed either by eating loose salmon eggs as they float downstream or by eating insects that have fed on dead salmon carcasses. In turn, these resident fish provide an important source of food for raptors (e.g., osprey and bald eagles), other fish (e.g., lake trout and pike), and local people who catch these fish year round.

Rainbow Trout—Rainbow trout are found in most waters within the Togiak Refuge, with major concentrations occurring in the Togiak, Goodnews, Kanektok, and Arolik river systems. Populations appear to be stable, but it is possible the average size of fish in the Kanektok and Goodnews river populations has decreased. These results may represent normal fluctuations in population structure, variations in sampling methods, or effects due to a fishery (Adams 1996).

Arctic Char—Little is known about these resident char within the Refuge except that they are most common in headwater lakes, in deep pools, and in mainstream rivers, and they spawn in lake tributary streams.

Lake Trout—Lake trout are known to exist in several deep lakes throughout the Togiak Refuge but primarily in the Kuskokwim drainage. Lake trout live and spawn in these lakes and are not known to migrate. There are very few data about lake trout populations within the Refuge. Between 2,000 and 7,000 lake trout were estimated to be in Kagati Lake during a 1989 and 1990 tagging study (Fair 1995; Lisac and MacDonald 1995).

Arctic Grayling—The majority of streams within the Refuge contain Arctic grayling. Annual movements between spawning, feeding, and wintering sites may be extensive. Juvenile and adult grayling migrate upstream just before or during spring break-up. Before freeze-up on the tributaries, Arctic grayling are thought to migrate to lakes and spring areas to overwinter.

Northern Pike—Pike are an important subsistence fish caught primarily through the ice on lakes throughout the Togiak Refuge. Many of the rivers, creeks, lakes, and ponds in watersheds on the Bristol Bay side of Togiak Refuge support pike. However, pike are less abundant in waters on the Kuskokwim Bay side of Togiak Refuge. Pike winter in lakes and near springs in rivers and creeks where the danger of oxygen depletion is minimal. As soon as the ice breaks up, the pike move inshore or upstream to marshy areas to spawn. Pike spend the summer and fall in the warm, slow-

moving water of shallow lakes and meandering rivers. Little information is available for populations within the Refuge, but they appear to be healthy and possibly expanding, according to local residents.

Kanektok and Arolik River Fisheries

The Refuge conducted a subsistence harvest survey in Quinhagak to collect harvest data on resident fish species (USFWS 1990). Of 84 households interviewed, 79 percent (66 households) reported harvesting fish other than salmon. Expanding these interview results to the 140 households in Quinhagak gives a rough estimate of a subsistence harvest for that year of 7,625 Dolly Varden and Arctic char, 2,585 rainbow trout, 543 Arctic grayling, and 22 lake trout.

Since 1983, when effort estimates were first available, participation in the recreational fishery increased rapidly to peak in 1988 (Figure 3-6). Approximately 60 percent of the total sport fishing effort occurs on the lower 20 miles of the Kanektok River, where anglers target chinook, chum, and coho salmon (Dunaway and Bingham 1992; Dunaway and Fleischman 1995). The upper 70 miles of the river primarily support recreational angling for rainbow trout, Arctic grayling, Dolly Varden, lake trout, and Arctic char.

Catches (including all fish released or harvested) of Dolly Varden and Arctic char from the Kanektok River are the largest among the non-salmon fish species, with an annual average recreational catch of more than 20,000 fish (Lafferty 2004). From 1996 through 2002, the seven-year average annual catch of other resident species was 11,684 rainbow trout, 120 lake trout, and 4,074 Arctic grayling. A small portion of the overall catch is actually harvested (killed). The seven-year average recreational harvests for 1996–2002 were 529 Dolly Varden and Arctic Char, 62 rainbow trout, 22 lake trout, and 59 Arctic grayling annually.

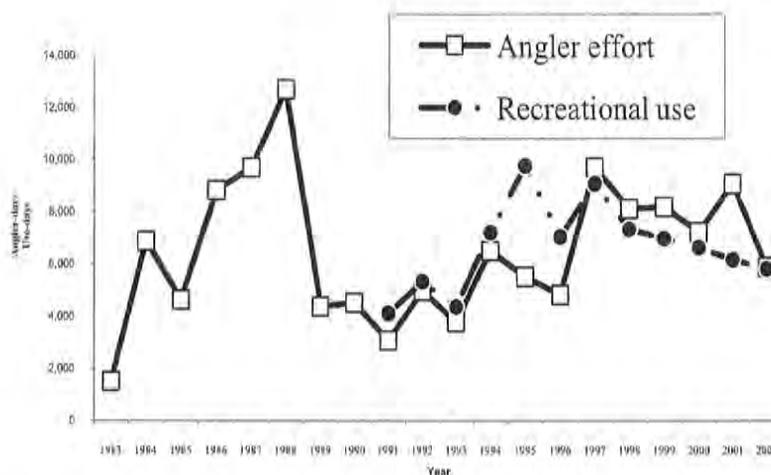


Figure 3-6. Kanektok River angler effort (USFWS 1991–2002; Lafferty 2004)

Studies conducted by the Service, ADF&G, and others have indicated that the impact of recreational and subsistence fisheries has the potential to change the length structure of rainbow trout populations in the Kanektok River (Adams 1996) and other rivers. The State of Alaska Board of Fisheries took action to reduce impacts of recreational fishing of rainbow trout in 1990 and in 1997 under the Southwest Alaska Rainbow Trout Management Plan. Recreational fishing for rainbow trout in the Kanektok River is restricted to catch-and-release only from June 8 through October 31, and tackle is restricted to unbaited artificial lures with a single hook. These actions are intended to reduce the potential for dramatic changes in the age structure of rainbow trout. Ongoing monitoring of fish populations should be adequate to detect and suggest necessary change to the management of these fish.

Available information suggests subsistence harvest represents the majority of rainbow trout mortality in the Kanektok River drainage. In 1990, the Service estimated rainbow trout harvest by Quinhagak residents was in excess of 2,000 fish. Using a maximum of 12 percent catch-and-release mortality (Taylor and White 1992) and the 1991 ADF&G sport fishing estimates reported by Dunaway and Sonnichsen (2001) of 5,856 rainbow trout caught and 182 fish harvested, total annual mortality due to sport fishing would be no more than 863 fish. This represents a maximum, and a catch-and-release mortality rate of three to five percent is probably more realistic for Kanektok River rainbow trout.

Goodnews River Fisheries

The Alaska Department of Fish and Game has estimated recreational catch of rainbow trout on the Goodnews River since 1991 (Figure 3-7). Estimated catch was variable from 1991 (2,776)

through 2002 (2,915), ranging from a low of 945 in 1994 to a high of 9,703 in 1997. The 1996–2002 annual average sport harvest of rainbow trout was approximately 103 fish (Lafferty 2004). Analyses of data collected indicate changes in the Goodnews River rainbow trout populations are similar to those described for the Kanektok River (Adams 1996). In her paper, Faustini (1996) suggested a change had occurred in the historic length-frequency and may be the result of sport fishing harvest, sport fishing hooking mortality, and subsistence fishing harvest.

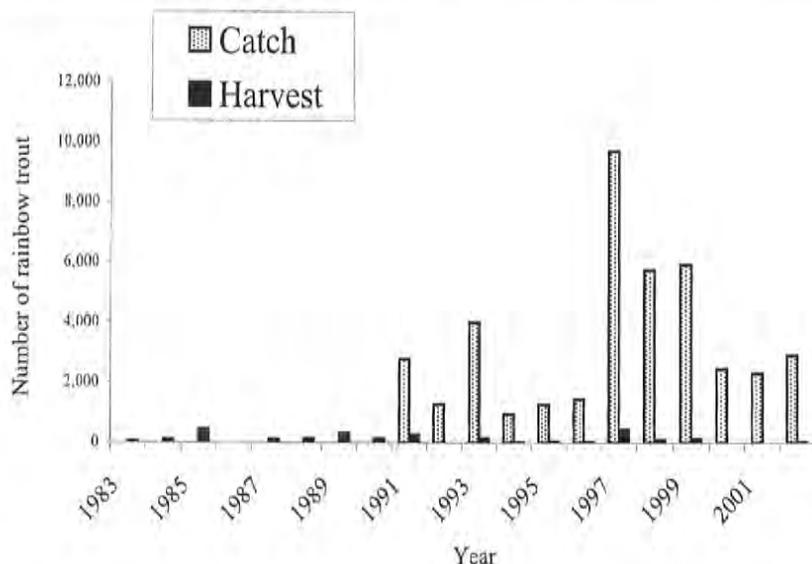


Figure 3-7. Goodnews River rainbow trout sport fishery harvest and catch (Lafferty 2004)

Other estimated annual average sport catches from 1996–2002 include 14,462 Dolly Varden and Arctic char, 227 lake trout, and 2,271 Arctic grayling. Annual average harvests during this same time period were 633 Dolly Varden and Arctic char, 16 lake trout, and 73 Arctic grayling. Similar estimates for subsistence harvest are not available.

Togiak River Fisheries

Dolly Varden and Arctic char have been captured in all tributaries of the Togiak River with the greatest concentrations being in the Izavieknik River (Lisac and MacDonald 1996; Lisac and Nelle 2000). More of these fish are caught in the recreational and subsistence fisheries than are any other species in the Togiak River. A household survey of Togiak area residents estimated the harvest of several non-salmon species of fish in 1994–1995 (BBNA and ADFG 1996) and in 1999–2000 (Coiley-Kenner et al. 2003). Estimated numbers of individuals harvested are shown in Table 3-2.

Table 3-2 Estimated subsistence harvest of non-salmon fish from the Togiak River during 1994–1995 and 1999–2000

Fish species	Estimated Number of Fish Harvested	
	1999–2000	1994–1995
Arctic grayling	50	124
Pike	593	1285
Dolly Varden and Arctic char	4,087	10,847
Lake trout	107	270
Rainbow trout	29	897
Whitefish	4,599	9350

Recreational catch estimates for the Togiak River have increased from 1994 through 1998, with a five-year average catch of 3,837 Dolly Varden and Arctic char (Dunaway and Sonnichsen 2001). It is unknown whether this is the result of angler preference, angler effort, or increases in stock abundance. Of the more than 3,800 Dolly Varden and Arctic char caught, an annual average of 437 fish was harvested by sport anglers during this time period.

Rainbow trout were not found to be present upstream of the Togiak Lake outlet and were primarily concentrated in lower tributaries (Lisac and MacDonald 1996). From 1993 through 1995, the Togiak Refuge conducted baseline fisheries inventories on Togiak River tributaries; these inventories provided the first documentation of age, weight, length, and species distribution for rainbow trout, Arctic grayling, pike, Dolly Varden, and Arctic char in the Togiak area (Lisac and MacDonald 1996). Recaptures of marked fish have shown movements of rainbow trout between the tributary streams and the main Togiak River, and additional work in 1998 and 2000 demonstrated rainbow trout in Gechiak and Pungokepek creeks are distinct populations that overwinter in headwater lakes (Nelle and Lisac 2001; Krueger et al. 1999).

Recreational anglers caught an increasing number of rainbow trout during the 1990s. From 1994 through 1998, the average annual catch was about 1,900 trout, but most of these fish were released. The estimated average harvest during this time period was less than 25 fish per year (Dunaway and Sonnichsen 2001).

3.4.2.2 Birds

Waterfowl—The Refuge and the Cape Newenham State Game Refuge (of which Chagvan Bay is a primary feature) are host to a wide variety of migratory and resident waterfowl. Lakes, rivers, tundra ponds, and coastal wetlands combine to offer nourishment and resting areas for staging, breeding, and molting waterfowl.

Major areas of importance include the Nushagak Peninsula, Kulukak Bay, Osviak Slough, Nanvak Bay, Chagvan Bay, Carter Bay, and Jacksmith Bay. A large portion of the world's black brant population feeds or rests on Nanvak and Chagvan bays during migration. A large portion of the North American west coast populations of emperor geese, and king and Steller's eiders migrate through or adjacent to the Refuge. Significant numbers of common eiders, harlequin ducks, and black scoters also stop in the area. Less common, but still abundant, are migrating greater scaup, long-tailed ducks, and red-breasted mergansers. The Refuge also provides nesting habitat for several waterfowl and water bird species, including tundra swans and Canada geese. Common nesting species are mallard, northern pintail, green-winged teal, greater scaup, common eider, harlequin duck, black scoter, common merganser, and red-breasted merganser. Nesting populations in the lowlands of the Nushagak Peninsula and north of Goodnews Bay have been estimated at 31 ducks and 1.3 tundra swans per square mile (USFWS 1990).

One species of particular concern is the harlequin duck. The low reproductive success and specialized habitat requirements of harlequin ducks make them particularly vulnerable to human disturbance (Genter 1992). They appear to be most sensitive to disturbances during the early stages of nesting (Clarkson 1992). Public use levels within the Togiak Refuge are low or nonexistent during the sensitive early stages of nesting. There is no evidence that harlequin duck abundance has been negatively impacted on the Togiak, Goodnews, and Kanektok rivers.

Marsh and Water Birds—A large portion of the North American west coast population of Pacific loons migrates past the Refuge. Red-throated, Pacific, and common loons nest on the Togiak Refuge, as do red-necked and horned grebes. Based on their 1983 surveys, Pogson and Cooper (1983) concluded nesting densities of sandhill cranes on the Nushagak Peninsula are among the highest recorded in Alaska.

Shorebirds—At least 39 species of shorebirds use the bays and lowlands of the Refuge as staging areas enroute to and from the arctic. Eighteen species of shorebirds have been documented breeding on the Togiak Refuge, with the most common nesters being semipalmated plovers, greater yellowlegs, spotted sandpipers, western sandpipers, least sandpipers, common snipe, and red-necked phalaropes. Nushagak Bay's importance to shorebirds resulted in its designation as a regional site in the Western Hemisphere shorebird reserve network because at least 60,000 shorebirds have been documented in this area at one time.

Marine Birds—Cape Newenham, Cape Peirce, Bird Rock, and Shaiak Island support the largest population of cliff-nesting birds in

the eastern Bering Sea mainland. The birds nest and roost on the ledges and in the cracks of the cliff faces, and they forage at sea. The two most common species are the common murre and black-legged kittiwake. Other common species include tufted and horned puffins, pelagic and double-crested cormorants, parasitic and long-tailed jaegers, glaucous and mew gulls, pigeon guillemot, and parakeet auklet. Several hundred Aleutian terns nest in Goodnews Bay, and Arctic terns are abundant throughout the Togiak Refuge. The population and productivity of black-legged kittiwakes, common murres, and pelagic cormorants have been monitored annually at Cape Peirce since 1984.

Cliff-nesting seabirds along the coastline of the Refuge are affected by human-induced and natural disturbances that may reduce their breeding performance. Ecological factors relating to forage food availability, climatological factors, and predation can also affect breeding performance. Disturbances to seabirds are especially critical during times of egg laying, incubation, and chick rearing, when disturbances may cause flushed adults to dislodge eggs or chicks so that they fall to their demise. For these reasons, potential human disturbance is of particular concern.

Marine bird eggs are an important subsistence resource with gull and murre eggs most commonly gathered. It is estimated more than 10,000 eggs are gathered annually by residents of Togiak, Twin Hills, and Manokotak (Coiley-Kenner et al. 2003). Similar harvest estimates by Quinhagak, Goodnews Bay, and Platinum residents are not available.

Raptors—At least 21 species of raptors are known to occur on the Togiak Refuge, with 16 species known to breed here. The most common are bald eagles, northern harriers, rough-legged hawks, merlins, and short-eared owls. In addition, golden eagles, gyrfalcons, peregrine falcons, and northern hawk owls are seen every year.

Because bald eagles are a highly visible species found mainly in association with aquatic habitats, they are more vulnerable than many other species to human disturbance, especially at nest areas (Anthony et al. 1982). This sensitivity varies among individuals, but generally adult eagles are more sensitive during courtship, egg laying, and incubation, with sensitivity decreasing as young develop (Fraser 1981). Public use along rivers, including boating, camping, or fishing near nesting areas, can be a major disturbance and can alter normal raptor activity patterns by altering the distribution of raptors, disrupting nest attentiveness patterns, causing abandonment of breeding territories, reducing productivity, and affecting foraging (Knight and Skagen 1986).

Based on surveys conducted from 1984 through 1988, the Togiak Refuge bald eagle population was 80–90 individuals during the summer, with approximately 20 remaining through the winter. The population appeared stable and showed a small, steady increase (Hotchkiss and Campbell 1989).

Upland Birds—Spruce grouse and willow, rock, and white-tail ptarmigan all occur on the Togiak Refuge, and each is a confirmed breeder. Willow ptarmigan are the most common of these species, with flocks of several hundred or more birds occurring. Rock ptarmigan are found on mountain slopes throughout the Togiak Refuge, while spruce grouse occur on the eastern boundary of the Togiak Refuge where coniferous trees are found. These birds are an important subsistence resource throughout the Refuge, with several thousand harvested each year (Coiley-Kenner et al. 2003).

Passerines—The diverse habitats on the Refuge support a variety of landbird species. Numerous species common throughout the Refuge include alder flycatchers; black-billed magpies; common ravens; tree swallows; blacked-capped chickadees; Arctic warblers; gray-cheeked and hermit thrushes; American robins; yellow wagtails; orange-crowned, yellow, blackpoll, and Wilson’s warblers; northern water thrushes; Savannah, fox, and golden-crowned sparrows; Lapland longspurs; and common redpolls. Other landbird species that are common in certain habitats scattered throughout the Togiak Refuge are bank and cliff swallows; ruby-crowned kinglets; Swainson’s and varied thrushes; American pipits; yellow-rumped warblers; American tree and white-crowned sparrows; snow buntings; and gray-crowned rosy finches. Togiak Refuge participates in various local, regional, and global monitoring efforts for landbirds, which include breeding bird surveys, area searches, checklists, and public bird counts.

3.4.2.3 Land Mammals

Caribou—Several significant changes in caribou migration, population, and distribution have occurred since the original Togiak Refuge Plan was completed in 1985. At that time, there were seldom more than 50 caribou on the Togiak Refuge at any given time, despite the fact there was suitable habitat available (USFWS 1985). Caribou were abundant in the Nushagak, Togiak, and Yukon-Kuskokwim deltas prior to 1900 (ADF&G 1973; ADF&G 1976) but were eliminated from the area by over harvesting, competition with introduced reindeer herds, wildfire, or a possible shift in migration patterns (ADF&G 1973). A small remnant herd remained to the north of the Togiak Refuge in the Kilbuck Mountains, possibly because of the optimum habitat and the inaccessibility of the area to hunters (Skoog 1968). In 1980, the Kilbuck or Quailnguut herd was estimated to be at least 50 animals; more accurate surveys in the mid-1980s showed the population to be 200–300 caribou. By 1995,

the population had grown steadily to more than 4,000 animals, and more caribou were being counted within the Togiak Refuge (Qauilnguut [Kilbuck] Caribou Herd Cooperative 1995; Miller 1995).

In the early 1980s, the range of another, much larger herd known as the Mulchatna herd was beginning to shift westward toward the Kilbuck herd and the lower Yukon-Kuskokwim Delta (Shepherd 1981). A large influx of Mulchatna caribou in the winter of 1994 may have contributed to the 1995 Qauilnguut (Kilbuck) population estimate. Near the end of 1994, approximately 30,000 caribou from this Mulchatna herd migrated through the area in which the Qauilnguut herd lived. As these caribou left, most of the Qauilnguut herd went with them. This was the first known migration of Qauilnguut caribou from their traditional range in the Kilbuck Mountains into areas that were traditionally used by the much larger Mulchatna herd (Qauilnguut [Kilbuck] Caribou Herd Cooperative 1995). It is debatable whether or not the Qauilnguut caribou herd still exists as a separate herd. The Mulchatna herd was estimated to be approximately 200,000 animals in 1996 (ADF&G 1999). However, since 1996, it has steadily declined in numbers. In 2006, it was estimated at 45,000 animals. This herd often moves through the Togiak Refuge, especially near the upper Kanektok, Goodnews, Arolik, and Togiak rivers. Surveys have estimated as many as 30,000 caribou wintering in the Togiak Drainage (USFWS 2000). The migration of this herd ranges from the lower Kuskokwim River, east to Lake Iliamna, south toward the lower Nushagak and Kvichak rivers, and north to the area near McGrath.

In the southeastern portion of the Togiak Refuge, another change in caribou populations occurred in 1988. To more quickly restore caribou populations to their historic level, 146 barren ground caribou were reintroduced to the Nushagak Peninsula in 1988. Because of exceptional range conditions, low predation, and closed hunting season, this herd grew to more than 1,000 animals by 1993. In 1995, a limited Federal subsistence hunt was allowed and is estimated to be removing 3 percent of the population each year (Collins et al. 2003).

Management of this caribou herd is conducted through the Nushagak Caribou Herd Management Plan (USFWS 1994). Until February 2000, most individuals in this herd resided entirely on the Nushagak Peninsula, the exception being a small group of animals inhabiting the area between Twin Hills and the Kulukak River. More recently, temporary movements off the Nushagak Peninsula by a majority of the herd occurred on at least four occasions. Lichen utilization by caribou has become more noticeable, especially in the southern half of the peninsula. Population counts indicate the herd peaked around 1,300 animals in 1998–1999 (Aderman and

Woolington 2001) and then declined to less than 1,000 by 2003. Caribou from the Mulchatna herd move through and seasonally occupy many areas within and adjacent to the Refuge. In response, the Federal Subsistence Board and Alaska Board of Game have greatly expanded subsistence and recreational hunting opportunities. In addition, the Nushagak Peninsula caribou herd has also provided expanded subsistence hunting opportunities. Beginning in the mid-1990s, this herd became an important subsistence hunting resource to residents from Manokotak and Dillingham primarily, and secondarily to residents of Aleknagik, Clarks Point, Togiak, and Twin Hills. This use persisted until 2006, at which time the caribou population had declined in number to a point at which hunting was no longer sustainable.

Interviews with residents of Togiak, Twin Hills, and Manokotak indicate the combined total harvest (which included caribou taken from both within and outside the Togiak Refuge) from these three communities during the 1999–2000 hunting season was approximately 333 animals (Coiley-Kenner et al. 2003). Comparable information was not available for Quinhagak, Platinum, Goodnews Bay, and other communities adjacent to the Refuge.

Moose—Little written information is available about moose abundance on the Togiak Refuge prior to the 1970s. Generally, it is believed moose populations have historically been at low densities in areas of southwestern Alaska and that moose populations have expanded their range and increased in number in this region during the 20th century (Machida 1987; Van Daele 1992).

In 1981, the first major survey of Game Management Unit (GMU) 17A, (see Figure 3-8) the majority of which is within the Togiak Refuge, was conducted. During five and one-half survey hours, only three moose were observed, resulting in the Alaska Board of Game's decision to close the hunting season. When the first Togiak Refuge Plan was written in 1985, it was estimated that fewer than 35 moose lived within the Togiak Refuge (USFWS 1985). Through the 1980s, ADF&G aerial surveys indicated moose numbers along the eastern edge of the Togiak Refuge (Unit 17C) continued to increase, while just to the west in Unit 17A, densities remained low despite the availability of suitable habitat (Taylor 1990). Illegal harvest was thought to be the principal reason for the low moose population in Unit 17A (Taylor 1990; Van Daele 1993; Jemison 1994). In 1990, winter hunting in western Unit 17C was eliminated in an effort to promote moose expansion into Unit 17A. In the mid-1990s, aerial surveys confirmed large increases in the number of moose in the Togiak and Kulukak River drainages (Jemison 1994; Aderman et al. 1995). Table 3-3 shows the results of various surveys conducted in Unit 17A.

subsistence harvests, disease, predation, pollutants, and disturbance.

Coastal haulouts appear to be important for harbor seals principally as a place to rest, give birth, care for and nurture their young, and molt on land (Frost et al. 1982). There are indications that hauling out may be particularly important during the molt. Ready access to water, isolation from disturbance, protection from wind and wave action, and access to food sources have all been mentioned as prerequisites for haulout selection (Burns 1984).

Steller Sea Lions—Cape Newenham and Round Island support the two largest Steller sea lion haulouts in northern Bristol Bay. ADF&G has monitored sea lion populations at Round Island since the late-1970s. The Service began monitoring sea lions at Cape Newenham in 1990 and continued through 1993. From the late 1950s to the mid-1980s, sea lion numbers declined in Alaska (Hoover 1988), and Steller sea lion abundance has declined by more than 80 percent in the past 30 years in the southeastern Bering Sea (Williams, et al. 1998). On April 10, 1990, the Steller seal lion was designated as endangered in the population west of 144 degrees west longitude, which includes the coastline of the Refuge.

In 1991, Cape Newenham was identified as a Steller sea lion haulout. Steller sea lions usually begin using the Togiak Refuge haulout in April and are seen feeding along the coast during the herring spawning migration, which usually occurs in May. Pupping at this haulout is rare. They normally feed heavily on herring in Chagvan Bay during May and June. Average annual sea lion counts have ranged from 166 to 300 at Cape Newenham.

3.5 Human Environment

3.5.1 History

The Cape Newenham and Togiak region of southwestern Alaska has been continuously occupied for 9,000 years and possibly longer. Kusququagmiut Eskimos occupied the area from Chagvan Bay north to the Kuskokwim River. The Chingigumiut Eskimos were a subgroup of the Kusququagmiut Eskimos who occupied the area around Cape Newenham. Tuyuyarmiut Eskimos lived within the areas between Cape Newenham and Nushagak Bay.

At the time of the 1880 census, approximately 2,300 Eskimos lived within what is now the Togiak Refuge. Elliot (1887) wrote that the Togiak River was remarkable for the density of population along its banks. At that time, 1,926 people lived in seven villages along the river from Togiak Lake to Togiak Bay—reflecting the abundance of fish and wildlife and size of this river system.

The Tuyuyarmiut, unlike most coastal Eskimos, did not depend entirely on marine resources. In the spring and fall, they hunted moose, caribou, and brown bear in the interior mountains and valleys. In midsummer, they returned to their villages to harvest salmon.

Kusququagmiut, who occupied the area west and north of the Tuyuyarmiut, depended more upon the sea and spent little, if any, time hunting land animals. The Chingigumiut people living in the vicinity of Cape Newenham, for example, obtained meat, blubber, and oil from seals, beluga whales, and Pacific walrus. Pacific walrus were especially prized for their ivory, which was used in tools and for trade. Seabirds provided meat and eggs, and feathers for clothing. Salmon and trout were also important items in the Kusququagmiut diet.

As forms of transportation in the Bristol Bay and Kuskokwim Bay regions began to shift from kayaks and dog sleds toward large sea-going ships owned by fishing and trading companies, the population of the region began to congregate near the coastal bays these ships used. This, along with the widespread epidemics that led to sharp population declines, caused many village sites throughout the region to be abandoned. Today, communities in and around the Togiak Refuge include Quinhagak, Goodnews Bay, Platinum, Togiak, Twin Hills, Manokotak, Aleknagik, Dillingham, and Clark's Point.

3.5.2 Cultural Resources

The Togiak Refuge has been inhabited for at least 9,000 years and includes hundreds of important cultural sites, many of which are likely to be located in areas where public use is concentrated. This concentration makes these resources particularly vulnerable to looting and damage. Illegal digging and looting are notable concerns in this area of Alaska.

Portions of the Refuge have been surveyed for cultural sites fairly extensively but with little excavation. Almost 200 sites have been documented within the Refuge, and another 50 sites have been documented nearby. Most sites documented are associated with major river drainages, lakes, and bays. It is assumed that some sites have been destroyed because of natural soil erosion along rivers and bays.

Distribution of remains on the Refuge is not uniform. Before 4000 BCE (Before Common Era), people living in what is now the Togiak Refuge were primarily inland caribou hunters. After 4000 BCE, inland hunting continued, but people in the area also began exploiting coastal resources, particularly in the Security Cove area. Dumond (1987) states the coastal area of the Refuge has been the center of human activities for the past 2,500 years, and he expects

3.5.3.2 *Economy*¹

In the 1800s, Russian American Company traders established a fur trading fort on the Nushagak River, which was soon handling more than 4,000 pelts annually from brown and black bears, wolves, wolverines, beavers, martins, mink, marmots, muskrats, river otters, ground squirrels, lynx, seals, and foxes. The trade in furs waned around World War I, although some trapping continues today.

As the fur industry declined, mining and commercial fishing grew. Several placer gold mines operated near the Arolik River between 1900 and World War II. Platinum mining near Goodnews Bay began in 1926, continued until 1975, and has been intermittent since then. During the 1920s, 1930s, and into the 1940s, a number of placer mining operations were active in the Arolik, Goodnews, Eek, and Kanektok River systems, and on Trail Creek. Varying amounts of gold and platinum were recovered, with the most extensive operations within the Refuge occurring on a tributary of the Arolik River prior to establishment of the Refuge. Abandoned cabins, airstrips, tractor trails, rusting machinery, empty barrels, and tailing piles are evidence of these past operations scattered throughout the region. At present, there are approximately 20 unpatented mining claims held by two claimants on refuge lands.

For at least the past 30 years, commercial fishing and fish processing—supported by the highly productive Bristol Bay fishery—have dominated the Refuge-area economy. These activities are highly seasonal, with a very distinct peak from May through September. Government spending and tourism, built primarily around recreational fishing, are also important contributors to the local wage economy. Because most area communities are so small, the trade and service sectors are not well developed; the small villages depend on the regional center of Dillingham and on Anchorage to provide most support services and retail opportunities.

Commercial fishing and fish processing—From 1985 through 1996, the annual value of salmon harvested in the Bristol Bay-area commercial fishery fluctuated around \$200 million (in 1997 dollars). A poor salmon harvest in 1997 marked the beginning of a reduction in the value of the fishery. Table 3-6 shows annual harvest and value of the Bristol Bay salmon fishery for 1985 through 2007.

¹Except where otherwise noted, this section is derived from a report commissioned by the U.S. Fish and Wildlife Service: Goldsmith, O.S., A. Hill, T. Hull, M. Markowski, and R. Unsworth. 1998. *Economic Assessment of Bristol Bay Area Refuges: Alaska Peninsula/Becharof, Izembek, Togiak*. Institute of Social and Economic Research, University of Alaska Anchorage, and Industrial Economics Incorporated. Anchorage, Alaska.

The commercial fishery is a limited entry fishery, and many permits are owned by nonresidents who come to the state for only a few weeks in the summer. Moreover, many of the permits held by Alaskans belong to fishermen who live outside the region.

Employment in fish processing is also dominated by workers from outside the region and outside the state; in a given year, usually less than 20 percent of processing employees are Alaska residents. The short fishing season, combined with the large nonresident share of permit holders, crew, and processing workers, means much of the economic impact of this harvest falls elsewhere, as dollars earned in the region are spent outside the region or outside the state.

Government—Government employment at all levels accounts for about one in three jobs in this part of Alaska. Most of these are local government jobs. The Federal and state government jobs tend to be concentrated in the regional service centers of Bethel and Dillingham. Most local government employment is with municipal governments or school districts. All of the financial support for rural schools, and much of the financial support for local municipal governments, comes from state government because local tax bases are small in most of the region's communities. Many government positions are relatively high-paying, year-round jobs, which provide some stability to the regional economy that otherwise depends heavily on commercial fishing.

occurring on claims along Kow Kow Creek (a tributary of the Arolik River), and shoveling operations were underway along Wattamus, Olympic, and Bear creeks (tributaries of the Goodnews River) (Holzheimer 1926).

In the summer of 1937, barges had delivered materials to construct an eight cubic foot dredge south of Goodnews Bay to work claims for the Goodnews Bay Mining Company. Freight for the company was being hauled by Caterpillar tractor from Platinum, along the coast to the mouth of the Salmon River, and then upriver to the mining camp. The Clara Creek Mining Company was operating a dragline in the area at that time, and the company was in the process of taking a drill inland from the north side of Goodnews Bay to Snow Gulch, a tributary of the Arolik River.

By November of 1937, the Goodnews Bay Mining Company had operated the dredge 40 days and was operating two draglines on Platinum Creek. At this time, a Caterpillar road led from Platinum around the northeast end of Red Mountain to the Clara Creek Mining Company camp. The road was being reconstructed into a permanent road by the Alaska Road Commission and was planned to reach the Goodnews Bay Mining Company camp at Squirrel Creek two miles further south. On a mining claim two miles up Fox creek from its junction with Slate Creek, an airplane drill was used in 1936 and a "small hydraulic outfit" was used the next year (USGS 1937). After hauling a drill overland from Goodnews Bay the previous year, the Goodnews Bay Mining Company reported considerable drilling along Snow Gulch. The Clendon Company also used an airplane drill to test claims along Trail, Faro, Deer, and Kow Kow creeks. (USGS 1937). This 1937 USGS report contains several photos of an open crawler tractor towing a fully erected wall tent on skids across open tundra.

In 1939, mining in the region was probably at its most active stage. Operations were located at Rainey Creek (a tributary of the Eek River), Trail Creek (a tributary of the Izavieknik River), Wattamus Creek (a tributary of the Goodnews River), Butte Creek, Kow Kow Creek, Peluck Creek, Snow Gulch, and Sulutak Creek. Placer mining also occurred along headwater streams of Kagati Lake, and an abandoned crawler type tractor remains in this area.

By 1939, the improved road had been constructed from Platinum southward to Clara and Squirrel creeks, and supplies were being hauled by truck instead of Caterpillar (Roehm 1937). Past and present day Clara Creek and Goodnews Bay Mining Company activities south of Platinum are outside the Togiak Refuge boundary.

Operations in the Arolik River drainage and overland transportation of equipment to this area took place on what are now State of Alaska lands, Bureau of Land Management lands, and

private lands within the Togiak Refuge boundary. However, if the 1939 planned bulldozing activity along Keno and Sulutak creeks (probably Flat Creek on USGS maps) did occur, these motorized activities would have occurred on selected lands within the Refuge and possibly Refuge lands further upstream as well. A cabin site noted on USGS maps near the confluence of Keno and Flat Creeks is located on selected lands and is within two miles of Refuge administered lands.

Resident Subsistence Activities 1940–1986. On January 1, 1960, 50 CFR 26.14 was revised to state “Travel in or use of vehicles is prohibited in wildlife refuge areas except on public highways and on roads, campgrounds and parking areas designated and posted for travel and public use by the officer in charge.” On January 20, 1969, the Secretary of the Interior issued Public Land Order 4583, withdrawing approximately 265,000 acres from the public domain to establish Cape Newenham National Wildlife Refuge. At this time, there were no public roads, highways, campgrounds, or parking areas designated within the Cape Newenham Refuge. Therefore, the use of motorized vehicles within the Cape Newenham Refuge was prohibited under 50 CFR 26.14.

Annual narratives for the Cape Newenham National Wildlife Refuge completed in 1969, 1970, and 1971 mention the use of snowmachines and airplanes within the Refuge. No other annual narratives were written for the Cape Newenham Refuge.

Sometime around 1970, three-wheeled all-terrain vehicles became available to the general public. Their use did not become widespread in Alaska until the 1980s, but Bristol Bay area villages—which were relatively wealthy compared to many interior Alaska villages—were among the first places to adopt them (Sinnott 1990).

The 1974 Final Environmental Impact Statement (EIS) for the proposed Togiak Refuge is the most comprehensive pre-1980 documentation of natural resources, economies, subsistence, and other uses within the present day Togiak Refuge. The EIS suggests that snowmachines and motorboats were integral to subsistence activities at the time: “Cash expenditures that are now necessary in order to successfully compete for subsistence resources include guns, shells, nets, snowmachines, boats and motors, gas and oil and maintenance costs” (Alaska Planning Group 1974). Other portions of the EIS mention off-road vehicles. The “Description of the Environment” chapter describes transportation in the proposal area as follows: “Aircraft provide the primary means of transportation to the villages; other travel is by boat, dog teams, snowmachines and other off-road vehicles” (page 26). The impact discussion of the proposed action on page 81 states, “Ground transportation routes in the Togiak region are presently limited to sled trails and winter tractor haul trails... use of trails and

snowmobiles is expected to continue” (Alaska Planning Group 1974). The motorized vehicles mentioned in this document include boats, airplanes, snowmachines, and tractors. It is assumed that the tractors and tractor trails mentioned were associated with the mining activities described previously. There is no mention of tractors being used for subsistence or recreational purposes.

The 1981 Togiak Refuge Annual Narrative mentions the use of three-wheelers within the Togiak Refuge boundary on coastal beaches, uplands, and during winter months. No specific locations or uses are described (USFWS 1982).

In 1981, DOWL engineers and others working under contract for the Alaska Department of Community and Regional Affairs prepared village profiles for each Bristol Bay community, including: Togiak, Twin Hills, Manokotak, Dillingham, and Aleknagik (Alaska Department of Community and Regional Affairs 1982). These reports indicate three-wheeled ATVs were widely used in most Bristol Bay communities, and were primarily used only on roads within the communities, while boats, airplanes, snowmachines, and dog teams were used for travel between communities.

Profiles for Twin Hills and Manokotak indicate that “Three-wheel all-terrain vehicles (ATVs) are the primary method of motorized transportation within the village.” It was noted that virtually every household in Aleknagik had a snowmachine, a three-wheel ATV, and/or a trail bike. While no specific uses of three-wheel ATVs were noted in Togiak, a photograph in the village profile shows two three-wheel ATVs and a Jeep in front of the Togiak Village Co-op. The authors were specific in their discussion of transportation modes and appear to have made a distinction between ATV use within the villages and ATV use outside the village. Outside Togiak Refuge at New Stuyahok, for example, it was noted: “Skiffs are used to some extent for transportation to other villages, and during the frozen winter season snow-gos and 3-wheel all-terrain-vehicles are used extensively” (Alaska Department of Community and Regional Affairs 1982).

In the summer of 1982, 60 residents of Aniak, Sleetmute, Crooked Creek, and Chuthbaluk were interviewed, in part to delineate traditional subsistence use areas. Respondents indicated harvesting subsistence resources as far south as Aniak Lake, which lies in the mountains north of what is now Togiak Refuge. They also reported using 16 to 20 foot aluminum or wood boats powered by 15 to 35 horsepower outboard motors, some of which were equipped with jet units. In winter, travel was by dog team or snowmachine. Airplanes were reported to be rarely used for harvesting locally available resources (Charnley 1982).

A detailed report prepared by Robert Wolfe and others (1984) describes the 1982–1983 subsistence activities for residents of Quinhagak, Goodnews Bay, Platinum, and Togiak. At this time, three-wheeled ATVs were common, and four-wheeled ATVs began arriving in Togiak during the spring of 1983. Quinhagak residents were using three wheelers with trailers to haul drinking water. Wolfe and others (1984) noted that stores in Quinhagak, Platinum, and Togiak sold three wheelers in 1982. Togiak Natives Ltd. acquired a Suzuki franchise prior to 1983 and had sold 15 four wheelers by the summer of 1983.

From May 3 through June 1 of 1984, Togiak Refuge staff documented waterfowl numbers and subsistence hunting at Chagvan Bay. During their stay at Chagvan Bay, the staff observed 16 hunting groups. Five groups used boats, the other 11 groups used two-, three-, and four-wheeled ATVs, including one hunter who flew from Togiak to Platinum before riding to Chagvan Bay (Pogson et. al. 1984). A map included in the 1984 report shows the use of these ATVs occurred along beaches of the north spit of Chagvan Bay (not on refuge lands).

The 1986 Comprehensive Conservation Plan and Final Environmental Impact Statement for Togiak Refuge states: “Goodnews Bay, Quinhagak, and Platinum residents all travel by skiffs or 3-wheeler to hunt geese in spring at Chagvan Bay” (USFWS 1986). Another section of the document reads: “3-wheelers are commonly used in and around all of the villages, on adjacent local roads outside of the refuge, and on coastal beaches.” The plan also states: “Access to refuge lands by traditional means will be permitted for subsistence purposes in accordance with Section 811 of ANILCA. Traditional means, as defined in Service regulations (50 CFR 36), include snowmachines and boats (excluding air boats) on Togiak Refuge.” The consistent message from this collection of early 1980s subsistence reports and from Service documents is that three- and four-wheeled ATVs were common in villages and along certain coastal areas, but they were not used for subsistence on refuge lands.

Two documents from the second half of the 1980s indicate that ATVs were occasionally used in upland areas during periods of poor snow cover. Fall and others (1986) reported that of 153 Dillingham households surveyed, 28 percent had all-terrain vehicles. Dillingham residents who were interviewed reported using ATVs to access set net sites along Snag Point, and trappers who were interviewed in 1984 reported using snowmachines, although ATVs were sometimes used during periods of poor snow cover. The local trapping area defined for Dillingham residents who were interviewed included the Nushagak Peninsula. Schichnes and Chythlook (1988) reported that in 1986, travel within the Igushik fish camp was most frequently by all-terrain vehicle, which was also

essential to the commercial fishing operation. During interviews, Manokotak residents stated the most common method of transportation for trapping was snowmachine, but all-terrain vehicles were also used during periods of poor snow cover.

Contemporary Refuge Access—Access to the Refuge today is primarily by plane, boat, or snowmachine. Most visitors fly from Anchorage to Dillingham or Bethel. From there, visitors hire an air taxi to either take them directly into the Refuge by landing on one of the rivers or lakes or to one of the smaller communities. From there, visitors can use a motorboat to go upriver into the Refuge. Other visitors who stay at lodges outside the Refuge are taken by float plane to these same rivers and lakes.

Most people who live within Togiak Refuge use motorboats, snowmachines, or personal aircraft to access various parts of the Refuge, but they occasionally charter an air taxi to take them to more inaccessible locations. During winter months, local residents are able to travel over much greater areas of the Togiak Refuge by snowmachines. Hagemester Island is rarely used by recreational visitors and infrequently visited by local residents.

Access to the Refuge is often influenced by weather. Wind, fog, water levels, and snow or ice conditions dictate where and when people are able to travel within the Refuge. Mountainous terrain confines travel to the wide U-shaped glacial valleys and coastal plains. Travel by foot is difficult due to thick alder and willow stands along rivers, and tundra and wetlands throughout the river valleys and coastal plains. There are a few well-known winter trails that can be used to travel across the entire Refuge.

There are no roads on lands administered by the Refuge. The majority of all public use during the summer months occurs by boat along the Kanektok, Goodnews, and Togiak rivers and their major tributaries. The lower reaches of the Kanektok and Togiak rivers are within the boundary of the Togiak Refuge, but the uplands along these reaches are privately owned by Alaska Native corporations and individuals, and the lands below the ordinary high water mark of navigable waters are owned by the State of Alaska. Use of these river sections is predominantly by motorboats for subsistence activities and recreational fishing. The Togiak Refuge manages the non-navigable upper reaches of these rivers, which also lie within the Federally designated Togiak Wilderness area. Several private inholdings are located along the Wilderness portion of these rivers. Use of these river sections within the Wilderness area is predominantly by guided motorized groups or rafting parties in the Kanektok, Goodnews, and Togiak river drainages. The upper Togiak River is primarily accessed by motorboat for subsistence and guided recreational use because of this river's low gradient and deeper water.

3.5.5 Subsistence

In 1980, the U.S. Congress passed the Alaska National Interest Lands Conservation Act (ANILCA), which established Togiak Refuge, among other conservation system units. One of the purposes of the act, and of the Refuge, is to provide the opportunity for rural residents engaged in a subsistence way of life to continue to do so (ANILCA sec. 101(c)). Subsistence is therefore regarded as a way of life rather than just an activity. The meanings of subsistence are based on family traditions, religion, relationships with particular places, and a preference for natural foods.

Several communities rely on the resources of the Refuge for subsistence purposes. Manokotak, Togiak, Twin Hills, Goodnews Bay, Platinum, Quinhagak, Dillingham, Aleknagik, and Clark's Point are all either within, or proximate to, the Refuge. The primary subsistence use areas within the Refuge are the Kanektok, Goodnews, Osviak, Matogak, Igushik, and Togiak rivers.

A wide variety of subsistence activities occur year round on or near the Refuge, and other activities last a short time, depending upon the resource. In late winter, spring, and fall, hunting for seals, Pacific walrus, beluga whale, and waterfowl is common. Fishing for herring, smelt, and char; gathering herring roe deposited on the kelp leaves; and collecting gull and murre eggs are also typical in late spring. As spring progresses and changes to summer, salmon fishing is in full swing, starting with chinook, sockeye, and chum, and then progressing to pink and coho salmon in late summer. Caribou and moose hunting, berry picking, firewood-gathering, and the gathering of other plants are primarily fall activities. As fall progresses, Dolly Varden, lake trout, Arctic char, rainbow trout, round whitefish, Arctic grayling, and pike are targeted; as lakes begin to freeze, jigging through the ice for these fish is common. Animals hunted include ptarmigan, ground squirrel, and brown bear. With winter comes trapping. Fox, mink, wolf, beaver, otter, wolverine, and lynx are the major species trapped. Several areas also have winter hunting seasons for moose and caribou.

Area residents use a variety of plants for food, medicines, and firewood. As an example, approximately 80 percent of households in Togiak, Twin Hills, and Manokotak are each estimated to harvest 22–31 gallons of wild berries annually. Over 50 percent of households in these three communities cut a combined total of roughly 632 cords of wood annually for smoking fish and other meat, home heating, and other household uses (Coiley-Kenner et al. 2003). Much of the wood cutting probably occurs on private lands near the communities.

Salmon, non-salmon fish species, large land mammals such as moose and caribou, and wild plants comprise 80–90 percent of all

subsistence resources harvested (on a usable weight basis) by residents of many communities within and adjacent to Togiak Refuge. The remaining 10 percent is mainly comprised of small land mammals, marine mammals, various bird eggs and bird species, and marine invertebrates (Coiley-Kenner et al. 2003).

Wolfe et al. (1984) reported that traditional rights to salmon fishing areas are influenced by customary law, and that communities view certain areas as their traditional territories. Drift and seine fishing areas are viewed as common property; a first-come basis of use appears to prevail. However, set net areas and salmon fish camps tend to be recognized as “traditional use areas of particular kinship groups or clusters of kinship groups.” Several campsites along the Kanektok and Goodnews rivers are named after people, and even when not used for several years, these sites retain identification with the kinship group. Other members of the community may use these locations after requesting permission from the appropriate kinship group.

3.5.5.1 Kanektok River

Gill nets are the primary means of harvest used in Kuskokwim Bay (outside of the refuge boundary) and in the lower Kanektok River. Sweep seining and short set nets are used in the Kanektok River upstream of the Wilderness area boundary. Residents also use rod and reel gear for subsistence harvest of salmon (Wolfe 1987). Salmon harvested from summer commercial salmon fishing activities are also retained for subsistence use, as are Dolly Varden and rainbow trout. Residents of Quinhagak have identified 51 traditional use sites (fish camps, hunting camps, and other locations) along the Kanektok River (Wolfe 1987); 29 of these sites are located upstream of the Togiak Wilderness area boundary. Quinhagak residents reportedly travel to Kagati Lake more in winter than at any other time of the year. Kwethluk residents periodically visit Kagati Lake in fall for hunting and squirrel trapping and also during winter for trapping and hunting furbearers (Wolfe et al. 1984; Coffing 1991).

3.5.5.2 Goodnews River

Most subsistence fishing for char, whitefish, Arctic grayling, and rainbow trout in the Goodnews River occurs within the lower 10 to 15 miles of the river, which is outside of the Refuge boundary (Wolfe et al. 1984; Wolfe 1987). From late May through early July, chinook, chum, sockeye, and pink salmon are taken with gill nets along the shore of Goodnews Bay. Salmon are also harvested a short distance up the Goodnews River with drift, set, or seine nets. Most salmon are taken with subsistence nets in Goodnews Bay before commercial season begins (Wolfe 1987). Small quantities are taken throughout the summer from commercial nets in the ocean or the river (Wolfe 1987). Trips are made upriver in summer to gather firewood, hunt beaver and birds, and harvest freshwater fish.

In late summer, coho salmon are harvested in the river, and berries are gathered along the shores. Day trips are also made upriver to collect firewood and to harvest Arctic ground squirrel and waterfowl. Some hunters make longer trips far upriver for moose. After the river freezes, trips are made to gather firewood and to hunt small game and the occasional moose. Trapping occurs throughout the area. Jigging through the ice for char, round whitefish, Arctic grayling, and rainbow trout occurs throughout the winter until breakup (Wolfe et al. 1984). Subsistence use maps that include the community of Platinum suggest a harvest pattern similar to that of Goodnews Bay, but subsistence fishing sites have not been mapped specifically for the Platinum community.

3.5.5.3 Osviak and Matogak Rivers/Hagemeister Island

Much of the property surrounding the mouths of the Osviak and Matogak rivers is privately owned. Subsistence use is concentrated on the lower stretches of these rivers, particularly the Osviak, where several subsistence and commercial fishing cabins are located. Few data exist on the extent and intensity of use, but traditional sites are probably used primarily for fish camps during spring, summer, and fall. Of Togiak households interviewed, 23 percent reported using this area for freshwater fishing (BBNA and ADF&G 1996). Togiak residents use this area to harvest a small number of Dolly Varden during the summer and occasionally smelt and rainbow trout (BBNA and ADF&G 1996). Other associated subsistence activities occur opportunistically.

Hagemeister Island is only used occasionally for subsistence purposes. Distance and swift tidal currents of Hagemeister Strait deter frequent access by small skiff from Togiak. Other subsistence access is by airplane or larger boats, particularly during the herring fishery.

3.5.5.4 Togiak River

The Togiak is an important river system for residents of Togiak and Twin Hills, both located near the mouth of the river on Togiak Bay. Residents of both communities use the river drainage for subsistence activities such as fishing, hunting, berry picking, trapping, and firewood gathering (Wolfe et al. 1984). The lower river section, below the Wilderness area boundary, receives most of the subsistence net fishing for salmon (Wolfe 1987) and ice fishing in the winter for char.

Unlike other rivers in the Togiak Refuge, the entire Togiak River is accessible by motorboat as long as it is ice free. For this reason, there are a number of important subsistence sites located within the Togiak Wilderness (Wolfe 1987). The tributaries of the Togiak River are valued as important reserves for fish and fish habitat.

Wolfe (1989b) states that subsistence salmon and char fishing occurs primarily in the Togiak River, with some fishing also occurring in marine waters of the bay. Research conducted in 1987 documented subsistence net fishing at 95 sites along Togiak River and Togiak Lake. The greatest concentration of sites was along the lower 12 miles of the river (well below the Togiak Wilderness boundary) and averaged 4.6 sites per river mile. Early in the salmon season, day trips are made by elders accompanied by younger children to harvest chinook, sockeye, pink, and chum salmon. Adult males harvest coho and char from mid-August through mid-October.

Residents of Togiak and Twin Hills utilize the upper Togiak River for subsistence purposes. The 1987 study by the ADF&G Subsistence Division (Wolfe 1989a) documented 24 subsistence salmon net fishing sites in the 41 miles of the upper river in the Togiak Wilderness. Nine sites were documented along the shores of Togiak Lake. Refuge staff have identified 18 “fishing holes” on the upper Togiak River that correspond very closely with the 24 subsistence net sites. Some subsistence set net sites are within a very short distance of each other, thus potential still exists for some level of displacement.

Based on a 1996 report by Bristol Bay Native Association (BBNA) and ADF&G, more than 26 percent of Togiak households reported harvesting freshwater fish from the Pungokebuk Creek (a tributary of the Togiak River) area from 1985 through 1994. Harvests included pike, Dolly Varden, Arctic grayling, whitefish, and rainbow trout (BBNA and ADF&G 1996). More than 50 percent of Togiak households responding also reported fishing Togiak Lake and the upper Togiak and Ongivinuck areas during the same 10-year period. Subsistence harvests of salmon (other than spawned-out sockeye salmon harvested at Togiak Lake) are fewer in the upper river than in the lower part of the Togiak River, where fresher fish can be found. Some backwaters are seined for sockeye, chum, and coho salmon. Most of the Togiak River is fished with seines, drift nets, or set nets for chinook, sockeye, chum, and coho salmon. During late August and September, many parties from Togiak and Twin Hills travel to Togiak Lake to harvest freshwater fish and spawned-out sockeye salmon and to hunt furbearers, caribou, and brown bear (Wolfe et al. 1984).

3.5.6 Recreation

3.5.6.1 Overview

The Togiak Refuge provides opportunities for all of the “Big Six” wildlife-dependent recreational activities: hunting and fishing, wildlife observation and photography, and education and interpretation. Refuge visitors can observe, photograph, and learn about a variety of animals, including walrus, seals, seabirds, and

caribou; and they can hunt for various waterfowl and upland birds, and big game. Fishing, however, attracts the vast majority of visitors.

The river systems within Togiak Refuge and nearby Wood-Tikchik State Park attract anglers from around the world. The Kanektok, Goodnews, and Togiak River systems are the most popular fishing areas on the Refuge. The headwaters and upper stretches of these rivers are located within the remote Togiak Wilderness. Many visitors to Togiak Refuge are interested in multiple satisfactions from their trips in addition to good fishing (Whittaker 1996). Many of these satisfactions are associated with wilderness traits such as being in a natural place, viewing scenery and wildlife, and opportunities for solitude while boating, fishing, and camping (Whittaker 1996). Fishing trips on the Refuge typically involve several nights of tent camping, although fly-in, day-use opportunities are available as well. Commercial support services, including guiding, outfitting, and air taxis are well-established on the Refuge. The majority of recreational visitors rely on air taxis for access, and about half rely on guides.

Recreational fishing use on the Refuge increased substantially during the 1980s, and along with that increase came concerns about litter, levels of motorboat use, loss of wilderness values, and other issues. The Togiak Refuge Public Use Management Plan (PUMP), completed in 1991, was developed to address these issues. The PUMP restricts the number of permits available for guided fishing operations and calls for regulating the timing of guided trip starts, party sizes, and camping in the most popular fishing areas. The PUMP does not restrict the amount of unguided use, but it does indicate that long-term management should be directed toward a 50/50 allocation of guided and unguided use. In most areas of the Refuge, unguided fishing has increased as a proportion of all fishing so that, in a typical year, it accounts for at least 50 percent of total use days.

Although it only accounts for a fraction of the use days that fishing does, big game hunting is an increasingly popular activity on the Refuge since the State of Alaska made additional brown bear and caribou hunts available in 2002. Caribou hunting in the vicinity of Kagati Lake, which is also the launch point for popular Kanektok River float and fishing trips, increased substantially between 2002 and 2005. It now appears to be in decline, however, due to a shift in the number and location of caribou. It is likely that hunting use in this area will continue to cycle up and down in accordance with changes in caribou availability.

Big game hunting guide permits are allocated among exclusive guide use areas on the Refuge. These permits are awarded every 5 to 10 years through a prospectus system that is managed at the regional (statewide) level.

Another refuge activity that has increased in popularity is wildlife observation at Cape Peirce. Demand for this opportunity increased sharply beginning in 2000, mirroring an increase in the number of walrus hauled out at the site and the increased demand for wildlife viewing across Alaska and the nation. Since about 2005, visitation has dropped considerably as a result of much smaller numbers of walrus hauling out at the site and the reduction or discontinuance of commercial eco tourism operations by two companies that contributed to the bulk of the visitation.

Guided use, which is limited by permit availability and permit stipulations, has fluctuated around the same level for most of that time. In contrast, unguided use, almost all related to fishing, has increased well over 100 percent from 1,170 use days in 1990 to 4,507 use days in 2007. Figure 3-10 shows annual guided and unguided fishing use days from 1990 through 2007.

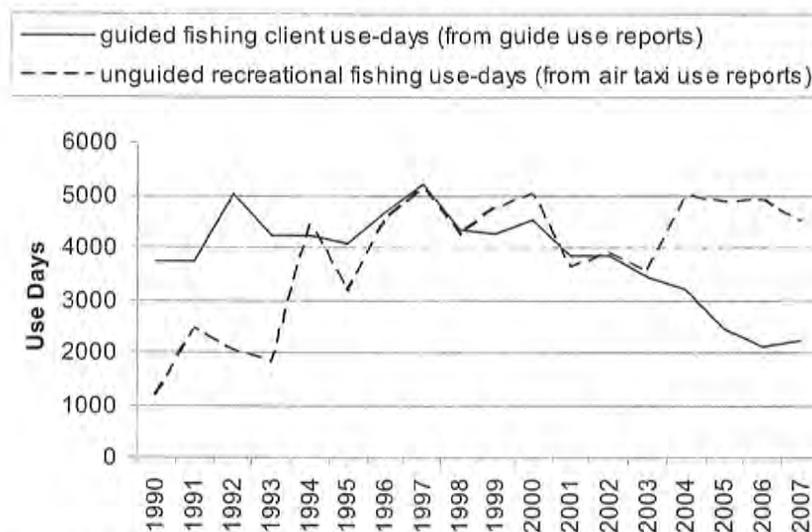


Figure 3-10 Togiak Refuge recreational fishing 1990–2007

3.5.6.2 Kanektok River

The Kanektok River has become known around the world as a premier recreational salmon and trout fishing destination. Few articles or books written about Alaska fly fishing fail to mention this remote 90-mile wilderness river. Like most other major rivers in southwestern Alaska, opportunities to fish Pacific salmon species and several resident fish species, spectacular scenery, and a variety of wildlife combine to make this river a popular attraction for recreational anglers. Fishing use on the Kanektok has been variable from year to year, but the river is consistently the most popular destination on Togiak Refuge.

Guided Recreation

Within the Togiak Wilderness, guided float operators are permitted to start at Kagati Lake every other day during the summer months. Specific float start dates for each permit are awarded through a competitive prospectus bid system. The annual average is about 20 guided float starts for the peak season, June through August. Annual guided float use has averaged close to 800 client use days from 1990 through 2007.

Guided motorized operations are also allowed within the Togiak Wilderness through a competitive prospectus bid system. All permits for the wilderness portion of the Kanektok River drainage limit the number of clients and the number of boats allowed at one time. These limits are likely a factor in the relatively consistent amount of guided use recorded within the Wilderness from 1990 to 1998 (Figure 3-11). There was a peak in guided use in 1999–2000; then, guided use stabilized in 2001–2004, and since 2004, guided use has decreased (Figure 3-11).

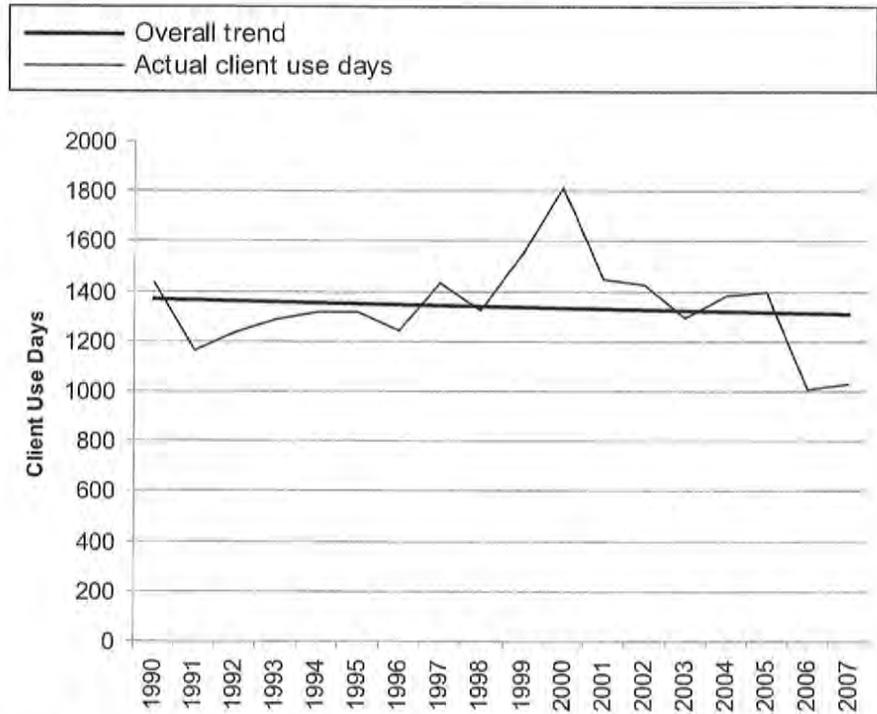


Figure 3-11. Upper Kanektok River Guided Fishing (Within Togiak Wilderness), 1990–2007

Guided motorized use within the Wilderness area has averaged 542 client use days since 1990. During peak use periods, there are typically three guided float groups on the river, using as many as 12 rafts, and five or six guided motorboat groups.

Recreational fishing opportunities along the lower Kanektok River (below the Togiak Wilderness boundary) are in high demand. Permits for guide camps along this portion of the Kanektok are not managed by the Refuge; rather, they are obtained through private land holders or through Qanirtuuq Incorporated, which is the Native village corporation in the village of Quinhagak. Observations by Togiak Refuge River Rangers and anecdotal reports from visitors indicate that use on the lower river may have increased over time, but multiple access points and limited jurisdiction make it difficult to obtain accurate assessments of the level of use by refuge visitors.

Unguided Recreation

Unguided fishing on the Kanektok River, which is not constrained by any permit requirements, has noticeably fluctuated over the last 18 years, from an average of 1,310 use days during 1990-1994 to an average of 1,900 use days during 1995-1999 to an average of 1,760 use days during 2000-2007². Figure 3-12 shows an overall increasing trend for unguided use on the Kanektok River. On average, 40 unguided trips begin from the put-in at Kagati Lake each summer. In recent years, although some tapering off has occurred, an additional 6–10 unguided fall hunting trips have also begun from Kagati Lake. According to data gathered through the Refuge River Ranger program, unguided fishing now accounts for about 51 percent of recreational use along the Wilderness section of the Kanektok River. Ranger reports show that during peak fishing periods (during the chinook and coho salmon runs), there are typically 10–14 unguided recreational fishing groups along this 58-mile stretch of river at one time.

² These numbers, gathered from air taxi reports, represent use on both the upper (Wilderness) and lower (non-wilderness) portions of the river, so they may not be directly compared to the guided use figures, which represent upper (Wilderness) use days only.

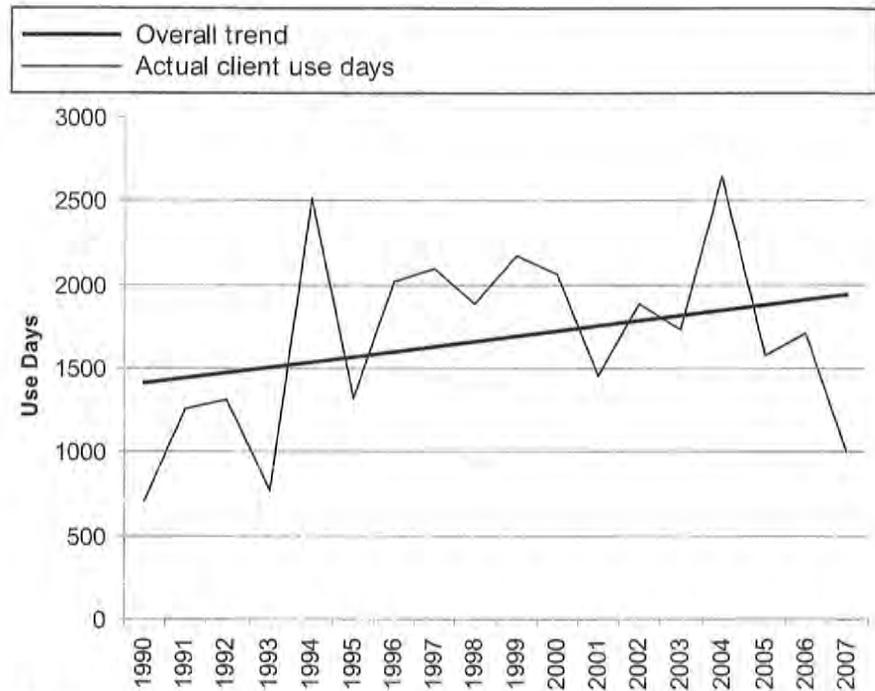


Figure 3-12. Upper and Lower Kanektok River unguided fishing, 1990–2007

3.5.6.3 Goodnews River

Most recreational fishing on the Goodnews River occurs on two major tributaries referred to as the North Fork and the Middle Fork. The North Fork receives the majority of use (guided and unguided combined). Most anglers seek opportunities to catch rainbow trout, coho salmon, and Arctic char in this river.

Unlike the lower sections of the Togiak and Kanektok rivers, the lower Goodnews River is not within the Togiak Refuge boundary. Recreational fishing pressure along the lower Goodnews River steadily increased until the late 1990s and has been variable since then. The Alaska Department of Natural Resources has primary management authority on the lower river, and its navigable channels below ordinary high water line. The Kuitsarak Native Corporation owns and manages the adjacent uplands.

Guided Recreational Fishing

Commercial guides operate both float and motorboat trips on the Goodnews River. The number of permits available for commercially guided recreational sport fishing on the Goodnews River within the refuge boundary has been limited since 1984. Visitor participation in guided fishing on the upper Goodnews River increased substantially through the 1990s, growing from about 200 client use days in 1990 to a high of over 500 use days in 2001. Overall use levels have not yet approached the maximum of 1,635 guided client use days allowed under current

management. Use days have declined slightly in recent years; there were 333 guided client use days recorded in 2007. However, Figure 3-13 shows an overall increasing trend for guided use on the Wilderness portion of the Goodnews River during the last 18 years³.

Since 1990, motorized guided use of the Middle Fork Goodnews River and its associated summer guide camp has remained close to the maximum permitted level of 280 use days (spread over an average of 70 trips) per year. No guided float fishing is currently permitted on the Middle Fork.

Guided motorized use on the North Fork has averaged about 87 use-days (42 trips per year) since the mid-1990s. Guided float use has averaged just six trips per year during the same period, but these trips account for an average of about 72 use days per year. One guided float start is authorized per week, and these trips typically occur late in the summer during the coho salmon run.

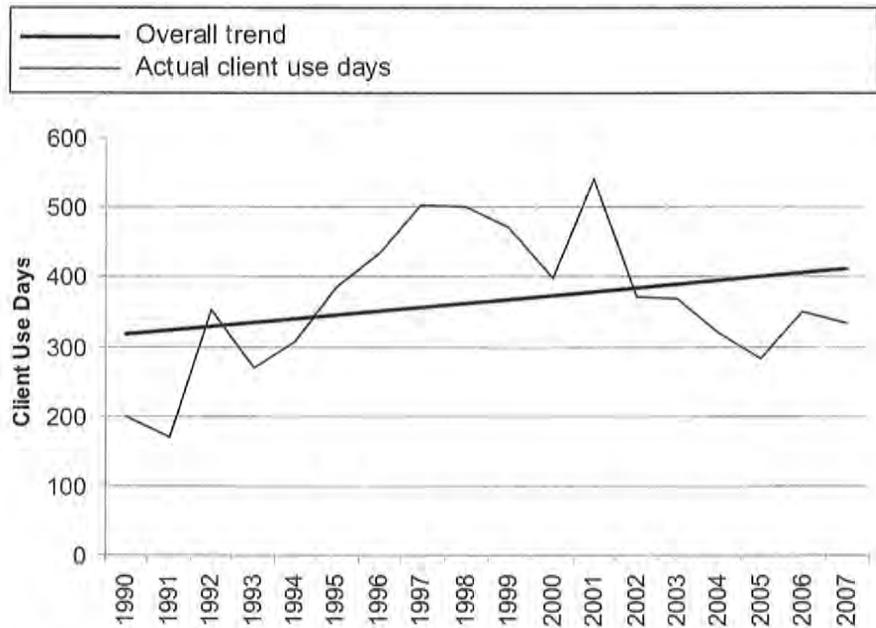


Figure 3-13. Upper Goodnews River guided fishing (within the Togiak Wilderness) 1990–2007

³ Data for 2005–2007 include the non-Wilderness area of the Middle Fork Goodnews River.

Unguided Recreational Fishing

There are no refuge restrictions on the amount of unguided fishing on the Goodnews River. Unguided use originates at Goodnews Lake, Middle Fork Goodnews Lake, or Kukaktlim Lake. Access is by float plane, and most groups are required to pull rafts through the shallow upper reaches of the rivers to reach water deep enough to float. Unguided use of the upper Goodnews River grew steadily through the early 1990s, reaching a peak of more than 2,600 use days in 1997. Since that time, unguided fishing has accounted for an average of 1,640 use days per year. Figure 3-14 shows an overall increasing trend for unguided use on the Goodnews River during the last 18 years⁴.

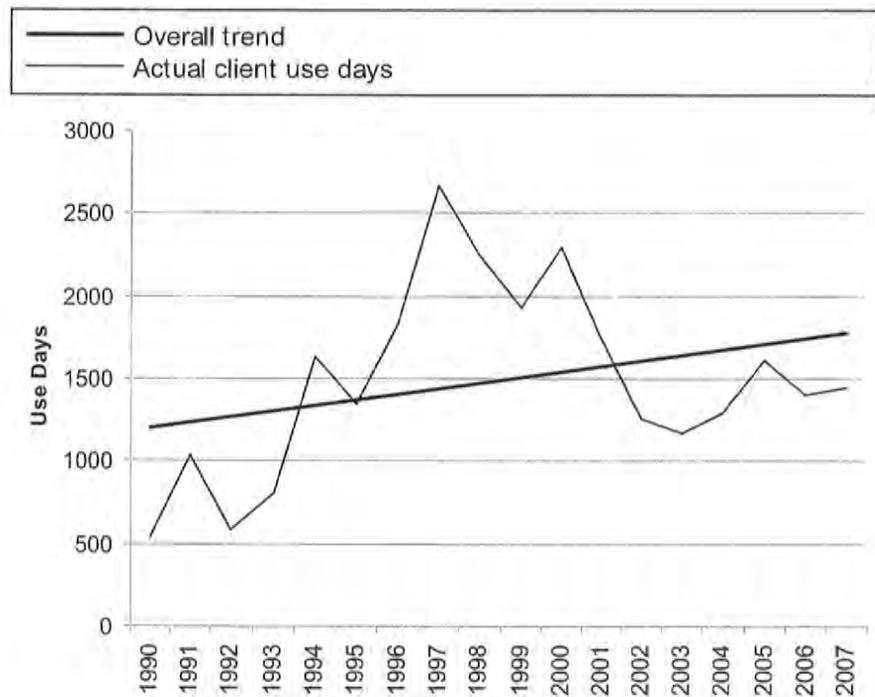


Figure 3-14. Unguided fishing on the Goodnews River (all forks, upper and lower sections) 1990–2007

⁴These numbers, gathered from air taxi reports, represent use on both the upper (Wilderness) and lower (non-wilderness) portions of the river, so they may not be directly compared to the guided use figures which represent upper (Wilderness) use days only.

3.5.6.4 Togiak River

There are numerous tributaries in the Togiak River drainage with headwater lakes accessible by float plane. These tributaries are generally shallow, small, and narrow, with many sweepers and other obstacles to navigation. The Togiak River itself originates from the largest lake in the Togiak Wilderness area. While the river is not difficult to navigate, and there are no difficult rapids, access through Togiak Bay can be hazardous because of braided tidal channels and often windy conditions. Most recreational fishing occurs from June through September. Opportunities to catch chinook, coho, sockeye, chum, and pink salmon are available. Fishing for coho and chinook salmon is the main attraction for anglers, with rainbow trout and sockeye targeted as well.

Due to the limited number of good fishing sites along the river and concerns about impacts from subsistence use and public recreational fishing, the 1991 Togiak Refuge PUMP designated three management zones for the upper Togiak River (within the Wilderness area). Within each zone, guided fishing is limited, but there are no limits on unguided fishing. Guided motorboat fishing accounts for most use on both the upper and lower portions of the Togiak River. Overall, the upper river receives less recreational fishing use than the lower river.

Guided Recreational Fishing

There are six commercial sport fishing permits granted for the upper (Wilderness) portion of the Togiak River. Three permits are for motorboats, allowing clients to be flown in by plane, and each are limited to one of the three zones; two permits are for non-motorized (float) boats and are not restricted to the zones; and one motorboat permit that accesses the river from below the refuge boundary does not allow clients to fly in and is not restricted to the zones. Since 1990, annual guided use along the upper river has averaged 428 client use days (Figure 3-15). Most of this use is concentrated in late summer during the coho salmon migration.

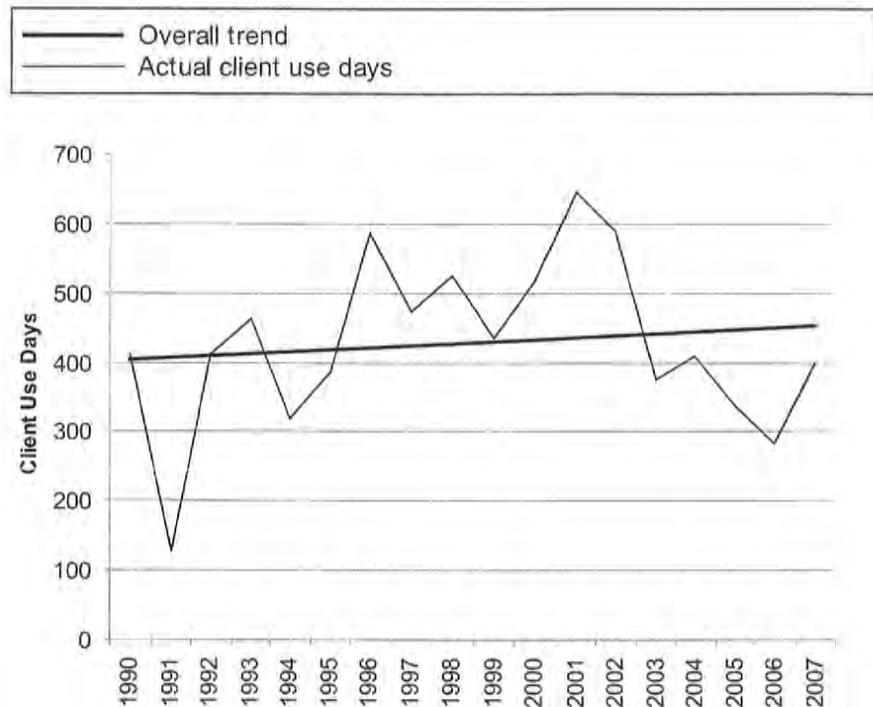


Figure 3-15. Guided fishing on the Upper Togiak River (within the Togiak Wilderness) 1990–2007

Unguided Recreational Fishing

Float groups typically access the Togiak drainage through Togiak Lake or Ongivinuk Lake. Floaters do not use the same waters until these two tributaries eventually meet, and from that point, many people continue down river to a popular pick-up located at the Wilderness area boundary. Available data indicate unguided use of the Togiak River has ranged from 50 to 176 use days since 1993, while unguided use of the Ongivinuck River ranged from 15 to 285 use days during the same time period. Because the Ongivinuck is a tributary of the Togiak River, its recreational use is added to that reported for the Togiak River to accurately represent unguided visitation below the confluence of the Ongivinuck and Togiak rivers. Overall, during the period from 1990–2007, there has been an annual average of nine unguided groups representing about 200 use days. Use levels have fluctuated from year to year with an average of 123 use days during 1990–1994, increasing to 246 average use days during 1995–1999, and slightly decreasing to 217 average use days during 2000–2007. Overall, unguided use on the Togiak River has slowly increased during the last 18 years.

3.5.6.5 Osviak and Matogak Rivers/Hagemeister Island

The Osviak and Matogak rivers flow south from headwater areas, emptying into Bristol Bay. The Osviak and Matogak rivers are floatable for most of their lengths, but a lack of aircraft landing areas within or adjacent to the rivers makes access difficult. Float-equipped aircraft may land in the bay. Otherwise, access is limited to small, wheeled planes landing on tundra ridges, river gravel bars, or ocean beaches at low tide. Access is also possible by boat from the village of Togiak, which takes several hours. Several privately held Native allotments are located along the lower reaches of these rivers and along the coast, making public access more difficult because permission from land owners is required for use of uplands.

Because of the access difficulties, recreational use of these rivers is negligible. Recreational use is estimated at 10 visitor days (or less) per year. This area is managed primarily for subsistence uses and is uniquely valuable because it receives so little use.

A few miles across Hagemeister Strait from the mouths of the Osviak and Matogak rivers lies Hagemeister Island. Recreational use of the island is sporadic, and people occasionally visit the island by boat or plane for beach combing.

3.5.6.6 Kulukak River

The Kulukak River is a remote river within the Refuge but mostly outside the Togiak Wilderness. Temporary tent camps are permitted for guided motorized recreational fishing through a competitive prospectus bid system. Commercial guide permits limit length of stay, the number of clients, and number of boats to ensure an uncrowded, remote fishing experience compatible with conserving the area's fishery resources. Largely because of limited access, use has remained relatively low, with only occasional visits by recreational anglers.

3.5.6.7 Wilderness Lakes

Five permits are currently issued for fly-in recreational fishing at a number of lakes throughout the Togiak Wilderness. To maintain subsistence opportunities, high-quality recreational opportunities, wilderness values, and healthy wild fishery stocks, several stipulations are included as part of these Wilderness Lakes guided sport fishing permits.

Many of these lakes are not used on a regular basis by guides often, only three or four times per year. Use of Kagati, Goodnews, Togiak, and Ongivinuk lakes is discussed in the Kanektok, Goodnews, and Togiak river sections of this chapter. Unguided use is also very sporadic.

3.5.6.8 Cape Peirce and Cape Newenham

This area encompasses the former Cape Newenham National Wildlife Refuge, which was established prior to ANILCA. The area was included as part of the Togiak Refuge under ANILCA and includes the majority of lands currently proposed for addition to the National Wilderness Preservation System, as described in the 1985 Togiak Refuge Plan. Cape Peirce has historically served as a walrus haulout and also provides opportunities for viewing a variety of other wildlife. Cape Newenham is a spectacular basalt promontory on a coastline comprised of 1000-foot volcanic cliffs.

Because many of the marine mammals, seabirds, and other wildlife found in this unique area are very sensitive to human disturbance, public use is managed to minimize that disturbance and to maintain the area's primitive natural character. The southeastern portion of this area has been identified as a "wildlife viewing area." The 1991 PUMP recommends that visitation within the viewing area be limited to no more than six people at one time through a first-come, first-served permit system in place from May 1 to November 30. At those times when either Pacific walrus are hauled out at Maggy Beach or seals are hauled out on sandbars in Nanvak Bay, boat and aircraft landings are limited. Instead, aircraft would be permitted to land just outside the wildlife viewing area at Sangor Lake or at the far northern end of Nanvak Bay. There are also a number of conditions as part of special use permits that minimize other potential wildlife viewing disturbances. Regulations to enforce the permit program have not been promulgated, although an informal permit program was in place for several years. At the current time, no permits are required to enter the wildlife viewing area.

Frequent inclement weather and long distances can make flying to and from Cape Peirce more difficult than other locations within the Togiak Refuge. This situation can affect levels of public use.

During the period from 2001 to 2004 there was a substantial increase in visitor use days relative to the prior period (1991–2000). In 2005 and following years, visitor use has decreased primarily because walrus have not been using Cape Peirce in large numbers. When walrus return to the area, visitation is likely to increase (Table 3-8).

Table 3-8. Visitor use at Cape Peirce

Year	Number of Flights	Number of Guides	Number of Clients	Total Use Days (Guides & Clients)
1991	3	0	11	49
1992	0	0	0	0
1993	1	0	3	15
1994	0	0	0	0
1995	1	0	4	4
1996	0	0	0	0
1997	3	0	6	12
1998	3	0	10	10
1999	1	0	5	5
2000	6	9	17	26
2001	15	24	60	108
2002	15	24	57	91
2003	19	30	60	90
2004	12	18	38	68
2005	5	7	20	27
2006	1	0	2	2
2007	2	1	6	36

3.5.7 Social Conditions and Visitor Experience in Popular Fishing Areas

Impacts on social conditions within the Refuge may not directly threaten wildlife or habitats, but they remain a concern because they do threaten the nature and quality of visitor and resident subsistence experiences. Within the Togiak Wilderness, experiential dimensions, including solitude or a “primitive and unconfined type of recreation,” are protected by law; and throughout the entire Refuge, managers are compelled—at a minimum—to consider the safety of visitors and minimize conflict between user groups participating in appropriate activities.

The purpose of this section is to describe important characteristics of recreational visitors and the social conditions they encounter on the Refuge, as revealed by two principle studies. The first of these studies—a recreational angler survey conducted in 1995—was developed and conducted by a contractor with input and support from Togiak Refuge and the Alaska Department of Fish and Game (Whittaker 1996). The second study, conducted in 2001, was a replication of the 1995 effort, conducted to measure changes over

time. Relevant results from these studies are summarized here and discussed in more detail in Appendix E.

3.5.7.1 Visitor Motivations and Expectations

As noted previously, the majority of Togiak Refuge recreational visitors participate in fishing on one of three main river systems: the Kanektok River, the Goodnews River, or the Togiak River. The majority (90 percent) of anglers come from outside Alaska; they plan their trips months or even years in advance, and they place a high degree of importance on fishing in a natural, wilderness setting where they can view scenery and wildlife, and experience solitude. Most anglers surveyed in 1995 and 2001 indicated that they expected to find “primitive recreation” within the Togiak Wilderness, defined as a setting “where one can expect to find solitude and very few traces of previous use.” On average, surveyed anglers expected a more primitive setting than what they actually encountered on the Refuge (Appendix E).

A research study commissioned by the Alaska Department of Fish and Game examined preferences and management attitudes of Alaskan nonresident anglers (Romberg 1999). Based on a small sample of nonresident anglers (n=41), Romberg (1999) showed evidence that some specialized anglers at Togiak Refuge consider aesthetic conditions, including scenery and solitude, to be important factors when choosing a fishing location, and they tend to support limits on the number of anglers who can participate in some fisheries in order to maintain quality fishing opportunities. Consistent with this general characterization, 44 percent of unguided anglers surveyed in 2001 indicated that they would support, or strongly support, limiting the number of unguided float trips allowed within the Togiak Refuge; levels of support for limits varied between different subgroups of anglers (Appendix E).

3.5.7.2 User Tolerances and Conditions of Concern

Within the broadly uniform Togiak Refuge angler population, it is possible to identify three distinct subgroups based on fishing style and closer analysis of specific motivations and expectations. *Guided float anglers* tend to place the highest importance on solitude and natural setting conditions and tend to be the least tolerant of impacts to those conditions. *Guided motorized anglers* tend to place the least importance on setting conditions and tend to be the most tolerant of impacts. *Unguided (float) anglers* usually fall between these two groups.

Among the various factors that could impact visitor experience, Togiak Refuge anglers identified litter, human waste, and competition for fishing sites and campsites as the things that would have the greatest negative influence on their trips. Togiak Refuge anglers have especially low tolerances for litter and human waste. Despite improvements over time, these items continue to negatively

Opportunities for a Primitive and Unconfined Type of Recreation—

The Nushagak Peninsula is visited primarily by subsistence users. A number of large ponds, lakes, and sand beaches make this area easily accessible by plane for much of the year. During winters with adequate snow cover, access is also possible by snowmachine.

Existing Wilderness Recommendation

Several recommendations for designating refuge lands as Wilderness were evaluated in the final Comprehensive Conservation Plan and Environmental Impact Statements for Togiak and Alaska Maritime refuges. (USFWS 1985; USFWS 1988). The record of decision for the final plan included a recommendation that approximately 334,000 acres of the Togiak Refuge be designated as part of the National Wilderness Preservation System. This recommendation includes the Cape Peirce/Cape Newenham Unit and the Goodnews River Unit, which would include the remaining portions of the South and Middle forks of the Goodnews River currently not within the Togiak Wilderness (see Figure 3-16).

3.6.2 River Values

Rivers are among the most important features of the refuge environment: they both influence and reveal the Refuge’s topography. In the rugged landscape, rivers serve as important transportation corridors for people and wildlife. They provide essential spawning and rearing habitat for resident and anadromous fish, which in turn support wildlife concentrations. Collectively, these resources have long supported human subsistence users, and they also attract modern recreational visitors.

Table 3-9. Rivers possessing outstanding values

River Segment	Segment Length (miles)	Outstanding Values
Kanektok River	90	Fish, wildlife, recreation, cultural importance
Arolik River	40	Fish, wildlife, scenic, recreation
Goodnews River	47	Fish, wildlife, recreation, cultural importance
Trail Creek	27	Fish, wildlife, scenic, geology/topography, recreation
Ongivinuck River	16	Fish, wildlife, scenic, recreation
Narogurum River (Kemuk River)	28	Fish, wildlife, geology/topography, scenic, recreation
Togiak River	30	Fish, wildlife, recreation, cultural importance

Based on the general attributes described previously—topography and geology, fish and wildlife populations, recreation opportunities, and cultural importance—seven river segments have been identified as exceptional examples of Togiak Refuge rivers. The outstanding values of these rivers are described in the following text. The river segments are depicted in Figure 3-17. Table 3-9 presents the rivers, their length, and the values identified for each river.

3.6.2.1 Kanektok River

The Kanektok River starts at Kagati Lake in the north central portion of the Refuge, where it flows through a glacial valley surrounded by mountains and continues 90 miles through a wide open tundra coastal plain and into Kuskokwim Bay. It is a shallow low gradient system with several braided channels in the lower half.

Fish and Wildlife Populations—Five species of Alaska native Pacific salmon, as well as rainbow trout, Dolly Varden, Arctic char, Arctic grayling, northern pike, sheefish, and round whitefish, all live in this river. Burbot and lake trout are found in Kagati Lake. Several wildlife species such as brown bear, caribou, peregrine falcon, harlequin duck, and beaver live in the river corridor.

Recreation Opportunities—Since the 1970s, the Kanektok River has become an increasingly popular recreational fishing destination. Today, the Kanektok has a world renowned reputation for its diversity of salmon, large trout, and spectacular scenery. The Kanektok River flows from Kagati Lake, which makes aircraft access possible for many float anglers and sport hunters. Motorboat access is also possible from the mouth of the river near the village of Quinhagak. Several commercial operators provide lodge and guide services along the Kanektok River. This mixture of transportation types, services, and activities creates a diversity of recreational opportunities along the Kanektok River from late May through September.

Cultural History—The Kanektok River has been and continues to be vitally important to the subsistence lifestyle of area residents. At Kagati Lake, where the Kanektok River begins, evidence has been found that indicates this river basin has been used continuously for approximately 9,000 years (Dumond 1987.) Today, subsistence use continues as people hunt, fish, trap, pick berries, and gather firewood along the Kanektok River. The village of Quinhagak at the mouth of the river is the largest population center in the area. Residents of Quinhagak use motorboats on the river to access subsistence fishing, hunting, and berry picking areas. A number of small cabins, fish racks, and set net sites scattered along the Kanektok River are evidence of its continuing role in rural Alaskan and Yupik Eskimo culture.

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The upper Kanektok River was considered for inclusion in the National Wild and Scenic River System in 1983. The river was not designated because of local concerns and because the designated Wilderness status of the uplands affords a significant level of protection without the additional designation.

3.6.2.2 Arolik River

The Arolik River flows nearly 40 miles from Arolik Lake through part of the Togiak Wilderness and on to Kuskokwim Bay.

Topography and Geology—The Arolik River begins at Arolik Lake, a remote glacially formed lake wedged between two high ridges. Downstream is extremely shallow with a bed of coarse gravel and small cobble. It flows through a high plateau area of tundra with alder and willows along its banks. Below the confluence of East Fork and South Fork Arolik rivers, its volume nearly doubles but remains a narrow shallow stream of large gravel and cobble. After passing through Arolik Gap, the river enters the coastal plain and gradually turns into a slow meandering stream with sharp cutbanks on either side. Approximately 10 miles from Kuskokwim Bay, the river divides into its North and South mouths.

Fish and Wildlife Populations—The Arolik supports populations of Arctic grayling, rainbow trout, whitefish, lake trout, Arctic char, and Pacific salmon. A variety of wildlife are found along the Arolik. Most species found along the river are small mammals, furbearers, and birds. Brown bear, moose, and caribou occasionally use the area seasonally.

Recreation Opportunities—Unlike other rivers used by anglers in the region, the Arolik receives little use or fishing pressure. Available areas for camping on public lands are severely limited. All camping on Native corporation land is restricted by a permit system. The number of permits issued by Qanirtuuq Incorporated is very low. Due to this very low amount of use, the Arolik River provides some of the best opportunities for extreme solitude, self-reliance, and quality fishing found anywhere in America. This combination of recreational and wilderness values is found on few other rivers in the region.

3.6.2.3 Goodnews River

The Goodnews River lies between the two other larger drainages, the Kanektok and Togiak rivers, and flows approximately 47 miles from its headwaters at Goodnews Lake to Goodnews Bay.

Fish and Wildlife Populations—The Goodnews River supports Pacific salmon, Dolly Varden, rainbow trout, lake trout, Arctic char, Arctic grayling, and whitefish. Wildlife such as brown bear, caribou, raptors, waterfowl, landbirds, beaver, otter, mink, and fox are also found along the river.

Recreation opportunities—In many ways, recreational opportunities are similar to those found on the Kanektok River but on a smaller scale. Opportunities are characterized by a more remote setting with less evidence of and contact with other people.

Cultural history—The human population in the Goodnews drainage is less than that in Kanektok or Togiak drainages, but like those areas, this area has a long history of subsistence use by rural residents and Yupik Eskimos. While the lower 22 miles of this river are most heavily used for subsistence, the upper portion is important for fishing, hunting, trapping, berry picking, and other subsistence activities.

3.6.2.4 Trail Creek

Trail Creek is approximately 27 miles in length and flows from its headwaters in the Ahklun Mountains to the Izavieknik River, which then flows into Togiak Lake.

Topography and Geology—Trail Creek differs from most other rivers in southwest Alaska and is characterized by its steep narrow canyon with high cliffs on either side (up to 150 feet). It has a steep gradient with deep pools, followed by long riffles and small rapids. Particle size ranges from coarse sand to large boulders. There are very few gravel bars. Beyond the river canyon are the tall peaks of the Ahklun Mountains. These features combine to create scenery not found along any other rivers in the Refuge or the region.

Fish and Wildlife Populations—Trail Creek provides outstanding habitat for nesting raptors such as gyrfalcons, northern harriers, merlins, rough-legged hawks, sharp-shinned hawks, peregrine falcons, and bald eagles. The habitat that this river provides for harlequin ducks can be found on few other rivers in the region. In addition to wildlife such as caribou, moose, brown bear, fox, wolf, beaver, lynx, otter, and mink found along this and other rivers within Togiak Refuge, black bear have also been sighted along Trail Creek. Because black bear have not been documented in other parts of the Refuge, this is a unique wildlife value in the region. Fish species including chinook, sockeye, chum salmon, Dolly Varden, rainbow trout, Arctic grayling, and Arctic char are also found in this river.

Recreation Opportunities—Some recreation use does exist along Trail creek, but it is mostly confined to the lower reach, which can be accessed by jet boat at higher water levels. For the adventurous and determined visitor, Trail Creek offers some of the most remote and challenging recreational opportunities within Togiak Refuge. A remote rugged tundra landing strip located almost two miles from Trail Creek is the closest access.

3.6.2.5 Ongivinuck River

The Ongivinuck River flows from the outlet of Ongivinuck Lake 30 miles to its confluence with the Togiak River.

Topography and Geology—A single main channel with occasional deep holes and gravel bars characterizes this river. Particle size ranges from sand to large cobble and small boulders. Much of the bank is undercut on the outside bends of the river, with gravel bars along the inside bends. The river is surrounded by towering mountains and rolling foothills. Cottonwood, willow, and alder line the banks. There are several gravel bars and deep holes along the river. This type of scenery is found on few other rivers in the region.

Fish and Wildlife Populations—Pacific salmon, rainbow trout, Arctic grayling, Dolly Varden, Arctic char, and round whitefish are found in this drainage. Wildlife such as brown bear, caribou, moose, porcupine, weasel, ptarmigan, raptors, waterfowl, landbirds, and beaver all live along the river.

Recreation Opportunities—The use of motorboats is practical along the lower reaches, and anglers use float planes, rafts, and motorboats to access the river. Recreational use is typically from anglers flying to Ongivinuck Lake and floating this tributary of the Togiak River. Recreational opportunities are characterized by this river's isolation and scenery, which provide a rewarding experience for self-reliant anglers of all experience levels.

3.6.2.6 Naragurum (Kemuk) River

The Kemuk is one of the five major tributaries of the Togiak River and flows approximately 28 miles from its source at Nenevok Lake to its confluence with the Togiak River.

Topography and Geology—A steep narrow canyon with several sections of rock cliff and several gravel bars characterize this river. It has a relatively steep gradient, and particle size ranges from coarse sand to large boulders. The river varies from 40 to 80 feet in width but generally is narrow. Willow, alder, and cottonwood trees grow along the banks.

Fish and Wildlife Populations—Pacific salmon, rainbow trout, Arctic char, Dolly Varden, and Arctic grayling are found in this river. Wildlife species include moose, brown bear, caribou, fox, porcupine, beaver, wolf, and various raptors.

Recreation Opportunities—Only the lower few miles are accessible by jet boat; the rest is accessible only by floating from Nenevok Lake. This river offers opportunities for a challenging recreational experience characterized by remoteness and solitude.

3.6.2.7 Togiak River

This segment of the Togiak River flows approximately 30 miles from the outlet of Togiak Lake to the Togiak Wilderness boundary near the confluence of Pungokepek Creek.

Topography and Geology—There are five major tributaries to the Togiak: the Gechiak, Pungokepek, Nayorurun (Kashiak), Kemuk (Narogurum), and the Ongivinuck. A single main channel in the Wilderness area with occasional small islands, deep holes, and gravel bars characterize the river. Particle size ranges from sand to large cobble and medium size boulders. Much of the bank is undercut on the outside bends of the river with gravel bars along the inside bends.

Fish and Wildlife Populations—Pacific salmon, rainbow trout, Arctic grayling, Dolly Varden, Arctic char, northern pike, and round whitefish are found in this drainage. Wildlife such as brown bear, caribou, moose, porcupine, weasel, ptarmigan, raptors, and beaver all live along the river.

Recreation Opportunities—Guided and unguided anglers use float planes and motorboats to access the river. Unlike other rivers within the Togiak Refuge, the Togiak River is wide enough and deep enough for float planes and most types of motorboats. The large gravel bars along the river provide a number of suitable campsites for float anglers as well. This combination of access and transportation provides a diversity of recreational opportunities in an undeveloped and remote setting.

Cultural History—The Togiak River (Elliot 1887) historically was home to one of the largest populations of Yupik Eskimos in southwest Alaska. Today, residents live near the mouth of this river in the communities of Togiak and Twin Hills. People use motorboats to access traditional hunting and fishing site areas, cabins, and other areas up to and beyond Togiak Lake. Several small cabins, fish racks, and other associated structures are built on private property along the river.

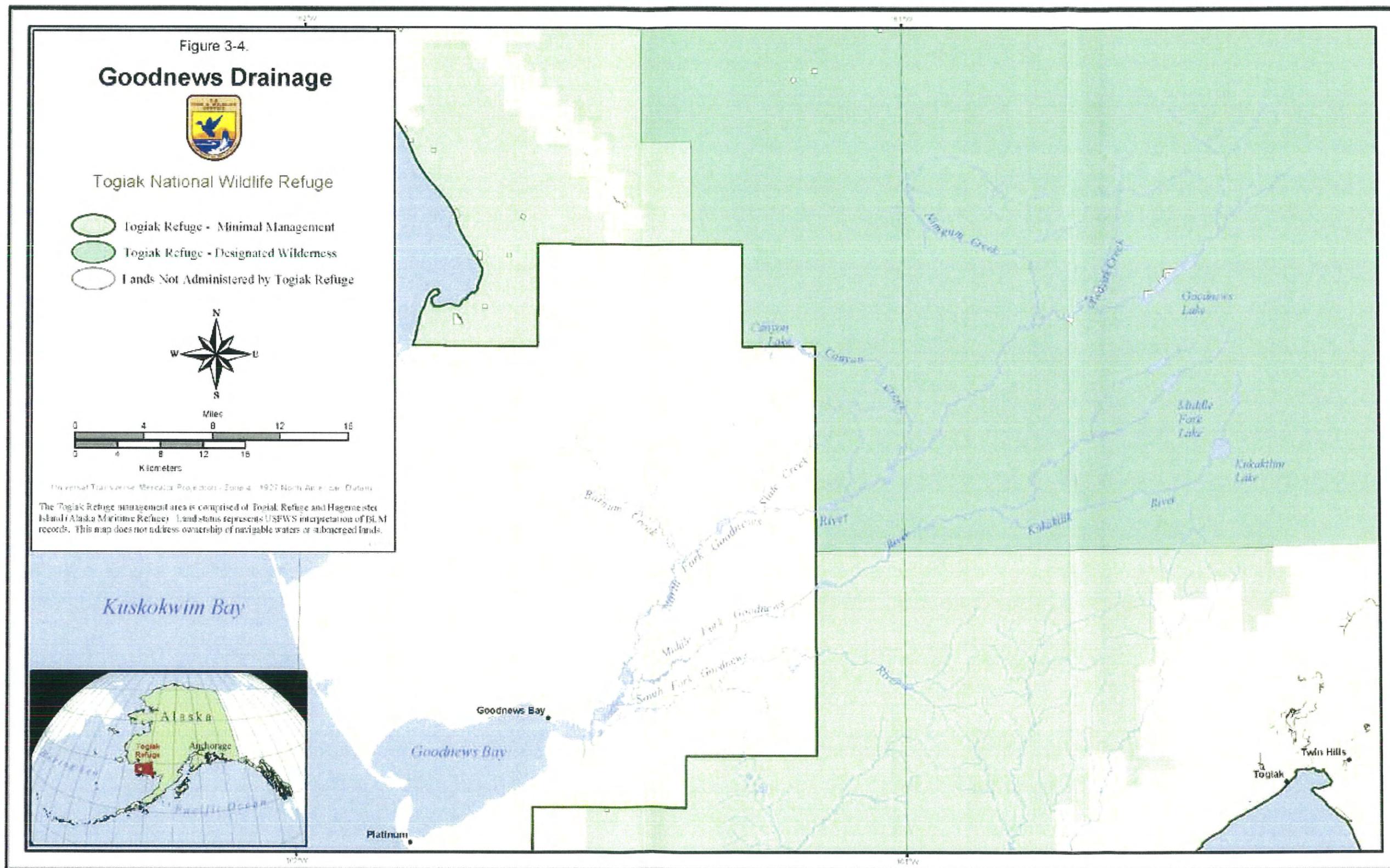


Figure 3-4. Goodnews Drainage

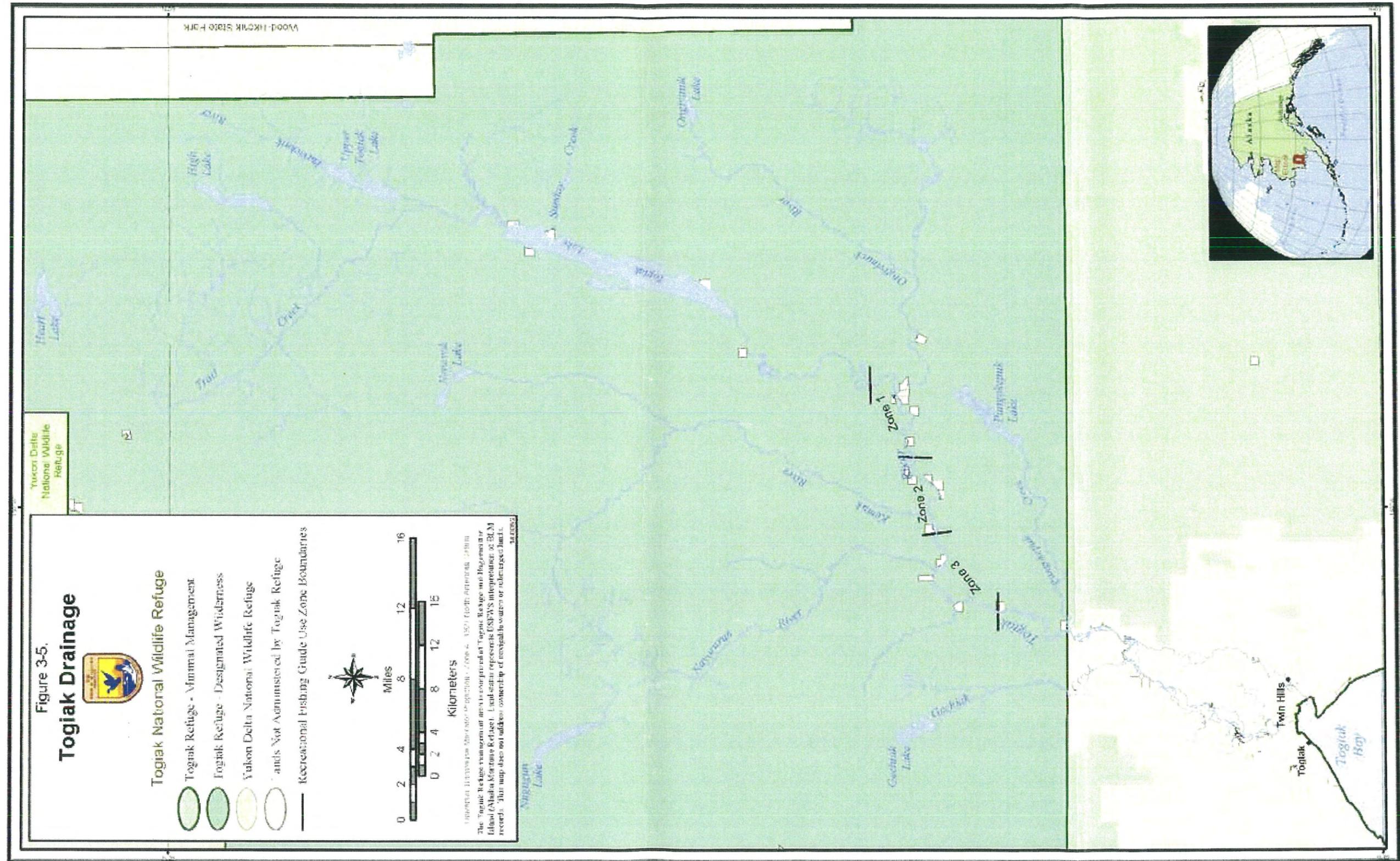


Figure 3-5. Togiak Drainage



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Photo Credit: USFWS

East Fork Arolik River, Togiak National Wildlife Refuge, AK

Streamflow Monitoring

Stream Gage Location – Lat 59E30.375' N., long 161E17.86' W., in SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 1, T.8S., R.71W., on (Goodnews C-7 quad), on right bank, 1 river mile upstream from confluence with South Fork Arolik River, 8 river miles downstream from Arolik Lake, and 27 air miles southeast of Quinhagak, Alaska.

Drainage Area – 34.5 mi², of which 33.3 mi² is located within the Togiak National Wildlife Refuge. 32.8 mi² is located within the Wilderness Area of the Refuge.

Updated 03/26/2010

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Photo Credit: USFWS

Arolik River, Togiak National Wildlife Refuge, AK

Streamflow Monitoring

Stream Gage Location – Lat 59E32.66' N., long 161E27.27' W., in NE¼ sec. 25, T.7S., R.72W., on (Goodnews C-7 quad), on right bank, 1.5 miles upstream from confluence with Faro Creek, 3 miles downstream from confluence with Keno Creek, and 21 miles southeast of Quinhagak, Alaska.

Drainage Area – 154 mi², of which 90.8 mi² is located within the Togiak National Wildlife Refuge. 79.0 mi² is located within the Wilderness Area of the Refuge.

Updated 03/26/2010

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U.S. Fish & Wildlife Service - Alaska

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Water Resources



Photo Credit: USFWS

Faro Creek, Togiak National Wildlife Refuge, AK

Streamflow Monitoring

Stream Gage Location – Lat 59E32.44' N., long 161E29.29' W., in SE¼ NW¼ sec. 26, T.7S., R.72W., on (Goodnews C-7 quad), on left bank, 1 river mile upstream from confluence with the south branch of Arolik River, 1 river mile downstream from confluence with Canyon Creek, and 20 air miles southeast of Quinhagak, Alaska.

Drainage Area – 64.9 mi², of which 11.2 mi² is located within the Togiak National Wildlife Refuge. 0.0 mi² is located within the Wilderness Area of the Refuge.

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Feature Query Results

Click the feature name for details and to access map services

Click any column name to sort the list ascending ▲ or descending ▼

Feature Name	ID	Class	County	State	Latitude	Longitude	Elev(ft) ▲	Map**	BGN Date	Entry Date
North Mouth Arolik River	1407219	Stream	Bethel (CA)	AK	594142N	1615302W	0	Goodnews Bay C-8	-	31-MAR-1981
South Mouth Arolik River	1409960	Stream	Bethel (CA)	AK	594016N	1615238W	0	Goodnews Bay C-8	-	31-MAR-1981
Arolik River	1398400	Stream	Bethel (CA)	AK	593721N	1613450W	89	Goodnews Bay C-7	01-JAN-1939	01-JAN-2000
South Fork Arolik River	1409913	Stream	Bethel (CA)	AK	593018N	1611945W	309	Goodnews Bay C 7	-	31-MAR-1981
East Fork Arolik River	1401572	Stream	Bethel (CA)	AK	593021N	1611941W	325	Goodnews Bay C-7	-	31-MAR-1981

1 - 5

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Note: If data are returned and the column headings display but no data appear, click any column heading.

*Elevations are from the [National Elevation Dataset](#)

**The map name is not necessarily the name of the community containing the feature. See [FAQs](#) for details.

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Feature Detail Report for: North Mouth Arolik River

ID: 1407219
Name: North Mouth Arolik River
Class: Stream ([Definitions](#))
History: Originally called by its Eskimo name Kwiyadik Creek in 1898 by J. E. Spurr and W. S. Post, U.S. Geological Survey (USGS). It was named North Mouth Arolic River in 1914 by US@C&GS this name was published in 1915 on Chart 9103.
Description: N distributary of Arolik River, heads at 5938N, 16136W, flows NW to Kuskokokwim Bay, 43 mi. N of Goodnews, YukonKuskokwim Delta.
Citation: U.S. Geological Survey. Geographic Names Phase I data compilation (1976-1981). 31-Dec-1981. Primarily from U.S. Geological Survey 1:24,000-scale topographic maps (or 1:25K, Puerto Rico 1:20K) and from U.S. Board on Geographic Names files. In some instances, from 1:62,500 scale or 1:250,000 scale maps.
Entry Date: 31-Mar-1981
***Elevation:** 0/0

*Elevations in feet/meters from the [National Elevation Dataset](#)

Variant Names

Variant Name	
Kwiyadik Creek	Citation
North Mouth Arolic River	Citation

Decision Card

no data found

Counties

Sequence	County	Code	State	Code	Country
1	Bethel (CA)	050	Alaska	02	US

Linear Feature (Stream, Valley, Arroyo) Mouth

Sequence	Latitude(DEC)	Longitude(DEC)	Latitude(DMS)	Longitude(DMS)	Map Name
1	59.6950000	-161.8838889	594142N	1615302W	Goodnews Bay C-8

Linear Feature (Stream, Valley, Arroyo) Source

Sequence	Latitude(DEC)	Longitude(DEC)	Latitude(DMS)	Longitude(DMS)	Map Name
2	59.6227778	-161.5808333	593722N	1613451W	Goodnews Bay C-7

Coordinates (One point per USGS topographic map containing the feature, NAD83)

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- [TerraServer DOQ](#)
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Sequence	Latitude(DEC)	Longitude(DEC)	Latitude(DMS)	Longitude(DMS)	Map Name
1	59.6950000	-161.8838889	594142N	1615302W	Goodnews Bay C-8
2	59.6227778	-161.5808333	593722N	1613451W	Goodnews Bay C-7

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Feature Detail Report for: South Mouth Arolik River

ID: 1409960
 Name: **South Mouth Arolik River**
 Class: **Stream** ([Definitions](#))
 History: **Named in 1914 by U.S. Coast and Geodetic Survey (USC&GS); published in 1915 on Chart 9103.**
 Description: **S tributary of Arolik River, heads at 593800N1613600W flows NW to Kuskokwim Bay, 40 mi. N of Goodnews, Yukon-Kuskokwim Delta.**
 Citation: **U.S. Geological Survey. Geographic Names Phase I data compilation (1976-1981). 31-Dec-1981. Primarily from U.S. Geological Survey 1:24,000-scale topographic maps (or 1:25K, Puerto Rico 1:20K) and from U.S. Board on Geographic Names files. In some instances, from 1:62,500 scale or 1:250,000 scale maps.**
 Entry Date: **31-Mar-1981**
 *Elevation: 0/0

*Elevations in feet/meters from the [National Elevation Dataset](#)

Variant Names

Variant Name

South Mouth Arolik River [Citation](#)

Decision Card

no data found

Counties

Sequence	County	Code	State	Code	Country
1	Bethel (CA)	050	Alaska	02	US

Linear Feature (Stream, Valley, Arroyo) Mouth

Sequence	Latitude(DEC)	Longitude(DEC)	Latitude(DMS)	Longitude(DMS)	Map Name
1	59.6711111	-161.8772222	594016N	1615238W	Goodnews Bay C-8

Linear Feature (Stream, Valley, Arroyo) Source

Sequence	Latitude(DEC)	Longitude(DEC)	Latitude(DMS)	Longitude(DMS)	Map Name
2	59.6225	-161.5819444	593721N	1613455W	Goodnews Bay C-7

Coordinates (One point per USGS topographic map containing the feature, NAD83)

Sequence	Latitude(DEC)	Longitude(DEC)	Latitude(DMS)	Longitude(DMS)	Map Name
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1	59.67111111	-161.8772222	594016N	1615238W	Goodnews Bay C-8
2	59.6225000	-161.5819444	593721N	1613455W	Goodnews Bay C-7

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Feature Detail Report for: Arolik River

ID: 1398400
 Name: **Arolik River**
 Class: **Stream** ([Definitions](#))
 History: The name of this stream was originally reported in 1898 as "Kwiyadik," an Eskimo name, by J. E. Spurr and W. S. Post (in Spurr, 1900, map 10), U.S. Geological Survey (USGS), and it included what is now the North Mouth. In 1913 U.S. Coast and Geodetic Survey (USC&GS) published the name "Arolic Creek" on Chart T-3399; it is an Eskimo name reported to mean "moon." The Eskimos also called the stream "Aalalik," meaning "ashes," which refers to the "ashes of a burnt village at the mouth of north fork."
 Description: heads at confluence of East and South Forks Arolik River, flows NW to North and South Mouths Arolik River, 36 mi. N of Goodnews, Yukon-Kuskokwim Delta. 14 miles long.
 Citation: U.S. Board on Geographic Names. Geographic Names Post Phase I Board/Staff Revisions. 01-Jan-2000. Board decisions referenced after Phase I data compilation or staff researched non-controversial names.
 Entry Date: 01-Jan-2000
 *Elevation: 89/27

*Elevations in feet/meters from the [National Elevation Dataset](#)

Variant Names

Variant Name	
Aalaik	Citation
Arolic Creek	Citation
Arolik River	Citation
Kwiyadik Creek	Citation

Board on Geographic Names Decisions

Name	Authority	Decision Type	BGN
Arolik River	Board Decision	Official	1939

Decision Card

no data found

Counties

Sequence	County	Code	State	Code	Country
1	Bethel (CA)	050	Alaska	02	US

Linear Feature (Stream, Valley, Arroyo) Mouth

Sequence	Latitude(DEC)	Longitude(DEC)	Latitude(DMS)	Longitude(DMS)	Map Name
1	59.6225000	-161.5805556	593721N	1613450W	Goodnews Bay C-7

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Linear Feature (Stream, Valley, Arroyo) Source

Sequence	Latitude(DEC)	Longitude(DEC)	Latitude(DMS)	Longitude(DMS)	Map Name
2	59.5052778	-161.3283333	593019N	1611942W	Goodnews Bay C-7

Coordinates (One point per USGS topographic map containing the feature, NAD83)

Sequence	Latitude(DEC)	Longitude(DEC)	Latitude(DMS)	Longitude(DMS)	Map Name
1	59.6225000	-161.5805556	593721N	1613450W	Goodnews Bay C-7
2	59.5052778	-161.3283333	593019N	1611942W	Goodnews Bay C-7

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Feature Detail Report for: South Fork Arolik River

ID: 1409913
 Name: South Fork Arolik River
 Class: Stream ([Definitions](#))
 History: Name published by G. L. Harrington (in Brooks, 1921, pl. 7), U.S. Geological Survey (USGS).
 Description: flows N joins East Fork Arolik River to form Arolik River, 30 mi. NE of Goodnews, Kilbuck Kuskokwim Mts.
 Citation: U.S. Geological Survey. Geographic Names Phase I data compilation (1976-1981). 31-Dec-1981. Primarily from U.S. Geological Survey 1:24,000-scale topographic maps (or 1:25K, Puerto Rico 1:20K) and from U.S. Board on Geographic Names files. In some instances, from 1:62,500 scale or 1:250,000 scale maps.
 Entry Date: 31-Mar-1981
 *Elevation: 308/94

*Elevations in feet/meters from the [National Elevation Dataset](#)

Variant Names

Variant Name

South Fork Arolic Creek [Citation](#)
 South Fork Arolic River [Citation](#)

Decision Card

no data found

Counties

Sequence	County	Code	State	Code	Country
1	Bethel (CA)	050	Alaska	02	US

Linear Feature (Stream, Valley, Arroyo) Mouth

Sequence	Latitude(DEC)	Longitude(DEC)	Latitude(DMS)	Longitude(DMS)	Map Name
1	59.5050000	-161.3291667	593018N	1611945W	Goodnews Bay C-7

Linear Feature (Stream, Valley, Arroyo) Source

Sequence	Latitude(DEC)	Longitude(DEC)	Latitude(DMS)	Longitude(DMS)	Map Name
2	59.3480556	-161.335	592053N	1612006W	Goodnews Bay B-7

Coordinates (One point per USGS topographic map containing the feature, NAD83)

Mapping Services



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- [USGS The National Map](#)
- [Microsoft Virtual Earth](#)
- [TerraFly.com](#)
- [TerraServer DOQ](#)
- [TerraServer DRG](#)
- [Find the Watershed](#)
- [MapQuest](#)
- [Yahoo! Local Maps](#)

Important Links

- [GNIS Home](#)
- [U.S. Board on Geographic Names](#)
- [Mapping Information](#)

Sequence	Latitude(DEC)	Longitude(DEC)	Latitude(DMS)	Longitude(DMS)	Map Name
1	59.5050000	-161.3291667	593018N	1611945W	Goodnews Bay C-7
2	59.3480556	-161.3350000	592053N	1612006W	Goodnews Bay B-7

U.S. Department of the Interior | U.S. Geological Survey
12201 Sunrise Valley Drive, Reston, VA 20192, USA
gnis_manager@usgs.gov
Form updated: March 22, 2011
[USGS Privacy Policy and Disclaimers](#)



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Geographic Names Information System (GNIS)



Feature Detail Report for: East Fork Arolik River

ID: 1401572
 Name: **East Fork Arolik River**
 Class: **Stream** ([Definitions](#))
 History: **Name published by Harrington (in Brooks and others, 1921, pl. 7), U.S. Geological Survey (USGS), as "East Fork Arolic Creek."**
 Description: **heads at Arolik Lake, flows NW to join South Fork Arolik River where it forms the Arolik River, 30 mi. NE of Goodnews, Kilbuck-Kuskokwim Mts. 8 miles long.**
 Citation: **U.S. Geological Survey. Geographic Names Phase I data compilation (1976-1981). 31-Dec-1981. Primarily from U.S. Geological Survey 1:24,000-scale topographic maps (or 1:25K, Puerto Rico 1:20K) and from U.S. Board on Geographic Names files. In some instances, from 1:62,500 scale or 1:250,000 scale maps.**
 Entry Date: 31-Mar-1981
 *Elevation: 325/99

*Elevations in feet/meters from the [National Elevation Dataset](#)

Variant Names

Variant Name

East Fork Arolic Creek [Citation](#)
 East Fork Arolic River [Citation](#)

Decision Card

no data found

Counties

Sequence	County	Code	State	Code	Country
1	Bethel (CA)	050	Alaska	02	US

Linear Feature (Stream, Valley, Arroyo) Mouth

Sequence	Latitude(DEC)	Longitude(DEC)	Latitude(DMS)	Longitude(DMS)	Map Name
1	59.5058333	-161.3280556	593021N	1611941W	Goodnews Bay C-7

Linear Feature (Stream, Valley, Arroyo) Source

Sequence	Latitude(DEC)	Longitude(DEC)	Latitude(DMS)	Longitude(DMS)	Map Name
2	59.4741667	-161.1208333	592827N	1610715W	Goodnews Bay B-6

Coordinates (One point per USGS topographic map containing the feature, NAD83)

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- [USGS The National Map](#)
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- [TerraFly.com](#)
- [TerraServer DOQ](#)
- [TerraServer DRG](#)
- [Find the Watershed](#)
- [MapQuest](#)
- [Yahoo! Local Maps](#)

Important Links

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- [U.S. Board on Geographic Names](#)
- [Mapping Information](#)

Sequence	Latitude(DEC)	Longitude(DEC)	Latitude(DMS)	Longitude(DMS)	Map Name
1	59.5058333	-161.3280556	593021N	1611941W	Goodnews Bay C-7
2	59.4741667	-161.1208333	592827N	1610715W	Goodnews Bay B-6

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Geographic Names Information System (GNIS)

[Query](#) [Result](#) [FAQs](#)

Feature Detail Report for: Arolik Lake

ID: 1398399
 Name: **Arolik Lake**
 Class: **Lake** ([Definitions](#))
 History: **Name derived from the Arolik River; published in 1951 by U.S. Geological Survey (USGS).**
 Description: **extends NW to headwaters of East Fork Arolik River, 31 mi. NE of Goodnews, Kilbuck-Kuskokwim Mts. 2.5 miles long.**
 Citation: **U.S. Geological Survey. Geographic Names Phase I data compilation (1976-1981). 31-Dec-1981. Primarily from U.S. Geological Survey 1:24,000-scale topographic maps (or 1:25K, Puerto Rico 1:20K) and from U.S. Board on Geographic Names files. In some instances, from 1:62,500 scale or 1:250,000 scale maps.**
 Entry Date: **31-Mar-1981**
 *Elevation: **469/143**

*Elevations in feet/meters from the [National Elevation Dataset](#)

Decision Card

no data found

Counties

Sequence	County	Code	State	Code	Country
1	Bethel (CA)	050	Alaska	02	US

Coordinates (One point per USGS topographic map containing the feature, NAD83)

Sequence	Latitude(DEC)	Longitude(DEC)	Latitude(DMS)	Longitude(DMS)	Map Name
1	59.4630556	-161.0994444	592747N	1610558W	Goodnews Bay B-6

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gnis_manager@usgs.gov
 Form updated: March 22, 2011
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- [TerraFly.com](#)
- [TerraServer DOQ](#)
- [TerraServer DRG](#)
- [Find the Watershed](#)
- [MapQuest](#)
- [Yahoo! Local Maps](#)

Important Links

- [GNIS Home](#)
- [U.S. Board on Geographic Names](#)
- [Mapping Information](#)



United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Alaska State Office
701 C Street, Box 13
Anchorage, Alaska 99513

IN REPLY REFER TO

(2561) (965)
Serial No. AA-37773
Parcel/Tract(s) A, B, C
3P? Yes (X) No ()
Survey Year 1988
Window No. 1562
Exclusion? Yes (X) No ()

Date: SEP 29 1988

MEMORANDUM

T 5 S, R 73 W (S.M.)

To: DSD for Cadastral Survey (920)

Parcel - B

From: Chief, Native Allotment Section (965)

Subject: Request for ~~Survey~~ Exclusion Survey

A review of the application, field report, and other information contained in the case file indicated that the applicant has used that land in a consistent manner or met the requirements of ANILCA. Therefore, it is recommended that Native allotment AA-37773 Parcels A, B, C, D be surveyed. For the metes and bounds description of this claim, please see below.

Case type: 2561

Applicant: Henry Matthew, Quinhagak, Alaska

Description:

Parcel A: Secs 8, 9, 16, and 17, T. 5 S., R. 72 W., Seward Meridian. Not to exceed 40 acres.

Parcel B: Secs. 22, 23, 26, and 27, T. 5 S., R. 73 W., Seward Meridian. Not to exceed 40 acres.

Parcel C: Sec. 35, T. 4 S., R. 74 W., Seward Meridian.
Sec. 1, T. 5 S., R. 75 W., Seward Meridian.
Sec. 6, T. 5 S., R. 74 W., Seward Meridian. Not to exceed 40 acres.

Parcel D: Secs. 6, and 7, T. 5 S., R. 74 W., Seward Meridian. Not to exceed 40 acres

See attached field reports for metes and bounds description
Parcels B, C, and D on I.C. lands.

Enclosure:
Field Report R. Campbell (965)

Attach 1

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

LAND REPORT TITLE PAGE

State Alaska	District Anchorage
County 1	Resource area McGiath
Type of Action ²⁵⁶¹ 7509 Native Allotment	Serial Number AA-37773 Parcel E
Applicant's name Henry Matthew	Address (include zip code) Quinhagak, Alaska 99655
Date(s) of examination July 9, 1984	

LANDS INVOLVED

TOWNSHIP	RANGE	MERIDIAN	SECTION	SUBDIVISION	ACRES
5 S.	73 W.	Seward	22, 23, 26, & 27	metes & bounds	40
Locan Coordinates for BLM marker: 59° 43' 30" N 161° 41' 04" W					

Purpose of report To locate parcel, determine conflicts, determine use and occupancy, and prepare survey instructions.

Prepared by Sylvia Hale SYLVIA HALE	Title Realty Specialist	Date of report 3-7-86
---	----------------------------	--------------------------

Case No: AA-37773 Parcel: B

Name of Applicant: Henry Mathew

Area or Village: Quinhagak, Alaska

Date of claimed occupancy: 1944

Field examined by Meg Jensen

A. TRACT LOCATION

1. a. USGS 1" = 1 mile location map (quad): Goodnews '8

b. Tract located as described in application: Yes No

If no explain: _____

2. Does tract length to width ratio exceed (4 to 1) or exceed 160-rod shore space limitation: Yes No If yes, explain: _____

3. Land posted: Yes No If yes, describe: _____

4. Access to tract by applicant: Boat in Summer and snow machine in winter

(Also indicate any existing "public" access routes which cross the allotment.)

5. Examiner accompanied to tract by applicant or authorized representative:

Yes No If not, why: _____

6. Others present during field exam: Frank Matthew, son

B. LAND USE AND OCCUPANCY

1. History of land use by the applicant (dates, types of use, circumstances, etc.):

Trapping

2. Are there any conflicts to applicant's exclusive use of land? (Explain):

None

3. Evidence of use on each parcel claimed by applicant.

a. Man-made (cabin, cache, tent frame, fish wheel, boat dock, fish racks, etc.):

None

b. Signs of use (boxes, firepits, trails, firewood cutting, cabin logs, etc.): None

c. Are natural resources there to support claimed use? (berrypicking areas, wildroots, greens, hunting, fishing, etc.): Yes, mammals

4. Applicant's personal knowledge of the parcel: Excellent. This is the end of the applicant, trapline. A slough leads from the bend at the east end of parcel and connects with the slough by the marker. This slough does not freeze up. It is a hand cut trail. Applicant wants to make sure that survey includes the slough that doesn't freeze over in his parcel. There is a beaver lodge next to the slough.

C. OTHER FIELD DATA

1. Antiquities, archeological, cultural values in area: Yes No

2. Other improvements on or near the parcel (powerlines, pipelines, telephone lines, etc.): None

D. CONCLUSIONS

Based on the information obtained during the field exam, the applicant appears to have met the use and occupancy requirements of the Native Allotment Act of 1906.

E. SURVEY INSTRUCTIONS

Locan Coordinates $59^{\circ} 43' 30'' N, 161^{\circ} 41' 24'' W$,
The BLM markers located at the mean high waterline on the right bank of Bessie Creek in the SE 1/4 of Sec. 22, T. 5 S, R. 73 W., Seward Meridian, as shown on USGS Quad Broadview C8 (scale 1:63,360). The BLM marker is also the true point of beginning and corner No. 1. Thence Easterly, 27 chs to corner No. 2; thence Southerly 17 chs to corner No. 3; thence Westly approximately 19 chs to the mean high waterline on the right bank of Bessie Creek ^{which is} corner No. 4; thence Northwesterly along the mean high waterline on the right bank of Bessie Creek approximately 25 chs to the BLM marker, the point of beginning. Corner Nos. 2 and 4 may be adjusted, if necessary, to encompass up to but not exceed 40 acres.

tol
9-28-86

Sylvia Hale 3-7-86
Realty Specialist Date

Meg Jensen 3/11/1986
Area Manager Date
Supervisory Realty Specialist

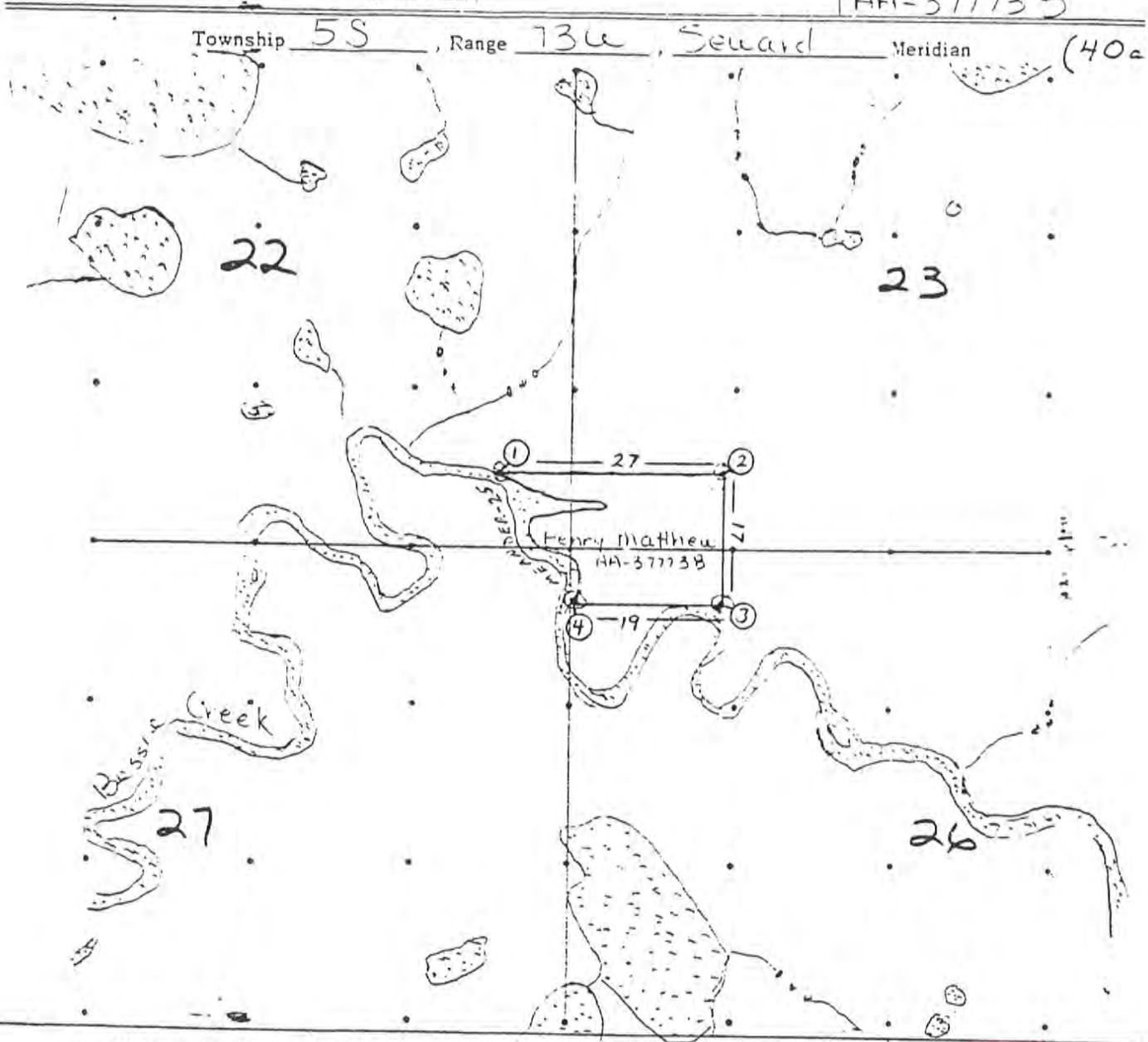
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Henry Mattheu

Serial Number
AA-37773B

SITE PLOT

Township 5S, Range 13W, Seward Meridian (40a)



LAND OWNERSHIP KEY AND ADDITIONAL TOPOGRAPHIC SYMBOLS

	Section line		Water
	Stream or Slough		
	Parcel boundary		
	BLM marker		
	Parcel Corner Number		

Scale: 1" =

OTHER DATA

Goodnews C 8

1:63,360

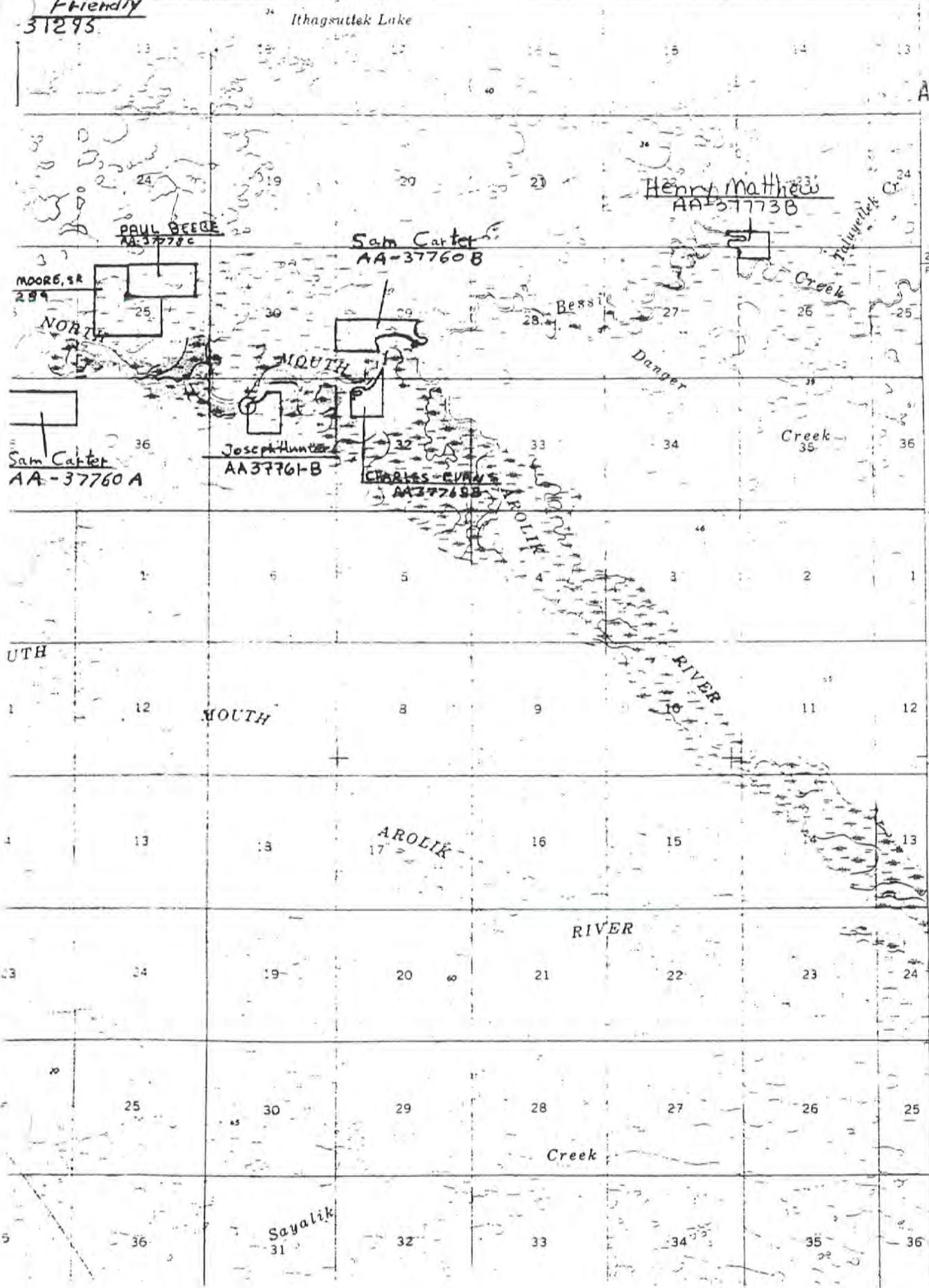
GOODNEWS (C-8) QUADRANGLE
ALASKA
1:63 360 SERIES (TOPOGRAPHIC)

GOODNEWS D-7

GOODNEWS D-8) 1:63 360 FEET 40' 161 37 30' 59' 45'

Friendly
31293

AA 37773



2090000
FEET

T 55
T 65

(GOODNEWS C-7)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

LAND REPORT TITLE PAGE

State <u>Alaska</u>	District <u>Anchorage</u>
County	Resource area <u>McGrath</u>
Type of Action ²⁵⁶¹ 7509 <u>Native Allotment</u>	Serial Number <u>AA-37773 Parcel B</u>
Applicant's name <u>Henry Matthew</u>	Address (include zip code) <u>Quinhagak, Alaska 99655</u>
Date(s) of examination <u>July 9, 1984</u>	

LANDS INVOLVED

TOWNSHIP	RANGE	MERIDIAN	SECTION	SUBDIVISION	ACRES
<u>5 S.</u>	<u>73 W.</u>	<u>Seward</u>	<u>22, 23, 26, & 27</u>	<u>metes & bounds</u>	<u>40</u>
<p>Loran Coordinates for BLM marker: 59° 43' 30" N 161° 41' 04" W</p>					

Purpose of report To locate parcel, determine conflicts, determine use and occupancy, and prepare survey instructions.

Prepared by <u>Sylvia Hale</u> SYLVIA HALE	Title <u>Realty Specialist</u>	Date of report <u>3-7-86</u>
--	-----------------------------------	---------------------------------

NATIVE ALLOTMENT FIELD REPORT

Case No: AA-37773 Parcel: B

Name of Applicant: Henry Mathew

Area or Village: Quinhagak, Alaska

Date of claimed occupancy: 1944

Field examined by Meg Jensen

A. TRACT LOCATION

1. a. USGS 1" = 1 mile location map (quad): Goodnews C8

b. Tract located as described in application: Yes No

If no explain: _____

2. Does tract length to width ratio exceed (4 to 1) or exceed 160-rod shore space limitation: Yes No If yes, explain: _____

3. Land posted: Yes No If yes, describe: _____

4. Access to tract by applicant: Boat in summer and snow machine in winter

(Also indicate any existing "public" access routes which cross the allotment.)

5. Examiner accompanied to tract by applicant or authorized representative:

Yes _____ No If not, why: _____

6. Others present during field exam: Frank Matthew, son.

B. LAND USE AND OCCUPANCY

1. History of land use by the applicant (dates, types of use, circumstances,

etc.): Trapping

2. Are there any conflicts to applicant's exclusive use of land? (Explain):

None

3. Evidence of use on each parcel claimed by applicant.

a. Man-made (cabin, cache, tent frame, fish wheel, boat dock, fish racks,

etc.): None

b. Signs of use (boxes, firepits, trails, firewood cutting, cabin logs, etc.): None

c. Are natural resources there to support claimed use? (berrypicking areas, wildroots, greens, hunting, fishing, etc.): Yes, mammals.

4. Applicant's personal knowledge of the parcel: Excellent. This is the end of the applicant's trapline. A slough leads from the bend at the east end of parcel and connects with the Slough by the marker. This slough does not freeze up. It is a land otter trail. Applicant wants to make sure that survey includes the slough that doesn't freeze over in his parcel. There is a beaver lodge next to the slough.

C. OTHER FIELD DATA

1. Antiquities, archeological, cultural values in area: Yes No

2. Other improvements on or near the parcel (powerlines, pipelines, telephone lines, etc.): None

D. CONCLUSIONS

Based on the information obtained during the field exam, the applicant appears to have met the use and occupancy requirements of the Native Allotment Act of 1906.

E. SURVEY INSTRUCTIONS

Locum Coordinates $59^{\circ} 43' 30'' N, 161^{\circ} 41' 04'' W$,
The BLM marker is located at the mean high waterline on the right bank of Bessie Creek in the SE $\frac{1}{4}$ of Sec. 22, protracted T. 5 S, R. 73 W., Seward Meridian, as shown on USGS Quad Goodnews C8 (scale 1:63,360). The BLM marker is also the true point of beginning and corner No. 1. Thence Easterly, 27 chs to corner No. 2; thence Southerly 17 chs to corner No. 3; thence Westerly, approximately 19 chs to the mean high waterline on the right bank of Bessie Creek, ^{which is} corner No. 4; thence Northwesterly along the mean high waterline on the right bank of Bessie Creek approximately 25 chs to the BLM marker, the point of beginning. Corner Nos. 3 and 4 ^{3 and 4} may be adjusted, if necessary, to encompass up to but not exceed 40 acres.

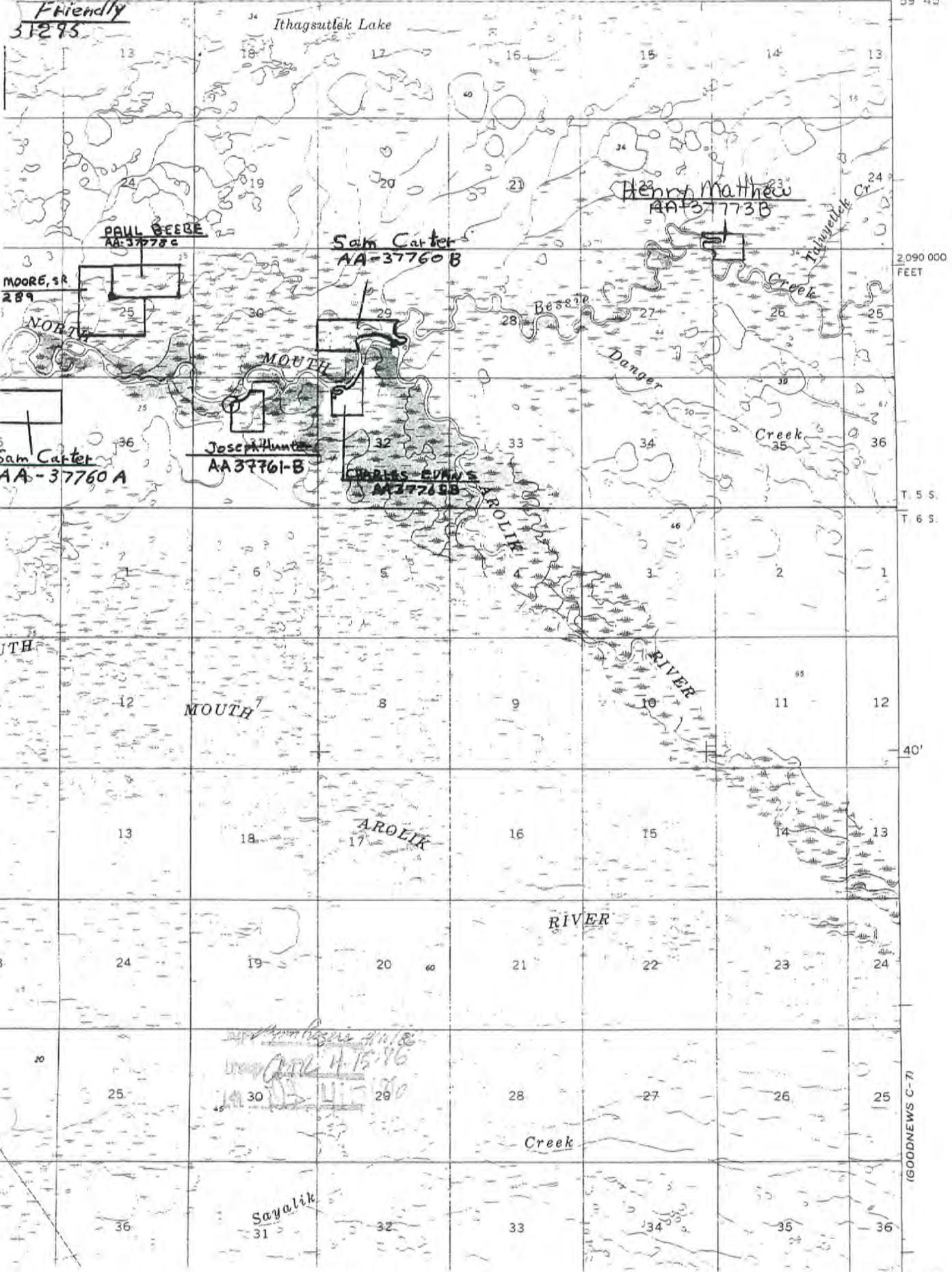
Sylvia Hale 3-7-86
Realty Specialist Date

Meg Jensen 3/11/1986
Area Manager Date
Supervisory Realty Specialist

GOODNEWS (C-8) 1:63 360 SERIES (TOPOGRAPHIC)
ALASKA

(GOODNEWS D-7)

GOODNEWS D-8) R 74 W 45' 760 000 FEET 40' 161° 37' 30" 59° 45'



(GOODNEWS C-7)

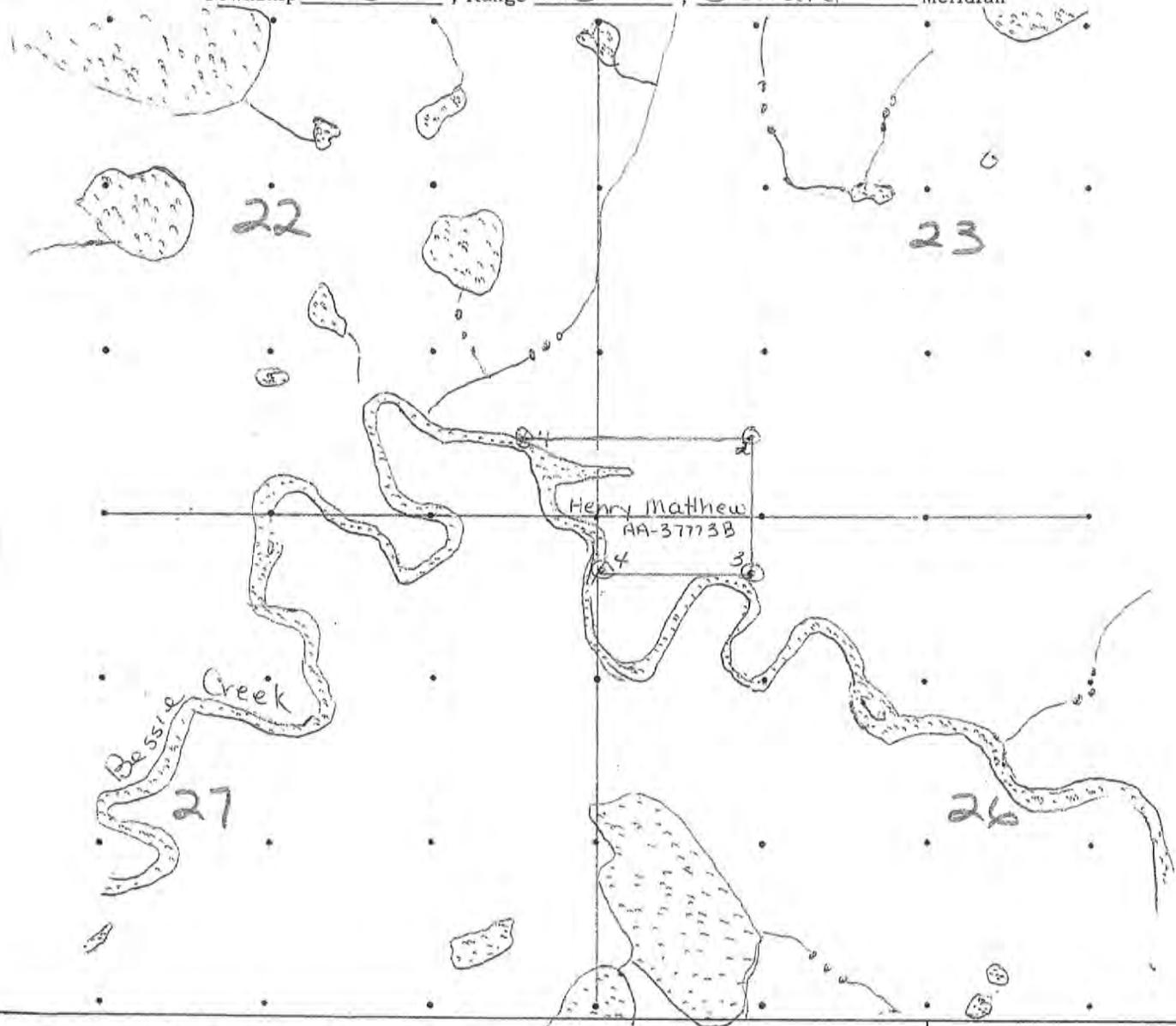
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Henry Mathew

Serial Number
AA-37773B

SITE PLOT

Township 5S, Range 13W, Seward Meridian



LAND OWNERSHIP KEY AND ADDITIONAL TOPOGRAPHIC SYMBOLS

Scale: 1" =

	Section line		Water
	Stream or Slough		
	Parcel boundary		
	BLM marker		
	Parcel Corner Number		

OTHER DATA
Goodnews C 8
1'. 63,360

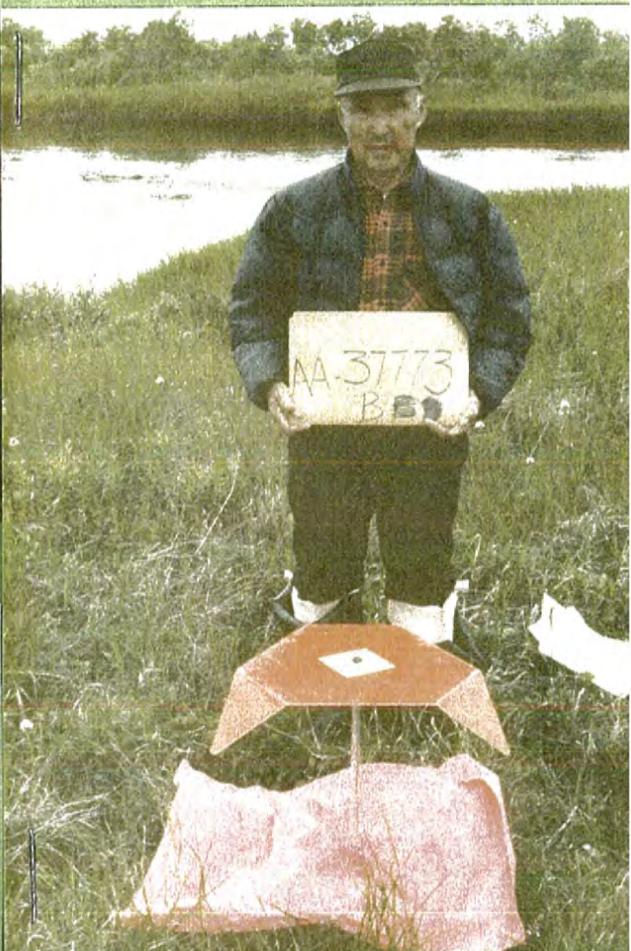


Henry Matthew/AA-37773.
Quinhagak, Alaska
7-9-84

Looking easterly toward the
beaver lodge.



applicant standing at
BLM marker. ↘



Looking northerly across west edge of parcel
(BLM marker circled).

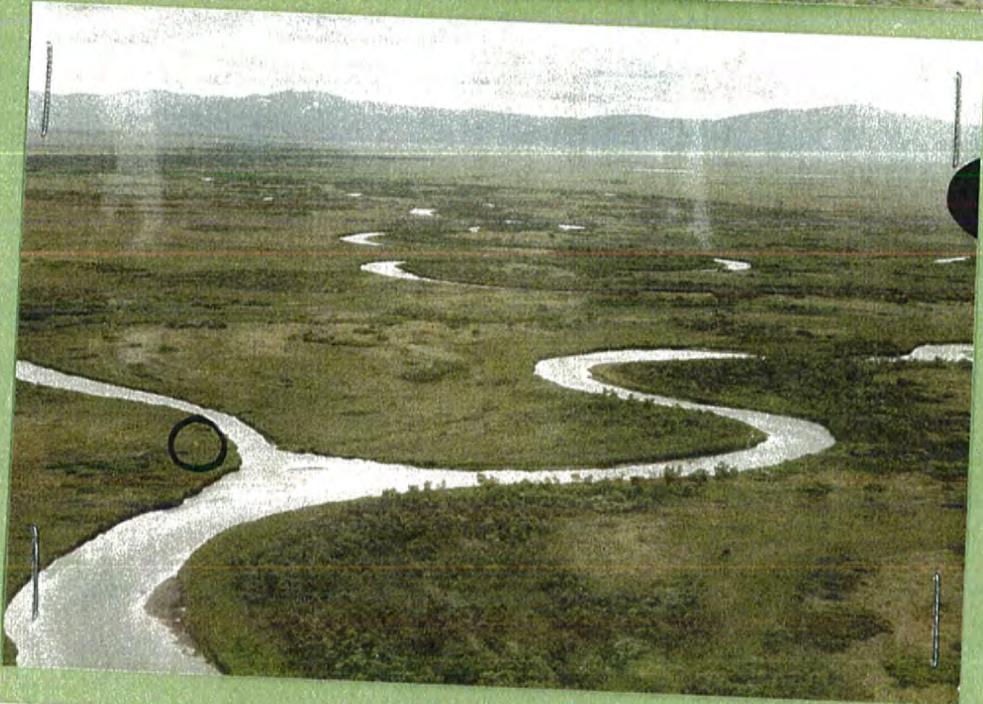


Looking northeasterly across
west boundary of parcel
(BLM marker circled) 1 of.



Henry Matthew
AA-37773B
Quinhagak, Alaska
7-9-84

Looking easterly
across parcel
(BLM marker
circled).



Looking southeast-
erly across parcel
(BLM marker
circled).



Looking southeasterly
across west edge
of parcel.

Superintendent
Bureau of Indian Affairs
P. O. Box 120
Anchorage, Alaska 99501

Dear Sir:

We, the undersigned, certify that Henry Matthew
has occupied, marked and posted the land applied for as a Native
Allotment; and that this land is not claimed by any other Native;
and is not an area of Native Community Use.

DATE: 27 Sept 1971 James Fox

John Johnson

Joseph Hunter

RECEIVED
BUREAU OF
LAND MANAGEMENT

DEC 5 11 24 AM '79

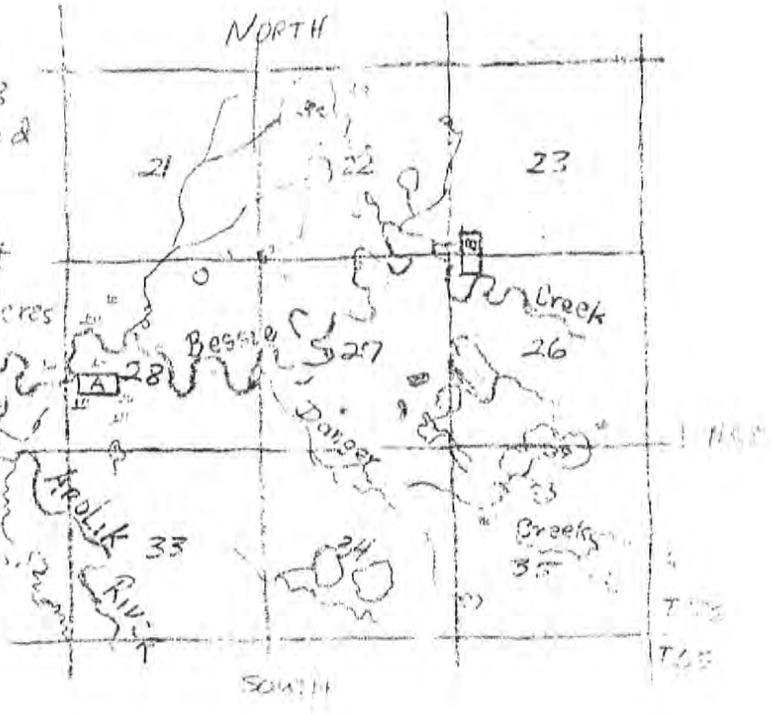
LAND SURVEYS
ANCHORAGE, ALASKA

AA37773

F.M.

1-3-79

COPIED From
 Goodnews U-8
 Quad
 (A) & (B)
 west
 Two Parcels 20 Acres
 EACH
 Henry
 MATTHEW
 Quinhagak,
 PRASNA
 - 99635



RECEIVED
 BUREAU OF
 LAND MANAGEMENT
 DEC 5 11 24 AM '79
 LOS ANGELES
 DISTRICT OFFICE
 ANCHORAGE, ALASKA

AA37773

Copies From Goodnews (D-8) Quarter
Two Parcels one 40 acres EACH

Henry Matthews
Greenhough, Alaska-99655

(C&D)



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LAND MANAGEMENT
DEC 5 11 24 AM '79
LEASING OPERATIONS
MCCASKEY BLDG
ANCHORAGE, ALASKA

AA37773

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LAND MANAGEMENT

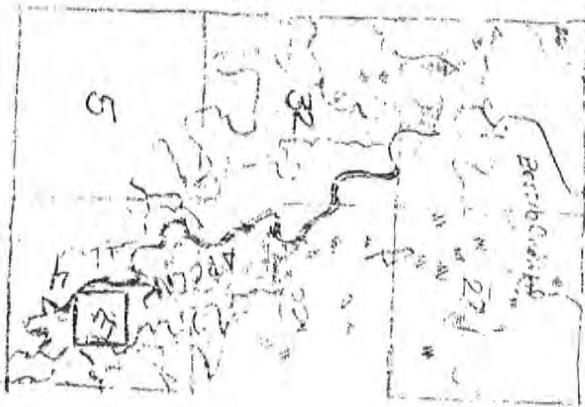
DEC 5 11 24 AM '79

LAND & MINERALS
OPERATIONS
ANCHORAGE, ALASKA

Herring Island
Crimchagok
Pulchra

(11)

Report from Green... (0...)



AA37773

Land Office & Serial Number

AA37773

File in proper Land Office

ALASKA NATIVE ALLOTMENT APPLICATION AND
EVIDENCE OF OCCUPANCY
Act of May 17, 1906 (34 Stat. 197)

1. Name of Applicant (first, middle initial, and last) *Henry Matthew* Address (include zip code) *Quinhagak, Ak. -99655-*

2a. Are you full mixed blood? Indian Aleut Eskimo

b. Were you born and are you now residing in the State of Alaska? Yes No

3. Sex of Applicant Male Female

4a. Are you head of a family? Yes No

b. Are you at least 21 years of age? Yes No

5. Give legal description of the lands applied for (If lands are unsurveyed, describe them in a manner sufficient to permit their ready identification on the ground) *20 ACRES MARKED (A) LOCATED MIDDLE LEFT PORTION OF 28, R73 W, T55, 20 ACRES MARKED (B) LOCATED ON LEFT OF GRID LINE DIVIDING 23+26 R73 W, T55 OF Goodnews C-8 QUADRANG. 40 ACRES MARKED (C) LOCATED ON MIDDLE BOTTOM OF 35, R74 W, T45 OF Goodnews (D-8). One 40 ACRES MARKED (D) LOCATED BOTTOM LEFT OF 6, R74 W, T55 OF Goodnews (D-8) Quad. One Parcel 40 acres marked (E) Located near middle of (4) R73 T65 OF Goodnews (C-8) Quad.*

6a. Is the land applied for essentially nonmineral? Yes No (if "no," specify mineral)

b. Is the land claimed for mining purposes by any person including yourself? Yes No

c. Is the land occupied or improved by any person other than yourself? Yes No

7. Have you received any other allotment under the Act of May 17, 1906, supra Yes No (if "yes," explain)

8a. From what date have you occupied the land applied for? *August*, 19 *50*

b. Are the corners marked and posted as required by the regulations? Yes No

EVIDENCE OF OCCUPANCY

1. PERIODS OF ACTUAL RESIDENCE ON THE LAND

CALENDAR YEAR	BEGAN		ENDED		IF ABSENT FROM THE LAND, GIVE REASONS
	MONTH	DAY	MONTH	DAY	
1950	Aug				Return Home to Village to Present

2. CULTIVATION OF THE LAND

CALENDAR YEAR	ACRES CULTIVATED	TYPE OF CROPS PLANTED	QUANTITY OF CROPS HARVESTED
		None	

3. DOMESTIC ANIMALS KEPT ON THE LAND

CALENDAR YEAR	KIND OF ANIMALS	NUMBER OF ANIMALS
	None	

NE 11/7/1980

F.M. - 1-3-79

4. IMPROVEMENTS

DESCRIPTION OF IMPROVEMENTS	VALUE OF IMPROVEMENTS	DATE MADE
None	\$ 0	

5. FISHING, TRAPPING, AND OTHER USES OF THE LAND

CALENDAR YEAR	USE BEGAN		USE ENDED		TYPE OF USE	REMARKS
	MONTH	DAY	MONTH	DAY		
1950	Aug		Oct		Hunting & Fish Berry Picking	Seasonal Use for subsistence
	Nov		Dec		Trapping	
To	Jan		Present		Hunting	

Remarks (Enter here any other information showing compliance with the requirements of the law for substantially continuous use and occupancy of the land for a period of 5 years)

I have used the above land claimed to support my family for subsistence for living.

RECEIVED
BUREAU OF
LAND MANAGEMENT
DEC 5 11 24 AM '79
LAND MANAGEMENT
GENERALS
COURTESY
ALASKA

I CERTIFY That the statements made herein are true, complete, and correct to the best of my knowledge and belief and are made in good faith.

27 Sept 71
(Date)

Henry Matthee
(Signature or mark of Applicant)

James Fox
(Signature of Witness)

WITNESSES MUST SIGN ONLY IF APPLICANT ENDORSES APPLICATION WITH HIS MARK OR THUMB PRINT RATHER THAN BY SIGNATURE

John Johnson
(Signature of Witness)

FOR USE OF BUREAU OF INDIAN AFFAIRS

I Certify Hereby That the above-named applicant is a native entitled to an allotment under the appropriate regulations in 43 CFR 2212. I further certify that the applicant has occupied, marked, and posted the lands as stated in this application and that this claim does not infringe on other Native claims or area of Native Community use.

(Signature)

(Date)

(Title)

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious, or fraudulent statements or representations as to any matter within its jurisdiction.

AA37773

STATE OF ALASKA

Jay S. Hammond, Governor



Completion Report

INVENTORY AND CATALOGING
OF SPORT FISH AND SPORT
FISH WATERS OF WESTERN
ALASKA

by

Kenneth T. Alt

ALASKA DEPARTMENT OF FISH AND GAME
James W. Brooks, Commissioner

SPORT FISH DIVISION
Rupert E. Andrews, Director
W. Michael Kaill, Chief, Sport Fish Research

COMPLETION REPORT

State:	ALASKA	Name:	Sport Fish Investigations of Alaska
Project No.	F-9-9		
Study No.:	G-I	Study Title:	INVENTORY AND CATALOGING
Job. No:	G-I-P	Job Title:	<u>Inventory and Cataloging of Sport Fish and Sport Fish Waters of Western Alaska</u>

Period Covered: July 1, 1976 through June 30, 1977

ABSTRACT

Sport fishing pressure on remote areas of Alaska is beginning to increase but to date little biological data on sport fish populations has been collected.

This two year study of 10,250 square miles of a remote area of the lower Kuskokwim River and Kuskokwim Bay was conducted to collect base line information on the waters and fish populations.

Streams surveyed were the Aniak, Tuluksak, Kisaralik, Kasigluk, Kwethluk and Eek rivers which enter the lower Kuskokwim River from the south and the Kanektok, Arolik and Goodnews rivers which drain into Kuskokwim Bay. Fifteen lakes, the majority in the Kuskokwim Bay drainage, were also surveyed.

The streams, all heading in the Kilbuck and Ahklun mountains, are swift flowing, clear streams with gravel bottoms, providing excellent spawning habitat for salmonids. The westernmost natural range of rainbow trout, Salmo gairdneri Richardson, in the world is included in the study area.

Physical, chemical and biological data were collected from all lakes and streams surveyed. Rainbow trout were found in all streams except the Eek and Tuluksak rivers. Fish associations in streams included five species of salmon, Oncorhynchus sp.; rainbow trout; Arctic char, Salvelinus alpinus (Linnaeus); round whitefish, Prosopium cylindraceum (Pallas); grayling, Thymallus arcticus (Pallas); and slimy sculpin, Cottus cognatus Richardson. Whitefish, Coregonus sp.; sheefish, Stenodus leucichthys (Guldenstadt); pike, Esox lucius Linnaeus; and burbot, Lota lota (Linnaeus), were less abundant and found only in lower reaches of streams of the lower Kuskokwim drainage. Lake populations consisted mainly of lake trout, Salvelinus namaycush (Walbaum); Arctic char and round whitefish. Red salmon, Oncorhynchus nerka (Walbaum), spawned in most lakes of Kuskokwim Bay streams and a few king, O. tshawytscha (Walbaum); chum, O. keta

(Walbaum); and silver, O. kisutch (Walbaum), salmon were also captured. Grayling were absent in most lakes of the Kuskokwim Bay drainage but are present in lakes of the lower Kuskokwim River. Pike were absent from all lakes except a single individual was caught in Goodnews Lake.

Arctic char, round whitefish and rainbow trout are year-round residents of streams in the lower Kuskokwim River drainage but are anadromous in streams of Kuskokwim Bay. Grayling of the lower Kuskokwim River study area may enter the Kuskokwim to overwinter, but grayling from Kuskokwim Bay probably overwinter in fresh water. Populations of grayling appeared lower in streams of Kuskokwim Bay than in the Kuskokwim River drainage.

Fishes in Kuskokwim Bay lakes and streams generally grew faster than Kuskokwim River fish, especially anadromous char and grayling. Rainbow trout from the Kuskokwim Bay streams reached a slightly larger size and a few fish up to 600 mm (23.6") and 2.8 kg (6 lbs 3 oz) were found. Lake trout from most lakes averaged 440-470 mm and only four fish over 700 mm (27 1/2") and 5 kg (11 lbs) were taken. Ages of these large fish were 19-27 years. No lake trout under 270 mm (10 1/2") were captured.

Longevity of fishes was similar in both sections of the study area. Growth of fishes in the study area, especially Kuskokwim Bay, compared favorably with growth of fishes in Interior Alaska. Sexual maturity is reached at Age V to VII for rainbow trout, Age IX to X for lake trout, Age VI to VII for Arctic char, Age IV to V for grayling and Age VI to VII for round whitefish. Consecutive spawning is the rule for most fish except lake trout.

Fishes of the study area could be termed opportunistic feeders and a wide variety of organisms were found in stomachs examined. Stream residents fed mainly on insects, especially Diptera and Tricoptera larvae, but fish, voles, snails and clams were also eaten. Char, grayling and rainbow trout fed heavily on salmon eggs and flesh in late summer. Lake residents fed mainly on insects, snails and clams and occasionally on fish.

Salmon in the study area have subsistence, commercial and some sport value, while light to moderate sport fishery pressure is exerted on rainbow trout, lake trout, Arctic char, pike and grayling.

INTRODUCTION

Scope

The lakes and streams of the mountainous areas of the lower Kuskokwim River and Kuskokwim Bay contain populations of fish that presently support a light sport fishery as well as subsistence and commercial fishing activities. No fisheries research other than salmon studies has been conducted on these waters. In anticipation of increased sport fishing pressure on these populations, the Sport Fish Division of the Alaska Department of Fish and Game undertook a two year fishery resource investigation of the lakes and streams of the lower Kuskokwim River and Kuskokwim Bay.

Major emphasis was placed on sport species such as rainbow trout, Salmo gairdneri Richardson; lake trout, Salvelinus namaycush (Walbaum); grayling, Thymallus arcticus (Pallas); and Arctic char, S. alpinus (Linnaeus); but information was also collected and analyzed on non-sport species. Observations were made of salmon, Oncorhynchus sp., numbers, run timing and sport fishing potential, but little life history data of salmon are given in this report as the Division of Commercial Fisheries, Alaska Department of Fish and Game has been studying salmon of this area for years and have amassed a large volume of data. The salmon (five species) are the most important subsistence and commercial fish of the region.

Study Area

The Kuskokwim River, nearly 800 miles long, is the second largest drainage in Alaska. Tributaries that enter from the south, drain the Alaska Range as well as the Chulinuk, Taylor and the Kilbuck and Ahklun mountains; while those entering from the north drain the Kuskokwim Mountains and the area between the Yukon and Kuskokwim rivers.

The study area (Fig. 1) includes those lakes and streams draining the Kilbuck and Ahklun mountains and waters flowing generally north and west into the lower Kuskokwim River and directly into Kuskokwim Bay. The study area is roughly 320 x 180 km (200 x 112 miles) and includes 9 major rivers and numerous lakes, 15 of which were surveyed. Bethel is the population, communication and transportation center of the area, but small villages are located near mouths of many of the tributary rivers. Size of the study area was determined by three factors: (a) presence of rainbow trout, (b) number of streams draining Kilbuck and Ahklun mountains and flowing into the Kuskokwim River or Kuskokwim Bay, and (c) amount of country that could adequately be surveyed by a small crew in two summers.

The main Kuskokwim River must be considered part of the study area as many fish of this area utilize the Kuskokwim as a feeding or overwintering area or migration route. Only limited sampling was conducted in the Kuskokwim River.

For purposes of data analysis the study area was divided into two regions: (a) Kuskokwim Bay and (b) lower Kuskokwim River. The Kuskokwim Bay drainage is 2,360 square miles and the Goodnews, Kanektok and Arolik rivers are the major tributaries. The Goodnews River system contains numerous lakes; but only Goodnews, Canyon, Asriguat, Kukaktlim, North Middle Fork and South Middle Fork lakes were surveyed. Other lakes were either too small to land on with a float plane or were close to larger surveyed lakes and could be expected to contain the same species of fish.

The lower Kuskokwim River study area contains 7,890 square miles. The major tributaries include the Aniak, Tuluksak, Kisaralik, Kasigluk, Kwethluk and Eek rivers. This area has numerous shallow lakes on the Kuskokwim River lowlands but most of these become anoxic in the winter and do not support year-round populations of sport fish. The headwater lakes were the principal lakes surveyed in the study area and Aniak,

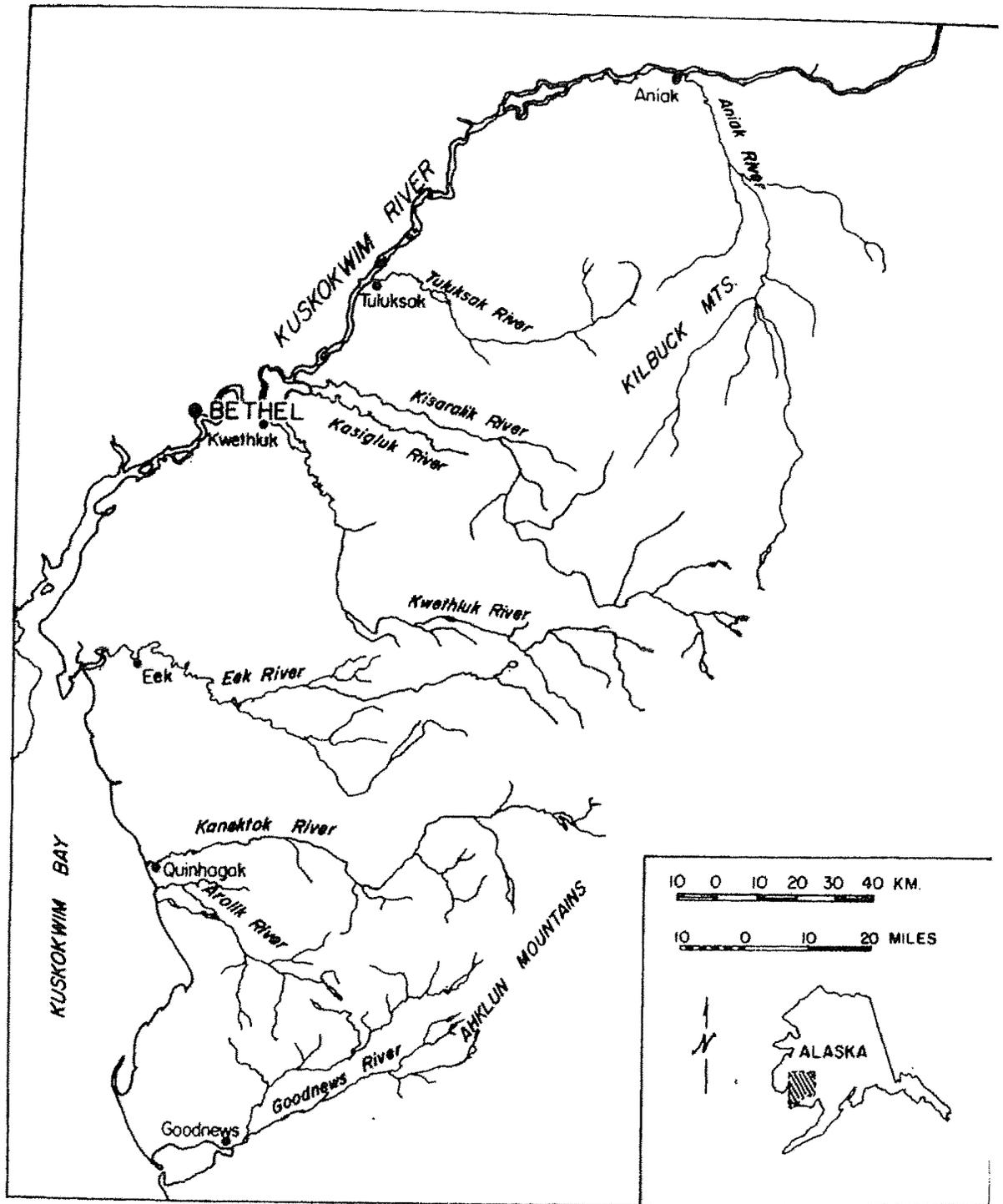


Figure 1. Lower Kuskokwim River and Kuskokwim Bay study area. Inset shows Alaskan location.

Kisaralik and Kisaralik #2 lakes are deep mountain lakes while Eek Lake is a shallow foothills lake.

The vegetation of the study area is tundra with a narrow band of spruce, birch and cottonwood trees along the watercourse in the lower reaches of streams of the Kuskokwim River and a band of willows along the lower reaches of streams of Kuskokwim Bay.

Climatic Data

The waters of the study area fall within two of the four Alaskan climatic zones. The Kuskokwim River below Bethel and the lower few miles of Kuskokwim Bay are in the Transitional Zone, while the Kuskokwim River above Bethel and the upper 80%-90% of all streams of Kuskokwim Bay are in the Continental Zone (Selkregg, 1976).

Temperatures are more moderate than in Interior Alaska but summers are colder, resulting in a shorter growing season for fish. Dates of freeze-up on the Kuskokwim River at Bethel average October 17; Aniak River at Aniak, October 19; and Kanektok River, October 21. Breakup dates for the Kuskokwim River at Aniak is approximately May 16; Bethel, May 18; the Aniak River, May 2; and the Kanektok River, May 3. July mean maximum temperatures range from 16°C (60°F) near Bethel to 19°C (66°F) at Aniak. Aniak average yearly temperature is -2°C (28°F) and it has 227 days when the temperature goes below freezing (U.S. Weather Bureau, Anchorage). Further climatic data on the study area is presented by Selkregg (1976).

Historical Data

The second half of the nineteenth century was important for Alaskan fisheries research as many military and scientific expeditions were sent to Alaska. Robert Kennicott, W. H. Dall, and T. H. Bean did much collecting and publishing on the freshwater drainages and coastal areas to the north as well as Bristol Bay drainages but none on the Kuskokwim. Mention of fish in the Kuskokwim River drainages was first made by Lt. Zagoskin who traveled throughout the lower Kuskokwim River area in the years 1794-1797 (Michael, 1957). He mentioned the location of Aniak Lake and gave physical characteristics of the river. Zagoskin noted the heavy spring upstream migration of sheefish, Stenodus leucichthys; broad whitefish, Coregonus nasus; Bering cisco, C. laurattae; and humpback whitefish, C. pidschian and also the early summer movement of salmon on the Kuskokwim.

The Alaska Department of Fish and Game, Commercial Fish Division, has been conducting research on fishes of the Kuskokwim River and Kuskokwim Bay since 1960 but most of the work has involved enumeration, utilization, and basic life history studies of the five species of Pacific salmon. Rae Baxter, Alaska Department of Fish and Game, Division of Commercial Fisheries, Bethel, has done considerable research on whitefish in the lower Kuskokwim River (Baxter, 1969-1974, unpublished MS in Bethel office). The author has conducted research on sheefish, and to a lesser degree whitefish, in the Holitna River and upper Kuskokwim tributaries between 1967 and 1971. No other information has been published

on the freshwater and anadromous fishes, other than salmon, of the waters of the study area. Lake trout, grayling, northern pike, rainbow trout and Arctic char are found in the Bristol Bay drainages just to the south of the Kuskokwim Bay drainages and information has been published by Metsker (1967), Yanagawa (1967) and Russell (1974). Scott and Crossman (1973) and McPhail and Lindsey (1970) have published general distributional and life history notes of fish found in the study area.

OBJECTIVES

1975

1. To survey the principal tributaries of the lower Kuskokwim River and Kuskokwim Bay, including major headwater lakes. In 1975, the Aniak, Kisaralik, Kanektok, and Goodnews river systems will be surveyed as time permits.
2. To assess the fish species composition of these waters with emphasis on sport fish species.
3. To determine life history parameters of these fish, including age and growth, reproduction, and migration timing.
4. To determine the present sport fishing utilization of these waters and their potential for supporting a sport fishery.
5. To evaluate other waters and sport fisheries in the job area as demand warrants.

1976

1. To complete surveys of the principal tributaries of the lower Kuskokwim River and Kuskokwim Bay, including major headwater lakes. In 1976, the Aniak, Kisaralik, Kwethluk, Tuluksak and Arolik river system will be surveyed as time permits.
2. To assess the fish species composition of these waters, with emphasis on the sport fish species.
3. To determine life history parameters of these fish, including age and growth, reproduction, and migration timing.
4. To determine the present sport fishing utilization of these waters and their potential for supporting a sport fishery.

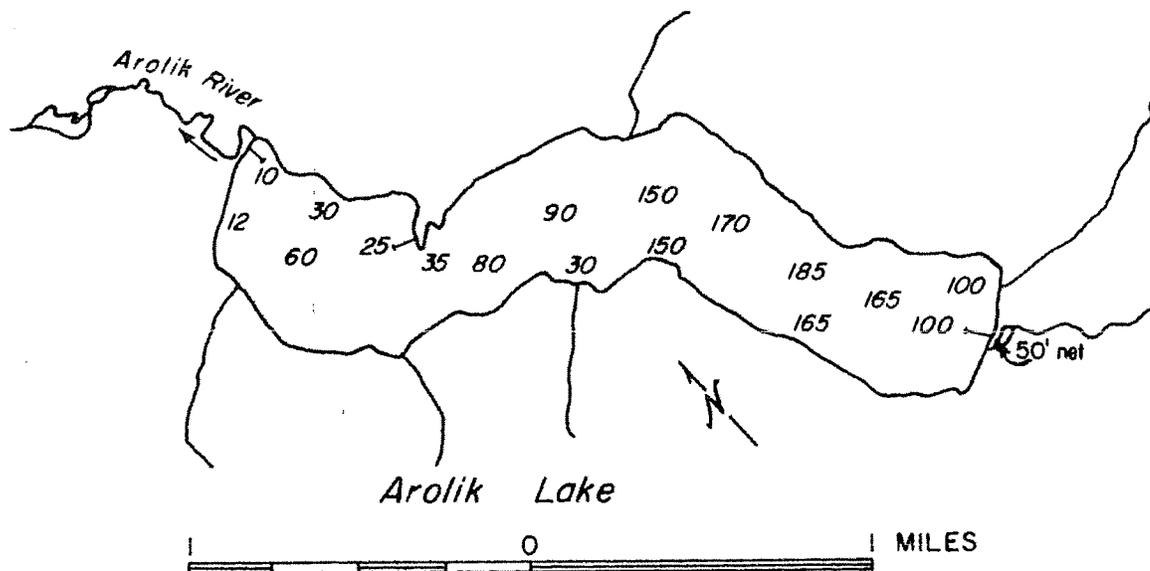


Figure 13. Arolik Lake (see Figure 12 for orientation).

Two overnight gill net sets took 18 lake trout, 13 char, 1 king salmon and 2 round whitefish. Two large lake trout weighed 11 and 13 lbs, respectively; and many of the char were large, deep bodied fish of 5-7 lbs. All char and the two large lake trout were caught in the net set in 60' of water. Six lake trout were taken by hook and line in 3 hours of angling. Red salmon probably use the lake or its outlet for spawning and rearing but none were taken by gill net. The lake has probably received little fishing pressure.

Klak Lake located at 59°44' N and 160°28' W and 1,050' above sea level, flows into the Kanektok River from the south via Klak Creek (Fig. 11). The lake is 1.2 miles long and 0.6 mile wide. No soundings were taken but since it is in a mountainous valley similar to Kanuktik Lake it is probably over 100' deep. It is siltier than the other lakes mainly because of hanging tundra banks falling into the lake. The Secchi disc reading was 20'. Shore vegetation was willow and open tundra, and rocks in the outlet stream were covered with algae. The lake has two major inlets and one outlet, and most gravel that would be suitable for spawning is located in these areas. The lake has very little shoal area and it is generally covered with boulders with an overlay of silt and sand. Water temperature on July 31 was 10°C (50°F) and water chemistry data were: total alkalinity 34 ppm, hardness 51 ppm and pH 7.5.

No hook and line fishing was conducted but two gill nets were set overnight and took 11 Arctic char, 4 lake trout and 4 king salmon. Red salmon probably utilize the lake but none were taken.

Arolik River System:

The *Arolik River*, (Fig. 12) draining a watershed of 573 square miles, is situated between the Goodnews and Kanektok river drainages. It flows generally northwest for approximately 69 miles and the North Mouth empties into Kuskokwim Bay at 59°42' N and 61°53' W. The main stem, the South Fork Arolik, heads in Tatlignagpeke Mountain at 59°21' N and 161°22' W; while the East Fork Arolik heads at Arolik Lake at 59°27' N and 160°15' W. The mouth is located 5 miles south of Quinhagak. The river has a gravel bottom over most of its course; has a moderate current; and because of its shallow depth, navigation with a propeller driven boat is difficult during most of the summer except for the lower few miles. Air access is via an unimproved landing strip at a mining camp near Snow Gulch 9 miles downstream from the junction of the East and South Forks or by landing on Arolik Lake and floating down the East Fork in a raft or canoe.

The Arolik River was surveyed by raft July 14-18, 1976 with Arolik Lake as the starting point. The river was divided into four sections.

Section I which included the lower 10 miles of the North Mouth is under tidal influence and has a mud and fine gravel bottom. The river is 200' wide and the current quite slow. No sampling was done in this section. The bankside vegetation consists mainly of tall grass.

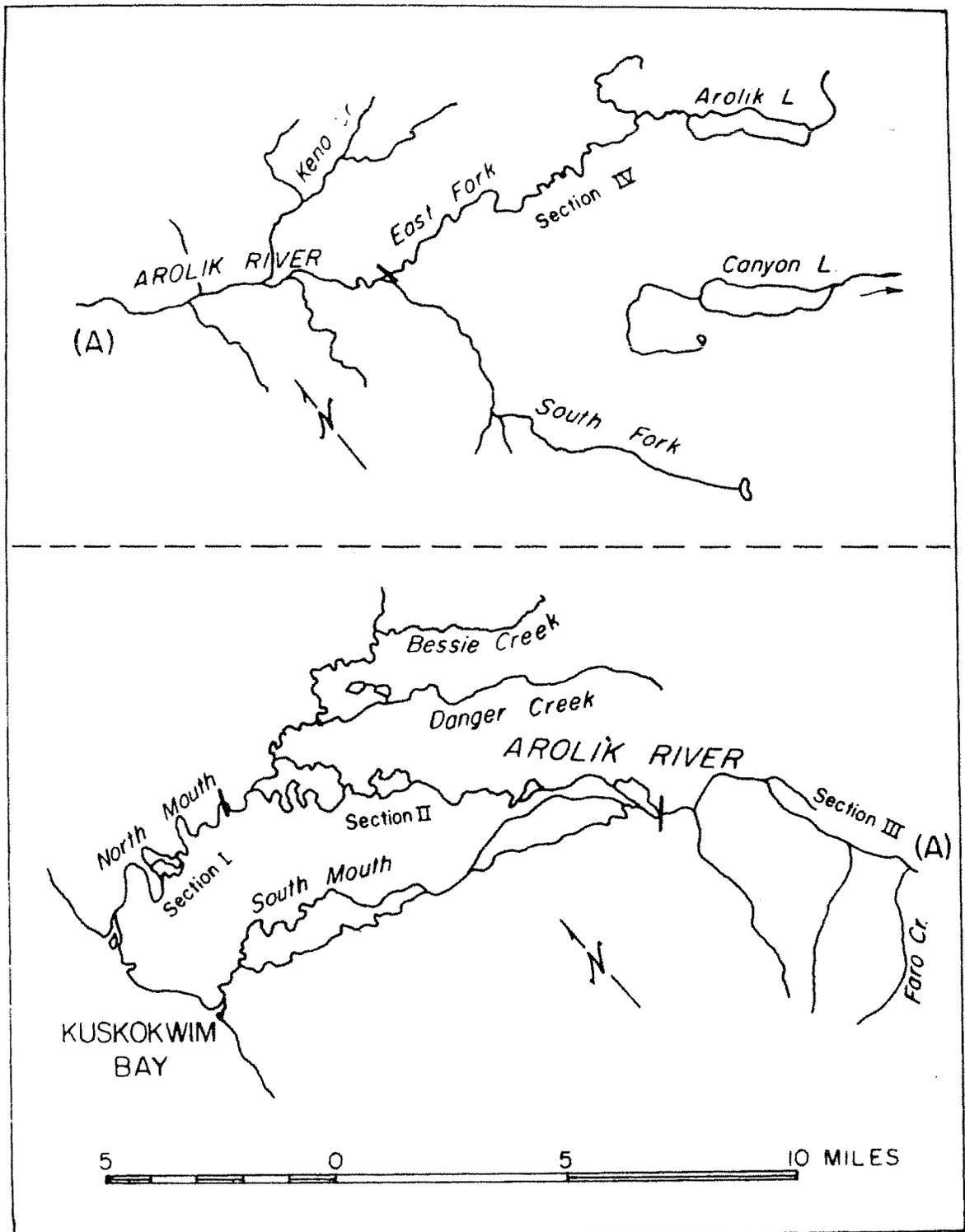


Figure 12. Arolik River drainage including Arolik Lake. Headwaters section at top of page.

Section II comprised the upper 19 miles of the North Mouth of the Arolik River. The current averages 2 mph and the bottom composition is 20% sand and silt, 60% fine gravel and 20% medium gravel. The streambed meanders considerably and the pool to riffle ratio is 2:3. Submerged willow roots, braided channels and overhanging willows, in addition to the favorable pool to riffle ratio, provide excellent habitat for rainbow trout. Eleven trout were caught in 10 hours of angling but many more were observed. Eleven grayling, 10 pink salmon, 3 chum salmon, 3 Arctic char and 1 king salmon were also taken on hook and line. Thousands of pink salmon were spawning in this section on July 17, and pink salmon were observed resting or moving further upstream. Round whitefish were observed in Section II. The stream in this section has a thick band of willows along shore and, because of the active channel has few earth banks. The water was clear during the float trip and temperature was 10.5°C (50°F). Bessie Creek is the major tributary in this section; but because of its slow current and small size, it is probably not much utilized by fish. The South Mouth of the Arolik takes approximately 30% of the water volume. It was not surveyed, but residents of Quinagak said it has very few salmon or rainbow trout.

Section III is a 24 mile section from the North and South Mouth junction upstream to the East Fork-South Fork junction. This section is characterized by a relatively straight channel, swift current, willow band along shore, clear water and a clean gravel bottom. The upper reaches of this section are swift and have a large gravel and rock bottom. There were few pools in the upper part of Section III; consequently, little rainbow trout habitat was present above Keno Creek.

The average width of the stream 3 miles below the junction of the East and South Fork was 120' and average depth was 14". Velocity was 5.26 fps and flow was 720 cfs. Velocity is considerably slower in the lower end of this section. The pool to riffle ratio is 3:7. Bottom composition is 10% sand, 30% fine gravel, 50% medium gravel, 10% coarse gravel in the lower end of Section III; but 10% sand, 10% fine gravel, 20% medium gravel, 40% coarse gravel and 20% rock and rubble in the upper part of Section III. This bottom provides spawning habitat for king and chum salmon throughout the entire section. Water temperature in this section ranged from 11°C (51°F) to 13°C (55°F) and water chemistry data were: hardness 17 ppm, alkalinity 25 ppm and pH 7.5.

Three small mesh gill nets set overnight in small, shallow, side-slough areas of the Arolik River took six chum salmon, four Arctic char and one grayling. Round whitefish were observed. Thirty-three hours of hook and line angling throughout the entire section yielded 21 rainbow trout, 32 grayling, 6 lake trout, 2 Arctic char, and 3 chum salmon. Numerous small yearling and young-of-the-year char, chum, silver, red and king salmon were captured by dip net, but only a few young rainbow trout and grayling were observed.

Section III is the main spawning area for king and chum salmon, although red and silver salmon may also spawn here. Pink salmon were spawning only in the lower end of Section III. This section is probably used for spawning by rainbow trout, char, round whitefish and grayling.

The two large tributaries entering Section III are Keno and Faro creeks. Keno Creek is clear, about 20' wide and 4" deep with a velocity of approximately 3 fps and a bottom composed of fine and medium gravel. Chum salmon were found at the mouth of the creek but no grayling or rainbow trout were observed or captured. Water temperature was 9.5°C (49°F). Faro Creek was similar to Keno Creek except slightly larger with larger gravel.

The South Fork Arolik was surveyed on foot in the lower half mile. The South Fork is quite swift with a velocity of 4 fps. It is 60'-80' wide and the lower reaches have a bottom composed mainly of coarse gravel and rock. Two rainbow trout were captured near the mouth and grayling were captured further upstream. King and chum salmon were observed at the mouth of the South Fork and chum salmon were spawning 1/2 mile up the South Fork on July 11.

Section IV is comprised of the East Fork of the Arolik, a section approximately 19 miles in length. The lower 13 miles of the section had swiftly flowing water (more than 5 fps) and a bottom composed mainly of large rocks and rubble. The channel was relatively straight, 20'-30' wide, and lined with willows. Twenty-five chum salmon, six king salmon and four red salmon were observed in this section.

The upper 6 miles of Section IV contain very slow moving water in braided meandering channels with overhanging willows. Numerous spring areas contribute to the total flow in the upper section, as the flow at the outlet of Arolik Lake was only 19 cfs. The bottom composition is 40% silt and sand, 50% fine gravel and 10% medium gravel. The bottom is covered with a thick mat of algae, and often the water was so shallow that a raft could not be floated through. The channel was often less than 20' wide. Red salmon were observed in this section and would probably spawn here. Grayling and round whitefish were found 2 miles down from the lake outlet. Grayling and lake trout were taken on hook and line in this area. Numerous salmon fry were observed or captured in the slow moving water.

The Arolik River, in comparison with the Goodnews and Kanektok rivers, appeared to contain excellent habitat for rainbow trout and grayling but had a paucity of fish. Excellent holes and grassy banks, that on the Goodnews would have consistently yielded trout, contained no fish on the Arolik River.

In the Arolik River, 31 rainbow trout and 45 grayling were captured in 45 hours of effort; while in the Goodnews River, with only slightly more effort, 190 grayling and 156 rainbow trout were captured on hook and line. In the Arolik River, no rainbow trout were found on the East Fork; but in the Goodnews, rainbows were found within 2 miles of the lake. Arolik River grayling were all large with only four fish less than 400 mm (15 1/2") taken or observed.

Arolik Lake (Figure 13) is located at the head of the East Fork Arolik at 59°29' N and 161°06' W and is 440' above sea level. It is 2.3 miles long by 0.4 mile wide. The lake is oriented in a southeast to northwest

axis; and the outlet stream, the East Fork Arolik River, is in the extreme northwest corner of the lake. The lake is tightly ringed by mountains so the drainage is small. Four inlet streams, all less than 2 miles long, enter the lake. The inlet at the southern end of the lake disappears into the tundra, while the other three are rapid runoff streams with gravel bottoms but little fish habitat. The vegetation is alpine tundra with a few willows present near inlet and outlet streams. The lake drops off rapidly in the southern end, but the northern end has considerable shoal area. Total shoal area is about 10%. The outlet and lake shore have an abundance of fine gravel. The maximum depth recorded was 185' in the center of the south part of the lake and almost the entire southern half of the lake was over 100' deep. Water chemistry data on July 13, 1976 at the outlet were: total hardness 17 ppm, alkalinity 25 ppm and pH 7.5. Water temperature of the lake and outlet was 10.5°C (51°F). The Secchi disc reading was 30'.

The lake was surveyed both in 1975 and 1976, and in both years lake trout were abundant. A total of four net nights of fishing took 39 lake trout, 8 round whitefish and 1 red salmon. Two small mesh gill nets took one silver salmon smolt, one round whitefish and one dwarf Arctic char. The Arctic char, ready to spawn at 140 mm, was taken in a tiny channel off the inlet stream at the southern end of the lake. Two grayling and 59 lake trout were taken by hook and line during 12 hours of angling. The lake trout captured on hook and line were all small and seldom exceeded 2 lbs. There is little evidence of past sport fishing utilization. Most effort comes from local Bethel and Dillingham residents.

Goodnews River System:

The Goodnews River is the most southerly river in Kuskokwim Bay and forms part of the dividing line between Bristol Bay streams and the Arctic-Yukon-Kuskokwim region (Fig. 14). Its headwaters are in the Ahklun Mountains and it flows southeast approximately 60 miles to Goodnews Bay at 59°07' N and 161°35' W. The Middle Fork is a major tributary which parallels the mainstem Goodnews River for its entire length and joins it near the mouth. The South Fork enters in the same area. The Goodnews system has an area of 910 square miles and contains numerous lakes. It is a good producer of red salmon.

Three lakes of the mainstem Goodnews River and three lakes of the Middle Fork, as well as the Goodnews River itself were surveyed in July.

The *Goodnews River* was floated from Goodnews Lake to the mouth using a 12' rubber raft from July 18 to 21. The river is slow moving (less than 2 mph) as it leaves the lake, and the rocky bottom was heavily covered with algae. The current in the middle section of the river is faster but there are no areas that are dangerous to a raft or canoe. Except for a few isolated stands of cottonwood and narrow bands of willows along the waterways, the shore vegetation is tundra-like.

The river was divided into five sections.

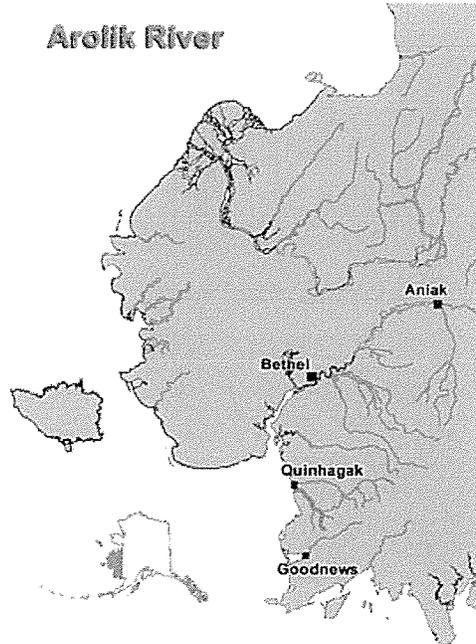
KUSKOKWIM MANAGEMENT AREA

Location: Kuskokwim Bay

Overview: A short duration float trip for the experienced or novice rafter, only 70 miles from Arolik Lake to the mouth in Kuskokwim Bay. The upper river has moderate current, but the river is shallow throughout its length. Downstream from the lake the channel is braided for a short duration and a single channel is present for the next 40 miles. The lower ten miles of the Arolik splits between two river mouths into Kuskokwim Bay. The lower 20 miles of the river has very few exposed banks and gravel bars for camping. Ownership of shorelands continues to be under dispute between state and federal land managers.

The Bureau of Land Management determined that portions of the Arolik River were non-navigable and conveyed the shorelands to the Quanirtuq, Inc. as part of their entitlement under the Alaska Native Claims Settlement Act (ANCSA). However, the State of Alaska received title to inland navigable waterbodies under the Alaska Statehood Act of 1958 and title to submerged lands under the U.S. Submerged Lands Act of 1953. The State of Alaska asserts that those shorelands that BLM conveyed to Quanirtuq Inc. were not in federal ownership and not under BLM authority to convey. The land ownership has not been resolved and most likely will be decided by the courts.

Understanding the current land status is essential to anyone wishing to float the Arolik River because if you are not camping below mean high water mark you will most likely be cited for trespassing by the local Native Corporation. The lower ten miles of Arolik is under tidal influence and the banks are comprised of tall grass. Campsites on State lands in the lower third of the river are very difficult to find. This makes the trip complicated and requires close coordination with your air charter service for pick up.



Watercraft: raft with a rowing frame is recommended.

Float Duration: 3-4 days from Arolik Lake to the mouth.

Attributes: Seasonally excellent angling opportunities for salmon and Dolly Varden, Arctic grayling, and rainbow trout. Check [fishing regulations](#) for restrictions.

Salmon Run Timing			
Salmon Species	Lower River	Mid and Upper River	Comments
Chinook (King)	Late June	July	
Chum (Dog)	July	Mid to late July	
Sockeye (Red)	July	Mid to late July	
Pink (Humpies)	Late July	August	Even Year Return
Coho (Silvers)	August	Mid August -September	

Access: Aircraft charter services are available from Bethel or Dillingham.

Land Managers: State of Alaska, Togiak National Wildlife Refuge and private ownership. See Bureau of Land Management for detailed map.

<http://www.sf.adfg.state.ak.us/Management/Areas.cfm/FA/kuskokwimFloat.goodnews>

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 Bethel, Alaska 99559
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An Alaskan Company
info@pbadventures.com
www.pbadventures.com

Arolik River Fishing Adventure																															
Drop Off:	By Float Plane on Arolik Lake.																														
Length:	Approximately 45 river miles.																														
Float Duration:	Recommended 5 to 7 Days.																														
River Description:	The Arolik River flows northwest from Arolik Lake through the Eek Mountains. The upper portion of the river is small and depending on the time of the year and current rainfall, can be fairly shallow. Rafters often find themselves having to get in and out of their rafts to walk them through the shallowest parts. After the first 10 miles, the river almost doubles in size and flow and this is where the fishing really turns on!!																														
Topo Maps:	We do not provide Maps. Maps may be purchased through the nearest U.S. Geological Survey office or by calling Toll Free (888)275-8747(From Alaska Only) or (907)786-7011. The following Map sheets are required for the Arolik River Float:																														
	Goodnews Bay B-6, C-7, C-8																														
Fishing Information:	The fishing begins each year in mid-June with the King Salmon run and culminates each year in mid-September with the Rainbow fishing reaching it's peak and the end of the Silver Salmon run. In addition to Rainbow and Salmon fishing, the Arolik Adventure also offers great Dolly Varden and Grayling fishing. The Arolik River is World Renowned for its World Class Rainbow Trout that lurk in the river.																														
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="4" style="text-align: center; padding: 5px;">Salmon Run Timing</th> </tr> <tr> <th style="width: 30%;">Salmon Species</th> <th style="width: 20%;">Lower River</th> <th style="width: 20%;">Mid and Upper River</th> <th style="width: 30%;">Comments</th> </tr> </thead> <tbody> <tr> <td>Chinook (King)</td> <td>Mid June</td> <td>July</td> <td></td> </tr> <tr> <td>Chum (Dog)</td> <td>Late June</td> <td>Mid to Late July</td> <td></td> </tr> <tr> <td>Sockeye (Red)</td> <td>Early July</td> <td>Mid to Late July</td> <td></td> </tr> <tr> <td>Pink (Humpy)</td> <td>Late July</td> <td>August</td> <td>Even Year Return</td> </tr> <tr> <td>Coho (Silver)</td> <td>Early August</td> <td>Mid August- September</td> <td></td> </tr> </tbody> </table>			Salmon Run Timing				Salmon Species	Lower River	Mid and Upper River	Comments	Chinook (King)	Mid June	July		Chum (Dog)	Late June	Mid to Late July		Sockeye (Red)	Early July	Mid to Late July		Pink (Humpy)	Late July	August	Even Year Return	Coho (Silver)	Early August	Mid August- September	
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Pickup:	Floaters are picked up near the mouth of the river by ground transportation and taken to the airstrip in the village of Quinhagak, Alaska. The floaters are then picked up by wheeled aircraft and flown back to Bethel.																														
Cost:	Round Trip Airfare - \$1200.00 per person. (This includes drop-off flight from Bethel to Arolik Lake and pickup flight from village of Quinhagak to Bethel) Ground Transportation from the Arolik River to the Airstrip in Quinhagak - \$65.00 per person																														
Notes:	<ol style="list-style-type: none"> 1. Rates are based on 2 Person Minimum. 2. Maximum allowable weight: 2-3 People = 1200lbs 4-6 People = 2400lbs 7-9 People = 3600lbs (Group weight= Weight of all people, gear, supplies and food) 3. Special Rates Available for Children under 16 depending on Group Size 4. Lodging in Bethel Available. 5. Boat fee paid directly to driver of vehicle in Quinhagak. 																														

Carl & Beverly Williams
P. O. Box 2073
Bethel, AK 99559
(907) 543-2958 - 593-6071
email: cwilliam@unicom-alaska.com
bwilliam@unicom-alaska.com

Dan,

Here is the survey, I hope you can read it. Grad school finished off what was already pretty poor penmanship.

To sum up in legible form:

The river is "navigable" for rafts and kayaks from as far up the main (South Fork) as I have been able to get in a float plane.

With people in Quinhagak buying more jet units, I am seeing more people further up the river than ever before. Even at moderate water flows, you can get a jet boat up the river well above the conjunction with the East Fork.

We are seeing more people from "outside" the area using this river as well as the Kisaralik, Aniak, Kanektok and Goodnews Rivers. Most of this use is coming "over the ridge" from Dillingham.

The South Mouth may (and I stress the word may) be navigable at high water, but from repeated flyovers, I can tell you that entire sections/stretches of that fork go completely dry in July and September even in "normal" years.

The increased levels of use are being reflected in dramatically reduced catch sizes and numbers for rainbows and grayling. I've never kept track of the Dolly Varden, since I've never actively sought them on the Arolik. To date, the salmon runs seem to be unaffected.

Let me know if there is anything else I can do to help.

Sincerely yours,



Carl L. Williams

STATE OF ALASKA

DEPARTMENT OF FISH AND GAME

TONY KNOWLES, GOVERNOR

ANILCA Program
333 Raspberry Road
Anchorage, AK 99518-1599
PHONE: (907) 267-2248
FAX: (907) 267-2472

October 10, 1996

REQUEST FOR ASSISTANCE FROM ALASKA RESIDENTS:

The Alaska Department of Fish and Game and the Alaska Department of Natural Resources are requesting help from the public and agency personnel in collecting information on specific rivers and streams throughout Alaska. While we have extensive knowledge of Alaska's water bodies, specific information is still needed on many of the state's 14 million acres of inland navigable lakes and rivers. In particular, we need information from individuals who have used these waters so we can catalogue historical and contemporary use, as well as hydrological characteristics. Any personal observations and concerns are also helpful and appreciated.

Attached is a questionnaire to be completed with any accurate details you can provide. Sign the form preferably witnessed by a notary or Post Office employee. The information you provide will help the Departments in addressing access, management, and ownership issues which are increasing throughout the state.

Return to: ANILCA/Nav Waters Project
Alaska Department of Fish and Game
333 Raspberry Road
Anchorage, AK 99518

Carl,

*Thanks for all the
info.*

WATERBODY USE AND OBSERVATION
QUESTIONNAIRE

DATE: 10-10-96

FULL NAME: Carl L. Williams

SIGNATURE: Carl L. Williams

AGENCY AND TITLE: YKAC - Director, Technology + Telecomm

CURRENT ADDRESS: P.O. Box 2073
Bethel, AK 99559

email = cwilliam@Unicom-alaska.com

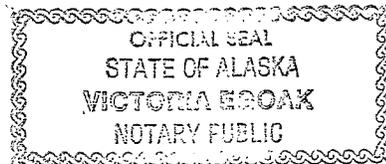
PHONE NUMBER: (907) 543-2958 (hm) 543 6071 (wk)

WATERBODY NAME: Arolik River

LOCATION: See Attached

U.S.G.S. QUAD: See Attached.

VICTORIA EGOAK Victoria Egoak
My Commission Expires: Nov. 1, 1997



I. CONTEMPORARY USE

A. What sections of the waterbody are you familiar with? Also, please identify on the enclosed map.

I have floated from Arolik Lake (East Fork) to the North Mouth 4/5 times.

I have landed on the South Fork in a float plane between the East Fork + first set of Sirenas from the left (Going up)

I have gone, by boat, from Quinhagak up to the AROLIK Gap

I have gone, by snow machine, from Quinhagak to fish the river from Bessie Creek to the first cabin

I have, at both high + low water, hiked from 1-3 miles

B. When have you used or observed others using the waterbody? Please include the following details:

Month(s) and year(s)

Type and size of watercraft

Type of propulsion

Amount of gear and people transported

Launch site

Travel distance upstream and/or downstream

Any obstructions causing portage and where

1989 - No use observed (Sept)

1990 - June/July 6 powerboat with 2-3 people + gear from Quinhagak scattered from the Gap down to the mouth (South Mouth)

1991 1 party of tourists seen @ Gap w Raft.

1992 Sept - 4 powerboats from Quinhagak
2 by the cabin (2 people each)
1 cutting wood @ creek mouth below the cabin
1 heading up 2 miles from the mouth w hunting

1993 - Didnt go

1994 - (6/7) 1 float party (2 rafts) at mouth 6 people

1995 (9) 1 party 2 rafts 6 people seen @ east fork
powerboat 2 people by cabin

(See next page)

1 Party 4 people in a raft from Fish & Wild
6 Boats (power) seen from the Bay down
In 9/1/96 "permanently" guide camps on river.

I. CONTEMPORARY USE (Continued)

C. Do you know of any other people using this waterbody but never observed their use? Please explain in detail.

Dr. Glenn Martin in June of 95
Bob Melling in 86 & 87 (Sept)
Jim Early - Date unknown

Half or better of the villagers use the area for fishing, berry picking, hunting & other subsistence activities. Use power boats & snow road for access. Wiland Church & Eddy Roberts both guide occasional clients on the river.

II. HYDROLOGICAL CHARACTERISTICS

A. Describe this waterbody as observed by you. Please include widths, depths, gradients, obstructions (artificial and natural) and seasonal water flows, i.e., lower dry periods, flood periods and freeze up periods.

High Water June + August July usually
Low. Floods occur @ Melt/Breakup + during
August/Sept Rains.

Seem to be 4 ecological zones/stream bed types

- 1) Upper River + last fork - Mostly Whitefish + Grayling
- 2) Upper middle River - Grayling + some Rainbow Trout
Fast water large gravel
- 3) Lower middle - shallow, flat water smaller gravel
few pools
- 4) Upper lower River - Pools rapids gravel smaller
still - best Rainbow fishing (size + NOS)
- 5) Lower River - Gravel to silt - Fewer Rainbows - Best

III. PERSONAL COMMENTS

A. Please explain why you believe that sections of the waterbody (are) (are not) capable of supporting water travel.

South with only occasionally suitable for travel
 East Fork - except at highest water requires
 dragging the raft/kayak + @ low water
 requires some portaging

South/Main Fork Navigable as far up as we
 could land a float plane

Frye up - a little before Kanebstop (~~March/April~~ ^{October/November})
 Bump up - a little after Kanebstop - March/April

B. Other comments.

Grayling #s dropped by 90% from 1989 to 1994
 we now average 1-2 Grayling per person per week
 compared to 80-120 grayling per person week (10-18 adu)

Rainbow #s dropped 45% from 95 to 96
 (From 20 per person per day to 10/11 per person per day)

Size drop observable from 1984 on -

Most Maribel from 95 to 96

95	4 fish 24 30+ inches (1 per day)	<u>1989</u> 3/4 Fish/Day 29-32"
----	----------------------------------	---------------------------------------

96 0 over 28 inches

95 0 fish under 16 inches

96 4/6 fish under 16 inches with
 12 under @ one foot.

On with (Kanebstop)
 needs protection

Waterbody Use and Observation Questionnaire

Return mailing:

Attn: ANILCA PROGRAM
Access/Navigable Waters Section
Alaska Department of Fish and Game
333 Raspberry Road
Anchorage, AK 99518

Date: Feb 16, 2007

Full Name of Interviewee: Mark D. Rutherford

Signature of Interviewee: _____

Current Address: PO Box 13569, Burton, WA. 98013

Phone Number: 206- 463-1456

Water body Name: Arolik River, South Fork and East Fork

U.S.G.S quadrangle map name known: Goodnews B-7 (South Fork) Goodnews C-8,
Goodnews C-7

**PLEASE ATTACH ADDITIONAL PAPER OR INFORMATION TO BEST
DESCRIBE YOUR EXPERIENCES**

- A. Please describe the waterbody. Please be as specific as possible and include widths, depths, gradients, obstructions (artificial and natural), and seasonal water flows, i.e., lower dry periods, flood periods, and freeze up periods.

South Fork Arolik from confluence with Crater creek to confluence of East Fork. Put in is located between Kisogle Mountain and Island Mountain at the mouth of Crater creek where it joins the south fork. Width varies from 20 feet wide to 100 feet. Depth varies from 6 inches to 3 feet. There are no obstructions. The entire river, both Forks are class I and class II.

The seasonal flow is characterized by high water in June and again high water from August through September when the fall Bering Sea storms arrive. I'm not sure when freeze up occurs. I have experienced only one flood which occurred in the second week of September, 2005 when the region received a major "pineapple express" storm. The river rose over the bank and all the flood channels were running. At flood stage it is not a pleasant river for rafting because the gravel bars for camps are submerged. However at flood stage local hunters from Quinhagak were able to ascend up by jet boat at least as far as the East Fork confluence with the South Fork.

B. Have you ever used the water body?

I use the South Fork once or twice per summer for weeklong guided fly-fishing float trips.

- 1) How long have you been using the waterbody, and how often? Include months and years. What sections of the waterbody are you most familiar with? Attach a map if necessary.

Mr. Richard Voss, manager of the Arctic National Wildlife Refuge and I first floated the East Fork (from Arolik Lake) in 2002. The dates were July 27 – August 2, 2002. I have been floating the South Fork Arolik since 2003 when I first floated it, also with Richard Voss. The dates were August 4 – 10, 2003.

Other dates of use which are documented in my logbooks:

July 11, 2004- July 19 2004

July 12, 2005- July 18, 2005

August 1- August 7, 2005

September 8- September 14, 2005

July 31- August 6, 2006

August 8 – August 14, 2006

- 2) What types of activities have you conducted on the waterbody? Example fishing, hunting, boating, transportation, and guiding.

The activities we are pursuing is guided fly-fishing, rafting, wildlife photography, and wilderness camping.

C. How do you access the water body?

To access the South Fork of the Arolik I use an air taxi service named Tikchik AirVentures out of Dillingham (907) 842-5841. The pilot, Rick Grant lands, in a pond near Crater Creek and we begin rafting at the confluence of Crater Creek and the South Fork. I have also used Tom Schlagel, of Bay Air to access the South Fork of the Arolik.

- 1) Where do you actually enter the water body?

See above: “at the confluence of Crater Creek and the South Fork.”

- 2) Where do you travel to?

We raft between Crater creek and the estuary over the course of 5-10 days.

3) Where do you take out at? List names of roads, trails, etc.

Take out is either a pick up by floatplane .5 miles east of the mouth of the Arolik (at Kuskokwim Bay) or to take out on the beach at the mouth and then arrange pick up from the village of Quinhagak.

Are there more access points that you are familiar with but have not used?

There is a take out .3 miles east of the estuary / beach on a dirt road connecting to Quinhagak. It is used daily by 2 jet boats operating for "Alaska West" which run day trips fro fly-fishermen up the Arolik.

4) If there are obstructions, is it possible to portage?

NA

D. What type of craft do you use when you are on the water body?.

Aire, Outcast, NRS, and Sotar rafts

1) What is the size of the craft used?

10-16 ft. inflatable rafts with inflatable floors.

2) What type of propulsion is used on the craft?

Oars

3) What is the weight of the craft?

XX- Less than 100 lbs XX- 100-400 lbs 400-800 800-1000+ lbs.

4) What is the estimated weight of the gear and people transported?

Less than 100 lbs. 100-400 lbs 400-800 800-1000+ lbs.

Almost exactly 120 lbs per raft which is 3 persons plus gear (1200# is the load a Dehavailand Beaver can carry to the put in pond.)

5)What is the largest size craft you have seen on this waterbody?

I see quite regularly various 18 foot outboard powered Jet boats with hunters from Quinhagak.

6) Based on your experience, what is the largest craft this water body could support?

18 foot outboard powered Jet boat. See above

E. Have you observed other people on the waterbody? In what types of crafts? What activities?

I see other people in watercraft on every trip. One always sees 1-2 jet boats per day on the lower river and when fall storms arrive in August caribou hunters run up the river in search of Caribou at least as far as the mouth of Keno creek where I have spoken with various Quinhagak hunters.

1) Do you know of anyone who is paid to take people out in a boat on the waterbody as a guide?

Just myself and the 2 guides per day which operate out of Alaska West's Camp and run upriver essentially everyday from July 1- August 30.

2) Do you know of anyone that has used this waterbody but not actually seen them on the water body?

I know dozens of people who have used the water body including USFWS researchers out of Togiak Wildlife Refuge, ADF&G researchers, several fly fishermen from Fairbanks float it every year etc...

F. Please list any other contacts that would provide first hand accounts of use on this water body.

Richard Voss, USFWS (907) 456-0253

Carl Lunderstadt, USFWS (907) 842- 1063

Rick Grant, Tikchik AirVentures (907) 842-5841

John Markoff, Reporter New York Times, (415) 288-5177

More by request from my list of guests/ clients

TOGIAK NATIONAL WILDLIFE REFUGE



PUBLIC USE MANAGEMENT PLAN **UPDATE**

November 1995

The Togiak National Wildlife Refuge (Refuge) Public Use Management Plan (Plan) states that every three to five years the Refuge staff should formally evaluate the Plan and determine if changes are needed. The Refuge staff is currently conducting a review and has already determined that some parts of the Plan should be revised. We are asking you to help determine the scope of revision by suggesting where changes should be made. The staff does not intend to prepare a new plan, only to make changes where needed. This planning update also provides information about the Plan and what has happened since it was completed.

Public Use Management Plan

The Public Use Management planning process began in January 1987 with mailings and workshops addressing issues, goals and objectives and developing options to address the issues. A draft Plan was released in April 1990 and the final Plan was released in February 1991. The Plan was a cooperative effort between the State of Alaska and the U.S. Fish and Wildlife Service. In addition to providing management direction for Refuge lands, a full chapter was devoted to management of State shorelands and waters.

A major focus of the Plan is management of guided sport fishing along rivers within the Refuge boundary. Special Use Permit allocations for sport fishing guides and establishment of a competitive system to select sport fishing guides are identified for most areas of the Refuge. Other issues addressed in the Plan include conflicts between subsistence, commercial and recreational users; knowledge of Refuge resources; the desire for consistency between State and Federal management; concerns about trespass, littering, water quality and levels of visitor use and the desire for local participation in sport fish guiding.

As identified in the Plan, sport fishing guides are competitively selected based on evaluations of their written proposals. An evaluation panel determines which applicants, in the judgment of the Fish and Wildlife Service, are best

qualified to provide services offered. Proposals are evaluated on criteria including, but not limited to, demonstrated ability and experience in this or related fields; demonstrated knowledge of the resources; description of services proposed; and history of compliance with related State and Federal laws and regulations.

The Plan divided the Refuge into 13 management units (see map, page 6). Nine of the units (Kulukak River, Negukthlik/Ungalikthluk River, Upper Togiak River, Three Rivers, Cape Peirce/Cape Newenham, Upper Kanektok River, Arolik River, Upper Goodnews River and Wilderness Lakes) are managed primarily by the Fish and Wildlife Service. The other four units (Igushik/Snake Rivers, Lower Togiak River, Lower Kanektok River and Lower Goodnews River) are managed primarily by the State of Alaska. Lands adjacent to the rivers are privately owned and the State of Alaska asserts jurisdiction on the waters and lands beneath the waters (shorelands).

The Plan allowed the existing level of guided sport fishing to continue on the Upper Goodnews River (Unit 12) through the 1995 season. Allocation of guided sport fishing use for the river was deferred until additional resource and use data could be acquired. The Plan also stated that when non-guided use approaches or exceeds the level of guided use, an analysis is to be conducted to determine if further regulation of non-guided use is needed. Since the Plan was completed, non-guided use has increased substantially and it has reached or exceeded the level of guided use on the Kanektok and Goodnews rivers. The Refuge staff has also gathered new data on Refuge public use and natural resources.

When Refuge staff began working on the Goodnews River allocation, it was determined that efforts should be deferred until a full review, and revision, if necessary, of the entire Plan was undertaken. All information gathered for the Goodnews River Environmental Assessment will be incorporated into this review. This review and subsequent revision will determine what changes should be made to the existing

Plan Review and Revision

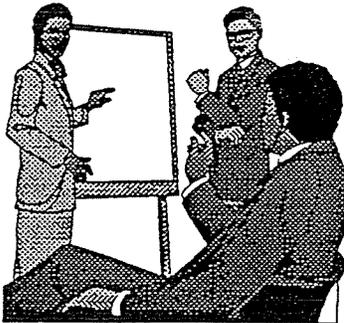
The Togiak National Wildlife Refuge Public Use Management Plan states that every three to five years the Refuge staff should formally evaluate the Plan and determine if changes are needed. The Plan was completed in February 1991.

The Plan has been amended four times. The amendments prepared to date were minor and required limited, or no environmental analysis. The proposed revision will be more extensive and will affect several sections of the Plan. A comprehensive environmental assessment will also be prepared along with the draft revision.

The purpose of this review is to determine what issues should be addressed and what revisions should be made to the Plan. At a minimum, sport fishing opportunities will be allocated in Unit 12 - Upper Goodnews River and the level of non-guided use refuge-wide will be addressed.

Public involvement is essential to making any changes to the Plan. Public comments, staff recommendations, local and State government recommendations, research results, and other relevant information will be reviewed and considered.

The following section identifies issues raised by Refuge staff, resource users, or others.



Issues

* Level of non-guided sport fishing use

There has been a substantial increase in the number of non-guided sport fishing groups on the Kanektok and Goodnews rivers since the Plan was completed. Concerns have been raised about crowding and potential for resource impacts from the number of people now visiting the rivers. The Plan states that long-term management will be directed toward an allocation of 50 percent guided and 50 percent non-guided use. When non-guided use approaches or exceeds the level of guided use, an analysis will be conducted to determine if further regulations of non-guided use are needed. Current data shows that non-guided use has reached or exceeded that of guided use on the Kanektok and Goodnews rivers.

If non-guided use limits are considered, they must be considered for all Refuge river systems or use would likely be displaced from one river to another, merely moving the problem, not solving it.

Concerns have been raised regarding illegal sport fish guiding. To conduct commercial operations within the Togiak Refuge a Special Use Permit is required. Investigations are underway and several people have been cited for illegal guiding.

* Guiding in areas not addressed in the Plan

Requests have been received to provide guided sport fishing services in areas that were not specifically identified in the Plan such as Pungokepuk Creek and Ongivinuck River. Competitive sport fish guiding permits have been issued for the Wilderness Lakes, Kulukak River, Upper Kanektok River, and Upper Togiak River. Prior to permitting new sport fish guiding opportunities, land ownership questions, access difficulties, concerns about fisheries resources, and demand for use will have to be addressed.

* Specific requests for change

There have been several requests to change specific parts of the Plan.

The following have been requested:

- Increase the number of visits per week that sport fishing guides are allowed on identified Wilderness Lakes. Currently permittees are allowed one visit per week per authorized lake.
- Authorize additional guiding on the Togiak River. Increase the number of guided motorboat trips to the Upper Togiak River from the lower river. Currently, access is limited to one boat with four people daily. Authorize guided fly-in day use for sport fishing in addition to the three fly-in motorboat use zones and one motorboat access permit.
- Increase the three-day camping limit on the lower Kanektok River. Currently camping on State shorelands without a permit is restricted to three consecutive days at one site.

* Expansion of the Cape Peirce Wildlife Viewing Area

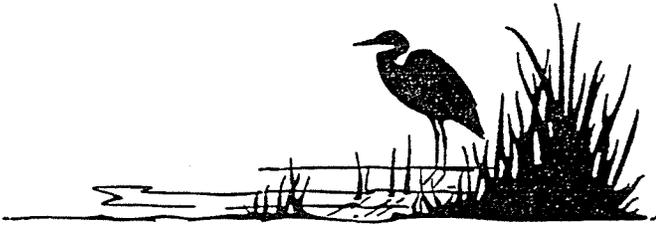
Refuge staff has recommended that the Cape Peirce Wildlife Viewing Area be expanded to include Sangor Lake. Use of this area as an access point and visitor camp location will minimize impacts to seabirds and marine mammals.

Unit	Management Emphasis	Guided Sport Fishing Management	Other Management
Unit 8 - Lower Kanektok River	State management-maintaining & ensuring access to public waters.	Short-term uses (e.g., camping, hiking & fishing) allowed; State permits required for activities that occur at 1 site for longer than 3 days; permanent camps, temporary base camps & lodges prohibited on State shorelands.	
Unit 9 - Upper Kanektok River	Maintaining subsistence opportunities, high quality recreational opportunities, wilderness values & wild fishery stocks.	<p>Float guides 1 start every other day, maximum of 12 people & 4 boats/group; scheduled in advance.</p> <p>2 temporary base camps for motorboat guiding, 24 people at one time; 6 boats maximum; boat capacity - 2 clients & 1 guide; generators, chain saws & other motorized equipment not allowed.</p>	June 15-September 15, camping within 1/4 mile of the river limited to 3 consecutive days at 1 place; after 3 days, camps must be moved a minimum of 1 mile; 1-night camping limit at Kagati Lake outlet. No other limits on non-guided use. River Rangers; annual public meeting held in village.
Unit 10 - Arolik River System	No unit-specific general management direction.	No sport fish guiding permits issued by U.S. Fish and Wildlife Service.	June 15-September 15, camping within 1/4 mile of the river limited to 3 consecutive days at 1 place; after 3 days, camps must be moved a minimum of 1 mile; camping limits do not apply to subsistence users. No other limits on non-guided use.
Unit 11 - Lower Goodnews River	State management-maintaining & ensuring access to public waters.	Short-term uses (e.g., camping, hiking & fishing) allowed; State permits required for activities that occur at 1 site for longer than 3 days; permanent camps, temporary base camps & lodges prohibited on State shorelands.	
Unit 12 - Upper Goodnews River	Maintaining subsistence opportunities, high quality recreational opportunities, wilderness values & wild fishery stocks.	No allocation made; established level of guided use to continue until allocation completed.	June 15-September 15, camping within 1/4 mile of the river limited to 3 consecutive days at 1 place; after 3 days, camps must be moved a minimum of 1 mile; camping limits do not apply to subsistence users. No other limits on non-guided use. River Rangers; annual meetings in village.
Unit 13A/13B Wilderness Lakes	Maintaining subsistence opportunities, high quality recreational opportunities, wilderness values & wild fishery stocks.	<p>Fly-in use authorized; maximum of 8 people/group; 1 visit per operator per lake a week; no landings if other groups on lake or shore except Togiak, Goodnews, & Kagati lakes; no fuel, equipment or boat storage.</p> <p>Izavieknik River float trips - 3 camping nights.</p>	June 15-September 15, camping within 1/4 mile of the lakes limited to 3 consecutive days at 1 place; after 3 days, camps must be moved a minimum of 1 mile; camping limits do not apply to subsistence users. No other limits on non-guided use.

Pending Lawsuits

Regarding management of navigable waters, two lawsuits, *Katie John vs. United States of America* and *Native Village of Quinhagak vs. United States of America* may have significant affects on Refuge management. Under "Katie John", the Federal government may take over management of subsistence fisheries in navigable waters within the Refuge. The plaintiffs in *Quinhagak vs. United States* have requested that the Togiak Public Use Management Plan be written with the navigable sections of the Kanektok and Goodnews rivers included as public lands.

Since the outcome and timing of decisions on these lawsuits are unknown, management of navigable waters within Togiak Refuge will remain under State jurisdiction.



What Comes Next?

Let us know if we have identified those areas where we should consider changing the Plan. Please provide your comments by December 20, 1995. For your convenience, you can reply on the back of this page which is pre-addressed. Comments received during the Goodnews River public review last year are on file and will be considered. Public meetings and dates will be announced.

The Fish and Wildlife Service will carefully review all comments received and will determine what parts of the Plan should be changed. A draft revised Plan and Environmental Assessment will be prepared and distributed for public review in the spring of 1996.

If you have any questions or wish to request additional information, please contact:

Refuge Manager
Togiak National Wildlife Refuge
P.O. Box 270
Dillingham, Alaska 99576

Phone: (907) 842-1063
Fax: (907) 842-5402

FROM:

Place
Stamp
Here

TO: Togiak National Wildlife Refuge
P.O. Box 270
Dillingham, Alaska 99576

staple here

WATERBODY USE AND OBSERVATION
QUESTIONNAIRE

DATE: 10-20-95

FULL NAME: Glenn Paul Martin

SIGNATURE: Glenn Martin

AGENCY AND TITLE: Dentist

CURRENT ADDRESS: P.O. Box 287 Unit 3085
Bethel, Alaska
99558

PHONE NUMBER: 907 543-6229

WATERBODY NAME: Arolik River

LOCATION: UK Delta

U.S.G.S. QUAD: _____

I. CONTEMPORARY USE

A. What sections of the waterbody are you familiar with? Also, please identify on the enclosed map.

I floated from Arolik Lake, the east fork to the north fork then motored to Quinhagak

B. When have you used or observed others using the waterbody? Please include the following details:

Month(s) and year(s)	6/95	7/95
Type and size of watercraft	18' Lund	Rafts
Type of propulsion	40 horse jet	
Amount of gear and people transported	2 Rafts	full of gear, #1200 lbs/4
Launch site	Arolik Lake	
Travel distance upstream and/or downstream	see	above
Any obstructions causing portage and where	NO	

I. CONTEMPORARY USE (Continued)

- C. Do you know of any other people using this waterbody but never observed their use? Please explain in detail.

I know of several people who have floated the entire length of the aralik and have observed the villagers from Quiahagak on the River

II. HYDROLOGICAL CHARACTERISTICS

- A. Describe this waterbody as observed by you. Please include widths, depths, gradients, obstructions (artificial and natural) and seasonal water flows, i.e., lower dry periods, flood periods and freeze up periods.

The water is low as the river leaves the lake during low snow or rain years.

III. PERSONAL COMMENTS

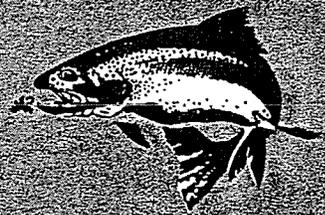
- A. Please explain why you believe that sections of the waterbody (are) (are not) capable of supporting water travel.

The Arolic is capable of supporting water travel. It supports travel every summer and has for years!

- B. Other comments.

I would float the river again.

The Alaska Angler®



"For those who want the very best in Alaska sportfishing"

Issue No. 55, Volume 9, Number 2, 1996

In This Issue:

The Twitch and Flutter Technique
Silver Salmon Where-to, How-to
The Dilemma with Catch and Release
North Slope Char: Part 2
Arolik River for Rainbows
Grayling, Sockeye, more

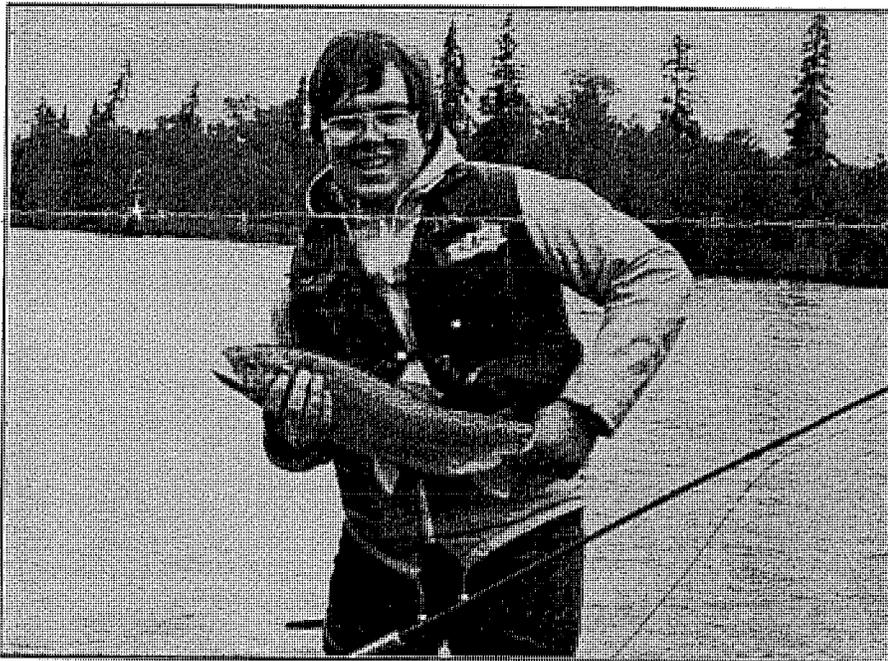
Dear Alaska Anglers:

During the last five years of Alaska fishing, I've noticed a strange yet identifiable behavioral trait welling up within me.

I'm not fishing with the same drive I had in years past. This lack of ambition has no ties to age or physical handicaps. I've slowed down because of what I have seen on the water and in the fish I catch and release. And herein lies the problem.

Catch and release is a great idea. In many waters, however, it is failing to perpetuate stocks of fish. In my underwater observations of sportfish, I've noticed anywhere from 30 to 80 percent of the fish observed to have minor to severe hook-induced injuries. Large fish I catch or observe almost always exhibit the most deformities. Unfortunately, many die from these injuries, which is one reason why fishing in Alaska waters isn't as good as it was 10 years ago.

Sure, you may argue that catch and release is better than someone bonking a trophy rainbow on the head when it was only a 14 or 18 incher. At least a few more people were able to enjoy that fish, you might reason. But what did these people actually enjoy? Were they fishing out of boredom, or were they out-of-staters who yanked the hook out of the fish's mouth, or allowed it to flop on the bank for minutes before kicking it back into the water? Just what did they get out of handling such a rare and precious resource as a 30-inch rainbow, 12-inch grayling or 18-inch char? Lifelong memories? If I were to venture a guess, most anglers forget the fish
(continued on page 7)



A late-summer rainbow taken from the Alanna area drainage.

Special Report

The Arolik: Underdog Rainbow Fishery of Bristol Bay

When anglers congregate around the fireplace and talk of premier rainbow streams, it's seldom the Arolik is mentioned. However, if you're looking for good rainbow and salmon fishing along with massive doses of wilderness, the Arolik is a stream to consider if you're willing to tolerate its inconveniences.

The Arolik River is located between the Goodnews and the Kanektok rivers. Draining a watershed of approximately 570 square miles, the river flows generally northwest for 70 miles, with the North Mouth emptying into Kuskokwim Bay. The main stem, the South Fork Arolik, has its headwaters at Tatlignagpeke Mountain, while the East Fork Arolik has its headwaters at Arolik Lake. The mouth is located five miles south of Quinhagak.

The Arolik has a gravel bottom and moderate current throughout most of its length. However, because of its shallow

depth, navigation with a jet or prop boat is difficult, if not impossible. This is walk/float/backpack. The exception is the lower few miles of river.

Air access is via landing strip near Snow Gulch, or landing on Arolik Lake and floating down the East Fork in an inflatable.

The Arolik is not as productive a fishery when compared to the Goodnews and the Kanektok rivers. It does, however, receive less angler pressure than the previously named rivers. In 1987, only 272 guided users were recorded, most of this in the lower river where one sportfish guide operates a motorboat camp. Because of the low water conditions in the upper 10 miles of river, anglers may have to portage their inflatables for several miles to reach deeper channels for floating. That's a lot of walking, but many anglers
(continued on page 8)

ng.

ure, compassion, pathos, emotion, feeling of oneness with the fish, environment ignite a spark that burns and brighter in some anglers than in others. Bolstered with this new vision, a few swim out of the turbulent sea of human frailties. They vow to protect the things that are beautiful, to sample them with minimal chance of harm, and to bring peace to the natural world, as well as to their own souls.

Without such a vision to guide us as we enter our 40s, 50s or 60s, we blind ourselves to the joys that underlie why we fish: to refresh the spirit, to touch the elusive yet attainable, to bring hope into our lives when world news and events scream hopelessness. We create our own Nirvana on the stream, a temporary escape from the purgatory of everyday life. Just as an evil man might not realize the hell he is living on earth because he is so caught up in his own self importance, so must we as anglers be diligent to avoid self-indulgent reasons for angling: for a skin mount, to brag about our angling skills to others, or to get caught up in the predatory mindset of catching fish after fish, for the sole purpose of possessing the physical, when it is the absolute abstracts of wildness, beauty, serenity and freedom that our souls crave. To ignore such warning signs is to proclaim mankind as Nature's biggest mistake. Indeed, most of the fish in this terrestrial Garden of Eden are dying at the negligent, unenlightened hands of man.

Yes, we can catch fish, and we can keep fish, but we must do it with respect. And if releasing fish is the goal, let us first look at our reasons for fishing, which will then guide us in our actions for the day. As anglers, we must continue to grow morally, ethically, and philosophically, or risk spiritual death. It is humbling for the egoist, yet heartening for the enlightened, to hear that we are created from the same elements as the fish we pursue. With heightened awareness, we realize that to injure a fish is to destroy a fragile and unique corporeal vessel that contains a power we can't fully comprehend. Some call it the universal spirit of life, the breath of God, the Tao. To sense its full power, we must journey into the mystical world, where no physical boundaries exist between fish and fisherman.

Once there, the angler discovers the greatest accomplishment in fishing is not in his skill nor in the size of the fish, but rather, in becoming one with the fish he pursues. This is the greatest fishing secret of all, the key to our salvation as anglers.

—Christopher Batin.

Special Report

(continued from page 1)

It's worth the effort. This is a float where you pack extremely light, with most of your gear fitting into a backpack, to lighten the inflatable, just in case. However, with heavy snowfall, and subsequent higher water levels

from snowmelt, this is looking to be a good year to float the Arolik.

In comparing catches on the Arolik with nearby streams, expect to catch from 1/3 to 1/2 of what you would normally catch on the Goodnews or Kanektok. Also, the East Fork has few rainbow trout. On the other hand, Arolik grayling average 16 inches.

Arolik Lake, located at 440 feet is roughly 2.3 miles long by .5 miles wide. The outlet stream is located in the far northwest corner of the lake. Around the lake you'll find several inlet streams, all less than two miles long. The southern end is the deepest, with over half being deeper than 100 feet. The maximum depth is roughly 185 feet. The northern end has considerable shoal area. The pH is 7.5, and water temperature hovers in the low 50s.

Lake trout are plentiful but seldom exceed two pounds. Dwarf populations of resident arctic char are present, but not plentiful. Grayling are not abundant. Herring patterns with gold tinsel and gold flash flies catch fish here. Grayling are fussy about dries. Green emergers seem to take the most fish.

Section 1

After it leaves Arolik Lake, expect the first 20 miles of the East Fork to be slow-moving water coursing through braided channels that meander through dense stands of overhanging willows. The bottom composition is roughly 40 percent silt and sand, 50 percent fine gravel and 10 percent medium gravel. Flow is roughly 15 to 19 cfs. The channel here is often less than 20 feet wide, and the bottom, especially in mid to late summer, is carpeted with dense algae, creating problems for floaters when water is low. About two miles down from the lake several pools are good for grayling and lake trout. Whitefish and red salmon are also interspersed throughout the area.

The remaining miles consist of swift-moving river flowing more than 5 fps. The bottom is mostly large rocks and rubble in a channel 20 to 33 feet wide. The vegetation is willow, with ample sedges. The area is a prime salmon spawning habitat.

Section 2

Section 2 is a major salmon spawning area, offering excellent fishing for all five species of Pacific salmon, rainbow trout, char, whitefish and grayling. It runs for about 24 miles from the East-Fork-South Fork Junction to the North-South Mouth Junction. Expect swift current flowing down a relatively straight channel. The bottom is clean gravel, with large gravel and rocks in the upper stretches. Water is also clear. Pools are scarce in the upper part of this section, and rainbow trout fishing is fair to poor.

However, approximately 2 to 3 miles south of the East and South Fork Junction, expect fair to good fishing conditions. Stream width is over 130 feet with an average depth of 15 inches. Water velocity is considerably slower here: The pool to riffle ratio is 3: 7. Rough estimates of bottom composition suggests 10 percent sand, 30 percent fine gravel, 50 per-

cent medium gravel, 10 percent coarse gravel. Readings indicate water temperature ranges from 51 to 55 F with a pH of 7.5.

Expect to catch king and chum salmon in season, and in the side sloughs, char and grayling. Rainbow trout and lake trout are also available throughout this section.

Section 3

In Section 3, the upper North Mouth of the Arolik, the current averages about 2 mph, with a bottom composition of roughly 20 percent sand and silt, 60 percent fine gravel, and 20 percent medium gravel. The streambed meanders haphazardly, and the pool to riffle ratio is 2: 3, excellent holding structure for rainbow trout. Submerged roots near undercut banks and channels, and overhanging willows provide additional cover. This stretch offers possibly the best rainbow trout fishing. Because of the shallow water, fish are often spooky, requiring light leaders and long casts. Grayling and char are also present in fair numbers. Salmon are plentiful. In early to mid July expect to see thousands of pink salmon in this section of river, along with chum and king salmon. Expect water temperatures in the low 50s.

Peach-colored egg patterns are especially effective here. Because of the low, clear water, it's common to see holding rainbows. An upstream cast and dead drift will reward the angler with a view of the interception. Rainbows here will often charge a dozen feet or more from their holding area to take a fly. Flies that resemble the benthic drift of the river are also effective.

Sculpins, salmon fry and eggs are the predominant fish remains in stomachs of rainbow trout. Tricoptera and Homoptera insects are predominant in catches, and fish are taken predominantly on patterns resembling these food items.

Although it handles about 30 percent of the water volume of the river, the South Mouth of the Arolik reportedly has minimal fish populations.

Section 4

Section 4, the lower 10 miles of the North Mouth is subject to tidal influence. It has a mud/sand bottom, slow current, and width of up to 200 feet. Tall grass line the bank. This area offers a good salmon fishery, but has few resident sportfish species.

The lower 1/3 of the river is the property of Qanirtuug Inc, and permission is required for camping or travel on these lands. The State of Alaska asserts that this river is navigable, and therefore subject to state management.

For more information, contact U.S. Fish and Wildlife Service, Togiak National Wildlife Refuge, P.O. Box 270, Dillingham, Alaska 99576.

The Arolik is divided into four regions, each with its own fishery and water conditions. This float is not for the novice, and experienced floaters/anglers should be prepared for stretches of low water, especially late in the summer, which could impede progress.

Togiak

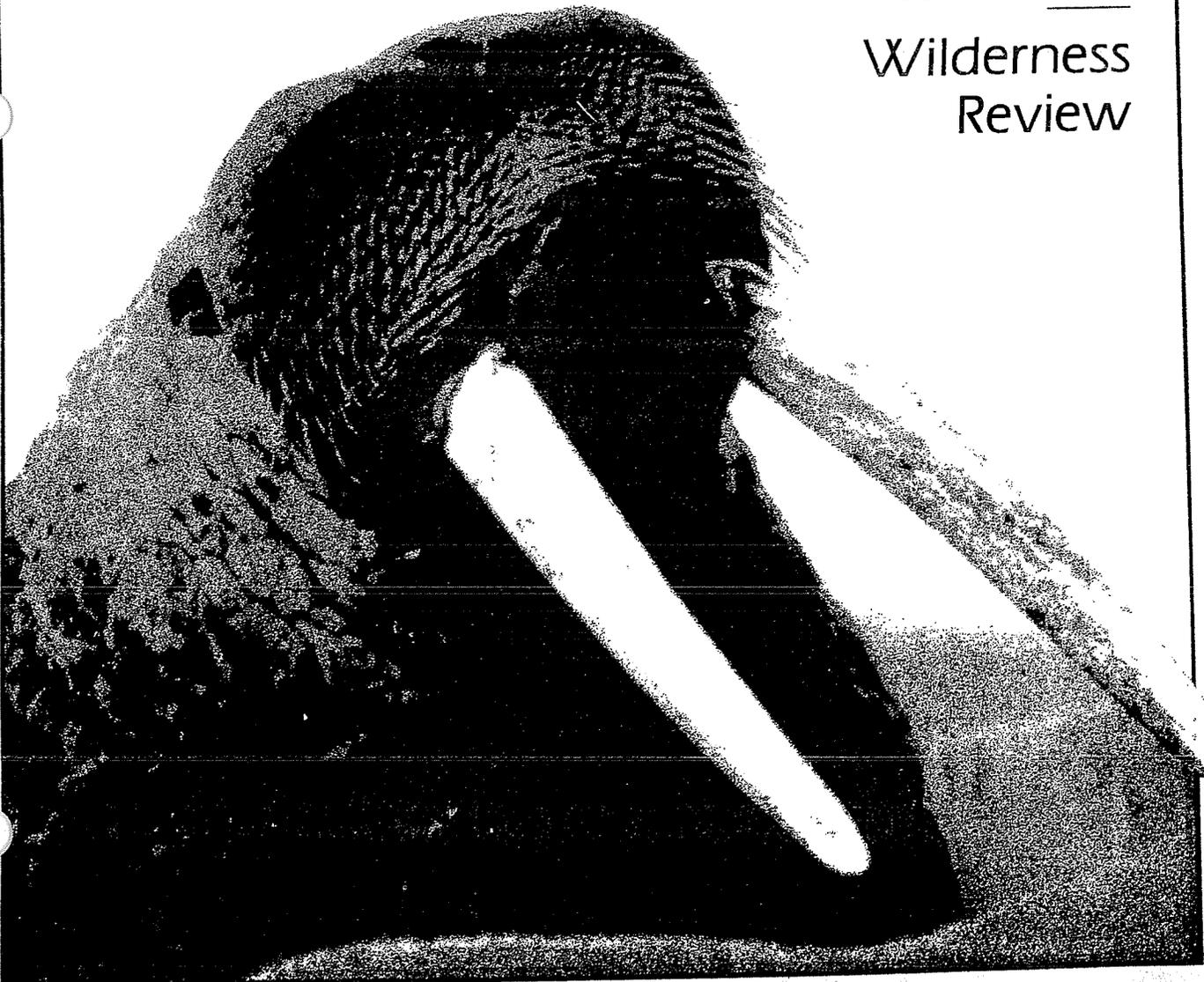
National Wildlife Refuge

FINAL

Comprehensive
Conservation
Plan

Environmental
Impact
Statement

Wilderness
Review





United States Department of the Interior

FISH AND WILDLIFE SERVICE
1011 E. TUDOR RD.
ANCHORAGE, ALASKA 99503

IN REPLY REFER TO:

DES 85-27

JUN 2 1986

Dear Reader:

Enclosed for your review and comment is the Final Comprehensive Conservation Plan/Environmental Impact Statement (CCP/EIS) and Wilderness Review for Togiak National Wildlife Refuge, Alaska. This CCP/EIS has been prepared pursuant to Sections 304(g)(5) and 1317 of the Alaska National Interest Lands Conservation Act of 1980 (ANILCA), Section 3(d) of the Wilderness Act of 1964, and Section 102(2)(c) of the National Environmental Policy Act (NEPA) of 1969. The final CCP/EIS includes five alternative strategies for long-term management of the Togiak National Wildlife Refuge.

When producing long-term management plans for the Nation's national wildlife refuges, the U.S. Fish and Wildlife Service actively seeks comments from the general public on the development of management alternatives and on the choice of a preferred management strategy. The management of national wildlife refuges in Alaska must conform to the legal and administrative requirements that are listed in the first section of this document. Those that have a direct impact on the development of the long-range plan and on the choice of the preferred management alternative are discussed below.

According to the National Wildlife Refuge System Administration Act and Section 304(b) of ANILCA, no use of a national wildlife refuge will be permitted unless it is first determined to be compatible with the purposes for which the refuge was established. Section 304(g) of ANILCA requires the preparation of a comprehensive conservation plan (CCP) such as this for each unit of the National Wildlife Refuge System (NWRS) established or enlarged by the Act. The CCP designates areas within the refuge according to their resources and values, outlines programs for conserving fish and wildlife resource values, and specifies uses within each area that may be compatible with the major purposes of the refuge. In addition, the plan discusses opportunities that will be made available for fish and wildlife oriented recreation, ecological research, environmental education and interpretation, and economic use of refuge lands. Comments received on the range of management alternatives and permitted activities presented in this plan will be taken into account during the development of a final plan.

In addition to presenting the Service's long-range management strategies for Togiak Refuge, the CCP evaluates the effect of the proposed management alternatives on subsistence uses and needs, as required by section 810 of ANILCA. The law requires the Service to give adequate notice and hold public hearings before implementing any part of the plan determined to have an effect on subsistence. The public hearings held in conjunction with the development

VII. ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

The purpose of this section is to identify, describe, and compare the biological and socioeconomic impacts that would result from implementing each of the management alternatives. Each alternative contains many broad management directions. To provide a basis for assessing the alternatives, descriptions of likely developments and events in the refuge were prepared. These scenarios focus on probable public (recreational) use on the Kanektok, Goodnews and Togiak rivers in the wilderness area, and oil and gas activities. None of the other permitted uses and activities are expected to result in significant impacts. In all of the scenarios it is assumed that reasonable management practices and the best available technology will be applied.

A scenario was developed for each alternative. The public use segment of each scenario is based on the management directions for that alternative and on information supplied by the refuge manager, ADF&G, local residents, guides, and air taxi operators. Recreational use levels were estimated for the Kanektok, Goodnews (the three forks), and Togiak rivers in 1990 based on use estimates in Tables 12-14. The assessment focuses on the impacts of these recreational use levels on the rivers in the wilderness area. It must be stressed that the use estimates are based on limited available data, and are not intended to indicate precisely the level of recreational use in 1990.

The oil and gas segments of each scenario are based on the management directions in the refuge alternatives and information in the Bristol Bay Regional Management Plan. The reader should refer to the Bristol Bay Regional Management Plan for information on the effects of regional development, including cumulative impacts, resulting from private, local, state, and federal actions.

The reader should understand that neither the Service's selection of a preferred alternative nor the adoption of a plan necessarily means that all of the specific developments and use levels outlined in the scenarios, including timing and locations, would happen exactly as described. The scenarios are sets of reasonable assumptions and estimates that provide a basis for assessing each alternative. In the future more detailed site-specific environmental assessments and environmental impact statements will assess proposed oil and gas projects in the refuge.

Definitions

Because of the general nature of the assessment and the lack of numerical and statistical information regarding refuge resources, impacts are often expressed in relative terms. The meanings of these terms are as follows:

Tables 24-26 show the different alternative sport fishing levels in 1990 for the Kanektok, Goodnews and Togiak rivers. Recreational use on each of the three rivers in the refuge would increase in Alternative A from the 1984 level due to the increase in unguided users. A total of 5,360 nonlocal people would visit the three rivers. The Kanektok River would receive the heaviest use.

On the Kanektok River guided float trips would account for the largest proportion of use, followed by unguided fly-in trips, unguided float trips and guided motorboat trips. Unguided float and motorboat groups would significantly increase over the next six years. The scenario assumes, however, that with the reduction in catch limits there would be a decline in the number of unguided fly-in groups from the 1984 level. It is estimated that:

- o A total of 745 groups (or 2,670) people would use the river in 1990, of which 95 of the groups (670 people) would be guided and 650 groups (2,000 people) would be unguided; in other words, an average of about 8 groups would come to the river every day during the season. This includes day users, floaters, and motorboat users.
- o There would be 90 groups (520 people) that float down the river, of which 40 groups (320 people) would be guided; this mean an average of one float group would begin floating the river every day during the 90-day season of use.
- o A total of 530 groups (1,650 people) would fly to the river and fish for several days on the river; 30 of these groups (150 people) would be guided.
- o A total of 125 groups (500 people) would use 21 motorboats on the river for recreational purposes, of which 25 groups (12 motorboats) would be guided. (This does not include motorboats used by local residents for subsistence purposes.)
- o Five temporary guide camps would be permitted along the river in the refuge, the same as in 1984.

Guided motorboat and float trips, and unguided float trips would account for the largest proportion of use on the three forks of the Goodnews River. Use levels and facilities would be as follows in 1990:

- o A total of 150 groups (or 660 people) would use the river for recreational purposes, of which 45 groups (315 people) would be guided and 105 groups (345 people) would be unguided; in other words, an average of almost two groups would come to the river each day during the season of use.
- o Forty-five groups (240 people) would float the river, of which 15 groups (120 people) would be guided; this means that an average of one group would begin floating the river about every two days. (Guided float use was increased over 1984 levels, unlike other guided groups, because of the low level of use that year.)
- o A total of 55 groups (195 people) would fly to the river and fish in the area for several days; 15 of these groups (75 people) would be guided;

Table 24. Projected sport fishing levels for the Kanektok River, 1990.

Alter- native	Activity	GUIDED				UNGUIDED				TOTAL				
		Number Groups	Number Per Group	Total Number People	Number days/ visit	Total Number of days	Number Groups	Number Per Group	Total Number People	Number days/ visit	Total Number Days	Number Groups	Number People	Number Visitor Days
A	1 Floaters	40	8	320	7	2,240	50	4	200	7	1,400	90	520	3,640
	2 Fly-in	30	5	150	6	900	500	3	1,500	1	1,500	530	1,650	2,400
	3 Motorboats	25	8	200	7	1,400	100	3	300	1	300	125	500	1,700
	4 Total	95		670		4,540	650		2,000		3,200	745	2,670	7,740
B	1 Floaters	10	8	80	7	560	10	4	40	7	280	20	120	840
	2 Fly-in	5	5	25	6	150	30	3	90	1	90	35	115	240
	3 Motorboats	10	8	80	7	560	5	3	15	1	15	15	95	495
	4 Total	25		185		1,270	45		145		385	70	330	1,575
C	1 Floaters	40	8	320	7	2,240	50	4	200	7	1,400	90	520	3,640
	2 Fly-in	30	5	150	6	900	500	3	1,500	1	1,500	530	1,650	2,400
	3 Motorboats	20	8	160	7	1,120	100	3	300	1	300	120	460	1,420
	4 Total	90		630		4,260	650		2,000		3,200	740	2,630	7,460
CM	1 Floaters						30	4	120	7	840	70	440	3,080
	2 Fly-in						150	3	450	1	450	180	600	1,350
	3 Motorboats						5	3	15	1	15	30	215	1,415
	4 Total						185		585		1,305	280	1,255	5,845
E	1 Floaters	70	8	560	7	3,920	50	4	200	7	1,400	120	760	5,320
	2 Fly-in	50	5	250	6	1,500	500	3	1,500	1	1,500	550	1,750	3,000
	3 Motorboats	45	8	360	7	2,520	100	3	300	1	300	145	860	4,220
	4 Total	165		1,170		9,340	650		2,000		3,200	815	3,370	12,540

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Togiak Refuge Bulletin
U.S. Fish & Wildlife Service
P.O. Box 270
Dillingham, AK 99576

Togiak National Wildlife Refuge

Planning Update



November, 1988

In this issue:

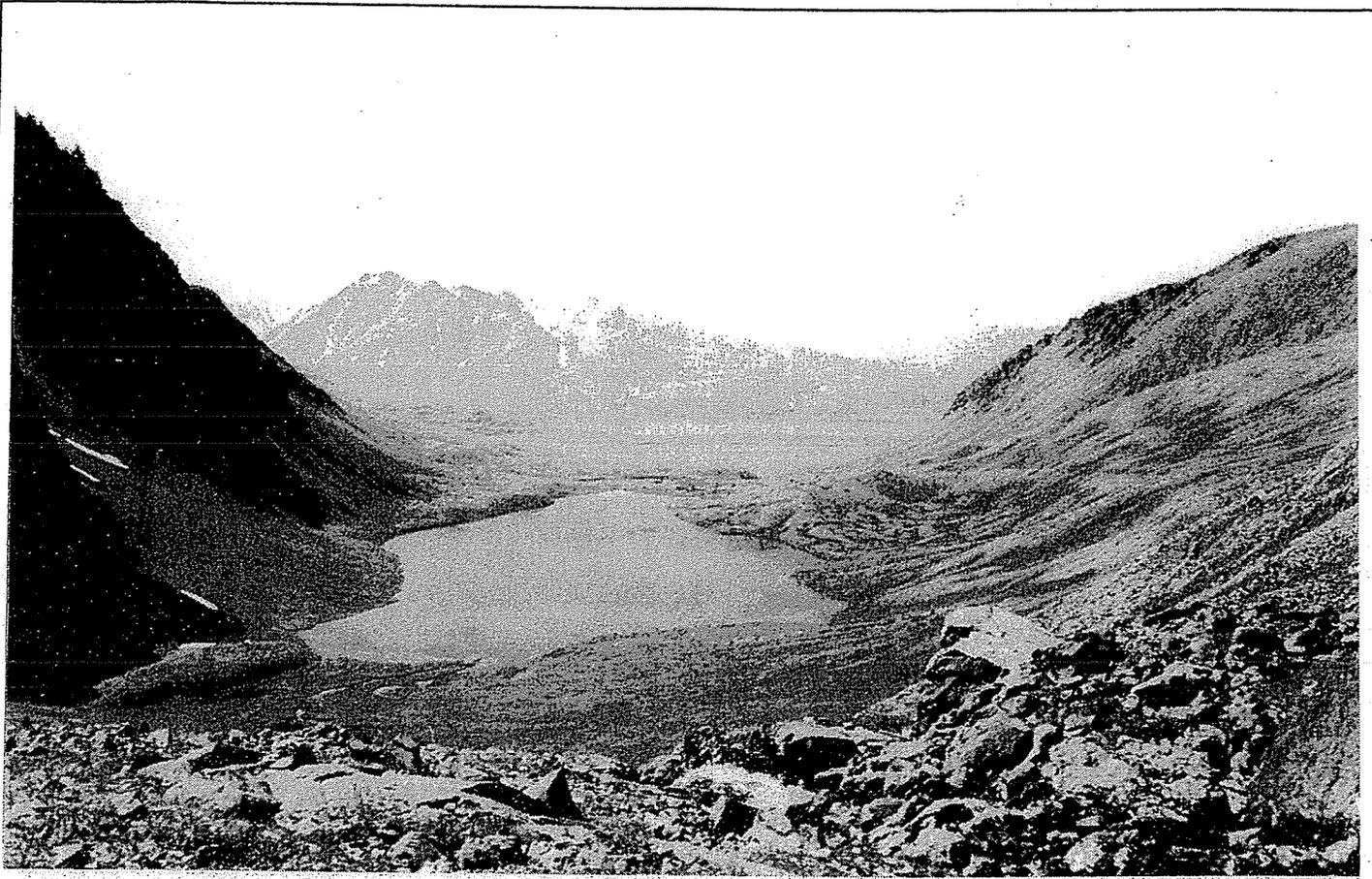
- ▶ How you can participate in planning for public use in the Togiak Refuge;
- ▶ Major issues and concerns facing future management of the refuge;
- ▶ Roles and responsibilities of resource management agencies within Togiak Refuge.

Togiak National Wildlife Refuge Public Use Management Plan

Planning Update



November, 1988



Kagati Lake

This bulletin is the first in a series of steps to provide opportunities for the public to become involved in the preparation of a public use management for Togiak National Wildlife Refuge. **The Alaska Department of Natural Resources and the U.S. Fish and Wildlife Service (Service) will jointly conduct the public involvement effort for this plan.**

During the past year several complex legal questions that relate to the planning effort have been addressed, mostly relating to management jurisdictions. **As a result, it has become clear that successful management of refuge resources and programs will depend on agreement of management objectives among the U.S. Fish and Wildlife Service, the Alaska Department of Natural Resource, the Alaska Department of Fish and Game, local Native village corporations, refuge user groups, and other interested parties.**

The purpose of this first update is to briefly describe

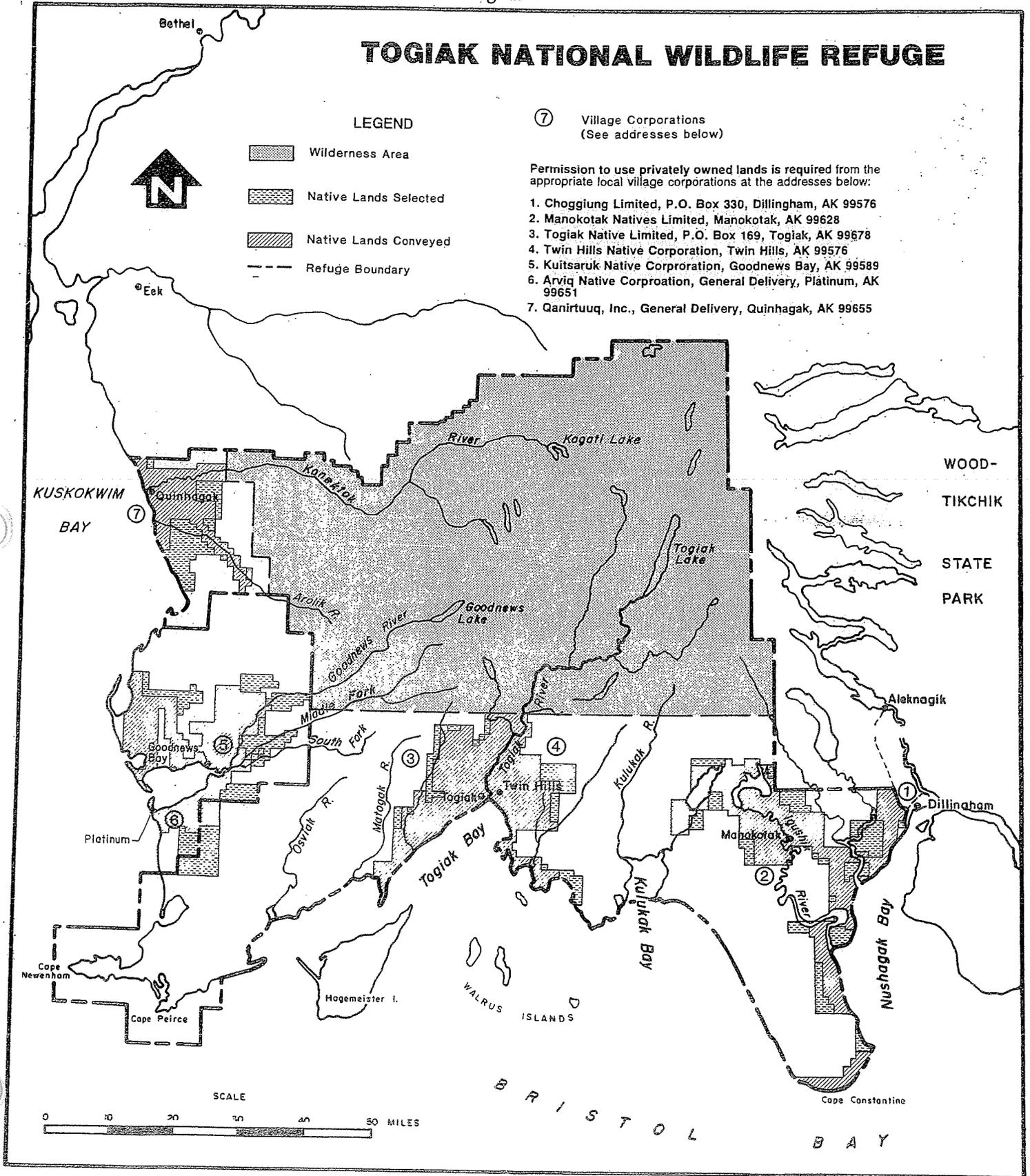
the planning effort and ways in which the public can participate. In addition, this bulletin is intended to provide information of refuge programs.

This is your opportunity to become actively involved in the process. Any ideas, concerns or suggestions that you may have are valuable for the successful completion of this project. We would like to hear from you.

Managing Public Use in the Togiak National Wildlife Refuge —

Between 1981 and 1984, resource managers noticed an accelerating trend in sport fishing on the Togiak Refuge; recreational use during that period is estimated to have increased from about 3,000 use days a year to more than 12,000 use days a year. As a result of this rapid change, refuge users became increasingly concerned over potential impacts to established subsistence activities, sport-fishing opportunities and wilderness values.

In 1984 the Fish and Wildlife Service placed a moratorium on the issuance of any new permits to conduct commercial sport fish guiding activities in the Togiak Refuge. The moratorium was to remain in place until the issues and concerns could be addressed through a planning process. With the approval of the Togiak Comprehensive Plan in 1987, the decision was made to prepare a public use management plan for the refuge. In preparing this plan, the Service would increase efforts to collect public use data on refuge rivers and provide opportunities for the public to determine how the refuge rivers should be managed.



Alaska's Wildlife Refuges

Alaska's 16 national wildlife refuges range in size from Izembek, the smallest at 321,000 acres, to the Yukon Delta Refuge at 19.6 million acres. The Yukon Delta Refuge is larger than Rhode Island, Connecticut, Delaware, New Jersey, Massachusetts and Hawaii combined.

Three interior refuges straddle the Arctic Circle. Salmon run up rivers on most refuges. In fact, salmon from the Bering Sea ascend the Yukon River to spawn in the freshwater streams of their birth of the Yukon Flats Refuge — the longest salmon run in the U.S.

Kenai and Tetlin refuges are the only refuges accessi-

ble by road year-round. Kenai, first established to protect moose, is well known for its two canoe routes and scenery. Several refuges have designated wilderness areas while others contain wild rivers. Alaska's 16 refuges make up 88 per cent of the acreage of all national wildlife refuges.

Each refuge is an important component of the U.S. National Wildlife Refuge system. Animals, for the most part, remain in Alaska (except for caribou which range into Canada). However, waterfowl and other migratory birds fly between Alaska and other states and countries. Salmon are another resource shared across international boundaries.

The National Wildlife Refuge System

National Wildlife Refuges are established to provide, preserve, restore, and manage a national network of lands and waters to meet society's needs for areas where the widest possible spectrum of benefits associated with wildlife and wildlands is enhanced and made available.

The U.S. Fish and Wildlife Service is steward of over 400 refuges across the country. The refuge system, a collection of lands and waters, began in 1903 when President Theodore Roosevelt established the tiny Florida refuge called Pelican Island. Refuges provide aquatic, coastal, woodland, desert, tundra and mountain habitats

on more than 88 million acres for our nation's wildlife.

The work of the U.S. Fish and Wildlife Service encompasses all phases of fish and wildlife management at the federal level. The Service conducts extensive research and management programs to preserve and perpetuate birds, animals and fish in cooperation with the states and other nations of the world.

A refuge protects habitats and wildlife. Because of refuges, a Canada goose nestling on the Yukon Delta Refuge is assured of winter food and shelter on refuges in Oregon and northern California.



What the plan will do?

The plan will identify how different sections of rivers in the Togiak Refuge should be managed. The preparation of the plan will be guided by several major goals. Based on public comment, these goals may change or be modified:

- Provide for continued opportunities for subsistence and recreational use of refuge resources.
- Provide for a range of high quality recreational opportunities, including wilderness areas that emphasize naturalness, solitude and primitive recreation, and areas that may not have wilderness qualities as a key feature of the recreational experience.
- Maintain wild fishery stocks in their naturally occurring species diversity, abundance and age class composition.
- Ensure public access to navigable or public waters of the state.

The plan will identify specific goals and objectives for how each section of river should be managed. Specific guidelines for accomplishing these goals will then be developed through the planning process. Developing these will take extensive discussion of the types of management tools available to each agency. In some cases, the U.S. Fish and Wildlife Service, Department of Natural Resources or the Department of Fish and Game may lack authority to meet a management goal without changes in legislation or regulations.

If you have any questions or comments on the planning process or the public involvement schedule, please contact Pete Jerome or Rob Walkinshaw at the addresses below:

Pete Jerome
U.S. Fish and Wildlife Service
Togiak National Wildlife Refuge
P.O. Box 270
Dillingham, Alaska 99576
(907) 842-1063

Rob Walkinshaw
Department of Natural Resources
P.O. Box 107005
Anchorage, Alaska 99510-7005
(907) 762-2660



Togiak Refuge volunteers

The Togiak National Wildlife Refuge — An Overview

National wildlife refuges are established to provide, preserve, restore, and manage a national network of lands and waters sufficient in size, diversity and location to meet society's needs for areas where the widest possible spectrum of benefits associated with wildlife and wildlands is enhanced and made available. One special refuge in Alaska is the Togiak National Wildlife Refuge.

Established in 1980 by Congress, the purposes of the refuge are to protect the diverse fish and wildlife resources, provide for subsistence use by local residents, and protect the quality of clear flowing streams, rivers, and lakes. It encompasses about 4.2 million acres of land; 2.3 million of which has been Congressionally designated as a National Wilderness Area. In area, the refuge is equivalent in size to the states of Connecticut and Rhode Island.

The Togiak Refuge includes coastal areas in Bristol Bay and the Kuskokwim Bay. Mountainous upland areas that

define the watersheds for several major river systems characterize the refuge landscape. The diversity and abundance of the fishery resources on the Togiak Refuge make this area unique. All five species of Pacific salmon spawn in refuge waters. Resident fish populations of rainbow trout, dolly varden/arctic char, arctic grayling, lake trout, and northern pike occur in lakes and rivers throughout the refuge.

These important fishery resources support local, regional, and state wide economies. Subsistence, commercial, and sport fisheries contribute to these economies. More than 2,000 people in the villages of Manokotak, Togiak, Twin Hills, Quinhagak, and Goodnews Bay are directly dependent on the future health and viability of refuge resources. In addition, unsurpassed sport fish angling opportunities in a natural wilderness setting has created a major industry of national and international importance.

What lands and resources are affected by the plan?

Land ownership patterns and management authorities within the refuge are complicated. Outlined below are the categories of land in the refuge and the agencies or groups responsible for management of each category.

Uplands and non-navigable waters

The Service manages federal lands within the refuge. In most cases, this includes the uplands and non-navigable waters both within and outside the designated wilderness area. When Congress created Togiak refuge, it identified the purposes for which the refuge was created. Congress directed USFWS to manage the refuge to protect the diverse fish and wildlife resources, provide for subsistence use by local residents and protect the quality of clear flowing streams, rivers and lakes.

Shorelands, tidelands, submerged lands and watercolumns

The state of Alaska owns the lands under many of the rivers in the refuge and all tidal areas adjacent to the refuge. The Submerged Lands Act of 1953 and the Alaska Statehood Act of 1958 and the state constitution provide for state ownership of shorelands (the beds of navigable rivers), tidelands (lands subject to tidal influence) and submerged lands (lands seaward to 3 miles from shore). Shorelands, tidelands and submerged lands adjacent to or within Native Corporation lands are also state owned and subject to state management.

Determinations of what waters are navigable and therefore in state ownership is an ongoing process in Alaska at both the administrative and judicial levels. The state is currently identifying the rivers within the refuge that it believes are navigable.

In addition to the shorelands, tidelands and submerged lands, the state owns all watercolumns within the refuge, regardless of whether the waterbody is navigable or not. The watercolumn is the actual water that is in a lake or river. This ownership is provided the Acts identified above and the state constitution. Along with the Department of Natural Resources, the USFWS also may have certain authorities to manage watercolumns within the refuge. The Service's authority to regulate certain uses on watercolumns to protect refuge lands and for conservation purposes stem from the two provisions of the U.S. constitution (the property clause and the commerce clause). These laws provide for watercolumn management by both the Service and the state. The purposes to which state waters should be managed is stated in Article VII Section 14 of the Alaska State Constitution, which states:

Free access to the navigable or public waters of the state...shall not be denied any citizen of the United States

or resident of the state, except that the legislature may by general law regulate and limit such access for other beneficial use of public purposes.

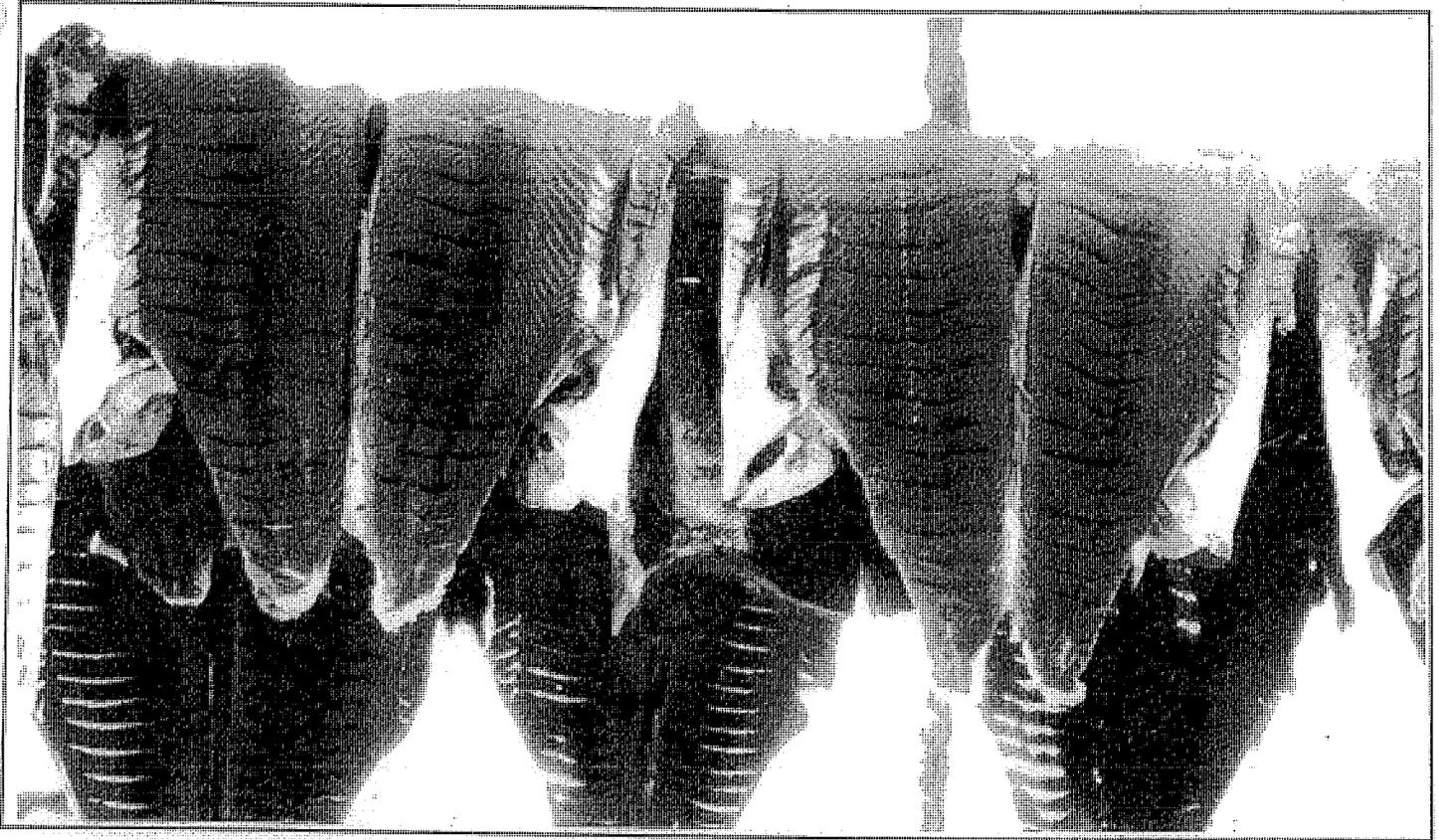
Regardless of the detailed legal authorities that each agency asserts that it has over shorelands, tidelands, submerged lands and watercolumns, **the USFWS and the State have agreed to work cooperatively to ensure that existing and future activities occurring on these lands and waters are compatible with the purposes for which the refuge was established, and the purposes for which the state was given ownership of tidelands, submerged lands, shorelands and watercolumns.**

Native Village Corporations

Local native village corporations own or manage lands that have been conveyed under ANSCA. These include land selections by nine different village groups and total more than 480,000 acres. Additionally about 420 native allotment applications have been filed, of which some 33,000 acres have been patented or approved. The state owns many of the shorelands adjacent to these Native lands. How the state manages these lands will also be addressed in the planning process.



Spawning sockeye salmon



Continued subsistence use is a purpose of the Togiak National Wildlife Refuge

Preparing the Public Use Management Plan —

Between January and April, 1987 workshops were held throughout the refuge to identify specific issues and concerns relating to public use. The following major issues were identified:

- * Increasing conflicts between recreational and subsistence users
- * Increasing conflicts between motorized and non-motorized recreation use
- * Increasing impacts to wilderness values (naturalness, solitude)
- * Loss of high quality sport fishing opportunities
- * Increasing litter and trespass on private lands
- * Lack of consistent management objectives between various land managers and landowners

By early 1988, State and Service resource management agencies began working to resolve conflicts between user groups on several rivers. The U.S. Fish and Wildlife Service; the Alaska Governor's Office, Division of Government Coordination; the Alaska Department of Natural Resources; and the Alaska Department of Fish and Game

met several times to discuss land use and resource problems on the Togiak, Kanektok, and Goodnews Rivers. As a result of these meetings, a public involvement strategy was developed to help complete the public use management plan.

How Can You Be Involved?

The Alaska Department of Natural Resources and the U.S. Fish and Wildlife Service will be conducting a public involvement effort. Many of the issues being addressed in the plan will involve resolving conflicts between various user groups, it will be very important that all interested agencies, groups, and individuals participate (we will provide opportunities). The following schedule will guide the process:

This introductory newsletter provides interested agencies, groups and individuals an opportunity to learn about and comment on the planning approach and public involvement process.

Public Involvement, cont'd. —

A **workbook** will be prepared that describes the existing management situation and possible management alternatives. It will provide interested agencies, groups, and individuals the opportunities to participate in the development of draft plan recommendations. (**December 1 - February 15, 1989**).

Workshops will be held in Togiak, Quinhagak, Goodnews Bay, Dillingham and Anchorage. The workshops will last several days in each location.

A **newsletter** summarizing the results of the workbook/workshop process will be distributed to interested agencies, groups, and individuals. (**March 15, 1989**).

Develop draft plan and interim policy for 1989 field season. (**April, 1989**).

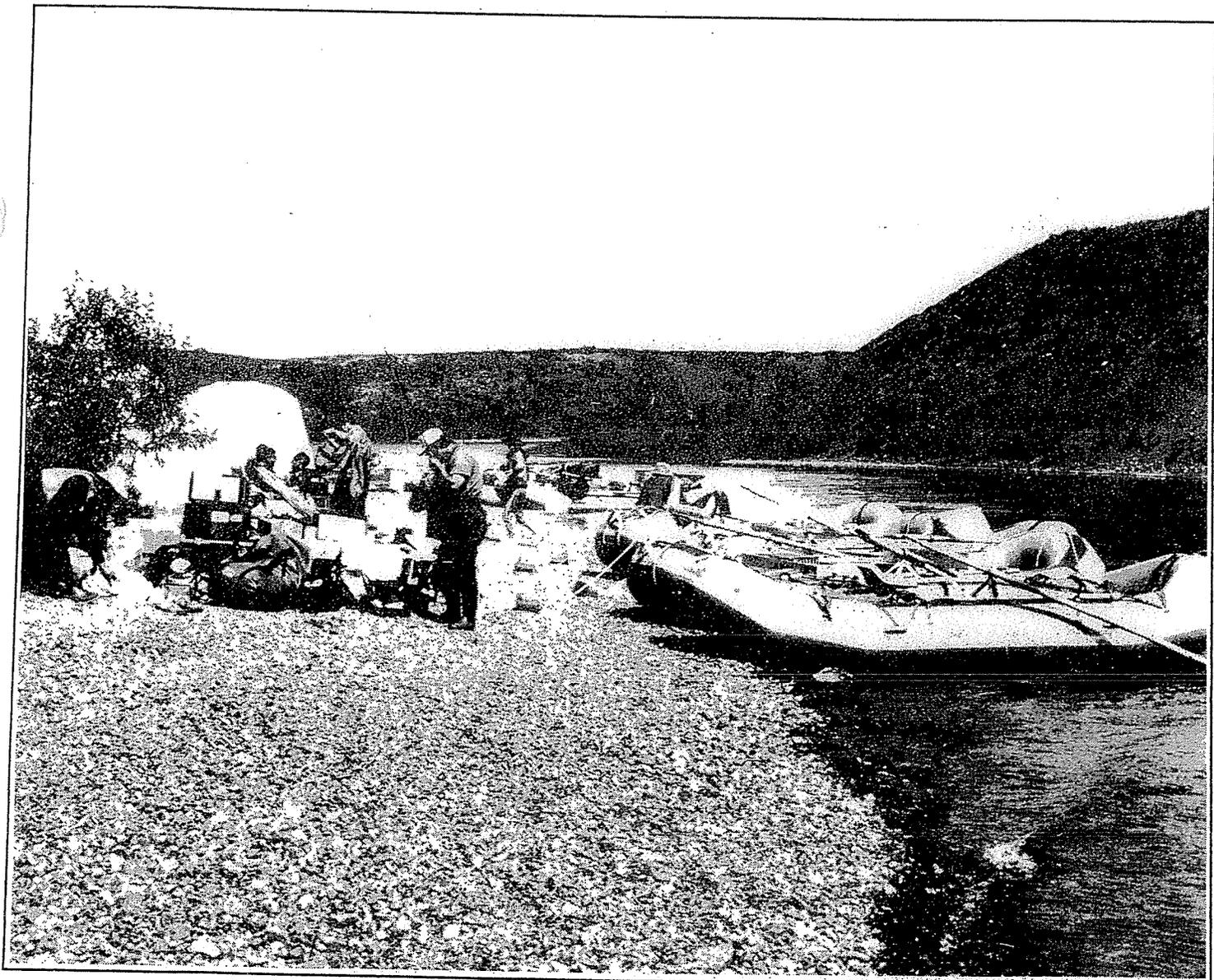
Public review of draft plan. (**April 1 to June 1, 1989**).

Open house and public meetings conducted on draft plan. (**April 15 - April 30, 1989**).

A **newsletter** summarizing the results of the draft plan will be distributed to interested agencies, groups, and individuals. (**May 30, 1989**).

Final plans prepared and available for public review. (**October 1, 1989**).

Implement plan - **April 1, 1990**.



Recreational use on the Kanektok River

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

BULLETIN 542

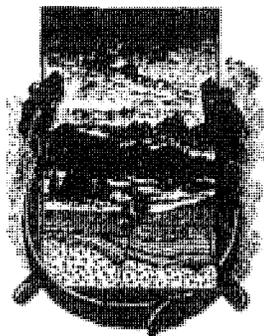
MINERAL RESOURCES OF ALASKA

REPORT ON PROGRESS OF
INVESTIGATIONS IN

1912

BY

ALFRED H. BROOKS AND OTHERS



WASHINGTON
GOVERNMENT PRINTING OFFICE
1913

ADMINISTRATIVE REPORT.

By ALFRED H. BROOKS.

INTRODUCTION.

For a number of years Congress recognized the necessity of making the plans for Alaskan investigations far in advance of the opening of the field season by including the annual grant of funds in the first appropriation bill passed. This policy made the money available between the first of January and the middle of February, and thus the plans, including the moving of supplies during the winter, could be carried out economically and efficiently. In 1912 the appropriation for the continuation of the investigations of the mineral resources of Alaska was not made until August 24 and was reduced from \$100,000 to \$90,000. As a consequence of this delay but little could be accomplished and the projects undertaken could be carried out only at relatively heavy expense. Only three parties out of the twelve eventually dispatched to Alaska had a full season's field work, these being supported up to the end of June by the balance left from the funds of the previous year, and from July 1 to the time the regular appropriation became available by the temporary grants made by Congress. Several other parties were dispatched as these temporary grants permitted, but the funds were so inadequate that the parties were undermanned and but poorly equipped.

In spite of the lateness of the appropriation, it was deemed best, in view of the large number of investigations for which there was urgent need, to undertake certain pieces of work. It was, however, fully realized that this work would be very expensive in proportion to the results which could be achieved.

Twelve parties in all were engaged in surveys and investigations during 1912. Of these, two started in April, one in May, two about the 1st of July, and the others between the 10th and 29th of August. The average length of the Alaska field season in the past has been 110 days; the average of 1912 was only 53 days. Moreover, the parties worked late in the fall, when much time was lost owing to unfavorable weather.

Among the important pieces of work which had to be abandoned were an exploration through the western part of the Colville basin to

Point Barrow and geologic and topographic reconnaissance surveys in the Talkeetna and Broad Pass regions. In preparation for the latter work provisions had been dispatched to Valdez Creek, some 300 miles from the coast, at very heavy expense. A reconnaissance of the Yakataga region and detailed geologic and topographic surveys of the eastern part of the Matanuska coal fields and of the Willow Creek gold district were also plans that could not be carried out.

The twelve parties included ten geologists, two geologic assistants, four topographic engineers, one traverseman, two hydraulic engineers, and fourteen packers, cooks, and other assistants. In addition to this, some gage readers were employed who gave only part of their time to the work. Seven of these parties were engaged in geologic work, three in topographic surveys, and two in the investigation of water resources. The results can be summarized as follows:

The areas covered by geologic reconnaissance surveys, on a scale of 1:250,000 (4 miles to the inch), amount to 2,000 square miles; by detailed geologic surveys, on a scale of 1:62,500 (1 mile to the inch), 525 square miles. Much of the time of the geologists was devoted to the investigation of special field problems in the important mining districts, the results of which can not be presented in terms of area. No topographic reconnaissance surveys were made in 1912, but detailed topographic surveys of 298 square miles, on a scale of 1:62,500 (1 mile to the inch), were completed.

In the Yukon-Tanana region 69 gaging stations were maintained in 1912 for an average of 14 weeks each, furnishing data on the water resources of the Fortymile, Eagle, Seventymile, Birch Creek, and Fairbanks districts.

To state the work geographically, one party was in southeastern Alaska, two in the Copper River basin, three in the Prince William Sound region, one on Kodiak Island, three in the Yukon-Tanana region, one in the lower Yukon and Iditarod regions, and one in northeastern Alaska.

Among the important results of the year was a detailed geologic and topographic survey of the mining district near Ellamar and Landlocked Bay, a reconnaissance of the Ruby Creek mining district, and the completion of the geologic survey from Porcupine River northward to the Arctic Ocean. The preliminary investigation of the water resources of the more important mining districts in the Yukon-Tanana region, begun six years ago, was also completed.

The following table shows the allotment, including both field and office expenses, of the total appropriation of \$90,000 to the districts investigated. In preparing this table the general office expenses were divided among the districts in proportions determined by the cost of the surveys in each district, allowance being made for variations in the character of the work. The results are expressed in

round numbers. The item "General investigations" includes the cost of working up field data on districts that were not under survey during the year and the cost of collecting the statistics of production. In past years the total funds have always been allotted. In 1912, however, the conditions already referred to made a full season's work impossible and a part of the money was therefore not allotted. This unallotted balance will be used in the preliminary work necessary to carry on the surveys planned for 1913.

Allotment to Alaskan surveys and investigations in 1912.

Southeastern Alaska.....	\$2, 000
Copper River region.....	20, 500
Prince William Sound and Kodiak Island.....	23, 800
Yukon basin.....	15, 000
Northeastern Alaska.....	5, 000
General investigations.....	7, 700
Unallotted.....	16, 000
	<hr/>
	90, 000

In the following table the approximate amount of money devoted to each class of investigations and surveys is indicated. It is not possible to give the exact figures, as the same party or even the same man may have carried on two different kinds of work, but this statement will help to elucidate a later table, which will summarize the complete areal surveys.

Approximate allotments to different kinds of surveys and investigations in 1912.

Detailed geologic surveys.....	\$15, 600
Reconnaissance geologic surveys.....	3, 500
Special geologic investigations.....	12, 000
Detailed topographic surveys.....	18, 200
Investigation of water resources.....	5, 000
Collection of statistics of mineral production.....	1, 100
Miscellaneous, including clerical salaries, administration, inspection, instruments, office supplies, and equipment.....	18, 600
Unallotted.....	16, 000
	<hr/>
	90, 000

Allotments for salaries and field expenses, 1912.

Scientific and technical salaries.....	\$36, 970
Field expenses.....	18, 370
Clerical and other office and miscellaneous expenses.....	18, 660
Unallotted.....	16, 000
	<hr/>
	90, 000

The following table exhibits the progress of investigations in Alaska and the annual grant of funds since systematic surveys were begun in 1898. It should be noted that a varying amount is expended each year on special investigations, yielding results which can not be expressed in terms of area.

Progress of surveys in Alaska, 1898-1912.

Year.	Appropriation.	Geologic surveys.			Topographic surveys.				Investigations of water resources.		
		Exploratory (scale 1:625,000 or 1:1,000,000).	Reconnaissance (scale 1:250,000).	Detailed (scale 1:62,500).	Exploratory (scale 1:625,000 or 1:1,000,000).	Reconnaissance (scale 1:250,000; 200-foot contours).	Detailed (scale 1:62,500; 25, 50, or 100 foot contours).	Lines of levels.	Bench marks est.	Gaging stations maintained part of year.	Measurements of stream volume.
1898.....	\$48,189	Sq. m. 9,500	Sq. m.	Sq. m.	Sq. m. 12,843	Sq. m. 2,070					
1899.....	25,000	6,000			8,690						
1900.....	60,000	3,500	6,700		630	11,150					
1901.....	60,000	6,200	5,800		10,200	5,450					
1902.....	60,000	6,950	10,950		8,330	11,970	96				
1903.....	60,000	5,000	8,000	96		15,000					
1904.....	60,000	4,050	3,500		800	6,450	480	86	19		
1905.....	60,000	4,000	4,100	536		4,850	787	202	28		
1906.....	60,000	5,000	4,000	421		13,500	40			14	286
1907.....	60,000	2,000	1,400	442		6,120	501	95	16	43	457
1908.....	60,000	2,000	2,850	604		3,950	427	76	9	53	556
1909.....	60,000	6,100	5,500	450	6,190	5,170	444			81	703
1910.....	90,000		8,635	321		13,815	30			69	429
1911.....	100,000	8,000	10,550	496		14,460	246			68	369
1912.....	60,000		2,600	525			298			69	331
Percentage of total area of Alaska.....	1,081,189	68,700	73,085	3,891	47,680	114,045	3,355	459	72		
		11.72	12.46	0.66	8.16	10.45	0.57				

GEOGRAPHIC DISTRIBUTION OF INVESTIGATIONS.

GENERAL WORK.

The writer was employed in office work of the Alaska division until August 31, when he was appointed vice chairman of the Alaska Railroad Commission. Most of his time from that date to the middle of February was devoted to work of the commission. During this period the administration of the Alaska division was in the hands of George C. Martin, as acting geologist in charge.

The writer, in company with the other members of the commission (Maj. J. J. Morrow, Eng. Corps, U. S. A., chairman; L. M. Cox, civil engineer, U. S. N.; and C. M. Ingersoll), left Washington for Alaska September 2 and returning reached Washington November 27. About two months were devoted to investigations in Alaska, during the course of which Katalla, Kenai Peninsula, the Willow Creek district, Valdez, Cordova, Fairbanks, Chitina, Haines, Skagway, and Juneau were visited. The commission was charged specifically with the duty of investigating the transportation problem and railway routes. Incidentally considerable information on mining development was collected, and this is embodied in the

The Fairbanks district continued in 1912 to be the largest producer of placer gold of the Yukon. It can not maintain this position long without a radical change in mining conditions which will make it possible to exploit profitably its extensive bodies of low-grade placers. But little has been accomplished in this direction, and the best hope of the future lies in obtaining direct railway connection with tide-water. Accounts of the mining progress during the year in the Yukon-Tanana region are presented on pages 203-222 of this report, and in the Ruby, Innoko, and Iditarod districts on pages 279-303. It remains here, therefore, to consider only the mining in some of the more isolated camps that were not visited by any member of the Survey in 1912. The data presented were obtained from what are believed to be reliable sources.

Bonnifield and Kantishna districts.—The Bonnifield and Kantishna districts are remote camps in which mining costs are excessive. So far as learned, placer mining was continued in these districts on about the same scale as in previous years. About 50 or 60 men were engaged in mining in these two districts, and the gold output in 1912 is estimated to have a value of about \$50,000, which is approximately the same as that of 1911. Several men who were formerly engaged in placer mining in the Kantishna district have turned their attention to prospecting auriferous lodes. A fact bearing on a possible easterly extension of the placer gold of the Bonnifield district has recently come to the writer's notice. This is to the effect that several years ago a little placer gold was mined on McCumber Creek, a tributary of Jarvis Creek. Jarvis Creek flows into the lower Delta River from the southeast. This evidence and other facts known about the geology suggest that the gold-bearing rocks of the Bonnifield district may extend into the unsurveyed region lying south of the Tanana and east of the Delta.

Koyukuk and Chandalar districts.—Only one or two placer mines were operated in the Chandalar district during 1912, and these in only a very small way. On the other hand, the Koyukuk district had an exceedingly prosperous season. It is estimated that more than 400 men were employed in the Koyukuk district during the mining season. It is reported that some very rich placer ground was found on Hammond River by sinking to a depth of 60 to 120 feet. Some successful prospecting with churn drill is said to have been done in this field. The gold found is chiefly very coarse, one nugget worth \$280 being reported. Work continued in 1912 on Emma, Smith, Swift, Nolan, Minnie, and other creeks previously developed, but details in regard to these operations are lacking. Mining was also continued in the Indian River region, in the southwestern part of the Koyukuk district.

KUSKOKWIM BASIN.

Much of the Kuskokwim basin is still but little known. Although prospectors have roamed over most of it, little thorough prospecting has been done except in those streams which head in the Innoko divide. A small amount of placer gold has been found in the head-water region of the Kuskokwim, but no mines have been developed. The mining in that part of the Kuskokwim lying near the Iditarod-Innoko district is described elsewhere in this report (pp. 299-303).

During the last few years there has been considerable prospecting of the region tributary to the lower Kuskokwim, between the Iditarod district and Bering Sea. The information at hand indicates that the geologic conditions in this region are similar to those in the Iditarod. Auriferous gravels have been found at many places in the region, but so far as has been learned no very rich deposits have been disclosed. Placer mining on a small scale has, however, been carried on, notably in the Anniak River, Tuluksak River, and Goodnews Bay regions. The value of the total gold production to date is estimated to be between \$75,000 and \$100,000. In 1912 there were probably some 200 men in this general field, most of whom were engaged in prospecting rather than in productive mining. So far as can be learned (for the district has not been examined by a geologist), considerable low-grade placer ground has been found which would not yield profitable returns under present costs and methods of mining. Some richer gravels that have yielded returns to the ordinary manual methods of operation have also been found. Plans have been formulated for the installation of dredges and hydraulic plants with the purpose of exploiting some of the gravels of lesser gold tenor. This region presents no greater difficulties of transportation than other inland districts of Alaska which have been profitably exploited. Ocean vessels can enter Kuskokwim River and transfer their freight direct to river steamers. The placers, however, are 30 to 60 miles from the limits of steamboat navigation, and in the absence of wagon roads this presents a serious obstacle to the installation of heavy machinery. The localities¹ where productive mining has been reported are on Bear Creek and its tributaries and other streams in the Tuluksak basin. These placers are said to be nearly 100 miles distant from the Kuskokwim. In 1911 considerable excitement was caused by the finding of gold placers in the Anniak River basin. So far as can be learned, the discoveries made did not justify the inrush of miners which took place. It is reported, however, that several promising finds have been made and that a number of claims on Marvel Creek were worked in 1912. This stream is said to be about

¹ In the absence of any map of the region it is difficult to locate the scenes of reported discoveries. This difficulty is increased because a single stream may be called by two different names.

DEPARTMENT OF THE INTERIOR
ALBERT B. FALL, Secretary

UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

Bulletin 714

MINERAL RESOURCES OF ALASKA

REPORT ON PROGRESS OF
INVESTIGATIONS IN

1919

BY

ALFRED H. BROOKS AND OTHERS



WASHINGTON
GOVERNMENT PRINTING OFFICE
1921

MINERAL RESOURCES OF THE GOODNEWS BAY REGION.

By GEORGE L. HARRINGTON.

INTRODUCTION.

The Goodnews Bay region as here considered embraces the territory lying south of Arolic River and draining into Kuskokwim Bay. It thus includes the Arolic and Goodnews river basins and the intermediate area. Some information regarding the area south of Goodnews Bay as far as Cape Newenham is also included in this paper. The surveys of this region in 1919 covered an area of approximately 1,400 square miles and extended from longitude $159^{\circ} 40'$ to 162° west, and from latitude 59° to $59^{\circ} 40'$ north. A traverse of the Yukon-Kuskokwim portage was also made. R. H. Sargent, topographic engineer, in general charge of the work, made the topographic surveys on which the geologic work north of Goodnews Bay was based. South of Goodnews Bay charts and maps of the United States Coast and Geodetic Survey were used as a base. The geologic mapping and investigation of mineral resources were done by the writer. A cook and a station assistant to Mr. Sargent completed the party.

The party left Seattle on the power schooner *Ozmo* on June 19 and made a landing in Security Cove, just east of Cape Newenham, on the evening of July 4. About two-thirds of the supplies and provisions and all other equipment were landed in the boats of the Survey expedition at the same time. The supplies were transported throughout the season by boat or by back packing. A 30-foot poling boat and a 20-foot dory, together with a 2-horsepower gasoline engine of the detachable hang-over type, were obtained at Seattle, and the poling boat was used on Goodnews River, and the dory for such shore work as was necessary. Field work ended at Kwinak (Quinhagak post office) on August 18. The return to Seattle was made by way of Bethel and the Kuskokwim-Yukon portage, Mr. Sargent with the field assistants going up the Yukon and the writer going down and continuing to St. Michael and Nome, where he spent a few days in the collection of statistics while awaiting the steamer *Victoria*. Transportation from St. Michael to Nome was afforded by the United

short distance below their confluence the creek flows through a pass in the hills in a rock-cut canyon at least 75 feet deep for perhaps half a mile before crossing the wide valley of Goodnews River, into which it finally empties. The stream now flows on the south side of the pass, very close to the base of the hill on that side. Numerous small lakes, with gravel banks, lie in the pass. This lake-dotted deposit is interpreted as being a moraine that fills the preglacial valley of the creek. As the glacier retreated the stream sought the lowest place through the pass, which happened to be at one side of the deposit. Since reaching bedrock it has continued cutting until it has formed the present canyon. At the confluence of the two streams, where both are flowing through unconsolidated material, the channel is approximately in the position of the preglacial channel.

It is believed that numerous changes in drainage, even of the major streams, were brought about by the glaciation of this region. The low lake-dotted pass between the forks of Goodnews River was probably the preglacial channel of that stream. The pass has been filled with gravel, as is shown by the gravel banks of the many lakelets which lie in it. These lakes differ from the lakes of flood-plain origin and from some of the lakes lying at elevations above the flood plains, practically all of which are in mossy bogs and have banks of peat or moss.

NIVATION.

Nivation, or erosion somewhat similar to glaciation but on a much smaller scale and produced by accumulations of snow, which may last from one season to another, has been an effective agent in the formation of a number of minor topographic features in this region. To nivation is attributed the abundance of small valleys of general U-shaped cross section. Such valleys were especially noted on the tributaries of Bear and Canyon creeks and also in the group of hills on the south side of Goodnews River about 20 miles from its mouth. Forms that are probably due to nivation were also observed on the slopes of the hills in the vicinity of Security Cove.

At the heads of a few of the valleys the snow banks develop cirque-like forms, one of which was observed near the granite-limestone contact in the vicinity of the glacial lake at the head of Tunulik River.

TRAVEL AND TRANSPORTATION.

In many respects this region is one of the most inaccessible in Alaska for a small expedition. For a number of years it has been necessary to come overland from the Yukon either by the portage or by way of Iditarod, or to travel in a kayak or canoe, or by a small schooner or sailing boat from Togiak. During the summer of 1919 an 800-ton schooner was placed on the run between Seattle and Bethel, and this boat made two trips and afforded the most satisfactory

freight and passenger service that has been available to the inhabitants of the lower Kuskokwim for many years. During the winter of 1918-19 there was an acute shortage of provisions, which had to be brought at heavy expense from the Yukon, on account of the failure of one of the supply schooners to bring in winter provisions. This schooner was scheduled to bring in supplies during 1919 also but had not reached Bethel when the Geological Survey party left the region in September.

Practically all supplies are landed at Bethel, although some of the smaller vessels will land supplies inside the spit at the entrance to Goodnews Bay, as well as at some points between the bay and Bethel. From Bethel supplies are brought down the river and bay by means of a launch to Kwinak and to Mumtrak, the village in the vicinity of the schoolhouse at Goodnews Bay. Supplies for the Arolic basin are brought from Kwinak either by poling boat in the summer or by dog sled in the winter and early in the spring. For the mining operations on Wattamus Creek, which flows into a tributary of Goodnews River, supplies are taken in summer up the river in poling boats or by kayaks to the landing about 3 miles from the scene of mining operations, where they are transferred to a small scow which is lined and poled up to the camp at Wattamus. In winter supplies may be brought by dog teams from either Mumtrak or Kwinak. The freight rate on general merchandise from Seattle to Bethel in 1919 was \$35 a ton, from Bethel to Mumtrak 2 cents a pound, and from Mumtrak to Wattamus Creek 5 cents a pound.

A monthly mail service was in effect from Holy Cross to Bethel and from Bethel to Kwinak during the summer of 1919. Contracts had also been let for a monthly winter service from Kwinak to Togiak by way of Goodnews Bay. In addition to the regular service thus afforded mail is put on such schooners as sail from Seattle for the Kuskokwim. A schooner, already mentioned as carrying supplies, was also intrusted with the mail and left Seattle in July, but had not reached Bethel when the Survey party left that place in September. In addition to mail service a monthly passenger service is afforded by the trips of the mail carrier from Holy Cross to Kwinak and return, his launches and boats providing the most comfortable way of crossing the portage.

CLIMATE.

A Weather Bureau station has already been established at the schoolhouse at Mumtrak. Owing to the short time during which this station has been in operation relatively few meteorologic data are yet available. During the early part of the season of 1919 the prevailing winds were westerly or southwesterly; later in the season easterly and southeasterly winds were more common. Surveys during the season were greatly hindered by stormy and foggy weather,

U.S. Geological Survey

FN-0422

George L. Harrington

Lower Kuskokwim
& Goodnews Bay

1919

6-10-2002 - original cover discarded

North side. On either
which is largely the same as
in both the det. and ign. rocks - found everywhere
chert, sil. ls. ss and arg. and the latter containing
tuff and pieces of basalt - at the lower end
of the ridge, rocks are partly ign. (basalts) and in
part sedimentary, embracing argillites and some
ss. These are found about undisturbed in
the hand specimen from the basalt from which
the component grains were mainly derived.
Both ss. & basalt weather alike to dark gray
and black along fracture planes which are so completely
coated with dark brown and black submetallic oxide, that
nothing as to their composition can be determined from
such fractures.

On the south side of the ridge on which Sargent made
his stations, there is a small lake in a depression
which however is much less cirque like than the
head of many of the valleys without lakes.
Immediately below the lake is a small terminal
moraine - the first seen thus far. Where the
cirque walls cut against the ridge, they have lost
their vertical appearance, largely due and doubt to
the talus, which covers the walls of the cirque.

42. Camped on bank M. Gardner's Cr. - was 1000 ft
 up & unloaded boat - back to bed - up at 3:30 pm. Bar. 30.17. Rained steadily
 from 3 am till 3 pm. and later ^{until night} at times blowing strongly from S.W.
 & N.W. - moved tent 200 yds upstream to higher place on bar.
 at 8 pm

July 4th - There was a low morning fog -
 high peaks showed up - but fog soon set heavy & we
 had to stop for sun at 3:30 pm on account of doubtful
 location. Strong tide making conditions dead, packing & unloading
 not helping much - some rain in P.M. - tent was
 loaded up & came ashore at 10 pm. Bed at 12 midnight

July 5 - Some kind of weather - but strong wind against head
 of fog & cleared somewhat - by 5 pm eyes felt clearing but
 Bar. 30.35 at 9 am - 30.27 at 7:30 pm - wind strong from S.W.

July 6 - Bar 30.37 at 5:30 pm wind from N.W. sea had to try
 at camp to go round to more exposed Castle Rock -
 Foggy for a little while in morning but cleared before noon
 & clear balance of day.

July 7. Went around Castle Rock, level is 100 ft for height 130-130.50
 Wind mostly N.W. moderate camped on E side Security Cove
 Part in am but fog & rain at sunset - Reached around 7

Pinnacle Rock - calm for about 24 hours - then during day clear
 July 8 - Westerly winds, shifting - for about 2 hours at about 10 am from
 S.W. SE - Foggy & heavy for 24 hours around Pinnacle
 Rock - road back - engine back it seems against wind & tide
 about 10 pm. Got up at 11:30 pm
 boots in out of sea. Good sleep after tent

July 9 - westerly winds, shifting to S.W. - 30.50 at 11:30 pm. Bar. fell from 30.50
 to 29.95 at 11:30 pm. Foggy & shifting - the Pinnacle
 peak visible till about 7 pm - a little fog during day - fixed
 boots - & fastened little wind at 8 pm.

July 10 - Up at 1:00 am, left camp 5:30 Bar. 30.00 wind S.E. - Heavy
 surf at cove - out all the way up coast - at Chaguan Joked Gables
 left 6 am Reached Gardner's - at 11:30 am - lunched. Occupied N.E. Cr.
 then moved over & camped at base of Balaha - Bar. 30.00 at noon - at
 night (10 am) 29.97. N.W. wind lasted about 5 hrs then they from
 westerly out of bay - gentle though at 4 pm - heavy fog & rain
 clearing out at night fairly clear.

July 11 - Bar. 29.90 wind gentle - westerly - gradually lightening out
 in morning. Heavy showers at 3 pm. Left Gardner's. Reached camp

July 12 - 29.70 in am. 30.02 at 6 pm. Found at 7 am to fish can
 of fish & Gardner's up to school house for more news

July 13 - 30.16 at 8 am - 30.22 8 pm.
 Foggy in a.m. but clearing toward night. The rest
 wholly clear at any time - fog especially on S side of bay.
 Wind from West.
 Left camp 2 natives only left at Sway Pt. (re-anchored) from here.

Wind over to S side - Heavy during night & after 7 pm.
 moved to north of Tumulik
 July 14 - 30.05 bar - 8 am + 4 PM Wind S into S.W. Rain practically
 all day - stayed inside.

July 15 - Moved on tide up Tumulik - Bar - 30.24 - wind southerly
 fog hanging low - discovered in forenoon - Sun in afternoon
 showers at night - 30.30
 17 - on camp on Tumulik - 30.40 - 9 pm - rain all day - wind W westerly
 N southerly - but abating - built alder fence on hill slope -
 clearing somewhat at night

18 - Bar 30.40 - 7 am. Went out with Sargent from Tumulik camp -
 to east + south - Cloudy all day - fog hanging over water to N. all
 day - but cleared from some to S. - Red clouds - rain about 1 hr. at 4 pm.
 W. from SW changing to southerly at night, Bar. 30.34 - 7:30 pm

19 - Rained first about 2 am. till 8 am - when cleared somewhat
 strong S.W. blowing all day - Rained down to camp at
 mouth of Tumulik - coming down at tide - Hauled boat over
 mud - Bar. 30.28 at 8 pm.

20 - Moved on tide - 30.28 - schoolhouse - fair and beautiful
 day in a.m. calm - but with strong SW wind and fog in pm. Grad
 dying down later - Bar. att 30.35

21 - Fair most all day. Some fog on high side (Cummahak) at times in
 pm. wind light SW. in a.m. changing to SE. with becoming
 tide, dying down at night. Rained bedding - packed spirit - whiskey
 returned. Bar. att 30.36. Moved camp up river in night
 tide - leaving aft - 11 pm. morning up. Calm when leaving

22 - Camped on bar on Goodnews R. - tide rose till 3 am. nearly to level
 up & unloaded boat - back to bar - up at noon. Bar. 30.17. Rained steadily
 from 3 am till 3 pm. and later - at times blowing strongly from S.W.
 to N.E. - moved tent 700 yds up stream to higher place on bar.
 at 8 pm

July 4th - there was a low dangerous fog - at times
 things were showed up - but fog was so heavy that
 had to stop at 3:30 pm on account of doubtful
 location. Strong tide making doubtful dead reckoning & soundings
 not helping much. - came ashore in bay - went back.

July 23. I got + went down to ...
 + by land route from ...
 in ...
 ...

Roll 6. #1 - 7/30 E from Sta 13 - to pass to Signal (up
 Goodnews R. R. hills $\frac{1}{3}$ - $\frac{1}{10}$ - 11 am - bright - (Chazy test.

- 2-3-4 - ...
- 5 - ...

- 4 - 1/2 - 5 - 11 am. ... contact of granite ...
- 5 - New - from ...
- 6 - Small ...

Roll 8. #1 - 2 1/2 miles across ...
 2 - same as 4 - roll 7
 3 - Snow glacier - betw. - l.s. + granite hill from
 Granite hill spm - $\frac{1}{16}$ - $\frac{1}{10}$ - 7/5/19
 4 - up Goodnews Valley spm $\frac{1}{6}$ - $\frac{1}{5}$ - 7/1-19.

- 5 - 7/6/19 - 1/2 - 11 - from near sta 15. ...
- 6 - Tent at Mining camp - ...
- 7 - ...
- 8 - ...
- 9 - 1 - ...
- 10 (way) 1 - ...
- 2 - ...
- 3 - ...
- 4 - ...
- 5 - ...
- 6 - ...
- 7 - ...

dropped - changed by accident in rough ground - Lewis lost knife -
6. ^{the little rain} ~~the little rain~~ crossed at - little rain - stopped just before reaching lake
N Delta - & another lake - big lake - camped across second
big lake -

One Lake - 10 miles in straight line
in new state by Henry Eric - Adkins

about at ...
1st ...
7, ...
...
by ...

One ...
has ...
for ...

7 - July 31st to Long Lake - Sergeant Hayward & I walked
along shore this lake to edge of smaller lake across from
4th July - which is highest fall - & for some distance run
thru brush from - on hard ground - on lower side (right) in
1900 ft spread before hundred feet - about now across
little rain in grass - considerable in grass. Crossed lake
from this side - (Rival "four" etc.) dinner on W side of July
enjoyed bath at post - supper at Indian camp on E side of lake
camped late at mouth of Pt. - in Yukon through in village

8. Rain - little wind - Russian mission 9 am. raining
all day. eating dinner at night. Ladies church, parties
of music, refreshments

9. Rain - started up Yukon - got word from Bennett at
Tuckers - said Capt. Polte with Kottlik in the top of box of
education at Tuckers - would spring up on leaving & then
up thru Tuckers along - supper and set 6 pm. Camped
thru - found native hut - Bennett took a note - 52 natives
had no camp for -

10. Left for Seward - in Seward at 10 am. at Seward
Hotel, even a little after 4 pm. (6 to 2 am) supper on
Oil City. got tel. to 41 news - loaded truck with supplies
& sold him some stuff - moderate fine day - had 1/2 lb

11 - Fine day - left at 11-10 am. passed Tuckers 6 pm
& Rem. news. 8 pm - NW Taylor aboard - met Death's night 10

12. Don't quit - 2:30 am. to 6 am. Marshall at 8:30 - 9 am
Fine day - red sky in morning. supper in night out camp
Ramsdell's camp - found his house at 12:30

13 - Red sky in morning at 6:30 passed under a big mountain 7:20
Left camp at 10:30 am. Old Hamilton at 10:30
at night. Left camp at 10:30

Went back had 7 heavy loads. Hodge for dinner from Helen
(potatoes, "Laska" fat)
up to the (changed time to 4 am) Left for "Kottlik" camp 10:30
6 am - foggy rain in am - left camp on bus from Kottlik
at Kottlik 11 am. went out for bar at 12:30
Tuckers & some other photos - sketch on lower part
of Clearing - again in caucab reached at 11 am
11 pm

Waters & water
Wanna & Victoria. From report

15 - Got recreation in Victoria - rainy in am. Clear
in pm - got letter to self Hayward some for Sergeant
Got packets & repacked bedding - left with 6 boxes
Clear in pm. Got out wind

