4. Environmental Consequences

4.1 Introduction

The purpose of this chapter is to identify, describe, and compare the effects on the physical, biological, and socioeconomic environment of five alternatives, including the current management, proposed for the Togiak National Wildlife Refuge Public Use Management Plan Revision. Current management provides the basis for comparing the effects of the action alternatives. The effects on Refuge resources of various management actions proposed by each alternative were assessed. This assessment of alternatives for revisions for the Public Use Management Plan analyzes the following topics:

- Public use and facilities at Cape Peirce
- Unguided recreational opportunities in the Kanektok and Goodnews River watersheds
- Human waste management

  Commercial sport fishing in the Goodnews, Togiak, Osviak, and Matogak River watersheds

Although all species and resources on the Refuge are important, certain species are more sensitive to disturbance, and others are representative of larger groups of species. For that reason, not all Refuge species are discussed in this chapter. An analysis of the effects of management actions on the biological environment has been conducted for the following:

- Water quality
- Vegetation conditions—campsites and trails
- Key fish species—populations and habitats

  Key wildlife species—populations and habitats

An analysis of effects on the human environment has been conducted for the following:

- Visitor access
- Visitor experience
- Local users
- Local economy
- Wilderness values
- Cultural resources
- Subsistence opportunities

Some actions (i.e., facility construction) in these alternatives would require site specific evaluation and National Environmental Policy Act (NEPA) documentation. That analysis will address any site specific environmental effects.

4.2 Physical Environment

None of the alternatives in this Plan are anticipated to have any effect on climate, landforms, geology, oil and gas potential, or leaseable or saleable minerals. While there are a few placer mining claims within the Refuge, activity has been negligible.

4.2.1 Effects on Water Quality

The Kanektok River is considered to be the area most likely to show impacts to water quality due to higher levels of public use. Water-quality monitoring by the Refuge at the Wilderness Area boundary in the summer of 2001 found that Kanektok River water quality remains very clean and fecal indicator bacteria are present at levels that occur naturally. Standards established by the EPA for recreational waters are at little or no risk of being exceeded within the life of this plan (Collins 2001). Based on the information gathered for the Kanektok River, water quality of the Goodnews and Togiak rivers above the Wilderness Area boundary is also expected to remain high for the life of this plan.

Because of concentrated use at Kagati and Goodnews lakes, public outhouses currently provided by the Togiak Refuge protect water quality and public safety. These structures will continue to be maintained to minimize potential impacts to public safety, water quality, cultural resources, and aesthetics that could be caused by public use at these two sites. The projected cost of maintaining these facilities is $7,000 over the next 10 years.

Effects on water quality will be similar under all alternatives. We anticipate no impacts under any alternative.

4.3 Biological Environment

4.3.1 Effects on Vegetation Conditions of Campsites and Trails

4.3.1.1 Kagati and Goodnews Lakes

Public use at Kagati and Goodnews lakes could affect vegetation cover, diversity, or abundance, but baseline information is not available. Kagati Lake is more than 1,000 feet in elevation. Plant communities at this elevation and

latitude are slow-growing and do not recover quickly from disturbance (Hammitt and Cole 1987; Hampton and Cole 1988). If these Arctic tundra plant communities are damaged to the point that bare ground is exposed, erosion may occur.

Current site conditions and trends need to be established to determine what level of use these sites can support without lasting damage. Under Alternative A, the number of camping areas above the ordinary high water mark at both Kagati and Goodnews lakes will increase. Both of these lakes have two or three frequently used sites along the gravel lake shore below mean high water, accessible by float plane and having sparse vegetation, all of which make them desirable sites to visitors and managers.

Under Alternative A, the number of days with three or more float starts is expected to increase, creating a need for additional camping areas. Because of accessibility by floatplane and proximity to the lake outlets, these additional sites will most likely be located on the uplands in fragile tundra. There will be few of these new sites, but as they become more frequently used, the trampling of vegetation could produce areas of bare ground and soil erosion. These impacts would represent long-term degradation of the wilderness environment in areas most visible to the public. Increased education about Leave No Trace camping and full implementation of the one-day camping limit at the Kagati Lake outlet would lessen these impacts.

Under Alternatives B, C, and E, additional campsites at Kagati and Goodnews lakes will be less likely. As a result, campsite impacts at these headwater lakes will be less than in Alternative A (no action).

Alternative D would result in short-term impacts at Kagati and Goodnews lakes similar to those in Alternative A as visitation continues to increase. Guided use will increase to one trip every other day, and potential impacts to campsites will be realized more rapidly at Goodnews Lake as the number of groups using Refuge lands will nearly double within the first five years. Over the long-term, impacts will stabilize due to limits on guided use.

4.3.1.2 Cape Peirce

Currently, there are two designated trails at Cape Peirce. Visitors walking between Sangor Lake and the wildlife-viewing area frequently use other routes, which are not designated. These trails currently are confined to a single

path with impact only to vegetation directly in the path. Under this alternative (and all other alternatives), these trails will be maintained where necessary to prevent erosion or to maintain visitor safety.

Impacts associated with facilities and trails in Alternative B would be similar to those of Alternative A (no action). The tent platform could cause soil and vegetation impacts similar to a small cabin.

Alternatives D and E include more structures at Sangor Lake and will cause more impact to soil and vegetation at the lake than the other alternatives. Each structure will have a footprint roughly equal to structures in the other alternatives, but there could be one cabin and additional tent platforms to accommodate up to 12 people at one time. These structures will be near one another, and impacts will be concentrated in one area.

4.3.2 Effects on Fish, Wildlife, and Key Species of Special Concern

This analysis focuses on those species used for subsistence and on those species most sensitive to human activity and environmental changes. These species are: rainbow trout, salmon species, bears, moose, walrus, and caribou.

4.3.2.1 Fish

Data currently available indicate fish stocks within the Refuge are healthy and should be able to sustain levels of commercial, subsistence, and recreational harvest projected for Alternatives A, B, and D. Under Alternative C, the number of unguided float anglers will increase along the Kanektok and Goodnews rivers outside Chinook and coho salmon permitted-use seasons. This could cause the number of unguided float anglers targeting resident fish species to increase. Alternative E restricts the number of recreational anglers, many of whom target rainbow trout, so this alternative poses the least risk for rainbow trout populations

Information regarding rainbow trout populations in the Osviak and Matogak rivers is very limited; therefore, impacts are difficult to determine. From the limited biological sampling conducted, the rainbow trout population in the Osviak River may be comprised of a few older fish. Although public use along the Osviak River would be low under this alternative, the level of exploitation may be enough to alter the historic size and age of this population because the number of individual fish is small.

4.3.2.2 Wildlife

Anticipated increases in the brown bear population, coupled with increases or changes in public use (i.e., guided versus unguided, new guide camps), have the potential to lead to an increase in the number of unreported kills, bear-human conflicts, bear habituation, and displacement from food resources (e.g., salmon streams) during peak use times by both bears and people. These potential impacts will be offset in all alternatives through increased bear safety education and monitoring. Under Alternative D, additional guided motorized use along the Togiak River will be allowed. It is uncertain how this will affect the distribution of moose in this river drainage, but we anticipate impacts will be slight to moderate and will only persist during the coho salmon run when public use peaks each season.

Under Alternatives C, D, and E, impacts of additional visitation and structures at Cape Peirce will be offset by the use of a permitted wildlife viewing guide or Refuge staff to accompany visitors during peak use periods. The guides will ensure that visitor behavior will minimize disturbance.

Inventory and monitoring of these important wildlife species and standards established through the Public Use Monitoring Plan will provide biologists and managers the necessary information to ensure that healthy populations and habitats are maintained during the life of this Plan.

4.3.2.3 Cumulative Effects

Subsistence harvest of all species will increase as local communities continue to grow. Guided recreational angling will continue to increase downstream of the Togiak Wilderness Area boundary on lands and waters beyond the jurisdiction of the Service.

The rainbow trout population appears to be capable of sustaining the current level of harvest, but 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 and other rivers. Ongoing monitoring of fish populations by USFWS and ADF&G should be adequate to detect and suggest necessary change to the management of these fish.

4.4 Human Environment

This section analyzes direct, indirect, and cumulative effects of the five management alternatives on visitor access and experience, local users, the local economy, and wilderness values. Estimates of impacts are primarily based on economic data and analyses presented in chapter three, user survey data presented in chapter three, and in appendix E, and Refuge visitation records. Additional resources are cited where relevant.

The magnitude or intensity of various impacts is described as negligible, minor, moderate, or major. Negligible impacts are real but barely detectable. Minor impacts are readily detectable, but they affect only a few individuals or are otherwise very localized. Moderate impacts may affect access or experiences for up to half of a particular user group (e.g., 50 percent of unguided river visitors); or they may modify the attributes of a setting at several specific locations; or they may affect jobs and household incomes at the community level. Major impacts may affect access or experiences for whole user groups; or they may alter the overall character of a setting; or they may affect jobs and household incomes in multiple communities.

4.4.1 Effects on Cultural Resources

Management decisions and public use affect cultural resources directly and indirectly. Direct effects include potential impacts from developments such as cabins, hardened camping areas, boat landings, outhouses, etc. Another direct effect of greater public use is the increased likelihood of damage to sites from looting or vandalism.

Of possibly greater concern are indirect effects resulting from uses such as camping, ad-hoc trails, use of "cat holes" for waste, etc. These impacts are especially severe on ephemeral or surface sites.

Loss of vegetation from camp sites or in trails, along riverbanks etc., exposes artifacts to illegal collection, breakage and loss of context. Erosion of devegetated areas causes physical destruction of sites with all of its artifacts, features and associated information potential. Compaction of the ground obliterates surface features and breaks and scatters artifacts.

Under all alternatives, cultural resources may be at risk of damage, primarily from public use activities and management. Areas around Kagati, Goodnews, and Togiak

Lakes, Cape Peirce, and all major river drainages are likely to include significant cultural resources but have not been adequately assessed. Before implementation of this plan, assessments will be done on high use areas, and mitigation measures will be developed.

4.4.2 Effects on Visitor Access

4.4.2.1 Alternative A

Under current management, visitor access to Togiak Refuge is largely unrestricted. Certain laws and regulations govern means of access, but for the most part, there are no restrictions on the number of unguided visits or visitors to the Refuge. One exception is at Cape Peirce, where access has been limited to one flight and six people per day. At recent use levels, this restriction has not been enforced and has not been a limiting factor (i.e. everyone who wants to visit is able to). Use levels increased from an average of less than three flights per year during the 1990s to about 15 flights per year from 2000 through 2003. If that trend were to continue, the current management direction could eventually prevent some people from visiting Cape Peirce. However, visitation demand at Cape Peirce is linked to the presence of walrus, which has proven to be highly variable and unpredictable. It is unlikely, based on recent visitor and walrus use patterns, that the existing management direction will be a limiting factor for future visitor access. Therefore, the impact on visitor access will likely be negligible.

On the popular Kanektok River, the absence of unguided visitor access restrictions will allow continued moderate growth in the number of annual float starts. According to reports from permitted air-taxi operators, the average number of annual float starts increased from 36 during the period 1993-1996 to 52 during the period 2001-2004 (numbers dropped substantially in 2005-06 due to the sale and temporarily suspended operations of a major commercial service provider in Dillingham[1]). If use numbers return to near 2004 levels (as expected) and the previous rate of growth holds steady, there would be approximately 76 unguided, annual float starts within 15 years. It is possible, however, that the rate of growth would slow slightly as higher use and associated impacts reduce

[1] Freshwater Adventures did not operate normally for much of 2005, which caused a substantial drop in visitor use for that year. It is not yet clear if low numbers in 2006 were caused by limited availability of services in the previous season or if they represent a new starting point from which to measure future trends. Regardless, given the overall use-trend during the last two decades, it is reasonable to expect that use will continue to increase moderately during the life of this plan. Because of the anomalous 2005 season, analyses in this chapter are based only on data collected through 2004.

demand. Absent any other confounding factors, maximum use would likely be between 70 and 76 unguided float starts per year by 2020.

Unguided visitation on the various forks of the Goodnews River would continue to fluctuate annually as it has over the past 15 years. Visitation could be affected by continued growth on the Kanektok if crowding and competition cause some visitors to choose the Goodnews River as an alternative destination. The magnitude of this effect is uncertain, but the overall impact on unguided visitor access would likely be negligible.

Guided float use on the Kanektok River is currently limited to one launch every other day during the summer and early fall, and that use-level would not be allowed to increase under current management. Some would-be guided clients may be unable to visit as demand rises. This impact is likely to be minor (affecting a few individuals who will not or cannot visit otherwise).

Guided float and motorized access on the forks of the Goodnews River would be allocated through a competitive bid process. One motorized use permit will continue to authorize the use of up to nine boats for up to 18 clients at one time on the North Fork. On the Middle Fork, one motorized use permit will continue to authorize up to two boats and four clients at one time. Float use will continue to be limited to one trip per week (up to 12 people) on the North Fork. No guided float permits will be awarded for the Middle Fork. Guided motorized use has historically been well below permitted levels (less than 20 total trips per year), so it is unlikely that this restriction will functionally limit guided visitor access during the life of this Plan. Guided float use on the North Fork presently occurs at near-permitted levels; if demand increased in the future, some would-be guided float clients could be prevented from visiting. This impact is likely to be minor (affecting a few individuals who will not or cannot visit otherwise). Visitor demand for guided float opportunities on the Middle Fork is extremely low due to difficult conditions (boats must be dragged a long distance except when water levels are very high), so the absence of a commercial float permit for that river would have only negligible effects on future visitor access.

On the Togiak River, guided visitor access would continue to be limited to seven motorboats (up to 28 people) per day and two float trips per week. Demand for guided float trips is low, so this restriction does not functionally limit access, and it is unlikely that it would have any effect during the life of

this Plan. Guided motorized use currently occurs at well below permitted levels, so the permit restriction also has no functional effect on visitor access. Use has been relatively stable for more than 10 years, and significant future changes are not expected.

4.4.2.2 Alternative B

Under this alternative, visitor access to Cape Peirce would remain essentially unchanged, except when demand is high, 50 percent of daily permits would be allocated for commercially guided visitors, and the remaining 50 percent would be allocated to unguided visitors. Unused permits would be available to either type of visitor from a common pool. At recent and likely future use levels, this alternative would have no impact on visitor access at Cape Peirce.

Unguided visitor access to the Kanektok River would be restricted through a limited permit system to one float start every other day (alternating with guided float starts) from June 1 through September 23[2]. If every available day were used, there could be as many as 57 unguided float starts permitted during this period (each including up to four boats and 12 people). From 2001 to 2004, there was an annual average of 52 unguided launches (Table 4-1). Under Alternative A, there could be as many as 76 unguided float starts by 2020, so Alternative B could ultimately deny access to as many as 19 groups. Other groups who would not or could not visit at other than their preferred times could also be indirectly prevented from floating the river. Overall, this would constitute a moderate negative impact on visitor access because one-quarter to one-third of potential visitors (in a given year) could be denied access.

Unguided visitor access to the Goodnews River (all forks) would be limited to the current level (approximately 44 starts per year[3]). Given that unguided visitor use on the river has been relatively stable since 2000, restricting use would not have any immediate or short term effects on visitor access (Table 4-2). Over the longer term (more than 10 years), demand could increase to a level at which a few groups are unable to visit each year. This effect could be magnified if visitors who are unable to access the Kanektok River look to the Goodnews as an alternate destination.

[2] The limited permit system would only apply under "high-use" conditions, defined as two consecutive seasons where total unguided use is greater than two-thirds of the maximum potential allocation. By this definition, "high-use" is about 40 float starts per season, which is equivalent to the average number of guided float starts that has been allocated through the prospectus system.

[3] Unguided use-limits within the Goodnews drainage would only be enforced in years when unguided use on the Kanektok is also limited.

Overall, the proposed restriction would likely have a minor to moderate negative impact on visitor access.

The effects on access for guided visitor float and motorboat opportunities would be the same as those described under Alternative A. Under Alternative B, the commercial permit awarded for guided motorized use on the Middle Fork Goodnews River would allow for one additional boat and up to four additional people each day. However, given that visitation does not appear to be limited by existing permit restrictions (use is below permitted levels and has not grown over the last decade), allowing for additional guided use would have no practical effect on visitor access.

4.4.2.3 Alternative C

Under this alternative, the existing limit of one flight per day and six people at one time at Cape Peirce would be increased to two flights per day and 12 people at one time, and the permit requirement would be waived altogether at low use levels. In addition, facilities such as tent platforms, a food storage area, and an outhouse could be constructed at Sangor Lake. At current and likely future use levels, this action would have little practical effect on visitor access. Facilities at Sangor Lake could attract a few more visitors, but it is unlikely that the availability of tent platforms and an outhouse would motivate a change in the current use pattern. If walrus become a consistent and predictable attraction at Cape Peirce and visitor demand increases accordingly, this alternative would substantially increase visitor access. In this unlikely scenario, this action could have a moderate to major positive effect on visitor access.

Unguided visitor access to the Kanektok River would be limited to one trip start every other day during peak use seasons (June 25 to July 15 and August 10 to September 7)[4]. During the rest of the year, there would be no limits on the number of unguided trip starts. From 2001 to 2004, there was an average of 14 trip starts during the early peak season and 19 starts during the late peak season. Under Alternative C, 11 starts would be permitted during the early peak season, and 15 would be permitted during the late peak season (Table 4-1). Thus, about 20 percent of the visitation currently occurring during the peak seasons would be re-allocated to different time periods or displaced altogether.

Much of the growth in Kanektok River visitation has occurred outside the peak seasons. Visitation during the

[4] Similar to Alternative B, the proposed limits would only be applied under high-use conditions.

early peak season has remained consistently at the level of 14 or 15 trip starts for more than 10 years, so it is unlikely that it would change much (up or down) in the absence of a restriction. During the late season, however, use has increased from about 12 starts a decade ago to about 19 starts in recent years. Some of the growth is attributable to hunters targeting a newly available caribou harvest opportunity in the early fall. It could be that use levels during the late season will now begin to level off, or they could continue to grow at a slower rate; it is unlikely that growth during this period will continue at the recent high rate because there are already multiple trip starts taking place on most available days.

Assessing the magnitude of impact from the proposed access limits is difficult because visitors displaced from the peak seasons could still come at other times of the year. At current use levels, a total of up to seven groups would be unable to access the river (assuming they would not or could not visit at other times). This number could grow to nine or 10 groups by 2020 if demand for peak season access continues to grow, which is equivalent to almost 15 percent of total projected annual use. However, at least a few groups would likely choose to visit at other times, up to 15 percent of unguided groups would be displaced in a given year. Overall, this would constitute a moderate negative impact on unguided visitor access to the Kanektok River.

On the Goodnews River, unguided float starts would be limited to one every other weekday and one on each weekend day[5]. This would create a Tuesday, Thursday, Saturday, and Sunday unguided launch pattern and allow for about 12 starts during the June 25 to July 15 peak season, and about 16 starts during the August 10 to September 7 peak season. During the rest of the year, there would be no limits on the number of unguided trip starts.

From 2001 to 2004, there was an average of nine trip starts during the early peak season and 18 starts during the late peak season; thus, this alternative would cause some redistribution of use and possibly some outright displacement of would-be visitors as well (Table 4-2). The immediate impact of this alternative would be that all groups wishing to access the Goodnews River on a Monday, Wednesday, or Friday during peak seasons would be bumped to an adjoining day. Under recent demand

[5] Similar to Alternative B, unguided use-limits within the Goodnews drainage would only be enforced in years when unguided use on the Kanektok is also limited.

conditions, up to two float groups could be prevented from visiting during the fall peak season. Consistent with the previous discussion relative to Kanektok River use, the proposed limits would likely constitute a minor negative impact on unguided visitor access to the Goodnews River watershed.

Guided motorized access to the North Fork Goodnews River would be reduced from the current maximum permitted level of nine boats per day to one boat and three people per day. This action would have the immediate effect of reducing group sizes; visitors wishing to travel in groups larger than three would not be able to access the North Fork via guided motorboats. The practical negative effect of this action would be negligible, however, because demand for guided motorboat access on the North Fork is low; use has averaged just 17 trips per year since 1990.

Guided float visitors would have the option of visiting either the North or Middle forks of the River under this alternative. This represents a minor positive impact on visitor access because there is currently no guided float access on the Middle Fork.

No changes in Togiak River management are proposed, so the effects of this alternative are the same as those described under Alternative A.

4.4.2.4 Alternative D

Under Alternative D, the existing limit of one flight per day and six people at one time at Cape Peirce would be increased to two flights per day and 12 people at one time, and only commercially guided clients would be allowed to visit. In addition, moderate facilities such as tent platforms, food storage areas, a cabin, and an outhouse could be constructed at Sangor Lake. This alternative would have a major negative effect on unguided visitors, because their opportunity to access Cape Peirce would be eliminated altogether. Facilities at Sangor Lake could attract a few more guided visitors, but it is unlikely that facilities alone would change the current level of use. If walrus become a consistent and predictable attraction at Cape Peirce and visitor demand increases accordingly, this alternative would substantially increase guided visitor access. In this unlikely scenario, this action could have a major positive effect on guided visitor access.

Effects on unguided visitor access to the Kanektok and Goodnews watersheds would be the same as those described under Alternative A (Tables 4-1, 4-2).

Opportunities for guided visitor access to the Goodnews watershed would be expanded under this alternative. Motorized use on the North Fork would be allowed to grow from 18 clients per day (currently allowed) to 27 per day, and one temporary support camp would be allowed. On the Middle Fork, motorized use would be allowed to grow from two boats and six clients per day to three boats and 10 people per day. Float access on the North Fork would be increased from one trip per week to one trip every other day, which is equivalent to about 40 additional trip opportunities. On the Middle Fork, where no guided float access is currently allowed, one trip per week would be permitted.

At current and projected use levels, raising motorboat limits would have no practical effect on guided motorboat visitor access. If, for unforeseen reasons, demand increased substantially, this alternative could have a moderate positive effect on guided motorboat access to the Goodnews watershed. Guided float use on the North Fork has been variable over the past 10 years, so future demand is uncertain. If there is demand for more than one trip per week, this alternative would have a moderate to major positive effect on guided visitor access. On the Middle Fork, where river conditions make float access very challenging, demand is expected to remain low. Therefore, this alternative would have only negligible effects on guided visitor access there.

4.4.2.5 Alternative E

Under this alternative, the effects on visitor access to Cape Peirce would be similar to those described under Alternative C, except that, under conditions of high demand, 30 percent of permits would be allocated for guided visitors and 70 percent for unguided visitors.

Unguided visitor access to the Kanektok River would be restricted through a limited permit system to one trip start every three days with a maximum of three boats and nine people per trip. For the season June 1 to September 23, there would be approximately 37 unguided float starts permitted. From 2001 to 2004, there was an annual average of 52 unguided trip starts with an average of about four people (two boats) each. Limiting group size under this alternative would have only a negligible impact on unguided visitor access, but limiting trip starts would deny access to

at least 15 groups immediately and up to 39 groups by 2020 (given maximum projected demand). Overall, this would constitute a major negative impact on visitor access because one-quarter to more than one-half of potential visitors (in a given year) could be denied access. (Table 4-1)

Unguided visitor access to the Goodnews River (all forks) would also be limited to one trip every three days under this alternative. From 2001 to 2004, there was an annual average of about 44 unguided trip starts within the Goodnews watershed with an average of about four people (two boats) each. Limiting group size would have only a negligible impact on unguided visitor access, but limiting trip starts would deny access to a few groups immediately and some additional groups, depending on the level of demand in the future. It is likely, given that a substantial proportion of groups would be displaced from the Kanektok under this alternative, that some of them would choose the Goodnews River as an alternative and thereby increase future demand. Given that at least four groups would likely be displaced immediately and some larger number would likely be displaced each year in the future, this alternative would have a minor negative effect in the short term and a moderate to major negative effect over the life of this Plan. (Table 4-2)

The effects of this alternative on guided visitor access would be the same as those described in Alternative A.

Table 4-1. Average unguided float starts: Kanektok River

	Total Groups (June 1- Sept 23)	Early Peak Season	Late Peak Season	Total Peak Season
1993-1996	36	15	12	27
2001-2004	52	14	19	33
change	16	-1	7	6
Max use Alt. A	unlimited	unlimited	unlimited	unlimited
Max use Alt. B	57	11	15	26
Max use Alt. C	unlimited	11	15	26
Max use Alt. D	unlimited	unlimited	unlimited	unlimited
Max use Alt. E	37	6	8	14

Table 4-2. Average unguided float starts: Goodnews River watershed

	Total Groups (June 1- Sept 23)	Early Peak Season	Late Peak Season	Total Peak Season
1993-1996	40	9	21	30
2001-2004	41	9	18	27
change	1	0	-3	-3
Max use Alt. A	unlimited	unlimited	unlimited	unlimited
Max use Alt B	44	13	15	28
Max use Alt C	unlimited	12	16	28
Max use Alt. D	unlimited	unlimited	unlimited	unlimited
Max use Alt. E	37	6	8	14

4.4.3 Effects on Visitor Experiences

4.4.3.1 Alternative A

Under current management, visitor experiences at Cape Peirce are primarily influenced by the primitive natural setting and the presence or absence of walrus and other wildlife for viewing. Because only one flight per day is permitted to land there, visitors are unlikely to encounter other groups, and the very few visitors who choose to stay overnight are unlikely to have others camping within sight or sound of them. Nothing proposed under current management is likely to affect these aspects of visitor experiences.

The results of surveys conducted in 1995 and 2001 (Appendix E) indicate that a substantial majority of float and motorboat visitors to the Kanektok, Goodnews, and Togiak Rivers (both guided and unguided) felt that "catching fish," "being in a natural place," and "being in a wilderness" were very important reasons for visiting the river. Most visitors also felt that "scenery," "viewing wildlife," and "opportunities for solitude" were very important. Surveyed visitors indicated that the factors most likely to negatively influence their experiences were competition for fishing and camping sites, seeing unburied human waste and litter, encountering other anglers in motorboats, and seeing large groups (more than four boats or eight people). Based on these data, the kind of experience that most visitors seek on these rivers can be characterized as a "wilderness fishing experience," which is defined as fishing with a relatively high likelihood of success in a primitive natural setting with relatively few other people or signs of people.

Most survey respondents in 2001 did not feel crowded, and most did not report unacceptable conditions with respect to litter or other negative influences. However, most respondents also indicated that they would have preferred more solitude and less evidence of other users than what they actually experienced. About 20 percent of them reported that the amount of litter they saw exceeded their personal tolerance levels (the point at which their experience is diminished). On the Kanektok River, an additional 40 percent of respondents reported that the amount of litter they experienced was right at their tolerance threshold; and on the Goodnews River, 35 percent of respondents reported the same. In other words, more than half of respondents from the Kanektok and Goodnews Rivers reported that the amount of litter they saw was at or above their personal tolerance levels. At least one-third of visitors to these rivers also indicated that other important factors (e.g., competition, encountering others—see Appendix E) were at or above their personal tolerance thresholds.

Under current management, unguided visitor use on the Kanektok River is expected to increase moderately each year, eventually reaching 70 to 76 annual float trip starts by 2020. Guided use, which is already limited, is expected to continue at current levels. By 2020, virtually all float groups would be forced to begin their trips on the same day as one or more other groups. Visitors in these groups would be more likely to camp within sight or sound of each other, compete for campsites and fishing holes, and feel crowded, but the magnitude of this impact is uncertain.

Cole (2001) demonstrated that visitor use and social and ecological impacts have a curvilinear relationship—that is, impacts tend to begin leveling out as use grows rather than continuing to increase in a linear fashion. Therefore, a 30 percent increase in use would not necessarily lead to a 30 percent increase in litter, competition, or crowding. In fact, some impacts like litter may actually be reduced by changing visitor behaviors even as total use increases. Further complicating matters is the fact that visitors' personal tolerance thresholds appear to have changed over time; 2001 survey respondents were generally more tolerant of experience impacts than 1995 respondents. These factors are likely to mitigate some of the negative impacts associated with future use increases on the Kanektok River. However, given that at least one-third of Kanektok visitors (according to 2001 survey results) already feel that use-related impacts are at or above their personal thresholds, it

is reasonable to expect that additional increases in use will result in diminished experiences for a substantial proportion of visitors. It is likely that this negative impact will be minor to moderate in the short term (affecting a few individuals or groups as use increases slightly over the next five years) and moderate to major over the life of this plan (affecting multiple groups or whole visitor segments by 2020).

On the Goodnews and Togiak rivers, where visitor use is expected to increase only slightly, negative impacts on visitor experiences will be proportionally smaller: negligible to minor over the next five years and minor to moderate over the life of this plan.

4.4.3.2 Alternative B

Under this alternative, visitor experiences at Cape Peirce will continue to be primarily influenced by the primitive natural setting, and the presence or absence of walrus and other wildlife for viewing. The proposed 50/50 allocation of permits for guided and unguided visitors could lead to a situation, under conditions of high demand, in which a few people are unable to visit in the way they would prefer. However, this scenario is unlikely. The effects of this proposed action are likely to be the same as those described in Alternative A (i.e., no impacts).

Unguided visitor access restrictions proposed for the Kanektok and Goodnews watersheds would prevent use levels from increasing much beyond current levels. Guided use would also continue at current levels except on the Middle Fork of the Goodnews River, where use would be allowed to increase by up to one boat and four people per day. In addition, float groups on the Kanektok River would be required to carry out solid waste if standards for water quality are exceeded. Under this alternative, a portion of river visitors would continue to encounter conditions that diminish their experiences, but the negative impacts associated with increased use would not occur. On the Kanektok River, in the short term, the proposed limited permit system would have a minor positive effect on both guided and unguided visitor experiences by spreading out use and reducing the likelihood of crowding and competition. Over time, if demand for Kanektok River experiences grows as expected, the proposed action would have a moderate to major positive impact by preventing or mitigating a host of negative impacts associated with visitor use. Positive impacts from the permit system would be proportionally smaller on the Goodnews River where current use and projected demand are lower; in the short term, they would

likely be negligible, but over time—especially if demand increases as some users are displaced from the Kanektok River—the magnitude of positive impacts could be moderate to major.

While the proposed permit system and access restrictions would reduce use-related impacts, there would be an experience tradeoff in terms of reduced visitor freedom. Some unguided visitors might feel constrained or hassled by the requirement that they obtain a permit before visiting. However, research suggests that wilderness visitors feel less constrained by regulations imposed outside wilderness such as permit requirements than they do by regulations that direct their behaviors or travel plans within wilderness such as campfire restrictions and designated campsites (Shindler and Shelby 1993). Moreover, survey results from 1995 and 2001 indicate that most of Kanektok and Goodnews visitors plan their trips more than six months in advance and travel long distances to reach the rivers; the process of obtaining a permit is likely to be a very small addition to their overall trip planning efforts. Therefore, experience impacts would be negligible for visitors who are able to obtain permits. Some visitors might also feel hassled or constrained if the proposed waste pack-out requirement was implemented. However, pack-out requirements are common and relatively popular on other rivers around the nation, and many Togiak Refuge visitors are likely to be familiar with them. Given the convenience and growing acceptance of modern waste pack-out technologies, the negative impacts associated with this requirement are likely to be negligible as well.

Of greater concern, perhaps, are the potential impacts to visitors who are unable to access the rivers due to the limited number of permits and start days available under this alternative. In 2004, there were 33 unguided groups that began their Kanektok River trips on the same day as another group. Under the proposed limited permit system, each of these groups would be required to begin their trips on some other available day. At current use levels, there are enough available days between June 1 and September 23 that all groups could be accommodated if they were spread evenly through the season. However, at least some groups would likely be unwilling or unable to visit at another time, and would be effectively denied access. If Kanektok River demand increases over time as expected, the proportion of unguided groups that are unable to visit or unable to visit at their preferred times would increase as well.

Short-term negative impacts on Goodnews River unguided visitor experiences would be similar in nature but smaller in magnitude compared to those described for the Kanektok River. In 2004, on the Goodnews River, there were just five unguided groups that began their trips on the same day as another group. These groups would be required to start on some other available day, and those who are unable or unwilling to do so would be denied access. The proposed limits could accommodate current use levels, but future unguided growth would not be allowed. Under current management conditions, demand on the Goodnews River is expected to increase only slightly over the life of this Plan. If unguided use is limited on the Kanektok, however, demand could increase substantially as would-be Kanektok visitors seek alternative opportunities.

The nature and magnitude of impacts to visitor experiences on both rivers would vary according to visitor characteristics. Guided visitors would likely benefit from reduced overall use without experiencing any negative impacts from access restrictions. For unguided visitors who are able to easily modify the dates of their trips, the short-term negative impact would be negligible. For those with little or no flexibility, the impact might be considered major. Over the longer term, overall impacts would be moderate to major—by 2020, up to 25 percent of would-be visitors could be unable to access the rivers at any time between June 1 and September 23 (assuming 57 available start days and estimated future demand for up to 76 starts).

Despite the potential negative impacts on their access opportunities, 44 percent of unguided visitors surveyed in 2001 indicated that they would support or strongly support limits on unguided float trip starts. Among guided visitors, the proportion in support of unguided limits was 79 percent. When responses from all visitors are considered together, 64 percent indicated support for limits on unguided trips. The main reason for this support was the belief that limits would improve visitor experiences. Among unguided visitors, about 40 percent of respondents agreed that limits would improve experiences; among guided visitors, nearly 80 percent agreed (see Figures E-2 and E-3 in Appendix E).

4.4.3.3 Alternative C

Under this alternative, visitation at Cape Peirce would be allowed to increase to two flights per day and up to 12 people at one time. In addition, some minimal facilities to support overnight stays would be provided. In times of high demand, visitors could frequently be on-site with one or

more other groups. This represents a substantial change compared to the current experience opportunity in which visitors are virtually guaranteed to be alone with the other members of their groups. Given current and expected future demand, however, this alternative would likely have negligible to minor negative impacts on Cape Peirce visitor experiences. The provision of tent platforms, a food storage area, and an outhouse could have a minor positive impact on the experiences of visitors who prefer a slightly more developed setting.

On the Kanektok River, both positive and negative impacts would be similar to those described under Alternative B. However, the limited permit system for unguided visitors would only be imposed during the early (June 25 to July 15) and late (August 10 to September 7) peak seasons, so most impacts would be concentrated during those times. Under this alternative, annual, unguided, peak season use—which has recently averaged 33 float-trip starts—would be limited to 26 starts. In the short term, up to seven unguided groups would be required to visit at another time of year or be displaced altogether. At the same time, visitors who obtain a permit would be less likely to encounter or compete with one another during their trips. Over the longer term, demand for peak season use is expected to increase slightly, so negative impacts (in the form of groups displaced or denied access) and positive impacts (in the form of reduced competition and crowding) would be slightly greater.

On the Goodnews River, unguided float starts would be limited to one every other weekday during peak seasons, but two starts would be allowed on weekends. This would result in a Tuesday, Thursday, Saturday, and Sunday launch pattern with up to 28 total unguided starts allowed during the combined peak seasons. Recent peak season use has averaged about 27 trips, so negative impacts in the form of displaced visitors would be minor. If limits on the Kanektok River lead to substantially increased demand for Goodnews River experiences, a greater number of would-be groups could be displaced; however, positive impacts in the form of reduced competition and crowding would increase as well. Overall, the affects of this alternative on unguided Goodnews visitor experiences would be similar to those described above for the Kanektok River.

The few, minor changes proposed for guided use under this alternative would have negligible impacts on visitor experiences. The proposed waste-management actions

would have essentially the same impacts as those described in Alternative B.

4.4.3.4 Alternative D

Under this alternative, actions at Cape Peirce and Sangor Lake would have impacts similar to those described in Alternatives B and C. One difference is that all visitors would be required to visit with a permitted commercial guide. The opportunity for an unguided experience would be eliminated altogether, and for the few people who prefer to visit without a guide each year, this action would constitute a major negative impact. Some dimensions of guided experiences may be qualitatively different than unguided experiences—for example, unguided experiences may involve more self-reliance or skill—but since most visitors already choose to visit with guides, the overall effect on their experiences would be minor.

Effects on Kanektok and Goodnews visitor experiences would be the same as those described under current management (Alternative A). New or additional guided experience opportunities would be created under this alternative on the Goodnews, Togiak, Osviak, and Matogak rivers. Since demand for these opportunities is low and is expected to remain low, the overall effect of these new opportunities on visitor experiences would be negligible.

The effects of proposed waste management actions would be the same as those described in Alternative B.

4.4.3.5 Alternative E

Under this alternative, the effects of proposed actions at Cape Peirce would be similar to those described in the other action alternatives. Only 30 percent of use would be allocated to commercial guides, so it is possible that future high demand for guided experiences could exceed capacity. This scenario, however, is unlikely. One additional difference in this alternative is that facilities to support cultural and natural history interpretive programs could be constructed at Sangor Lake. Such facilities would likely enhance certain dimensions of visitor experiences (e.g., learning and appreciation), but they could also have a negative impact on the primitive setting that currently influences visitor experiences.

The effects of proposed unguided use limits on the Kanektok and Goodnews Rivers would be similar in nature but greater in magnitude compared to the effects described in Alternative B. Unguided users on both rivers would be

limited to one trip start every three days. Crowding and competition for all users would be reduced from current levels, and future growth of these impacts would essentially be prevented. Guided visitors would enjoy enhanced experiences immediately and into the future at no cost in terms of access. Unguided visitors, on the other hand, would be subject to substantial access restrictions and associated negative impacts on their experiences. Maximum unguided use for both rivers would be reduced to 37 float starts per year. On the Kanektok River, that would mean the immediate displacement of 15 groups; on the Goodnews River, up to seven groups would be immediately displaced. Since limits would apply equally to both rivers, the Goodnews would not be available for displaced Kanektok users. By 2020, more than 40 would-be visitor groups could be denied access to these rivers each year. Since no changes are proposed for guided experience opportunities, this alternative would also have the effect of making guided experiences the predominant type on these rivers. In addition to guided motorized activities, guided float starts would be allowed every other day or approximately 57 times per season, while only 37 unguided starts would be permitted.

The effects of proposed waste management actions would be the same as those described in the other action alternatives.

4.4.4 Effects on Local Users

4.4.4.1 Alternative A

Residents of Togiak Refuge-area communities may be impacted by changes in visitor use in much the same way that visitors are impacted. Increased visitor use may lead to increased crowding, competition, and general conflict for local users. Wolfe (1987, 1989) and Kluwe (2002) have documented general types and specific incidents of conflicts between recreation visitors and local users on popular rivers in the Refuge area. Most conflicts occur on the lower stretches of these rivers where guided motorized visitors and local users are most likely to encounter one another. Some conflicts are rooted in opposing value systems (e.g., the ethics of catch-and-release fishing), while others are based on more tangible issues such as limited availability of camp or fishing sites.

All other things being equal, increased visitor use means an increased likelihood of competition and conflict with local users. As with other kinds of impacts, the relationship between increasing use and increasing conflicts is probably not linear. In this case, however, it is possible that conflicts

could increase at a faster rate than visitor use. General research in sociology and psychology has shown that the rate of aggressive behaviors and conflicts increases as more people vie for the same territory or resources (Malmberg 1980, Taylor 1988).

At present, local resident and visitor use of the Cape Peirce area is low, and no management actions are proposed that would be likely to change the amount of use or affect local users in any other way. On the Kanektok River, unguided visitor float use is expected to grow by 18 to 24 trip starts over the life of this plan (40 to 50 percent more use than is currently occurring). However, on the scale of total boat traffic along the lower river (where local user encounters are most likely to occur), 24 new trips is a negligible increase. A nearly 50 percent increase in float visitor use may indirectly contribute to a few additional conflicts with locals who use the upper river, but this impact is likely to be negligible overall.

Guided motorized use on the Kanektok, Goodnews, and Togiak Rivers currently occurs at below permitted levels. If use on these rivers increased to near-maximum allowed levels, impacts to local users would increase. Refuge permit records from the last 15 years show short periods of increasing and then decreasing use, but the overall trend has been relatively flat. Accordingly, short term increases or decreases in negative impacts to local users may also occur, but the overall impact of current management is expected to be negligible.

4.4.4.2 Alternative B

Under this alternative, unguided visitor use would be limited to one trip start every other day on the Kanektok River, and limited to current levels on the Goodnews River. These actions would have negligible impact on local users. Guided motorized users on the Middle Fork Goodnews River would be allowed to develop one temporary camp, and maximum allowable use would increase from six to 10 people per day. Given historical use trends, it is unlikely that visitor use would approach these maximum allowable levels. If it does, however, this action would increase the likelihood of minor negative impacts to local users compared to current management.

4.4.4.3 Alternative C

This alternative would have impacts similar to those described under current management. Seasonally implemented, unguided visitor limits would have negligible

effects on local users. Similarly, the proposed moderate reduction in allowable guided motorized use on the Goodnews River would likely have only minor or negligible effects on the actual number of guided users. Therefore, the effect on local users would be negligible or minor.

Seasonally implemented visitor limits could slow growth on the Kanektok and Goodnews Rivers compared to current management, although growth could still occur without restriction outside of peak-use seasons. Therefore, the potential negative economic impact of use-limits would be partially mitigated. If the expected negative impacts under Alternative B are minor to moderate, then impacts under this alternative would likely be negligible.

4.4.4.4 Alternative D

Under this alternative, expanded commercial guiding opportunities would be provided on the Goodnews and Togiak Rivers, and new guiding opportunities would be provided on the Osviak and Matogak Rivers. On the Goodnews River, where demand has historically been below permitted levels, expanded opportunities probably would not lead to substantially increased visitor use. On the Togiak River, demand for guided visitor experiences has also been below permitted levels, but small changes there could lead to greater impacts on local users.

Commercial guiding opportunities on the Togiak River were carefully allocated according to available fishing sites in the 1991 Togiak Refuge Public Use Management Plan (PUMP). Roughly doubling the allowable guided use, as proposed in this alternative, could reduce the number of fishing sites available at any one time from nine to two or three. During seasonal periods of peak demand, local users and guided visitors would compete for available sites, and some conflicts would likely occur. Based on the level of interest in Togiak River allocation that was expressed during development of the 1991 PUMP and again during scoping for this PUMP revision, it is also likely that some local users would be further impacted by the perceived loss of access protections for which they have argued. Estimating the magnitude of these impacts is difficult due to the many interacting factors involved (e.g., individual behaviors and tolerances, seasonal fish returns and water levels, trip logistics, travel patterns). It is reasonable to expect, however, that a large proportion of local users could be negatively impacted by the proposed action, either directly as the result of competition and conflict or indirectly as the result of perceived inequities or lost opportunities. If more than half of local users were

affected in one of these ways, the proposed action would have a major negative impact.

There is currently very little, if any, visitor use on the Osviak and Matogak Rivers, so any new guided visitors would be conspicuous. In addition, there are several private parcels and cabins located on the lower stretches of these rivers where local users and visitors would be likely to encounter one another. Providing new guiding opportunities on the Osviak and Matogak Rivers would likely lead to conflicts with a few local users, but visitor demand on these rivers is expected to be very low (at present it is not clear that there is any commercial interest in guiding these rivers), so overall impacts would likely be negligible.

4.4.4.5 Alternative E

Under this alternative, unguided use on the Kanektok and Goodnews Rivers would be limited to one float start every three days. Since this reduction would have little impact on the total volume of lower-river boat traffic (where recreational visitors are most likely to encounter local users), the positive effects (in the form of reduced conflicts) of this action would be negligible. Management of guided use would be the same as current management, so the effects on local users would be the same as well.

4.4.5 Effects on the Local Economy

4.4.5.1 Alternative A

Refuge public use management affects the economy through direct spending and through various actions that may influence the number of visitors who travel and spend money in the region. Direct spending includes employee salaries, gas, and equipment, and may also include the purchase of special goods and services such as contracted facility construction and maintenance. The primary outlets for visitor spending include air taxis, lodging, guide and outfitter fees, food, and miscellaneous small equipment such as fishing gear.

No changes in direct Refuge spending that would affect the local economy are planned under current management. Guide and air taxi fees associated with hunting and wildlife viewing will continue to be important sources of revenue for a few individuals, but most economic impacts will be associated with recreational fishing.

The vast majority of recreational visits to Togiak Refuge are associated with fishing. According to reports from permitted guides and air taxi operators, there were a total of 90

wildlife viewing use-days at Cape Peirce in 2003. In comparison, there have been between 8,000 and 10,000 recreational fishing use-days on the Refuge each year since the mid 1990s (See Figure 3-10, Togiak Refuge Recreational Fishing 1990-2004 in the Plan). Goldsmith, et al. (1998) estimate that the economic significance of recreational fishing on the Refuge (the impact of spending after it has circulated in the economy) was about $3,570,000 in statewide household income in 1997. Based on these figures, an average recreational fishing day is worth (very roughly) $357 in the Alaska economy.

Under current management, guided use of the Kanektok, Goodnews, and Togiak Rivers is expected to continue at roughly the same level as in recent years. Unguided use on the Kanektok would likely increase by 18 to 24 trips within 15 years. According to 2001 visitor survey results (Appendix E), average trip length for unguided float groups is eight days, and average group size is four, so the projected increase would result in 576 to 768 use-days. At $357 per use-day, increased use could be worth as much as $274,176 in annual household income (in 1997 dollars) by 2020. While additional visitor spending would clearly have a positive economic impact, the effect would be small on the scale of total recreational fishing impacts; the maximum expected increase represents less than eight percent of the total income currently generated by fishing. It is likely that positive impacts would be limited to the community level; therefore, current management will have a minor to moderate positive effect on the economy, affecting jobs and income within the community.

4.4.5.2 Alternative B

Under this alternative, growth in unguided use of the Kanektok River and Goodnews Rivers would essentially be prevented. There would be few short-term differences, but over time, less household income would be generated from Kanektok River visitors compared to current management. If group size, trip lengths, and demand on other rivers stay the same, the difference by 2020 could be as much as $217,000 annually (in 1997 dollars), or close to seven percent of total statewide household income currently generated by Togiak Refuge recreational fishing[6]. The loss of this potential income would constitute a minor to moderate negative impact on the economy. The effects of Cape Peirce

[6] The difference between maximum projected use under current management (76 Kanektok River unguided float trips) and maximum allowable use under Alternative B (57 starts) is 19. Nineteen, four-person trips of eight days each is equivalent to 608 use-days or $217,056 in statewide household income (using 1997 estimates).

management and guided river-use management would be essentially the same as those described under Alternative A.

4.4.5.3 Alternative C

Under this alternative, maximum allowable use at Cape Peirce would double compared to current management. Visitor demand at that location varies according to the unpredictable presence of walrus, but if demand were consistently high, actual visitor use could more than double compared to recent years. However, since the economic significance of non-consumptive refuge activities is relatively small—estimated at $300,000 (Goldsmith, et al. 1998) in 1997—the positive impacts of increased use would likely be minor.

Seasonally implemented visitor limits could slow growth on the Kanektok and Goodnews Rivers compared to current management. However, the proposed Goodnews River limits would allow for substantial growth compared to current use; some displaced Kanektok visitors could, and likely would, switch to the Goodnews River because it offers similar fishing and floating opportunities. Therefore, the potential negative economic impact of use-limits would be partially mitigated. If the expected negative impacts under Alternative B are minor to moderate, impacts under this alternative would likely be negligible.

4.4.5.4 Alternative D

Under this alternative, the minor positive economic impacts of increased use at Cape Peirce would be the same as those described under Alternative C. The effects of increased, unguided visitor use would be the same as those described under current management.

The effects of increased commercial guiding opportunities largely depend on visitor demand. Since most guided visitor use has long been below permitted levels, there is little evidence to suggest that increasing guided opportunities would lead to more guided visitors. This alternative presents the potential for substantially increased visitor use and associated positive economic impacts; however, it is likely that actual impacts would be negligible.

4.4.5.5 Alternative E

Under this alternative, the minor positive economic impacts of increased use at Cape Peirce would be the same as those described under Alternative C. Construction of a cabin could motivate a small, short-term increase in Refuge spending but the effect would be negligible.

Unguided use of the Kanektok and Goodnews Rivers would be limited to one trip every three days. On the Kanektok, limiting trip starts in this manner would reduce use by at least 15 trips immediately and up to 39 trips by 2020 (given maximum projected demand). On the Goodnews, use would be reduced by up to seven trips immediately and some slightly larger number by 2020 (given relatively flat demand). If future unguided use on these two rivers was reduced by a total of 45 trips compared to current management, the economic effect would be (roughly) a $514,000 reduction in statewide income or about 14 percent of total statewide household income currently generated by Togiak Refuge recreational fishing [7]. If the expected negative impacts under Alternative B are minor to moderate, projected long-term impacts under this alternative would likely be moderate to major (affecting some jobs and income in multiple communities).

No changes are proposed for guided fishing opportunities, so the effects would be the same as those described under current management.

4.4.6 Effects on Wilderness Values

4.4.6.1 Alternative A

The wilderness values considered in this section are derived from the 1964 Wilderness Act and described in chapter 3, section 3.6.1 of the Plan. The values are: *undeveloped, untrammeled, natural, outstanding opportunities for solitude, and outstanding opportunities for a primitive or unconfined type of recreation*. For the purposes of this analysis, only values that may be influenced by refuge management are considered.

In the context of refuge management, the *undeveloped* and *natural* values may be affected by the presence of structures such as cabins and outhouses, and by other evidence of people such as litter, human waste, and campsite impacts including trampled vegetation and fire rings. Opportunities for solitude and primitive recreation may be affected by the presence of other users, by developments that reduce challenge or self-reliance (e.g., signage, bridges), and by regulations that limit perceived freedom. Most of these factors, including crowding and solitude, perceived freedom, litter, and human waste were discussed in the preceding visitor experiences section. Where

[7] Forty-five trips is equivalent to 1,440 use-days; multiplied by $357 per use-day, the total is $514,080.

appropriate, that section is referenced rather than repeating the information here.

Under current management, Cape Peirce is likely to remain an undeveloped, highly natural setting with excellent opportunities for primitive recreation and solitude. Visitation is limited to one flight and six people per day, and all visitors are required to obtain a Refuge permit. This limitation virtually assures each visiting group that they will experience a high degree of solitude. The permit requirement may be perceived as a constraint by some, but at current and expected use levels, it is not enforced and does not functionally limit use. Therefore, its negative effects on perceived freedom are now, and will continue to be, negligible.

On Kagati and Goodnews Lakes, outhouses will continue to have a minor, localized impact on settings that are otherwise undeveloped and highly natural. River visitors who begin their trips at these lakes will be more likely to encounter other visitors as use increases over time. Increased use will have a moderate to major impact on opportunities for solitude through increased competition, crowding, and conflicts as described in the preceding visitor experiences section. Litter and human waste from additional visitor use may also have a minor impact on natural conditions.

On the Togiak River, both guided and unguided visitation is expected to continue at present levels and no change in current wilderness values is expected.

4.4.6.2 Alternative B

Under this alternative, impacts to wilderness values at Cape Peirce will be the same as those described under current management. At Kagati and Goodnews lakes, outhouses could be removed if river floaters are eventually required to carry out all waste. Removing the outhouses would have a minor positive impact on naturalness, but regulating visitor behaviors could also have a negative impact on the experience of wilderness freedom. The magnitude of this impact would be major in the sense that it would affect all float visitors, but the nature of the impact (its actual influence on perceived freedom) would be highly variable depending on individual visitor characteristics.

Float groups under this alternative will be much less likely to encounter one another, as both guided and unguided visitors would be limited to one trip each on alternating days. Over time, opportunities for solitude—especially on

the Kanektok River—would be enhanced compared to current management; the preceding section on visitor experiences describes projected levels of use and associated impacts. On the Togiak River, both guided and unguided visitation is expected to continue at present levels and no change in current wilderness values is expected.

4.4.6.3 Alternative C

Under this alternative, maximum public use at Cape Peirce would be doubled from one to two flights per day, and tent platforms, an outhouse, and a food storage area would be constructed at Sangor Lake. Construction of the facilities would have a moderate, localized negative impact on the natural setting. Doubling allowable use would not immediately impact opportunities for solitude, given current visitor demand. Under conditions of high demand, however, this increase could have at least a moderate negative impact (affecting up to half of visitors) on opportunities for solitude, as visiting groups would be much more likely to encounter one another.

It is doubtful that outhouses at Kagati and Goodnews lakes could be removed under this alternative, because packing out human waste would be voluntary. Research has shown that river users almost never voluntarily comply with waste pack-out programs (Whittaker 2005). At the same time, a voluntary program would have no impact on visitor experiences of freedom.

During peak fishing seasons on the Kanektok and Goodnews rivers, impacts on solitude and naturalness would be reduced compared to current management as a result of the proposed limited permit program. Outside of the peak seasons, unguided use could and likely would increase moderately compared to current levels, with associated negative impacts on solitude and naturalness. See the preceding section on visitor experiences for specific estimates of projected future use and impacts.

A small reduction in the permitted amount of guided, motorized use on the North Fork Goodnews River could have a positive impact on opportunities for solitude there. However, since current use is low and demand also appears to be low, the magnitude of that impact would be negligible. On the Togiak River, where no management changes are proposed, both guided and unguided visitation is expected to continue at present levels, and no change in current wilderness values is expected.

4.4.6.4 Alternative D

Under this alternative, impacts to wilderness values at Cape Peirce will be largely the same as those described under Alternative C. Facilities at Sangor Lake would be upgraded to include a cabin as well as tent platforms, an outhouse, and a food storage area, but the impacts to the undeveloped, natural setting would still be moderate and localized.

The effects of the proposed waste management program would be the same as those described under Alternative B. Unguided use on the Kanektok and Goodnews rivers would be allowed to expand according to demand, with associated impacts to naturalness and solitude as described in previous sections. Guided, motorized and float use would be allowed to expand on the Goodnews and Togiak rivers, although demand for these opportunities is uncertain. Projected future use levels and associated impacts to primitive recreation and solitude are described in the preceding sections on visitor experiences and local users.

4.4.6.5 Alternative E

Visitor use and facilities at Cape Peirce will be largely the same as those described under Alternative D, although a large cabin with a meeting area would also be provided. Impacts to naturalness and opportunities for primitive recreation would be greater under this alternative than under any of the others. However, with proper attention to the design and specific location of the facilities, impacts could still be localized and moderate.

At Kagati and Goodnews lakes, outhouses could be removed when river floaters are eventually required to carry out all waste. Removing the outhouses would have the same effects, both positive and negative, as those described under Alternative B. Solitude for float visitors beginning their trips at these lakes and for other Kanektok and Goodnews River visitors would be maximized under this alternative. Projected future use levels and associated impacts are described in the preceding section on visitor experiences. On the Togiak River, where no management changes are proposed, both guided and unguided visitation is expected to continue at present levels and no change in current wilderness values is expected.

4.4.7 Cumulative Effects

4.4.7.1 Alternative A

Estimates of environmental effects under this alternative are based largely on current and projected future visitor-

use levels. The accuracy of those projections depends on a host of factors that are not under the direct control or influence of refuge management. For example, the availability of other recreational fishing opportunities within southwest Alaska may influence Refuge visitation. At nearby Wood-Tikchik State Park, where wilderness fishing is also a popular attraction, visitor access has recently been limited in accordance with the 2002 Park plan (Alaska Department of Natural Resources 2002). Use limits implemented in the Park could, over time, effectively increase demand for Togiak Refuge fishing. However, given that the total number of visitors displaced from the state park is likely to be small and that opportunities in the Refuge may not be directly substitutable for those in the park, the magnitude of this impact is likely to be negligible.

Long-term weather, wildlife, and fishery trends could also impact refuge visitation, but of all the many potential outside factors, those affecting the cost and various challenges of air travel are the most likely to have a measurable impact. The vast majority of Refuge visitors arrive by air, many from distant parts of the United States or foreign countries. Air travel is strongly influenced by security concerns, flight and route availability, and fuel and other operating costs. The worldwide downturn in air travel and tourism arrivals following the September 11, 2001 terrorist attacks in New York City is well-documented (Travel Industry Association of America 2005). Conversely, studies have shown that the addition of a single new commercial air route—such as the direct flight from Frankfurt, Germany to Anchorage seasonally operated by Condor Airlines—can measurably increase Alaska visitation (Alaska Department of Commerce, Community, and Economic Development 2004).

It is reasonable to expect that improvements in air travel (i.e., reductions in cost, new technologies that reduce time or improve convenience, etc.) might encourage more Refuge visitation, while increased cost (due to rising fuel prices for example) or other negative changes might mitigate projected increases in visitation. However, the likelihood of these changes is uncertain, and therefore associated impacts to Refuge visitation are also uncertain.

Overall, the actions under current management, combined with other foreseeable influences, would allow for continued increases in unguided visitor use on popular Refuge rivers. The projected use increases would have moderate to major negative impacts on Kanektok River visitor experiences,

negligible or minor negative impacts on local users, moderate positive impacts on the local economy, and moderate negative impacts on wilderness values.

4.4.7.2 Alternative B

Under this alternative, the effects of various factors outside direct control of the Refuge would be the same as those described under current management. Overall, the actions under this alternative, combined with other foreseeable influences, would essentially eliminate increases in unguided visitor use on the Kanektok and Goodnews rivers. The proposed actions would protect most aspects of visitor experiences and wilderness values, with moderate negative impacts to visitor access and freedom. Over time, local users could benefit slightly from reduced competition and conflicts, while the local economy would be negatively impacted from lost visitor spending.

4.4.7.3 Alternative C

Under this alternative, the effects of various factors outside direct control of the Refuge would be the same as those described under current management. Overall, the actions under this alternative, combined with other foreseeable influences, would allow unguided visitor use outside the peak fishing seasons to increase at a moderate rate while limiting peak fishing season use to current levels or lower. These actions would have impacts similar to those described under Alternative B, but they would be smaller in magnitude. Positive impacts to visitor experiences, wilderness values, and local users would occur primarily during peak seasons; negative impacts associated with access restrictions would also be limited to those time periods.

4.4.7.4 Alternative D

Under this alternative, the effects of various factors outside direct control of the Refuge would be the same as those described under current management. Overall, the actions under this alternative, combined with other foreseeable influences, would also be similar to those described under current management. However, expanded commercial use, particularly on the Togiak River, could have additional moderate to major negative impacts on local users.

4.4.7.5 Alternative E

Under this alternative, the effects of various factors outside direct control of the Refuge would be the same as those described under current management. Overall, the actions under this alternative, combined with other foreseeable

influences, would reduce unguided visitor use on the Kanektok and Goodnews rivers by about 30 percent immediately and by more than 50 percent by 2020. The proposed actions would enhance most aspects of visitor experiences and wilderness values, with associated moderate to major negative impacts to visitor access and freedom. Over time, local users would also benefit from reduced competition and conflicts, while the local economy would be moderately impacted from lost visitor spending.

4.4.8 Relationship Between Short-Term Uses of the Environment and Long-Term Productivity

Under all alternatives, the primary short-term uses of the Refuges would be subsistence and recreation. Monitoring and regulation of harvested fish and wildlife populations by ADF&G and the Service will ensure the long-term productivity of fish and wildlife populations. None of the short-term uses described in the alternatives would affect the long-term productivity of the ecosystem.

4.4.9 Irreversible and Irretrievable Commitment of Resources

The irreversible commitment of resources means that nonrenewable resources are consumed or destroyed. Examples include the destruction of cultural resources by other management activities and mineral extraction that consumes nonrenewable minerals.

The irretrievable commitment of resources represents trade-offs (opportunities forgone) in the use and management of natural resources. Irretrievable commitment of resources can include the expenditure of funds, loss of production, or restrictions on resource use.

Decisions made in a comprehensive conservation plan do not represent actual irreversible or irretrievable commitment of resources. A conservation plan determines the kinds and levels of activities appropriate within the laws establishing the refuge. A decision to irreversibly or irretrievably commit resources occurs in the following circumstances:

When the Service makes a project- or site-specific decision

At the time Congress acts on a recommendation to establish a new conservation system unit such as

Wilderness or to include a river in the Wild and Scenic River System

Mineral leasing development would not be allowed within the Refuges under any of the management categories used within the Refuge. Therefore, these resources could not be irreversibly committed unless the Plan was amended. Wilderness and river-related values are protected by the management categories applied to the Refuges and would not be irreversibly lost or irreversibly committed under any of the alternatives. Limits on the level of guided use within the refuge would be an example of an irretrievable commitment of resources. Although alternatives presented in this plan allow for increases in the amount of guided use allowed on the Goodnews and Togiak rivers, no alternative reduces the amount of guided use allowed at this time. Therefore, no irretrievable commitment of resources is proposed in this plan.

4.4.10 Environmental Justice

Federal agencies are required to identify and address, as appropriate, any disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations (Executive Order 12898, 1994; amended 1995). This includes health risks and other impacts for people who rely principally on fish or wildlife for subsistence. As described in chapter 3 of the Comprehensive Conservation Plan, communities associated with the Refuges are rural, contain many low-income households, and engage in subsistence uses. The nature of the proposed action, revision of the Public Use Management Plan for the Refuge, is very different from proposals often associated with environmental justice issues (e.g., siting of polluting facilities). None of the alternatives proposed in the Environmental Impact Statement would place a disproportionate weight of any adverse effects on low-income or minority populations. Maintaining high-quality habitat and healthy populations of fish and wildlife, maintaining water quality, and providing opportunities for subsistence are legislated purposes of the Refuge. Thus, the Service cannot compromise these values and their associated uses under any management alternative. While the alternatives contain slightly different approaches to meeting the purposes, neither would favor activities or projects that could direct negative impacts toward low-income or minority populations.

4.4.11 ANILCA Section 810 Evaluation/Effects on Subsistence Opportunity

This evaluation was prepared to comply with Title VIII, Section 810 of the Alaska National Interest Lands Conservation Act (ANILCA). It evaluates the potential impacts to subsistence activities that could result from the various public use management alternatives that have been proposed for Togiak Refuge. Specifically, this evaluation considers whether any of the proposed alternatives would, "…reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes."

Chapter 3, section 3.5.5, describes subsistence activities in the Refuge area. The communities of Manokotak, Togiak, Twin Hills, Goodnews Bay, Platinum, Quinhagak, Dillingham, Aleknagik, and Clark's Point are all either within or adjacent to the Refuge. The primary subsistence-use areas within the Refuge are the Kanektok, Goodnews, Togiak, Osviak, and Matogak rivers.

Wolfe and others (1984) report that traditional subsistence-use sites within Togiak Refuge are often associated with family groups. Members of these family groups may grant permission to area community members to use their sites. As documented by Wolfe (1987, 1989) and Kluwe (2002), recreational visitors are often unaware of informal subsistence rules, and their actions sometimes result in competition, conflict, or temporary displacement of local users along the Kanektok River and other rivers in the Refuge. Although the behaviors and impacts of individual visitor groups are variable, increased visitor use generally means an increased likelihood of conflicts and temporary displacement for local subsistence users.

4.4.12 Effects of the Proposed Alternatives

4.4.12.1 Alternative A

Under current management, guided commercial use on Refuge rivers is expected to continue near current levels. Unguided use on the Goodnews and Togiak rivers is also expected to continue near current levels with minor increases over time. Unguided float-use on the Kanektok River is expected to increase by around 40 percent. The addition of 20 to 25 float groups per year could cause a few additional conflicts between recreational anglers and subsistence users who access the upper portions of the river with the Togiak Wilderness area. However, most subsistence users focus their efforts downstream of the Wilderness boundary during the fishing season where there

is a high volume of motorboat traffic. An extra 25 float groups passing through the lower river would be a negligible addition to the overall volume of boat traffic in that area; therefore, the overall impact to subsistence activities would be negligible as well.

4.4.12.2 Alternative B

Under this alternative, recreational fishing on rivers in the Refuge would continue at near-current levels indefinitely. No new impacts to subsistence activities are expected to occur.

4.4.12.3 Alternative C

This alternative would allow off-peak season recreational use on the Kanektok and Goodnews Rivers to increase according to demand. On the upper Kanektok River, a few additional conflicts between recreational anglers and subsistence users could occur as a result of increased use. On the Goodnews River, increased float use would probably not cause any new conflicts because very few subsistence users travel the shallow upstream waters where they are most likely to encounter float-anglers. Overall, impacts to subsistence activities would be negligible.

4.4.12.4 Alternative D

This alternative would allow for increases in both guided and unguided recreational fishing on the Kanektok, Goodnews, and Togiak rivers. It would also allow for new guiding opportunities on the Osviak and Matogak Rivers, where no commercial guiding is currently allowed. On the Goodnews and Kanektok rivers, impacts would be similar to those described under current management. On the Togiak River, demand for guided visitor experiences has also been below permitted levels, but small changes there could lead to greater impacts on local users.

Commercial guiding opportunities on the Togiak River were carefully allocated according to available fishing sites in the 1991 Togiak Refuge Public Use Management Plan. Roughly doubling the allowable guided use on the Togiak River, as proposed in this alternative, could reduce the number of fishing sites available at any one time from nine, to two or three. During seasonal periods of peak demand, local users and guided visitors would compete for available sites, and some conflicts would likely occur. Based on the level of interest in Togiak River allocation that was expressed during development of the 1991 Public Use Management Plan, and again during scoping for this Public Use Management Plan revision, it is also likely that some local

users would be further impacted by the perceived loss of access protections for which they have argued.

On the Osviak and Matogak rivers, there is currently very little if any recreational visitor use, so any new guided visitors would be conspicuous. In addition, there are a number of private parcels and cabins located on the lower stretches of these rivers where local users and visitors would be likely to encounter one another. However, visitor demand on these rivers is expected to be low (at present it is not clear that there is any commercial interest in guiding these rivers), so opportunities for actual encounters and conflicts would be relatively low as well.

4.4.12.5 Alternative E

Under this alternative, unguided fishing-use on the Kanektok and Goodnews rivers would be reduced by about 25 percent immediately and possibly more than 50 percent by the year 2020. These actions would reduce the potential for conflicts between subsistence users and recreational anglers on the upper portions of the rivers, but there would be little change on the lower river sections where most subsistence use and most boat traffic occur. The few subsistence users with traditional fishing sites or land allotments on the upper river sections could benefit, but the overall impact to subsistence activities would be negligible.

4.5 Conclusion

Neither current management nor any of the actions proposed in alternatives B, C, or E would significantly impact subsistence activities. However, expanding guided fishing opportunities as proposed in Alternative D could significantly impact subsistence activities under conditions of sufficient recreational demand. Alternative D could periodically reduce the number of fishing sites available to Togiak River subsistence users by two-thirds and introduce a new recreational use (guided fishing) to areas that are important locally for subsistence activities. Even if recreational demand is not sufficient to directly impact subsistence activities, allocating additional use for recreational visitors would likely result in perceived impacts on the part of local subsistence users.

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