



The Economic Contribution of Bear Viewing to Southcentral Alaska

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photo by Drew Hamilton

Executive Summary

For visitors worldwide, coming to view the majesty of Alaskan brown bears flourishing in their natural habitat is something very special. It is quite literally an Alaskan safari. The majority of bear viewing occurs in the summertime near the coasts surrounding the Cook Inlet in Southcentral Alaska. Optimum bear viewing opportunities coincide with the great Alaskan salmon runs which begin in late May and peak in July.¹ Given the quality of habitat and vibrancy of local ecosystems, Southcentral Alaska is home to the largest concentration of brown bears found anywhere on earth (NPS 2019).

This study examines the economic contribution of remote-access bear viewing to the regional economy of Southcentral Alaska. Bear viewing opportunities are inextricably linked to McNeil River State Game Sanctuary (SGS), Katmai National Park & Preserve (NP&P), and Lake Clark National Park & Preserve (NP&P). The predictability of brown bear congregations has influenced the development of permanent bear viewing sites within all three parks, which allows visitors to plan trips in advance (NPS 2019; ADF&G

¹ North American Pacific Ocean adult salmon population in 2015 was estimated to be more than 400 million; only Pink, Sockeye, and Chum Salmon were evaluated, therefore even this massive figure is an underestimation of the total North American salmon population (Ruggerone & Irvine 2018). Also, more than 1.5 Billion juveniles are released annually by Alaska salmon hatcheries (Stophra 2018).

2019). In order to reach these remote-access bear viewing sites, businesses in local communities have been providing services, such as air/boat taxis, wildlife guides and sleeping accommodations, to visitors for well over 40 years.²

Two approaches were taken to determine the economic significance of bear viewing in the region. The first approach examines existing research, which has assessed the regional economic contributions associated with wildlife viewing activities and visitation to Katmai NP&P, Lake Clark NP&P, and McNeil River SGS. This approach not only outlines the contribution of visitor spending to the regional economy in terms of employment and total economic output, but also identifies studies that estimate the economic benefits associated with the individual parks. The second approach taken utilizes primary data obtained from an online survey of bear viewing service providers who supplied proprietary financial information in order to estimate the economic contribution of bear viewing activities to the regional economy. The survey asked respondents to identify the proportion of their business attributable to bear viewing services they provide. The proprietary financial data reported by service providers was then extrapolated to account for all 109 bear viewing-associated service providers originally contacted to participate in the survey. The final data set was then used to estimate the economic contribution of service providers to the regional economy using IMPLAN.³

Alaska is often referred to as the “last frontier”, where wildlife continues to thrive in pristine environmental conditions. Many Alaskan residents and non-residents alike believe it is in our economic interest to maintain and protect these natural environments. A service or good (i.e. bear viewing) that has no established dollar value is no less valuable to society than a good or service with one. As competing uses of natural resources grow, it is necessary to incorporate an unbiased economic framework in which monetary values are determined for those goods and services that do not have an established dollar value (Thomas, Miller, Pamplin 1992).⁴ To this end, it is critical for resource and land use management to consider all aspects of societal benefit (welfare) in the decision-making process. This report highlights the economic

² 43% of survey respondents report opening their business between 1976 and 1985.

³ See Sections IV and V for detailed description of IMPLAN analysis

⁴ This concept is often referred to as ‘non-market valuation’

contribution of bear viewing opportunities in Southcentral Alaska, as these opportunities serve a strong foundation for economic viability of local service providers in the region.



McNeil River State Game Sanctuary, by: Mark Wipfli/USGS

Key insights from previous research:

The McNeil River State Game Sanctuary (SGS) has been the subject of two studies estimating the willingness to pay (WTP) for bear viewing permits. Hill (1988) estimates that the WTP for a McNeil River SGS bear viewing permit ranges from \$464 to \$696. A second examination by Clayton and Mendelsohn (1993) provide WTP estimates for site access ranging from \$444 to \$542 on average, and even \$980 for a guaranteed permit. These values represent expenditures permit lottery participants were willing to pay beyond the existing costs associated with accessing the location.

There are also two recent examinations of the economic benefits derived from bear viewing at Katmai NP&P. Richardson, Huber, & Loomis (2017) draw on visitor survey data to estimate the consumer surplus (economic benefit) derived

from bear viewing at Brooks Camp in Katmai NP&P. Measured as a per person trip value their estimates range from \$417 to \$1,002. Consumer surplus is a traditional measure of economic benefit which represents the difference between what an individual is willing to pay and what they actually pay for a good or service.

Similarly, Loomis et al. (2018) evaluate the economic benefit of virtual bear viewing opportunities made possible by the presence of cameras at Katmai NP&P. This thoughtful use of technology makes remote bear viewing opportunities more accessible, increasing the exposure of brown bears beyond Alaska. Their study notes that there were approximately 2.4 million hours spent viewing bears at Brooks Camp online. They estimate an economic benefit of approximately \$27 million is associated with watching Katmai bears online.

In evaluating the economic significance of visitor related spending to Katmai NP&P and Lake Clark NP&P two studies stand out. It is important to note that the economic significance studies focus on individual parks rather than any one particular activity.

Fay and Christensen (2010) provide an assessment of the economic significance of visitor spending associated with Katmai NP&P to the regional economy of Southcentral Alaska (Municipality of Anchorage, Bristol Bay Borough, Lake and Peninsula Borough, Kodiak Borough, Kenai Peninsula Borough). Their assessment indicates that visitor spending associated with Katmai NP&P supported approximately 390 jobs and approximately \$55 million in total output. While this study does not specifically focus on bear viewing related expenditures it does provide estimates localized to the same region examined here.

Most recently, Thomas et al. (2018) provide a modelling framework used to calculate the statewide economic contributions associated with visitor spending related to Katmai NP&P and Lake Clark NP&P. For Katmai NP&P, they find that visitor spending related to the park supports 756 jobs and approximately \$84.6 million in total economic output. For Lake Clark NP&P these values are 455 jobs and approximately \$50.9 million. While these results aren't isolated to the Southcentral region, they highlight the importance of overall visitation to Katmai NP&P and Lake Clark NP&P.



Naknek Lake, Katmai NP&P, by P. Woelber/UnSplash

Estimates of the economic contribution of bear viewing related service providers to Southcentral Alaska:

A total of 22 businesses providing bear viewing related services participated in the survey, providing information about sales, employee payroll, the number of employees, costs, and the proportion of their business activity linked to bear viewing operations. A total of 109 businesses were contacted.

Survey respondents indicated that 74% of their business related spending was made in the Southcentral region. Over half of respondents indicate 90-100% of spending is regional.

Bear viewing related activities were an important component of respondent revenues in 2017. By area of operation the average proportion of revenues associated with bear viewing is 60% for respondents operating accommodations, 58% for firms offering guide services, and 55% for scenic and sightseeing

transportation (boat and air taxis). The lowest proportion reported was 10%, and 36% of businesses report that 80-100% of their business sales are associated with bear viewing.

Scaled to the sample frame of 109 service providers, *bear viewing related service providers generated \$34.5 million in sales. Service providers paid approximately \$10 million in wages and benefits and filled 371 jobs (average).*

Using a multi-region by-parts approach, spending by service providers and households is estimated to support *\$36.3 million in production and contribute \$19 million in value added to the Southcentral region.*

Spending by service providers and households supports approximately *\$17.3 million in labor income and 490 jobs* in the Southcentral region. These figures include the direct wages and benefits of \$10 million paid and 371 positions filled by service providers.

These figures are conservative given that they do not include expenditures by local food and grocery providers, commercial airfares to King Salmon, or national lodging chains that may be related to bear viewing activity by visitors.

TABLE OF CONTENTS

Acknowledgements	i
Executive Summary	ii
TABLE OF CONTENTS	vii
List of Tables & Figures	viii
I. INTRODUCTION & PURPOSE OF STUDY	1
II. OVERVIEW OF BEAR VIEWING IN ALASKA	3
A. Region of Analysis	3
B. Bear Viewing Locations & Visitor Participation	4
i. McNeil River State Game Sanctuary	5
ii. Katmai National Park & Preserve	9
iii. Lake Clark National Park & Preserve	12
C. Industries Supported by Bear Viewing Opportunities	14
III. PRIOR RESEARCH OF ECONOMIC EFFECTS	15
A. Visitor Welfare (Benefit) Estimations	15
B. Economic Significance Estimations	18
IV. METHODS OF ASSESSMENT	20
A. Service Provider Survey & Data	22
B. Types of Economic Effects	22
V. ECONOMIC MODELING & RESULTS	24
VI. FINAL REMARKS	27
APPENDIX A. Glossary of Terminology	28
APPENDIX B. Modeling Limitations & Assumptions	30
REFERENCES	31

List of Tables & Figures

Tables

1. McNeil River SGS Bear Viewing Permit Time Blocks	6
2. McNeil River SGS Permit Fees, Historic and Present	7
3. Locations of Visitor Group Stays Before & After Trip to Katmai NP&P	10
4. Visitor Welfare Estimates of Bear Viewing at McNeil River SGS (2019 dollars)	17
5. Visitor Welfare Estimates of Bear Viewing at Katmai NP&P (2019 dollars)	17
6. Katmai NP&P Visitor Economic Effects – 2007 (2017 dollars)	18
7. Visits, Spending, and Economic Contributions of Katmai NP&P and Lake Clark NP&P to Local Economies – 2017	19
8. Bear Viewing Economic Contribution Results (2017 dollars)	25

Figures

1. Region of Analysis	4
2. McNeil River SGS Mean Daily Bear Count Per Period Compared to Hourly High Counts and Historic Means	8
3. Katmai NP&P Visitor Use Days by Primary Activity (2007-2017)	11
4. Lake Clark NP&P Total Visitor Use Days by Location (2008-2017)	13
5. Lake Clark NP&P Visitor Use Days by Primary Activity (2007-2017)	13
6. Percentage of Expenditures by Service Providers	21



Photo by: K. Jalone/NPS



'Bear Paws' Photo by: Katie Critz/NPS



Photo by: K. Jalone/NPS

I. Introduction & Purpose of Study

The Significance of Bear Viewing in Southcentral Alaska

The Alaska Department of Fish & Game (ADF&G) reports that Alaska supports over 98% of the brown bear (*Ursus arctos*) population found within the United States, and about 70% of the population in all of North America. In fact, both Alaska State and U.S. National government agencies affirm Southcentral Alaska supports the world's largest concentration of brown bears (ADF&G 2019; NPS 2019). While bears in general are omnivores and opportunistic, eating whatever is most easily accessible, the sight of brown bears gorging on salmon as they migrate upriver to spawn is a defining image for many individuals when they imagine Alaska. Bears are also frequently seen munching on a wide variety of abundant vegetation and shellfish such as sedges, berries, clams, and mussels. Having a steady supply of food means less competition among the bears, and population densities in this region have been reported to be as high as one bear per square mile (ADF&G 2019). The quality of the natural habitat found in this region creates a truly unique experience for bear-viewers, the associated local service providers, and the bears themselves.

According to the *2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation*, there were 640,000 total non-consumptive wildlife-viewing participants in the State of Alaska including both residents and non-residents. It is reported that these wildlife-viewers spent a total of more than \$2 Billion in 2011, with the average participant spending about \$3,200. Although the analysis does not identify the distinct species of wildlife being viewed, it does distinguish between broad classes of animals viewed. The "large land mammals" category specified includes bears, bison, deer, moose, and elk. The survey reports that 64% of wildlife-related recreation participants were non-consumptive users, which surpasses the 56% that report consumptive wildlife recreation uses, such as hunting and fishing. According to these numbers, about 20% of survey participants report engaging in a combination of non-consumptive and consumptive activities in Alaska during 2011 (U.S. Census Bureau 2014).

The purpose of this study is twofold. First, to review prior research which has examined the economic significance and contribution of non-consumptive wildlife viewing (including bear viewing) to visitor welfare and the regional economy. Second, to estimate the economic significance of businesses in the local economy of the Southcentral region of Alaska that results from carefully managed remote-access bear viewing. The map shown in Section II, Figure 1 details the region of focus throughout the report. The subsequent data, unless otherwise noted, was primarily developed through a survey conducted by the Resource and Applied

Economics Program housed within the School of Management at the University of Alaska Fairbanks. To better isolate the specific contribution of bear viewing to the regional economy, we surveyed service providers located around the region explicitly offering services associated with bear viewing. These services include lodging and hospitality as well as air taxis and guide services. The majority of providers originate from the communities of Homer and Anchorage, and the main bear viewing locations include Katmai National Park & Preserve, Lake Clark National Park & Preserve, and McNeil River State Game Sanctuary.

This study contributes to a broader body of research identifying the significant linkage between conservation of renewable resources in southcentral Alaska and the economic well-being of local communities in the region. The estimated economic contribution provides a lower bound measure of the total value of bear viewing in Southcentral Alaska since it only accounts for monetary expenditures by service providers. Total economic value is the sum of many different use components and is generally difficult to determine. Naturally, many visitors would be willing to spend additional funds beyond what is currently required to engage in bear viewing activities. Estimates of additional willingness-to-pay (WTP) and indirect, offsite use values such as TV programs, photographs, and books are key components to a total economic value framework. It would also be necessary to include nonuse values, such as existence and bequest values, which are likely to be quite large given the unique opportunities of bear viewing in Alaska. Existence values reflect the value that people receive knowing that the bear population is thriving in their natural habitat and that others are able to view the bears, even if they do not intend to travel to Alaska personally. Bequest value is an intergenerational concept referring to the WTP to ensure bear viewing will be available to future generations (Swanson, Bergstrom, Trent 1992). We do not suggest that economic research alone should be cause of resource and land use allocation, but rather it is a valuable tool to include in considerations of conservation policy and management evaluation.



Lake Clark National Park & Preserve. Photo by: NPS/Kevyn Jalone

II. Overview of Bear Viewing in Alaska

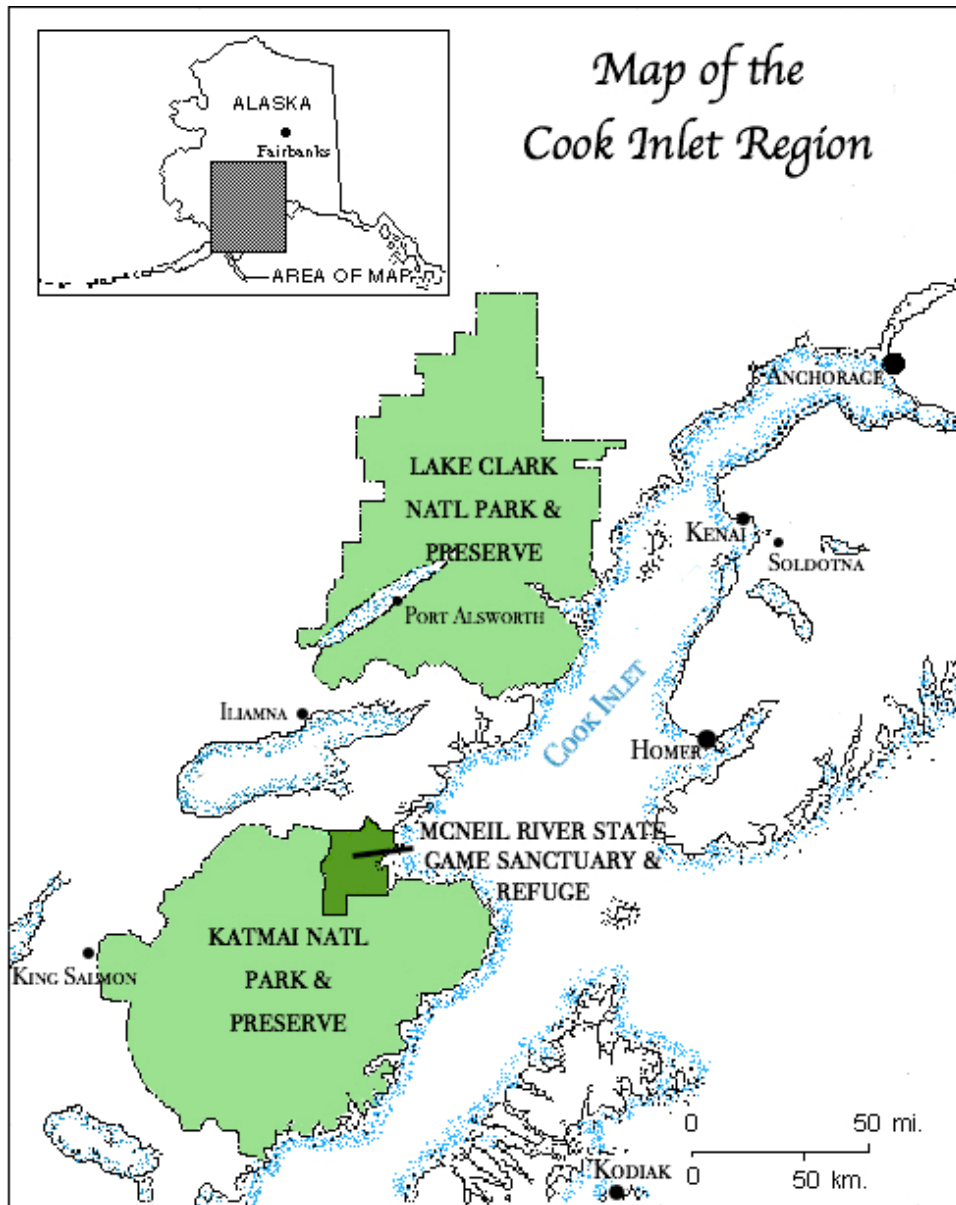
Alaska is home to more than 32,000 individual brown bears, which supports a multitude of unique bear viewing opportunities in the State for both residents and non-residents (ADF&G 2019).

A. Region of Analysis

The majority of opportunities for bear viewing in Alaska are predominantly located near the west coast of Cook Inlet, and include: Katmai National Park & Preserve (NP&P), McNeil River State Game Sanctuary (SGS), Lake Clark National Park & Preserve (NP&P), and locations in between. We define our region of analysis as ‘Southcentral Alaska’. The following economic analysis encompasses the entire Cook Inlet Region, including but not limited to Homer, Kenai, Soldotna, Anchorage, Kodiak Island, King Salmon, and Iliamna. The reason that this particular region was chosen for our analysis is because it is where the large majority of bear viewing participants originate, and in turn, where bear viewing services. In 2017, there was a total of 59 and 28 CUAs issued to service providers for Katmai NP&P and Lake Clark NP&P, respectively, indicating bear viewing as their primary purpose. Forty-six (78%) of the Katmai NP&P bear viewing CUAs originated from Anchorage, Homer, or Kodiak, and half (50%) of the Lake Clark NP&P bear viewing CUAs originated from one of these three local communities (G. Irvine, NPS, personal communication, April 2019).

Miller, Miller, and McCollum (1998), note that 99% of all brown bears had been locally extinct from their original range south of Canada due to human intolerance and habitat destruction, with fewer than 900 bears remaining in all of the contiguous U.S. (Miller, Miller, and McCollum (1998). This statistic is congruent with that of ADF&G’s current estimates of the population proportion that Alaska supports (98%). Although there are opportunistic brown bear viewing sites around North America, such as in Yellowstone National Park and British Columbia, Alaska is the only place in North America with well-developed, permanent bear-viewing sites (Penteriani et al. 2017). Given the availability of bear viewing infrastructure and the viability of local bear populations, the uniqueness of the bear viewing experience helps drive visitation to the region.

FIGURE 1.
Region of Analysis



Adapted from: U.S. Geological Survey (2001)

B. Bear Viewing Locations & Visitor Participation

Brown bears inhabit nearly the entire state of Alaska, but the largest concentrations are found near the west coast of Cook Inlet (ADF&G 2019). As mentioned previously, the majority of bear viewing related visitation occurs within Katmai NP&P, McNeil River SGS, and Lake Clark NP&P. All locations are remote and are accessed by air taxi or boat taxi. Katmai NP&P

and Lake Clark NP&P visitor participation data is primarily quantified using reported data by operators who obtain National Park Service (NPS) Commercial User Authorization (CUA).⁵ Each service provider that obtains a CUA to enter NPS property is required to report total visitor use days (VUD) as well as primary reason for the visit (e.g. bear viewing, sportfishing, flightseeing, etc.) (NPS 2019).⁶ While Katmai NP&P continues to be the most widely accessed area to view bears, Lake Clark NP&P has seen the most rapidly increasing visitor participation over the last ten years (Southwest AK IM Network 2018; ADF&G 2019). Redoubt Bay Critical Habitat Area and Trading Bay, Goose Bay, and Susitna Flats State Game Refuges are State protected areas located along the west coast of Cook Inlet, all of which also support critical brown bear habitat (ADF&G 2019).



McNeil River Falls, McNeil River State Game Sanctuary. Photo by: Wikimedia Commons/Drew H.

i. McNeil River State Game Sanctuary & Refuge

Originally established in 1967, the McNeil River State Game Sanctuary (SGS) is one of Alaska’s most distinctive bear viewing locations. The Sanctuary was expanded in 1993 and it protects portion of the region known to support the largest concentration of wild brown bears in the entire world. A record 74 bears have been viewed at one time, and approximately 144

⁵ For information about CUA policies, visit: <https://www.nps.gov/locations/alaska/commercial-authorizations.htm>

⁶ **A visitor use day (VUD) is defined as total number of people at a location multiplied by the number of days at that location.** VUD underreports actual visitor use due to two major caveats: 1) Unguided overnight drop-offs and pick-ups in a park are reported as one-day trips, and 2) If a lodge or other operation is located on private property in a park, clients of the lodge can explore the park without a CUA, and their visit/trip to the park is not recorded. Source: T. Shepherd, NPS, personal communication, March 2019.

individual bears viewed in one season at the Sanctuary. The McNeil River State Game Sanctuary & Refuge complex encompasses nearly 250,000 acres. Brown bears are protected throughout the McNeil River SGS&F complex borders, which is located south of Lake Clark NP&P and it shares a border with Katmai NP&P to the south (Griffin & Weiss, various years).⁷

Bear viewing access to McNeil River SGS is solely granted through a visitor permit lottery administered annually by ADF&G. The permit lottery was developed to provide the public with unique bear viewing opportunities while concurrently minimizing negative impacts to bears and the fragile ecosystem. Since the permit program was enacted, there has not been any reported human injury by bear, and no bears have been killed (Griffin & Weiss, various years). To ensure this record, visitor participation at the Sanctuary is closely managed and evaluated.

TABLE 1.
McNeil River SGS Bear Viewing Permit Time Blocks

Time Block Letter	Time Block Dates	Time Block Letter	Time Block Dates
A	June 7 - June 10	AS	June 9 - June 12
B	June 11 - June 14	BS	June 13 - June 16
C	June 15 - June 18	CS	June 17 - June 20
D	June 19 - June 22	DS	June 21 - June 24
E	June 23 - June 26	ES	June 25 - June 28
F	June 27 - June 30	FS	June 29 - July 2
G	July 1 - July 4	GS	July 3 - July 6
H	July 5 - July 8	HS	July 7 - July 10
I	July 9 - July 12	IS	July 11 - July 14
J	July 13 - July 16	JS	July 15 - July 18
K	July 17 - July 20	KS	July 19 - July 22
L	July 21 - July 24	LS	July 23 - July 26
M	July 25 - July 28	MS	July 27 - July 30
N	July 29 - August 1	NS	July 31 - August 3
O	August 2 - August 5	OS	August 4 - August 7
P	August 6 - August 9	PS	August 8 - August 11
Q	August 10 - August 13	QS	August 12 - August 15
R	August 14 - August 17	RS	August 16 - August 19
S	August 18 - August 21	SS	August 20 - August 23
T	August 22 - August 25		
Guided Viewing Access Permit		Camp-Standby Viewing Access Permit	

Adapted from: McNeil River SGS Permit Application 2019, Alaska Department of Fish & Game

Over the last five years, a total of 4,711 applications have been received by ADF&G. Each bear viewing permit applicant may apply for up to four preferred time blocks for both a Guided Permit and a Camp-Standby Permit (Table 2) (ADF&G 2019). The McNeil River SGS bear viewing lottery generates interest from both Alaska residents and visitors from outside of the state. On average, lottery applicants are split 60/40, resident/non-resident. This proportion generally holds for permit winners as well. Over the last five years, bear viewing participants

⁷ McNeil River State Game Refuge was created in 1993, at the same time that the Sanctuary was expanded. While the Refuge also protects the brown bear population, it was not included in this analysis because a majority of activity in the Refuge is consumptive wildlife recreation, such as fishing, trapping, and hunting.

at MRSGS have come from 16 countries, including Australia, Austria, Canada, France, Germany, Great Britain, Israel, Japan, Netherlands, New Zealand, Poland, Slovenia, Spain, Switzerland, Turkey, and the United States (Griffin & Weiss, various years).

There are two types of non-transferable, 4-day Viewing Access Permits: Guided and Camp-Standby. Annually, 185 Guided Permits and 57 Camp-Standby Permits are issued. The permit lottery program limits the number of guided visitors to 10 individuals per 4-day time block between June 7 and August 25. These are the only dates that visitors are able to visit the Sanctuary (Griffin & Weiss, various years). The current application fee to enter into the lottery is \$30, which was increased from \$25 beginning in March 2018. When an applicant is drawn in the lottery, they are required to pay an additional permit fee which varies by permit type and Alaska residency (Table 3). Guided Viewing Access Permits guarantee a campsite and opportunity to view bears where they are likely to be most concentrated that day, with a professional wildlife guide, during the selected time block. Camp-Standby Permits guarantee a campsite and a placement on the Guided Viewing standby list. Should a visitor with a Guided Viewing Permit choose not to use their permit, a Camp-Standby permittee is offered the opportunity. It is exceptionally common for Camp-Standby permittees to see bears feeding on shellfish and vegetation along the coast, even if they are never granted access to join the Guided Viewing group of visitors (ADF&G 2019).

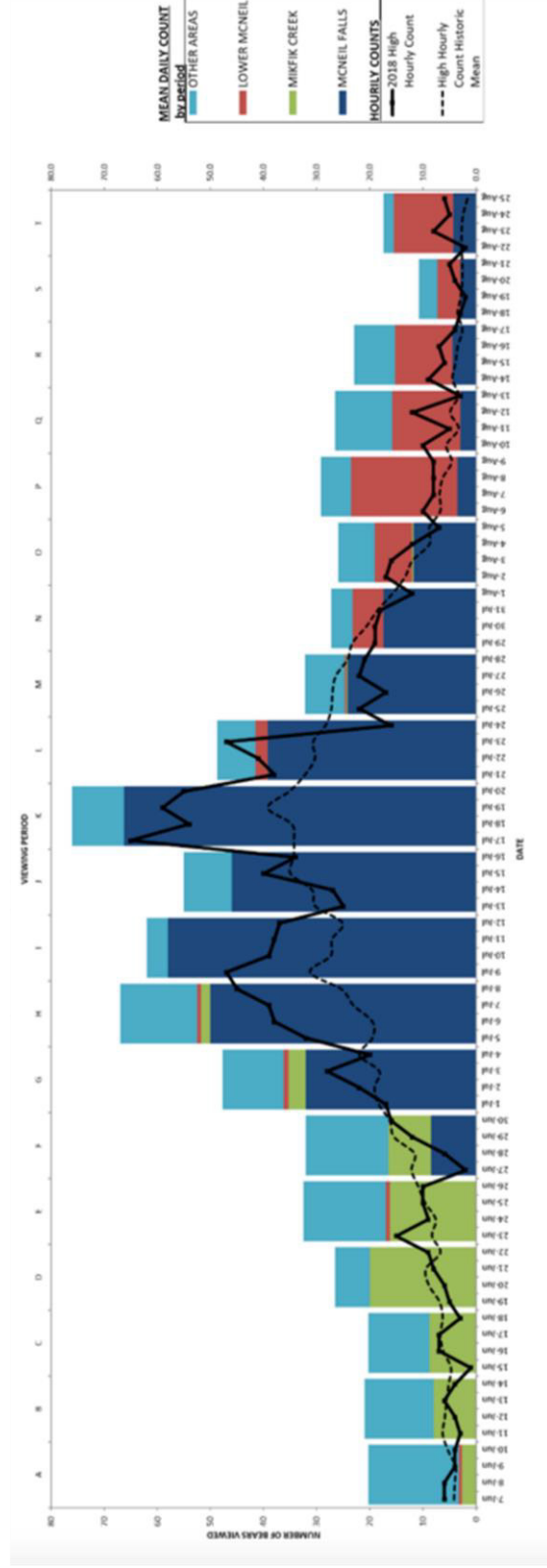
TABLE 2.
McNeil River SGS Permit Fees, Historic and Present

	Fees Prior to 2018	Current Fees	% Change Increase
Lottery Application Fee	\$25	\$30	20%
Guided Permit (AK resident)	\$150	\$225	50%
Guided Permit (non-resident)	\$350	\$525	50%
Standby Permit (AK resident)	\$75	\$112	49%
Standby Permit (non-resident)	\$175	\$262	50%

Adapted from: ADF&G, accessible at: <https://www.adfg.alaska.gov/index.cfm?adfg=mcneilriver.main>

The number of permit applicants and odds of winning a specific permit is generally influenced by the perceived quality of bear viewing associated with a given time block. The daily average number of bear sightings peaks around mid-July. Last summer between July 17 and 20, an average of more than 75 bears were counted daily (Griffin & Weiss, 2018). The peak of bear sightings naturally coincides with the peak of salmon runs (Figure 2).

Figure 2.
McNeil River SGS Mean Daily Bear Count Per Period Compared to Hourly High Counts and Historic Means



Source: Alaska Department of Fish & Game, 2018 McNeil River State Game Sanctuary Annual Management Report (2019)

In addition to the bear-viewing benefits that visitors receive, there is also a financial advantage of the McNeil River SGS lottery permit allocation system. McNeil River SGS is able to generate revenues while minimizing human impacts. Revenues generated through bear viewing lottery application and permit fees help to fund McNeil River SGS operations and management. Between 2014 and 2017, the bear viewing permit lottery has generated close to \$375,000 in revenue, which is deposited annually into the State of Alaska Fish and Game Fund (Griffin & Weiss, various years). During the first year of increased fees in 2018 revenues increased by about 40%, totaling \$96,060. Beyond the monetary aspect, there are also significant social benefits produced by the McNeil River SGS.⁸

ii. Katmai National Park & Preserve

Katmai National Monument was officially established in 1918 by President Woodrow Wilson to preserve the Novarupta Volcano, which generated the largest volcanic eruption of the twentieth century, and formed the Valley of Ten Thousand Smokes. It was not until 1980 that the Alaska National Interest Lands Act (ANILCA) was signed into law, which expanded the Monument to include more than four million acres creating what is now known as Katmai National Park & Preserve. The National Park Service states that:

“The purpose of Katmai National Park & Preserve is to protect, study, and interpret ... habitats surrounding a high concentration of salmon and brown bears, and an ongoing story of humans integrated with a dynamic subarctic ecosystem.” (NPS, 2009)

Topographically, Katmai NP&P is situated in the northern-most part of the Aleutian Range, with the Cook Inlet to the north and Pacific Ocean to the east of the park. Glaciation, both past and present, influences the surrounding area as evidenced by sharp mountain ridges, rivers, streams, broad U-shaped valleys, and narrow lakes such as Naknek Lake. The region also continues to be seismically active, and earthquakes are frequent. Native inhabitants of the Katmai NP&P region are known as the Alutiiq/Sugpiaq peoples; Central Yup'ik natives are also present in the surrounding region (Nowaki, 2001). Native societies in the region continue to use natural resources for subsistence and recreation.

⁸ See Section III for detailed discussion of various McNeil River SGS social benefit estimations

The State-owned airport located in the community of King Salmon is the main point of entry for most visitors to Katmai NP&P, and the location of Park Headquarters (NPS 2009). To further illustrate the economic importance of the region of analysis as it relates to bear viewing, summary statistics from a visitor study conducted in Katmai NP&P asking respondents to list where their group stayed the night before their visit to the park, and the night after, are listed in Table 3 (Strawn & Le 2015).

TABLE 3.
Locations of Visitor Stays Before & After Trip to Katmai NP&P

Location	Night Before*	Night After**
Anchorage	42.3%	37.4%
Homer	19.2%	17.1%
King Salmon	8.1%	6.4%
Kodiak	7.7%	4.8%
All others***	22.7%	34.3%

Adapted from Katmai NP&P Visitor Study Database (Strawn and Le, 2014)

*Total of 456 visitor groups; **Total of 439 visitor groups; ***Includes all other locations and non-specified responses

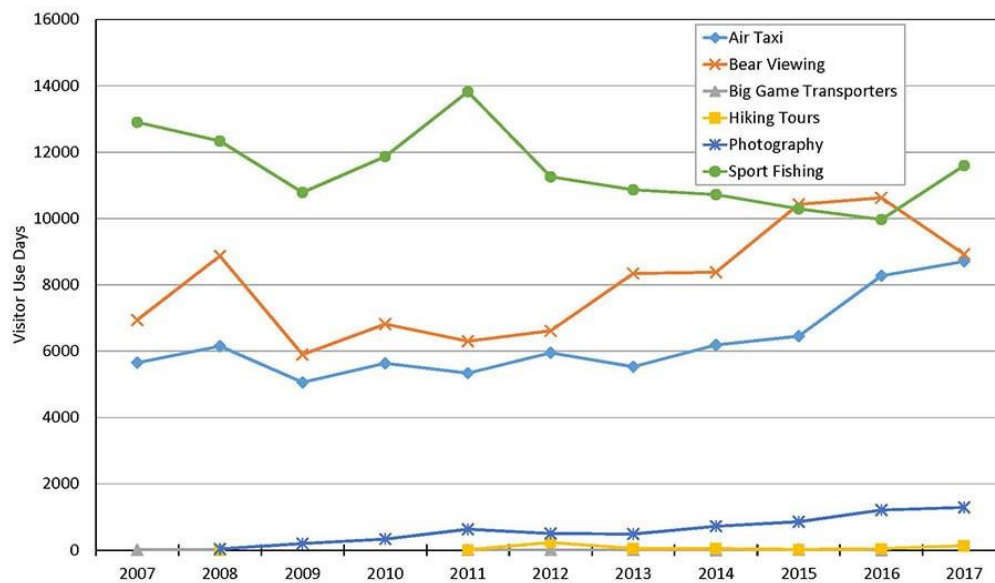
In 2017, fifty-nine CUAs were issued to operators offering bear viewing services. Service providers originating from Homer, Anchorage, and Kodiak reported a combined total of 5,783 bear viewing Visitor Use Days (G. Irvine, NPS, personal communication, April 2019). Most visitors to Katmai NP&P appear in July and August, with July visitation consistently growing (Southwest AK IM Network 2018). Strawn and Le (2015) reported that out of 392 visitor groups surveyed, 79% listed bear viewing as the primary reason for visiting the park. Of these visitor groups, 77% consisted of 2-4 people, and 14% were in groups of 5 or more.



Brooks Falls Viewing Platform, Katmai National Park & Preserve. Photo by: NPS/R. Taylor

Over the last ten years, sportfishing has been the most popular ‘primary’ activity reported by commercial operators, with the exception of 2015 and 2016, when bear viewing tallies surpassed it. Bear viewing and air taxi services are the second and third most popular activities annually reported, and account for nearly 60% of all VUDs combined in 2017; see figure 3 below. It is also important to consider that these three activities are not mutually exclusive (Southwest AK IM Network 2018).

FIGURE 3.
Katmai NP&P Visitor Use Days by Primary Activity (2007-2017)



Source: Southwest Alaska Inventory and Monitoring Network, Katmai National Park & Preserve Visitor Use (2018)

The main NPS Visitor Center is located in Brooks Camp, which may be the most photographed and well-known location to view bears in the wild. This location comprises approximately one-third of all VUD within the park. Unlike the McNeil River SGS, Katmai NP&P does not strictly limit the number of visitors to the park. However, all visitors are required to attend bear orientation and the Brooks Falls Platform is limited to 40 viewers at a time, with a time limit of one-hour if there are others waiting to use the platform (NPS 2009). Other major locations within the park that visitors can view coastal bears include: Hallo Bay, Moraine Drainage, Amalik Bay, and Kulik River, among many others (NPS 2019).

iii. Lake Clark National Park & Preserve

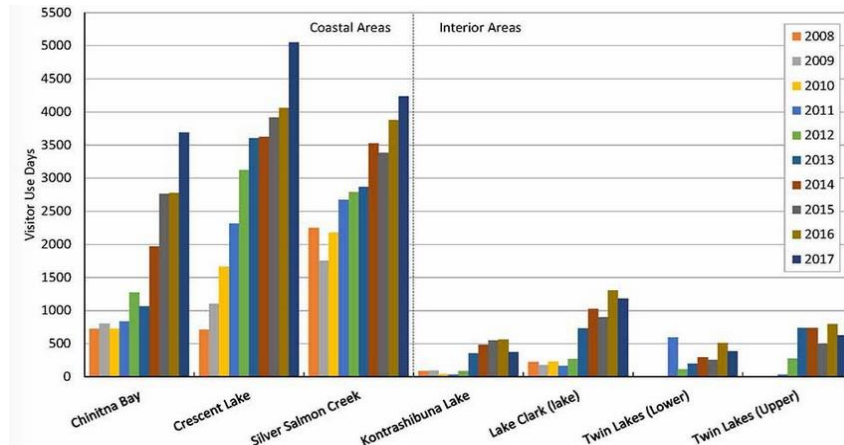
The first float plane to land on Lake Clark was in 1930. Lake Clark NP&P was dedicated as a National Monument in 1978 by President Carter. Two years later, the park was included in the 1980 Alaska National Interest Lands Act (ANILCA), which created and expanded the Monument to include over four million acres (NPS 2019). Lake Clark NP&P is comprised of the Lime Hills and Alaska Range ecoregions. Topographically, the Lime Hills ecoregion is located southwest of the Alaska Range where the surface transitions into rolling landscape. Heavy glaciation has significantly influenced this ecoregion as evidenced by thin deep lakes such as Lake Clark, sharp mountain ridges, and broad U-shaped valleys (Nowaki et al. 2001). The Dena'ina Athabascan name for Lake Clark is *Qizhjah Vena*, meaning 'a place where people gather' (NPS 2019). Native inhabitants settled the region thousands of years ago, mainly that of Dena'ina Athabascan, Central Yup'ik and Alutiiq/Sugpiak peoples. Subsistence living is still widespread throughout native communities within and around the park. Today, Port Alsworth and Nondalton are the largest human communities (Nowaki et al. 2001).



Crescent Lake, Lake Clark National Park & Preserve. Photo by: NPS

Port Alsworth Visitor Center is the only public information center, but there are many independently operating lodges, campsites, and dining facilities. Over the last ten years, *total visitation* reported by commercial operators to Lake Clark NP&P has more than quadrupled from approximately 4,000 total VUD to nearly 17,000! The majority of this increased visitation has been occurring on the coast of the Cook Inlet, with Crescent Lake reportedly seeing a seven-fold increase since 2008. In 2017, Crescent Lake, Silver Salmon Creek, and Chinitna Bay accounted for more than 75% of total visitation to the park (Southwest AK IM Network 2018).

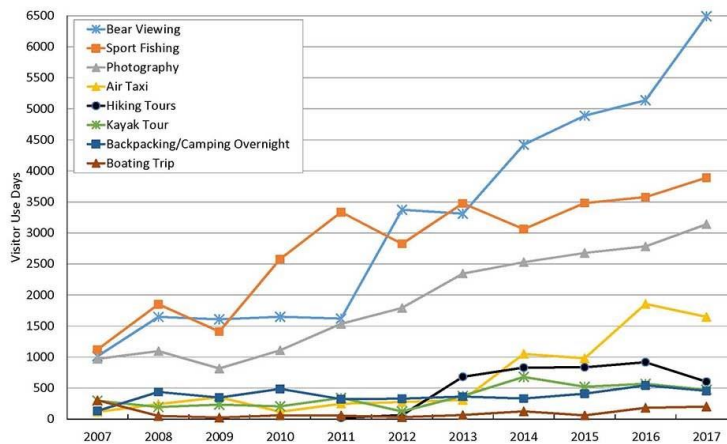
FIGURE 4.
Lake Clark NP&P Total Visitor Use Days by Location (2008-2017)



Source: Southwest Alaska Inventory and Monitoring Network, Lake Clark National Park & Preserve Visitor Use (2018)

In 2017, twenty-eight CUAs were issued to operators offering bear viewing services. Service providers originating from Homer and Anchorage reported a combined total of 3,000 bear viewing VUD (G. Irvine, NPS, personal communication, April 2019). Similarly to Katmai NP&P, Lake Clark NP&P is visited most heavily in July and August. In the last five years, the number of visitors indicating bear viewing as their *primary activity* has surpassed that of sportfishing, increasing from about 1,000 total VUD in 2007 to 6,500 in 2017. The number of reported VUD for sportfishing and photography, the second and third most common activities reported, has tripled during the same ten-year period. In recent years, park biologists have counted well over 200 individual bears within a 54-square mile area (NPS 2019).

FIGURE 5.
Lake Clark NP&P Visitor Use Days by Primary Activity (2007-2017)



Source: Southwest Alaska Inventory and Monitoring Network, Lake Clark National Park & Preserve Visitor Use (2018)

C. Industries Supported by Bear Viewing Opportunities

Almost all of the businesses offering bear viewing services are locally owned & operated. This is an extremely important fact to consider when analyzing the economic opportunities that the activity of bear viewing influences. Service providers surveyed indicate approximately 74% of business expenditures, on average, are made locally in the Southcentral region of Alaska (Figure 1), and more than half of these businesses report 90-100% of expenditures as such. These statistics indicate that the majority of money operators receive from bear viewing visitors is injected back into the local economy.

There are many different business industries that are directly impacted as a result of the non-consumptive opportunities to view brown bears in southcentral Alaska. There are lodges and hotels, air taxi providers, guided photography workshops, guided wildlife viewing, boat taxi providers, and dining facilities, to name a few. These different business entities are not mutually exclusive, and quite often are combined into horizontally integrated business models. For example, many lodges offer their own air taxis and guest meals, and air taxis often work jointly with professional wildlife guides or even double as guides themselves. All bear viewing locations require air taxi or boat taxi and most of these places do not offer any food stores which means meals must be taxied out. With the exception of King Salmon having a handful of public dining options, no other bear viewing entryway has food stores or dining facilities for public use. As you can imagine, bears are attracted to any kind of food they can get their paws on and this would cause unnecessary human-bear conflicts. Therefore, many visitors may opt for a package tour that includes meals. Package tours may include any combination of lodging, meals and drinks, transportation, professional guides, or equipment. In order for this to be possible, a company must independently offer all of these services or there may be multiple operators that work jointly to provide a full visitor package, further demonstrating the integration among service operators that offer bear viewing opportunities.

Consequently, the origin of a visitor's trip has a significant impact on the local grocers and dining facilities in the community. It would not be feasible to survey grocers or dining facilities in order to capture bear viewing-related revenues because they naturally do not collect this kind of information from customers. Nevertheless, we know that all of the service operators also live and recreate in their local communities, so it is extremely likely that a significant portion of their incomes generated from bear viewing associated services are then pumped back into the local economies.

III. Prior Research of Economic Values

Two notable visitor surveys concerning Katmai NP&P were conducted in the summers of 2006 and 2014 (Littlejohn & Hollenhorst 2007; Strawn & Le 2015). A number of analyses have utilized the final data from these two studies to analyze economic effects of tourism associated with the individual parks. The two main aspects of economic values analyzed among the studies are referred to as ‘economic significance or contribution’ and ‘consumer surplus’ (i.e. visitor welfare accounted for above and beyond actual cost). Economic significance or contribution typically examines how spending ripples through an economy, impacting employment and total output. Measures of economic benefit (e.g. consumer surplus) highlight the value an individual derives from a particular good or service. While related, these two economic measures tell us different things about any given allocation of resources, goods, or services. If we are concerned with identifying the potential impact a given change in spending has on employment in a local economy an economic impact or significance analysis is warranted. If we are concerned with conducting a cost-benefit analysis measures of economic welfare such as consumer surplus are also necessary to include. As noted by Richardson, Huber, & Loomis (2017) a full portrait of the economic importance of any activity can be evaluated using both of these frameworks. The following studies discussed do not focus on any one particular visitor activity (i.e. bear viewing), but rather analyze the economic effects of each individual park as a whole.

A. Visitor Welfare (Benefits) Estimations

Hill (1988) assessed visitor welfare associated with the McNeil River State Game Sanctuary permit lottery as a case study to highlight the economics of a lottery mechanism for distributing a good or service, as opposed to “market-like” mechanisms such as price. The general assertion is that a visit to McNeil River SGS is a scarce economic good, and the current distribution mechanism (lottery) does not provide the highest societal benefits.⁹ Hill (1988) argues that one reason for considering a market-like alternative would be raising revenues to cover the cost of the bear viewing program, “given the State budget outlook”. Related to that, it may be in the interest of Alaska residents, as State resource owners, to maximize the return of this scarce resource by allowing the permits to be distributed in a way that minimizes economic

⁹ Scarcity is present when demand for a good is much higher than the limited supply of that good; e.g. there are not enough McNeil River SGS bear viewing permits to satisfy the overall demand for the permits. Therefore, a distribution mechanism (i.e. lottery, queue, price) is necessary.

losses.¹⁰ The report presents economic impacts of the lottery mechanism using a 1986 survey of McNeil River SGS lottery participants.¹¹ A linear demand curve for Guided Viewing permits was derived from the survey data, and indicated that if bear viewing permits were sold or auctioned in some fashion, the “market” price would generate \$464 per permit at minimum, and could significantly exceed \$696 (Hill 1988).¹² Based on these estimates, if the maximum 185 Guided Viewing permits were allocated and paid for, a conservative range of annual revenue could be from \$85,840 to \$128,760.¹³ Although the lottery mechanism is still used by ADF&G to distribute McNeil River SGS bear viewing permits, the agency most recently increased the fee schedule significantly in 2018 (Table 2). Revenues generated in 2018 from the permit program were approximately \$96,060 – an increase of more than \$22,000 from the prior year revenues of \$73,400 – even with 90 less permit applicants and 14 less payments received for all permit types (Griffin & Weiss, 2017 and 2018). Assuming all applicants would pay for the permit they apply for, we can discern that 872 individuals are willingly to pay, at minimum, the increased fees. This suggests that the total economic significance of bear viewing at McNeil River SGS is well beyond the revenues generated by the permit program.

Clayton & Mendelsohn (1993) estimate visitor willingness-to-pay (WTP) for access to McNeil River SGS using the contingent valuation method (CVM).¹⁴ Four CV questions were asked in order to minimize wording-bias and confirm consistency among responses.¹⁵ An intercept survey was administered in 1990 at McNeil River SGS, to approximately 90% of all visitors that year. Table 6 below summarizes the results from data adjusted to eliminate protest bids of \$0 from Question 1 and all responses in excess of \$1,957 (2019 dollars). The average price people would be willing to pay is estimated to be about \$480 per permit (2019 dollars). Echoing the analysis by Hill (1988), the authors suggest that increasing user fees has the potential to generate significant additional revenues. Particularly, the survey data indicated that if there was a mixed-mode mechanism of distribution involving a guaranteed-permit auction and the current lottery, 20 guaranteed-permits would sell for about \$980 each (2019 dollars), which would still allow for the vast majority of permits to be allocated by lottery. Extrapolating these reported figures, revenues generated from the McNeil River SGS bear viewing permit program

¹⁰ Economic losses discussed in Hill (1988) include transaction (e.g. time) costs, non-transferability of permits, unused permits (“no shows”), and societal losses resulting from permits not necessarily being used where they are valued the highest.

¹¹ 488 out of 806 surveys were returned (61% response rate)

¹² Dollar figures adjusted from 1986 dollars to 2019 dollars using the BLS CPI Inflation Calculator accessed at: https://www.bls.gov/data/inflation_calculator.htm

¹³ This range does not include additional permit fees collected from visitor transport authorizations or special access permits.

¹⁴ Willingness to pay (WTP) represents the maximum amount of money an individual is willing to pay to acquire one unit of a good or service.

¹⁵ Two of the CV questions used to estimate the value of a McNeil River SGS visit were open-ended, direct WTP questions and two were presented in a discrete choice framework. Summary of results are presented in Table 6.

would hypothetically approximate \$100,450.¹⁶ This figure lies directly mid- range of the estimates derived by Hill (1988), and is only slightly higher than the current permit program revenues of \$96,060 (Griffin & Weiss 2019).

TABLE 4.
Visitor Welfare Estimates of Bear Viewing at McNeil River SGS*

	<u>CVM Question Format</u>			
	Open-Ended		Discrete Choice	
	<u>Q1</u>	<u>Q2</u>	<u>Q3</u>	<u>Q4</u>
Mean**	\$444	\$452	\$542	\$485
SD**	\$362	\$236	\$250	\$354

*All figures reported in 2019 dollars, based on BLS CPI **Bids of \$0 and in excess of \$1,957 have been removed
Adapted from Clayton & Mendelsohn (1993)

The most recent estimates of consumer surplus (visitor welfare) pertaining to remote access wildlife viewing in Alaska focuses on Katmai NP&P (Richardson, Huber, & Loomis 2017). The visitor survey by Strawn & Le (2015) served as the primary source of data for the travel cost model developed in the study.¹⁷ The travel cost variable in the model was constructed using the round-trip distance (in miles) from the respondent’s home ZIP code to Anchorage International Airport multiplied by an estimate of average airfare cost per mile. Opportunity cost in the form of lost wages during the trip and the average cost of an air taxi to arrive in King Salmon is added to the travel cost variable previously derived. The consumer surplus (visitor welfare) estimation also includes 9 other explanatory variables such as other wildlife viewed and hiring a professional guide. The visitor benefit estimations are shown in Table 5 below.

TABLE 5.
Visitor Welfare Estimates of Bear Viewing at Brooks Camp (Katmai NP&P)

	<u>Average (\$) value</u>	<u>90% confidence interval</u>
CS per group, per trip	\$1,281	[\$853, \$2,074]
CS per person, per trip	\$619	[\$412, \$1,002]
CS per person, per day	\$287	[\$191, \$464]

Adapted from Richardson et al. (2017)

¹⁶ 20 permits auctioned at \$980 = \$19,600 plus 165 (remaining) permits randomly distributed by lottery at \$490 (the average WTP reported) = \$80,850, totals \$100,450

¹⁷ Travel cost method is used as a tool to value goods or services that do not have an established dollar value, i.e. used for non-market valuation. It is derived from the amount visitors spend traveling to a specific site (Haab & McConnell 2002).

Similarly, Loomis, Richardson, and Huber (2018) evaluate the economic benefit of virtual bear viewing opportunities made possible by the presence of live-feed cameras at Katmai NP&P. This thoughtful use of technology makes remote bear viewing opportunities more accessible, increasing the exposure of brown bears beyond Alaska. Their study notes that viewers spent approximately 2.4 million hours watching bears at Brooks Camp online. They estimate an economic benefit of approximately \$27 million is associated with watching Katmai bears online.

B. Economic Significance Estimations

Fay and Christensen (2010) provided a comparative assessment of IMPLAN modeling versus the NPS’s Money Generating Model (MGM) methodology typically used to estimate economic contributions of U.S. National Parks. One of critiques explicitly mentioned is that the MGM approach uses secondary data and a national model, which severely underestimates impacts in Alaska. The authors use adjusted figures from visitor spending surveys, secondary data from government statistic databases, economic base models, input-output models and multipliers to estimate the economic significance of Katmai NP&P. The visitor survey used to estimate visitor group expenditures was conducted in 2006. The combined estimated data for visitor group expenditures and total visitors were then used to model the economic effects in 2007. Two separate models were estimated: statewide impacts in Alaska as a whole, and a localized model encompassing the Municipality of Anchorage, Bristol Bay, Kodiak Island, Lake and Peninsula, and Kenai Peninsula Boroughs (Fay & Christensen 2010). Table 4 below summarizes the localized modeling results, adjusted to 2017 dollars.

TABLE 6.
Katmai NP&P Visitor Economic Effects – 2007*

Type of Impact	Total Effect
Employment	390
Labor Income	\$17,869,817
Value Added	\$28,446,867
Total Industry Output	\$55,793,313

Adapted from Fay & Christensen (2010)

*Results from the local model, includes only Katmai NP&P visitor spending in the five-borough region, in 2017 dollars (BLS 2019)

The Natural Resource Stewardship and Science division of the National Park Service most recently released a comprehensive report of all U.S. National Parks – *2017 National Park Visitor Spending Effects*. Data was collected between 2003 and 2015 and the analysis was built using 2015 IMPLAN models. While this study does include economic contributions to ‘local’ economies for both Katmai NP&P and Lake Clark NP&P, the data may be somewhat skewed due to the economic regions for parks in Alaska being defined as the entire state of Alaska. In contrast, all other parks in the same study were analyzed using a 60-mile radius around a park’s borders, except Hawaii which also is analyzed as a statewide region only (Thomas, Koontz, & Cornachione 2018). This unfortunately translates into an analysis that includes many areas not intrinsically linked to either Katmai NP&P or Lake Clark NP&P. It is also noted in the final report that visitor characteristics and spending averages are not primary data, and were adapted using national averages for each park type. In fact, trip characteristics and spending profiles are adapted from two reports: a 2010 report on the economic impacts of visitors to Southeast Alaska (McDowell Group 2010) and Fay and Christensen (2010) (Thomas et al. 2018). Their estimates are shown in Table 5 below; all \$ figures are reported in 2017 dollars.

TABLE 7.
Visits, Spending, and Economic Contributions of Katmai NP&P
and Lake Clark NP&P to Local Economies – 2017*

NPS Park Unit	Total Recreation Visits	Total Visitor Spending	Jobs	Labor Income	Value Added	Total Economic Output
Katmai NP&P	37,818	\$58.07 M	756	\$26.88 M	\$50.97 M	\$84.65 M
Lake Clark NP&P	22,755	\$34.94 M	455	\$16.173 M	\$30.67 M	\$50.93 M

Adapted from Thomas et al. (2018)

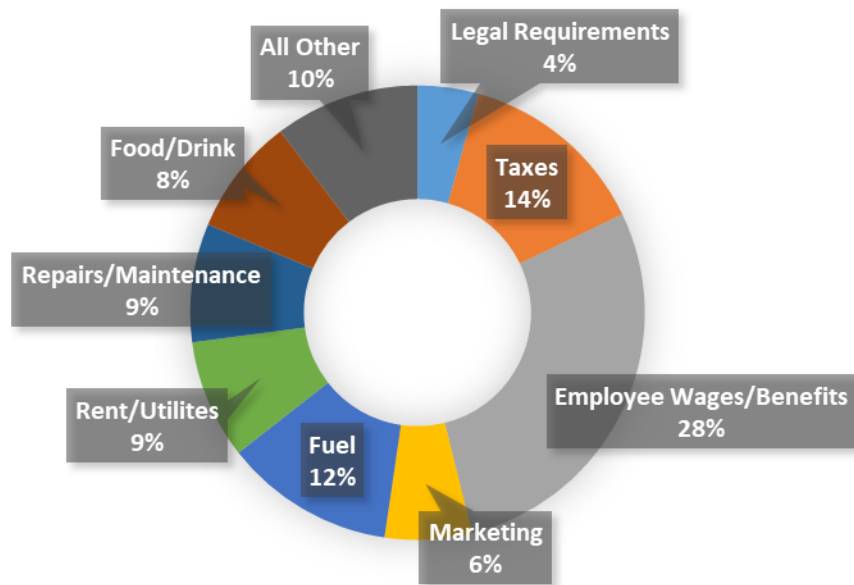
IV. Methods of Assessment

A variety of data sources were used in this assessment. Information about the number of visitors to both Katmai NP&P and Lake Clark NP&P was drawn from Commercial Use Authorization (CUA) reports prepared by the NPS. CUA data (2019) obtained includes community origin of operators, how many visitors each operator hosts, and the primary interest (i.e. bear viewing) for visiting the park(s). Visitor data for McNeil River SGS was accessed through publically available annual management reports. Along with detailing annual management activities at McNeil SGS the reports provide information about the number of permit lottery applicants and recipients. The annual reports also outline the revenues generated by the permit program and provide a count of visitors to the McNeil River Falls viewing area for July 25-August 5 of each season (ADF&G, various years).

The primary source of data used to determine the final results of economic effects in the local region is proprietary financial data that was collected from service providers through an online survey. This data includes information on firm revenues, costs, payroll, and visitor volume related to bear viewing activities. Service operators offering services associated with bear viewing located within 100 air miles of the Cook Inlet were identified through a variety of sources such as local Chambers of Commerce and the NPS website. The Alaska State Department of Commerce, Community, and Economic Development business license database was used to verify official NAICS codes listed for each service provider and cross-listed with the corresponding IMPLAN industrial sector.

Given the proprietary nature of this information, all statistics have been broadly aggregated across the three following sectors: 414 ‘Scenic and Sightseeing Transportation and Support Activities for Transportation’, 496 ‘Other Amusement and Recreation Industries’, and 500 ‘Other Accommodations’. The model includes the Municipality of Anchorage, and four boroughs: Kenai Peninsula, Lake and Peninsula, Bristol Bay, and Kodiak Island. All service provider expenditure and payroll data is annually aggregated and bridged to appropriate IMPLAN sectors. Each respondent was also asked how they allocated their expenditures among 13 different sectors, which closely correlate or are exact matches to IMPLAN sectors. See Figure 6 below for a summary of business expenditures among these sectors, adjusted to reflect activities directly associated with bear viewing based on respondent’s indicating the proportion of business sales that are associated with bear viewing. The data obtained from the service provider survey was then used to aggregate to the total number of service providers who were contacted for the survey.

FIGURE 6.
Percentage of Expenditures of Service Providers



Impact Analysis for Planning (IMPLAN) software was used to carry out the economic significance analysis of bear viewing in Southcentral Alaska. IMPLAN is a regional input-output (I-O) model with a basic assumption that the fundamental information in I-O analysis involves the flow of products or services from each industrial (producer) sector to each of the industrial (consumer) sectors. IMPLAN allows internal customization including the development of multiplier tables, changing components of production functions and trade flows, and creating custom analysis by entering final demand changes, among others (Bonn & Harrington 2008).

A. Service Provider Survey & Data

The service provider survey was administered to 109 individual businesses that offer bear viewing related services, such as air taxis, wildlife guides, and lodges in Southcentral Alaska. The online survey was designed using Qualtrics software and responses were recorded electronically between 20 March 2019 and 19 April 2019. The primary source of service provider contact information came from the NPS website, local Chambers of Commerce, and Katmai Service Providers, Inc. A total of 22 service providers completed the survey and the data provided by each business was separated based on their original NAICS code, and then

extrapolated to the sample frame. Respondents were asked information pertaining to the 2017 bear viewing season such as home-base location, number of employees, aggregated employee wages, annual revenues, expenditures, and net revenues, percentage of bear-viewing related operations, percentage of Alaska resident employment, and how many trips were made to/within specific parks.¹⁸ Fifty-percent of all service providers indicate 70-100% of all businesses sales were associated with bear viewing in 2017.

The extrapolation of data was accomplished using the following steps. First, as noted earlier, all original survey responses were apportioned to account for only bear viewing specific activity, based on the proportion of business sales associated as indicated by each individual respondent.¹⁹ Second, separating each business into the appropriate IMPLAN sector as delineated by official NAICS code obtained from the Alaska State DOCCED Business License database (2019). Averages were calculated amongst each sector, and then extrapolated to account for all non-respondent service providers. After extensive research of individual service provider offerings, the survey response rate of 20% is deemed representative of the known population due to the homogeneity of business make up in terms of locational distances and commonality of horizontally integrated business models.²⁰ Also, the responses of the four different sectors used for analysis was generally even split, allowing representative means to be calculated to apply to the non-respondent service providers.

B. Types of Economic Effects

A **direct effect** is the observed amount of commodity input spending required to produce a dollar of the primary industry's output. The direct effects measure the dollar amount of spending it takes to produce one dollar worth of bear viewing related services. To provide an example, in the case of an air taxi or other flight seeing service a direct effect would be measured by the service operator's spending on fuel and other inputs needed to conduct the service. **Indirect effects** are derived from the production requirements of all other industries needed to meet the industry's initial demand for a dollar of its output. For example,

¹⁸ Data from 2017 is used because many businesses had not yet validated their 2018 data and/or completed 2018 tax filings

¹⁹ One very large outlier indicated business expenditures made within the local region of only 10%; therefore, all data coming from this respondent was multiplied by .1 to account for the documented leakages. All other respondents' data is assumed to follow the default IMPLAN local purchase coefficients built-in the software.

²⁰ Further justification for assuming survey respondents as representative of the entire population rests on a report estimating the economic value of wildlife watching tourism in Africa that was conducted by the World Tourism Organization agency of the United Nations, using a survey of tour operators which also received a 20% response rate (159 tour operators from 34 countries replied out of 758 operators from more than 40 countries contacted).

direct input requirements to produce bear viewing related services may include fuel, maintenance costs, and insurance. Indirect effects measure the production requirements of all industries necessary to support the demand for input goods and services used to produce bear viewing operations. Additional spending by employees and businesses who earn money as a result of increased demand in the primary industry generates **induced effects**. An example would be the jobs and benefits produced in the retail food industry which results from increased spending by service operators providing bear viewing services.



Silver Salmon Creek, Lake Clark National Park & Preserve, Photo by: K. Lewandowski/NPS

V. Economic Modeling & Results

Contribution analyses estimate the importance of an activity or industry to a specified region by modeling monetary flows from the final activity or service up through to the point of origination for all production requirements necessary. The results are interpreted as the economic contribution rather than an economic impact because tax revenues were not included (Fay & Christensen 2010). For detailed description of economic modeling terminology see Appendix A.

Each operator indicated the proportion of their business sales associated with bear viewing as well as the proportion of business expenditures made within the region of study. These two data points were critical for determining the economic significance of bear viewing specifically as they highlight the contribution of the bear viewing to their overall business activity. The number of employees, total wages & benefits (\$), sales (\$), and approximate value added (\$) were individually weighted to accurately reflect each business' proportion of business sales associated with bear viewing.

To capture the potential level of total sales the survey data was aggregated to reflect the total sample frame of 109 firms. A by-parts approach was used and an 'Industry Spending Pattern' for each of the three sectors was imported directly from IMPLAN. Total service operator sales less wages and benefits were aggregated and bridged to the corresponding IMPLAN sector and then entered as the spending level. Labor income and proprietor income were incorporated as separate activities. Induced effects associated with labor and proprietor income have been included in the estimates.

All four boroughs and the municipality of Anchorage were analyzed jointly in IMPLAN as part of the Southcentral region. Employment, labor income, valued added, and output estimates are modeled and reported in 2019 dollars, using SAM-type multipliers. The values derived for direct, indirect, and induced impacts to the region resulting from bear viewing-associated service provider expenditures are summarized in Table 8 below. Scaled to the sample frame of 109 service providers, bear viewing related business activity resulted in approximately \$34.5 million in sales and \$10 million in direct wages and benefits.

TABLE 8.
Bear Viewing Economic Contribution Estimates (2019 dollars)

	Direct Purchases	Employment	Labor Income	Value Added
Direct Effect	\$17,085,981	371	\$9,984,858	\$7,205,510
Indirect Effect	\$9,765,449	56	\$3,974,799	\$6,126,837
Induced Effect	\$9,411,464	63	\$3,319,786	\$5,708,554
Total Effect	\$36,262,894	490	\$17,279,170	\$19,040,901

Direct purchases by service providers and household spending by supports approximately \$36.3 million in intermediate economic production in the region. Spending by bear viewing related service providers and households contributes approximately \$19 million in value added.²¹ Finally, bear viewing related service providers and households also support approximately \$17.3 million in labor income and 490 jobs (average) in the Southcentral region (Municipality of Anchorage, Kenai Peninsula Borough, Lake and Peninsula Borough, Kodiak Borough, and Bristol Bay Borough).²²

For a rough comparison of bear viewing associated economic contributions from Katmai NP&P based on Littlejohn & Hollenhorst (2007), approximately 84% of visitors to the park indicated that bear viewing was the primary purpose of their trip. If we were to use this proportion to roughly estimate the effects using the Katmai NP&P economic analysis by Fay & Christensen (2010), which used the same visitor study as their primary data, we would find that about 328 jobs and \$46.9 million in intermediate production and \$23.9 million in value added would be associated with Katmai NP&P alone.²³

The data used in the Fay and Christensen (2010) analysis was obtained directly from visitors and includes dining expenditures, which make up a significant portion of economic effects estimated and cannot be accounted for in our estimates. Our economic contribution estimates are a reflection of spending by the service providers and households, therefore the spending by visitors that does not go to service providers directly associated with bear viewing such as air/boat taxis, lodges, and wildlife guides, is not accounted for. Our assessment identifies \$36.3 million in intermediate production and \$19 million bear viewing related value

²¹ Tax contributions are not included. Respondents reported approximately \$600k in federal, state, and local taxes.

²² Standard IMPLAN multipliers were used to model labor income effects.

²³ reported in 2019 dollars

added. While conservative the estimates presented here help to illustrate the economic importance of bear viewing related services to the Southcentral region. Spending by visitors on bear viewing opportunities helps to diversify the regional economy and supports the financial well-being of many local businesses and households.



Photo Courtesy of Mark Emery



Photo by Alaska Ultimate Safaris

VI. Final Remarks

The remote aspect of bear viewing in Alaska presents major challenges to developing a comprehensive economic significance analysis. Drawing on proprietary data provided by local businesses this study provides an assessment of the economic contribution of bear viewing opportunities and related services provide to Southcentral Alaska.

Bear viewing in Southcentral Alaska is unquestionably unique. The original brown bear range in the U.S. has been substantially reduced due to habitat destruction, with fewer than 900 bears remaining in all of the contiguous U.S. (Miller, Miller, and McCollum 1998). The complex interdependent relationship between wildlife and humans has only recently begun to be understood and taken into account. Constant human development around the world is being realized as a major pressure on wildlife. As a consequence, the conservation of brown bears in Alaska is not only desired, but also economically wise.

As the supply of unique wildlife viewing opportunities decline worldwide, the distinctive opportunities available in Southcentral Alaska will become more valuable. Not only in terms of future economic activity, but also in terms of the social welfare derived from bear viewing by visitors and residents alike. Our examination paints only a portion of the economic picture since we examined economic significance and did not estimate the total economic value of bear viewing. To better guide decision making, future research should be directed towards enhancing our understanding of how Alaskan brown bears contribute to the economic well-being of our state. Along with calculating the willingness-to-pay (WTP) of visitors for actual viewing trips, Loomis et al. (2018) found that online viewing opportunities for Alaska brown bears provide \$24 million in individual welfare. Research examining the relationship between online viewing opportunities and potential impacts on actual visitation would be a worthwhile effort. As it stands Alaskan brown bears are a financially valuable natural asset which positively contribute to the economic vitality of the Southcentral economy and contribute to the positive perceptions of Alaska outside of the state.

APPENDIX A

Glossary of Terminology

Economic Significance Analysis evaluates the contribution of sector importance of an industry or activity to a region, usually including spending by both local residents and visitors from outside the region.

Impact Analysis estimates the extent of change in income, employment, payroll, and taxes from a change in spending coming from outside a region.

Region represents the geographic area for which economic changes are calculated. In this analysis, the region includes the Municipality of Anchorage and the three boroughs of: Lake and Peninsula, Kenai Peninsula, and Kodiak Island.

Sector defines a set of industries whose product or service output is roughly similar. Sectors are commonly coded using the North American Industrial Classification System (NAICS).

Input-output model is a representation of the flows of economic activity between sectors within a region. The model captures what each business or sector must purchase from every other sector in order to produce a dollar's worth of goods or services.

IMPLAN is an input output modeling software system. The current version uses 536 sectors and includes procedures for generating multipliers and estimating impacts by applying final demand (expenditure) changes to the model.

Final Demand is the term for sales to final consumers (households or government). Sales between industries are termed intermediate sales. Economic impact analysis generally estimates the regional economic impacts of final demand changes.

Direct effects are the changes in economic activity which results from the initial change in spending.

Indirect effects are the changes in sales, income or employment for firms providing goods and services to the primary businesses.

Induced effects are the further changes in economic activity which occur as a result of the change in laborers and payroll of directly and indirectly affected businesses.

Total effects are the sum of direct, indirect and induced effects.

Multipliers describe how much secondary impact (indirect and induced) are generated from each dollar of initial spending. The size of a multiplier shows the extent to which initial spending circulates throughout a region.

Measures of economic activity:

Total Industry Output (TIO): IMPLAN uses input/output accounting to assess the value of production by industry for a calendar year. Output can also be thought of as a value of sales plus or minus inventory. Output associated with bear viewing visitation is mainly in the form of services (e.g., travel, guides, food, accommodations).

Sales or output is the dollar volume of a good or service produced or sold.

Jobs or employment is a measure of the number of individuals required to produce a given volume of sales/production. Jobs include full time, part time and seasonal positions.

Value Added is the aggregation of net income across all proprietors. It avoids double counting of intermediate sales.

Willingness-to-pay (WTP) is the maximum amount of income an individual is willing to exchange in order to keep circumstances (attributes) of a service (good) the same.

Consumer Surplus is the net value of a good or service above and beyond the price paid.

Total Economic Value is the sum of use (onsite) and nonuse (offsite).

Use (onsite) value is any participation of activity using a service or good, including non-consumptive uses (e.g. wildlife-watching, hiking, or photography) and consumptive uses (e.g. hunting, trapping, or fishing). **Option value** is a subset of use value and is defined as the value an individual holds for the future availability of a good or service.

Nonuse (offsite) value is the passive, non-physical consumption of a resource, and includes existence value. **Existence value** is the value of a resource for an individual just knowing that it exists, and/or knowing that the resource is available to be used by others. **Bequest value** is a subset of existence value and refers to the value derived from knowing that the resource will be available for future generations even if the individual has no intentions of ever using the resource themselves. **Intrinsic value** is another type of existence value and is the value derived from knowing that the resource is undisturbed and able to flourish without negative intervention.

APPENDIX B

Input-Output Modeling Limitations & Assumptions

Input output modelling is a useful tool but there are a number of assumptions and limitations which guide interpretation of the outputs and constrain what can be stated about the economic efficiency of any specific allocation of resources. I/O models assume constant returns to scale in production which, by extension, ensures a linear cost function and equal marginal and average costs of production. Output is assumed to be homogenous (identical). The approach also assumes that there is no input substitution and that there are no supply constraints. Put simply, firms can readily change output to meet demand and do so using existing input ratios. Within the IMPLAN platform modelled economies are assumed to be in full employment, likewise, technology and trade relations are assumed.

I/O models are useful for outlining the potential employment and output impacts associated with a particular change in expenditures. These models differ from a cost-benefit framework since they do not comment on the social welfare associated with any underlying distribution of economic endowments.

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