



Backcountry Visitor Impact Assessment in Katmai National Park and Preserve and the Alagnak Wild River, 2007





Alaska Region Technical Report Series

Natural Resources Technical Report NPS/AR/NRTR/2008-70.

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Front Cover: Three photographs taken as part of the impact study. Nonvianuk Outlet (top left) and Moraine Creek (lower pictures).

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**National Park Service
United States Department of the Interior**

Backcountry Visitor Impact Assessment in Katmai National Park and Preserve and the Alagnak Wild River, 2007

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ABSTRACT

Visitor impacts were documented in the backcountry of Katmai National Park and Preserve and Alagnak Wild River from June through September 2007. Site data for campsites, human waste, trash, and other visitor-related impacts such as fire rings and cut stumps were collected by rangers during routine backcountry patrols. These data are the first broad scale documentation of backcountry visitor impacts in Katmai. Crosswind Lake near Moraine Creek recorded the highest concentration of impacts overall, with 82 impact sites located in an area of less than 6 hectares including 26 human waste sites and 51 trash sites. Moraine Creek, another area of high use, recorded along 9 km of its length 16 campsites and numerous related human waste and trash issues. The highest density of campsites was found at the Nonvianuk outlet area with 12 campsites recorded in less than 6 hectares. Hallo Bay showed a moderate level of use compared to Moraine and Nonvianuk. It is not clear whether the higher amounts of impacts are related to higher levels of use, or if "Leave No Trace" practices are not being applied specifically in these areas. In either case, these visitor impacts should be monitored more intensively in the future to prevent park resources from being degraded. Other backcountry areas not surveyed by this project but known to have high visitor numbers should be targeted in the future to assess visitor impacts.

Key Words

Alagnak Wild River, Alaska, backcountry, bear viewing, impacts, Katmai National Park and Preserve, sport fishing, visitor, wildlife viewing

INTRODUCTION

Although Katmai National Park and Preserve and the Alagnak Wild River are inaccessible by automobile, thousands of visitors are transported by commercial operators in float and wheeled planes annually to the park units. For Katmai; 19,810 user days were documented for the backcountry areas and 4287 user days were totaled for the Alagnak Wild River for the 2006 season (Alaska Region Office of Concession Operations data, 2007 numbers not available at time of report completion).

Anecdotally, most overnight backcountry use appears to be from sport fishing and hunting visitors. Overnight backcountry use appears to occur predominantly along river corridors including the Alagnak Wild River where visitors are transported by small plane to boat/raft and camp along rivers (often involving more than one commercial operator). Overnight backcountry use also frequently occurs around lakes and lake outlets.

Day use appears to be primarily from sport fishing and bear viewing visitors. Many fishing visitors access the park during the day after overnighing in private sport fishing lodges located on park inholdings or outside park boundaries. For example, there are five lodges along the Alagnak/Nonvianuk drainages which have between 2 to 20 boats per lodge accessing the park's fishing areas during the day (2007 Alagnak patrol rangers, pers. comm.). Many sport fishing lodges also use floatplanes for day trips to access prime fishing and bear viewing areas in the park units. A large number of day bear-viewing trips into the park are based out of Homer and Kodiak. Commercial operators fly one or two floatplanes (typical capacity 6-10 passengers) to areas along the Katmai coast (such as Geographic Harbor or Hallo Bay) or to Moraine/Funnel Creeks in the preserve.

Visitation is also known to be increasing in the backcountry as evidenced by coastal visitor numbers. Visitor days have greatly increased across the coast: in 2004, 3323 coastal visitor days were recorded and in 2006, this figure doubled to 6820 coastal visitor days (Katmai Concessions Office data, Alaska Region Office of Concession Operations data). Some bays such as Hallo Bay (582 to 2382 visitor days) and Geographic Harbor (239 to 1092 visitor days) are showing a four-fold increase within a three- to six-year period.

Although different backcountry impact projects have occurred throughout the years, no project has attempted to document backcountry impacts unit-wide in Katmai National Park and Preserve. Instead, studies over the past two decades have been conducted in smaller, localized areas with different objectives and data collection methods. Independent studies have occurred in American Creek (Jope and Welp 1987), the Bay of Islands (Del Vecchio and Brennan 1992), the Alagnak River (datasheets from 1995 [no final report written]; Zwiebel 2003), and Moraine and Funnel Creeks in 2004-

2007 (Groth et al. 2007). These projects have not provided inference to the park as a whole for understanding the prevalence of backcountry visitor impacts.

With increasing visitation trends and groups up to 30 people reportedly concentrated in certain sites throughout the summer, the park in 2007 initiated an opportunistic data collection project for backcountry visitor impacts. In summer 2007, through a collaborative project between the Natural Resource Division and the Resource and Visitor Protection Division, data were collected to document campsites, human waste, and other associated impacts throughout the backcountry and provide the park with an overview of problem areas.

STUDY AREA

Katmai National Park and Preserve and Alagnak Wild River are located approximately 325 and 400 km respectively southwest of Anchorage, Alaska (Figure 1). The park units are not connected to the Alaska Highway system and are not accessible by car. Both are world renowned destinations for recreational activities related to rainbow trout (*Oncorhynchus mykiss*), brown bears (*Ursus arctos*), and salmon (*Oncorhynchus* spp.). Brooks Camp Developed Area is the only frontcountry area of Katmai National Park and Preserve, and the rest of the 4.7 million acre park unit is backcountry. For the backcountry, the Alaska National Interest Lands Conservation Act (ANILCA) in 1980 designated 3,425,811 acres of Katmai National Park and Preserve as wilderness (Figures 2 and 3). The Alagnak Wild River unit boundary surrounds 30,700 acres (federal jurisdiction covers 27,200 acres) and does not have any frontcountry developments, although there are private inholdings within unit boundaries. Both park units are administered by a headquarters office in the town of King Salmon.

Vegetation communities vary across the landscape including dense alder stands, dwarf shrub, cottonwood and balsam poplar stands, and alpine tundra. Much of the park is covered by the 1912 ash layer from the Katmai eruption with successional plant communities still occurring (Bennett et al. 2005).

METHODS

Data was collected from 12 June-27 September 2007 by backcountry rangers during routine patrols. Data collection efforts were coordinated with backcountry law

enforcement patrols to minimize costs and maximize backcountry area coverage. Patrols were already scheduled in areas considered to have higher visitor use, and data for this project were collected opportunistically. Data collection methods were selected that would (1) provide a “snapshot” of the current impact situation in the park units to determine specific areas with existing backcountry impacts (not to provide a highly accurate, repeatable dataset for resurveying campsites for site expansion); (2) allow data collection in many areas, instead of intensively surveying smaller areas; and (3) avoid being overly time consuming as law enforcement patrol activities continued to occur while data were collected.

Data collection focused on visitor impacts such as campsites, human waste, trash, and any other visitor-associated backcountry impact such as fire rings and cut stumps. Survey transportation modes included foot, kayak, raft, and motorboat. Rangers stopped to record data when an impact site was located. Rangers recorded GPS locations using Garmin handheld units and recorded coordinates (WGS84 datum) on datasheets. (Although electronically storing data in the Garmins was considered, field deployments were typically for two weeks at a time, and there were concerns over lack of memory in the units for electronic data.) Habitat information was recorded broadly for the impact site. A digital photograph was also taken for each impact whenever possible and its identification was recorded for future linkage. For campsites, general information such as presence/absence of “hard/permanent” edges and a rough estimate of size were described. Human waste was identified broadly in categories of feces, toilet paper, or a combination. (See protocol in Appendix B and datasheet in Appendix C for specifics.)

Once datasheets were brought back to the office, data were entered into an Access database and respective digital photos were manually linked to each datapoint. Some sites had multiple photos and up to six photolinks were saved for each impact. Backcountry rangers also roughly mapped patrol areas in order to document what areas had been checked for backcountry visitor impacts. These patrol areas were spatially drawn into GIS shapefiles and brought into a geodatabase. This allowed the project to identify areas which were “cleared” versus unsurveyed for visitor impacts. Impact tables (Campsites, Human Waste, Trash, and Other) from the Access database were also exported and brought into the GIS geodatabase. Only the first digital photolink

associated with the Access database was exported into the GIS and hotlinked in ArcMap to the specific GIS point.

GIS points were reexamined for accuracy by comparing patrol areas to locations of recorded points. Errors were either corrected or if corrections were not possible, the data points were deleted from both the Access and GIS databases (for example, GPS locations located outside of the park unit clearly miswritten by observer). Where two patrols overlapped in an area, impact points located close together were compared to each other in description and photos, and deleted if the location appeared to be the same to avoid double-counting.

RESULTS

Backcountry rangers surveyed parts of the Katmai coast (Hallo Bay, Devil's Cove near Kukak Bay, and Amalik Bay), the Nonvianuk/Alagnak area, the Moraine Creek/Funnel Area, and Hammersley Lake through Lake Grosvenor (Figure 2). Impacts were found in different parts of the park (Figure 3), primarily in Nonvianuk/Alagnak (Figure 4), Moraine/Funnel areas (Figure 6), and Hallo Bay (Figure 8).

Of the surveyed areas, the two areas with the highest concentrations of impacts were the Nonvianuk outlet (Figure 5) and Crosswinds Lake (Figure 7) area near Moraine Creek. The Nonvianuk outlet had the most concentrated campsite area, with 12 campsites recorded in less than 6 hectares (Figure 5). Crosswinds Lake appeared to have the greatest level of impacts: in an area of less than 6 hectares, there were 82 impact sites recorded: 5 campsites, 26 human waste sites, and 51 trash sites (Figure 7). Moraine Creek (Figure 6) also had extensive visitor use impacts; along approximately 9 km toward the mouth of Kukaklek Lake, rangers documented 16 campsites, 28 human waste areas, and 20 trash sites.

Hallo Bay had evidence of moderate levels of use in 5 hectares with 4 campsites, 6 human waste sites, and 11 trash sites (Figure 8). Areas such as Devil's Cove, Amalik Bay, and Hammersley Lake through the Iliuk Arm of Naknek Lake appeared to have much lower levels of impacts than those listed above (Figure 3).

DISCUSSION

Both Katmai and the Alagnak clearly have areas with varying levels of backcountry visitor impacts ranging from concentrated high levels to none. Before this project, only anecdotal information existed for most areas in the park units gleaned from ranger reports. This project is the first study to document backcountry visitor use impacts throughout Katmai Park and Preserve as a whole and the Alagnak Wild River. This project will need to be repeated in order to obtain information for other areas not patrolled in 2007, as well as to potentially document changes in impact patterns for highly affected areas. This project provided a “snapshot” for 2007, and if repeated in the future will provide another “snapshot” for that particular year.

An issue that emerged related to data collection was the specific transportation method employed by personnel conducting the survey and the corresponding level of effort to find visitor impacts. When a ranger was on foot, they were more likely to discover trash and human waste evidence. Motorized boating and kayaking appeared to successfully document campsites along shores but were less likely to detect trash and human waste. Areas surveyed by motorized boat or kayaking, such as Geographic Harbor which had previously been reported as an area with human waste impact sites, were likely underrepresented by this preliminary investigation. Type of transportation employed by survey crew should be documented in future data collection efforts.

Another consideration is that for trash impact sites, no distinction was made between smaller items such as cigarette butts compared to larger items such as bear barrels. Having size classes for trash specified as a datafield may be a way to sort out different levels of trash for GIS analyses. Additionally, an issue related to future data collection is trash removal. In September 2007, after collecting data for this project, backcountry rangers removed over 100 pounds of trash from the Moraine Creek/Funnel Creek preserve area, which will most likely result in lower overall trash levels for that area for 2008 (Katmai Chief Ranger, Neal Labrie, pers. comm.). Collecting backcountry impact data for the area in 2008, however, will provide the park with an opportunity to document an annual trash accumulation amount.

A recently completed project directly related to backcountry visitors provides an accurate visitor count in the backcountry. Until 2005, annual backcountry visitor

numbers were recorded inconsistently and data were not comparable from year to year (B. Brock, Katmai Concessions Specialist, pers. comm.). In 2005, the Southwest Alaska Inventory and Monitoring Network (SWAN) and the Alaska Region Office of Concession Operations partnered together to create a Commercial Use Authorization database that included number of user days, specific locations that visitors were transported to, and the activities of transported visitors. This information is currently located on a website maintained by the Alaska Regional Office and in a corresponding database maintained by the SWAN data manager. This information can be used to link visitor numbers to levels of backcountry impacts recorded.

The most current numbers for visitor use from the Commercial Use Authorization database at time of report completion were 2006 data (Alaska Region Office of Concession Operations/Southwest Alaska Network, 2007 numbers pending in summer 2008). These visitor use numbers are based on user days (each day a visitor is in the park counts as a single occurrence) and are not equivalent to the number of visitors entering the park. Overnight versus day use visitors are not separated in the Commercial Use Authorization database and cannot be inferred from the user day numbers. Out of the ten backcountry sites with the highest number of user days, only four (Moraine Creek, Hallo Bay, Geographic/Amalik Bay, and Nonvianuk Outlet area) were surveyed for backcountry impacts (Table 1). In 2006, the most visited backcountry area was Kulik River (3445 user days) which was not surveyed by backcountry rangers for this project. Moraine Creek which was surveyed during this impact project had the second highest number of user days (3118). In future years, the park should encourage documenting backcountry impacts in the five other areas with higher user day numbers: Kulik River, American Creek, Swikshak Lagoon, Kamishak River, and Kukak Bay (Table 1). (The sixth area, Kukaklek Outlet, is a 1-acre camping easement surrounded by private lands and would most likely not be surveyed.)

Plans for the 2008 field season include incorporating the backcountry field data collection with the law enforcement ranger's Field Observations Reporting Tool (FORT) database. The Field Observation Recording Tool (FORT) database, initiated in FY2007, is a cutting-edge adaptive management strategy used by Katmai's Law Enforcement Division to document ranger reports and prioritize future patrols. The FORT database is

Table 1. In 2006, the ten most popular backcountry areas in Katmai National Park & Preserve shown by User Day from Commercial Use Authorization Reports; data from the Southwest Alaska Network and Alaska Region Office of Concessions database. Bolded locations with an asterisk (*) indicate backcountry impacts were surveyed in 2007. (Data for 2007 not available at time of report completion.)

	Backcountry Location	User Days in 2006
1.	Kulik River	3445
2.	Moraine Creek*	3118
3.	Hallo Bay*	2382
4.	American Creek	1628
5.	Kukaklek Outlet	1353
6.	Swikshak Lagoon	1182
7.	Kamishak River	1174
8.	Geographic/Amalik*	1092
9.	Kukak Bay	664
10.	Nonvianuk Outlet*	630

expected to be adopted by law enforcement divisions servicewide and is expected to continue at Katmai for a number of years in the future. Data from the backcountry impact project will assist the rangers in determining which areas are particularly degraded and will be used in the Threat Analyses matrix to identify critical patrol areas. Field data collection methods will also be closely analyzed to determine better efficiency for data collection and processing, and may involve updating or creating new databases.

MANAGEMENT RECOMMENDATIONS

To prevent future impacts, the park should consider partnering with commercial operators for educational “Leave No Trace” and other related messages. Nearly all visitors access the park units via commercial operators, and both human waste and trash remains are directly preventable by visitors. Trash in particular is a park concern with the potential to food condition bears. Human waste is a challenge due to concerns over archeological disturbance as a result of burying feces and a lack of clear transport and disposal guidelines for removal (especially in small planes). On the other hand, while this project did record feces occurrences, rangers reported that it was not uncommon for

the feces to be excavated and presumably eaten by bears. Bears have been known in prior years to dig up and consume feces from outhouses at Brooks Camp (J. Gavin, KATM Chief of Maintenance, pers. comm.). It is unclear what the implications are for bears and potentially increasing amounts of human feces in the backcountry. Many other parks in Alaska and elsewhere have addressed this problem and a thorough review of successful, existing alternatives for backcountry management of human waste would benefit park managers and visitors. Long-term effects such as expanding backcountry campsites are more difficult to address, while human waste and trash are issues under a visitor's direct control.

Although this project provides a “snapshot” of the current level of backcountry impacts, the park will need to focus on a long-term monitoring program for visitor impacts to closely record trends, especially for campsites. Other parks such as Zion National Park have monitoring programs focusing on measuring changes in areal extent of campsites and trails as well as documenting trash and human waste (Marion 2002). These measurements are typically very detailed and time-consuming and were not adopted for this project due to those factors. However, the park should consider conducting a project adopting a radial transect method of recording campsites (Marion 1991), or other more rapid methods for campsite assessments such as those adopted by Glacier Bay National Park (Lewis and Drumheller 2004). Other campsite documentation methods at Gates of the Arctic National Park and Preserve, Yukon-Charley Rivers National Preserve, and the Arctic National Wildlife Refuge have focused on photodocumentation and GPSing campsite edges (J. Chakuchin, YUGA resource manager, pers. comm.). Kenai Fjords National Park is also currently focusing on developing protocols for campsite monitoring with both rapid assessment and long-term monitoring techniques (Meg Hahr, KEFJ ecologist, pers. comm.) that Katmai may consider adopting in the future.

ACKNOWLEDGEMENT

This project would not have been possible without the backcountry rangers collecting the field data: George Pratsinak, Ralph Anderson, Bruce Carter, Tracey Wiese, Barry Dombro, John Pendergraft, and Dave Woodcock. Neal Labrie, Chief

Ranger, at Katmai National Park and Preserve also supported this project after he arrived during the 2007 summer. Troy Hamon, Chief of Natural Resources Division, provided support and edits for this report. Dorothy Mortenson, Data Manager for the Southwest Alaska Inventory and Monitoring Network (SWAN), provided the statistics from the Commercial Use Authorization reports in the Alaska Region Office of Concessions and SWAN database.

LITERATURE CITED

Bennett, A. J., Thompson, W.L., and Mortenson, D. C. 2005. Phase III Vital Signs Monitoring Plan Southwest Alaska Network Inventory and Monitoring Program. National Park Service Report. Anchorage, Alaska, USA.

Del Vecchio P. and Brennan, K. 1992. Bay of Islands Impact Study. Internal report. Katmai National Park and Preserve, King Salmon, Alaska, USA.

Groth, E.M., T.L. Olson, C.I. Vaughn, and K.W. Mocnik. 2007. Visitor and bear use of Moraine and Funnel Creeks, Katmai National Preserve, 2006. Resource Management Technical Report KATM NR 07 03, Katmai National Park and Preserve, King Salmon, Alaska, USA.

Joep, K.L. and Welp, L.A. 1987. Monitoring Resource Conditions Related to Commercial Use on American Creek. Internal report. Katmai National Park and Preserve, King Salmon, Alaska, USA.

Lewis, T.M. and Drumheller, N. 2004. Wilderness Camp Impacts: Assessment of Human Effect on the Shoreline of Glacier Bay. Internal Report. Glacier Bay National Park. Gustavus, Alaska, USA.

Marion, J.L. 1991. Developing a Natural Resource Inventory and Monitoring Program for Visitor Impacts on Recreation Sites: a Procedural Manual. Cooperative Park Studies

Unit, National Park Service. Virginia Tech, Blacksburg, VA, USA. Natural Resources Report NRR-91/06.

Marion, J.L. 2002. Campsite Monitoring Manual, Zion National Park. Internal manual. Zion National Park, Springdale, Utah, USA.

Zwiebel, Brian. 2003. Identifying the spatial and temporal distribution of human users in a river corridor. M.S. University of Washington, Seattle, Washington, USA.

Appendix A

Maps

Katmai National Park & Preserve and Alagnak Wild River

Figure 1

Katmai National Park & Preserve
National Park Service
U. S. Department of the Interior



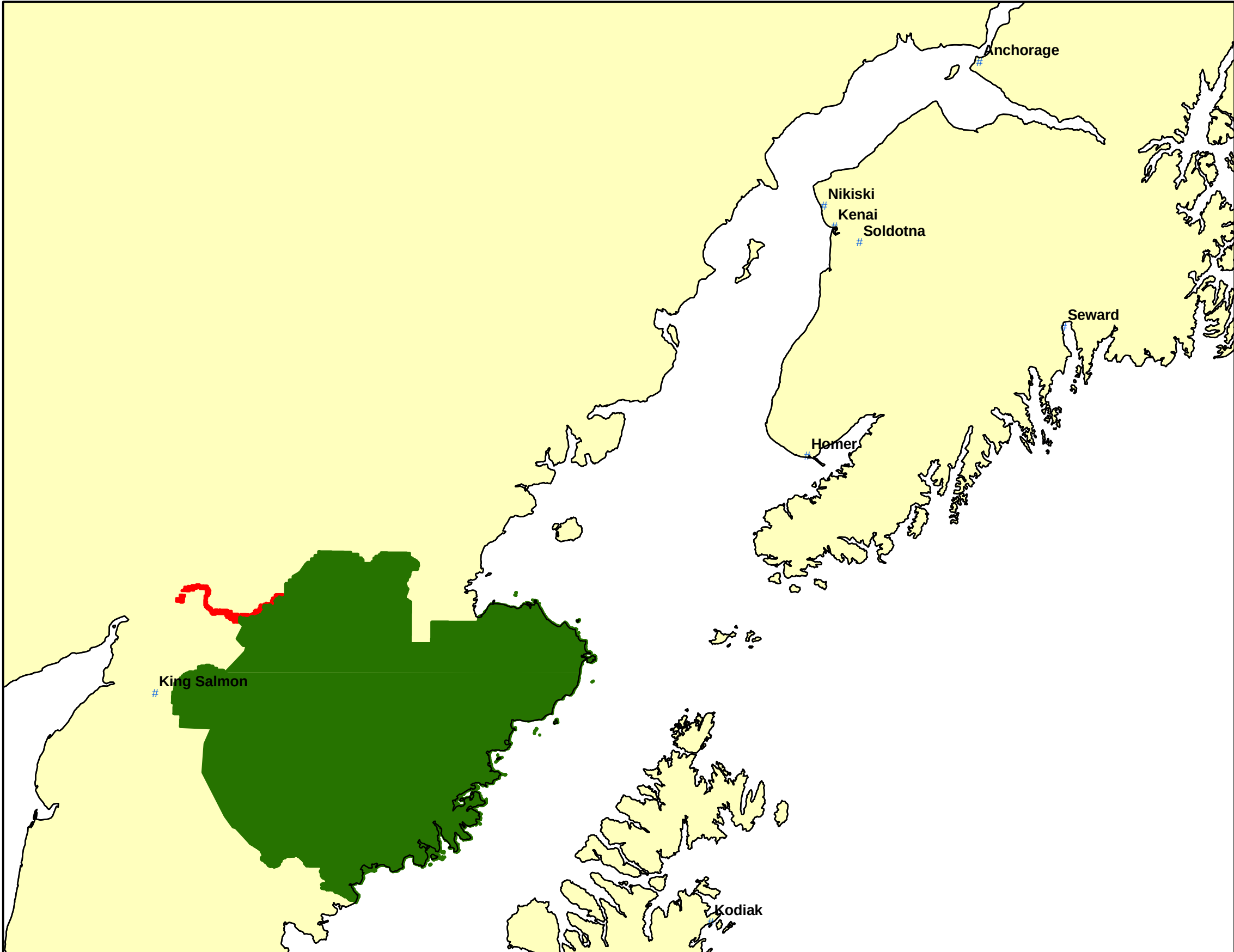
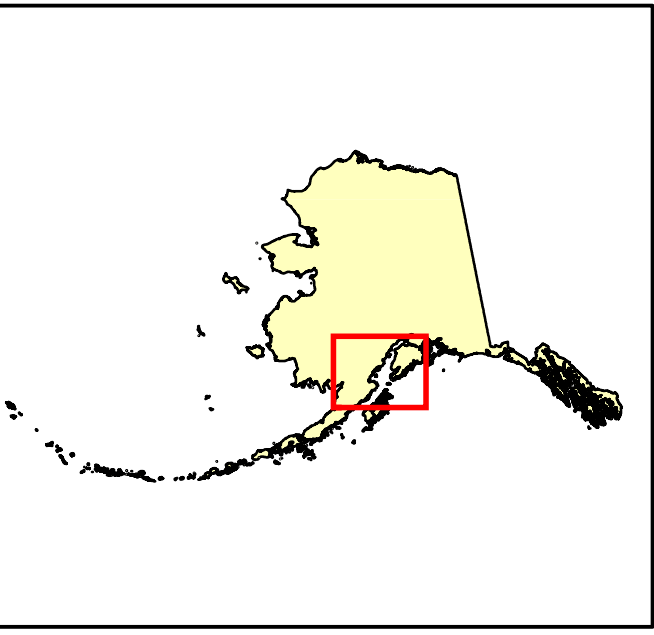
Legend

- # Towns
- Alagnak Wild River
- Katmai Nat'l Park & Preserve

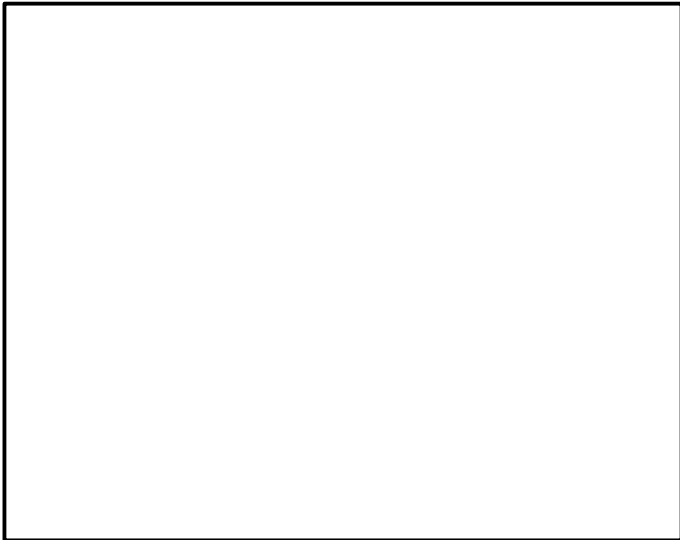
Katmai National Park & Preserve
King Salmon, Alaska
Sharon Kim, Coastal Biologist



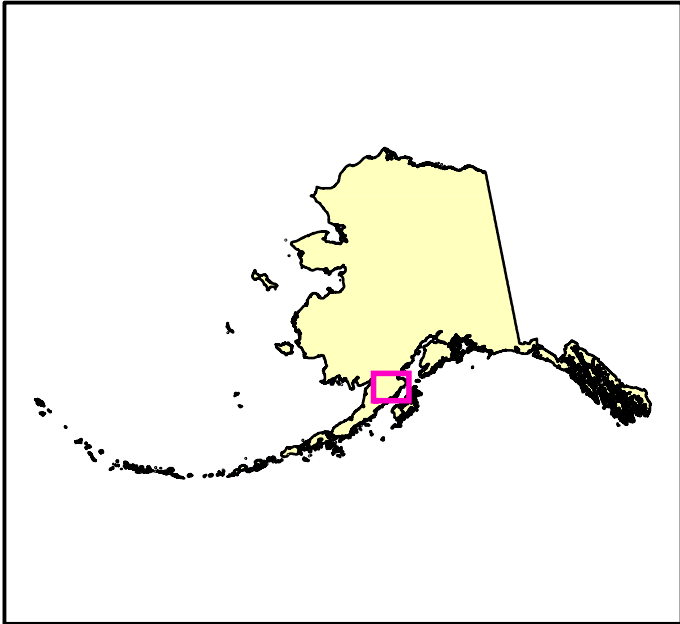
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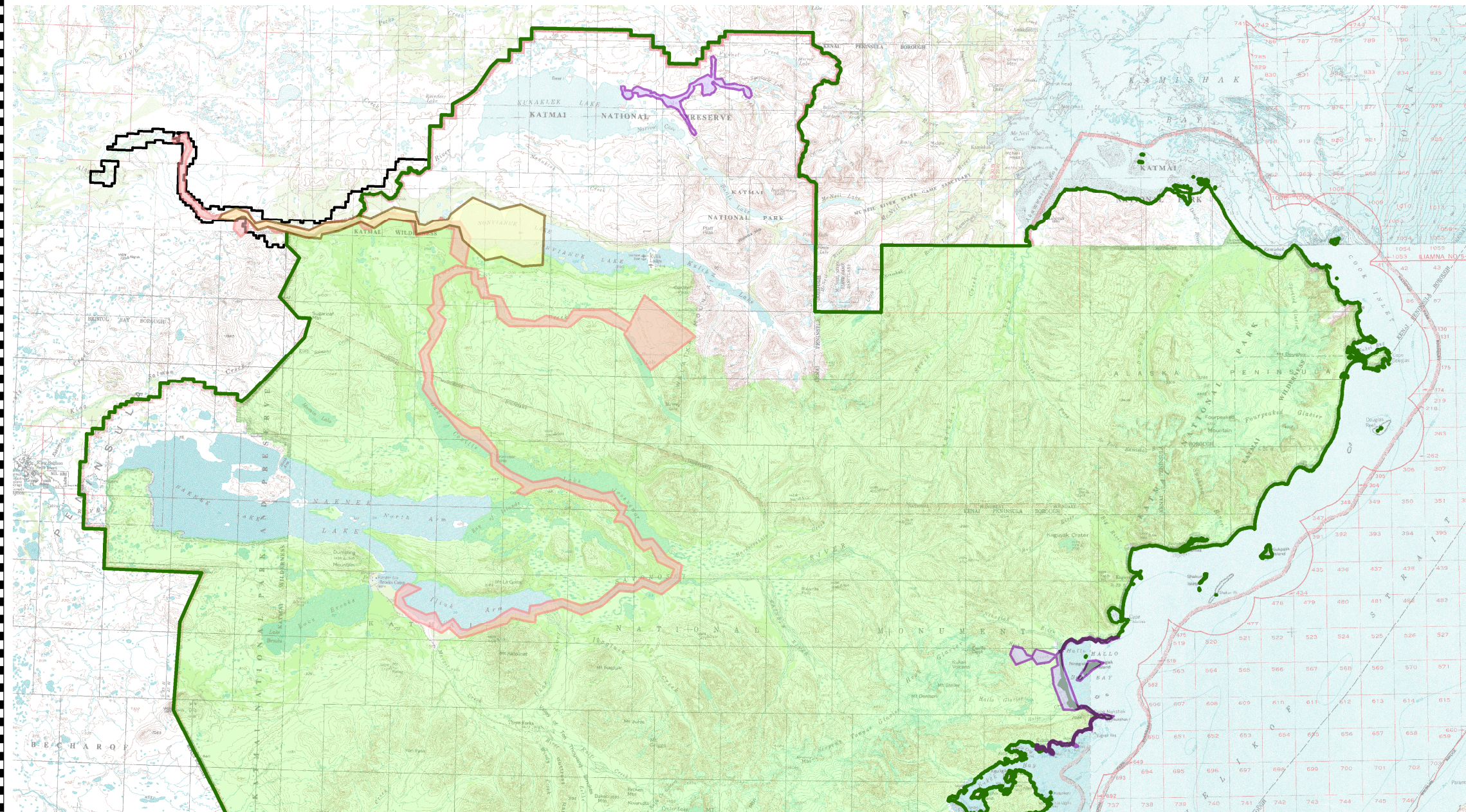
Backcountry Patrol Areas



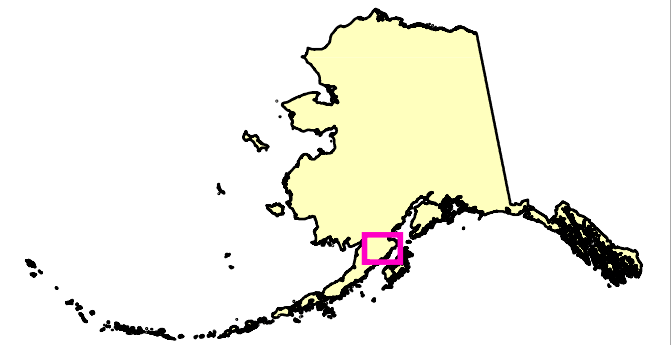
Katmai National Park & Preserve
King Salmon, Alaska
Sharon Kim, Coastal Biologist



Backcountry Patrol Areas and Impacts



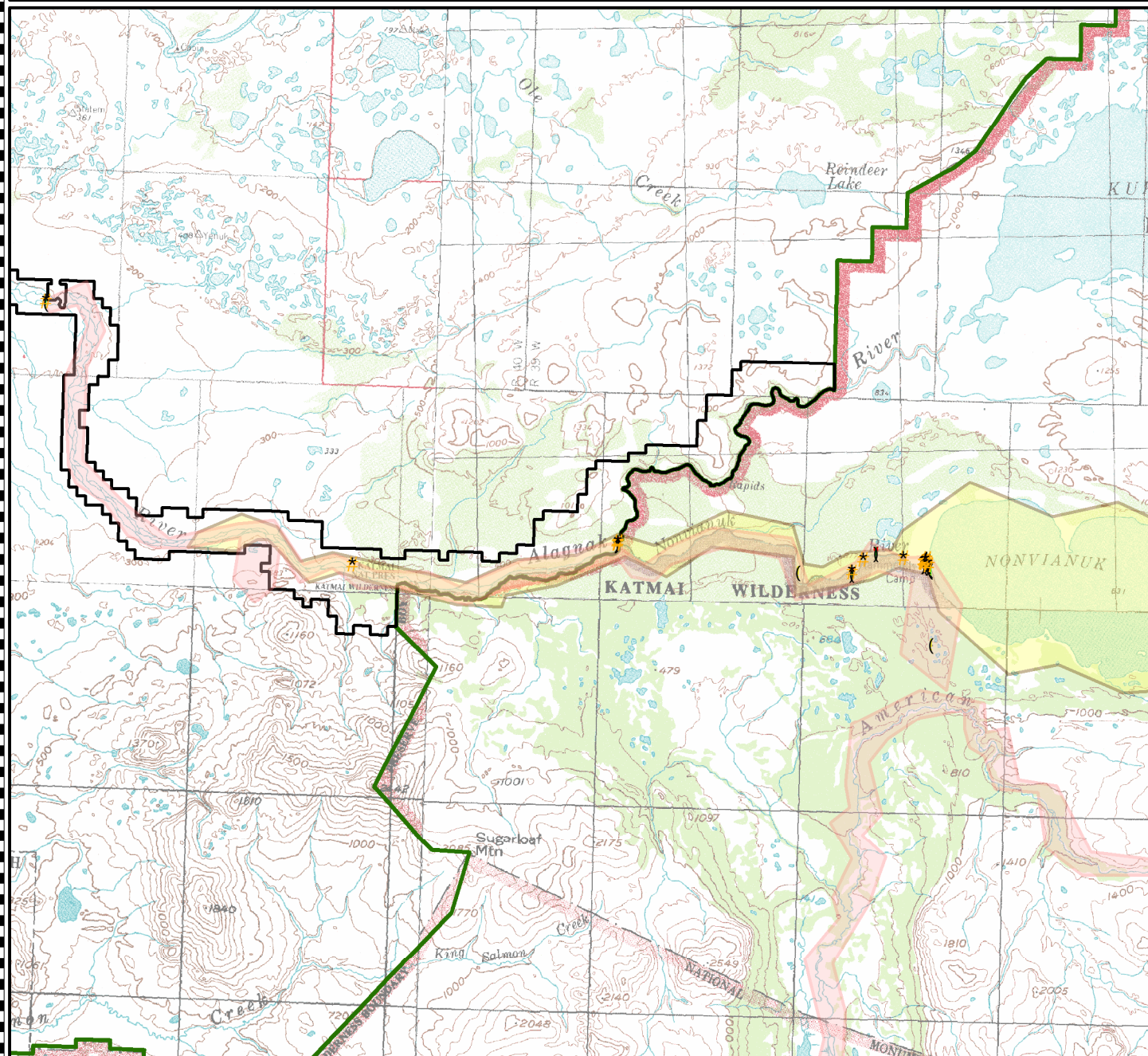
Katmai National Park & Preserve
King Salmon, Alaska
Sharon Kim, Coastal Biologist



Nonvianuk Area

Figure 4

Katmai National Park & Preserve
National Park Service
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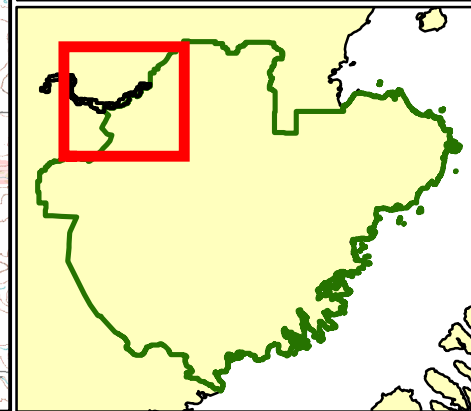
Legend

- Campsites
- Human Waste
- Other Impacts
- Trash
- Surveyed by Dombro
- Surveyed by Wiese/Carter

Katmai National Park & Preserve
King Salmon, AK
Sharon Kim, Coastal Biologist

0 2.5 5 7.5 10 Kilometers

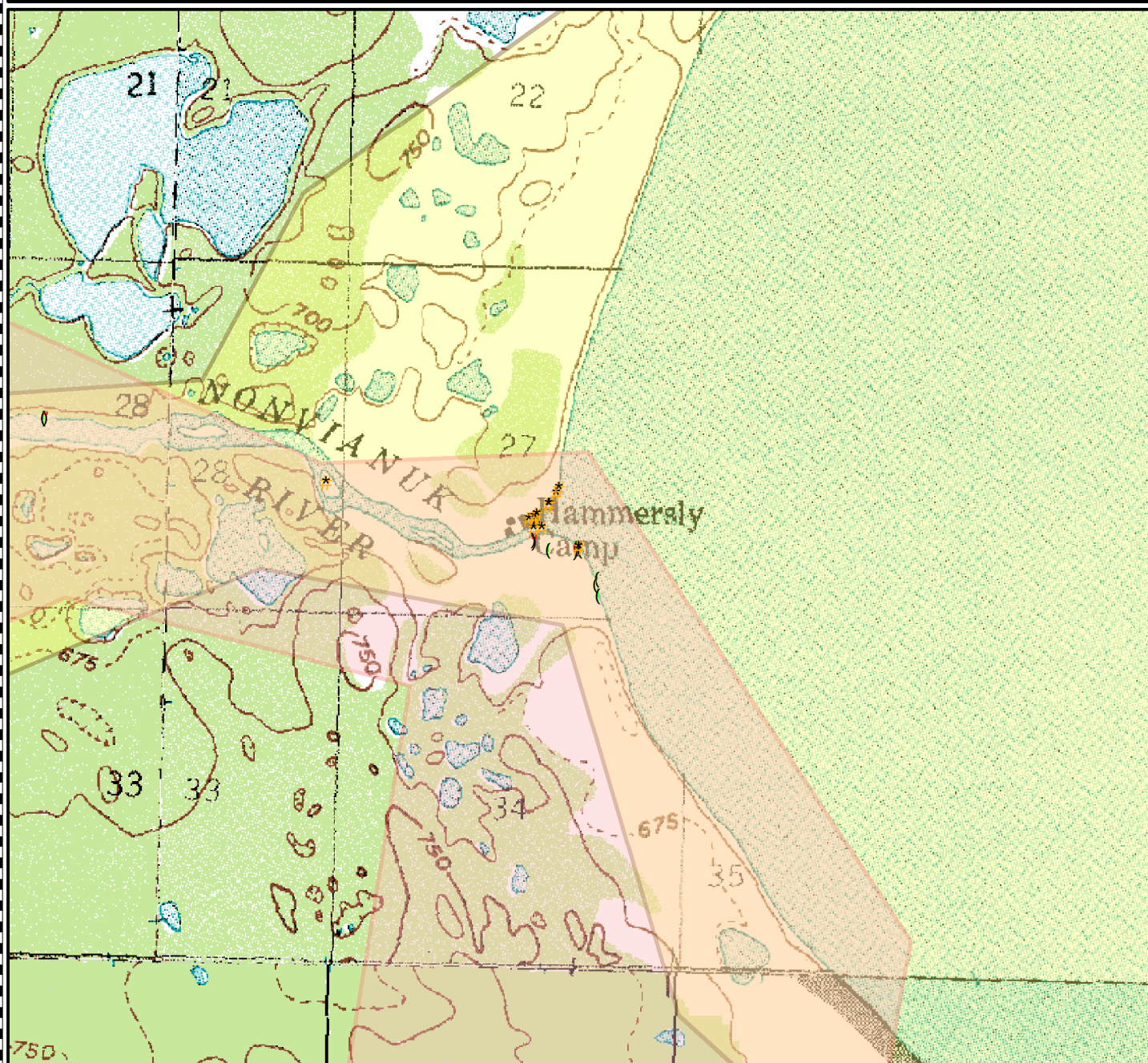
4



Nonvianuk Outlet Area

Figure 5

Katmai National Park & Preserve
National Park Service
U. S. Department of the Interior



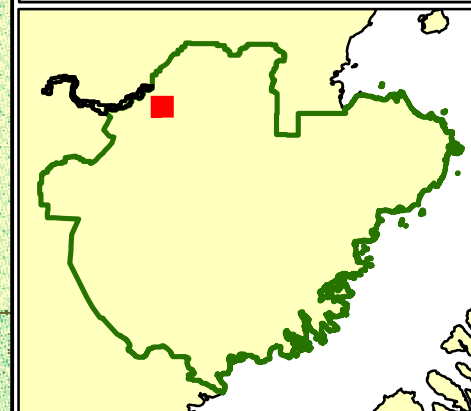
Legend

- Campsites
- Human Waste
- Other Impacts
- Trash
- Surveyed by Dombro
- Surveyed by Wiese/Carter

Katmai National Park & Preserve
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0 250 500 750 1,000 Meters

4



Moraine/Funnel Area

Figure 6

Katmai National Park & Preserve
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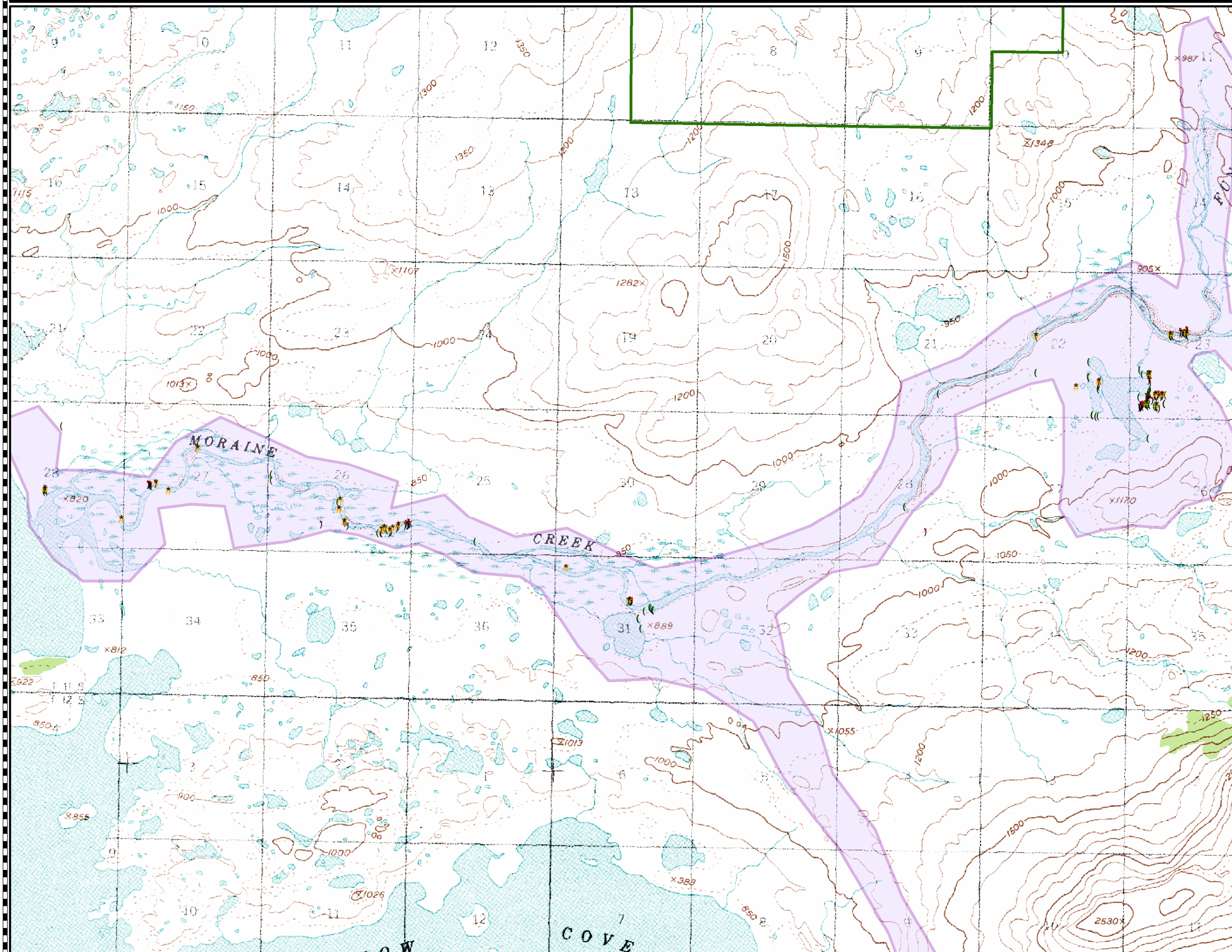
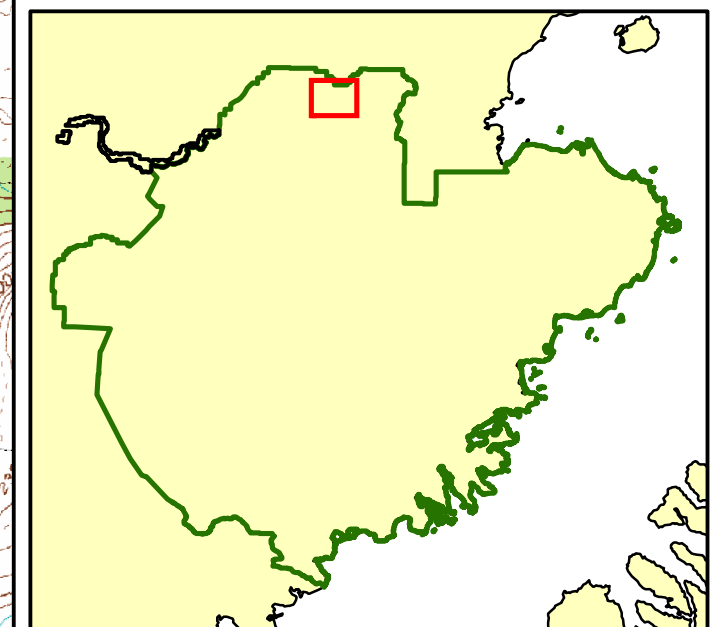
Legend

- Campsites
- Human Waste
- Other Impacts
- Trash
- Surveyed by Pratsinak

Katmai National Park & Preserve
King Salmon, Alaska
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0 0.5 1 1.5 2 Kilometers

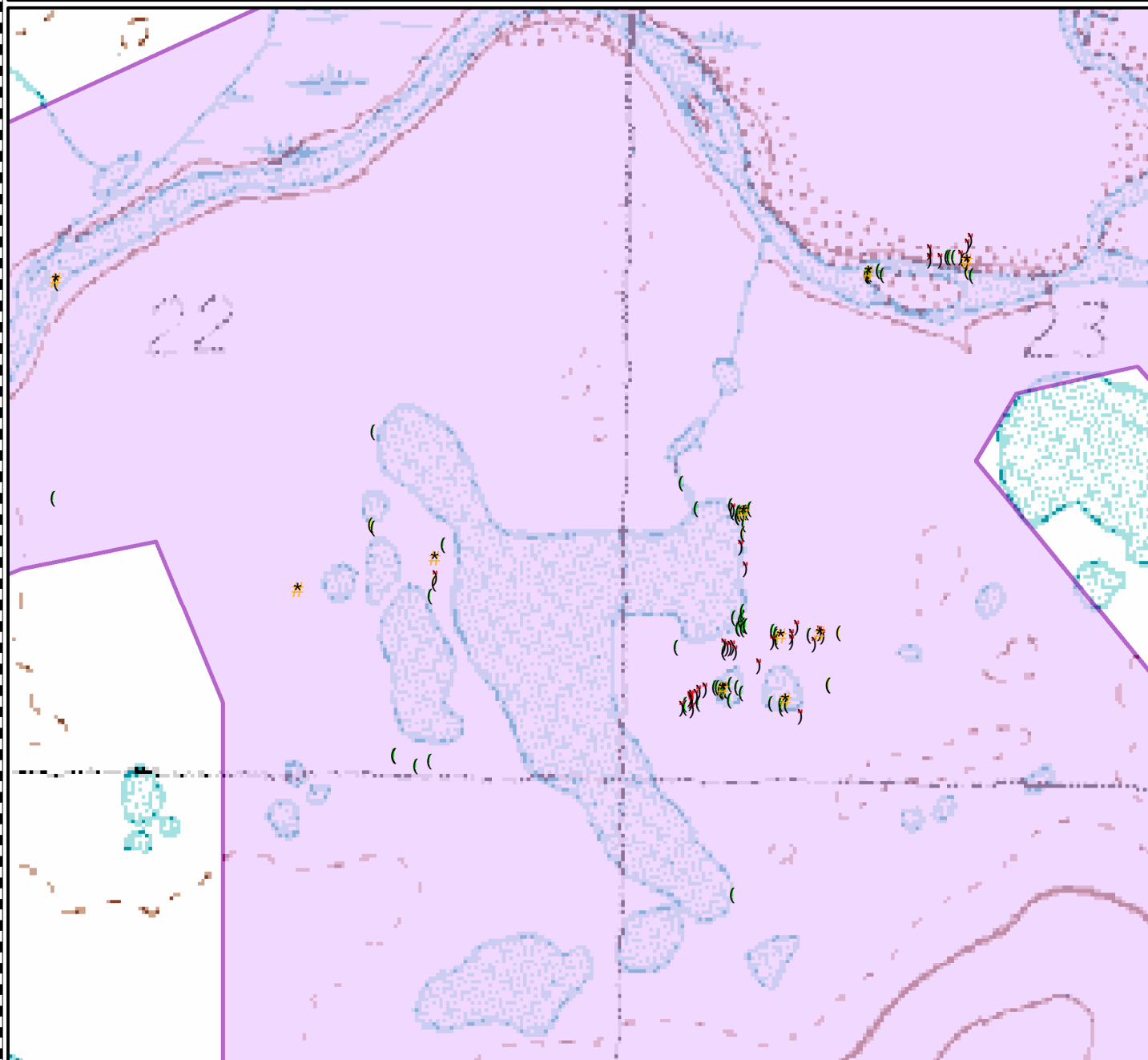
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Crosswind Lake Area

Figure 7

Katmai National Park & Preserve
National Park Service
U. S. Department of the Interior



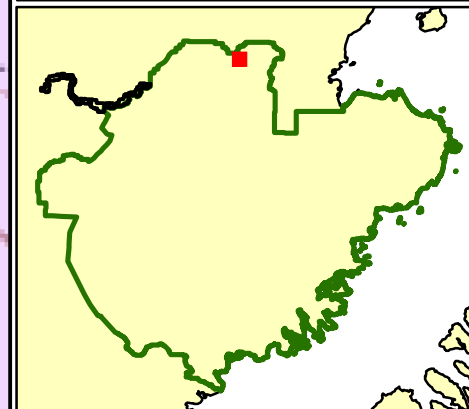
Legend

- Campsites
- Human Waste
- Other Impacts
- Trash
- Surveyed by Pratsinak

Katmai National Park & Preserve
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0 125 250 375 500 Meters

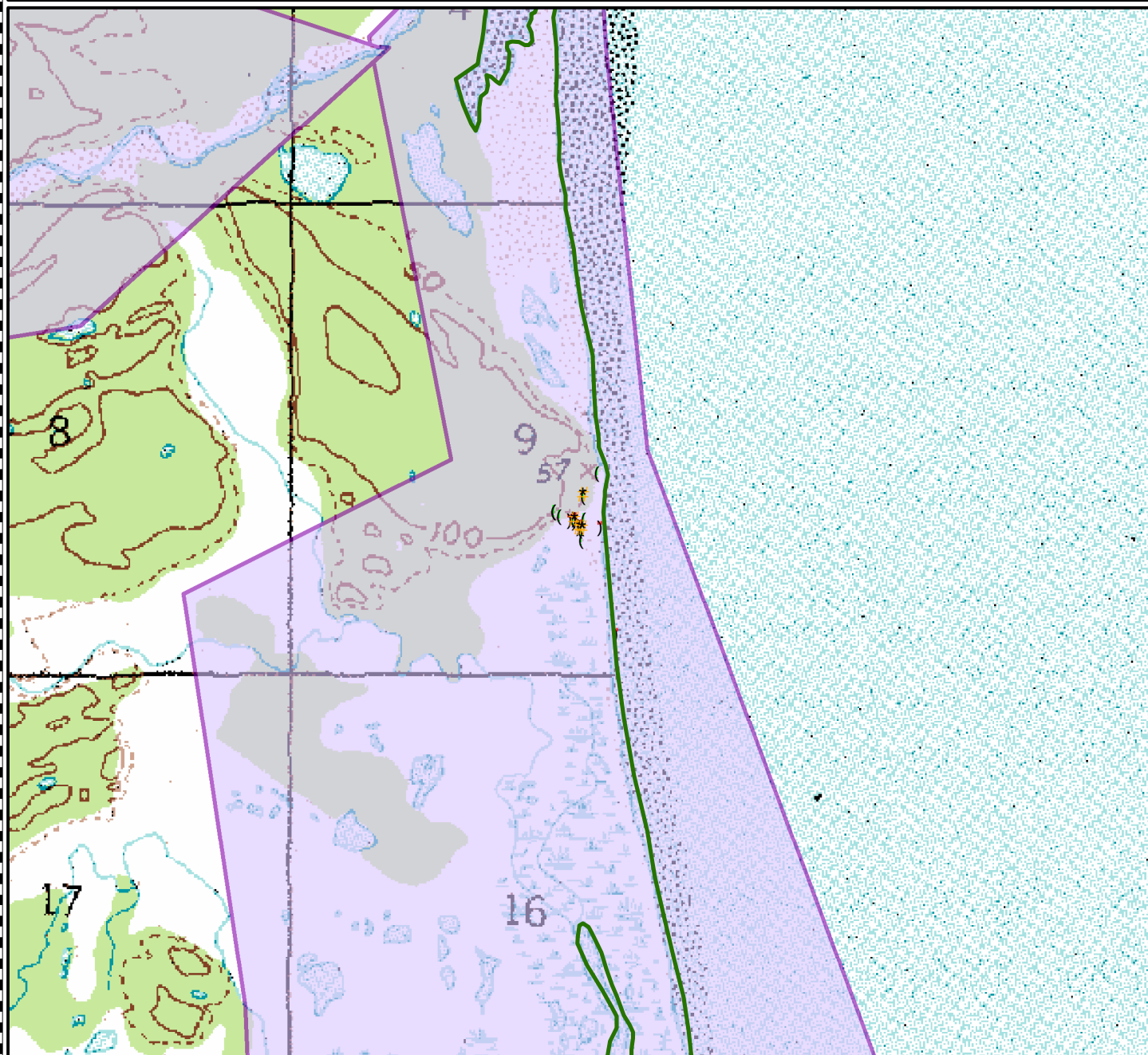
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Hallo Bay Area

Figure 8

Katmai National Park & Preserve
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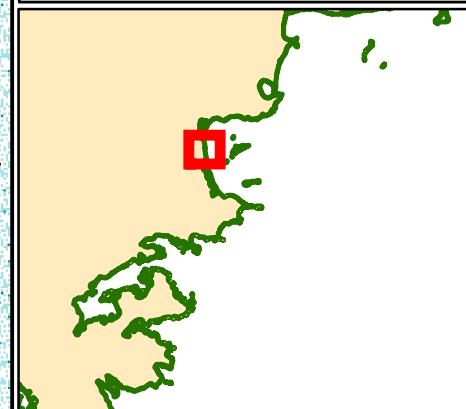
Legend

- Campsites
- Human Waste
- Other Impacts
- Trash
- Surveyed by Pratsinak

Katmai National Park & Preserve
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0 250 500 750 1,000 Meters

4



Appendix B—Field Collection Protocol

PROTOCOL

Equipment needed: GPS, digital camera, Rite-in-the-rain datasheets, pencil.

GPS Unit Setup

DATUM: WGS 84

UNITS: Degrees Decimal Minutes

Data collected:

- Date
 - Observer
 - General Area (Hallo Bay, Alagnak, Geographic Harbor, Moraine Creek, etc.)
 - Habitat Type
 - Type of visitor impact (Campsite, Human Waste, Trash)
 - Comments
-

--Campsite specific

- Hard/permanent boundary (Y/N)
- GPS location—Northing
- GPS location—Westing
- Estimated area disturbed (in sq. feet)
- Photo taken (Y/N)
- Photo ID

--Human Waste specific

- Type (Feces, Toilet Paper, Other)
- Human waste deposits (Single, Multiple)
- GPS location—Northing
- GPS location—Westing

- Photo taken (Y/N)
- Photo ID
- Trash specific
 - Description
 - GPS location—Northing
 - GPS location—Westing
 - Photo taken (Y/N)
 - Photo ID
- Other specific
 - Description
 - GPS location—Northing
 - GPS location—Westing
 - Photo taken (Y/N)
 - Photo ID

Photo recommendations:

Have an item/person in the picture to show scale.

Appendix C—Data sheet

Date_____ Observer_____	
Gen. area (Hallo Bay, Alagnak, etc.)_____	
Habitat type: _____	
Impact (check): ☐ Campsite ☐ Human Waste ☐ Trash	
Comments:*_____	

Campsite Info:	<i>Need scale comparison for pictures.</i>
Hard (permanent) boundary? Y / N	
GPS location N_____ W_____	
Estim. area disturbed (in sq. feet)_____	
Photo taken? Y / N Photo ID_____	

Human Waste Info:	
Circle: Feces Toilet Paper Other_____	
Human waste deposits: Single Multiple	
GPS location N_____ W_____	
Photo taken? Y / N Photo ID_____	

Trash info:	
Description_____	
GPS location N_____ W_____	
Photo taken? Y / N Photo ID_____	

*Write additional comments, specific maps, and/or photo points on back if needed.	

Datasheet used to collect information.

Appendix D—Database structure and GIS conversion

Database notes:

- 1) Rangers preferred to collect GPS data in degrees decimal minutes. GIS data requires that GPS data is in decimal degrees. To solve this issue, a field was created post-data collection to convert the GPS data into decimal degrees through a conversion button programmed in VBA. Another alternative would be to export the field into Excel and then reimport the table back into Access as a new table containing this information.
- 2) While Access easily hyperlinks pictures, these links once exported outside Access could not be used by other programs. After export, hidden characters (for example, many “#” signs) were found to be inserted into the hyperlink. Incidentally, when any photo links documented in other applications (for example: “g:\photos\Impact1.jpg”) were imported into Access as text, and then converted into a Hyperlink file, Access immediately entered the “#” signs again. While the database was useful for storing the Hyperlinks to one or more pictures, it will not work in any other program. For future databases, it may be best to keep the field as a text field, unless you specifically want Access to hyperlink the photo in the database.
- 3) ArcGIS will only read a conventional file path and doesn’t accept the Access-related “#.” After hyperlinking the pictures in the Access database for 2007 data, another database field was created for GISphotolink. This field held the actual file pathway for the photolink and was not used in Access to hyperlink photos. This field was created by exporting into Excel and doing global changes to remove the hidden characters. This is easiest done before adding the table to ArcGIS.
- 4) See the Figure below for the Access database structure.

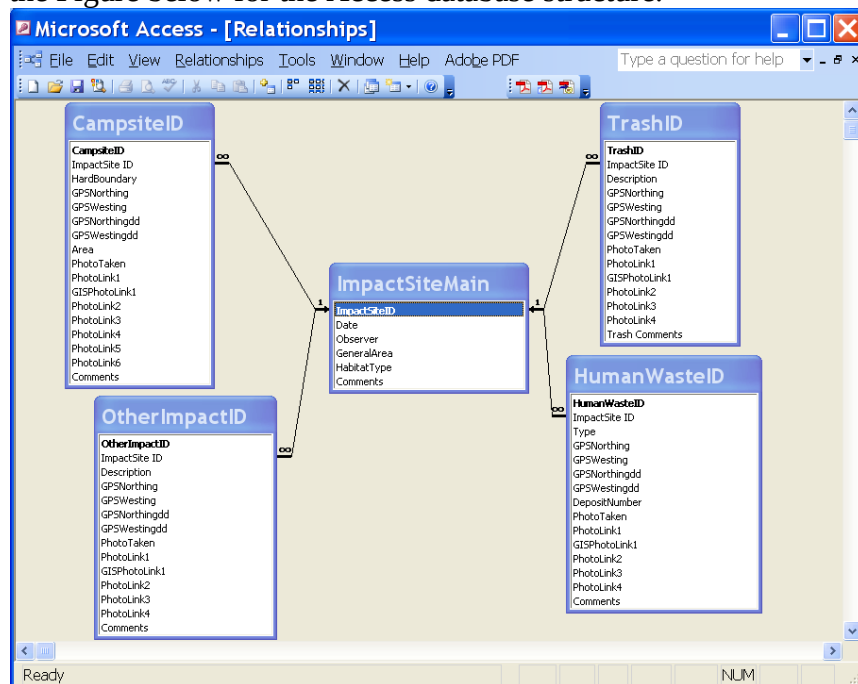


Figure A: Access database structure.

GIS conversion:

Because the native format of ArcGIS is an mdb/gdb, the Access tables were directly exported to a geodatabase.

STEPS TO CREATE PROJECTED SHAPEFILES:

- 1) Open ArcCatalog. Create a new file geodatabase.
- 2) In ArcCatalog, select the Access database to see individual tables. (If you want the dates associated with each field, you will need to create a “MakeTable” query in Access combining the Main Table and the specific Impact Table.)
- 3) Right click on one of the impact tables (CampsiteID, HumanWasteID, TrashID, or OtherID). Export the table to the newly created single geodatabase—you will have to do the below steps for each one.
- 4) “Table to output location” window
 - a. Output location=new file geodatabase
 - b. Name output table and click “ok”
- 5) Start ArcMap. Add created tables from the geodatabase.
- 6) Right-click on table and select “Display X-Y data”
 - a. For X-Field, select “GPS Westing”
 - b. For Y-Field, select “GPS Northing”
 - c. Edit coordinate system
 - i. Geographic Coordinate System→World→WGS1984.prj
 - ii. Hit “OK” twice
- 7) Open ArcToolbox. Find the “Project Tool” under “Data management tools→Projections & transformation→Feature→Project.
- 8) Under the tab “Display”, select the X-Y map representation of the table in the Table of Contents
- 9) For the Project Tool window:
 - a. For “Input dataset or feature class”, drag the X-Y map representation
 - b. For “Output” make sure the geodatabase that you created is selected
 - c. For “Output coordinate system” select Alaska Albers Equal Area Conic (under Projected→Continental→North America)
 - d. For “Geographic transformation”, select the first item.
- 10) Your data is now in a projected shapefile that is compatible with other park files
- 11) Write metadata for the new geodatabase and shapefiles.

TO HYPERLINK PHOTOS TO GIS POINTS

- 1) Right-click on the shapefile you created in the step above.
- 2) Click on “Properties”
- 3) Select the “Display” tab
- 4) Check “Support hyperlinks” using field
- 5) Specify field as “GISPhotolink1”

- 6) Click OK
- 7) Check to see if the hotlink is working by selecting the lightning bolt on the tool bar.
 - a. You may need to change the sensitivity options under “Selection”
 - b. Change “selection tolerance” to “ 6 pixels” if necessary.