

*Exxon Valdez* Oil Spill Gulf Ecosystem Monitoring and Research Project Final Report

Mapping Marine Habitat - Kodiak Island

GEM Project 020619  
Final Report

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**Study History:**

This project was a result of 2002 meetings designed to develop projects to map the nearshore environment in the EVOS study area. In April 2002 Robert J. Foy was asked to oversee this project and tie it into existing nearshore projects in the Kodiak Region. Funds were allocated for a brief 6 day aerial survey in June 2002 and for a web based map linked with video. We determined that surveying as much ground as possible with the funds provided would be the most efficient use of time and money. Map production would not be included in this effort.

**Abstract:**

The Project was to undertake aerial video mapping of northwest coastal areas of Kodiak Island at extreme low tides. Biological, geological and anthropogenic attributes of the coast will be mapped in future efforts if funds can be obtained. Approximately 1300 km of coastline were mapped in a six-day survey. Final imagery will be set up on an ArcIMS website (probably at UAA) with future funds.

The project was proposed as a component of the EVOS-GEM Nearshore program and will provide a spatial framework for more detailed mapping.

**Key Words:**

Kodiak, intertidal, aerial survey

**Project Data:**

Data includes aerial video of *part* of Kodiak coastline. These videos are being stored at the Coastal Ocean Resources and a copy has been made at UAF in Kodiak. A copy was also sent to EVOS (22 VHS video tapes). The flight line data is available and is included as an attachment to this report. The electronic flight line data was provided to EVOS on CD-ROM. The imagery has been placed on a public web page for viewing 1-sec intervals: ( <http://imf.geocortex.net/mapping/demos/cori/imf.jsp>).

**Citation:**

Foy, R.J. and J. Harper. 2003. Mapping marine habitat – Kodiak Island, *Exxon Valdez* Oil Spill Gulf Ecosystem Monitoring and Research Project Final Report (GEM Project 020619), University of Alaska Fairbanks, Kodiak, Alaska.

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- Appendix 1. Letter from John Harper describing the number of hours actually surveyed and addressing other concerns.
- Appendix 2. Letter to Kodiak Daily Mirror to expose local public to project. Project was highlighted in a front page Mirror story.
- Appendix 3. Aerial Survey tracklines (hardcopy previously sent to EVOS)

### **Executive Summary:**

The Project was to undertake aerial video mapping of northwest coastal areas of Kodiak Island at extreme low tides. Six days of surveys covered a significant portion of northeast Kodiak. Video has been analyzed and made available for public viewing. It is now NECESSARY to secure funding to a) finish mapping Kodiak region b) georeference the audio geological and biological information into useable maps and c) groundtruth visual observations with discrete studies in the subtidal and intertidal regions.

### **Introduction:**

Aerial video mapping of the coastal zone for geological (substrate, geomorphology), biological (flora, fauna) and anthropogenic attributes has been demonstrated as an effective method of providing an important baseline dataset of intertidal and subtidal environmental data for a wide range of applications. Extensive mapping using aerial video has been undertaken throughout coastal British Columbia and Washington, initially related to oils spill concerns.

In addition to a complete set of georeferenced, annotated videotapes of the coastline, interpreted data were provided in GIS-compatible databases from which mapping of various types and scales can be undertaken if future funds become available.

### **Objectives:**

1. Undertake aerial video survey at extreme low tide of an area along Kodiak Island for shore-zone geology and biology (intertidal to shallow sub-tidal).
3. Set up video imagery on a website.

### **Methods:**

#### **Field Survey**

Aerial video imagery is collected of the shore zone at tides less than "zero" elevation, resulting in the entire intertidal zone being imaged. A synchronous narration is provided by a geomorphologist and a marine ecologist on separate audio channels. High resolution still photos are shot by the biologist. DGPS track line data is recorded and also burned synchronously onto the video images. All video imagery is recorded in digital tape format, as well as a back-up tape in Hi8 format. Ground hovers are conducted as required to assist both the biologist and geomorphologist in interpreting features and biota. A flightline manual is produced as part of the field survey with maps of flight tracks and logs of tapes.

#### **Analysis**

If future funding were secured the following analyses could be completed. The shore zone is mapped using a protocol of the Washington ShoreZone mapping project. Maps and databases are produced during this phase and would incorporate all of the Washington ShoreZone features in addition to new features appropriate for Alaska. Geomorphologists and biologists review the imagery and using professional interpretations, classify the shore-zone features. The Washington ShoreZone protocol includes QAQC procedures.

**Results:**

Video has been collected and archived

**Conclusions:**

After having viewed the video tapes, this method is an effective tool for monitoring nearshore habitat. It is clear, however, that groundtruthing efforts **MUST** be completed to make these efforts useful for future projects.

## COASTAL & OCEAN

### RESOURCES INC.

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2 December, 2003

Exxon Valdez Oil Spill Trustee Council  
441 W. 5<sup>th</sup> Ave  
Anchorage, AK 99501-2340

***RE: Kodiak Aerial Video Imaging***

Dear \_\_\_\_\_,

I am responding to Katharine Miller's letter of 10 February 2003 to Dr. Robert Foy; as most of the issues concern our products, I thought it most appropriate to respond. Also since Katharine is no longer with EVOS, I am addressing the letter to you for appropriate referral. Items are addressed as per Katharine's letter.

1. Why was only 1,300km of shoreline imaged?

I have summarized the survey effort in Table 1. The total estimate of shoreline imaged is slightly better - 1,400km as opposed to my previous estimate of 1,300km. I do estimate our proposed survey based on imaging hours/day which is 3.2 hr/day (i.e., the proposal). We were bang-on

**Table 1 Summary of Survey Estimate for Kodiak Is**

Date	Hours of Imagery	Km of Imagery
11 June 2002	3.6	279
12 June 2002	3.4	268
13 June 2002	3.1	161
14 June 2002	3.2	316
15 June 2002	2.8	186
16 June 2002	2.8	190
	3.15 hr/day average	1,400km total (233km/d)

this estimate (Table 1) and our flight speed during imaging is 60 knots or 100km/hr - so why is our surveyed shoreline length not closer to my original estimate? My guess is that we are *actually* using a 1:250,000 scale map (most detailed scale available for Kodiak) for measuring shoreline length - if we were to use a 1:64,000 scale map with more detail

(4 times as detailed), we would find that our estimated survey length would be closer to the forecast. So I would qualify our 1,400km of surveyed shoreline as 1,400km of *apparent* survey rather than actual. Our actual, based on hours imaged and average speed, is probably in the 1,900 km range which is not very different than proposed.

We were handicapped by flying further from our fuel source, which impacts efficiency, and I DID have fuel placed on Afognak Is (not in original budget either) to minimize this problem.

## 2. Final Report Methods and Deliverables

Most of these comments are based on the contention that we substantially under-achieved on our imaging mileage (proposed of 1,950km and apparent 1,400km). As discussed above, I think that a large part of the difference may be attributed to low resolution maps that are available for Kodiak. The statement that “the actual methods and deliverables for this project vary significantly from what was included in the original proposal” is based totally on the discrepancy of the mileage estimates, which I have attempted to explain (Item 1). *No interpretive mapping was proposed or funded.*

The two bullets on Page 2 of the letter refer to items that were envisaged as part of the long-term objective but were not proposed or funded as part of this project.

## 3. Issue of Meta Data

Since the interpretive mapping component of the project was not funded, there is *no* mapping for which meta data would be included.

## 4. Video Imagery

The video imagery is data and has been supplied to the EVOS in the form of 22 VHS videotape copies of the original tapes. We have archived the original minDV tapes on behalf of EVOS. They belong to EVOS but we have found that they are actually safer when stored in our formal archiving system.

## 5. Narration and 35mm Photos

There is a 2-channel synchronous narration on the videotapes, so this part of the contract is satisfied. Ms. Miller is correct in pointing out that the 35mm slides have not been delivered; again we are storing them on behalf of EVOS. We hope to obtain funding from state sources to complete the mapping, for which the slides are required. We have had our clients misplace slides before, as they do not fit into normal filing systems. With EVOS permission, we will retain these until such time as the mapping is complete.

## 6. Video Imagery Accessibility



Video captures of the imagery have been set up on the website and are publically accessible. We did not intend to be a distribution agent for the imagery. It may be advatageous to setup an ordering catalog and procedure for reproducing videotapes, but this was not included in our proposal estimate.

#### 7. Website Maintainance

John Harper will be the person responsible for the web site until October of 2004.

#### 8. Flightline Data

Electronic GPS data of the flight tracks was previously provided on CD-ROM. We will be glad to provide additonal CD copies.

With regards,

John Harper  
Marine Geologist

Appendix 2. Press Release

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**17 January 2003.01.17**

To: Editor  
Kodiak Times  
**Kodiak, Alaska**

From: John Harper

RE: Coastal Imaging Survey, Kodiak Island

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Howdy,

Attached is a press release on a survey that we completed last summer, as well as some information about the web availability of coastal imagery that might be of interest to your readers. So far, we have found that a whole range of people from kayakers to federal resource managers have been hitting the site.

I included a couple figures but the map is not very good and you might wish to download an image of the Kodiak waterfront to go with the story. The images are not copyrighted.

If I can provide any other info, let me know. Contact info is included on the press release

Press Release

***Kodiak Coastal Imagery on the Web***

As part of the Gulf of Alaska Ecosystem Monitoring Project (GEM), funded by the Cook Inlet Regional Citizen's Advisory Council (CIRCAC) and the Exxon Valdez Oil Spill Trustee Council (EVOS), coastal video imagery has been systematically collected throughout the Gulf of Alaska, including Kodiak Island. During extreme low tides of June 2002, about 1,200 miles of the Kodiak Island shoreline were documented; another

1,800 miles were collected in Cook Inlet and on the Outer Kenai coast. The imagery provides information for high resolution habitat mapping and oil spill response.

A unique aspect of the project is the web-posting of the coastal imagery, allowing web-users to literally fly the coastline (<http://imf.geocortex.net/mapping/cori/launch.html>). The web site allows the user to zoom into a location of interest, select a starting point and then start the image-player with a few click of the mouse. Principal investigator for the project, John Harper noted that you could fly from Cape Douglas to Prince William Sound but most people are interested in a few specific locations. "A few months ago, the national wire services were making a big deal about a guy who was posting digital imagery of the California coast on the web. I thought big deal, the California coast is only 500 miles long – we just posted 3,000 miles of the Alaskan coast on the web!" said Harper. "It's an experiment and so far, and people seem to like it. We have had great feed-back from a whole range of groups - agencies to school groups."

The imagery is being used to create high-resolution coastal habitat maps. Features such as eelgrass and kelp beds are mapped and are of significant interest to resource managers. Detailed coastal morphology and sediment features are also included so that we have much better picture of oil spill sensitivity than we did ten years ago. "People don't appreciate how hard it is to get good low-tide imagery. The lowest tides are early in the morning and the weather doesn't always cooperate. Although we can collect our imagery in almost any weather, we were extremely lucky to have great weather in Kodiak. Our pilot, Tom Walters of Maritime Helicopters, kept saying 'I've never seen it so calm'. Tom was also wondering if Kodiak might be the US's largest island *at low tide*?"

The information will be critical for the selection of long-term ecosystem monitoring sites that are part of the GEM program. Additional surveys of the Katmai coast are planned for the low-tide windows of 2003.

Principal Investigator: John Harper  
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907 283 7222  
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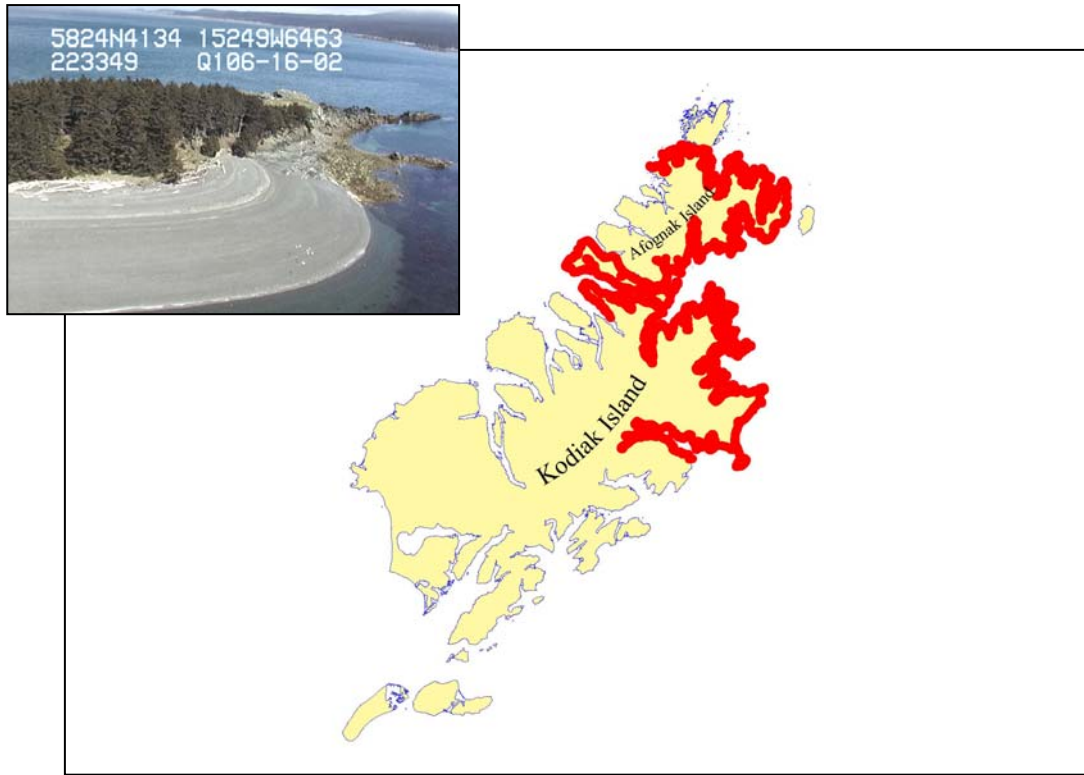
Location of web-posted coastal imagery in the Gulf of Alaska



Example of image capture showing the coastline with steep cliffs as well as the latitude, longitude, date and time.

Appendix 3. Aerial track lines

# 2002 Aerial Video Imaging Survey, Kodiak Island, Alaska (11 -16 June 2002)



prepared for  
University of Alaska, Fairbanks, Alaska,  
*Exxon Valdez* Oil Spill Trustee Council



**COASTAL & OCEAN RESOURCES INC.**  
214-9865 W. Saanich Rd., Sidney, BC V8L 5Y8



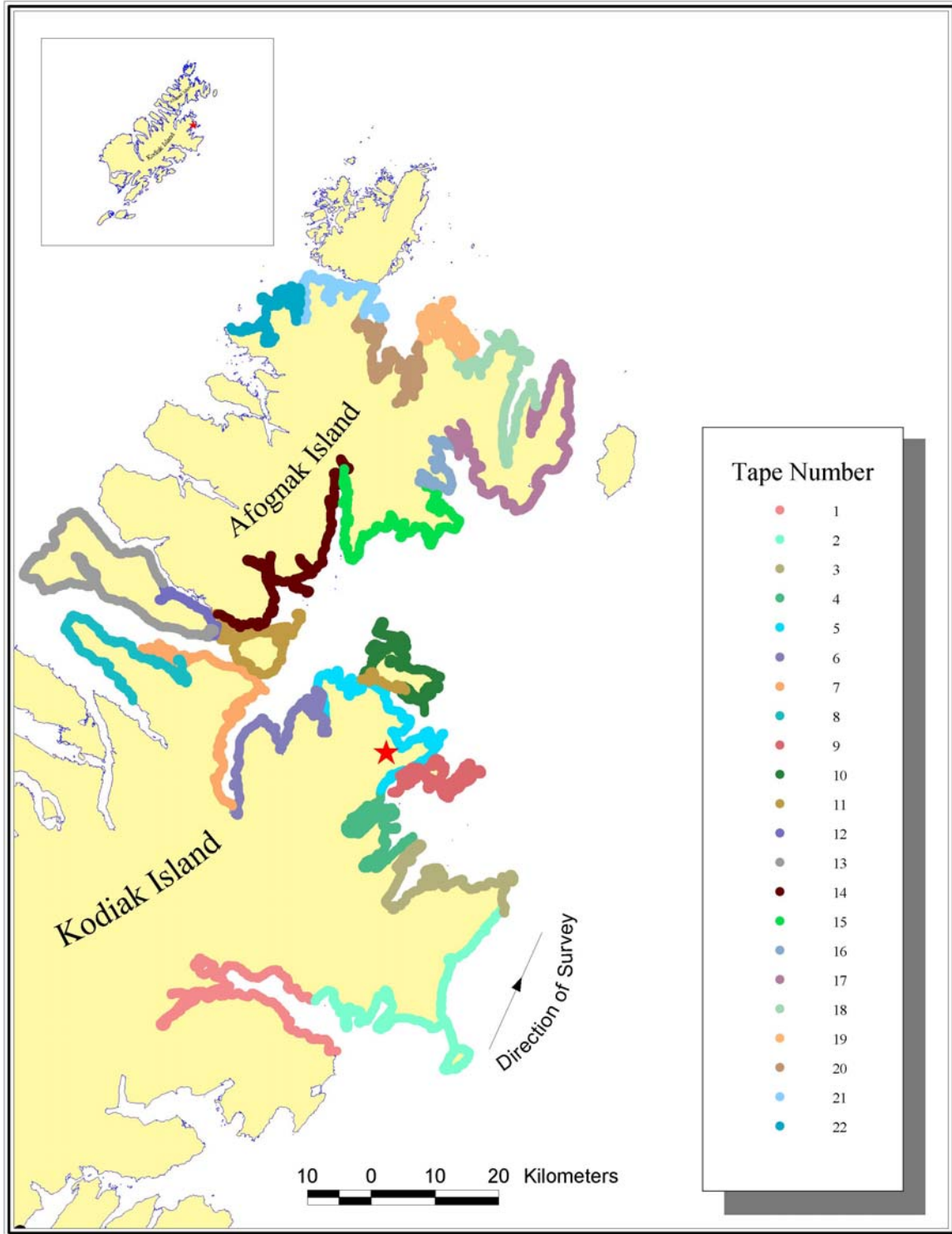


Figure 1. Location of individual tapes from the 2002 Kodiak Island AVI Survey

## INTRODUCTION

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This survey involved the use of digital video camera technology to image the shoreline of Kodiak and Afognak Islands at low tide. The unusual features of the survey are: (a) the survey was conducted during the lowest tides of the year so the entire intertidal zone is imaged, (b) the technique is not weather dependent so imagery can be collected in any conditions under which aircraft can fly and (c) both a coastal ecologist and coastal geomorphologist were in the aircraft providing real-time commentary on intertidal features that may not be visible on the imagery.

The survey was conducted by Coastal & Ocean Resources Inc. (CORI) of Sidney, BC under contract to University of Alaska, located in Fairbanks Alaska, as part of the Gulf of Alaska Ecosystem Monitoring and Research Program; a program of the *Exxon Valdez* Oil Spill Trustee Council.

Figure 1 shows the overall flight coverage by tape number. The flight crew names and responsibilities are summarized in Table 1. We very much appreciate the assistance of Maritime Helicopters, and the principle pilot in this survey, Tom Walters. His flight expertise and local knowledge contributed greatly to the success of this survey.

**Table 1 AVI Flight Personnel and Responsibilities**

<b><i>Function</i></b>	<b>Individual/ Affiliation</b>	<b>Responsibilities</b>
<i>geomorphologist project leader</i>	John Harper CORI	co-ordination of survey video imaging geomorphology commentary project reporting
<i>coastal ecologist</i>	Mary Morris Archipelago Marine Resources	biology commentary 35mm photographs
<i>navigator</i>	Neil Borecky CORI	in flight navigation & recording post-flight track plotting
<i>pilot</i>	Tom Walters – Maritime Helicopters, Homer, AK	



# 2002 Kodiak Island Aerial Video Imaging Survey Tape 1



# Kodiak Island 2002 Aerial Video Imaging Survey

**Tape Number:** 1  
**General Location:** Ugak Bay  
**Date:** 11 June 2002  
**Time Start:** 15:12:40  
**Time End:** 16:10:33  
**Tape Length:** 57:53  
**Weather:** DFC (Dead. Flat. Calm), overcast. 600ft aprox. ceiling.  
**Electronic File:** Kodiak2002.dbf, KodiakPhotos.dbf

Time UTC	Location	Film Roll	Film Frame	Chart	Topo
15:20:37	Eagle Harbor	1	16	16593	p.45
15:55:21	Hidden Basin	2	37	16593	p.45
16:00:44	Saltery Cove	3	11	16593	p.45
16:10:33	Portage Bay	3	27	16593	p.45

# 2002 Kodiak Island Aerial Video Imaging Survey Tape 2



## Kodiak Island 2002 Aerial Video Imaging Survey

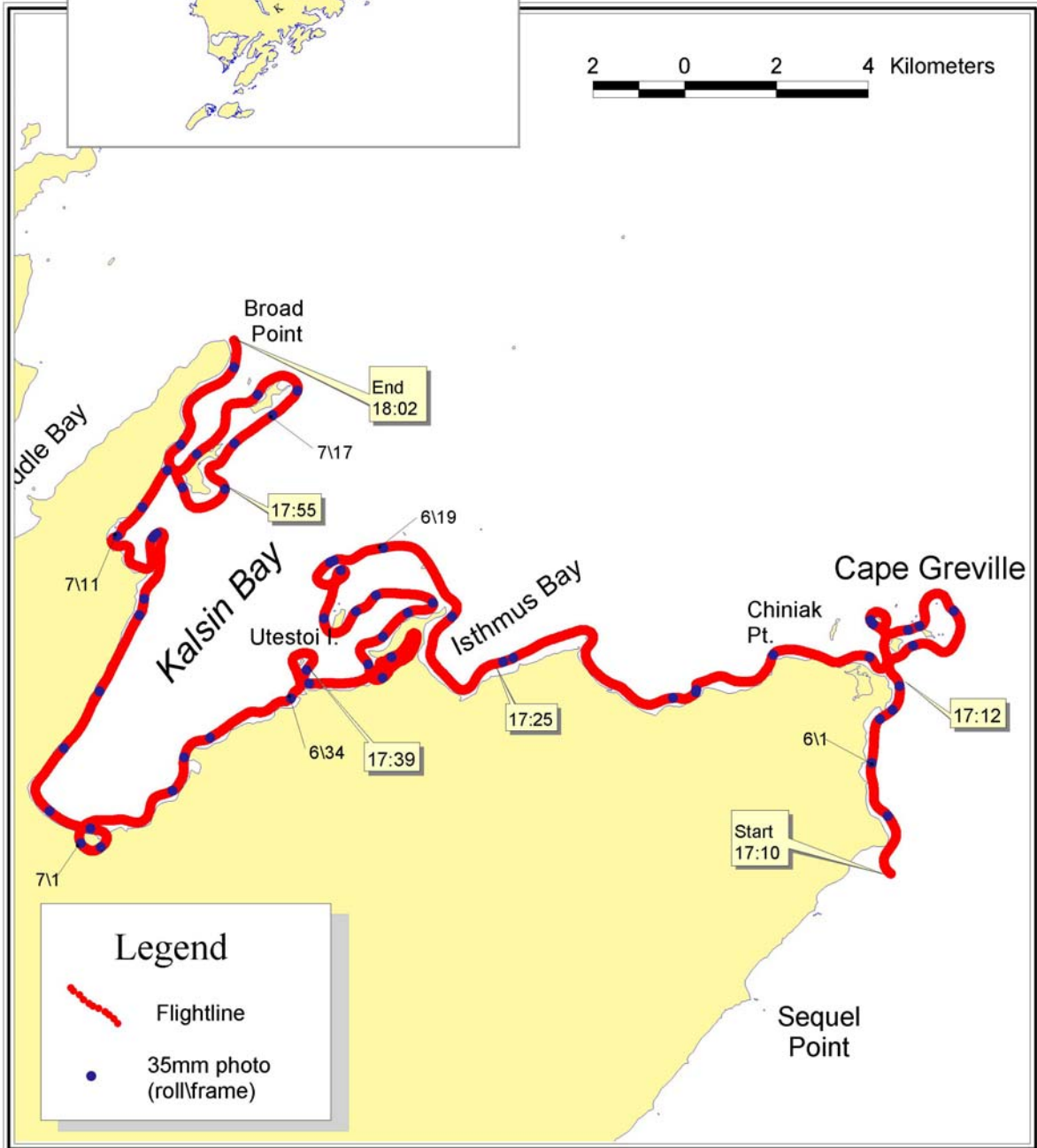
**Tape Number:** 2  
**General Location:** Ugak Bay to Cape Greville  
**Date:** 11 June 2002  
**Time Start:** 16:11:10  
**Time End:** 17:09:15  
**Tape Length:** 57:55  
**Weather:** DFC (Dead.. Flat..Calm), overcast. 600ft aprox. ceiling.  
**Electronic File:** Kodiak2002.dbf, KodiakPhotos.dbf

Time UTC	Location	Film Roll	Film Frame	Chart	Topo
16:17:10	Shark Point	3	36	16593	p.45
16:34:06	Pusagshak Pt.	4	19	16593	p.45
16:40:59	Fossil Beach, Narrow Cape	4	30	16593	p.45
16:50:24	Ugak Island	5	9	16593	p.45
17:09:15	Sequel Pt.	5	36	16593	p.45

2002 Kodiak Island  
Aerial Video Imaging Survey  
Tape 3



2 0 2 4 Kilometers

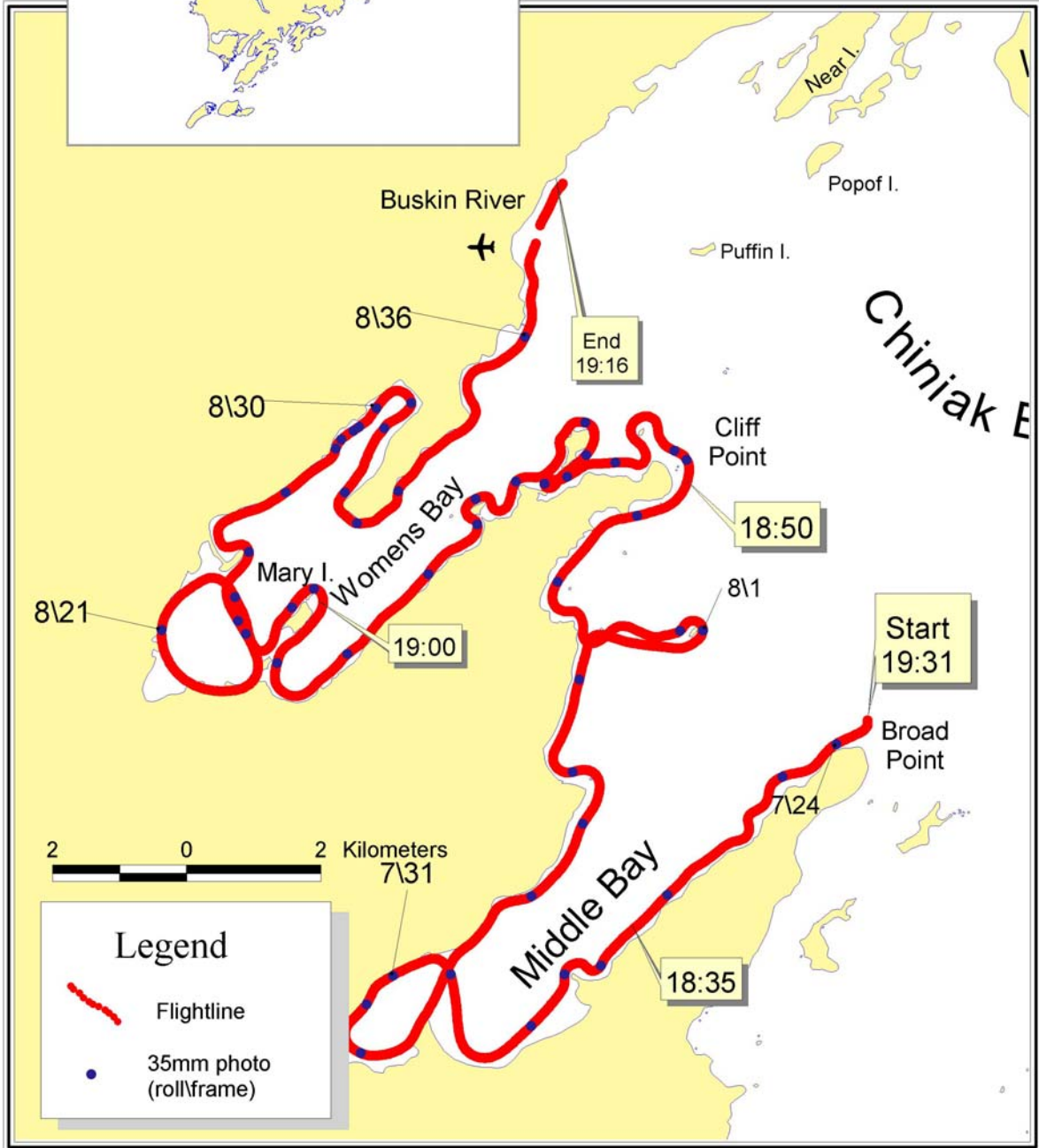


## Kodiak Island 2002 Aerial Video Imaging Survey

**Tape Number:** 3  
**General Location:** Cape Greville to Kalsin Bay  
**Date:** 11 June 2002  
**Time Start:** 17:10:16  
**Time End:** 18:02:36  
**Tape Length:** 52:20  
**Weather:** DFC (Dead.. Flat..Calm), overcast. 600ft aprox. ceiling.  
**Electronic File:** Kodiak2002.dbf, KodiakPhotos.dbf

Time UTC	Location	Film Roll	Film Frame	Chart	Topo
17:12:12	Cape Greville	6	4	16593	p.45
17:25:17	Isthmus Bay	6	17	16593	p.45
17:39:09	Utesistoi I.	6	34	16593	p.45
18:02:36	Broad Pt.	7	23	16593	p.45

# 2002 Kodiak Island Aerial Video Imaging Survey Tape 4



## Kodiak Island 2002 Aerial Video Imaging Survey

**Tape Number:** 4  
**General Location:** Middle Bay and Womens Bay  
**Date:** 11 June 2002  
**Time Start:** 18:31:36  
**Time End:** 19:16:05  
**Tape Length:** 44:29  
**Weather:** DFC (Dead.. Flat..Calm), overcast. 600ft aprox. ceiling.  
**Electronic File:** Kodiak2002.dbf, KodiakPhotos.dbf

Time UTC	Location	Film Roll	Film Frame	Chart	Topo
18:35:30	S-Side Middle Bay	7	27	16593	p.45
18:50:31	Cliff Point	8	6	16593	p.45
19:00:39	Womens Bay- Mary Island	8	18	16593	p.45
19:16:05	Airport, Buskin R.	8	36	16593	p.45



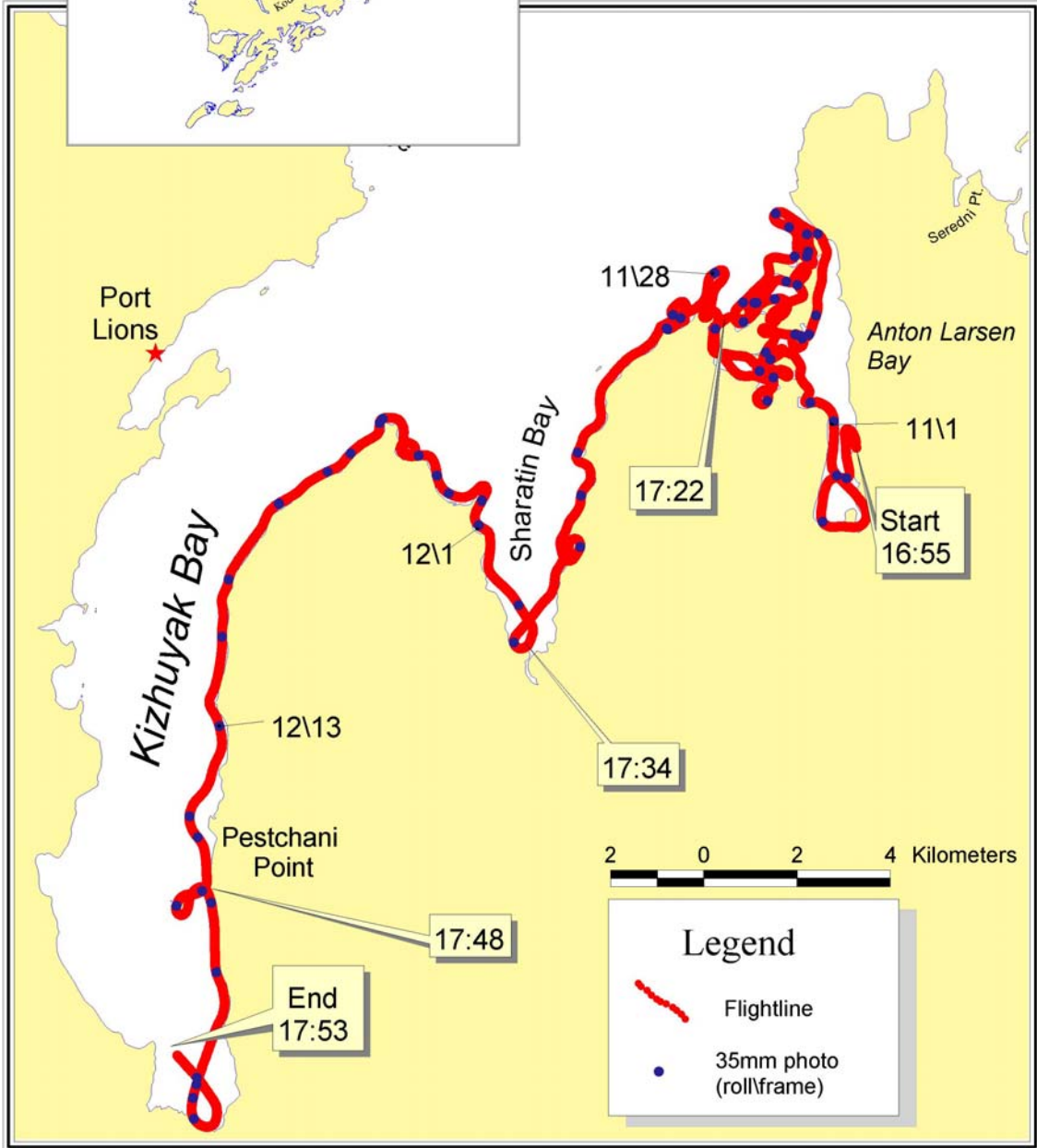


## Kodiak Island 2002 Aerial Video Imaging Survey

**Tape Number:** 5  
**General Location:** Buskin River, Kodiak, Narrow Strait, to Anton Larsen Bay  
**Date:** 12 June 2002  
**Time Start:** 15:56:17  
**Time End:** 16:54:38  
**Tape Length:** 58:20  
**Weather:** DFC (Dead.. Flat..Calm), overcast. 600ft aprox. ceiling.  
**Electronic File:** Kodiak2002.dbf, KodiakPhotos.dbf

Time UTC	Location	Film Roll	Film Frame	Chart	Topo
16:07:45	Spruce Cape	9	15	16594	p.45
16:26:00	Narrow Cape	9	37	16594	p.45
16:44:48	Seredni Pt.	10	24	16594	p.45
16:54:38	Anton Larsen Bay	10	34	16594	p.45

2002 Kodiak Island  
Aerial Video Imaging Survey  
Tape 6

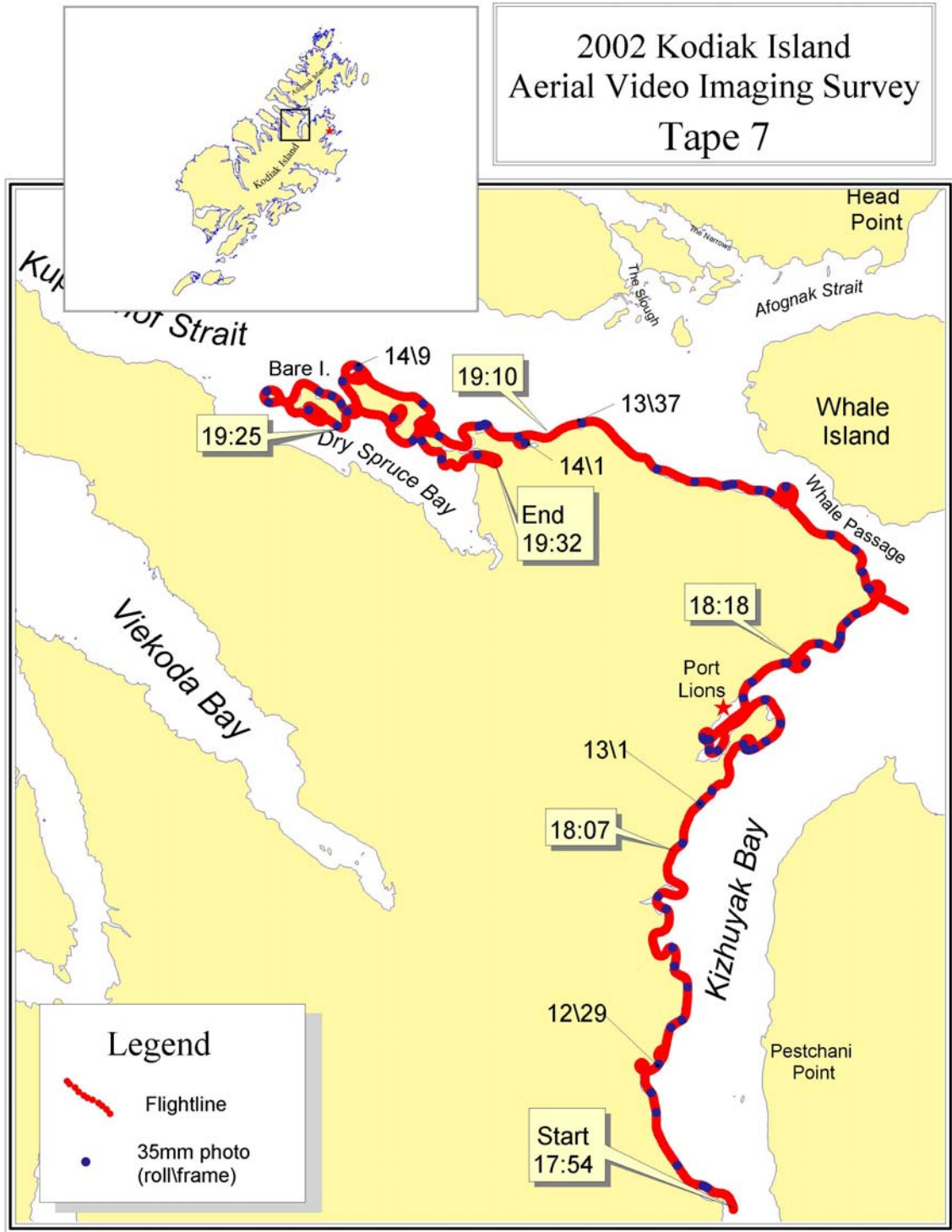


## Kodiak Island 2002 Aerial Video Imaging Survey

**Tape Number:** 6  
**General Location:** Anton Larsen Bay to Sharatin Bay and Kizhuyak Bay  
**Date:** 12 June 2002  
**Time Start:** 16:55:09  
**Time End:** 17:53:18  
**Tape Length:** 58:09  
**Weather:** DFC (Dead.. Flat..Calm), overcast. 600ft aprox. ceiling.  
**Electronic File:** Kodiak2002.dbf, KodiakPhotos.dbf

Time UTC	Location	Film Roll	Film Frame	Chart	Topo
17:22:43	W. Side Anton Larsen Bay, Larsen I.	11	27	16594	p.45
17:34:34	Head of Sharatin Bay	11	37	16594	p.45
17:48:46	Pestchani Pt. in Kizhuyak Bay	12	18	16594	p.45
17:53	Head of Kizhuyak Bay	12	23	16594	p.45

2002 Kodiak Island  
Aerial Video Imaging Survey  
Tape 7



## Kodiak Island 2002 Aerial Video Imaging Survey

**Tape Number:** 7  
**General Location:** Kizhuyak Bay, Whale Passage, Dry Spruce Bay.  
**Date:** 12 June 2002  
**Time Start:** 17:54:34  
**Time End:** 19:32:36  
**Fuel Break:** 18:22:09 to 19:00:18  
**Tape Length:** 57:57  
**Weather:** DFC (Dead.. Flat..Calm), overcast. 600ft aprox. ceiling.  
**Electronic File:** Kodiak2002.dbf, KodiakPhotos.dbf

Time UTC	Location	Film Roll	Film Frame	Chart	Topo
18:07:11	W. Kizhuyak Bay	12	37	16594	p.45
18:18:25	Port Lions, Settler's Cove	13	19	16594	p.45
18:22:09 to 19:00:18	Fuel Break				
19:10:13	Whale Passage Chernof Pt.	13	37	16594	p.45
19:25:47	Dry Spruce Bay, Bare Island	14	17	16594	p.45
19:32:36	Dry Spruce Island, Drying Pt.	14	23	16594	p.45

2002 Kodiak Island  
Aerial Video Imaging Survey  
Tape 8



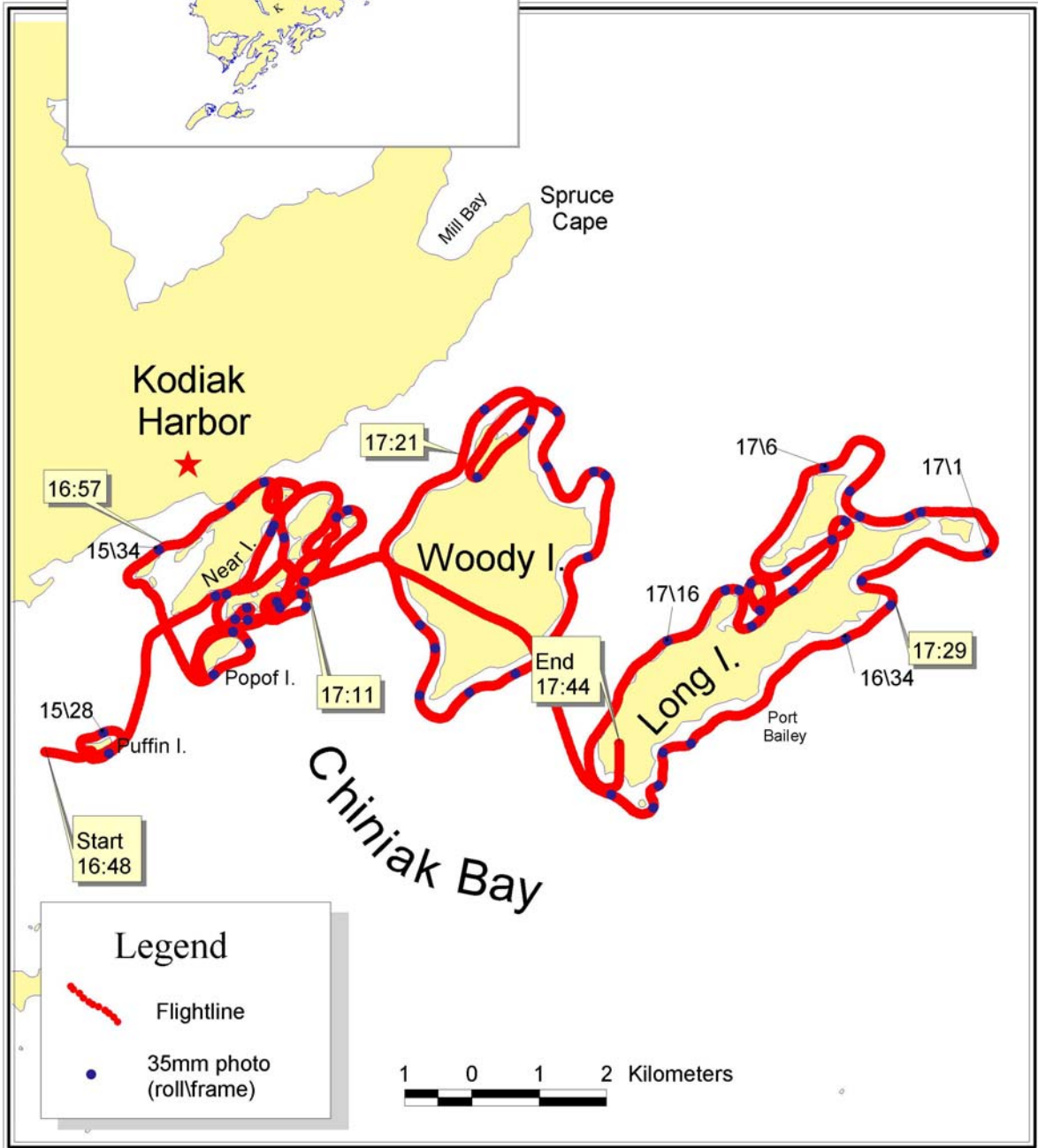
## Kodiak Island 2002 Aerial Video Imaging Survey

**Tape Number:** 8  
**General Location:** Kupreanof Peninsula  
**Date:** 12 June 2002  
**Time Start:** 19:33:10  
**Time End:** 20:10:13  
**Tape Length:** 37:02  
**Weather:** DFC (Dead.. Flat..Calm), overcast. 600ft aprox. ceiling.  
**Electronic File:** Kodiak2002.dbf, KodiakPhotos.dbf

Time UTC	Location	Film Roll	Film Frame	Chart	Topo
19:47:57	Dry Spruce Bay, Port Bailey	14	37	16594	p.45
19:59:35	Kupreanof Peninsula, Sieba Pt.	15	14	16594	p.45
20:10:13	Mid-Viekoda Bay	15	25	16594	p.45



2002 Kodiak Island  
Aerial Video Imaging Survey  
Tape 9

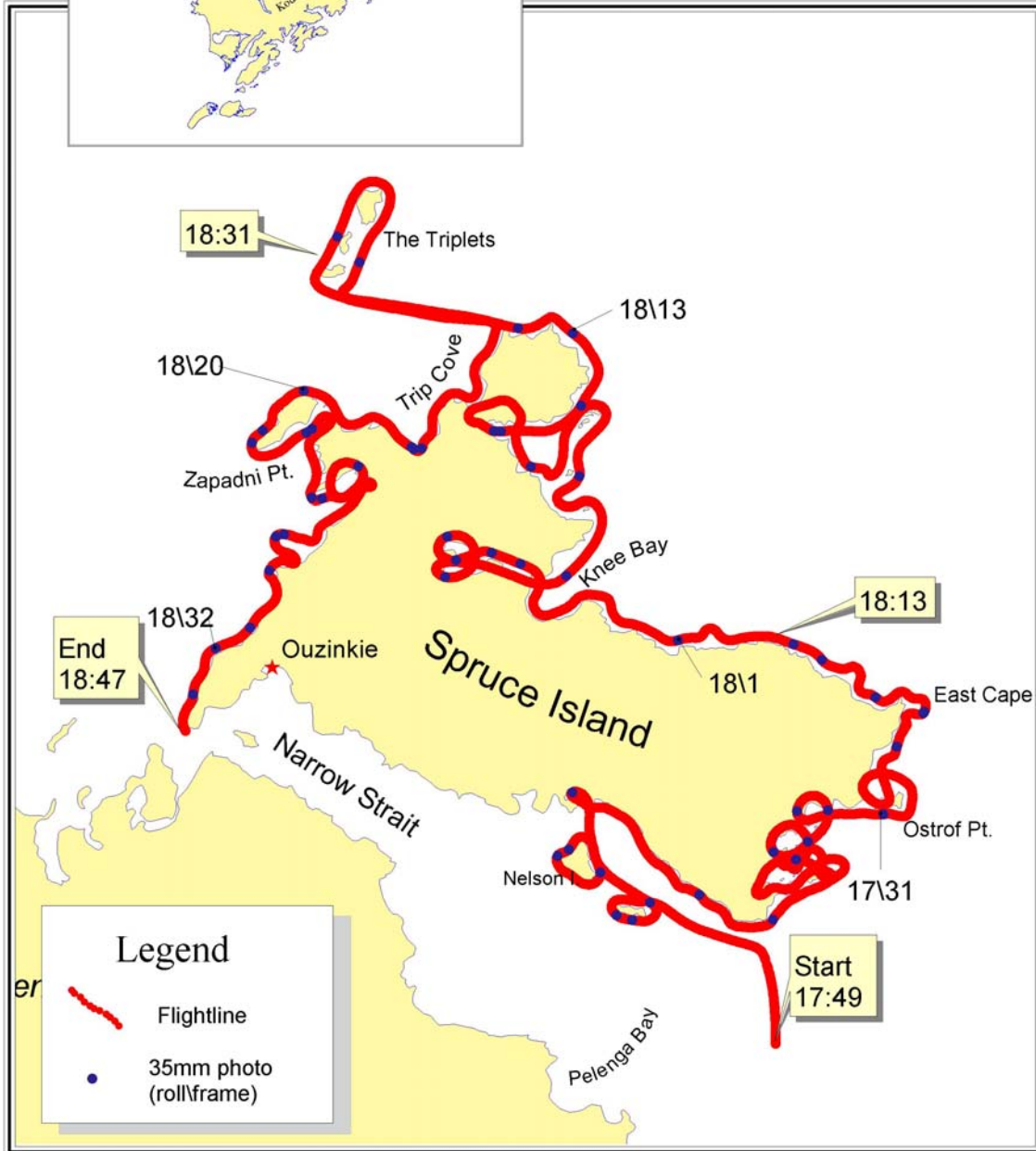


## Kodiak Island 2002 Aerial Video Imaging Survey

**Tape Number:** 9  
**General Location:** Near Island, Woody Island, Long Island  
**Date:** 13 June 2002  
**Time Start:** 16:48:51  
**Time End:** 17:44:16  
**Tape Length:** 55:25  
**Weather:** Clear, Sunny, Calm  
**Electronic File:** Kodiak2002.txt, dbf, .xls

Time UTC	Location	Film Roll	Film Frame	Chart	Topo
16:57	Kodiak Harbour side of Near Island	15	34	16594	p. 45
17:11:05	Near Island	16	14	16594	p. 45
17:21:21	Woody Island	16	28	16594	p. 45
17:29:46	E.Side Long Island	16	36	16594	p. 45
17:44:16	SW. tip, Long Island	17	17	16594	p. 45

2002 Kodiak Island  
Aerial Video Imaging Survey  
Tape 10

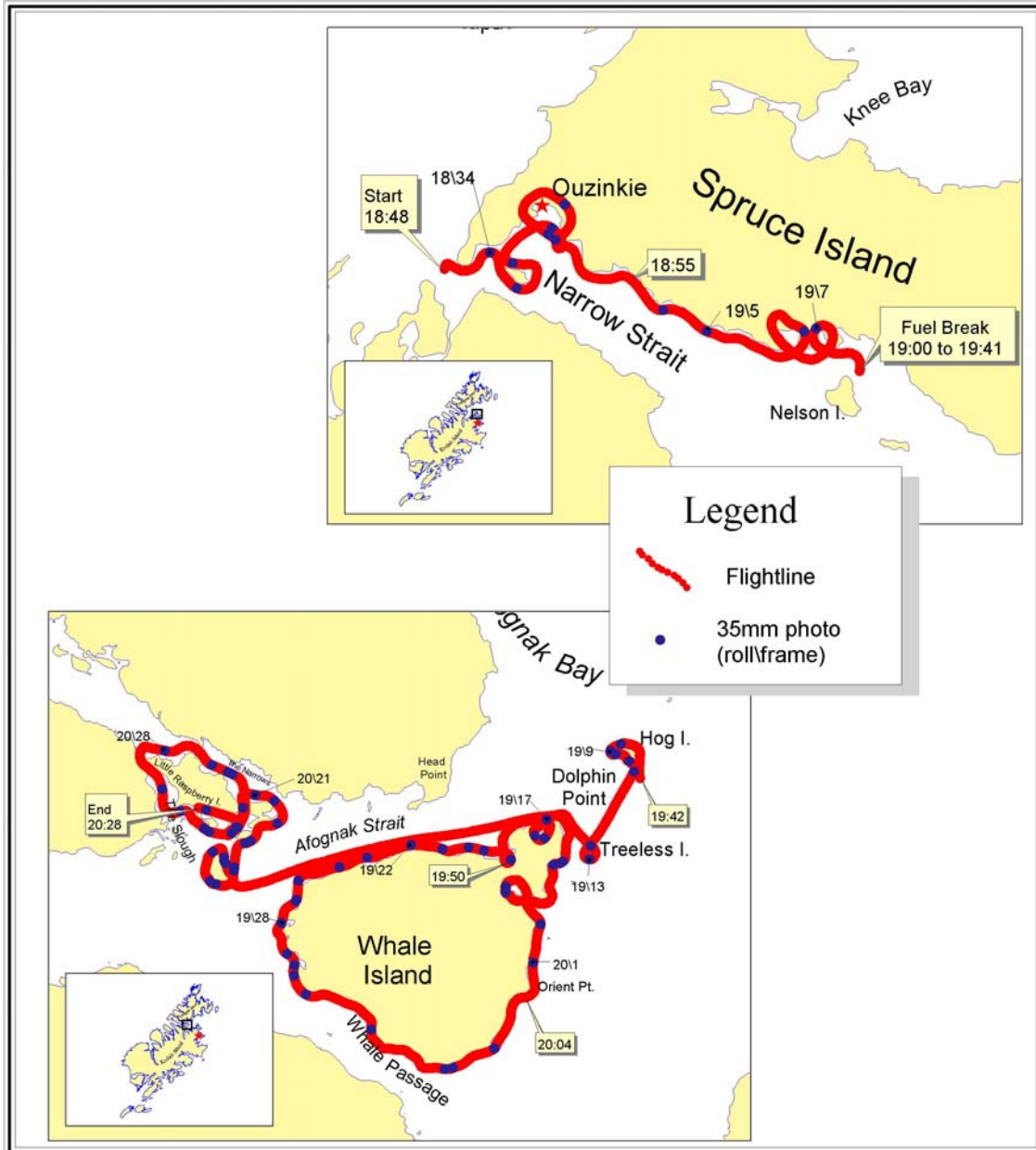


## Kodiak Island 2002 Aerial Video Imaging Survey

**Tape Number:** 10  
**General Location:** Spruce Island  
**Date:** 13 June 2002  
**Time Start:** 17:49:37  
**Time End:** 18:47:53  
**Tape Length:** 58:00  
**Weather:** Clear, Sunny, Calm  
**Electronic File:** Kodiak2002.txt, dbf, .xls

Time UTC	Location	Film Roll	Film Frame	Chart	Topo
18:13:24	East Cape	17	37	16594	p. 45
18:31:38	The Triplets.	18	16	16594	p. 45
18:47:53	Zapadni Pt.	18	34	16594	p. 45

2002 Kodiak Island  
Aerial Video Imaging Survey  
Tape 11



## Kodiak Island 2002 Aerial Video Imaging Survey

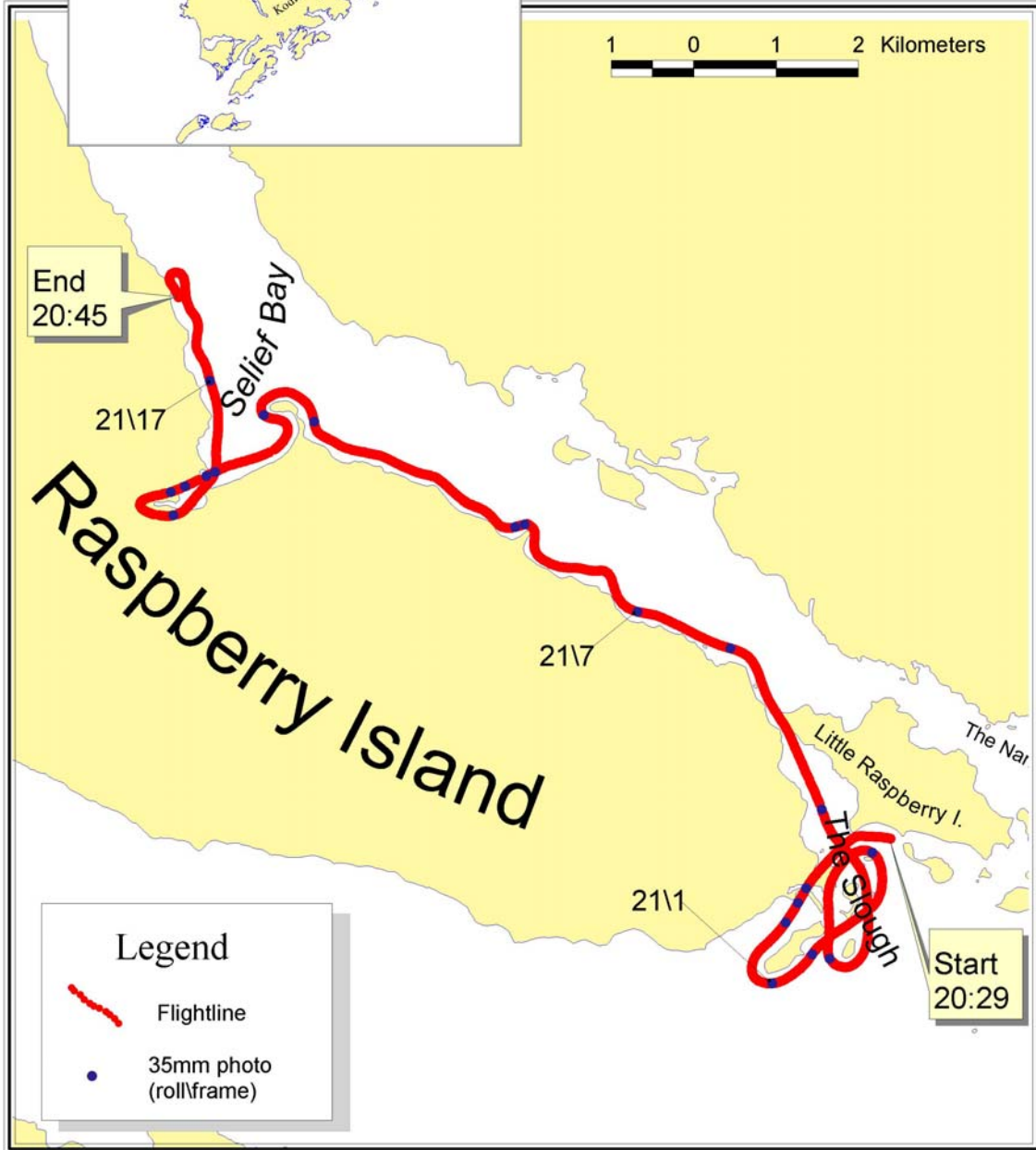
**Tape Number:** 11  
**General Location:** Spruce Island, Whale Island  
**Date:** 13 June 2002  
**Time Start:** 18:48:38  
**Time End:** 20:28:22  
**Fuel Break:** 19:00:17 to 19:41:44  
**Tape Length:** 58:18  
**Weather:** Clear, Sunny, Calm  
**Electronic File:** Kodiak2002.txt, dbf, .xls

Time UTC	Location	Film Roll	Film Frame	Chart	Topo
18:59:38	Ouzinkie, South Spruce Island	19	7	16594	p. 45
19:00:17 to 19:41:44	Fuel Break				
19:50:09	Dolphin Pt.	19	18	16594	p. 45
20:02:45	West side Whale I., Bird Pt.	19	36	16594	p. 45
20:09:25	E.side Whale I. Orient Pt.	20	7	16594	p. 45
20:28:22	Little Raspberry Island cluster	20	34	16594	p. 45

2002 Kodiak Island  
Aerial Video Imaging Survey  
Tape 12



1 0 1 2 Kilometers

A horizontal scale bar with markings at 1, 0, 1, and 2 kilometers.

## Kodiak Island 2002 Aerial Video Imaging Survey

**Tape Number:** 12  
**General Location:** SE Raspberry Island  
**Date:** 13 June 2002  
**Time Start:** 20:29:30  
**Time End:** 20:45:52  
**Tape Length:** 16: 12  
**Weather:** Clear, Sunny, Calm  
**Electronic File:** Kodiak2002.txt, dbf, .xls

Time UTC	Location	Film Roll	Film Frame	Chart	Topo
20:36:54	The Slough	21	7	16594	p. 45
20:45:52	Selief Bay	21	17	16594	p. 45



2002 Kodiak Island  
Aerial Video Imaging Survey  
Tape 13



2 0 2 4 Kilometers



Legend

- Flightline
- 35mm photo (roll/frame)

## Kodiak Island 2002 Aerial Video Imaging Survey

**Tape Number:** 13  
**General Location:** Raspberry Island  
**Date:** 14 June 2002  
**Time Start:** 17:32:01  
**Time End:** 18:27:06  
**Tape Length:** 55:05  
**Weather:** Clear, Sunny, Calm  
**Electronic File:** Kodiak2002.txt, dbf, .xls

Time UTC	Location	Film Roll	Film Frame	Chart	Topo
17:40:08	Raspberry Strait Iron Creek	21	37	16594	p. 45
17:56:42	NW. Raspberry Island, Raspberry Cape	22	23	16594	p. 45
18:05:06	Ustia Pt.	22	37	16594	p. 45
18:12:44	Onion Bay	23	10	16594	p. 45
18:27:06	The Slough	23	24	16594	p. 45

2002 Kodiak Island  
Aerial Video Imaging Survey  
Tape 14

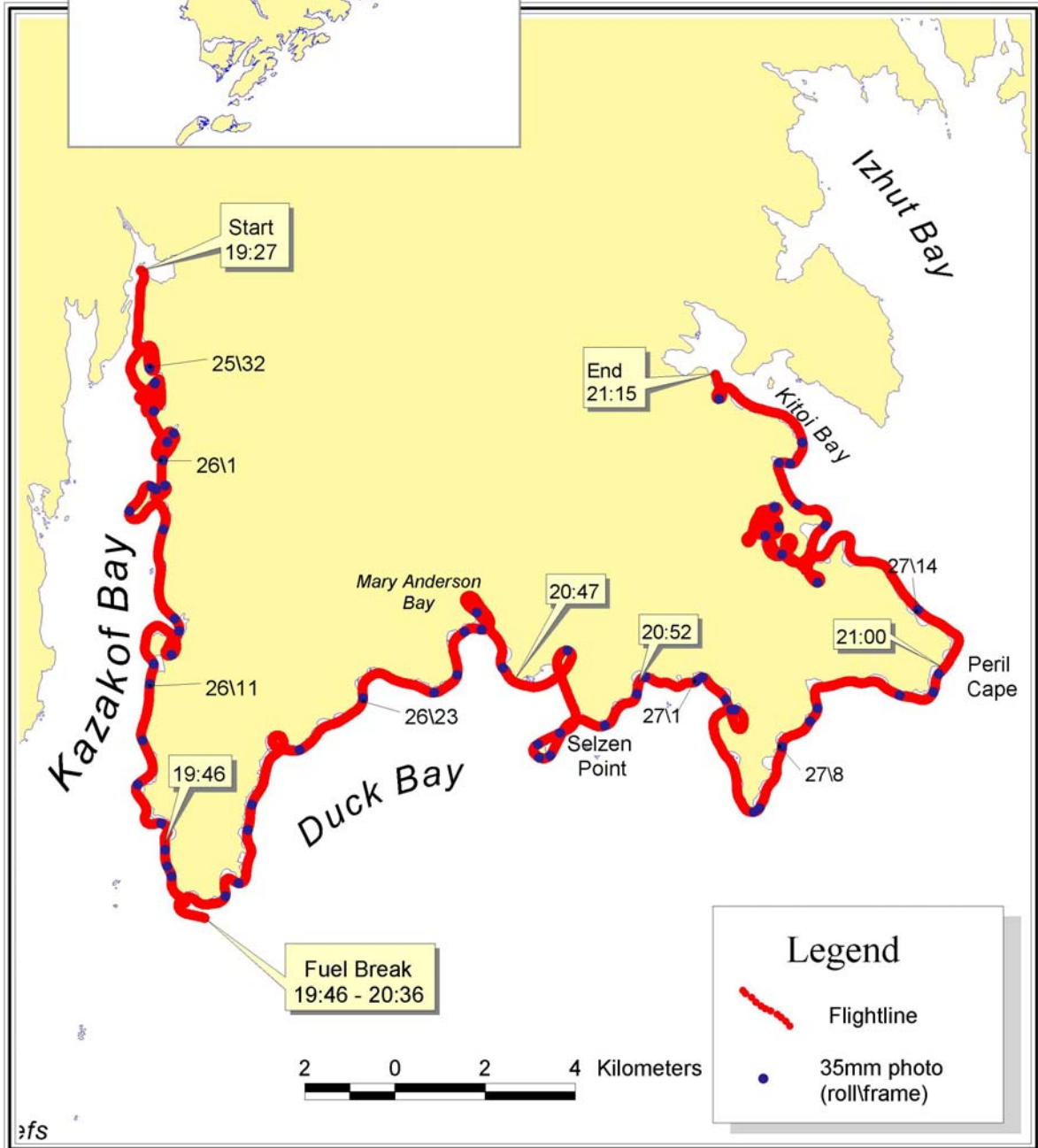


## Kodiak Island 2002 Aerial Video Imaging Survey

**Tape Number:** 14  
**General Location:** SE Afognak Is- Afognak Strait to Kazakof Bay  
**Date:** 14 June 2002  
**Time Start:** 18:29:11  
**Time End:** 19:26:52  
**Tape Length:** 57:41  
**Weather:** Clear, Sunny, Calm  
**Electronic File:** Kodiak2002.txt, dbf, .xls

Time UTC	Location	Film Roll	Film Frame	Chart	Topo
18:36:20	Afognak Strait, Head Pt.	23	37	16594	p. 45
18:42:27	S. Afognak Bay	24	13	16594	p. 53
19:02:02	Afognak Bay, Skipwith Reefs	24	36	16594	p. 53
19:26:52	Kazakof Bay	25	31	16594	p. 53

2002 Kodiak Island  
Aerial Video Imaging Survey  
Tape 15



## Kodiak Island 2002 Aerial Video Imaging Survey

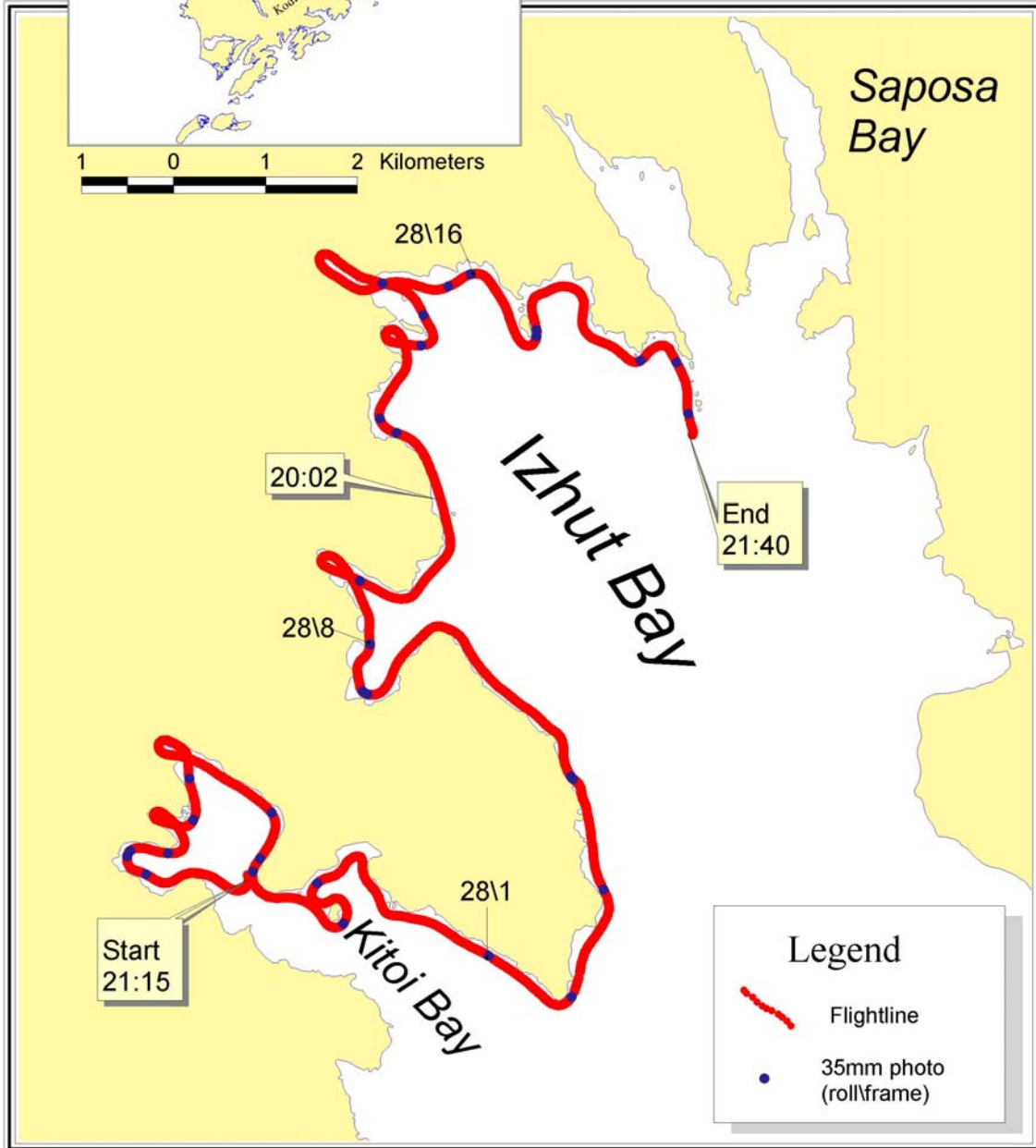
**Tape Number:** 15  
**General Location:** Afognak Is- Kazakof Bay, Duck Bay, Kitoi Bay  
**Date:** 14 June 2002  
**Time Start:** 19:27:38  
**Time End:** 21:15:22  
**Fuel Break:** 19:46:53 to 20:36:38  
**Tape Length:** 58:08  
**Weather:** Clear, Sunny, Calm  
**Electronic File:** Kodiak2002.txt, dbf, .xls

Time UTC	Location	Film Roll	Film Frame	Chart	Topo
19:46:24	E. side Kazakof Bay	26	17	16594	p. 53
19:46:53 to 20:36:38	Fuel Break				
20:47:07	Mary Anderson Bay	26	29	16594	p. 53
20:52:14	Selezen Pt	26	37	16594	p. 53
21:00:37	Peril Cape	27	13	16594	p. 53
21:15:22	Kitoi Bay	27	26	16594	p. 53

2002 Kodiak Island  
Aerial Video Imaging Survey  
Tape 16



1 0 1 2 Kilometers



Saposia Bay

Izhut Bay

20:02

End  
21:40

28\8

Start  
21:15

28\1

Kitoi Bay

Legend

- Flightline
- 35mm photo (roll/frame)

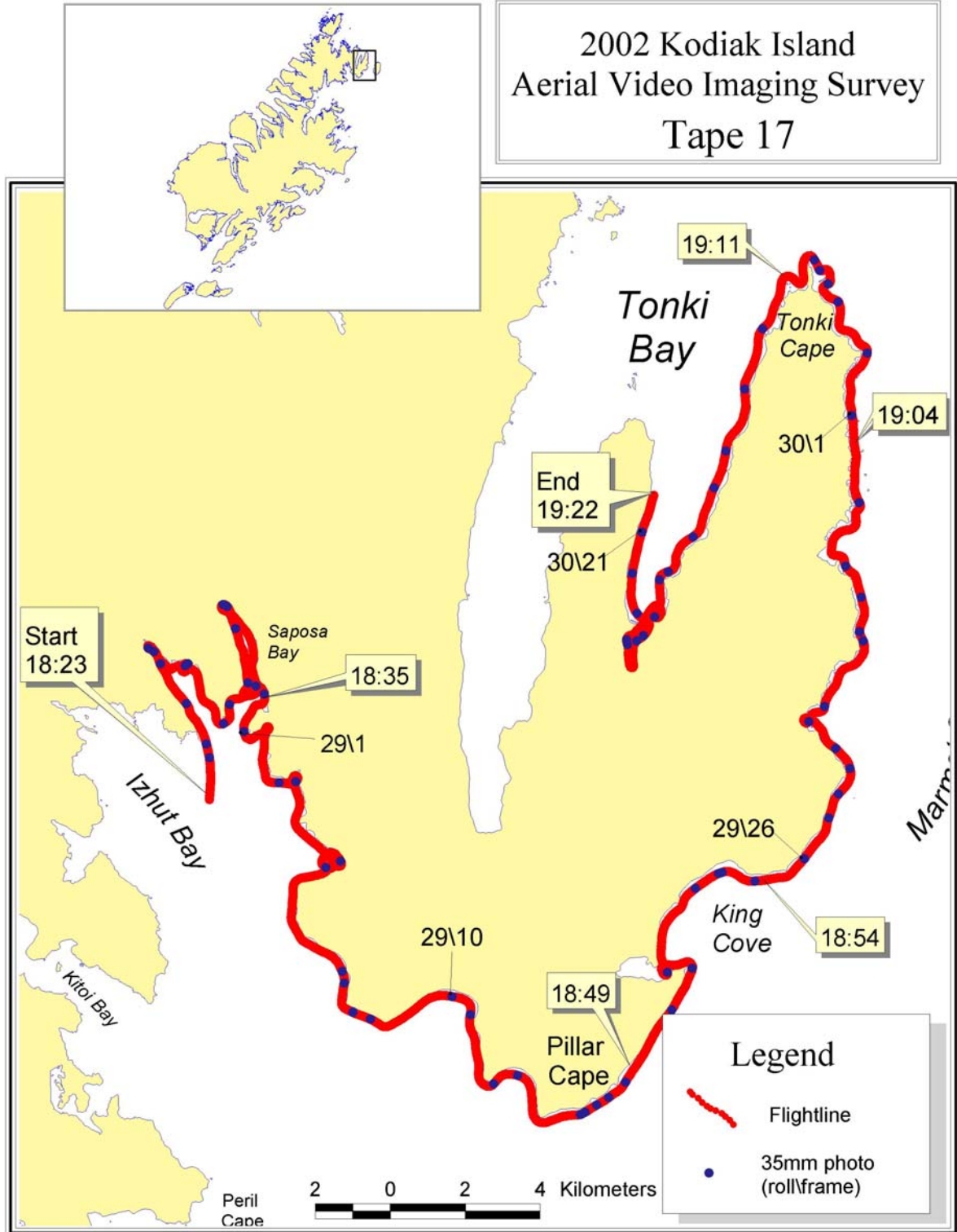
## Kodiak Island 2002 Aerial Video Imaging Survey

**Tape Number:** 16  
**General Location:** Afognak Is, Izhut Bay  
**Date:** 14 June 2002  
**Time Start:** 21:15:58  
**Time End:** 21:40:14  
**Tape Length:** 24:16  
**Weather:** Clear, Sunny, Calm  
**Electronic File:** Kodiak2002.txt, dbf, .xls

Time UTC	Location	Film Roll	Film Frame	Chart	Topo
21:22:51	Kitoy Bay	27	37	16594	p. 53
21:40:14	W. Izhut Bay	28	20	16594	p. 53



2002 Kodiak Island  
Aerial Video Imaging Survey  
Tape 17



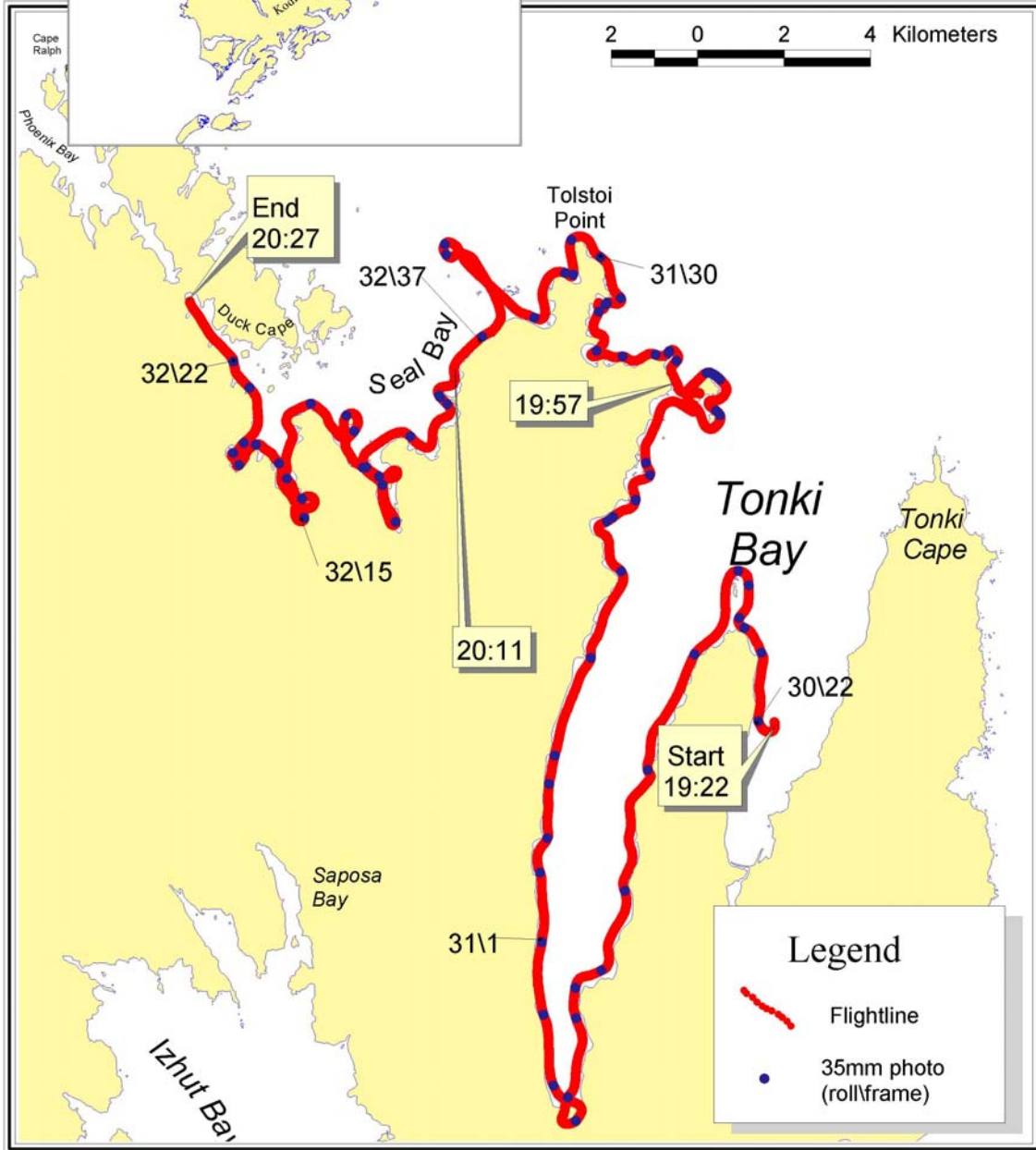
## Kodiak Island 2002 Aerial Video Imaging Survey

**Tape Number:** 17  
**General Location:** Afognak Is- Izhut Bay, Tonki Cape Peninsula  
**Date:** 15 June 2002  
**Time Start:** 18:23:11  
**Time End:** 19:22:02  
**Tape Length:** 56:20  
**Weather:** Clear, Sunny, Hot, Gusting Winds  
**Electronic File:** Kodiak.xls, .dbf, .txt

Time UTC	Location	Film Roll	Film Frame	Chart	Topo
18:35:00	Saposa Bay	28	37	16604	p. 53
18:49:26	Pillar Cape	29	18	16604	p. 53
18:54:30	King Cove	29	25	16604	p. 53
19:04:06	Midway Marmot Strait.	29	37	16604	p. 53
19:11:11	Tonki Cape	30	7	16604	p. 53
19:22:02	E. Arm Tonki Bay	30	21	16604	p. 53

2002 Kodiak Island  
Aerial Video Imaging Survey  
Tape 18

2 0 2 4 Kilometers



## Kodiak Island 2002 Aerial Video Imaging Survey

**Tape Number:** 18  
**General Location:** Afognak Is- Tonki Bay to Seal Bay  
**Date:** 15 June 2002  
**Time Start:** 19:22:29  
**Time End:** 20:27:44  
**Tape Length:** 55:55  
**Weather:** Clear, Sunny, Hot, Gusting Winds  
**Electronic File:** Kodiak.xls, .dbf, .txt

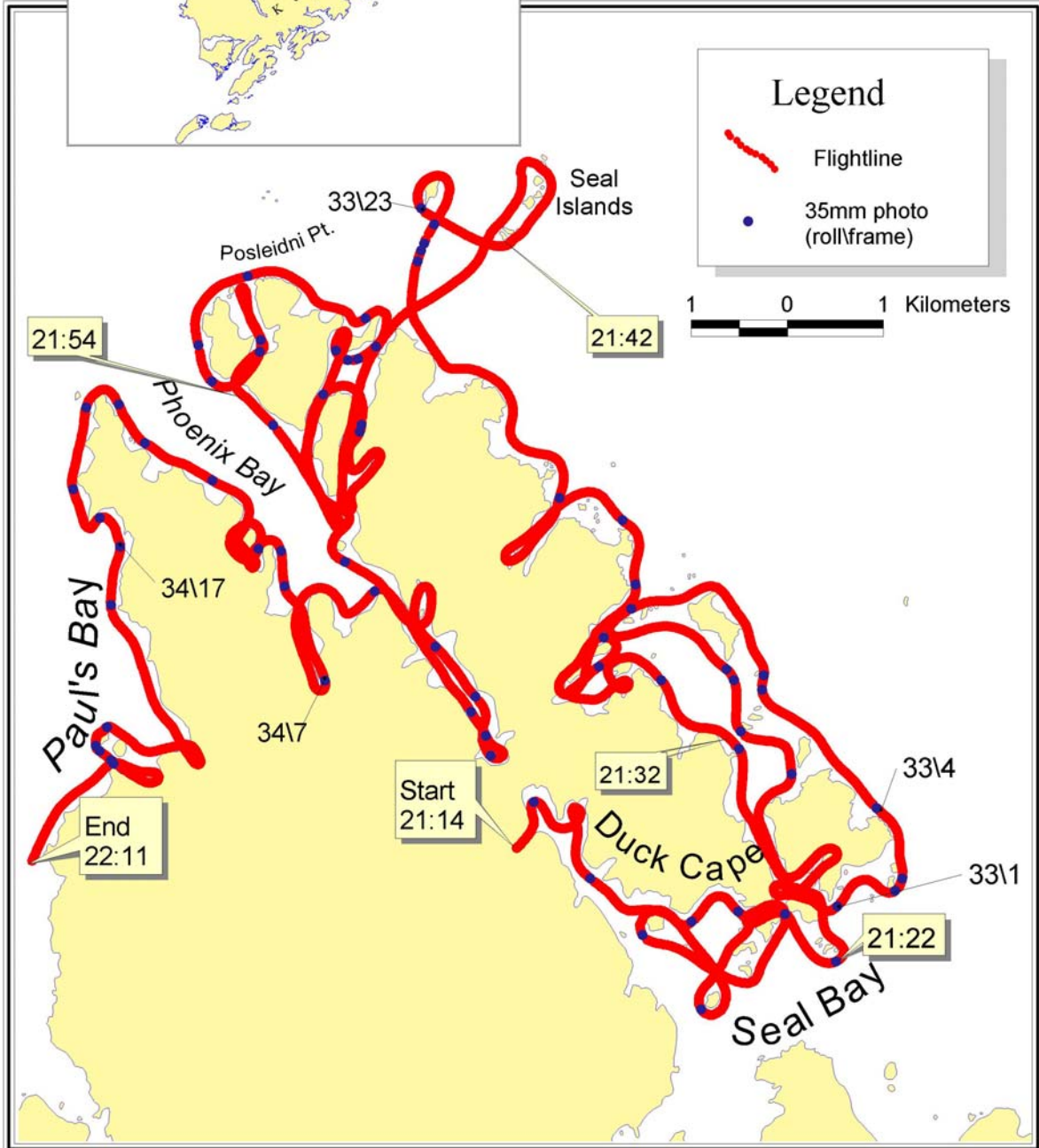
Time UTC	Location	Film Roll	Film Frame	Chart	Topo
19:36:01	Head of W. Arm Tonki Bay	30	37	16604	p. 53
19:57:08	W. Side Tonki Bay	31	19	16604	p. 53
20:11:09	E. side Seal Bay	31	37	16604	p. 53
20:27:44	Islands near Duck Cape in Seal Bay	32	22	16604	p. 53

2002 Kodiak Island  
Aerial Video Imaging Survey  
Tape 19



**Legend**

- Flightline
- 35mm photo (roll/frame)

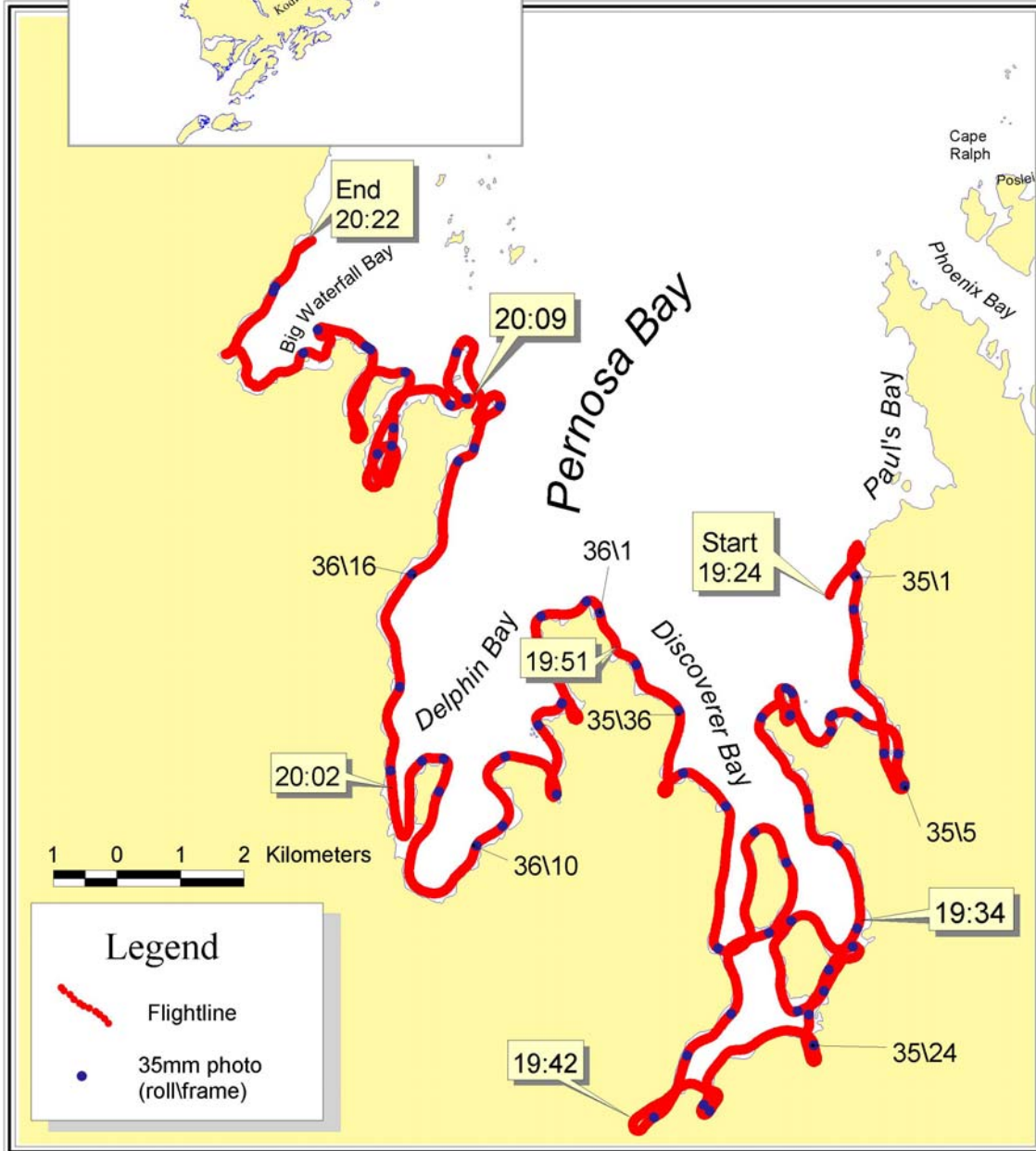


## Kodiak Island 2002 Aerial Video Imaging Survey

**Tape Number:** 19  
**General Location:** Afognak Is- Seal Bay, Phoenix Bay, Paul's Bay  
**Date:** 15 June 2002  
**Time Start:** 21:14:49  
**Time End:** 22:11:51  
**Tape Length:** 57:02  
**Weather:** Clear, Sunny, Hot, Gusting Winds  
**Electronic File:** Kodiak.xls, .dbf, .txt

Time UTC	Location	Film Roll	Film Frame	Chart	Topo
21:22:18	Islands near Duck Cape	32	37	16604	p. 53
21:32:23	Duck Cape	33	12	16604	p. 53
21:42:02	Seal Islands	33	32	16604	p. 53
21:54:13	Posedni Pt.	34	36	16604	p. 53
22:11:51	Paul's Bay	35	23	16604	p. 53

2002 Kodiak Island  
Aerial Video Imaging Survey  
Tape 20



## Kodiak Island 2002 Aerial Video Imaging Survey

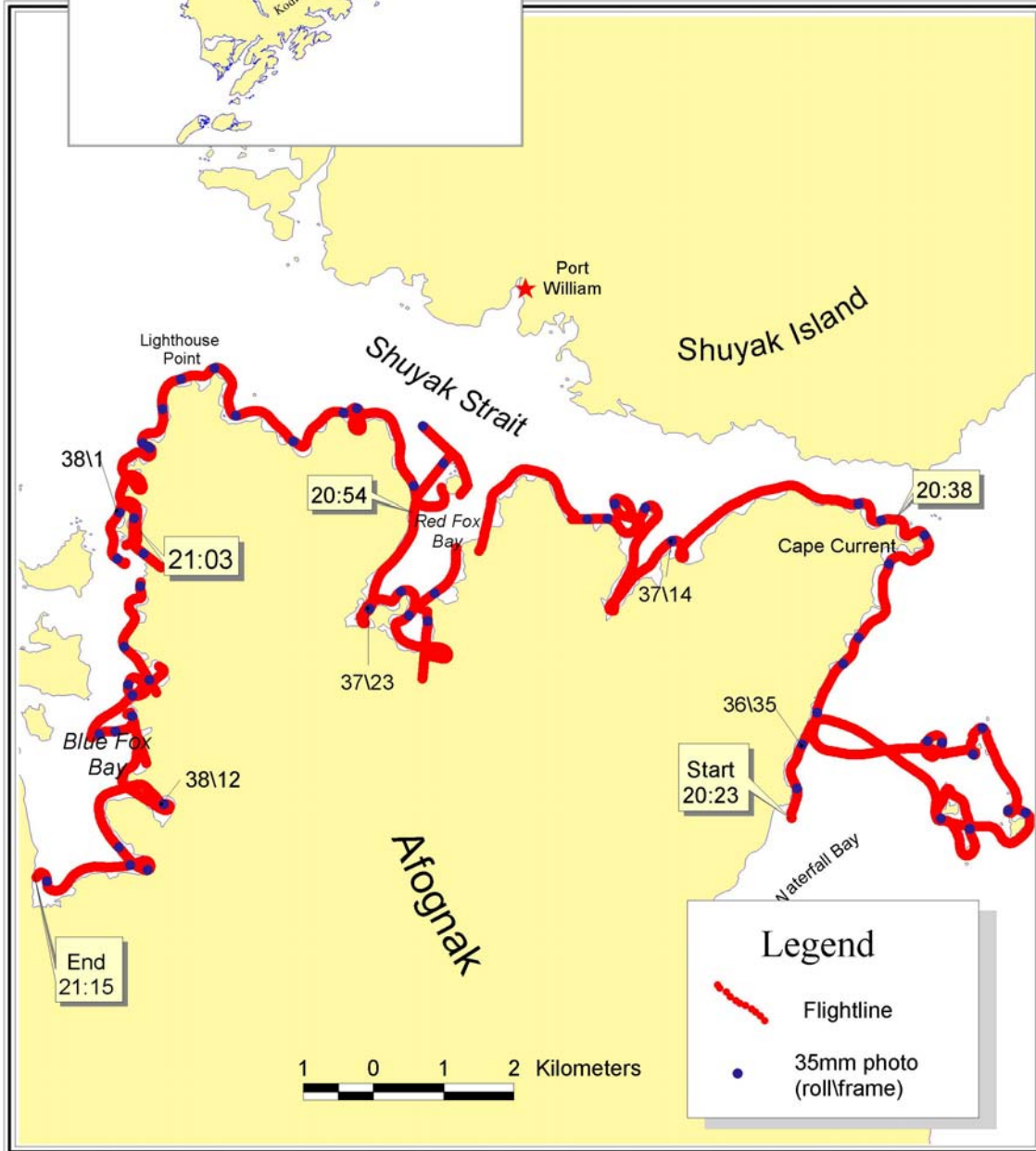
**Tape Number:** 20  
**General Location:** Afognak Is- Pernosa Bay  
**Date:** 16 June 2002  
**Time Start:** 19:24:26  
**Time End:** 20:22:23  
**Tape Length:** 58:06  
**Weather:** Foggy, Low Ceiling 400ft.  
**Electronic File:** Kodiak.xls, .dbf, .txt

Time UTC	Location	Film Roll	Film Frame	Chart	Topo
19:34:00	SW island in Discoverer bay	35	17	16604	p. 53
19:42:23	Head of Discoverer Bay	35	27	16604	p. 53
19:51:42	E. Mouth of Discoverer Bay	35	37	16604	p. 53
20:02:31	Delphin Island, Delphin Bay	36	14	16604	p. 53
20:09:32	Head of Pernosa Bay	36	21	16604	p. 53
20:22:23	Big Waterfall Bay	36	33	16604	p. 53

**Note:** This section of trackline is quite patchy due to the interference of higher mountains blocking out the GPS constellation. Trackline jumps in places.



2002 Kodiak Island  
Aerial Video Imaging Survey  
Tape 21



## Kodiak Island 2002 Aerial Video Imaging Survey

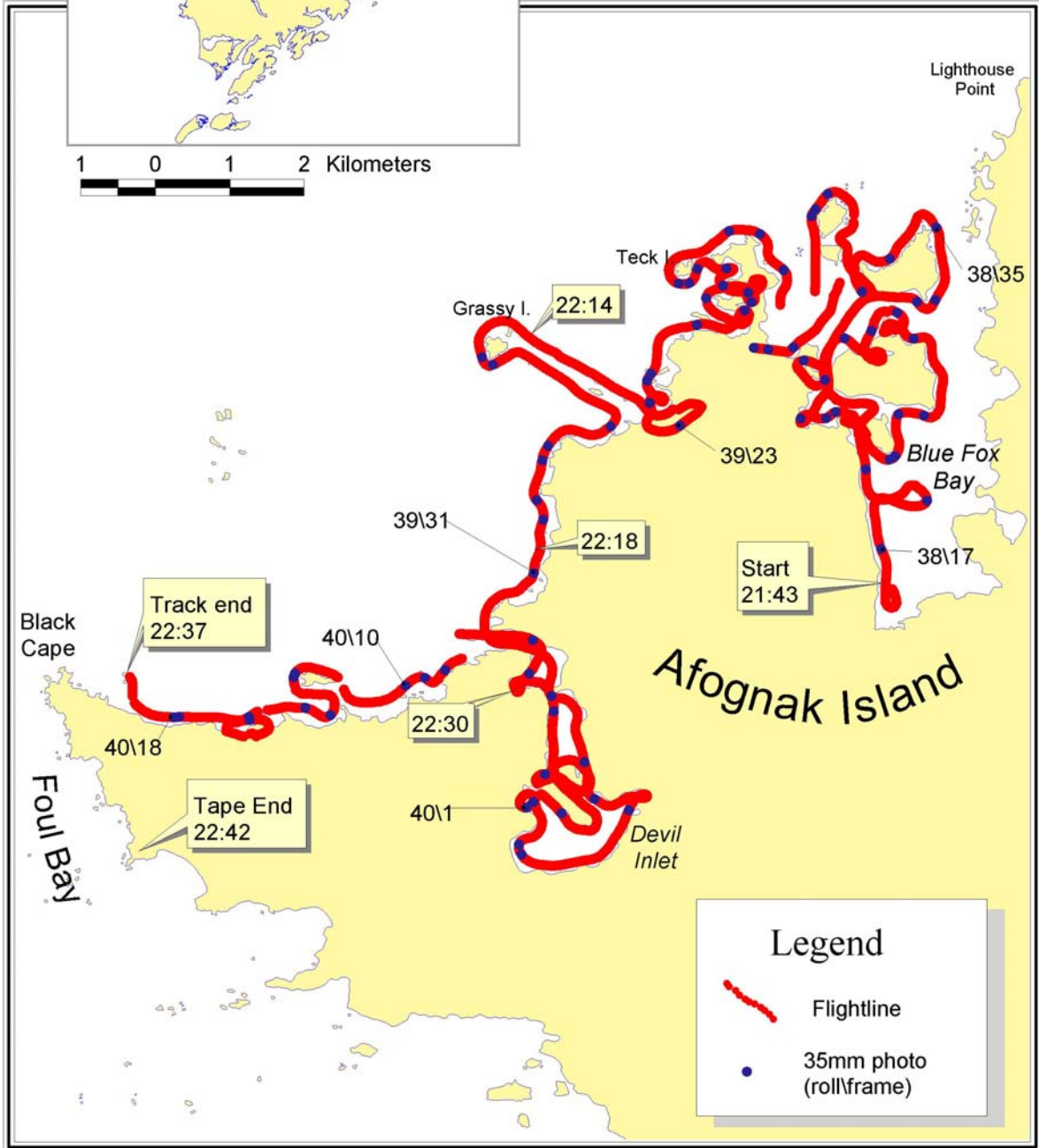
**Tape Number:** 21  
**General Location:** Afognak Is- Cape Current, Shuyak Strait  
**Date:** 16 June 2002  
**Time Start:** 20:23:10  
**Time End:** 21:15:55  
**Tape Length:** 52:45  
**Weather:** Foggy, Low Ceiling 400ft.  
**Electronic File:** Kodiak.xls, .dbf, .txt

Time UTC	Location	Film Roll	Film Frame	Chart	Topo
20:38:38	Cape Current	37	14	16604	p. 53
20:54:50	Red Fox Bay	37	26	16604	p. 53
21:03:06	Lighthouse Point	37	37	16604	p. 53
21:15:55	Head of Bluefox Bay, fuel cache	38	16	16604	p. 53



# 2002 Kodiak Island Aerial Video Imaging Survey Tape 22



1 0 1 2 Kilometers

A horizontal scale bar with alternating black and white segments, marked with the numbers 1, 0, 1, and 2, representing kilometers.

### Legend

-  Flightline
-  35mm photo (roll/frame)

## Kodiak Island 2002 Aerial Video Imaging Survey

**Tape Number:** 22  
**General Location:** Afognak Is- Blue Fox Bay, Devil Inlet, Black Cape  
**Date:** 16 June 2002  
**Time Start:** 21:43:11  
**Time End:** 22:42:02  
**Tape Length:** 58:50  
**Note:** Track Ends at 22:37:47 due to battery failure  
**Weather:** Foggy, Low Ceiling 400ft.  
**Electronic File:** Kodiak.xls, .dbf, .txt

Time UTC	Location	Film Roll	Film Frame	Chart	Topo
21:59:56	Teck Island	38	37	16604	p. 53
22:14:53	Grassy I.	39	25	16604	p. 53
22:18:30	Entrance Devil Inlet	39	31	16604	p. 53
22:30:51	Devil Inlet	40	7	16604	p. 53
22:37:00	Black Cape	40	18	16604	p. 53
22:42:02	Outer Foul Bay	40	25	16604	p. 53



