MOOSE CAPTURE SUMMARY IN UNIT 17A (TOGIAK AND KULUKAK DRAINAGES), ALASKA, 30 MARCH - 7 APRIL, 1998

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SUMMARY

From March 30th to April 7th, we radio collared 36 moose (27 cows, 9 bulls) within Game Management Subunit 17A (Appendix A). A Bell Jet Ranger III helicopter was used in the capture operation along with fixed-winged aircraft (PA18 SuperCub or Cessna 185) to locate and monitor moose after darting. Capture operations were based out of Dillingham. Fuel (Jet A and AvGas) was cached at Togiak Lake outlet and at the Fish and Wildlife Service container van in Togiak. The primary capture/handling crew consisted of TransAlaska Helicopters Pilot Bill Merkley, ADF&G Area Biologist Larry Van Daele, ADF&G Wildlife Technician John Crouse, and TNWR Wildlife Biologist Andy Aderman. TNWR Wildlife Biologist/Pilot Mike Hinkes flew spotter except for the last day when he assisted the capture crew (Crouse had to return to the Moose Research Center). Tucker Aviation Pilot Tommy Tucker and TNWR Refuge Information Technician Pete Abraham spotted on the final day of capture. The entire crew kept a positive attitude and worked some long hours despite the abundance of inclement weather (Appendix B). All work was performed in a safe and professional manner.

Targeted moose were spotted first from fixed-winged aircraft and the position radioed to the helicopter crew. Once near the moose's location, 2 members of the capture crew were "dropped off" before pursuing and darting the animal. Radio communication between aircraft and ground personnel was maintained at all times. After darting the moose, the helicopter would return to pick up the ground personnel and wait for the spotter's directive to move in on the moose.

Moose were darted using a mixture of Carfentanil (3.0 to 4.0 mg) and Xylazine (150 to 200 mg) and typically went down in 4 to 6 minutes (induction time) after darting (Appendices A, D). Eight moose required more than 1 dart to immobilize. Decisions to redart a moose were based on protocol (Appendix C). We darted 2 cows (1 with 2 darts, 1 with 3 darts) that did not "go down" and thus were not collared. We attributed multiple dartings to insufficient drug entering the moose due to dart velocity using green external charges. Using the green external charges, we had numerous darts "bounce" out of or "skip" off the animals. Darts recovered from moose usually had bent tips. We darted the last 14 moose using brown (medium) external charges and single darts. All 14 darts were recovered with few bent tips. After radio collaring, taking measurements, and samples (Appendix E) moose were given Naltrexone (typically 10 times the amount of Carfentanil, i.e., 300 to 400 mg) and were generally back up (standing and walking) in 3 to 4 minutes. All aspects of the capture and work up of each moose were recorded on *Rite in the Rain* capture forms and entered electronically afterwards (Appendix D). All moose were checked by the spotter after the capture crew departed.

One of the measurements we attempted to get was rump fat thickness using ultrasound. Crouse obtained rump fat measurements for 18 moose (Table 1). Bulls had the least amount of rump fat while cows with twins had the most. All moose appeared healthy and in good shape for this time of year, considering the amount of snow we had.

Blood samples were obtained from 34 moose and were collected and prepared according to protocol (Appendix F).

All of the moose we captured were estimated to be between 22 and 70 months old, indicating a young population. We did not attempt to capture moose less than 22 months old. Moose habitat looked good (very little browsing) in the areas we captured moose. As planned (Appendix G.), we captured moose throughout Unit 17A in the following areas: 2 - Tithe Creek; 4 - Kulukak River; 1 - Ungalikthluk River; 2 - lower Togiak River; 2 - Gechiak Creek; 1 - Nayorurun River; 2 - Kemuk River; 6 - Ongivinuck River; 8 - upper Togiak River (above Kemuk to Togiak Lake); 1 - Kipnucktuli Creek; 3 - Izavieknik River; and 4 - upper Trail Creek (Figure 1). We had 1 capture related mortality (death) of a 22 month-old bull near Ongivinuk Lake. It is probable this moose had an unusual sensitivity to the capture drugs as he went down in less than 1 ½ minutes and died shortly afterwards. We also observed a cow along Gechiak Creek that was wounded by poachers.

The capture operation cost $48,000 excluding salaries of ADF&G and TNWR personnel (Tables 2 and 3). We exceeded the projected total costs (Appendix G.) by nearly $4,000 due to underestimating the cost of the capture drugs and inclement weather (which prolonged the capture period and the helicopter on-call contract). ADF&G covered Crouse's airfare and TNWR provided room at their bunkhouse.

Media: While no reporters were on site during the capture, we received coverage from the Bristol Bay Times Newspaper (Appendix H.), KDLG Radio (Dillingham), and KTUU T.V. (Anchorage).

Table 1. Ultrasound rump fat measurements (cm) for Unit 17A moose, 30 Mar - 6 Apr, 1998.

	Bulls	Cows with no calf	Cows with one calf	Cows with two calves
	0.5	1.6	2.3	2.3
	0.4	1.1	1.6	2.3
	0.2	0.5	1.4	1.3
		0.4	1.2	1.3
		0.4	1.1	0.9
mean	0.37	0.80	1.52	1.62
s.d.	0.15	0.53	0.48	0.64

Table 2. Costs associated with Unit 17A moose capture, 30 Mar - 7 Apr, 1998.

Item	Responsibility	Cost
36 radiocollars (Telonics Mod 600 w/mort. sens)	TNWR	$15,507
36 visual collars (Apocalypse Design - Fairbanks)	TNWR	$858
Helicopter on-call contract (TransAlaska Helicopters)	TNWR	$18,734
Spotter plane charter (Tucker Aviation)	TNWR	$1,512
Spotter plane refuge	TNWR	$2,901
800 gal Jet A and delivery (Alaska Cargo Services)	TNWR	$3,031
Capture drugs (Wildlife Laboratories, Inc.)	ADF&G	$4,900
Dart components and incidentals	TNWR	$557
Total capture cost		$48,000

Table 3. Amount and cost of drugs required for capturing 36 moose.

Drug	# vials	Cost/vial	Extended Cost
Carfentanil	7	$335.50	$2,348.50
Xylazine	2	$40.00	$80.00
Naltrexone	16	$140.00	$2,240.00
Ivermectin	4	$50.00	$200.00
Shipping			$31.50
Total cost			$4,900.00

Appendix A. Parameters associated with capture of Unit 17A moose, southwest Alaska, 1998

Freq	Collar #	Sex	Age at Cap	Number of darts	Maximum Carf/Xyla	Induct time	Cond Score	Rump Fat	Rump Length	Hind Foot Length	Blood edta/ser	Ear Plug?	Precap Activity	Date Collared	Capture Location/1997 calving status
3010	01	F	4	2	7/300	290	6			58	2/1	yes	ly	04/06/98	Togiak Valley N of Ongiv./1 calf
3020	02	F	3 or 4	1	3.5/150	180	6	1.1	60	58	2/1	yes	ly	04/06/98	upper Togiak River/1 calf
3030	03	F	4	1	3.5/150	260	7	1.6	60	60	2/1	yes	ly	04/06/98	Izavieknik/1 calf
3040	04	M	2 or 3	3	10.5/450	2160	6			58	2/1	no		04/06/98	Trail Creek Romeo
3050	05	F	3	1	3.5/150	221					2/1	no	ly	04/06/98	upper Togiak R. - Ongiv. confl./none
3060	06	M	4	1	3.5/150	645	7			59	2/1	yes	ly	04/06/98	upper Togiak River
3070	07	F	6	1	3.5/150	440	7	1.3	61	59.5	2/1	yes	ly	04/06/98	upper Togiak River/twins
3080	08	M	4 or 5	1	3.0/150	480	6				2/1	yes		04/07/98	Gechiak
3100	10	F		2	7/300	285	6	1.3	58	59	2/1	yes	ly	04/06/98	Trail Creek/twins
3110	11	M	3	1	3.5/150	238	6			60.5	2/1	yes	ly	04/06/98	Upper Kemuk
3120	12	F	4 or 5	3	10.5/450	2070	6			58	1/1	yes		04/06/98	Trail Creek Juliet/none
3130	13	F	2	1	3.5/150	765	7	0.5	58	58	2/1	yes	ly	04/06/98	Trail Creek/none
3140	14	F	4 or 5	1	3.0/200	300	6	0.9	60	60.5	2/1	yes	ly	04/06/98	Kemuk canyon trib./twins
3160	16	F	3 or 4	1	3.0/150	370	6				2/1	yes		04/07/98	lower Togiak/none
3170	17	F	5+	1	3.0/150	280	6.5				2/1	yes		04/07/98	upper Ongivinuck R. - Lake/twins
3180	18	F	2	1	3.0/150	315					2/1	no		04/07/98	upper Ongivinuck R. - Lake/none
3190	19	F	3 or 4	1	3.0/150	300					2/1	yes		04/07/98	upper Gechiak/none
3210	21	F	4 or 5	1	3.5/150	1233	6	1.4	60	59.5	2/1	yes		04/04/98	upper Togiak/1 mean bull calf
3220	22	F	4	1	3.5/150	870	7	1.2	60	58	2/1	yes		04/04/98	Togiak R. betw Ongiv. & Kemuk/1 calf
3230	23	M	3?	2	7.0/300	1294	5	0.2	58	60	none	yes		04/04/98	Togiak R. between Ongiv. & Kemuk
3250	25	F	3 or 4	1	3.5/150	390	6				2/1	yes		04/04/98	Ongivinuck - No Lake Cr./1 calf
3260	26	F	3 or 4	1	3.0/200	570	6	1.1	63	60	2/1	yes		04/04/98	Ongivinuck/none
3270	27	F	3 or 4	2	6.0/400	2540	7	2.3	58		2/2	yes		04/01/98	lower Togiak/twins
3290	29	F	4 or 5	1	3.5/150	600	7	2.3	58	58.5	2/1	yes		04/04/98	Ongivinuck - No Lake Cr./1 calf
3300	30	F	3	2	8.0/300	1265	6	1.6	60	58	2/1	yes		04/01/98	lower Kulukak/none
3310	31	F	4 or 5	1	3.5/150	390	6				none	no	ly	04/06/98	lower Izavieknik/twins
3320	32	M	5 or 6	1	3.5/150	240	5.5			61	2/1	yes		04/04/98	Ongiv - No Lake Cr. backward collar
3330	33	F	3	1	4.0/150	390					none	no		04/01/98	mid-Kulukak/none
3340	34	M	3 or 4	1	3.5/150	320	6			58.5	2/1	yes	ly	04/06/98	Izavieknik trib.
3350	35	M	3	1	4.0/150	180	6	0.4	61	61	2/1	yes	st	04/01/98	Upper Ungalikthluk
3360	36	F	2	2	8.0/300	1280	6	0.4	54	56	2/1	yes		04/01/98	mid-Kulukak/none
3370	37	F	3	1	4.0/150	280	7	2.3	63	59	2/1	yes		04/01/98	lower Kulukak/twins
3380	38	F	3	1	3.0/150	315	6			60.3	2/1	yes		04/07/98	Kipnucktuli/none
3390	39	F	3 or 4	1	3.0/150	900	6.5			58.4	2/1	yes		04/07/98	Nayorurun (Kash Creek)/1 calf
3400	40	M	3	1	4.0/150	246	6	0.5	63		2/1	yes		03/30/98	Tithe Creek
3410	41	F	2	1	4.0/150	975	6	0.4	60	59.7	2/1	yes	st	03/30/98	Tithe Creek/none
none	none	M	2	1	3.0/150	85	5.5				2/1	yes		died	upper Ongivinuck

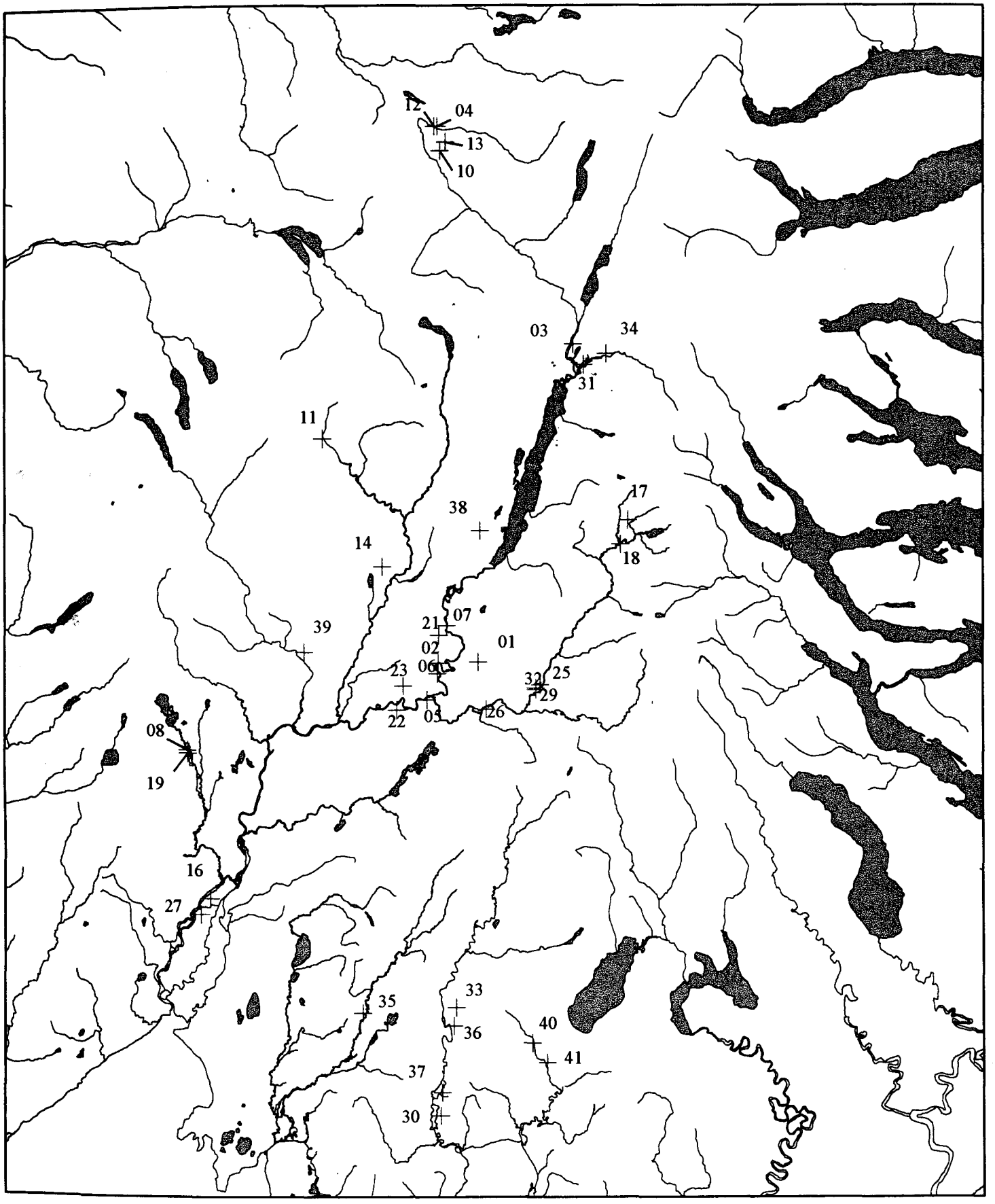

Figure 1. Unit 17A moose capture locations, 30 Mar - 7 Apr, 1998 (numbers represent visual collar number).

Appendix B. Daily chronology of moose radio collaring effort.

29 March 1998 - Trans-Alaska Helicopter pilot Bill Merkley arrived in Dillingham with N87TA (BH206B-Jet Ranger III) at 14:15. ADF&G Wildlife Technician John Crouse arrived via Pen Air at 15:05. Area Biologist Larry Van Daele, Wildlife Biologist/Pilot Mike Hinkes, and Wildlife Biologist Andy Aderman reviewed the capture plans, logistics, and equipment list with Merkley and Crouse. The last of the visual collars were pop-riveted to the radio collars and blood kits were prepared and duct taped to the collars.

30 March - Overcast and light snow at 08:00. Crouse, Van Daele, and Aderman prepared capture darts (4 mg Carfentanil/150 mg Xylazine) at ADF&G office while Hinkes and Merkley readied their respective aircraft (Super Cub N9786P and Helicopter N87TA). With the less than ideal weather we decided to work closer to home and selected the Tithe Creek/Kulukak River area to begin the capture operations. Hinkes departed at 10:40 to spot moose. The rest of the crew departed at 11:00. A few miles west of Dillingham the visibility decreased to 2 miles and was further decreasing to the west. Hinkes and Merkley landed in Manokotak at 11:15 to wait for the weather to improve. By 11:30 the visibility had increased to 4-5 miles. Both aircraft departed to the west and Hinkes soon spotted a pair of moose along Tithe Creek. Crouse and Aderman were dropped off near the moose while Van Daele and Merkley gave chase. Forty-five seconds into the chase Van Daele darted a young cow. Merkley returned to Crouse and Aderman and waited. Hinkes kept track of the cow. Fifteen minutes after darting the cow was still up so Van Daele left to administer a second dart. The first dart had hit the left side flank and fallen out. On their arrival the cow had gone down. Merkley returned to pick up Crouse and Aderman. Crouse and Van Daele worked the moose while Aderman observed and recorded data. Van Daele departed with Merkley as Hinkes had spotted a group of 12 moose nearby. Van Daele darted a young bull just as Crouse and Aderman reversed the cow. The bull went down in 4 minutes, 6 seconds. Hinkes flew to the lower Kulukak River locating a cow and a calf and returned and landed on Ualik Lake. Van Daele departed to the Kulukak River but was turned back due to poor visibility in the pass. Crouse and Aderman finished with the young bull and were picked up. Visibility was decreasing to less than 1 mile so the crew rendezvoused at a small lake southwest of Ualik Lake to once again wait for conditions to improve. After 1 hour visibility improved to 2 miles and the crew departed to Dillingham. Visibility was greatly improving so after refueling the crew headed back out to the lower Kulukak River. Van Daele soon darted a cow (with 2 calves). Hinkes kept track of her and notified Merkley when she neared the river. A couple short hazes with the helicopter worked fine. She seemed wobbly at 12 minutes, but after 20 minutes she was still up so Van Daele delivered a second dart which bounced out upon impact. Hinkes departed back to Dillingham due to deteriorating conditions. The cow was still up 20 minutes after the second dart so a decision was made to dart her with Naltrexone. Crouse and Aderman prepared 2 darts and Van Daele departed. On arrival the cow was down so Van Daele was dropped off to attach a radiocollar. Crouse and Aderman were picked up. The cow got up when Van Daele approached. Van Daele was picked up and a Naltrexone dart (barbless) was delivered at 17:38. The capture crew departed for Dillingham via the coast and Tuklung foothills. Back in Dillingham by 18:30.

31 March - Wet semi-horizontal snow and rain most of the day. Breaking up by 17:00. Did not contemplate going out today. Aderman secured a centrifuge from Kanakanak Hospital and he and Crouse spun blood (at ADF&G) from yesterday's moose. Hinkes had N9786P worked on as the artificial horizon, GPS, and radio failed yesterday when he was flying over the lower Kulukak River.

1 April - Snow squalls, winds SW@10-15, and 20 °F at 07:45. Attempted to go out but turned back by weather near Manokotak. Tucker came in from Togiak and said it looked pretty good most of the way except near Dillingham. Struck out again and began operations in the lower Kulukak River. Hinkes flew refuge C185 (N735EA) for spotting. Darted 4 cows and then headed for Togiak darting a bull in the Ungalikthluk drainage. Refuel in Togiak (55 gallons Jet A) and prepared 3 darts (Carfentanil/Xylazine - 3/200 mg, no sterile water as Crouse thought it might freeze and preclude effective discharge of drug on impact). Headed up north and darted a cow (with twins) along the lower Togiak River. Headed back to Dillingham. Back at 20:20.

2 April - Solid overcast with low ceilings at 08:00. Mixed rain/snow and gusty winds all day. Report from Togiak in a.m. was winds SW@30 with 1.5 miles visibility and 600' solid. Cape Newenham winds SW@40. Crouse and Aderman spun blood and transferred to cryovials and cleaned used darts. Crouse cleaned Capchur gun. Still working on N9786P.

3 April - Solid overcast with low ceilings at 08:00. Mixed rain/snow and gusty winds all day. Report from Togiak in a.m. was winds SW@20 with 300' solid. Not much improvement during the day. Hinkes, Van Daele, Crouse, and Aderman met at the refuge office at 14:00 and discussed options for continuing the capture operation beyond Sunday (helicopter contracted until then), priorities for data and sample collection, target areas for moose capture, etc. Aderman and Crouse reviewed capture forms and typed up a blood handling protocol.

4 April - Solid overcast with low ceilings, light snow and winds, at 08:00. Togiak AWAS in a.m. reported winds SW@14 with 3.5 to 7 miles visibility with forecasted winds increasing to 30. Pilot reports were favorable around noon so we took off from Dillingham around 13:00. Went to the Ongivinuck River via Amanka Lake and the Ongoke River. Crouse rode with Hinkes in N9786P as the helicopter was heavy (range extender got filled). They returned to the hangar before taking off as the electronics went out once again. They swapped the Cub for the 185. Van Daele darted a cow with a calf along the Ongivinuck (just upstream from the No Lake Creek confluence) and he and Aderman worked her up as Hinkes and Crouse arrived and landed. Van Daele darted a nice bull in the same area and we got back into our routine. We worked our way down the Ongivinuck collaring 2 more cows (1 w/1 calf) and a young bull. Near the confluence with the Togiak River we collared a cow with a calf (Merkley refueled at Togiak Lake). We wrapped up the day collaring another cow with a somewhat protective bull calf. The calf made a couple of charges and left front foot kicks at Van Daele and Crouse. A few well placed snowballs convinced him to move on. No further excitement. We retraced our route back to Dillingham, arriving around 20:00. Crouse and Aderman spun blood at the bunkhouse.

5 April - Daylight savings. Aderman cleaned used darts and Capchur gun. Solid overcast with low ceilings. Snow, winds to 20 and visibility 1.5 miles in Togiak in a.m., but much better around Dillingham. Crouse and Aderman prepared darts and loaded 5 in anticipation of our departure. Conditions about the same through mid morning. We decided to take a look and departed Dillingham around 13:00. Crouse and Van Daele had brewed another 10 darts. Took the Ongoke River route over to the mid Togiak River area. Strong gusty (30-40) winds from the west and snow convinced us this was not a good capture day so we headed back to Dillingham.

6 April - A complete turn around in the weather. Clear blue skies and calm winds all day. The capture crew was in the air by 09:10. Hinkes was spotting with N735EA. We began in the eastern mid-Togiak Valley darting 2 cows with single calves. We worked our way west collaring a bull, a young adult cow, and a cow with 2 calves. We worked a cow (with a calf) along Kipnuktuli Creek that the crew dubbed the "Iron Maiden". She went down briefly 17 minutes and 5 seconds after the 2nd dart (29 minutes, 35 seconds after the 1st dart), got back up, and went down briefly 21 minutes and 50 seconds after the 2nd dart. A 3rd dart (2.0/100 mg - Carfentanil/Xylazine) did not bring her down after 10 minutes (we left then as we were low on fuel). She appeared to be walking fine. The first 2 darts were 3.5/150 mg - Carfentanil/Xylazine mixtures. All 3 darts bounced out upon impact. We put on 60 - 65 gallons Jet A and Hinkes put on 30 gallons Av Gas. Crouse and Van Daele prepared more darts. We headed up to the Trail Creek drainage intending to work a couple of animals along High Creek. We encountered 15 - 20 knot winds blowing down Trail Creek and the High Creek/Lake bowl did not look favorable for safe work. We collared 4 animals (a cow w/twins, a young cow, and a bull and cow together - Romeo and Juliet) along Trail Creek before heading downstream to the Izavieknik River. At this point, we began using brown external charges instead of the green. We collared 1 cow before going back to the south end of Togiak Lake to refuel (55 gallons). We returned to the Izavieknik (between Togiak and Upper Togiak lakes) collaring a cow (went down in river) and a bull. We then went to the upper Kemuk River (western branch) and collared a bull. We finished up the day collaring a cow (with twins) on a tributary to the Kemuk just west of the canyon. We arrived back in Dillingham at 21:10. A 14 moose day - not bad (with a little more luck, we could have collared 16).

7 April - Good weather continues. Crouse had to get back to the Moose Research Center today. He prepared darts (11) with the remaining Carfentanil (Larry contacted Bill Taylor last evening to PenPak us more Carfentanil as we had enough for 10 to 11 darts with 7 moose yet to capture) and saw the capture crew off at 10:15. Local pilot Tommy Tucker (Tucker Aviation) and his C185 (N7046) were chartered to spot and keep track of darted moose. Pete Abraham (RIT for TNWR - Togiak) helped out as a observer. Hinkes replaced Van Daele as the shooter and we began operations near Ongivinuk Lake. The first animal darted was a young (22 months) bull that went down in 1 minute and 25 seconds (45 seconds chase, 3.0/150 mg Carfentanil/Xylazine dart). Van Daele and Aderman began working on the bull while Hinkes darted a nearby cow. Van Daele had taken blood and sized the radiocollar on the bull when the cow went down, partially in open water. Hinkes came back to help Aderman with the bull while Van Daele went to work the cow. Aderman observed the bull's breathing was shallow and irregular 17 minutes after going down and repositioned the bull's neck and head (the bull was out deep approximately

3 minutes after darting and was laying partially on his right side). Breathing improved but was still shallow and irregular. Aderman was preparing the reversal when Hinkes indicated the bull was dead, 22 minutes after going down (23.5 minutes after darting). Hinkes attempted chest compressions while Aderman administered the reversal (300 mg Naltrexone). The bull died. Hindsight indicates Tolazoline or Doxapram should have been given at the first notice of irregular breathing or sooner. Other notes on the bull include a condition score of 5 to 6 and the dart was imbedded in the left rear pelvis and was difficult to remove. Van Daele darted a cow with twins after working up the cow (2nd moose darted) that went down in the water. We finished up with the cow and moved to the Kipnucktuli Creek area where Hinkes darted a cow. We refueled at Togiak Lake (55 gallons). Aderman climbed into the gunner's position and darted a cow (his first moose) along the Nayorurun River (Kash Creek). Tucker and Abraham took a break in Togiak. The crew moved into the Gechiak drainage. Tucker and Abraham observed a bedded cow, about 1 mile downstream from Gechiak Lake, that had been chased (and possibly wounded) by snowmachiners in the last 30 minutes. They had flown over the same area prior to taking a break in Togiak and did not observe any snowmachine tracks. The capture crew did not observe any blood near the bedded animal (but did not land) and thought the cow might be bedded due to heat exhaustion. Aderman darted a cow and a bull further downstream. The crew finished up (hung the last radiocollar) with a cow along the lower Togiak River. The crews went to Togiak and met with VPSO Stanley Active, Jr. to discuss the cow near Gechiak Lake. Abraham thought the cow might be wounded and asked Van Daele if the village (Togiak) could check and salvage the meat if it was. Van Daele agreed. Abraham and Hinkes flew back to Dillingham with Tucker while Aderman and Van Daele went up to Togiak Lake with Merkley to move unused fuel/empty drums to the ADF&G cabin. Slinging the barrels went smoothly. We left 2 sealed and 3 partial drums of Jet A (about 150 gallons total) along with 4 empty drums at the cabin. One sealed drum of AvGas was left at the refueling site. The crew headed back to Dillingham.

8 April - Aderman signed OAS paperwork and saw Merkley off from Dillingham around 09:00. Aderman cleaned up the hanger and put away equipment. Aderman centrifuged blood and cleaned used darts.

9 April - Aderman finished blood work.

10 April - Aderman returned centrifuge to Kanakanak Hospital and gave them 2 jugs of "sharps" (used needles, syringes, empty drug vials, and damaged dart tips).

Appendix C. Moose redarting protocol.

After 1st dart if no effect seen after 12 minutes, dart with 2nd dart at full dose.

After 1st dart if drug effects are seen but animal does not go down after 20 minutes, dart with 2nd dart at 2 mg Carfentanil and 100 mg Xylazine. On animals darted a second time extra effort should be made to monitor heart/breathing rate and depth of respiration. Handling time should be minimal (i.e. collect blood, attach collar, measure rump fat and forego morphological measurements). If animal is very deep with head down, shallow respirations, and poor color (blue/grayish) of tongue and gums, attach collar and reverse as quickly as possible using both Naltrexone and Tolazoline.

If animal is hit with 2 darts and still does not go down but drug effects are apparent, dart animal with reversal (barbless dart) and pursue another animal. Concern of infection with dart in animal - Kris Hundertmark suggested, given no extended chase, to go ahead and dart again (3rd dart) with one half dose and try to get the animal down; process quickly and reverse.

Appendix D. Completed moose capture forms.

Moose Capture Form

Moose# TM- 41 Date 30 Mar 98 Observer/Crew Hinkes/Van Daele-Crouse-Aderman
Method/Notes
Location 59° 01.19" N 159° 32.45" W Tithe Creek
Immobilization: Drug Carfentanil/Xylazine Dose 4.0/150 mg
Start Chase 12:15:00 #missed___ Dart In 12:15:45 1st effect _____ Time down 12:32:00
Placement/notes left side - flank (dart fell out and was not recovered)
Drug Effect: light/moderate/deep light
Reversal: Drug Naltrexone Dose 400 mg Time 13:13 Incr. Resp._____ Up 13:17
Tag none Visual Collar blue w/ Make & Frequency Telonics 153.410 Magnet off? x
Sex F Calf__ Est. Age 22 mo Condition 6 Length 302 cm Girth 173 cm HFL 59.7 cm
Orbits 21.9 cm Head Length 68.6 cm Weight_____ Photos: Body 2 Teeth 1
Ultrasound: Rump Fat 0.4 cm T.L. 60.0 cm Fetuses_____ C.L.
Notes: With another slightly smaller (body size) moose before darting. Both standing on low tundra ridge adjacent to willow habitat. Level SR. Helicopter landed approximately 75 yards from moose. 5 cc Ivermectin administered subcutaneous. Light wet snow falling throughout handling. Head and ears up at 13:15.
Samples Collected: EDTA 2 Serum 1 Heparin_____ Ear Tissue yes (knife)
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM- 40 Date 30 Mar 98 Observer/Crew Hinkes/Van Daele-Crouse-Aderman
Method/Notes
Location 59° 02.38" N 159° 33.64" W Tithe Creek
Immobilization: Drug Carfentanil/Xylazine Dose 4.0/150 mg
Start Chase 13:13:00 #missed___ Dart In 13:13:30 1st effect _____ Time down 13:17:36
Placement/notes left rear ham (dart recovered)
Drug Effect: light/moderate/deep deep
Reversal: Drug Naltrex/Tolazoline Dose 400/200 mg Time 14:00 Incr. Resp.____ Up 14:07
Tag none Visual Collar blue w/ Make & Frequency Telonics 153.400 Magnet off? x
Sex M Calf__ Est. Age 34 mo Condition 6 Length 312 cm Girth 194 cm HFL_____
Orbits 24 cm Head Length_____ Weight_____ Photos: Body 2 Teeth 1
Ultrasound: Rump Fat 0.5 cm T.L. 63.0 cm Fetuses_____ C.L.
Notes: With 11 other moose (12 total), mostly bulls, in a small grassy dry lake bed surrounded by willows/cottonwoods. Level SR in deep snow, no HFL due to legs in deep snow. Helicopter landed approximately 60 yards from moose. 5 cc Ivermectin administered subcutaneous. Light wet snow falling throughout handling. Length measured from top of nasolabial spot along contour of head and spine to tip of tail. Notch in left ear, hole in right ear (bullet?).
Samples Collected: EDTA 2 Serum 1 Heparin_____ Ear Tissue yes (knife)
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM-30 Date 01 Apr 98 Observer/Crew Hinkes/Van Daele-Crouse-Aderman
Method/Notes
Location 58° 57.90" N 159° 47.86" W Kulukak River
Immobilization: Drug Carfentanil/Xylazine Dose 4.0/150 mg
Start Chase 13:53:00 #missed___ Dart In 13:54:00 1st effect _____ Time down 14:15:05
Placement/notes 1st dart left hip bone, 2nd dart 6" from 1st in high left rump (both recovered).
Drug Effect: light/moderate/deep moderate
Reversal: Drug Naltrexone Dose 600 mg Time 14:43 Incr. Resp._____ Up 14:46
Tag none Visual Collar blue w/yellow #30 Make & Frequency Telonics 153.300 Magnet off? x
Sex F Calf__ Est. Age 34 mo Condition 6 Length 296 cm Girth 182 cm HFL 58.0 cm
Orbits 21.9 cm Head Length_____ Weight_____ Photos: Body___ Teeth 1
Ultrasound: Rump Fat 1.6 cm @ 39 T.L. 60.0 cm Fetuses_____ C.L._____
Notes: With another similar size cow before darting. Both in willow habitat adjacent to river. Level SR. 2nd dart (Carfentanil/Xylazine - 4/150 mg) in @ 14:07:20 after 25 second chase. Helicopter landed approximately 20 yards from moose. 5 cc Ivermectin administered subcutaneous. Rumen contents in nose. Head and ears up at 14:45:35.
Samples Collected: EDTA 2 Serum 1 Heparin_____ Ear Tissue yes (plug)
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM-37 Date 01 Apr 98 Observer/Crew Hinkes/Van Daele-Crouse-Aderman
Method/Notes
Location 58° 59.37" N 159° 47.72" W Kulukak River
Immobilization: Drug Carfentanil/Xylazine Dose 4.0/150 mg
Start Chase 14:44:35 #missed___ Dart In 14:45:20 1st effect _____ Time down 14:50:00
Placement/notes upper left rump (dart recovered).
Drug Effect: light/moderate/deep light
Reversal: Drug Naltrexone Dose 400 mg Time 15:19 Incr. Resp._____ Up 15:24
Tag none Visual Collar blue w/[illegible] Make & Frequency Telonics 153.370 Magnet off? x
Sex F Calf 2 Est. Age 34 mo Condition 7 Length 310 cm Girth 186 cm HFL 59.0 cm
Orbits_____ Head Length_____ Weight_____ Photos: Body 1 Teeth 1
Ultrasound: Rump Fat 2.3 cm T.L. 63.0 cm Fetuses_____ C.L._____
Notes: **With twins** and fork bull (both antlers) before darting and until down. All in willow habitat adjacent to river. Level SR. Helicopter landed approximately 80 yards from moose. 5 cc Ivermectin administered subcutaneous. All Naltrexone given intramuscular.
Samples Collected: EDTA 2 Serum 1 Heparin_____ Ear Tissue yes (plug)
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM-36 Date 01 Apr 98 Observer/Crew Hinkes/Van Daele-Crouse-Aderman
Method/Notes
Location 59° 03.47" N 159° 46.24" W Kulukak River
Immobilization: Drug Carfentanil/Xylazine Dose 4.0/150 mg
Start Chase 15:31:30 #missed___ Dart In 15:33:40 1st effect _____ Time down 15:55:00
Placement/notes 1st dart left side, 2nd dart high left flank 12" behind & up from 1st (1st dart fell out- not recovered, 2nd dart recovered).
Drug Effect: light/moderate/deep deep
Reversal: Drug Naltrexone Dose 500 mg. Time 16:31 Incr. Resp. 16:33 Up NV
Tag none Visual Collar blue w/yellow #36 Make & Frequency Telonics 153.360 Magnet off? x
Sex F Calf__ Est. Age 22 mo Condition 6 Length 271 cm Girth 156 cm HFL 56.0 cm
Orbits_____ Head Length_____ Weight_____ Photos: Body___ Teeth 1
Ultrasound: Rump Fat 0.4 cm T.L. 54.0 cm Fetuses_____ C.L._____
Notes: Another older cow (TM-33) in same area (willow habitat adjacent to river) before darting - took off across tundra. Level SR. Laid down first @ 15:37:40, then up, down again @ 15:38:40, back up and walking @ 15:39:40. Still walking @ 15:50. 2nd chase 15:51 - 15:52, 2nd dart (Carfentanil/Xylazine - 4/150 mg) @ 15:52:00. Helicopter landed approximately 80 yards from moose. 5 cc Ivermectin administered subcutaneous. Small animal - radiocollar a little loose. Green external charges might be too "hot".
Samples Collected: EDTA 2 Serum 1 Heparin_____ Ear Tissue yes (plug)
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM-33 Date 01 Apr 98 Observer/Crew Hinkes/Van Daele
Method/Notes
Location 59° 04.60" N 159° 45.89" W Kulukak River
Immobilization: Drug Carfentanil/Xylazine Dose 4.0/150 mg
Start Chase 15:57:00 #missed___ Dart In 15:57:45 1st effect _____ Time down 16:04:15
Placement/notes left side tenderloin (dart recovered).
Drug Effect: light/moderate/deep deep
Reversal: Drug Naltrexone Dose 150 mg Time _____ Incr. Resp._____ Up yes
Tag none Visual Collar blue w/ Make & Frequency Telonics 153.330 Magnet off? x
Sex F Calf__ Est. Age 34 mo Condition__ Length _____ Girth_____ HFL_____
Orbits_____ Head Length_____ Weight_____ Photos: Body___ Teeth_____
Ultrasound: Rump Fat_____ T.L. _____ Fetuses_____ C.L._____
Notes: In same vicinity as TM-36 (willow habitat adjacent to river) before darting - took off across tundra. Went down in waist deep open water along river shore. Helicopter landed approximately 20 yards from moose. No measurements or samples taken. Naltrexone given IV on underside of tongue, eyes bright within 30 seconds, up in 1 - 2 minutes.
Samples Collected: EDTA No Serum No Heparin_____ Ear Tissue No
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM-35 Date 01 Apr 98 Observer/Crew Hinkes/Van Daele-Crouse-Aderman
Method/Notes
Location 59° 04.28" N 159° 57.45" W upper Ungalikthluk River
Immobilization: Drug Carfentanil/Xylazine Dose 4.0/150 mg
Start Chase 16:46:00 #missed 1 Dart In 16:49:00 1st effect _____ Time down 16:52:00
Placement/notes left upper rump (dart recovered, missed dart not recovered)
Drug Effect: light/moderate/deep deep
Reversal: Drug Naltrexone Dose 400 mg Time 17:16:00 Incr. Resp._____ Up 17:20:00
Tag none Visual Collar blue w/yellow #35 Make & Frequency Telonics 153.350 Magnet off? x
Sex M Calf__ Est. Age 34 mo Condition 6 Length _____ Girth_____ HFL 61.0 cm
Orbits_____ Head Length_____ Weight_____ Photos: Body 2 Teeth 1
Ultrasound: Rump Fat 0.4 cm T.L. 61.0 cm Fetuses_____ C.L._____
Notes: With 1 other bull in willow habitat adjacent to river. Level SR on deep snow. Helicopter landed approximately 25 yards from moose. No Ivermectin administered. 5 cc (100 mg) Doxapram given @ 16:58 - no noticeable respiratory response. Increased breathing @ 17:13.
Samples Collected: EDTA 2 Serum 1 Heparin_____ Ear Tissue yes (plug)
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM-27 Date 01 Apr 98 Observer/Crew Hinkes/Van Daele-Crouse-Aderman
Method/Notes
Location 59° 10.46" N 160° 17.33" W lower Togiak River
Immobilization: Drug Carfentanil/Xylazine Dose 3.0/200 mg
Start Chase 18:16:40 #missed____ Dart In 18:17:40 1st effect _____ Time down 19:00:00
Placement/notes 1st dart left rump?, 2nd dart high left rump [1st dart fell out- not recovered (but couldn't find any wound), 2nd dart recovered].
Drug Effect: light/moderate/deep moderate
Reversal: Drug Naltrexone Dose 300 mg Time 19:32 Incr. Resp._____ Up 19:36
Tag none Visual Collar blue w/ Make & Frequency Telonics 153.270 Magnet off? x
Sex F Calf 2 Est. Age 34-46 mo Condition 7 Length _____ Girth_____ HFL_____
Orbits_____ Head Length_____ Weight_____ Photos: Body 1 Teeth 1
Ultrasound: Rump Fat 2.3 cm T.L. 58.0 cm Fetuses_____ C.L._____
Notes: **With twins** in willow habitat adjacent to river before darting. 2nd chase from 18:32 - 18:33 with 2nd dart (Carfentanil/Xylazine - 3/200 mg) @ 18:33. Level SR. Helicopter landed approximately 30 yards from moose. 5 cc Ivermectin administered subcutaneous. Trouble getting blood. Head up, neck rigid, jerky. Walked towards helicopter when up.
Samples Collected: EDTA 2 Serum 2 Heparin_____ Ear Tissue yes (plug)
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM- 25 Date 04 Apr 98 Observer/Crew Merkley/Van Daele-Aderman
Method/Notes
Location 59° 24.51" N 159° 36.13" W Ongivinuck River above No Lake Creek confluence
Immobilization: Drug Carfentanil/Xylazine Dose 3.5/150 mg
Start Chase 14:19:30 #missed___ Dart In 14:20:10 1st effect _____ Time down 14:26:40
Placement/notes left upper rump (dart recovered)
Drug Effect: light/moderate/deep deep
Reversal: Drug Naltrexone Dose 350 mg Time 14:38 Incr. Resp._____ Up_____
Tag none Visual Collar blue w/yellow #25 Make & Frequency Telonics 153.250 Magnet off? x
Sex F Calf 1 Est. Age 34-46 mo Condition 6 Length _____ Girth_____ HFL_____
Orbits_____ Head Length_____ Weight_____ Photos: Body 2 Teeth_____
Ultrasound: Rump Fat_____ T.L. _____ Fetuses_____ C.L._____
Notes: **With calf** in willow/cottonwood habitat adjacent to river before darting. Calf hung around for 2 minutes after arrival to cow. Level SR. Helicopter landed approximately 50 yards from moose. No Ivermectin or ultrasound (Crouse w/Hinkes in N735EA).
Samples Collected: EDTA 2 Serum 1 Heparin_____ Ear Tissue yes (plug)
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM- 32 Date 04 Apr 98 Observer/Crew Hinkes/Van Daele-Crouse-Aderman
Method/Notes
Location 59° 24.64" N 159° 35.59" W Ongivinuck River above No Lake Creek confluence
Immobilization: Drug Carfentanil/Xylazine Dose 3.5/150 mg
Start Chase 14:47:30 #missed___ Dart In 14:50:00 1st effect _____ Time down 14:54:00
Placement/notes left upper rump (dart recovered)
Drug Effect: light/moderate/deep deep
Reversal: Drug Naltrexone Dose 350 mg Time 15:06:00 Incr. Resp. 15:07:00 Up15:10:00
Tag none Visual Collar blue w/ Make & Frequency Telonics 153.320 Magnet off? x
Sex M Calf__ Est. Age 46-58 mo Condition 5-6 Length ____ Girth____ HFL 61.0 cm
Orbits_____ Head Length_____ Weight_____ Photos: Body 1 Teeth_____
Ultrasound: Rump Fat_____ T.L. _____ Fetuses_____ C.L._____
Notes: With 2 other young bulls in cottonwood habitat adjacent to river. Helicopter landed approximately 60 yards from moose. 5 cc Ivermectin administered subcutaneous. 9" of new antler growth. Collar on backwards. 1/16" wear on teeth.
Samples Collected: EDTA 2 Serum 1 Heparin_____ Ear Tissue yes (plug)
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM-29 Date 04 Apr 98 Observer/Crew Hinkes/Van Daele-Crouse-Aderman
Method/Notes
Location 59° 24.38" N 159° 36.11" W Ongivinuck River above No Lake Creek confluence
Immobilization: Drug Carfentanil/Xylazine Dose 3.5/150 mg
Start Chase 14:59:15 #missed Dart In 15:00:00 1st effect Time down 15:10:00
Placement/notes high left back - flank/kidney area (dart recovered)
Drug Effect: light/moderate/deep moderate
Reversal: Drug Naltrexone Dose 350 mg Time 15:43 Incr. Resp. 15:44 Up 15:48
Tag none Visual Collar blue w/yellow #29 Make & Frequency Telonics 153.290 Magnet off? x
Sex F Calf 1 Est. Age 46-58 mo Condition 7 Length Girth HFL 58.5 cm
Orbits Head Length Weight Photos: Body Teeth
Ultrasound: Rump Fat 2.3 cm T.L. 58.0 cm Fetuses C.L.
Notes: **With calf** in cottonwood habitat adjacent to river before darting. Level SR. Helicopter landed approximately 60 yards from moose. 5 cc Ivermectin administered subcutaneous. 1/16" wear on teeth.
Samples Collected: EDTA 2 Serum 1 Heparin Ear Tissue yes (plug)
Lab: Hct % Cryo: EDTA Serum Tissue Plasma

Moose Capture Form

Moose# TM-26 Date 04 Apr 98 Observer/Crew Hinkes/Van Daele-Crouse-Aderman
Method/Notes
Location 59° 23.14" N 159° 42.24" W Ongivinuck River below No Lake Creek confluence
Immobilization: Drug Carfentanil/Xylazine Dose 3.0/200 mg
Start Chase 15:18:00 #missed 2 Dart In 15:20:30 1st effect Time down 15:30:00
Placement/notes left rump (dart recovered, 2 missed darts not recovered)
Drug Effect: light/moderate/deep moderate
Reversal: Drug Naltrexone Dose 300 mg Time 16:17 Incr. Resp. 16:18 Up 16:20
Tag none Visual Collar blue w/ Make & Frequency Telonics 153.260 Magnet off? x
Sex F Calf Est. Age 34-46 mo Condition 6 Length 301 cm Girth 186 cm HFL 60.0 cm
Orbits Head Length Weight Photos: Body 3 Teeth 1
Ultrasound: Rump Fat 1.1 cm T.L. 63.0 cm Fetuses C.L.
Notes: With 6 bulls in cottonwood habitat adjacent to river before darting. Level SR in open tundra. Helicopter landed approximately 30 yards from moose. 5 cc Ivermectin administered subcutaneous. 1/16" wear on teeth. Several scars (hair missing - fighting?) on body. Panalog put on dart wound. Dart was leftover from 01 April afternoon.
Samples Collected: EDTA 2 Serum 1 Heparin Ear Tissue yes (plug)
Lab: Hct % Cryo: EDTA Serum Tissue Plasma

Moose Capture Form

Moose# TM-23 Date 04 Apr 98 Observer/Crew Hinkes/Van Daele-Crouse-Aderman
Method/Notes
Location 59° 24.62" N 159° 52.42" W Togiak River (north side) between Ongivinuck & Kemuk Immobilization: Drug Carfentanil/Xylazine Dose 3.5/150 mg
Start Chase _____ #missed_____ Dart In 16:15:00 1st effect _____ Time down 16:36:34
Placement/notes 1st - left leg (bounced out) 2nd - left rump (dart recovered, 2 missed darts at a different bull not recovered)
Drug Effect: light/moderate/deep light
Reversal: Drug Naltrexone Dose 350 mg Time 17:08 Incr. Resp._____ Up 17:12
Tag none Visual Collar blue w/yellow #23 Make & Frequency Telonics 153.230 Magnet off? x
Sex M Calf__ Est. Age_____ Condition 5. Length_____ Girth_____ HFL 60.0 cm
Orbits_____ Head Length_____ Weight_____ Photos: Body___ Teeth_____
Ultrasound: Rump Fat 0.2 cm T.L. 58.0 cm Fetuses_____ C.L._____
Notes: With 19 bulls in willow habitat adjacent to river before darting. Level SR. Helicopter landed approximately 30 yards from moose. 5 cc Ivermectin administered subcutaneous. Begin 2nd chase @ 16:28:15 with 2nd dart(3.5/150 Carfentanil/Xylazine) in @ 16:29:00. No antler growth. Rigid and stiff, jugular vein flat - several attempts to draw blood unsuccessful. Rapid shallow heart beat. Naltrexone given all intramuscularly.
Samples Collected: EDTA No Serum No Heparin_____ Ear Tissue yes (plug)
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM-22 Date 04 Apr 98 Observer/Crew Hinkes/Van Daele-Crouse-Aderman
Method/Notes
Location 59° 23.10" N 159° 53.30" W Togiak River (south side) between Ongivinuck & Kemuk
Immobilization: Drug Carfentanil/Xylazine Dose 3.5/150 mg
Start Chase 16:50:00 #missed___ Dart In 16:51:00 1st effect _____ Time down 17:05:30
Placement/notes left rump (dart recovered)
Drug Effect: light/moderate/deep moderate
Reversal: Drug Naltrexone Dose 350 mg Time 17:46 Incr. Resp._____ Up 17:49
Tag none Visual Collar blue w/ Make & Frequency Telonics 153.220 Magnet off? x
Sex F Calf 1 Est. Age 46 mo Condition 7 Length 300 cm Girth 186 cm HFL 58.0 cm
Orbits_____ Head Length_____ Weight_____ Photos: Body 3 Teeth 1
Ultrasound: Rump Fat 1.2 cm T.L. 60.0 cm Fetuses_____ C.L._____
Notes: **With calf** in willow habitat adjacent to river before darting. Level SR in open short willows. Helicopter landed approximately 30 yards from moose. 5 cc Ivermectin administered subcutaneous. 1/16" wear on teeth.
Samples Collected: EDTA 2 Serum 1 Heparin_____ Ear Tissue yes (plug)
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM-21 Date 04 Apr 98 Observer/Crew Hinkes/Van Daele-Crouse-Aderman
Method/Notes
Location 59° 27.78" N 159° 48.04" W Togiak River (west side) half way between Ongivinuck River outlet & Togiak Lake.
Immobilization: Drug Carfentanil/Xylazine Dose 3.5/150 mg
Start Chase _____ #missed___ Dart In 18:10:27 1st effect _____ Time down 18:31:00*
Placement/notes high left rump (dart recovered)
Drug Effect: light/moderate/deep deep
Reversal: Drug Naltrexone Dose 350 mg Time 17:46 Incr. Resp._____ Up 17:49
Tag none Visual Collar blue w/yellow #21 Make & Frequency Telonics 153.210 Magnet off? x
Sex F Calf 1 Est. Age 46-58 mo Condition 6 Length_____ Girth_____ HFL 59.5 cm
Orbits_____ Head Length_____ Weight_____ Photos: Body 2 Teeth_____
Ultrasound: Rump Fat 1.4 cm T.L. 60.0 cm Fetuses_____ C.L._____
Notes: **With calf** (M) in willow/cottonwood habitat before darting. Level SR in cottonwoods. Helicopter landed approximately 70 yards from moose. *cow first went down @ 18:23:07 (12 minutes 40 seconds) after darting but then got up @ 18:26:00 when helicopter approached. Back down @ 18:28:14 and then up @ 18:29:00 and then down @ 18:31:00. Bull calf very protective of cow - charged Van Daele and then Crouse before being driven off with several snowballs. 50 mg Xylazine given intravenous @ 18:36. 5 cc Ivermectin administered subcutaneous.
Samples Collected: EDTA 2 Serum 1 Heparin_____ Ear Tissue yes (plug)
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM-01 Date 06 Apr 98 Observer/Crew Hinkes/Van Daele-Crouse-Aderman
Method/Notes
Location 59° 26.09" N 159° 43.26" W Togiak valley north of Ongivinuck, west of mountains
Immobilization: Drug Carfentanil/Xylazine Dose 3.5/150 mg
Start Chase 9:55:00 #missed___ Dart In 9:56:30 1st effect _____ Time down 10:01:20
Placement/notes 1st dart bounced off rump (not recovered), 2nd dart in right back (recovered)
Drug Effect: light/moderate/deep deep
Reversal: Drug Naltrexone Dose 500 mg Time 10:19 Incr. Resp. 10:21 Up see Notes
Tag none Visual Collar blue w/ Make & Frequency Telonics 153.010 Magnet off? x
Sex F Calf 1 Est. Age 46 mo Condition 6 Length_____ Girth_____ HFL 58.0 cm
Orbits_____ Head Length_____ Weight_____ Photos: Body 1 Teeth_____
Ultrasound: Rump Fat_____ T.L. _____ Fetuses_____ C.L._____
Notes: Bedded **with calf** in willow habitat before darting. 2nd dart (3.5/150Carfentanil/Xylazine) @ 9:58:00. Level SR in open tundra. Helicopter landed approximately 35 yards from moose. 5 cc Ivermectin administered subcutaneous. 1/16" wear on teeth. Probable partial injection from 1st dart, was still down at capture site but with head up @ 10:30. Had moved by 19:45 or sooner.
Samples Collected: EDTA 2 Serum 1 Heparin_____ Ear Tissue yes (plug)
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM-02 Date 06 Apr 98 Observer/Crew Hinkes/Van Daele-Crouse-Aderman
Method/Notes
Location 59° 26.02" N 159° 48.12" W Togiak River about 2 miles north (direct) of Ongivinuck outlet
Immobilization: Drug Carfentanil/Xylazine Dose 3.5/150 mg
Start Chase 10:13:30 #missed___ Dart In 10:15:00 1st effect _____ Time down 10:18:00
Placement/notes in bone along right side of tail (dart recovered)
Drug Effect: light/moderate/deep deep
Reversal: Drug Naltrexone Dose 350 mg Time 10:41 Incr. Resp._____ Up yes
Tag none Visual Collar blue w/yellow =02 Make & Frequency Telonics 153.020 Magnet off? x
Sex F Calf 1 Est. Age 34-46 mo Condition 6 Length_____ Girth_____ HFL 58.0 cm
Orbits_____ Head Length_____ Weight_____ Photos: Body____ Teeth_____
Ultrasound: Rump Fat 1.1 cm T.L. 60.0 cm Fetuses_____ C.L._____
Notes: Bedded **with calf** in cottonwood habitat before darting. No Ivermectin administered

Samples Collected: EDTA 2 Serum 1 Heparin_____ Ear Tissue yes (plug)
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM-06 Date 06 Apr 98 Observer/Crew Hinkes/Van Daele-Crouse-Aderman
Method/Notes
Location 59° 25.36" N 159° 48.06" W Togiak River about 2 miles north (direct) of Ongivinuck outlet
Immobilization: Drug Carfentanil/Xylazine Dose 3.5/150 mg
Start Chase _____ #missed 1 Dart In 10:34:15 1st effect _____ Time down 10:45:00
Placement/notes upper left rump in pelvis bone (dart recovered, 1 missed dart not recovered)
Drug Effect: light/moderate/deep moderate - head up but very relaxed
Reversal: Drug Naltrexone Dose 350 mg Time 11:20 Incr. Resp._____ Up_____
Tag none Visual Collar blue w/ Make & Frequency Telonics 153.060 Magnet off? x
Sex M Calf__ Est. Age 46 mo Condition 7 Length 301 cm Girth 184 cm HFL 59.0 cm
Orbits 24.0 cm Head Length 76 cm Weight_____ Photos: Body 1 Teeth_____
Ultrasound: Rump Fat_____ T.L. _____ Fetuses_____ C.L._____
Notes: Bedded with 3 other bulls in cottonwood habitat adjacent to river before darting. Level SR. 5 cc Ivermectin administered subcutaneous. No antler growth on left side, 2" on right. Notch in top of right ear. Wound in lower rear right ham, cleaned out and 30 cc Penicillin given.
Samples Collected: EDTA 2 Serum 1 Heparin_____ Ear Tissue yes (plug)
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM- 05 Date 06 Apr 98 Observer/Crew Hinkes/Van Daele
Method/Notes
Location 59° 23.76" N 159° 49.50" W Togiak River ½ mile below Ongivinuck outlet
Immobilization: Drug Carfentanil/Xylazine Dose 3.5/150 mg
Start Chase 10:52:00 #missed___ Dart In 10:53:00 1st effect _____ Time down 10:56:41
Placement/notes left rump (dart recovered)
Drug Effect: light/moderate/deep moderate
Reversal: Drug Naltrexone Dose 350 mg Time 11:15 Incr. Resp._____ Up_____
Tag none Visual Collar blue w/yellow #05 Make & Frequency Telonics 153.050 Magnet off? x
Sex F Calf__ Est. Age 34 mo Condition__ Length_____ Girth_____ HFL_____
Orbits_____ Head Length_____ Weight_____ Photos: Body____ Teeth_____
Ultrasound: Rump Fat_____ T.L. _____ Fetuses_____ C.L._____
Notes: Bedded with another cow and yearling in willow habitat before darting. No Ivermectin administered. Van Daele worked this animal alone.

Samples Collected: EDTA 2 Serum 1 Heparin_____ Ear Tissue No
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM- 07 Date 06 Apr 98 Observer/Crew Hinkes/Van Daele-Crouse-Aderman
Method/Notes
Location 59° 28.39" N 159° 47.11" W Togiak River (east side) about ½ way between the Ongivinuck outlet and Togiak Lake
Immobilization: Drug Carfentanil/Xylazine Dose 3.5/150 mg
Start Chase 11:30:00 #missed___ Dart In 11:30:15 1st effect _____ Time down 11:37:35
Placement/notes left rump (dart recovered)
Drug Effect: light/moderate/deep deep
Reversal: Drug Naltrexone Dose 350 mg Time 12:03 Incr. Resp._____ Up 12:06
Tag none Visual Collar blue w/ Make & Frequency Telonics 153.070 Magnet off? x
Sex F Calf 2 Est. Age 58 mo Condition 7 Length 313 cm Girth 188 cm HFL 59.5 cm
Orbits_____ Head Length_____ Weight_____ Photos: Body 1 Teeth_____
Ultrasound: Rump Fat 1.3 cm T.L. 61.0 cm Fetuses_____ C.L._____
Notes: Bedded **with twins** in cottonwood habitat before darting. Level SR. Helicopter landed approximately 35 yards from moose. 5 cc Ivermectin administered subcutaneous. One calf crossed Togiak River on our arrival.

Samples Collected: EDTA 2 Serum 1 Heparin_____ Ear Tissue yes (plug)
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM-10 Date 06 Apr 98 Observer/Crew Hinkes/Van Daele-Crouse-Aderman
Method/Notes
Location 59° 57.90" N 159° 47.92" W Trail Creek
Immobilization: Drug Carfentanil/Xylazine Dose 3.5/150+ mg
Start Chase 14:01:30 #missed___ Dart In 14:02:15 1st effect _____ Time down 14:07:00
Placement/notes 1st dart - left rump bounced out (not recovered), 2nd dart left tenderloin (dart recovered)
Drug Effect: light/moderate/deep deep
Reversal: Drug Naltrexone Dose 500 mg Time 14:31:30 Incr. Resp._____ Up 14:34:00
Tag none Visual Collar blue w/yellow #10 Make & Frequency Telonics 153.100 Magnet off? x
Sex F Calf 2 Est. Age 46 mo Condition 6 Length_____ Girth_____ HFL 59.0 cm
Orbits_____ Head Length_____ Weight_____ Photos: Body____ Teeth_____
Ultrasound: Rump Fat 1.3 cm T.L. 58.0 cm Fetuses_____ C.L._____
Notes: Bedded **with twins** and young cow (TM13) and young bull in willow habitat before darting. Level SR in deep snow (4'+). Helicopter landed approximately 40 yards from moose. 5 cc Ivermectin administered subcutaneous. 2nd dart (3.5/150 mg Carfentanil/Xylazine) @14:03:30
Samples Collected: EDTA 2 Serum 1 Heparin_____ Ear Tissue yes (plug)
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM-13 Date 06 Apr 98 Observer/Crew Hinkes/Van Daele-Crouse-Aderman
Method/Notes
Location 59° 58.43" N 159° 47.28" W Trail Creek
Immobilization: Drug Carfentanil/Xylazine Dose 3.5/150 mg
Start Chase _____ #missed___ Dart In 14:14* 1st effect _____ Time down 14:26:45
Placement/notes dart in right rump 3" from base of tail in pelvis bone, bending it over and nearly breaking off needle (dart recovered)
Drug Effect: light/moderate/deep moderate
Reversal: Drug Naltrexone Dose 350 mg Time 15:06 Incr. Resp._____ Up_____
Tag none Visual Collar blue w/ Make & Frequency Telonics 153.130 Magnet off? x
Sex F Calf___ Est. Age 22 mo Condition 7 Length 289 cm Girth 178 cm HFL 58.0 cm
Orbits 20.5 cm Head Length_____ Weight_____ Photos: Body____ Teeth_____
Ultrasound: Rump Fat 0.5 cm T.L. 58.0 cm Fetuses_____ C.L._____
Notes: Bedded with cow (TM10)/twins and young bull in willow habitat before darting. Level SR out in wide open tundra. Helicopter landed approximately 30 yards from moose. 5 cc Ivermectin administered subcutaneous. *estimated
Samples Collected: EDTA 2 Serum 1 Heparin_____ Ear Tissue yes (plug)
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM-12 Date 06 Apr 98 Observer/Crew Hinkes/Van Daele-Crouse-Aderman
Method/Notes
Location 59° 59.40" N 159° 48.67" W Trail Creek
Immobilization: Drug Carfentanil/Xylazine Dose 3.5/150 mg
Start Chase 15:00:00 #missed___ Dart In 15:00:30 1st effect _____ Time down 15:35:00
Placement/notes 1st and 2nd darts bounced out (not recovered), 3rd dart left rump (recovered)
Drug Effect: light/moderate/deep deep
Reversal: Drug Naltrexone Dose 500 mg Time 15:51 Incr. Resp._____ Up 16:01*
Tag none Visual Collar blue w/yellow #12 Make & Frequency Telonics 153.120 Magnet off? x
Sex F Calf__ Est. Age 46-58 mo Condition 6 Length_____ Girth_____ HFL 58.0 cm
Orbits_____ Head Length_____ Weight_____ Photos: Body 1 Teeth_____
Ultrasound: Rump Fat_____ T.L. _____ Fetuses_____ C.L._____
Notes: "Juliet" With bull (TM04) in willow habitat before darting. Level SR out in wide open tundra. Helicopter landed approximately 30 yards from moose. 2nd and 3rd darts same mixture as 1st. 2nd dart in @ 15:22, 3rd dart in @ 15:33. *may have been up sooner
Samples Collected: EDTA 1 Serum 1 Heparin_____ Ear Tissue yes (plug)
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM-04 Date 06 Apr 98 Observer/Crew Hinkes/Van Daele-Crouse-Aderman
Method/Notes
Location 59° 59.43" N 159° 48.31" W Trail Creek
Immobilization: Drug Carfentanil/Xylazine Dose 3.5/150 mg
Start Chase 15:01:00 #missed___ Dart In 15:02:00 1st effect _____ Time down 15:38:00
Placement/notes 2nd dart bounced out (not recovered), 1st and 3rd darts left rump (recovered)
Drug Effect: light/moderate/deep moderate
Reversal: Drug Naltrexone Dose 350 mg Time 15:58 Incr. Resp._____ Up 16:01
Tag none Visual Collar blue w/ [illegible] Make & Frequency Telonics 153.040 Magnet off? x
Sex M Calf__ Est. Age 22-34 mo Condition 5 Length_____ Girth_____ HFL_____
Orbits_____ Head Length_____ Weight_____ Photos: Body___ Teeth_____
Ultrasound: Rump Fat_____ T.L. _____ Fetuses_____ C.L._____
Notes: "Romeo" With cow (TM12) in willow habitat before darting. Level SR out in wide open tundra. Helicopter landed approximately 30 yards from moose. 2nd and 3rd darts same mixture as 1st. 2nd dart in @ 15:24, 3rd dart in @ 15:32. Collar left a little loose - did not cut off excess.
Samples Collected: EDTA 2 Serum 1 Heparin_____ Ear Tissue No
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM-03 Date 06 Apr 98 Observer/Crew Hinkes/Van Daele-Crouse-Aderman
Method/Notes
Location 59° 45.78" N 159° 31.55" W Izavieknik River between Togiak & Upper Togiak lakes
Immobilization: Drug Carfentanil/Xylazine Dose 3.5/150 mg
Start Chase 16:20:45 #missed___ Dart In 16:22:00 1st effect _____ Time down 16:26:20
Placement/notes left side between ribs (dart recovered)
Drug Effect: light/moderate/deep moderate
Reversal: Drug Naltrexone Dose 350 mg Time 16:52:30 Incr. Resp.___ Up 16:57:00*
Tag none Visual Collar blue w/yellow #03 Make & Frequency Telonics 153.030 Magnet off? x
Sex F Calf 1 Est. Age 46 mo Condition 7 Length_____ Girth_____ HFL 60.0 cm
Orbits_____ Head Length_____ Weight_____ Photos: Body___ Teeth_____
Ultrasound: Rump Fat 1.6 cm T.L. 60.0 cm Fetuses_____ C.L._____
Notes: Bedded with calf in cottonwood habitat before darting. 5cc Ivermectin administered subcutaneously. Beginning with this animal we began using brown external charges in Capchur gun. Naltrexone was old (1993). *may have gotten up sooner.

Samples Collected: EDTA 2 Serum 1 Heparin_____ Ear Tissue yes (plug)
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM-31 Date 06 Apr 98 Observer/Crew Hinkes/Van Daele-Crouse-Aderman
Method/Notes
Location 59° 44.53" N 159° 30.28" W Izavieknik River between Togiak & Upper Togiak lakes
Immobilization: Drug Carfentanil/Xylazine Dose 3.5/150 mg
Start Chase 18:00:00 #missed___ Dart In 18:00:30 1st effect _____ Time down 18:07:00
Placement/notes left rump near tail (dart recovered)
Drug Effect: light/moderate/deep deep
Reversal: Drug Naltrexone Dose 350 mg Time 18:18:00 Incr. Resp.___ Up 18:23:00*
Tag none Visual Collar blue w/ Make & Frequency Telonics 153.310 Magnet off? x
Sex F Calf 2 Est. Age 46-58 mo Condition 6 Length_____ Girth_____ HFL_____
Orbits_____ Head Length_____ Weight_____ Photos: Body 2 Teeth_____
Ultrasound: Rump Fat_____ T.L. _____ Fetuses_____ C.L._____
Notes: Bedded with twins on gravel bar before darting. No Ivermectin administered. Went down in water with head near bank. No measurements or samples. Crouse stayed with animal until up - cow headed upriver through water after up.
Samples Collected: EDTA No Serum No Heparin_____ Ear Tissue No
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM-34 Date 06 Apr 98 Observer/Crew Hinkes/Van Daele-Crouse-Aderman
Method/Notes
Location 59° 45.16" N 159° 27.49" W east side tributary to Izavieknik River.
Immobilization: Drug Carfentanil/Xylazine Dose 3.5/150 mg
Start Chase 18:18:00 #missed___ Dart In 18:19:00 1st effect _____ Time down 18:24:20
Placement/notes upper left rump (dart recovered)
Drug Effect: light/moderate/deep deep
Reversal: Drug Naltrexone Dose 350 mg Time 18:39 Incr. Resp. 18:44 Up_____
Tag none Visual Collar blue w/yellow #34 Make & Frequency Telonics 153.340 Magnet off? x
Sex M Calf__ Est. Age 34-46 mo Condition 6 Length_____ Girth_____ HFL 58.5 cm
Orbits_____ Head Length_____ Weight_____ Photos: Body___ Teeth_____
Ultrasound: Rump Fat_____ T.L. _____ Fetuses_____ C.L._____
Notes: Bedded with another bull on gravel bar before darting. Level SR Helicopter landed approximately 30 yards from moose. 3" of new antler growth. 5 cc of Ivermectin administered subcutaneously. Head still down @ 18:44 but increased breathing.
Samples Collected: EDTA 2 Serum 1 Heparin_____ Ear Tissue yes (plug)
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM-11 Date 06 Apr 98 Observer/Crew Hinkes/Van Daele-Crouse-Aderman
Method/Notes
Location 59° 39.98" N 160° 02.32" W upper Kemuk River (west branch)
Immobilization: Drug Carfentanil/Xylazine Dose 3.5/150 mg
Start Chase 19:09:45 #missed___ Dart In 19:10:20 1st effect _____ Time down 19:14:18
Placement/notes left rear pelvis bone (dart recovered)
Drug Effect: light/moderate/deep moderate
Reversal: Drug Naltrexone Dose 350 mg Time 19:35 Incr. Resp._____ Up_____
Tag none Visual Collar blue w/ Make & Frequency Telonics 153.110 Magnet off? x
Sex M Calf__ Est. Age 34 mo Condition 6 Length_____ Girth_____ HFL 60.5 cm
Orbits_____ Head Length_____ Weight_____ Photos: Body___ Teeth_____
Ultrasound: Rump Fat_____ T.L. _____ Fetuses_____ C.L._____
Notes: Bedded with another bull in cottonwood habitat adjacent to river before darting. Level SR on snow (cobble) bar next to river Helicopter landed approximately 60 yards from moose. 3" notch in outer edge of left ear. 5 cc of Ivermectin administered subcutaneously.
Samples Collected: EDTA 2 Serum 1 Heparin_____ Ear Tissue yes (plug)
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM- 14 Date 06 Apr 98 Observer/Crew Hinkes/Van Daele-Crouse-Aderman
Method/Notes
Location 59° 32.04" N 159° 55.05" W Kemuk tributary 1 mile west of canyon
Immobilization: Drug Carfentanil/Xylazine Dose 3.0/200 mg
Start Chase 19:47:45 #missed___ Dart In 19:48:00 1st effect _____ Time down 19:53:00
Placement/notes right rump (dart recovered)
Drug Effect: light/moderate/deep deep
Reversal: Drug Naltrex/Tolazoline Dose 300/400 mg Time 20:19 Incr. Resp.____ Up 20:23
Tag none Visual Collar blue w/yellow #14 Make & Frequency Telonics 153.140 Magnet off? x
Sex F Calf 2 Est. Age 46-58 mo Condition 6 Length_____ Girth_____ HFL 60.5 cm
Orbits_____ Head Length_____ Weight_____ Photos: Body____ Teeth_____
Ultrasound: Rump Fat 0.9 cm T.L. 60.0 cm Fetuses_____ C.L._____
Notes: Bedded **with twins** on gravel bar before darting. No Ivermectin administered. Went down partially in water. Helicopter landed approximately 50 yards away. 400 mg Tolazoline administered before Naltrexone. >1/16" wear on teeth
Samples Collected: EDTA 2 Serum 1 Heparin_____ Ear Tissue yes (plug)
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM- 18 Date 07 Apr 98 Observer/Crew Tucker-Abraham/Hinkes-Van Daele
Method/Notes
Location 59° 33.44" N 159° 25.65" W Ongivinuck River 2 miles downstream from lake
Immobilization: Drug Carfentanil/Xylazine Dose 3.0/150 mg
Start Chase 11:02:00* #missed___ Dart In 11:02:45* 1st effect ____ Time down 11:08:00*
Placement/notes left rump (dart recovered)
Drug Effect: light/moderate/deep
Reversal: Drug Naltrexone Dose 350 mg Time 11:25* Incr. Resp.____ Up yes
Tag none Visual Collar blue w/ Make & Frequency Telonics 153.180 Magnet off? x
Sex F Calf__ Est. Age 22 mo Condition_____ Length_____ Girth_____ HFL_____
Orbits_____ Head Length_____ Weight_____ Photos: Body____ Teeth_____
Ultrasound: Rump Fat_____ T.L. _____ Fetuses_____ C.L._____
Notes: Alone, went down in water, Van Daele worked alone. *times are approximate. No Ivermectin given

Samples Collected: EDTA 2 Serum 1 Heparin_____ Ear Tissue No
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM- 17 Date 07 Apr 98 Observer/Crew Tucker-Abraham/Van Daele-Hinkes-Aderman
Method/Notes
Location 59° 34.93" N 159° 24.84" W 1 ½ miles WNW from Ongivinuk Lake
Immobilization: Drug Carfentanil/Xylazine Dose 3.0/150 mg
Start Chase _____ #missed___ Dart In 11:30:20 1st effect ____ Time down 11:35:00
Placement/notes left rump (dart recovered)
Drug Effect: light/moderate/deep deep
Reversal: Drug Naltrexone Dose 300 mg Time 11:52 Incr. Resp.____ Up 11:58
Tag none Visual Collar blue w/yellow #17 Make & Frequency Telonics 153.170 Magnet off? x
Sex F Calf 2 Est. Age 58+ mo Condition 6-7 Length_____ Girth_____ HFL_____
Orbits_____ Head Length_____ Weight_____ Photos: Body 2 Teeth_____
Ultrasound: Rump Fat_____ T.L. _____ Fetuses_____ C.L._____
Notes: **With twins** in willow habitat before darting. Level SR in open. Helicopter landed approximately 45 yards away. 5 cc Ivermectin administered subcutaneously.

Samples Collected: EDTA 2 Serum 1 Heparin_____ Ear Tissue yes (plug)
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM- 38 Date 07 Apr 98 Observer/Crew Tucker-Abraham/Hinkes-Van Daele-Aderman
Method/Notes
Location 59° 34.26" N 159° 42.96" W Kipnuktuli (1 ½ miles W of south end of Togiak Lake)
Immobilization: Drug Carfentanil/Xylazine Dose 3.0/150 mg
Start Chase 12:09:30 #missed___ Dart In 12:10:45 1st effect ____ Time down 12:16:00
Placement/notes upper left rump (dart recovered)
Drug Effect: light/moderate/deep light
Reversal: Drug Naltrexone Dose 300 mg Time 12:28:30 Incr. Resp.____ Up 12:33:00
Tag none Visual Collar blue w/ Make & Frequency Telonics 153.380 Magnet off? x
Sex F Calf__ Est. Age 34 mo Condition 6 Length_____ Girth_____ HFL 60.3 cm
Orbits_____ Head Length_____ Weight_____ Photos: Body____ Teeth_____
Ultrasound: Rump Fat_____ T.L. _____ Fetuses_____ C.L._____
Notes: With bull in willow habitat before darting. Level SR in open short willows. Helicopter landed approximately 45 yards away. No Ivermectin administered.

Samples Collected: EDTA 2 Serum 1 Heparin_____ Ear Tissue yes (plug)
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM-39 Date 07 Apr 98 Observer/Crew Tucker-Abraham/Aderman-Hinkes-Van Daele
Method/Notes
Location 59° 26.71" N 160° 04.59" W lower Nayorurun River (Kashaiak Creek)
Immobilization: Drug Carfentanil/Xylazine Dose 3.0/150 mg
Start Chase 13:10 #missed___ Dart In 13:13 1st effect ____ Time down 13:28
Placement/notes upper left rump - pelvis bone (dart recovered)
Drug Effect: light/moderate/deep moderate to deep
Reversal: Drug Naltrexone Dose 300 mg Time 13:45 Incr. Resp.____ Up 13:52
Tag none Visual Collar blue w/yellow #39 Make & Frequency Telonics 153.390 Magnet off? x
Sex F Calf 1 Est. Age 34-46 mo Condition 6-7 Length_____ Girth_____ HFL 58.4 cm
Orbits_____ Head Length_____ Weight_____ Photos: Body 1 Teeth_____
Ultrasound: Rump Fat_____ T.L. _____ Fetuses_____ C.L._____
Notes: **With calf** in willow habitat before darting. Level SR in tall willows. Helicopter landed approximately 65 yards away. 5 cc Ivermectin administered subcutaneously. Aderman's first moose (darting).
Samples Collected: EDTA 2 Serum 1 Heparin_____ Ear Tissue yes (plug)
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM-19 Date 07 Apr 98 Observer/Crew Tucker-Abraham/Aderman-Hinkes-Van Daele
Method/Notes
Location 59° 20.47" N 160° 18.94" W upper Gechiak Creek (about 3 miles from Gechiak Lake)
Immobilization: Drug Carfentanil/Xylazine Dose 3.0/150 mg
Start Chase 14:15 #missed___ Dart In 14:16 1st effect ____ Time down 14:21
Placement/notes left rump (dart recovered)
Drug Effect: light/moderate/deep moderate
Reversal: Drug Naltrexone Dose 300 mg Time 14:41* Incr. Resp.___ Up 15:04**
Tag none Visual Collar blue w/ Make & Frequency Telonics 153.190 Magnet off? x
Sex F Calf__ Est. Age 34-46 mo Condition____ Length_____ Girth_____ HFL_____
Orbits_____ Head Length_____ Weight_____ Photos: Body_____ Teeth_____
Ultrasound: Rump Fat_____ T.L. _____ Fetuses_____ C.L._____
Notes: With 4 bulls (one of which was TM08) in willow habitat adjacent to creek before darting. Helicopter hovered above cow just before she went down (she was standing next to creek, then in the creek, climbed out on opposite bank and went down). Helicopter landed approximately 25 yards away. Darted bull TM08 ran up creek past Van Daele and Hinkes while working her up. Naltrexone given all IV. *estimated **or sooner
Samples Collected: EDTA 2 Serum 1 Heparin_____ Ear Tissue yes (plug)
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM-_08_ Date 07 Apr 98 Observer/Crew Tucker-Abraham/Aderman-Hinkes-Van Daele
Method/Notes_____
Location 59° 20.65" N 160° 19.01" W upper Gechiak Creek (about 3 miles from Gechiak Lake)
Immobilization: Drug Carfentanil/Xylazine Dose 3.0/150 mg
Start Chase 14:26 #missed___ Dart In 14:27 1st effect ____ Time down 14:35
Placement/notes left rump (dart recovered)
Drug Effect: light/moderate/deep moderate to light
Reversal: Drug Naltrexone Dose 300 mg Time 14:58 Incr. Resp.____ Up 15:04
Tag none Visual Collar blue w/yellow =08 Make & Frequency Telonics 153.080 Magnet off? x
Sex M Calf__ Est. Age 46-58 mo Condition 6 Length_____ Girth_____ HFL 63.5 cm
Orbits_____ Head Length_____ Weight_____ Photos: Body_____ Teeth_____
Ultrasound: Rump Fat_____ T.L. _____ Fetuses_____ C.L._____
Notes: With 3 bulls and cow (TM19) in willow habitat adjacent to creek before darting (see moose capture sheet for TM19) - was alone when we actually pursued him. Helicopter hovered above bull (walking up creek after darted) - ran up creek past Van Daele and Hinkes while working on TM19. Went down on edge of creek in shallow water with head on bank 3-400 yards upstream of TM19. Helicopter landed approximately 75 yards away. Naltrexone given all IM. HFL seems high - measured in inches.
Samples Collected: EDTA _2__ Serum__1__ Heparin_____ Ear Tissue__yes (plug)_____
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM-_16_ Date 07 Apr 98 Observer/Crew Tucker-Abraham/Aderman-Hinkes-Van Daele
Method/Notes_____
Location 59° 11.39" N 160° 16.20" W lower Togiak River 2 miles below Gechiak Creek outlet
Immobilization: Drug Carfentanil/Xylazine Dose 3.0/150 mg
Start Chase 15:16 #missed___ Dart In 15:18:15 1st effect ____ Time down 15:24:25
Placement/notes right rump (dart recovered)
Drug Effect: light/moderate/deep moderate
Reversal: Drug Naltrexone Dose 300 mg Time 15:42 Incr. Resp.___ Up_____
Tag none Visual Collar blue w/ Make & Frequency Telonics 153.160 Magnet off? x
Sex F Calf__ Est. Age 34-46 mo Condition 6 Length_____ Girth_____ HFL_____
Orbits_____ Head Length_____ Weight_____ Photos: Body_____ Teeth_____
Ultrasound: Rump Fat_____ T.L. _____ Fetuses_____ C.L._____
Notes: Alone in willow habitat adjacent to slough before darting. Helicopter landed approximately 45 yards away. Level SR. No Ivermectin given. Last moose collared!
Samples Collected: EDTA _2__ Serum__1__ Heparin_____ Ear Tissue__yes (plug)_____
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Moose Capture Form

Moose# TM-__ Date 07 Apr 98 Observer/Crew Tucker-Abraham/Hinkes-Van Daele-Aderman
Method/Notes_____
Location 59° 33.13" N 159° 26.78" W Ongivinuck River 2 miles downstream from lake
Immobilization: Drug Carfentanil/Xylazine Dose 3.0/150 mg
Start Chase 10:54:30 #missed___ Dart In 10:55:15 1st effect _____ Time down 10:56:40
Placement/notes left upper rump - stuck in pelvis bone (dart recovered)
Drug Effect: light/moderate/deep deep
Reversal: Drug Naltrexone Dose 300 mg Time 11:20 Incr. Resp.____ Up DIED
Tag none Visual Collar none Make & Frequency_____ Magnet off?___
Sex M Calf__ Est. Age 22 mo Condition 5-6 Length_____ Girth_____ HFL_____
Orbits_____ Head Length_____ Weight_____ Photos: Body 2 Teeth_____
Ultrasound: Rump Fat_____ T.L. _____ Fetuses_____ C.L._____
Notes: 45 seconds chase, 1 minute 25 seconds induction. Van Daele and Aderman arrived at the moose at approximately 11:00. Moose was out deep - head and neck on snow, body positioned somewhat on right side. Van Daele took blood samples and sized radiocollar while Aderman removed dart (very difficult to remove). Van Daele left @ 11:12 to work on cow (#18) that Hinkes darted that went down. Aderman observed the moose's breathing was shallow and irregular @ 11:14 and repositioned neck and head. Breathing increased. Hinkes arrived @ 11:15. Aderman began to draw up Naltrexone reversal. Hinkes observed breathing had stopped @ 11:19 and attempted chest compressions by sitting up and down abruptly on upper back. Attempts to administer reversal IV failed, all was administered IM. Hinkes continued chest compressions - to no avail. No rumen contents were observed in nasal passage. No autopsy was performed. Thoughts: This moose probably had an unusual sensitivity to capture drugs given the short induction time. Dart placement may have been a factor. Tolazoline should have been given immediately on arrival or at least at the first sign of irregular breathing. Administration of Naltrexone at first sign of problems (radiocollar was attached but visual collar was not secure - wired through grommets @ 11:14) may have worked.
Samples Collected: EDTA 2 Serum 1 Heparin_____ Ear Tissue yes (plug)
Lab: Hct_____% Cryo: EDTA_____ Serum_____ Tissue_____ Plasma_____

Appendix E. Moose capture strategy and work up priorities.

A. When darted moose goes down, drop 2-person crew on moose.

B. Helicopter takes shooter to dart another (2nd) moose.

C. Work up priorities after removing dart(s) are: 1) attach radio collar; 2) collect blood; 3) take ultrasound measurement; 4) take hind foot measurement; 5) obtain ear plug sample; and 6) administer reversal.

D. 2nd moose goes down, shooter begins work up (C.1 and C.2).

E. Helicopter brings 2-person crew to 2nd moose to finish work up (C.3-C.6).

B. Helicopter takes shooter to dart another moose.

D. See above

E. See above

This capture strategy and work up prioritization (dependent on project objectives) maximizes efficiency of helicopter and 3-person capture crew when collaring 2 or more animals in the same vicinity. Situations may arise (i.e. animal goes down in water, time to refuel, weather moving in) requiring modification to this strategy. The safety of the crew and well being of the animal(s) should be top priorities.

Appendix F. Moose capture blood work protocol.

In Whirlpac attached to radiocollar:
3 EDTA tubes (short purple tops)
2 "Tiger tops" (large red/gray tops with serum separator)
1 vaccutainer holder
2 vaccutainer needles
ear plug envelope
wire for visual collar

In the field:
Blood obtained from jugular vein (2 EDTA, 1 Tiger top). Label blood collection tubes with moose #. Gently mix EDTA samples for 15 seconds. Keep all from freezing.

Back from the field (at the office or lab):
Store blood in refrigerator at approximately 40 ^{0}F in upright position ideally no longer than 24 hours. Label 1.8 ml cryovials (in permanent ink) with the following:

animal#	3 each TM36	2 each TM36	1 each TM36
species	Moose	Moose	Moose
what is it	Serum	Plasma	WHL. Blood
who owns it	TNWR	TNWR	TNWR
date collected	4/01/98	4/01/98	4/01/98

TM36=Togiak Moose #36, TNWR=Togiak National Wildlife Refuge, WHL.=Whole

Pipet Whole blood sample from one of the EDTA tubes. If blood is clotted in Tiger tops, use something sterile to run around the side of the tube to break the clot loose. Spin the EDTA and Tiger tops in cetrifuge (Kanakanak's loaner) at level 3 for 3 minutes and shut off. Pipet serum (clear to yellowish) from the Tiger tops and plasma (clear to yellowish) from the EDTA tubes. If serum or plasma has a reddish tinge, it is due to broken red blood cells (not good but don't throw it away). Tighten caps on cryovials snugly but not too tight. Freeze at -20°F.

Appendix G. **MANAGEMENT STUDY PROPOSAL**

Togiak National Wildlife Refuge
and
Alaska Department of Fish and Game

Title: Population identity and movements of moose in the Togiak, Kulukak, and Goodnews River drainages, southwest Alaska.

Problems Addressed:

Little is known regarding movements, immigration and population parameters of moose on the Togiak National Wildlife Refuge (TNWR). Moose numbers have generally been low and illegal harvest high. Recent increases in numbers and the expansion of their range in Subunit 17A has resulted in several proposals to liberalize seasons. In 1997, a limited registration hunt was opened for moose in GMU 17A. It is unknown what effect increased hunting, in concert with unreported illegal harvest will have on the growth and expansion of moose on the refuge. Radio-collaring and subsequent tracking will provide the information necessary to set harvest limits which allow the continued growth and expansion of moose on the refuge while meeting the nutritional needs of local people.

Objectives:

1. Identify seasonal movements and distribution of moose within portions of TNWR and determine what portion of the moose observed during winter surveys are resident and what portion are migratory.

2. Identify potential areas in which trend count areas can be established, and times when composition counts can be conducted in those areas.

3. Investigate population dynamics of moose to establish productivity and mortality parameters so that more accurate models can be developed for management.

4. Educate local residents on the importance of protecting moose until a viable population can be established.

5. Analyze habitat to better define the number of moose the area can support.

Background and Justification:

Moose appear to be relatively new inhabitants in the Bristol Bay area, possibly immigrating into the area from middle Kuskokwim River drainages during the last century. Until recently, populations were low and moose were found primarily in the Nushagak/Mulchatna River system. Local residents harvested moose opportunistically, however, caribou, reindeer, and beaver were historically the main sources of game meat. Alaska Department of Fish and Game (ADF&G) staff began collecting data on the Unit 17 moose population in 1971. At that time, moose were not abundant in the unit and animals close to the villages were subject to heavy hunting pressure (Faro 1973).

Illegal harvests along the Nushagak and Mulchatna Rivers have decreased in the past 10 years. There has also been a notable decline in the number of female moose taken. This has resulted in a significant increase in moose populations in those areas. However, illegal harvest continues to be a problem in Subunit 17A. Some subunit residents actively pursue moose with aircraft and snowmachines during the winter and spring. Both male and female moose are taken, with an estimated annual harvest of 15 - 25 moose (Van Daele 1996).

In spite of this harvest, the moose population in Subunit 17A has increased dramatically in the past couple of years from 6 moose observed in 1992 to over 100 in 1995. Data from a joint ADF&G/TNWR radio telemetry study indicated that although most moose radio-collared in Subunit 17C stayed in the subunit, there was some movement into Subunit 17A (Jemison 1994). However, that investigation was completed prior to the recent population increase in the subunit. During the February 1995 census, 29 moose moved into 17A from the upper Sunshine Valley in 17C (Aderman et al. 1995). This observation, coupled with the rapid increases in moose observed in recent years strongly suggests immigration into the subunit. It appears that this immigration is continuing west into the Goodnews River drainage in GMU 18. Further research into the nature of these movements needs to be conducted.

The current population size in Subunit 17A is probably around 250 moose. In February 1995 we censused the moose population in Subunits 17A and 17C (west). The 1395 mi^2 study area contained an estimated 458 moose (+\-11.95% at 90% C.I.). We also derived an estimate of 100.9 moose (+\- 21.11% at 90% C.I.) for the Subunit 17A portion of the study area (1042 mi^2) (Aderman et al. 1995). Aerial surveys during winter 1996-1997 indicated a minimum of 234 in 17A.

In 1997, a limited registration hunt was opened for moose in GMU 17A, with a harvest limit of 10 bulls during the fall season. Local residents recognize the importance of being conservative, and would like to see the moose population attain the target level of 600-1000. Residents of Nushagak River villages are also interested in a conservative management approach for Subunit 17A moose. Part of the reason for the immigration of moose from 17C to 17A is because of voluntary hunting restrictions Nushagak River villagers have imposed on themselves to encourage westward movements of moose.

A moose management guideline, jointly developed by ADF&G, TNWR, and local residents attempts to balance the nutritional needs of local residents with the objective of allowing the moose population to grow to its potential (ADFG and TNWR 1996). Establishment of target levels for a hunting season (100 moose), liberalization of hunting seasons (300), and an objective level (600-1000) will allow managers to objectively evaluate the status of the herd. These target levels can be adjusted as results from future research projects become available. Both state and federal law enforcement personnel are working closely with local villagers and Traditional Councils to curtail illegal moose harvests. Cooperation between ADF&G, TNWR, and the local residents is critical to the success of this plan.

There has been no objective analysis of the moose habitat in Subunit 17A. Assuming vegetative and weather patterns similar to adjacent areas in Subunits 17B and 17C, we estimate that the subunit could ultimately support from 600 to 1000 moose. We should investigate methods to refine that estimate possibly through habitat analysis by remote sensing techniques and associated ground truthing, The use of vegetation utilization plots should also be investigated to evaluate the impacts of moose on this relatively virgin range.

Methods:

Adult moose will be captured by darting them from a helicopter with Carfentanil. Capture operations will occur sometime between January and April 1998, whenever suitable weather conditions, moose concentrations, and logistical considerations allow. A total of 36 moose (9 males, 27 females) will be collared with Telonics Mod 600 radio collars with 12 hour mortality sensors and frequencies within the 150.000 - 153.999 range. Radio-collars will be distributed within the Ongivinuck, Kemuk, Gechiak, Kulukak, Trail Creek and Izavieknik River drainages, proportional to the number of moose in each of those areas (Figure 1).

Telemetry flights will be conducted monthly throughout the year, and weekly during calving (late May through early June), for 5 years (1998 - 2003). Attempts will be made to determine the cause of death for any collared moose that die during the project.

Meetings in affected villages will be conducted to educate local residents on the importance conservative hunting seasons and protecting immigrating moose until a population can be established. Information bulletins will also be completed periodically to keep local residents informed.

Habitat analysis will be achieved by developing a general land cover map through computer-aided analysis of satellite imagery. General cover types will be delineated, ground truthed, and cataloged. These data will be used to estimate the amount of moose winter habitat available and derive a target population level for the area.

Anticipated Results:

Analysis of radio telemetry data will provide a basis for determining population identity, seasonal movements and distribution, and provide basic population parameters so more accurate models can be developed for management. These data will allow biologists to better predict the effects of various harvest levels on the growth and expansion of moose on the refuge. Habitat analysis will provide a better estimate of how many moose the area can support. Managers will be able to adequately address future hunt proposals, management goals and objectives. Progress reports will be submitted to the Refuge Manager.

Cooperators and Responsibility:

This management proposal will be a cooperative effort between ADF&G and TNWR. Principle investigators will be Larry Van Daele, Area Wildlife Biologist, ADF&G, Andy Aderman, Wildlife Biologist, TNWR, and Michael Hinkes, Wildlife Biologist/Pilot, TNWR. The principle investigators will be jointly responsible for defining or modifying study design or objectives.

The U.S. Fish and Wildlife Service (USFWS), through its Subsistence Division, will have primary responsibility for funding this project, including flight time, telemetry equipment, radio-collars, and capture drugs. ADF&G will be responsible for the operational phase of the capture and collaring program. Refuge wildlife biologists will assist during the capture phase and have joint responsibility with the ADF&G biologist for conducting telemetry flights. Telemetry flights will be conducted using refuge aircraft as much as possible for cost savings.

TNWR biologists will work with Division of Information Resource personnel to complete computer-aided analysis of satellite imagery for land cover mapping. The principle investigators will be jointly responsible for ground truthing, and developing an estimate of "carrying capacity". TNWR biologists will be responsible for data archive, including computer database and GIS technology. The principle investigators will be jointly responsible for data analysis and progress report preparation.

A portion of the study will occur on or adjacent to lands administered by the Bureau of Land Management (BLM). This study will be coordinated with the BLM and they may become a cooperator through staffing and/or funding at a future date. The extent of their support would be negotiated annually.

Funding Requirements:

Capture (FY 98):	
36 Radio-collars (Telonics Mod 600 w/mortality sensor) @ $500	$18,000
30 hrs. helicopter charter @ $550/hr	$16,500
10 hrs spotter plane charter @ $250/hr	$2,500
15 hrs refuge spotter plane @ $125/hr	$1,875
800 gallons Jet A fuel @ $4/gal	$3,200
Drugs, maps, and incidentals	$2,000
Total Capture Costs	$ 44,075
Land cover mapping (FY 99):	
Acquire satellite imagery	$1,200
Initial aerial reconnaissance	$2,000
Develop preliminary classification	$2,000
	$5,200
Land cover mapping continued (FY 00)	
Ground truthing 12 hrs helicopter charter @ $550/hr	$6,600
360 gallons Jet A fuel @ $4/gal	$1,440
Develop final cover map, type descriptions, products	$3,000
	$10,040
Monitoring (FY 98 - FY 02):	
5 charter flights @ 8 hrs/flight @ $250/hr	$10,000
10 Refuge flights @ 8 hrs/flight @ $125/hr	$10,000
Miscellaneous radio-tracking equipment	$1,000
Annual Monitoring Costs	$21,000

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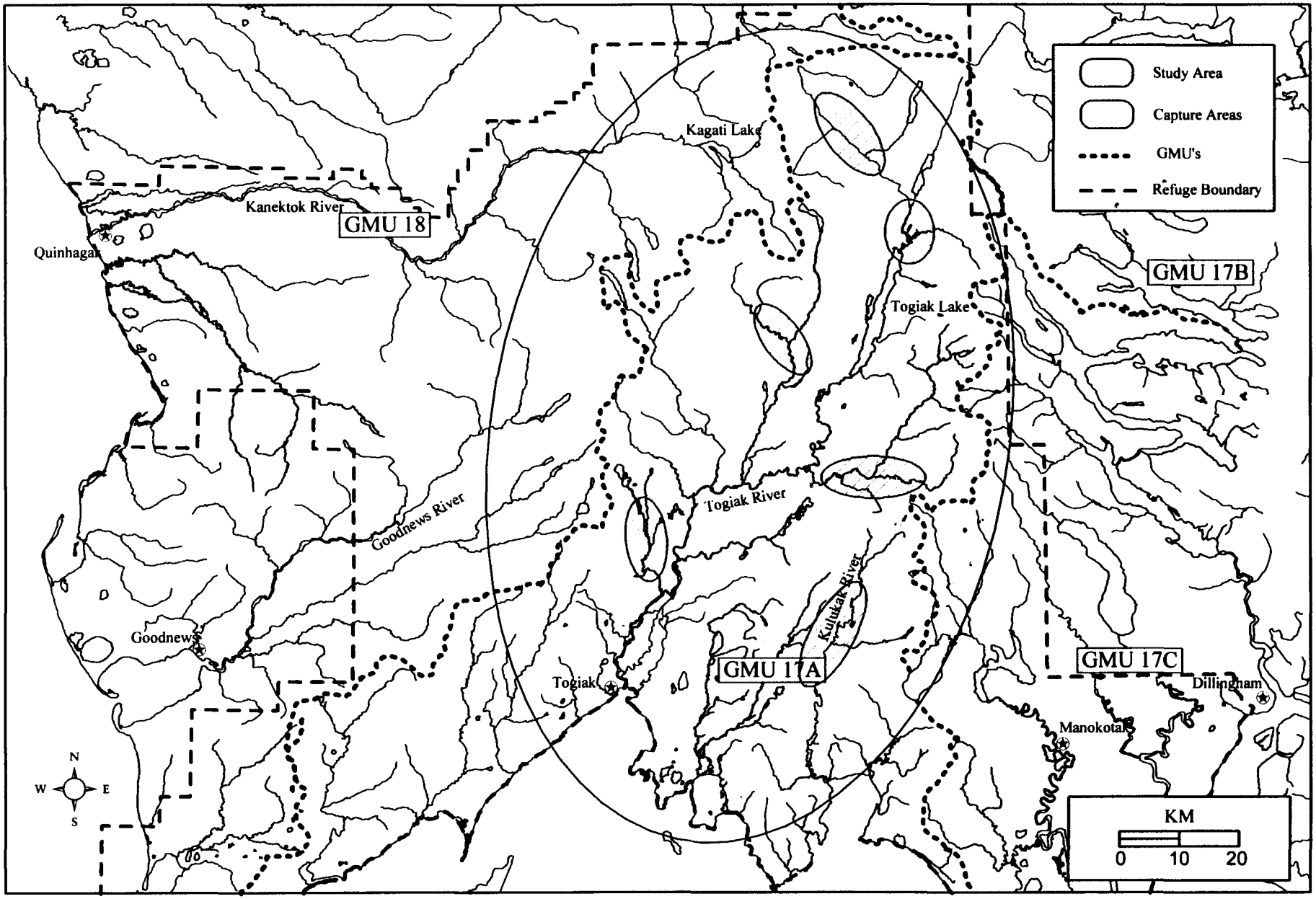

Location of the moose telemetry study area, Togiak National Wildlife Refuge, southwest, Alaska.

Appendix H. Bristol Bay Times article (9 April, 1998)

Biologists putting the collar on Togiak-area moose herd

By Kenneth A. Howe

BayTimes staff

Federal and state biologists began radio-collaring moose north of Togiak last week as part of a five-year study.

The collaring and five years of subsequent tracking in Game Management Unit 17A will allow biologists to set accurate hunting limits based on a balance of the needs of residents and continued growth and expansion of moose populations.

The study, at a cost of $80,00, is a collaboration among the Togiak National Wildlife Refuge, the Alaska Department of Fish and Game and the U.S. Fish and Wildlife Service Subsistence Division, said Andy Aderman, a wildlife biologist with the Togiak National Wildlife Refuge.

Aderman said the study came together this year because the government allocated more funds for federal wildlife refuges.

"It's more timely now, with the recent moose issues in that area," he said in reference to Togiak's recent request for a winter hunt.

The study includes census counts, analyzing the habitat to better determine the number of moose the area can support and tracking seasonal movements to determine what portion of moose in 17A are resident and what portion are migratory.

See Moose, page 2

Moose ...

From page 1

A total of 36 moose — 9 males and 27 females — were collared. The radio collars are equipped with mortality sensors; if an animal doesn't move for 12 hours the collar informs biologists by transmitting a special beep.

Aderman said the moose were first spotted from an airplane piloted by Mike Hinkes, a refuge wildlife biologist and pilot. Hinkes then radioed the location to a helicopter carrying the biologists who shot the moose with a narcotic, carfentanil.

While sedated, aside from collaring the animals, biologists took physical measurements and blood samples for detecting disease and pregnancy. John Crouse, a state wildlife biologist working out of the Moose Research Center on the Kenai Peninsula, used ultrasound to determine fat percentages.

Aerial tracking will be conducted monthly and weekly during calving — late May through early June — until 2003.

Ideally, the biologists would like to see the moose population in GMU 17A reach between 600 and 100 animals; current estimates show 429 moose.

Last April, 20 caribou of the Nushagak herd were collared. In 1993, some bears on the northern edge of the refuge were collared.