Pebble Project

NORTHERN DYNASTY MINES INC.

DRAFT ENVIRONMENTAL BASELINE STUDIES
2006 STUDY PLANS

CHAPTER 11.
FISH AND AQUATIC HABITAT

JULY 2006

TABLE OF CONTENTS

LIST OF TABLES (attached)

LIST OF FIGURES (attached)

11. FISH AND AQUATIC HABITAT

11.1 Fish Studies, Mine

Objectives/Study Area/Methods and Approach

The 2006 fish study program for the mine has the same objectives (Section 11.1.1), study area (Section 11.1.2.1), and methods and approach (Section 11.1.2.2) as described in the 2005 study plan. Primary fish study tasks for 2006 are listed below:

- Overwinter sampling.
- Salmon-spawning surveys.
- Fish-tissue sampling.
- Arctic grayling radio-telemetry surveys—2006 surveys.
- Snorkel surveys.
- Instream flow study.

It should be noted that tasks such as habitat mapping, quantitative sampling (e.g., fish density), qualitative sampling, and index-species monitoring as described in the 2005 study plan are not planned for 2006 because data collection for these tasks is complete. Table 11.1-1 summarizes the primary tasks completed in 2004 and 2005 and lists study tasks planned for 2006. Table 11.1-2 provides a period-of-record summary of fish tissue sampling in the study area.

2006 Fish Study Task Summary

Task 1: Late Winter Field Investigations—Overwinter Sampling

During late winter of 2004 and 2005, minnow traps were set in 48 selected locations for stream sampling (primarily within open water) throughout the three major drainages. The overall catch rates were low and consisted mainly of juvenile Dolly Varden and coho salmon. Winter sampling will be conducted again during the 2006 field season. Sampling will take place in mid- to late March. Sample locations will be based on open water availability, and sample sites from previous years will be sampled again if possible.

Task 2: Rainbow Trout and Salmon Spawning Surveys

Aerial surveys for adult salmon and rainbow trout will continue in 2006 during the spawning season to acquire additional information about spawning abundance and distribution.

Task 3: Fish Tissue Sampling

Biological monitoring in 2004 and 2005 included trace metal analysis of fish tissues from a total of 22 riverine sample sites (17 in the mine study area and five in the road corridor) and four lakes in the mine study area (Table 11.1-2). In 2005 two additional lakes, Black Lake and Lake #2 were added to the

sampling program because they are located up and down range of the dominant wind direction and may show chemical differences in fish tissues from airborne particulates. To date, only one year of fish tissue data have been collected for these two lakes. Thus, Black Lake and Lake 2 are scheduled for fish tissue sampling in 2006 (Table 11.1-3) so that two years for fish tissue data will have been collected for all sample sites (see Figure 11.1-1 for sample site locations). Fish tissue samples from northern pike were collected from Big Wiggly Lake in 2004 and 2005, this lake is being sampled again in 2006 in an attempt to collect fish tissue samples from arctic grayling.

Task 4: Arctic Grayling Radio Telemetry Surveys

In 2005, radio transmitters were surgically implanted in 29 arctic grayling. The radio tags (Lotek Model MCFT-3BM) were programmed to be on for 14 weeks immediately after implantation, then off for 35 weeks, and back on for an additional 14-week period. Beginning in May 2006 a survey team will use telemetry equipment to track arctic grayling to spawning locations. Telemetry data between years will be compared to provide an index of species fidelity to spawning and summer feeding habitats.

Task 5: Snorkel Surveys

Snorkeling surveys were completed at 85 locations (Figure 11.1-2) in conjunction with the Instream Flow Study within the North and South Forks of the Koktuli and the Upper Talarik during the 2005 field season. The snorkel team documented fish species distribution, relative abundance, and location of fish in the water column. Snorkeling surveys will be conducted at the same locations in 2006.

Task 6: Instream Flow Study

Instream flow transects were completed at 84 locations (Figure 11.1-2) within the Mainstem and North and South Forks of the Koktuli and in the Upper Talarik during the 2005 field season (Table 11.1-4). In addition, off-channel habitat was surveyed at 16 locations (Figure 11.1-3) in Reach 2 (springs reach) of the South Fork Koktuli. Water depth, velocity, substrate, and cover were recorded at stations along each transect. Elevation and hydraulic slope were also surveyed. In 2006, data will be collected at all these sites again at two different river flow levels to allow for characterization of the relationship between habitat and flow (Tables 11.1-4 and 11.1-5).

11.2 Macroinvertebrate and Periphyton Studies, Mine

Objectives/Study Area/Methods and Approach

The objectives of the macroinvertebrate and periphyton program are to characterize baseline macroinvertebrate and periphyton populations in the mine study area and to begin building a pre-project baseline dataset to which post-project datasets can be compared. Macroinvertebrates and periphyton will not be collected from the stream sites detailed in the 2005 study plan. The effort associated with baseline characterization of macroinvertebrates and periphyton is complete. Monitoring will resume in future years once agency and permit specifications for monitoring are determined.

To complete the baseline characterization of the project area, zooplankton sampling will be added in four lakes near the mine study area: Frying Pan, Big Wiggly, Black Lake, and Lake #2. The field crew will also survey freshwater mussels in the Upper Talarik and North and South Fork Koktuli drainages.

2006 Macroinvertebrate Study Task Summary—Task 1: Zooplankton Sampling

During August, three horizontal zooplankton tows will be conducted from a zodiac boat in four lakes near the mine study area: Frying Pan, Big Wiggly, Black Lake, and Lake #2. These sites are shown on Figure 11.1-1. Samples will be preserved in ethanol and transported to Anchorage for processing and identification. Subsampling and identification will occur in accordance with the Standard Methods for the Examination of Water and Wastewater (20th Ed.).

Freshwater mussel beds, if present in the Upper Talarik and Koktuli drainages, will be sampled in accordance with the protocols outlined in the 2005 quality assurance project plan (QAPP) and the 2005 field sampling plan for the Iliamna lake study. All samples will be submitted to the appropriate laboratories for analyses.

11.3 Fish Studies, Transportation Corridor

No fish studies are planned for 2006 in the transportation corridor.

11.4 Macroinvertebrate and Periphyton Studies, Transportation Corridor

No macroinvertebrate and periphyton studies are planned for 2006 in the transportation corridor.

11.5 Iliamna Lake Study

Objectives/Study Area/Methods and Approach

The objectives of the Iliamna Lake Study are to characterize existing conditions related to water quality, sediments, mussel tissues, and zooplankton at sites in the littoral zone of the northeast end of Iliamna Lake. The study will contribute to a pre-project dataset to which post-project datasets can be compared. Table 11.5-1 summarizes the work for this study in 2005 and 2006. The work conducted in 2006 will consist of sampling for mussels, sediments, and water quality at the four sites sampled during the 2005 field effort (Figure 11.5-1).

2006 Iliamna Lake Study Task Summary—Task 1: Lake Sampling

One sampling event will be conducted in July at the four mussel sites: Bucket Lake, Whistlewing Bay, Flat Island, and Finn Bay. One water quality sample, sediment sample, YSI reading, and in situ turbidity reading will be collected at each of these four sites. All samples will be submitted to the appropriate laboratories for analyses (refer to the 2005 field sampling plan and 2005 study plan for detailed collection and processing methods).

Table 11.1-1 Pebble Project Fish Studies Summary 2004-2006
Consultant: HDR Alaska
Date: 05/05/06

Field studies: Fish	2004 Study Tasks	2005 Study Tasks	2006 Study Tasks
Fish - Mine	Winter Sampling	Winter Sampling	Winter Sampling
	Salmon and Rainbow Trout Spawning Surveys	Salmon and Rainbow Trout Spawning Surveys	Salmon and Rainbow Trout Spawning Surveys
	Fish Characterization: Population analysis FPL, Removal Sampling, Habitat survey	Arctic Grayling Telemetery	Arctic Grayling Telemetery
	Fish Tissue and Index Sampling	Fish Tissue and Index Species Sampling	Fish Tissue and Index Species Sampling- Black Lake and Lake No. 2
	Flow Habitat Study	Flow Habitat and Snorkel Study (Main Channel)	Flow Habitat and Snorkel Study (Main Channel)
		Flow Habitat (Off Channel Habitat)	Flow Habitat (Off Channel Habitat)
		Habitat Mapping and Fish Density Sampling	
Fish - Road Corridor	Road Corridor Survey	Y Creek Investigation	No field work planned
		Salmon Spawning Surveys	
		Barge Landing Area Survey	
		Transmission Line Corridor Survey	

Table 11.1-2 Pebble Project
Sample Site Period Of Record Index
Fish Resources

Period Of Record By Discipline — Hydrology[2] and Water Quality

Sample Location	Year[1]	Hydrology[2]												Water Quality											
	Month	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
KC100A	2004					I	I	I	C	C	C						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q							
KR100A	2004				I		I	I	I	I	I						Q	Q	Q	Q	Q	Q	Q		
	2005			I			I	I	I	I	I					Q			Q	Q	Q	Q	Q		
	2006	I		I		I								Q		Q		Q							
NK100A (USGS)	2004						I	I	C	C	C						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
NK100B (Orig. Location)	2004				I												Q	Q							
	2005																								
	2006																								
NK100B	2004								I	I	I										Q	Q	Q		
	2005	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
NK100C	2004				I	I		I	C	C	C						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I		C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
NK119A	2004				I		I	I	C	C	C						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I		C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
NK119B	2004				I	I	I	I	I	I	I						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I		I								Q		Q		Q							
SK100A	2004				I		I	I	C	C	C						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
SK100B (USGS)	2004				I		I	I	C	C	C						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
SK100B1	2004																								
	2005									I	I	C	C									Q	Q		
	2006	C	C	C	C	C	C	C	C	C	C	C	C	Q		Q		Q	Q	Q	Q	Q	Q		
SK100B2	2004																								
	2005					I	I	I	I	I	I								Q	Q	Q	Q	Q		
	2006	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
SK100C	2004						I	I	C	C	C						Q	Q	Q	Q			Q		
	2005	I		I		C	C	C	C	C	C			Q				Q	Q	Q		Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
SK100D	2004						I	I	I	I	I						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
SK100F	2004					I	I	I	C	C	C							Q	Q	Q	Q	Q	Q		
	2005	I		I		C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q							
SK100G	2004				I	I	I	I	C	C	C						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q							
SK119A	2004				I	I	I	I	C	C	C						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
SK124A	2004																								
	2005	I		I		C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
SK131A	2004				I	I	I	I	I	I	I						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I		I								Q		Q		Q							
SK133A	2004				I	I	I	I	I	I	I						Q	Q	Q	Q	Q	Q	Q		
	2005			I		I	I	I	I	I	I							Q	Q	Q	Q	Q	Q		
	2006	I		I		I								Q		Q		Q							
SK134A	2004				I	I	I	I	I	I	I						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I		I								Q		Q		Q							
SK136A	2004				I	I	I	I	I	I	I						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I		I								Q		Q		Q							
SK136B	2004				I	I	I	I	I	I	I						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I		I								Q		Q		Q							
UT100A	2004					I			I	I	I						Q	Q			Q	Q	Q		
	2005	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q		Q		
	2006	I		I		I								Q		Q		Q							
UT100B (USGS)	2004					I	I	I	C	C	C						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
UT100C	2004				I	I											Q	Q							
	2005																								
	2006																								
UT100D	2004				I	I	I	I	C	C	C						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I		C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
UT100E	2004				I	I	I	I	C	C	C						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
UT119A	2004				I	I	I	I	C	C	C						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
UT119B	2004				I	I	I	I	I	I	I						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
UT135A	2004				I	I	I	I	I	I	I						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I		I								Q		Q		Q							
UT138A	2004				I	I	I	I	I	I	I						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I		I								Q		Q		Q							
UT141A	2004				I	I	I	I	I	I	I						Q	Q	Q	Q	Q	Q	Q		
	2005			I		I	I	I	I	I	I					Q		Q	Q	Q	Q	Q	Q		
	2006	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
UT146A	2004				I	I	I	I	I	I	I						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I		I								Q		Q		Q							
Black Lake	2004																								
	2005																								
	2006																								
Big Wiggly	2004																								
	2005																								
	2006																								
Frying Pan Lake	2004																								
	2005																								
	2006																		Q						
Chiquita Lake	2004																								
	2005																								
	2006																								
Lake No. 2	2004																								
	2005																								
	2006																								
Mud Lake (Near Lily Lake)	2004																								
	2005																								
	2006																								
Seeps	2004																	X				X			
	2005																			X			X		
	2006														X			X		X	X		X		

Period Of Record By Discipline — Fish Tissue, Macroinvertebrates and Sediment

Sample Location	Year[1]	Fish Tissue												Macroinvertebrates												Sediment											
	Month	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
KC100A	2004								W										D		D											F		F			
	2005								W																						F	F					
	2006																																				
KR100A	2004																		D		D											F					
	2005																																				
	2006																																				
NK100A (USGS)	2004								W										D		D											F		F			
	2005								W										S												F	F					
	2006																														F						
NK100B (Orig. Location)	2004								W										D		D																
	2005								W																												
	2006																																				
NK100B	2004																																				
	2005																														F	F		F			
	2006																														F						
NK100C	2004								W										D		D											F		F			
	2005								W										S												F	F		F			
	2006																														F						
NK119A	2004								W										D		D																
	2005								W																												
	2006																																				
NK119B	2004																															F		F			
	2005																														F	F					
	2006																																				
SK100A	2004								W										D		D										F						
	2005								W																						F	F					
	2006																														F						
SK100B (USGS)	2004								W										D		D											F		F			
	2005								W										S												F	F					
	2006																														F						
SK100B1	2004																																				
	2005																																				
	2006																																				
SK100B2	2004																																				
	2005																																				
	2006																																				
SK100C	2004								W										D		D											F		F			
	2005								W																						F	F					
	2006																														F						
SK100D	2004																																	F			
	2005																																				
	2006																																				
SK100F	2004								W										D		D											F		F			
	2005								W																						F						
	2006																																				
SK100G	2004								W										D		D											F	F	F			
	2005								W																						F	F					
	2006																																				
SK119A	2004								W										D		D											F		F			
	2005								W																						F						
	2006																														F						
SK124A	2004																																				
	2005																																				
	2006																																				
SK131A	2004																															F		F			
	2005																																				
	2006																																				
SK133A	2004																																				
	2005																																				
	2006																																				
SK134A	2004																																				
	2005																																				
	2006																																				
SK136A	2004																																				
	2005																																				
	2006																																				
SK136B	2004																																				
	2005																																				
	2006																																				
UT100A	2004																																	F			
	2005																																				
	2006																														F						
UT100B (USGS)	2004								W										D		D											F	F	F			
	2005								W										S												F	F		F			
	2006																														F						
UT100C	2004								W										D		D										F						
	2005								W																												
	2006																																				
UT100D	2004								W										D		D											F		F			
	2005								W										S												F	F		F			
	2006																														F						
UT100E	2004								W										D		D											F		F			
	2005								W																						F						
	2006																														F						
UT119A	2004								W																							F		F			
	2005								W																						F						
	2006																														F						
UT119B	2004																																				
	2005																															F					
	2006																																				
UT135A	2004																																				
	2005																																				
	2006																																				
UT138A	2004								W										D		D											F		F			
	2005								W										S																		
	2006																																				
UT141A	2004																															F		F			
	2005																																F				
	2006																														F						
UT146A	2004																															F		F			
	2005																																				
	2006																																				
Black Lake	2004																																				
	2005								T																								F				
	2006								T												P																
Big Wiggly	2004								T												M																
	2005								T										M													F					
	2006																				P																
Frying Pan Lake	2004								T												M																
	2005								T										M													F					
	2006																				P																
Chiquita Lake	2004																																				
	2005																																	F			
	2006																																				
Lake No. 2	2004																																				
	2005								T																								F				
	2006								T												P																
Mud Lake (Near Lily Lake)	2004																																				
	2005																																	F			
	2006																																				
Seeps	2004																																				
	2005																															7			5		
	2006																																				

KEY:

C	Continuous stage/discharge hydrometric data collected in streams (gaged stations with dataloggers).
D	Macroinvertebrate sites were sampled with Drift nets AND ASCI methods; periphyton was collected with RBP and diatoms were assessed.
F	Sediment samples collected. Seep sediment samples show number of seeps sampled in 2005. Sediment symbol not shown on associated map.
I	Instantaneuous stream discharge measurements taken each month coincident with water quality (ungaged stations without dataloggers).
M	Macroinvertebrate samples from lakes were collected with a modified ASCI approach.
P	Plankton tows .
Q	Surface water quality samples collected for field and laboratory analyses.
S	Macroinvertebrate sites were sampled with Surber Sampler AND ASCI methods; periphyton was collected with DNR methods and chlorophyll a was assessed.
T	Fish tissue sample consisted of discrete muscle and liver samples from adult nothern pike.
W	Fish tissue sample consisted of discrete whole body juvenile fish .
X	Seep measurements/samples collected as described in notes.

NOTES:

1 Work for 2006 is shown as planned, but not yet completed.

2 At stations where continuous hydrometric data is collected, continuous hydrographs will be estimated throughout winter months using standard hydrometric methods. Stream gages are reinstalled each spring as early as breakup conditoins allow.

Table 11.1-3
Schedule for Fish Tissue Sampling for 2006

Location	Fish Species	Sample Matrix	No. of Primary Samples	No. of QC Samples	Total No. of Samples	Analytes
Black Lake	Northern Pike & Arctic Grayling or White Fish *	mussel	20	4	24	Antimony, arsenic, cadmium, copper, lead, nickel, selenium, silver, and total mercury
Big Wiggly Lake	Arctic Grayling	mussel	10	2	12	same as above
Lake 2	Northern Pike & Arctic Grayling or White Fish *	mussel	20	4	12	same as above
Total Number of Tissue Samples					**60**	

***** Grayling are preferred, white fish will be sampled if more abundant.

Table 11.1-4 Pebble Project Instream Flow Study
Main Channel Sample Site Period of Record Index

Site Name	Year	Period Of Record																						Notes
		Habitat Assessment												Fish Use Assessment										
	Month	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	
05-nfk1-ic1	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-nfk1-ic2	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-nfk1-ic3	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-nfk1-rf1	2004																									
	2005						x	x											x							
	2006						x	x											x							
05-nfk1-rf2	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-nfk1-rn1	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-nfk1-rn2	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-nfk1-rn3	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-nfk1-rn4	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-nfk1-rn5	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
nfk-ic1	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
nfk-ic2	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
nfk-pl1	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
nfk-pl2	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
nfk-rf1	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
nfk-rf2	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
nfk-rf3	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
nfk-rn1	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
nfk-rn2	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
nfk-rn3	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
sfk-ic1	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
sfk-pl2	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
sfk-rf2	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
sfk-rf3	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
sfk-rn2	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
sfk-rn3	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
05-sfk1-ic1	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
05-sfk1-ic2	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
05-sfk1-rf1	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
05-sfk1-rn1	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
sfk-ic2	2004						x	x	x																	
	2005						x	x	x										x							

Table 11.1-4 Pebble Project Instream Flow Study
Main Channel Sample Site Period of Record Index

Site Name	Year	Period Of Record																						Notes
		Habitat Assessment											Fish Use Assessment											
	Month	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	
	2006						x	x											x							
05-sfk2-ic1	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-sfk2-rf1	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-sfk2-rn1	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-sfk2-rn2	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-sfk2-rn3	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-sfk2-rn4	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-sfk2-rn5	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-sfk2-rn6	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-sfk2-rn7	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
sfk-pl1	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
sfk-rf1	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
sfk-rn1	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
05-sfk3-pl1	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-sfk2-pl1	2004																									
	2005						x	x	x																	
	2006						x	x																		
05-sfk3-pl2	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-sfk3-rn1	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
utc-ic2	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
utc-rf1	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
utc-rf2	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
utc-rn1	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
utc-rn2	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
05-utc1-ic1	2004																									
	2005						x	x	x										x							
	2006						x	x											x							2006 measurements dependent on permission to access APC land.
05-utc1-rf1	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-utc1-rf2	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-utc1-rn1	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-utc1-rn2	2004																									
	2005						x	x	x										x							
	2006						x	x											x							2006 measurements dependent on permission to access APC land.
05-ut190-rf1	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-ut190-rf2	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-ut190-rf3	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-ut190-rf4	2004																									
	2005						x	x	x										x							

Table 11.1-4 Pebble Project Instream Flow Study
Main Channel Sample Site Period of Record Index

Site Name	Year	Period Of Record																						Notes
		Habitat Assessment												Fish Use Assessment										
	Month	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	
	2006						x	x											x							
05-ut190-rf5	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-ut190-rn1	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
utc-ic1	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
utc-pl1	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
utc-pl2	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
utc-rf3	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
utc-rn3	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
05-utc2-rf1	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-utc2-rf2	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-utc2-rf3	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-utc2-rn1	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-utc2-rn2	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-utc3-pl1	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-utc3-rf1	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-utc3-rf2	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-utc3-rn1	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-utc3-rn2	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
05-utc3-rn3	2004																									
	2005						x	x	x										x							
	2006						x	x											x							
msk-ic1	2004						x	x	x																	
	2005																		x							
	2006																		x							
msk-ic2	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
msk-pl1	2004						x	x	x																	
	2005																		x							
	2006																		x							
msk-pl2	2004						x	x	x																	
	2005																		x							
	2006																		x							
msk-rf1	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
msk-rf2	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
msk-rf3	2004						x	x	x																	
	2005																		x							
	2006																		x							
msk-rn1	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							
msk-rn2	2004						x	x	x																	
	2005																		x							
	2006																		x							
msk-rn3	2004						x	x	x																	
	2005						x	x	x										x							
	2006						x	x											x							

Table 11.1-5
Pebble Project Instream Flow Study
Off-Channel Habitat Transect Sample Site Period of Record Index

Site Name	Year	Period Of Record																						Notes
		Habitat Assessment												Fish Use Assessment										
	Month	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	
OCH-1	2004																									
	2005								x												x					
	2006							x										x		x						
OCH-2	2004																									
	2005								x												x					
	2006							x										x		x						
OCH-3	2004																									
	2005								x												x					
	2006							x										x		x						
OCH-4	2004																									
	2005								x												x					
	2006							x										x		x						
OCH-5	2004																									
	2005								x												x					
	2006							x										x		x						
OCH-6*	2004																									
	2005																									
	2006																									
OCH-7	2004																									
	2005								x												x					
	2006							x										x		x						
OCH-8*	2004																									
	2005																									
	2006																									
OCH-9	2004																									
	2005								x												x					
	2006							x										x		x						
OCH-10	2004																									
	2005								x												x					
	2006							x										x		x						
OCH-11	2004																									
	2005								x												x					
	2006							x										x		x						
OCH-12	2004																									
	2005								x												x					
	2006							x										x		x						
OCH-13	2004																									
	2005								x												x					
	2006							x										x		x						
OCH-14*	2004																									
	2005																									
	2006																									
OCH-15	2004																									
	2005								x												x					
	2006							x										x		x						
OCH-16*	2004																									
	2005																									
	2006																									
OCH-17	2004																									
	2005								x												x					
	2006							x										x		x						
OCH-18*	2004																									
	2005																									
	2006																									
OCH-19	2004																									
	2005								x												x					
	2006							x										x		x						
OCH-20*	2004					`																				
	2005																									
	2006																									
OCH-21	2004																									
	2005								x												x					
	2006							x										x		x						
OCH-22	2004																									
	2005								x												x					
	2006							x										x		x						

* Transects were plotted on field study maps but were not sampled to ensure transectes were represenative of the up welling reach and for purposes of efficiency. Transects were not renumberd to avoid creating confusion and ensure consistency between sample years.

Table 11.2-1
Pebble Project Macroinvertebrate and Periphtyon Studies Summary 2004-2006
Consultant: HDR Alaska
Date: 05/05/06

Field studies- Macroinvertebrates	2004 Study Tasks	2005 Study Tasks	2006 Study Tasks
Macroinvertebrates - Mine site	Sample Macroinvebrates and Periphyton at Study Sites	Sample Macroinvebrates and Periphyton at Study Sites	Sample for Zooplankton at Four Lakes
	Sample Processing/Identification	Sample Processing/Identification	Sample Processing/Identification
Macroinvertebrates - Road corridor	Sample Macroinvebrates and Periphyton at Study Sites	Sample Macroinvebrates and Periphyton at Study Sites	None
	Sample Processing/Identification	Sample Processing/Identification	

Table 11.2-2
Pebble Project
Sample Site Period Of Record Index
Macroinvertebrates

Period Of Record By Discipline

Sample Location	Year[1]	Hydrology[2]												Water Quality											
	Month	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
KC100A	2004					I	I	I	C	C	C						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q							
KR100A	2004				I		I	I	I	I	I						Q	Q	Q	Q	Q	Q	Q		
	2005			I			I	I	I	I	I					Q			Q	Q	Q	Q	Q		
	2006	I		I		I								Q		Q		Q							
NK100A (USGS)	2004						I	I	C	C	C						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
NK100B (Orig. Location)	2004				I												Q	Q							
	2005																								
	2006																								
NK100B	2004								I	I	I										Q	Q	Q		
	2005	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I		I	I	I	I	I	I			Q		Q	Q	Q	Q	Q	Q	Q	Q		
NK100C	2004				I	I		I	C	C	C						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I		C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
NK119A	2004				I		I	I	C	C	C						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I		C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
NK119B	2004				I	I	I	I	I	I	I						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I		I								Q		Q		Q							
SK100A	2004				I		I	I	C	C	C						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
SK100B (USGS)	2004				I		I	I	C	C	C						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
SK100B1	2004																								
	2005									I	I	C	C									Q	Q		
	2006	C	C	C	C	C	C	C	C	C	C	C	C	Q		Q		Q	Q	Q	Q	Q	Q		
SK100B2	2004																								
	2005					I	I	I	I	I	I								Q	Q	Q	Q	Q		
	2006	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
SK100C	2004						I	I	C	C	C						Q	Q	Q	Q			Q		
	2005	I		I		C	C	C	C	C	C			Q				Q	Q	Q		Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
SK100D	2004						I	I	I	I	I						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
SK100F	2004					I	I	I	C	C	C							Q	Q	Q	Q	Q	Q		
	2005	I		I		C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q							
SK100G	2004				I	I	I	I	C	C	C						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q							
SK119A	2004				I	I	I	I	C	C	C						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
SK124A	2004																								
	2005	I		I		C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
SK131A	2004				I	I	I	I	I	I	I						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I		I								Q		Q		Q							
SK133A	2004				I	I	I	I	I	I	I						Q	Q	Q	Q	Q	Q	Q		
	2005			I		I	I	I	I	I	I							Q	Q	Q	Q	Q	Q		
	2006	I		I		I								Q		Q		Q							
SK134A	2004				I	I	I	I	I	I	I						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I		I								Q		Q		Q							
SK136A	2004				I	I	I	I	I	I	I						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I		I								Q		Q		Q							
SK136B	2004				I	I	I	I	I	I	I						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I		I								Q		Q		Q							
UT100A	2004					I			I	I	I						Q	Q			Q	Q	Q		
	2005	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q		Q		
	2006	I		I		I								Q		Q		Q							
UT100B (USGS)	2004					I	I	I	C	C	C						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
UT100C	2004				I	I											Q	Q							
	2005																								
	2006																								
UT100D	2004				I	I	I	I	C	C	C						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I		C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
UT100E	2004				I	I	I	I	C	C	C						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
UT119A	2004				I	I	I	I	C	C	C						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I	C	C	C	C	C	C	C			Q		Q		Q	Q	Q	Q	Q	Q		
UT119B	2004				I	I	I	I	I	I	I						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
UT135A	2004				I	I	I	I	I	I	I						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I		I								Q		Q		Q							
UT138A	2004				I	I	I	I	I	I	I						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I		I								Q		Q		Q							
UT141A	2004				I	I	I	I	I	I	I						Q	Q	Q	Q	Q	Q	Q		
	2005			I		I	I	I	I	I	I					Q		Q	Q	Q	Q	Q	Q		
	2006	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
UT146A	2004				I	I	I	I	I	I	I						Q	Q	Q	Q	Q	Q	Q		
	2005	I		I		I	I	I	I	I	I			Q		Q		Q	Q	Q	Q	Q	Q		
	2006	I		I		I								Q		Q		Q							
Black Lake	2004																								
	2005																								
	2006																								
Big Wiggly	2004																								
	2005																								
	2006																								
Frying Pan Lake	2004																								
	2005																								
	2006																		Q						
Chiquita Lake	2004																								
	2005																								
	2006																								
Lake No. 2	2004																								
	2005																								
	2006																								
Mud Lake (Near Lily Lake)	2004																								
	2005																								
	2006																								
Seeps	2004																	X				X			
	2005																			X			X		
	2006														X			X		X	X		X		

Sample Location	Year[1]	Fish Tissue												Macroinvertebrates											
	Month	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
KC100A	2004								W										D		D				
	2005								W																
	2006																								
KR100A	2004																		D		D				
	2005																								
	2006																								
NK100A (USGS)	2004								W										D		D				
	2005								W										S						
	2006																								
NK100B (Orig. Location)	2004								W										D		D				
	2005								W																
	2006																								
NK100B	2004																								
	2005																								
	2006																								
NK100C	2004								W										D		D				
	2005								W										S						
	2006																								
NK119A	2004								W										D		D				
	2005								W																
	2006																								
NK119B	2004																								
	2005																								
	2006																								
SK100A	2004								W										D		D				
	2005								W																
	2006																								
SK100B (USGS)	2004								W										D		D				
	2005								W										S						
	2006																								
SK100B1	2004																								
	2005																								
	2006																								
SK100B2	2004																								
	2005																								
	2006																								
SK100C	2004								W										D		D				
	2005								W																
	2006																								
SK100D	2004																								
	2005																								
	2006																								
SK100F	2004								W										D		D				
	2005								W																
	2006																								
SK100G	2004								W										D		D				
	2005								W																
	2006																								
SK119A	2004								W										D		D				
	2005								W																
	2006																								
SK124A	2004																								
	2005																								
	2006																								
SK131A	2004																								
	2005																								
	2006																								
SK133A	2004																								
	2005																								
	2006																								
SK134A	2004																								
	2005																								
	2006																								
SK136A	2004																								
	2005																								
	2006																								
SK136B	2004																								
	2005																								
	2006																								
UT100A	2004																								
	2005																								
	2006																								
UT100B (USGS)	2004								W										D		D				
	2005								W										S						
	2006																								
UT100C	2004								W										D		D				
	2005								W																
	2006																								
UT100D	2004								W										D		D				
	2005								W										S						
	2006																								
UT100E	2004								W										D		D				
	2005								W																
	2006																								
UT119A	2004								W																
	2005								W																
	2006																								
UT119B	2004																								
	2005																								
	2006																								
UT135A	2004																								
	2005																								
	2006																								
UT138A	2004								W										D		D				
	2005								W										S						
	2006																								
UT141A	2004																								
	2005																								
	2006																								
UT146A	2004																								
	2005																								
	2006																								
Black Lake	2004																								
	2005								T																
	2006								T												P				
Big Wiggly	2004								T												M				
	2005								T										M						
	2006																				P				
Frying Pan Lake	2004								T												M				
	2005								T										M						
	2006																				P				
Chiquita Lake	2004																								
	2005																								
	2006																								
Lake No. 2	2004																								
	2005								T																
	2006								T												P				
Mud Lake (Near Lily Lake)	2004																								
	2005																								
	2006																								
Seeps	2004																								
	2005																								
	2006																								

Sample Location	Year[1]	Sediment											
	Month	J	F	M	A	M	J	J	A	S	O	N	D
KC100A	2004							F		F			
	2005						F	F					
	2006												
KR100A	2004							F					
	2005												
	2006												
NK100A (USGS)	2004							F		F			
	2005						F	F					
	2006						F						
NK100B (Orig. Location)	2004												
	2005												
	2006												
NK100B	2004												
	2005						F	F		F			
	2006						F						
NK100C	2004							F		F			
	2005						F	F		F			
	2006						F						
NK119A	2004												
	2005												
	2006												
NK119B	2004							F		F			
	2005						F	F					
	2006												
SK100A	2004						F						
	2005						F	F					
	2006						F						
SK100B (USGS)	2004							F		F			
	2005						F	F					
	2006						F						
SK100B1	2004												
	2005												
	2006												
SK100B2	2004												
	2005												
	2006												
SK100C	2004							F		F			
	2005						F	F					
	2006						F						
SK100D	2004									F			
	2005												
	2006												
SK100F	2004							F		F			
	2005						F						
	2006												
SK100G	2004							F	F	F			
	2005						F	F					
	2006												
SK119A	2004							F		F			
	2005						F						
	2006						F						
SK124A	2004												
	2005												
	2006												
SK131A	2004							F		F			
	2005												
	2006												
SK133A	2004												
	2005												
	2006												
SK134A	2004												
	2005												
	2006												
SK136A	2004												
	2005												
	2006												
SK136B	2004												
	2005												
	2006												
UT100A	2004									F			
	2005												
	2006						F						
UT100B (USGS)	2004							F	F	F			
	2005						F	F		F			
	2006						F						
UT100C	2004						F						
	2005												
	2006												
UT100D	2004							F		F			
	2005						F	F		F			
	2006						F						
UT100E	2004							F		F			
	2005						F						
	2006						F						
UT119A	2004							F		F			
	2005						F						
	2006						F						
UT119B	2004												
	2005							F					
	2006												
UT135A	2004												
	2005												
	2006												
UT138A	2004							F		F			
	2005												
	2006												
UT141A	2004							F		F			
	2005								F				
	2006						F						
UT146A	2004							F		F			
	2005												
	2006												
Black Lake	2004												
	2005								F				
	2006												
Big Wiggly	2004												
	2005							F					
	2006												
Frying Pan Lake	2004												
	2005							F					
	2006												
Chiquita Lake	2004												
	2005									F			
	2006												
Lake No. 2	2004												
	2005								F				
	2006												
Mud Lake (Near Lily Lake)	2004												
	2005									F			
	2006												
Seeps	2004												
	2005							7			5		
	2006												

KEY:

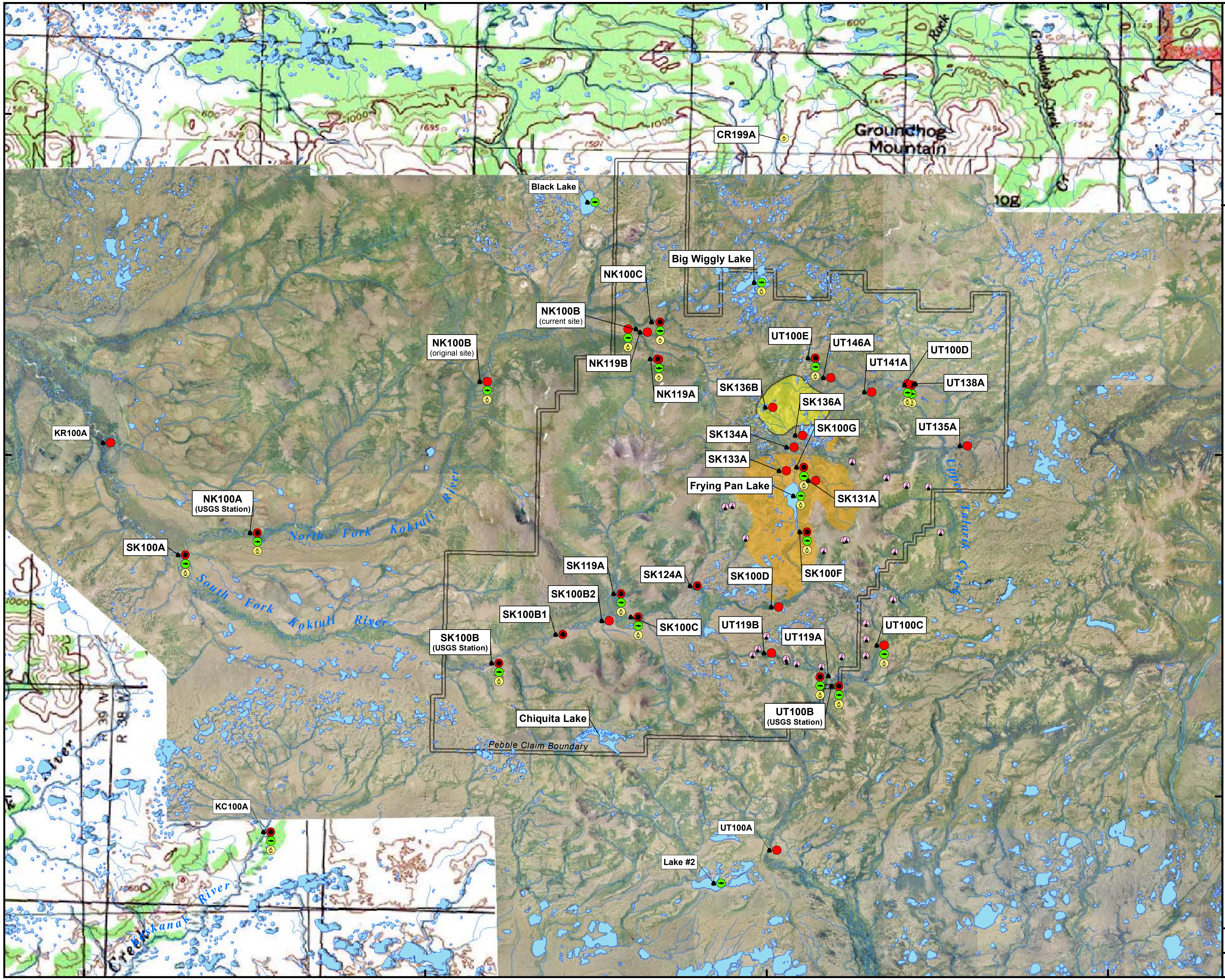
C	Continuous stage/discharge hydrometric data collected in streams (Stations with dataloggers).
D	Macroinvertebrate sites were sampled with Drift nets AND ASCI methods; periphyton was collected with RBP and diatoms were assessed.
F	Sediment samples collected. Seep sediment samples show number of seeps sampled in 2005. Sediment symbol not shown on associated map.
I	Instantaneuous stream discharge measurements taken each month coincident with water quality (Stations without dataloggers).
M	Macroinvertebrate samples from lakes were collected with a modified ASCI approach.
P	Plankton tows .
Q	Surface water quality samples collected for field and laboratory analyses.
S	Macroinvertebrate sites were sampled with Surber Sampler AND ASCI methods; periphyton was collected with DNR methods and chlorophyll a was assessed.
T	Fish tissue sample consisted of discrete muscle and liver samples from adult nothern pike.
W	Fish tissue sample consisted of discrete whole body juvenile fish .
X	Seep measurements/samples collected as described in notes.

NOTES:

1	Work for 2006 is shown as planned, but not yet completed.
2	At stations where continuous hydrometric data is collected, continuous hydrographs will be estimated throughout winter months using standard hydrometric methoc

Table 11.5-1
Pebble Project Iliamna Lake Study Summary 2004-2006
Consultant: HDR Alaska
Date: 05/05/06

Field studies: Lake Iliamna	2004 Study Tasks	2005 Study Tasks	2006 Study Tasks
		Sample at 5 Water Quality Stations for Water, Sediments and Zooplankton May - Oct.	Sample at 4 Sites for Mussels, Water and Sediments in August
		Sample at 4 Sites for Mussels	
		Process and Identify Zooplankton Samples	



ASP 5 NAD 83

Pebble Project
NORTHERN DYNASTY MINES INC.

Figure 11.1-1
Hydrology, Surface Water, and Aquatic Resources Study Area (2004-2006 Mine Studies)

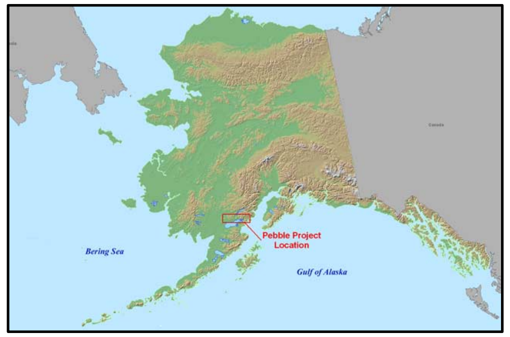
DRAFT

Legend

- Mine Development Concept Plan
- Ore Body
- Claim Boundary
- Sampling Location

Type of Sample Site

- Hydrology & Water Quality sample site with data logger
- Hydrology & Water Quality sample site without data logger
- Fish tissue sample site
- Macroinvertebrate & Periphyton sample site
- Seep water quality sample site



N

Miles: 0 2 4 6 8
Kilometers: 0 2.5 5 7.5 10

Scale 1:167,981

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

File: Figure 11.1-1.mxd	Date: June 02, 2006
Version: 2	Author: HDR-CEB, DW

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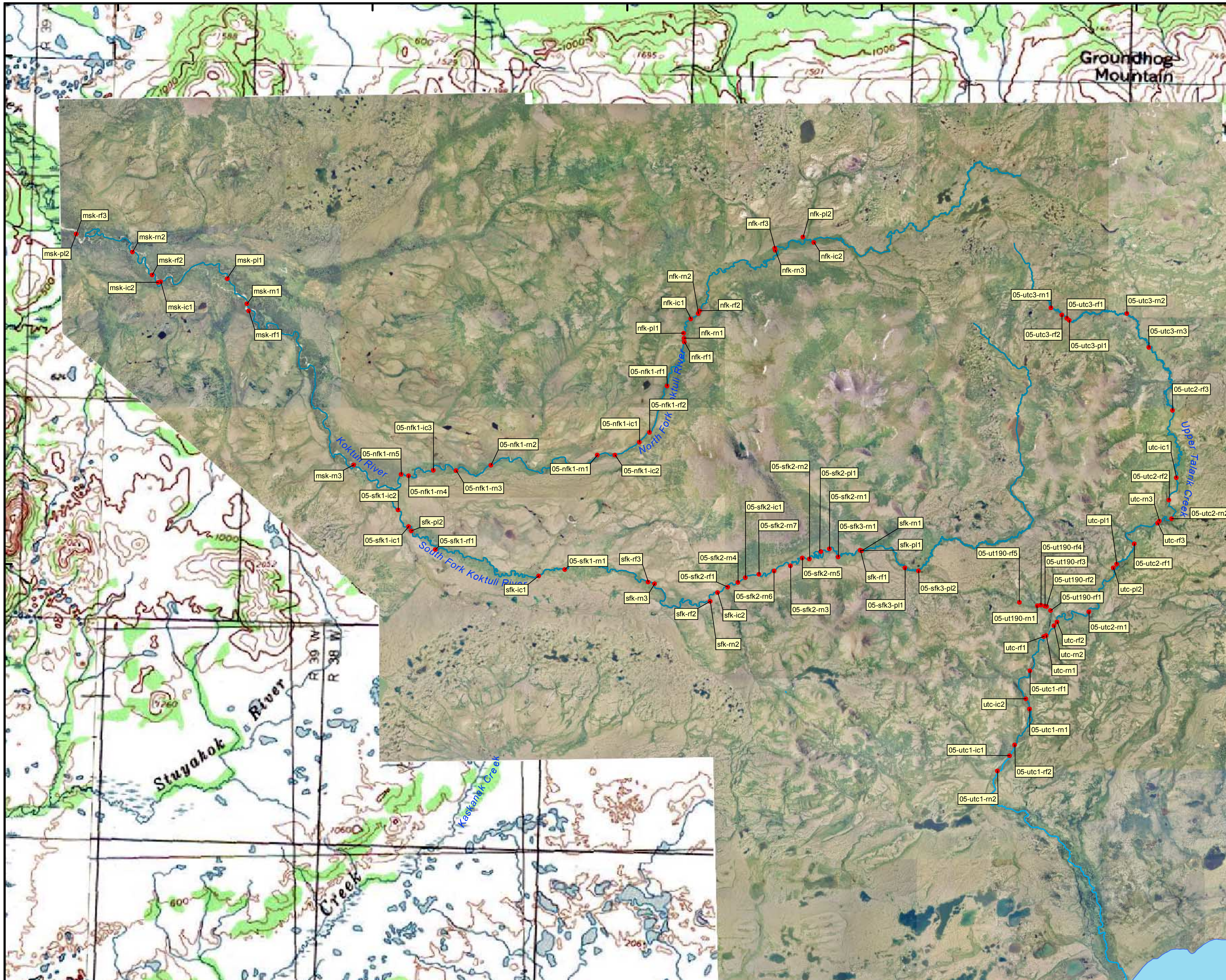

Pebble Project
NORTHERN DYNASTY MINES INC.

Figure 11.1-2
Fish Habitat and Snorkel Sites
(2004-2006 Mine Studies)

DRAFT

Legend

• Fish Habitat and Snorkel Sites

Bering Sea
Pebble Project Location
Gulf of Alaska

N

Miles: 0 2 4 6 8
Kilometers: 0 2 4 6 8 10

Scale 1:175,315

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

File: HDR_fish_Figure 11.1-2_V03.mxd	Date: June 9 2006
Version: 3	Author: HDR-ceb, DW

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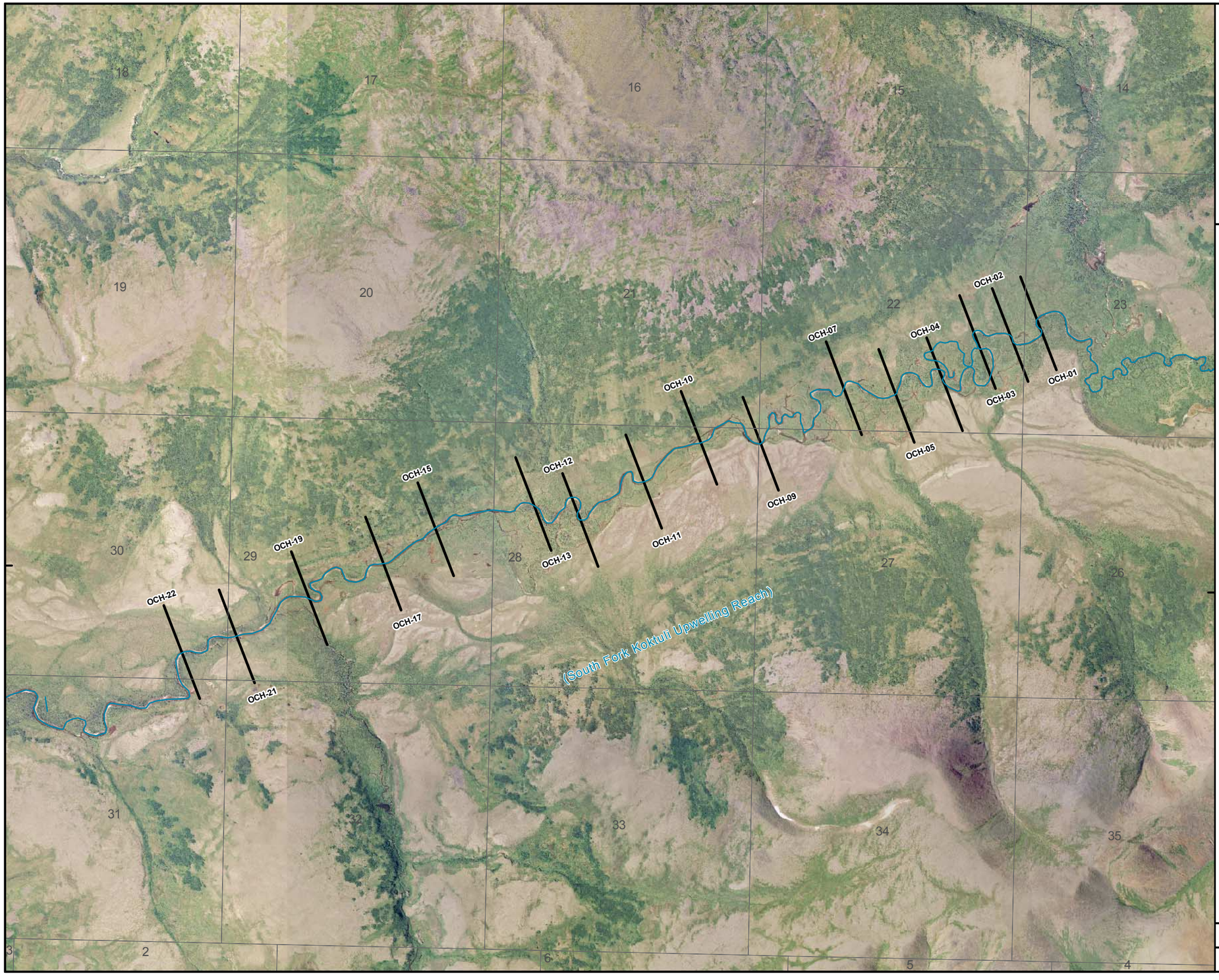


Pebble Project

NORTHERN DYNASTY MINES INC.

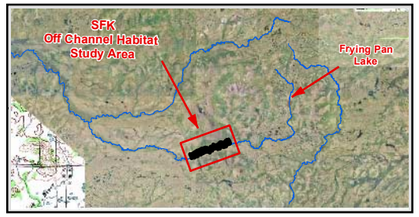
Figure 11.1-3
Off Channel Fish Habitat Transects
South Fork Koktuli
(2005-2006 Mine Studies)

DRAFT

Legend

Off Channel Fish Habitat Transects

Sites from HDR, file date May 2006



N

Miles
0 0.5 1

Kilometers
0 0.5 1

Scale 1:24,000

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

File: 2006studyplan_fig 11_1-3.mxd	**Date: June 2006**
Version: 3	**Author: HDR-ceb, DW**

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1,400,000 1,450,000 1,500,000 1,550,000 1,600,000 1,650,000 1,700,000

2,250,000 2,200,000 2,150,000 2,100,000 2,050,000 2,000,000

Bucket Lake
Northeast Bay
Knutson Bay
Pile Bay
Whistlewing Bay
Flat Island
Roadhouse Bay
Finn Bay
Upper Talarik

ASP 5 NAD 83

Pebble Project

NORTHERN DYNASTY MINES INC.

Figure 11.5-1
2005-2006 Iliamna Lake Study Sample Sites

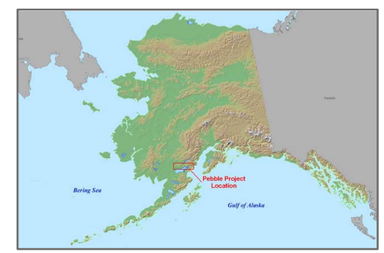
DRAFT

Legend

- Proposed Road Corridor
- Ore body
- Mine development concept boundary

Type of Sample Site

- Iliamna Lake Water Quality Sample Site
- Mussel Sample Site



N

0 2.5 5 7.5 10 Miles

0 5 10 15 20 Kilometers

Scale 1:336,000

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

File: HDR_lake_Figure 11.5-1_V02.mxd	Date June 6 2006
Version: 2	Author: HDR-EC, DW

Z:\Ancs003\project\200847 Northern Dynasty Minerals\All Disciplines\GIS\RD\Source\HDR\All_Disciplines\DELIVERABLES\2006 Study Plan - All Disciplines\mxd\HDR_lake_Figure 11.5.1_V02