

## Report Series L: Iliamna Lake Studies

Since 2005, the Pebble Partnership has retained independent environmental consultants HDR Alaska to conduct research, fieldwork, and analysis for the Iliamna Lake studies. The objectives of the Iliamna Lake Study are:

- to describe existing conditions in Iliamna Lake relative to water quality, sediment, trace elements, and zooplankton; and,
- to document information on existing aquatic conditions, habitats, and biota.

### Background

Iliamna Lake is the largest lake in the state of Alaska, encompassing 1,012 square miles (approximately 77 miles long and 22 miles wide), reaching more than 985 feet in depth (mean depth of 144 feet), and containing a volume of approximately 27.7 cubic miles (approximately 30 trillion gallons). The lake empties into the Kvichak River, which flows into Bristol Bay.

### Methods

This study supplements other ongoing investigations of fresh water systems in the study area for the Pebble Project. The data presented in this document were gathered during studies conducted at nine sampling locations around Iliamna Lake from 2005-2007. Field work completed for the Iliamna Lake studies included:

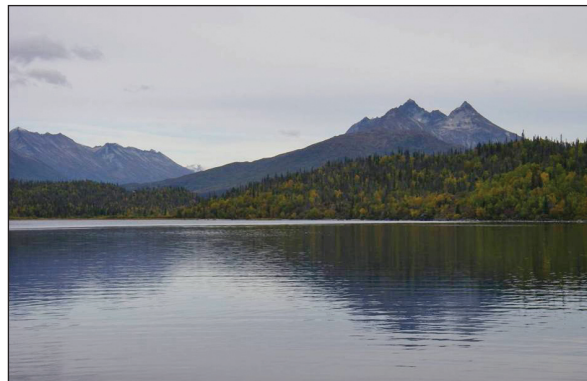
- ambient water measurements of dissolved oxygen (DO), temperature, specific conductance, oxidation reduction potential (ORP), pH, turbidity, and water clarity;
- collection of water-quality samples at each site for laboratory analysis of a range of parameters;
- collection of sediment samples for laboratory analysis of a suite of major ions and trace elements;
- collection of zooplankton samples— one vertical zooplankton tow was conducted at each site; and,
- collection of mussel tissue samples for laboratory analysis of a suite of trace elements.

### Summary of Findings

The data collected from Iliamna Lake pertaining to water quality, mussel tissue, and sediment suggest that Iliamna Lake is low in nutrients and algae. Water-quality conditions of Iliamna Lake appear similar to the natural conditions of other regional lakes. Iliamna Lake has two mixing periods – occurring in spring and fall. Results for only a few parameters



HDR Scientist collecting water quality samples.



Lake Iliamna, at approximately 77 miles long and 22 miles wide, is the largest lake in Alaska.

(e.g., copper, lead, aluminum, iron, zinc, manganese, and alkalinity) exceeded the chronic aquatic life criteria (CALC) benchmark from the Alaska Department of Environmental Conservation for fresh water. These values are likely a result of geological influences and are consistent with previous studies conducted at Iliamna Lake and other area watersheds. Ambient water measurements were within normal ranges, with the exception of a few slightly low pH measurements at Pile Bay, and are considered suitable for plant and animal life.

Concentrations of nutrients and major ions found during the study were similar to values from a study conducted at Iliamna Lake nearly 40 years ago. The one exception is sodium, which was present at nearly twice the concentration found by the earlier study. Cation and anion dominance in Iliamna Lake is generally characteristic of temperate lakes. Sodium was more abundant than magnesium, however, suggesting a contribution from igneous rocks in the region. Depth was not found to have an effect on the concentrations of major ions, suggesting that waters at these sites were well-mixed. Several major ions and total dissolved solids (TDS) were lower earlier in the summer, peaked in September, and declined again in October. These temporary increases may be associated with the influence of inflow from streams and precipitation.

Temporal and spatial variations were evident in some of the water quality samples. Pile Bay and Knutson Bay tended to exhibit similar concentrations, which were often different (usually higher) than the other three sites. Zinc reached peak concentrations in June and July, during which time lead was at its lowest at most sites. Copper, lead, zinc, and aluminum were periodically found to be above CALC or drinking water standards. Mercury, cyanide and organics were rarely found to be above the laboratory method reporting limits during the course of the study.



HDR Scientist taking water quality measurements.

**Table L-1 Summary of Sampling, Iliamna Lake, 2005-2007**

Samples Collected during each Sampling Event																
Site Name	Ambient Water Measures			Zooplankton			Surface Water			Sediments			Mussels			
	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007	
Bucket Lake	x	x						x			x	x		x	x	
Finn Bay	x	x						x			x	x		x	x	
Flat Island	x	x						x			x	x		x	x	
Knutson Bay	x		x	x		x	x		x	x						
Northeast Bay	x		x	x		x	x		x	x						
Pile Bay	x		x	x		x	x		x	x						
Roadhouse Bay	x		x	x		x	x		x	x						
Upper Talarik	x		x	x		x	x		x							
Whistling Bay		x						x			x		x	x		

**\*Preliminary data only. Do not cite or quote.**

**The Iliamna Lake Studies data report, released as part of the Pebble Partnership's Pre-Permitting Environmental & Socio- Economic Data Report Series, is available online at [www.pebblepartnership.com](http://www.pebblepartnership.com).**