A retrospective view of the water connections of the Kennecott Mines and Copper River Salmon 100 years after the first ore shipments

By

James A. Munter

J. A. Munter Consulting Inc.

100 years ago this week

- March 29, 1911.
  - First train of CR&NW Railroad reaches Kennecott Mines
  - 197 miles from tidewater.

- April 8, 1911.
  - First ore shipment of 1200 tons
  - 70% copper
  - Ships from Cordova Tacoma for smelting.
  - Value: $250,000.

Outline

- Brief History of Kennecott Mines
  - Discovery/Finance
  - Access – CR&NW RR
  - Political Battles
- Copper River Salmon
- Effects of Cu on Salmon
- Cu in water of the Copper River Basin
- What have we learned?

Equation 1 - Fact or Myth?

Mining Copper Sulfides in Alaska = Dead or Missing Salmon

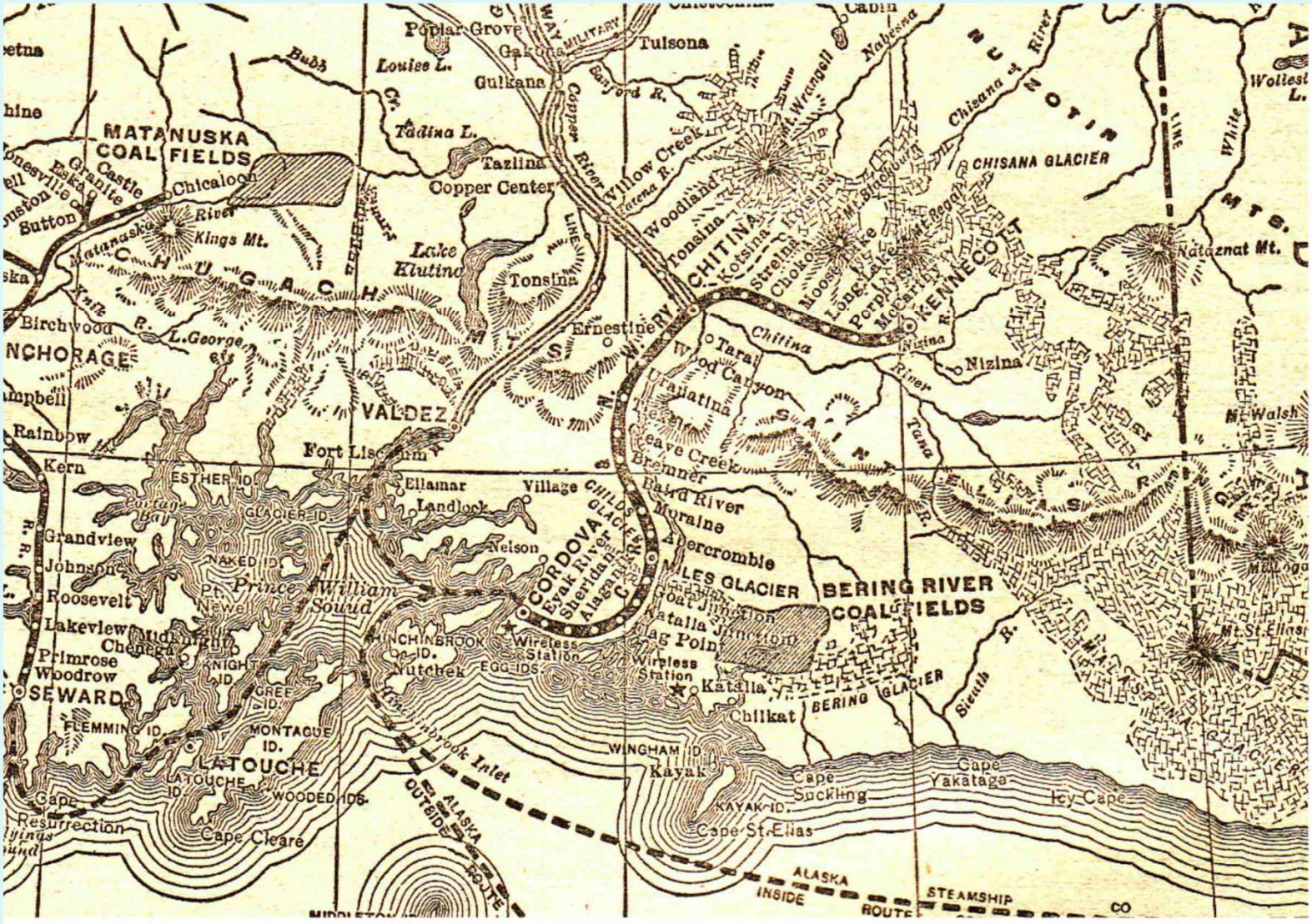
Timeline

- 1896 gold discovered in the Klondike
- 1897 $400,000 Klondike gold arrives in San Francisco
- 1898 Gold rush takes off – through Canada
- 1899 Abercrombie opens road through Valdez – All-American Route
- 1899 Chief Nicolai's copper mines "discovered" near Kennecott
- 1900 Bonanza discovery at Kennecott near McCarthy, predominantly chalcocite, Cu_2S, world class deposit

Kennecott Mill Town

View from ore processing building

1930 Map – CR &NW RR



1900-1907

- 1900-1906 consolidation and clearing of claim titles
- 1906 formation of Alaska Syndicate –Guggenheim and J.P. Morgan families
- 1905 Valdez selected as railroad terminus
- 1906 Katalla selected as railroad terminus
- 1906 Roosevelt withdraws coal lands from staking
- 1907 Chugach National Forest created

Chugach National Forest - 1907

1907-1911

- November 1907: Major storm destroys Katalla docks
- Cordova chosen as RR terminus
- U.S. law: 4 years to complete or government tax $100/mi/yr.
- 1907-1911 construction of CR & NW Railroad.
- 1911 coal claims found invalid.
  - Steam engines converted to expensive diesel.
  - No RR extension to Yukon River.
  - No Alaska smelter.
  - No coal for heating/development in Copper River valley.

Million Dollar Bridge-restored

Kennecott Mines

1911-1938

- Extracted 536,000 metric tons of copper
- Extracted 9 million ounces silver
- Gravity separator, flotation, and ammonia leaching
- Today's value about $5 Billion
- Almost all underground drifts
- Employed about 500 mine and mill workers

Ballinger-Pinchot Affair

- Questionable coal leases at Katalla from 1904.
- Taft-Appointee Ballinger implicated in approval
- Taft fires Pinchot for insubordination
- Roosevelt feuds with Taft; forms Bull Moose party - 1912.
- Split Republican vote elects Woodrow Wilson, first Progressive President.

His (Her?) Excellency

How Crazy Does it Get?

- Up to $60/lb King fillet at Pike Place Market, Seattle
- $43.95 per entrée for lunch and dinner (New York)
- “This is some of the best, most delicate fish in the world” –Indianapolis chef
- SEATAC/Alaska Airlines celebrity chef cook-off
  - Prizes
  - trip to experience the fishery firsthand.

King Salmon Value Chain

Collecting Data

Processing Data

How many Copper River salmon?

- King Salmon: Average run =73,000 fish/year

- Red Salmon: Average run = 1.8 million fish/year

The affects (sic) of dissolved copper on salmon and the environmental affects (sic) associated with the use of wood preservatives in aquatic environments

Prepared for:

Western Wood
Preservers Institute

Prepared by:

Dr. Kenneth M. Brooks

December 13, 2004

Copper abundance

- Copper constitutes about 0.006% of earth's crust
- typically found at concentrations of 1.4 to 10.0 µg/L in fresh water.

Cu in the Copper River

Dissolved Copper – all USGS data 1996-2003

- 25 values
- Range: 2-23 ug/L Cu

Copper and salmon don't mix (Part 1)

Unacclimated chinook salmon significantly avoid 0.8 µg/L Cu.

Acute salmon toxicity studies: LC50 range 19 - 61.5 ug/L

ADEC drinking water secondary standard: 1000 ug/L.

Or do they? (Part 2)

- Salmon acclimated to 2 µg/L Cu do not demonstrate same changes as unacclimated fish: 5 to 15 µg/L.

- Salmon not expected to elicit the same behavioral changes to small or gradual increases in copper as found in unacclimated fish in laboratory studies.

- This hypothesis is strengthened by the existence of very healthy salmon runs in watersheds like Alaska's Copper River, where historic dissolved copper concentrations are 2 to 23 µg/L.

USGS Prof. Paper 1619

R. Eppinger, P. Briggs, D. Rosenkranz, and V. Ballestrazze

Environmental Geochemical Studies of Selected Mineral Deposits in Wrangell–St. Elias National Park and Preserve, Alaska, 1999

- WRST: Do “geoenvironmental hazards related to the (Kennecott) mines and mill exist”?

- 13 water samples from small streams, a spring, and a pool near adits and the mill area.

USGS samples sites and geology

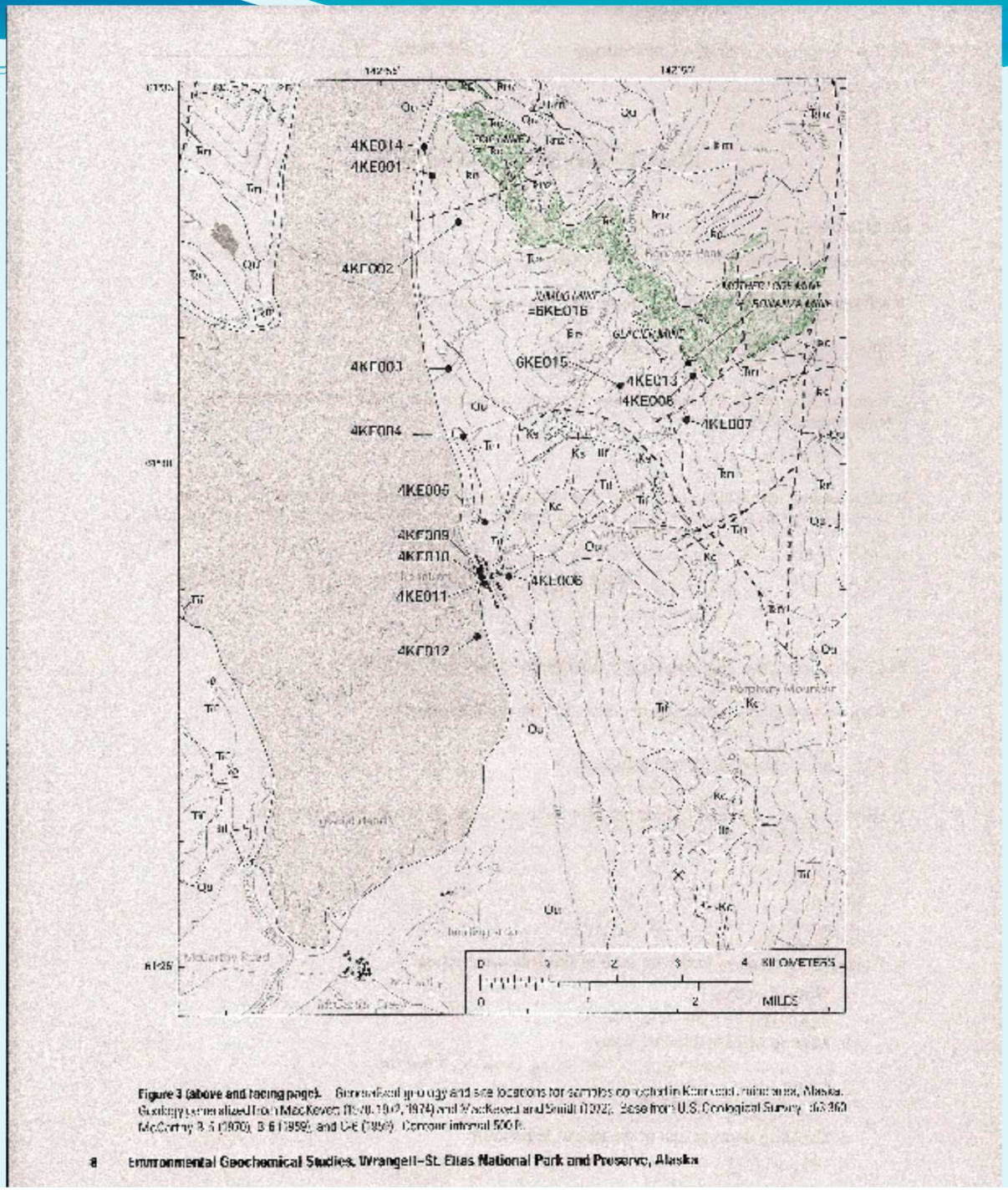


Figure 3 (above and facing page). Generalized geology and site locations for samples collected in Kennicott mineral area, Alaska. Geology generalized from MacKevett (1970, 1974) and MacKevett and Smith (1972). Base from U.S. Geological Survey [illegible] McCarthy B-5 (1970), B-6 (1959), and C-6 (1959). Contour interval 500 ft.

USGS Water-Quality Findings

- Calcium-bicarbonate water type
- Low TDS (< 188 uS/cm) except one sample at 436 uS/cm
- Near-neutral pH = 7.7 -8.2
- Low metals similar to worldwide average surface water except one sample at 67 ug/L Cu
- Median Cu approx. 2 ug/L

- (My inference here) Most Cu in Copper River comes from someplace else.

USGS Findings

- Low metals due to widespread host carbonate rocks that provide buffering capacity.
- Absence of unstable sulfide minerals such as pyrite.
- “Kennecott-type deposits are relatively **benign** to the environment”

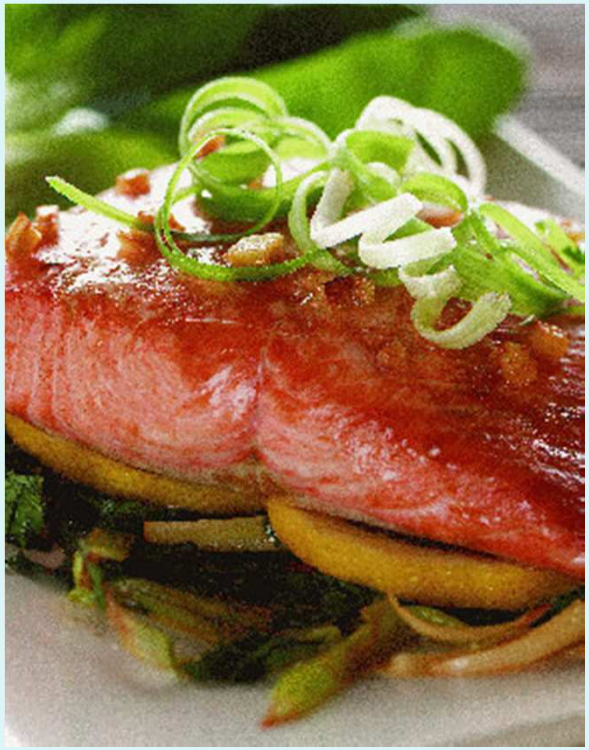
Are Salmon impacted by Kennecott now?

Probably not:

- Current salmon abundance
- Geology and water-quality data – “benign”
- Effects of glacier at site

Is the Copper River Salmon “brand” tainted by mining?

Order Alaskan Wild Salmon online:
Copper River Salmon Wild Copper River Salmon direct from processing in Alaska!
Order Wild Salmon toll free at 1-888-355-2747



Equation 1

Mining Copper Sulfides in Alaska = Dead or missing salmon

Fact or Myth?

Answer: Probably Myth. Equation 1 not proven.

National Historic Site -1997

- NPS acquires much of old Milltown area
- Works to comply with National Historic Preservation Act
- Inventory, assess, recommend, preserve and restore

- What would Gifford Pinchot say?

World-class copper sulfide deposit mined in Alaska for 27 year-span without:

- EIS
- Baseline data
- Significant permitting
- Monitoring or
- Closure Activities

- Later found “benign to the environment” by USGS

Kennecott Project:

- Provided major US copper production for WWI and home electrification.
- Helped develop Alaska between Gold Rush and WWII
- National Park asset, tourist, and recreational destination contributing to livelihood of Alaskans.
- Mining and salmon appear to have thrived in the same drainage basin on a decadal to century time-scale.

Preservation vs Development

Katalla Coal

- Federal withdrawal
- Preserved
- Obscure
- Public-domain
- Pop. of Katalla = 0
- Not historic or cult. resource
- “great place to go hunting”

Kennecott Copper

- Legal mining claims
- Developed
- Semi-famous
- Privately owned (was)
- Pop. of McCarthy = 42
- Historic and cult. Resource
- Tourist destination

Gone Fishin’

Salmon and Copper in Alaska – coexisting