



December 2011 | BBNC


Inside this issue

The Pebble Watch team addresses a frequently asked question using documents currently available for readers to examine online. These include Northern Dynasty Minerals' 2011 Preliminary Assessment and the U.S. Environmental Protection Agency's (EPA's) draft conceptual diagrams prepared for its ongoing Bristol Bay watershed assessment. Pebble Watch also explores a question the EPA is asking during the watershed assessment: "Is the Bristol Bay salmon fishery the world-class fishery it is depicted to be?"

Visit us online

This is the one-year anniversary of Pebble Watch, and the science team is dedicated to bringing you timely, relevant information about Bristol Bay. Visit us online at www.pebblewatch.com to reference any back issues you may have missed and to leave us a comment about how we're doing so far.

Friend us on Facebook

On Facebook? Then friend Pebble  Watch for convenient links to the latest news, research and developments about the proposed Pebble mine.

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Bristol Bay:

World-class fishery



photo credit: Laura Ganis

There is no shortage of people who say Bristol Bay is an amazing fishery, unsurpassed anywhere – but does that qualify it as “world-class?” The term is subjective and doesn't have a specific meaning in terms of U.S. Environmental Protection Agency rules and regulations. However, we can examine the fishery's economic, ecological, and cultural significance to help readers put Bristol Bay in perspective.

The information currently being gathered by EPA during its watershed assessment will help determine if the Nushagak and Kvichak river drainages represent “an exceptional resource that might be worthy of special protection.” As part of the assessment, EPA aims to answer, “Is the Bristol Bay salmon fishery the one of a kind, world-class fishery that it is depicted to be?”

An economic engine

Salmon are the lifeblood of Bristol Bay—a resource that can be quantified by volume and dollar value. When it comes to sockeye salmon, Bristol Bay provides about half of the world supply. Expand the criteria to include all kinds of wild salmon (kings, reds, silver, pinks), and Bristol Bay's salmon harvest accounts for 7 percent of all

Bristol Bay

(continued from front)

world salmon catches. Factor in farmed salmon, and Bristol Bay's contribution still represents 3 percent of world harvests.

The economics of the fishery benefit thousands of people. From subsistence and commercial fishermen to seafood processors and recreational fishing guides, the payroll value of Bristol Bay wild salmon is significant (more than \$161 million in 2005, according to "Economics of Wild Salmon Watersheds: Bristol Bay, Alaska," February 2007). 2010 numbers from the Alaska Department of Fish and Game show a preliminary estimate of \$165 million in earnings from the commercial fishery alone.

The recreational fishery in Bristol Bay brings an average of more than 14,000 anglers a year to the Nushagak and Kvichak river drainages. Together they spend millions of dollars for travel, supplies, lodging and food. Direct spending for sport fishing in 2005 surpassed \$61 million.

Subsistence fishing activities, which take place mainly in the Nushagak and Naknek-Kvichak river drainages, add direct spending and indirect savings to the economic health of the region. More than \$7 million was spent in 2005 on subsistence fishing activities. The 10-year average harvest is 111 salmon per permit. If residents were not able to harvest subsistence fish, the replacement value of that food could add up quickly, as detailed in a November 2009 report from the Alaska Department of Fish and Game by James A. Fall, Theodore M. Krieg, and Davin Holen. "An Overview of the Subsistence Fisheries of the Bristol Bay Management Area" showed that in 2005, the annual wild food harvest per household in Koliganek was 2,139 pounds. About half of this was wild salmon. At a replacement cost of \$7 a pound, a household without subsistence salmon would have to spend more than \$7,000 on other foods throughout the year.

An ecologic anomaly

The long-term sustainability of Bristol

Bay's fish population sets it apart from other fisheries around the world. "A large part of the sustainability of the Bristol Bay system comes from the fact that there are a lot of fish populations in a number of lakes, each with different habitat needs and life history patterns," says Thomas Quinn, Ph.D., a professor in the School of Aquatic and Fishery Sciences at the University of Washington. "When conditions are unfavorable for some, they are favorable for others, so the whole system is much steadier than any of the individual components." Compare this to the Lower 48, where many salmon populations have dwindled, or are already extinct. "The remaining populations swing up and down in abundance with little to buffer them," Quinn says.

Along the Pacific Northwest and California, an estimated 29 percent of the 1,400 historical salmon populations are extinct, with another one-third of the remaining populations threatened or endangered. In the Bristol Bay region, none of the salmon species is extinct.

Heritage from the sea

When the fish return each year to the Bristol Bay, Alaska Natives reconnect with a history that goes back thousands of years. Subsistence fishing activities provide a common bond across generations through the sharing of work and the handing down of stories and techniques. This traditional lifestyle strengthens communities materially, socially and nutritionally.

"Values that support families and communities are expressed, emphasized, and taught during the harvest, preparation, and sharing of wild foods," stated the authors of a 2009 Alaska Department of Fish and Game report. Even though much has changed in the last century, "subsistence activities and values remain a cornerstone of area residents' way of life, a link to the traditions of the past, and one of their bases for survival and prosperity."



photo credit: Nathaniel Chambers

"What we have here is truly exceptional in the realm of salmon: The Bristol Bay fishery has been sustainable for over a century and gives every indication that it will be so in the future."

—Thomas P. Quinn, Professor, School of Aquatic & Fishery Sciences, University of Washington

"Anybody in the salmon world knows about Bristol Bay fisheries. It's very big by any standard. It's legendary for the sheer size of harvest, and it's extremely valuable for the hundreds of millions of dollars it brings in for wholesale value of fish produced."

—Gunnar Knapp, Professor of Economics, ISER, University of Alaska, Anchorage

"It's not just locals who know about the importance of Bristol Bay, America's 'Fish Basket.' The Alaska brand in seafood marketing is huge."

—Laine Welch, columnist and broadcaster covering Alaska fishing news

Conceptual diagrams

A graphic look at EPA's watershed assessment

A review of online documents provided by the EPA shows a conceptual diagram, which is one tool the agency is using to frame its ongoing Bristol Bay watershed assessment. According to EPA, conceptual diagrams will be included in the draft watershed assessment available for public comment in Spring 2012.

For this reason, the Pebble Watch team prepared an overview of conceptual diagrams so readers are familiar with this tool before the watershed assessment is published.

What is a conceptual diagram?

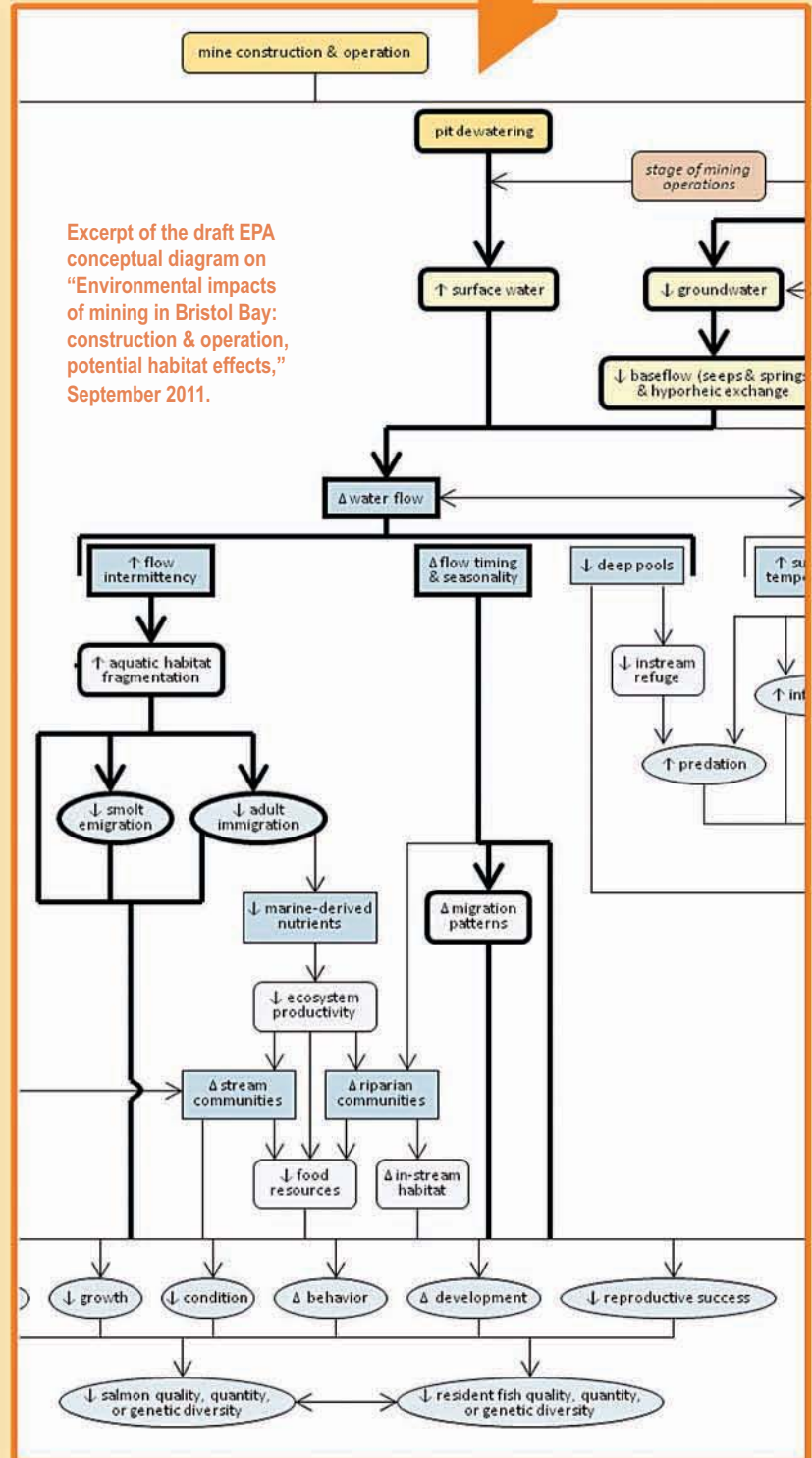
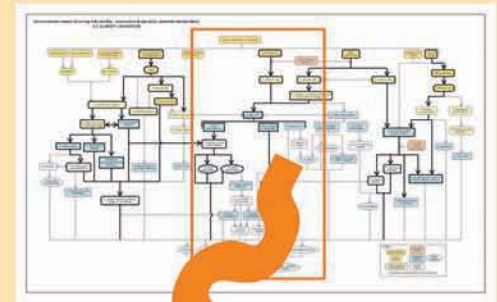
A conceptual diagram looks like a flowchart. It visually shows the relationship between a cause and effect. In the case of the watershed assessment, it shows how human activity in Bristol Bay can impact the environment.

In a presentation to local, state and federal governmental partners, EPA staff Glenn Suter and Jeffrey Frithsen explained the agency's use of conceptual diagrams as a tool for framing the assessment, and provided five draft diagrams. These diagrams offer unique insight into what EPA is considering as it moves ahead with the assessment. All diagrams are available online in draft form. (Visit the Resources page at www.pebblewatch.com for a link.)

How to read a conceptual diagram

The diagrams look complex. After all, the watershed is complex, too. The example at right is one section from a draft diagram that illustrates relationships between mine construction and potential habitat effects. By following the arrows, you can read the diagrams to better understand the links between human activity in the Bristol Bay and potential outcomes. (Follow the bold lines from top to bottom.) For example, this diagram shows that pit dewatering can increase surface water, leading to a change in water flow, which in turn leads to other changes that can ultimately reduce the "quality, quantity or genetic diversity of salmon and resident fish." Bold lines indicate relationships, or "pathways" that EPA has identified as high priority.

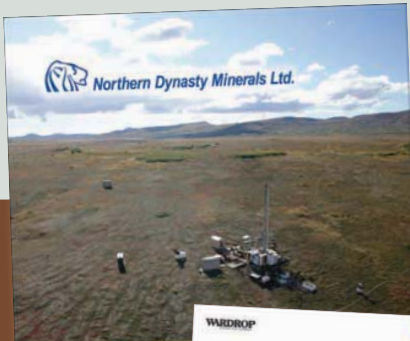
EPA staff emphasize that these diagrams are works-in-progress; they are revised and updated throughout the assessment process. They are meant to help stimulate discussion, encourage a common understanding, and generate agreement concerning the structure of the system and importance of causal pathways.



Important documents

In the near future we are expecting the release of two documents that could affect the development of the proposed Pebble mine. Follow Pebble Watch online to find out when they are available.

Document	Environmental Baseline Document (EBD)	Bristol Bay Watershed Assessment
Author	Pebble Limited Partnership (PLP)	U.S. Environmental Protection Agency (EPA)
Available	Expected in late 2011 or early 2012	Spring 2012 (draft); Late Summer 2012 (final)
Description	Reportedly more than 20,000 pages long, the EBD will include scientific information about the Pebble mine area that PLP contractors gathered from 2004 through 2008. According to the PLP web site, 2009 and 2010 data will be added after a thorough quality assurance/quality control of the initial document. Topics include air quality, fish and wildlife, surface and ground water, soil and sediments, and subsistence and traditional knowledge.	The watershed assessment seeks to answer questions about how a large-scale hard-rock mine might impact Bristol Bay, specifically in terms of the discharge of dredged and fill material into the water. EPA is using available information and data, and has collected some additional traditional ecological knowledge. Key sections will include a characterization of current conditions in the area (salmon and other fish, wildlife, indigenous culture and economy), potential risks associated with hard-rock mining, and how those risks might be mitigated.
Why it's important	In addition to providing the public with much-anticipated scientific information, the publication of an EBD is the first step in the permitting process, because it helps agencies develop an Environmental Impact Statement. It may also contribute information for the EPA's watershed assessment. Additionally, release of the EBD may launch public dialogue activities, such as Independent Science Panels planned by the Keystone Center group.	EPA stated that the watershed assessment will inform any potential decision it makes regarding whether to use its authority under 404(c) of the Clean Water Act. If used, the 404(c) action could affect the development of Pebble mine.
How to access	PLP stated it will provide the EBD online, and on DVD, and will print a limited number of paper copies.	It will be available on the EPA Bristol Bay website, on CD for public meetings, and mailed out on request. A limited number of paper copies will be shared with Tribes and placed in libraries, community centers, and made available to individuals with limited internet access. EPA welcomes suggestions for paper distribution locations. Write to R10BristolBay@epa.gov .
Will there be a public comment period?	PLP stated the EBD will be available for public review and comment when it is completed. However, there will be no formal public comment period.	Yes. EPA will release the assessment to the public and an External Peer Review Panel, followed by EPA public meetings.
Peer review	The EBD will go through an internal quality assurance/quality control process, as well as a third-party review.	The EPA report will be reviewed and critiqued by scientists outside the agency who are not involved and do not have a stake in Bristol Bay issues. This month (December), EPA is requesting public input on the selection of Peer Review Panelists. The External Peer Review Panel will also hold a public meeting in May 2012.



Preliminary Assessment of the Pebble Project, Southwest Alaska
Effective Date: February 10, 2011

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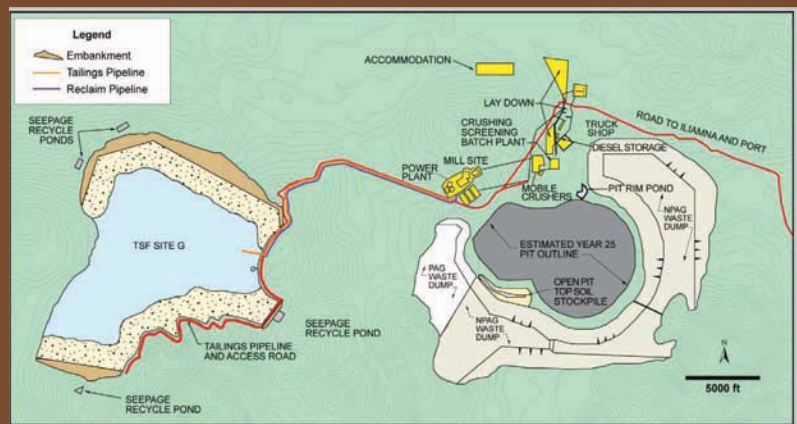
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FREQUENTLY ASKED QUESTION: *Is there a mining plan?*

In February 2011, Northern Dynasty Minerals (NDM), a 50-percent owner in the Pebble prospect, published a report for its investors regarding the profitability of the proposed Pebble mine. This "Preliminary Assessment" is more than 500 pages long, and includes 25-year, 50-year and 75-year mining plans.



Images from Northern Dynasty Minerals' Preliminary Assessment, www.northerndynastyminerals.com

ANSWER:

Although there is no official mining plan from the Pebble Limited Partnership, Northern Dynasty Minerals' Preliminary Assessment offers detailed information regarding what development of Pebble might entail, and how profitable such a mine could be. Reviewing this document can help readers develop questions in anticipation of an official plan. Pebble Watch has highlighted a few points to the right. Find a link to the entire document at www.pebblewatch.com.

Type of mine

Our readers have asked what the proposed Pebble Mine might look like—will it be an open pit or an underground mine?

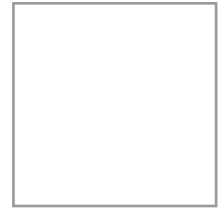
The Preliminary Assessment describes a seven-phase open-pit mine during the first 25 years of mine operation, with the possibility of block cave mining thereafter. In order to assess profitability, the report also includes detailed operating assumptions. For example, the mine would operate 350 days a year with two 12-hour shifts daily, and workers would have two meal breaks per shift.

FAST FACT: To determine the best mine design for the area, the Pebble Limited Partnership has conducted extensive geotechnical investigations, including 215 drill holes and 320 test pits.

Mine access

Moving materials to and from the mine requires infrastructure, as envisioned in the Preliminary Assessment:

- An 86-mile-long gravel access road from Cook Inlet to the mine site, with 20 bridges.
- Two pipelines to carry natural gas and diesel to the mine site.
- An 8-inch diameter steel pipeline to carry a copper/gold concentrate from the site.
- A 7-inch diameter pipeline to return excess slurry water to the mine.
- A temporary port in Williamsport, to serve as an "inbound logistics facility."
- Permanent deep-water "Port Site 1" on Inskin Bay capable of handling 1.1 million tons of concentrate and 50 million gallons of fuel per year.



 Bristol Bay
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In this issue: Questions answered

- Is Bristol Bay a world-class fishery?
- Is there a mining plan?
- What important documents will be released soon?
- How do I read a conceptual diagram?

What is peer review?

This month, the U.S. Environmental Protection Agency plans to ask for public input on the peer reviewers it will choose for its draft watershed assessment document. Peer review is a process that provides a critical review of scientific papers.

Collecting data and presenting results may seem straightforward, but scientists can overlook details or make flawed conclusions. In peer review, other scientists familiar with the subject will critically review a paper and provide comments to the author.

For scholarly papers to be published in journals like *Nature* or *Science*, peer review is an essential part of the selection process. According to its own "Peer Review Handbook," the EPA describes peer review as a process intended to "uncover any technical problems or unresolved issues in a preliminary (or draft) work product through the use of independent experts." The responses from peer reviewers

help authors revise their drafts. For the EPA, peer review "is a process for enhancing a scientific or technical work product so that the decision or position taken by the Agency, based on that product, has a sound, credible basis."

In October, *Science* magazine published an overview of a public forum in Dillingham that focused on the proposed Pebble mine. The forum was part of a symposium sponsored by the Arctic Division of the American Association for the Advancement of Science (AAAS). Author Edward Lempinen wrote: "What the Arctic Division meeting made clear... was that science will be critically important both to public opinion and policy decisions on the project."

With science playing such an important role, it helps to understand not only the facts and figures, but the peer review process as well. Visit www.pebblewatch.com for updates on EPA's peer review process.

photo credit: Chris Scarafile