

**The Environmental Protection Agency's Review of the Pebble Mine:  
Key Considerations for a Large-Scale Mining Proposal in Bristol Bay,  
Alaska.**

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A THESIS

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## **Introduction:**

### **EPA Jurisdiction and Responsibility under 404(c) of the Clean Water Act**

Located in the southwest corner of Alaska, Bristol Bay contains thousands of lakes, hundreds of small streams, and nine major rivers. It is home to the most biologically diverse freshwater ecosystem in the country and the largest remaining runs of wild salmon in the world.<sup>1</sup> This thoughtfully managed, renewable resource employs and provides subsistence for thousands of people and is internationally renowned for its remarkable fishery and wildlife qualities. As salmon and their respective ecosystems continue to decline throughout the world, Bristol Bay stands as one of the last remaining environmental strongholds yet to be altered by the devastating by-products of industrial development. The expansive landscape of southwest Alaska is home to two national parks- Katmai and Lake Clark- two national wildlife refuges, and four designated state reserves, including the 1.6 million acre Wood-Tikchik State Park.<sup>2</sup> As one of the world's largest freshwater lakes, Lake Iliamna lies between Katmai and Lake Clark and forms the headwaters of the world-renowned Kvichack River, the world's most abundant Sockeye salmon fishery. Bristol Bay has only two small towns of less than 5,000 people, 26 First Nation villages with populations less than 500, and little more than 200 miles of paved road in an area roughly the size of the state of Washington.<sup>3</sup> This remote area of southwestern Alaska supports the world's largest commercial salmon fishery, provides an

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<sup>1</sup> Ketchum, Robert. "Bristol Bay." *News Watch*. Web. 20 Jan. 2012.  
<<http://newswatch.nationalgeographic.com/2011/10/18/bristol-bay/>>.

<sup>2</sup> Ibid.

<sup>3</sup> Ibid.

integral food source for subsistence of local communities, and offers world-class recreation and sport fishing opportunities.<sup>4</sup> In a world of dramatically increasing over-population and development, Bristol Bay offers one of the few remaining expanses of its kind.

The valuable and pristine function of the Bristol Bay ecosystem is currently being challenged by another potential source of wealth in the region: a proposal to develop one of the world's largest open-pit mines at the headwaters of the watershed. While the targeted mineral deposit contains one of the largest concentrations of copper, gold, molybdenum, and silver in the world, the potential environmental impact of development could be severe and irreversible. Figures categorize the discovery as the second-largest deposit of its kind ever found, only slightly behind Indonesia's Grasberg mine, and some suspect it will become the world's largest source once the full extent has been learned.<sup>5</sup> The three principle metals- copper, gold, and molybdenum- are disseminated as tiny grains throughout more than 4.5 billion tons of rock, and the cheapest, most efficient way to extract them is through open-pit mining (an invasive type of surface mining).<sup>6</sup> Despite the impressive size of the mineral deposit, according to the Environmental Protection Agency (EPA), this type of hard-rock mining is the number one toxic polluter in the United States, and has polluted 40% of the stream reaches in the

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<sup>4</sup> Parker, Geoffrey, Frances Raskin, Carol Ann Woody, and Lance Trasky. *Pebble Mine: Fish, Minerals, and Testing the Limits of Alaska's "Large Mine Permitting Process"* Rep. 1st ed. Vol. XXV. Duke University School of Law, June 2008. Print. Alaska Law Review. Pg. 2

<sup>5</sup> "Save Bristol Bay." *Save Bristol Bay*. Trout Unlimited. Web. 20 Dec. 2011.

<<http://www.savebristolbay.org/for-the-press/news-archive/alaskas-pebble-mine-fish-versus-gold>>.

<sup>6</sup> Ibid

"The definition of a open pit mine is "an excavation or cut made at the surface of the ground for the purpose of extracting ore and which is open to the surface for the duration of the mine's life." To expose and mine the ore, it is generally necessary to excavate and relocate large quantities of waste rock." ([http://www.mine-engineer.com/mining/open\\_pit.htm](http://www.mine-engineer.com/mining/open_pit.htm))

headwaters of western watersheds.<sup>7</sup> The proposed Pebble Mine has pitted mining proponents against environmentalists, natives, and fisherman, sparking a fundamental conflict between development and conservation interests. Never before has a large-scale industrial proposal caused such widespread opposition in Alaska, which has generally welcomed development and mining projects. Deliberation of the proposal's outcome has involved local grassroots efforts, environmental non-governmental organizations (NGOs), state bureaucracy and legislators, and federal jurisdiction under the Clean Water Act. The Alaska-based environmental NGO, Renewable Resources Coalition, financed a state wide residential opinion poll and found that fifty-three percent of Alaskans oppose the project, twenty eight percent support it and the rest were undecided in 2007.<sup>8</sup> The only poll that exclusively focused on Bristol Bay residents found that 70 percent opposed the mine.<sup>9</sup>

Supporters of the mine argue that the Pebble deposit represents one of North America's most significant mineral deposits and has the potential to provide long-term employment, business and economic opportunities in Southwest Alaska. Advocates include several of the state's politically influential resource development groups, as well as the Lake and Peninsula Borough and some regional Native American corporations.<sup>10</sup> Opposition parties assert that the risks of an open pit mine in such pristine, sensitive and valuable habitat are far too great. Dissenters include nearly a dozen Bristol Bay village

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<sup>7</sup> "Save Bristol Bay." *Save Bristol Bay*. Trout Unlimited. Web. 20 Dec. 2011. <<http://www.savebristolbay.org/for-the-press/news-archive/alaskas-pebble-mine-fish-versus-gold>>.

<sup>8</sup> Wilson, Vernor. *Indigenous Empowerment: The Pebble Mine and Environmental Justice in Bristol Bay, Alaska*. Brown University, May 2008. Print. Pg. 11

<sup>9</sup> Ibid.

<sup>10</sup> "Save Bristol Bay." *Save Bristol Bay*. Trout Unlimited. Web. 20 Dec. 2011. <<http://www.savebristolbay.org/for-the-press/news-archive/alaskas-pebble-mine-fish-versus-gold>>.

or tribal councils, Alaska based fishing groups, a seafood processing association, the Alaska Wilderness Recreation and Tourism association, the Bristol Bay Economic Development Corporation, a locally based land trust, and a host of environmental NGOs including Trout Unlimited and the National Resources Defense Council.<sup>11</sup> Even the late, traditionally pro-extraction U.S. Senator Ted Stevens (R), a long-term supporter of development interests in the state, articulated that he was “very disturbed” by the project.<sup>12</sup> The conflict in Bristol Bay centers around one question: Do the advantages of harvesting one of the planet’s richest mineral deposits over a finite period of time outweigh the risks to one of the world’s last, greatest fisheries and pristine, diverse ecosystems? The outcome of the Pebble Mine proposal will set long-term precedents for conservation and development interests both regionally and federally, and will result in profound implications for the future of Bristol Bay.

The Pebble Project is currently in the pre-feasibility and pre-permitting research stage.<sup>13</sup> There are over 67 federal, state and local permits and approvals that the involved mining conglomerates have to obtain in order to begin any development.<sup>14</sup> Over eight federal agencies, six state agencies and three local governments will have oversight of the project through various laws and requirements in order to ensure that the mine will meet occupational and environmental safety standards.<sup>15</sup> The focus of this thesis pertains primarily to a series of permits that the mining companies must apply for under the Clean Water Act (CWA). Section 404 of the CWA was established to regulate the discharge of

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<sup>11</sup> Ibid.

<sup>12</sup> Ibid.

<sup>13</sup> "Project." *Pebble Limited Partnership*. Web. 15 Dec. 2011.

<<http://www.pebblepartnership.com/opportunity>>

<sup>14</sup> Wilson, Vernor. *Indigenous Empowerment: The Pebble Mine and Environmental Justice in Bristol Bay, Alaska*. Brown University, May 2008. Print. Pg. 59

<sup>15</sup> Ibid.

dredged or fill material into waters of the United States, including wetlands.<sup>16</sup> Activities regulated under this program include fill for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports) and mining projects. Section 404 requires a developer to file for a permit before dredged or fill material may be discharged into waters of the United States.<sup>17</sup> The basic premise of the 404 Program is that no discharge of dredged or fill material may be permitted if: *1. A practicable alternative exists that is less damaging to the aquatic environment; 2. The nation's waters would be significantly degraded.*<sup>18</sup> Four different agencies including the U.S. Army Corps of Engineers, the U.S. EPA, the US Fish and Wildlife Service (USFWS), and the National Marine Fisheries Service (NMFS), all play a role to help facilitate the 404 permitting process. The Army Corp administers the day-to-day program, conducts or verifies jurisdictional determinations, develops policy and guidance, and enforces 404 provisions.<sup>19</sup> The EPA develops and interprets policy, reviews and comments on individual permit applications, and has the authority to deny or restrict the use of any area as a disposal site.<sup>20</sup> The USFWS and NMFS evaluate the impacts on fish and wildlife of all new federal projects and federally permitted projects.<sup>21</sup>

Under the CWA, while the Army Corps of Engineers has the authority to issue a 404 permit, under Section 404(c) the Environmental Protection Agency has the jurisdiction to intervene and stop the entire permitting process. More specifically, Section 404(c) of the Clean Water Act authorizes the EPA to “prohibit, restrict, or deny

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<sup>16</sup> EPA. “Clean Water Act Section 404(c): “Veto Authority.” Water: Discharge of Dredged or Fill Materials (404) Web. 25 January 2011 <<http://water.epa.gov/lawsregs/guidance/cwa/dredgdis/>>

<sup>17</sup> Ibid.

<sup>18</sup> Ibid.

<sup>19</sup> Ibid.

<sup>20</sup> Ibid.

<sup>21</sup> Ibid.

the discharge of dredged or fill material at defined sites in waters of the United States (including wetlands) whenever it determines, after notice and opportunity for public hearing, that use of such sites for disposal would **have an unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreational areas.**<sup>22</sup> Guidance for identifying an “unacceptable adverse effect” is provided in the 404(c) regulation:

*Unacceptable adverse effects means impact on an aquatic or wetland ecosystem which is likely to result in significant degradation of municipal water supplies (including surface or ground water) or significant loss of or damage to fisheries, shellfishing or wildlife habitat or recreational areas. In evaluating the unacceptability of such impacts, consideration should be given to the relevant portions of the section 404(b)(1) Guidelines. (40 C.F.R. Part 230)*<sup>23</sup>

The EPA has only used 404(c) permit veto power 13 times in the history of the CWA, setting a clear precedent that the agency’s authority will only be used if accompanied by compelling justification.<sup>24</sup> If the EPA employs a 404(c) ruling in Bristol Bay, the area will be withdrawn as a potential development site and the permitting process will be ended. Such a ruling would protect Bristol Bay from mining development for the foreseeable future. In February of 2011, the EPA announced that it has initiated a watershed assessment to evaluate the suitability of large-scale mining in Bristol Bay (expected by mid-April 2012). The EPA initiated this assessment in response

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<sup>22</sup> EPA. “Clean Water Act Section 404(c): “Veto Authority.” Water: Discharge of Dredged or Fill Materials (404) Web. 25 January 2011 <<http://water.epa.gov/lawsregs/guidance/cwa/dredgdis/>>

<sup>23</sup> H.R. Doc. No. 40 C.F.R. § 231.2(e) at 8 (2011). Print.

<sup>24</sup> “EPA Halts Disposal of Mining Waste to Appalachian Waters at Proposed Spruce Mine.” *EPA*. Environmental Protection Agency. Web. 20 Apr. 2012. <[http://www.epa.gov/agingepa/press/epanews/2011/2011\\_0113\\_1.htm](http://www.epa.gov/agingepa/press/epanews/2011/2011_0113_1.htm)>.

to petitions from nine federally recognized tribes and other stakeholders who urged the agency to protect Bristol Bay's salmon populations from large-scale mining. Information gathered by the EPA watershed assessment will establish a scientific foundation for any rulings, and the results of the watershed assessment will determine whether the 404(c) process will be initiated. EPA regional administrator Denis McLerran stated that the "Bristol Bay watershed is essential to the health, environment, and economy of Alaska...gathering data and getting public review now, before development occurs, just makes sense. Doing this we can be assured that our future decisions are grounded in the best science and information in touch with the needs of these communities."<sup>25</sup> Following the release of the watershed assessment, the EPA will compile a peer-reviewed report on the Bristol Bay watershed that will be exposed to public comment for 6 to 9 months. After this process, a final version of the report will be published and a decision will be made.

While the EPA has the jurisdiction to dictate the outcome of the Pebble Mine permitting process, the debate surrounding whether to allow development in Bristol Bay is at the core of larger, historical issues of environmentalism. This debate can be traced back to the origins of American industrialization and westward expansion in the 19<sup>th</sup> century and the ideals of two fathers of American environmentalism: John Muir and Gifford Pinchot. John Muir appreciated nature in its purest form. He saw himself as a facet of the natural world, not a conqueror of it. He refuted the convergence of technology and nature in an effort to maintain the West in its' pristine condition. Gifford Pinchot, on the other hand, proclaimed, "we the American people, have come into the

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<sup>25</sup> "EPA Includes Pebble in Review of Proposed Bristol Bay Projects." : *Pebble*. Web. 20 Apr. 2012. <<http://www.adn.com/2011/02/07/1688653/epa-to-review-bristol-bay-projects.html>>.



possession of nearly 4 million square miles of the richest portion of our Earth.”<sup>26</sup> Pinchot fully supported of human alteration and utilization of the environment. He saw nature through a lens of commercial potential, not natural beauty, and advocated for sustainable development of natural resources. He also espoused the conservation ethic, which encouraged resource use, allocation, exploitation and protection.<sup>27</sup> The juxtaposition of Pinchot and Muir’s perspectives has prevailed as a fundamental conflict in the development of America: human use vs. environmental preservation. What is man’s relationship to his environment? What levels of environmental degradation are considered acceptable to allow for the exploitation of natural resources? Is the natural world at our disposal for unregulated consumption and manipulation, or are we just a facet of its function? These questions challenge our moral accountability in a world that is becoming increasingly stressed in the wake of hundreds of years of human abuse. Contemporary Americans would be naïve to view Muir’s preservationist argument as realistic or sensible. Conversely, Pinchot’s pragmatic approach of resource use, allocation, exploitation, and protection has been widely adapted and manifested itself through mechanisms such as the CWA, which regulates environmentally sensible and productive development projects. The historical debate between Muir and Pinchot is at the forefront of modern environmental politics, and a large disconnect prevails between development and conservation interests in our country. Today, this disconnect is largely framed by the enduring conflict between government regulation and unrestricted free market practices, bureaucracy versus unrestricted democracy. What is the Constitutional

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<sup>26</sup> McKibben, Bill, and Albert Gore. *American Earth: Environmental Writing since Thoreau*. New York, NY: Literary Classics of the United States, 2008. Print. Pg. 132

<sup>27</sup> Ibid.

role of federal agencies? Do environmental regulations such as the CWA and its section 404 requirements hinder free-market growth in an unwarranted or unconstitutional manner?

One of the most outspoken criticisms of our country's environmental regulations and the function of the EPA can be found in the narrative of Rich Trzupek, author of Regulators Gone Wild: How EPA is Ruining American Industry. Trzupek, like many opposition voices to environmental bureaucracy, believes that the EPA is an inefficient and unnecessary agency that stifles business and development in America. He asserts that environmental regulations have instituted industrial restrictions that go far beyond addressing society's actual needs. In the eyes of Trzupek, when toxins or any other kind of pollutant are involved in development processes, American manufacturers cannot succeed as long as they operate a plant in the United States.<sup>28</sup> He fiercely attacks the current administration, voicing that President Obama, his EPA administrator Lisa Jackson, and "energy czar Carol Browner" have pursued environmental policies that go far beyond anything we have ever seen in America: the EPA pushes the nation to an "abyss that will consume our already beleaguered industrial sector."<sup>29</sup> Trzupek and other conservative opposition voices see environmental regulation as "a silent killer, a cancer slowly eating away at the most productive parts of society;" perhaps when China, India, and Taiwan have stripped every last manufacturing job from the U.S., we will realize that we have been too idealistic.<sup>30</sup> Recent political developments have bolstered Trzupek's criticism of the EPA. Republicans and Democrats settled on a budget in April 2011 that

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<sup>28</sup> McKibben, Bill, and Albert Gore. *American Earth: Environmental Writing since Thoreau*. New York, NY: Literary Classics of the United States, 2008. Print. Pg. 39

<sup>29</sup> Ibid, pg. 110

<sup>30</sup> Ibid, pg. 133

included a \$1.6 billion reduction in EPA funding, and earlier in the year the Senate came within one vote of passing a bill that would prohibit the EPA from regulating greenhouse gases without specific Congressional approval.<sup>31</sup> Various Republican Presidential candidates, including Newt Gingrich, have publicly suggested that it is time to terminate the EPA and replace it with another organization that “is more in tune with America’s economic realities”.<sup>32</sup>

On the other end of the spectrum, environmental regulation is seen as a crucial aspect of the thoughtful development of American industry. As highlighted by Harvard professor Reina Steinzor, the consequences of under-regulation in our country are seen by disasters such as the explosion of the Deepwater Horizon drilling platform operated by British Petroleum and Transocean, which killed eleven people and destroyed precious natural resources.<sup>33</sup> Although criticism and constant evaluation is necessary to improve upon the efficiency and validity of government bureaucracy, federal environmental regulations have helped to facilitate an incredible level of American industrialization while maintaining a long-term focus on the health of our natural environment. The balanced approach of development and conservation that Steinzor and others reference was championed by Gifford Pinchot. In order to facilitate sustainable and sensible industrial growth in our country, we must protect the priority that has been traditionally placed upon the health of fragile and valuable environmental ecosystems. As Steinzor points out, to verify the importance of environmental regulations, one only needs to consider China, “where breakneck pace toward industrial development has left the

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<sup>31</sup> McKibben, Bill, and Albert Gore. *American Earth: Environmental Writing since Thoreau*. New York, NY: Literary Classics of the United States, 2008. Print. Pg. 135

<sup>32</sup> Ibid. 135

<sup>33</sup> Steinzor, Rena. *The Truth About Regulation in America*. Harvard Law & Policy Review, Vol. 5, Oct. 2011. Web. Feb. 2012. Pg. 323

environment in shambles, causing as many as 2.4 million deaths annually as a direct result of contaminated water and air (adjusted for population, the American equivalent would be 558,000 deaths.)”<sup>34</sup>

An EPA 404(c) ruling is not contingent upon the necessity to choose development over conservation or vice versa. Granting CWA development permits is not a zero-sum game. EPA decision-makers must decide whether a 404(c) ruling will be consistent with the guiding principles of the CWA and advantageous for Bristol Bay from an economic development standpoint and an environmental conservation standpoint. The fiercely partisan and politicized atmosphere that currently defines our country has made it extremely difficult to pass legislation or create legal infrastructure that prioritizes environmental protection over industrial development. Accordingly, proponents of environmental conservation should focus on existing mechanisms and legal infrastructure to promote environmental stewardship. Institutions like the CWA provide valuable mechanisms that support sensible development projects while also protecting valuable and fragile natural ecosystems. As this thesis will demonstrate, EPA authority under the CWA is a powerful tool that should be utilized to protect Bristol Bay and can be further empowered in the future to thoughtfully reconcile development and conservation interests in fragile, irreplaceable, and valuable ecosystems.

The aim of this paper is to determine whether the Environmental Protection Agency has the authority, jurisdiction, and responsibility to protect Bristol Bay from mining development under 404(c) of the Clean Water Act. The investigation starts by providing an overview of the ecological and commercial integrity of the Bristol Bay ecosystem in addition to the mining claims and project description. We then focus on

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<sup>34</sup> Ibid, pg. 324

the specific statutes designated under 404(c): fisheries, wildlife, municipal water supplies and recreational areas, providing a forecasted extent and location of unacceptable adverse environmental impacts. The likelihood of potential adverse impacts on Bristol Bay will receive further perspective and validation through an analysis of the track records of Anglo American and Northern Dynasty mining conglomerates and the environmental legacy of similar mining projects in Alaska. Finally, we will look at past cases in which the EPA has used its 404(c) authority, highlighting 404(c) precedents and drawing subsequent connections to this case.

## **Chapter 1:**

### **Mining Claims, Project Description and an Overview of the Ecological and Commercial Integrity of Bristol Bay**

In order to judge whether the EPA should make a 404(c) ruling in Bristol Bay, we must have a general understanding of both the local ecosystem and the project description for proposed development. The following overview aims to highlight both the ecological and commercial integrity of the Bristol Bay watershed in addition to the size and scope of the proposed Pebble mine. This background information will provide a crucial foundation supporting an eventual judgment of potential risks associated with large-scale mining development, and the viability of EPA intervention.

Fishing and mining interests have both played significant roles in Alaska. Historically, mining has served as a cornerstone of Alaska's economy. Some major communities including Fairbanks, Juneau, and Nome were all founded on mining activity. Much of the major infrastructure in Alaska such as roads and ports was originally created to support the mining industry.<sup>35</sup> In the late nineteenth and early twentieth centuries, the "Alaska Syndicate," formed by the Guggenheim family and J.P. Morgan, developed the Kennecott copper mine in the Wrangell mountains north of Prince William Sound and held major interests in gold mines, the dredging, shipping, and

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<sup>35</sup> [www.akrdc.org/issues/mining/overview.html](http://www.akrdc.org/issues/mining/overview.html)

transportation industries, as well as Alaska's salmon canneries.<sup>36</sup> There are currently five operating mines in Alaska (Ft. Knox, Greens Creek, Red Dog, Usibelli, and Pogo) that provide approximately 1,500 full-time jobs of the nearly 3,500 mineral industry jobs.<sup>37</sup> Today, mining in Alaska primarily produces zinc, lead, gold, silver, and coal, as well as construction minerals such as sand, gravel, and rock.<sup>38</sup> Mining exploration, development, and mineral production generates \$35 million in state government revenue annually.<sup>39</sup> In 2009, the industry spent \$160 million on exploration, \$262 million on mine construction, and \$750 million on mining exports.<sup>40</sup>

By the time Congress conferred statehood on Alaska in 1959, the state's commercial salmon harvests had drastically declined from an annual average of ninety million fish in the 1930s to an annual average of forty million fish in the 1950s.<sup>41</sup> The Alaska Statehood Act granted the state authority to directly manage fish and game, greatly assisting the facilitation of salmon population recovery. In 1973, the Alaska Legislature enacted the Limited Entry Act, which increased the power to control the issuance of commercial fishing permits and limit salmon harvest to more sustainable levels.<sup>42</sup> In 1976, Congress enacted the Magnuson-Stevens Fisheries Management and Conservation Act, establishing an exclusive economic zone that extended United States

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<sup>36</sup> Parker, Geoffrey, Frances Raskin, Carol Ann Woody, and Lance Trasky. *Pebble Mine: Fish, Minerals, and Testing the Limits of Alaska's "Large Mine Permitting Process"* Rep. 1st ed. Vol. XXV. Duke University School of Law, June 2008. Print. Alaska Law Review. Pg. 2

<sup>37</sup> [www.akrdc.org/issues/mining/overview.html](http://www.akrdc.org/issues/mining/overview.html)

<sup>38</sup> Ibid.

<sup>39</sup> [www.pebblepartnership.com/project/mining](http://www.pebblepartnership.com/project/mining)

<sup>40</sup> Ibid.

<sup>41</sup> Parker, Geoffrey, Frances Raskin, Carol Ann Woody, and Lance Trasky. *Pebble Mine: Fish, Minerals, and Testing the Limits of Alaska's "Large Mine Permitting Process"* Rep. 1st ed. Vol. XXV. Duke University School of Law, June 2008. Print. Alaska Law Review. Pg. 6

<sup>42</sup> Ibid.

jurisdiction over fisheries for 200 nautical miles beyond state waters.<sup>43</sup> This legislation allowed the federal government to regulate foreign fishing vessels and reduce their harvests of fish that returned to Alaska's rivers to spawn.

Due in large part to the above mentioned legal framework, today's thriving salmon populations in Alaska are a global exception. Salmon populations around the world have suffered steep declines due to habitat loss and over-fishing. In 2008, National Geographic designated Alaska as one of the last three remaining well-managed fisheries in the world.<sup>44</sup> This distinction is largely due to sound, scientific management by the state and federal agencies. Because of their unique success, Alaska's wild salmon populations currently support a lucrative commercial fishing industry, subsistence fishing tradition, and a substantial recreation industry. According to Tim Bristol, Director of Trout Unlimited, Alaska, of "what's left of the Pacific north rim as far as salmon habitat goes, this [Bristol Bay] is the epicenter, the best of the best."<sup>45</sup> 2009 marked the 125<sup>th</sup> anniversary of commercial fishing in Bristol Bay, and the renowned watershed has been widely recognized as an important asset to the state of Alaska and our nation. In 1972 the Alaska legislature established a fisheries reserve to protect the area from oil and gas development.<sup>46</sup> The commercial fisheries management area of Bristol Bay includes eight major river systems: Naknek, Kvichak, Egegig, Ugashik, Wood, Nushagak, Igushik, and Togiak.<sup>47</sup> During 2010, more than 40 million salmon swam through Bristol Bay and it is estimated that half of all wild salmon sold in the United States comes from Bristol Bay

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<sup>43</sup> Ibid.

<sup>44</sup> <http://www.savebristolbay.org/about-the-bay/commercial-fish>

<sup>45</sup> <http://www.orvis.com/intro.aspx?subject=4571>

<sup>46</sup> <http://www.savebristolbay.org/about-the-bay/commercial-fish>

<sup>47</sup> Ibid.



fisheries.<sup>48</sup> By 2001, nearly 54,000 people earned all or part of their annual incomes from fishing, which provided more jobs than oil, gas, mining, timber, agriculture and forestry, combined.<sup>49</sup> Commercial fishing related jobs account for nearly 75% of local employment, and Bristol Bay accounts for one third of all earnings from commercial salmon fishing in Alaska.<sup>50</sup> The 2010 harvest of all salmon species was approximately 31 million fish, valuing over \$153 million.<sup>51</sup> Bristol Bay provides spawning habitat for all five species of Pacific Salmon, including Pink, Chum, Sockeye, Coho, and King. Local expenditures that depend on the use or harvest of the wild salmon ecosystem drive the economy in terms of job and wage creation. In 2008, these expenditures fell between \$317.9 and \$572.5 million with an estimated direct expenditure of \$392.4 million.<sup>52</sup>

The Bristol Bay drainages produce the world's largest sockeye salmon population, which is commercially the most valuable species. The Alaska Department of Fish and Game (ADF&G) recently estimated average annual returns of sockeye to Bristol Bay drainages at about 39 million sockeye salmon,<sup>53</sup> twice as many salmon as the entire Columbia River drainage produced at its' peak.<sup>54</sup> The commercial sockeye salmon harvest in Bristol Bay is five-to-ten times larger than all other Alaska sockeye fisheries combined.<sup>55</sup> Between 1986 and 2005, annual commercial catches of all fives species of

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<sup>48</sup> [news.nationalgeographic.com/news/2011/10/11-salmon-pebble-mine/](http://news.nationalgeographic.com/news/2011/10/11-salmon-pebble-mine/)

<sup>49</sup> Parker, Geoffrey, Frances Raskin, Carol Ann Woody, and Lance Trasky. *Pebble Mine: Fish, Minerals, and Testing the Limits of Alaska's "Large Mine Permitting Process"* Rep. 1st ed. Vol. XXV. Duke University School of Law, June 2008. Print. Alaska Law Review. Pg. 7

<sup>50</sup> Ibid.

<sup>51</sup> Chambers, Dave, Robert Moran, and Lance Trasky. *Bristol Bay's Wild Salmon Ecosystems and Pebble Mine: Key Considerations for a Large-Scale Mine Proposal*. Wild Salmon Center and Trout Unlimited., Jan, 2012. Print. Pg. 7

<sup>52</sup> Ibid., pg. 82

<sup>53</sup> [http://www.sf.adfg.state.ak.us/pubs/afrb/vol10\\_n2/fairv10n2.pdf](http://www.sf.adfg.state.ak.us/pubs/afrb/vol10_n2/fairv10n2.pdf)

<sup>54</sup> Parker, Geoffrey, Frances Raskin, Carol Ann Woody, and Lance Trasky. *Pebble Mine: Fish, Minerals, and Testing the Limits of Alaska's "Large Mine Permitting Process"* Rep. 1st ed. Vol. XXV. Duke University School of Law, June 2008. Print. Alaska Law Review. Pg. 7

<sup>55</sup> Ibid.

Pacific salmon in Bristol Bay averaged nearly 24 million sockeye (red), 70,000 Chinook(king), 922,000 chum, 103,000 coho (silver) and, in even years, 261,000 pink salmon.<sup>56</sup> In 2008, the commercial fishery's wholesale value was between \$295.93 million and \$389.26 million.<sup>57</sup> The commercial fishery also employs many Native residents who comprise nearly 70% of the Bristol Bay area communities.<sup>58</sup>

In addition to an impressive commercial fishing industry, healthy salmon populations have supported long-standing subsistence fishing practices in Bristol Bay. Salmon, in addition to over 20 other species of fish, have been central to subsistence needs in the region for thousands of years.<sup>59</sup> It is estimated that nearly 88% of the region's economic base relies upon the local salmon fishery.<sup>60</sup> In addition to salmon, residents utilize moose, caribou, bear, and smaller terrestrial animals such as fox and beaver for subsistence. 7,600 people residing in the Bristol Bay, primarily Yupik Eskimo, Aleut, and Athabaskan tribal groups, harvest fish and game, accounting for 2.4 million pounds of subsistence harvest per year and a net economic value annually between \$78 and \$143 million.<sup>61</sup> Subsistence harvest of fish and game provides around 20% of the necessary calories for the region,<sup>62</sup> and wild salmon comprise 52% of the average

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<sup>56</sup> Ibid.

<sup>57</sup> Chambers, Dave, Robert Moran, and Lance Trasky. *Bristol Bay's Wild Salmon Ecosystems and Pebble Mine: Key Considerations for a Large-Scale Mine Proposal*. Wild Salmon Center and Trout Unlimited., Jan, 2012. Print. Pg. 82

<sup>58</sup> Ibid.

<sup>59</sup> *Bristol Bay*. Web. 15 Jan. 2012. <[www.groundtruthtrekking.org/issues/fisheries/bristolbay.html](http://www.groundtruthtrekking.org/issues/fisheries/bristolbay.html)>

<sup>60</sup> Wilson, Vernor. *Indigenous Empowerment: The Pebble Mine and Environmental Justice in Bristol Bay, Alaska*. Brown University, May 2008. Print. Pg. 9

<sup>61</sup> Duffield, John. "Economics of Wild Salmon Watersheds: Bristol Bay, Alaska." Trout Unlimited, Feb. 2007. Web. Dec. 2011. [http://www.housemajority.org/coms/hfsh/trout\\_unlimited\\_report.pdf](http://www.housemajority.org/coms/hfsh/trout_unlimited_report.pdf), Pg. 24-25

<sup>62</sup> *Bristol Bay*. Web. 15 Jan. 2012. <[www.groundtruthtrekking.org/issues/fisheries/bristolbay.html](http://www.groundtruthtrekking.org/issues/fisheries/bristolbay.html)>

families diet.<sup>63</sup> Due to the limited employment opportunities in the area and high cost of living, regional subsistence is instrumental in sustaining the standard of living and cultural legacy that the communities currently enjoy.

Recreation and tourism spending in Bristol Bay generate \$90 million annually to the state in the form of taxes and licenses; and in 2007, anglers in Alaska spent nearly \$1.4 billion on fishing trips, fishing equipment, and development and maintenance of land used primarily for the pursuit of sport fishing in Alaska.<sup>64</sup> Sport fishing in Bristol Bay is a renowned and highly sought after experience for anglers worldwide. The bay is home to some of the most premier sport fishing locations on the globe including: the Nushagak, Mulchatna, Koktuli and Kvichak Rivers, and Talarik Creek; “rivers that are as productive now as they were thousands of years ago.”<sup>65</sup> Bristol Bay currently supports 846 full and part time sport fishing jobs and accounts for \$27 million in total wages and benefits paid to employees and proprietors yearly.<sup>66</sup> The local sport fishing industry boasts nearly 40 commercial fishing lodges in the Bristol Bay watershed; most of which have stated opposition to any mining development.<sup>67</sup> The development of the Pebble mine could adversely affect the pristine nature of the watersheds that currently attract a substantial sport-fishing industry.

An additional value that should be noted in consideration of Bristol Bay’s current economic worth is the non-market passive use value: the value of saving a place for future generations or for the sake of an ecosystem’s existence. These values are

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<sup>63</sup> “Save Bristol Bay, Subsistence.” *Save Bristol Bay*. Trout Unlimited. Web. 15 Dec. 2011. <<http://www.savebristolbay.org/about-the-bay/subsistence>>

<sup>64</sup> “Save Bristol Bay, Sportfish.” *Save Bristol Bay*. Trout Unlimited. Web. 25 Dec. 2011. <<http://www.savebristolbay.org/about-the-bay/sportfish>>

<sup>65</sup> Ibid.

<sup>66</sup> Ibid.

<sup>67</sup> Ibid.

significantly higher than the above-mentioned commercial, subsistence, and recreational use values. Congress has legitimized passive damage valuations as an economic measure and ‘willingness to pay’ passive value studies were endorsed by the National Oceanic and Atmospheric Administration.<sup>68</sup> Based on extrapolations of data showing what citizens have been willing to pay to protect regions in other areas, studies show that the combined bequest and existence value of the Bristol Bay fish and wildlife resources is between \$3.18 and \$6.36 billion dollars.<sup>69</sup> Although this large deviation suggests the need for refinement of the passive use value measurements, the result still denotes a noteworthy passive value of the Bristol Bay ecosystem.

A comparison of taxation and local revenue generation between the wild salmon populations and mining based industries should also be noted in evaluation of the overall economic importance of a healthy Bristol Bay ecosystem. Based on a 20-year average, the Bristol Bay fishing economy may generate up to \$16.79 million/year in tax revenue for the state of Alaska through the Fisheries Business tax and Seafood Market Assessment tax.<sup>70</sup> In addition, the Bristol Bay wild salmon economy generates an average of \$158.6 million in gross income from commercial fishing drift gillnet usage.<sup>71</sup> The Regional Seafood Development tax also generates up to \$1.1 million/year in additional revenue for the State of Alaska.<sup>72</sup> In total, Bristol Bay fishery resources have the potential to generate up to \$18.37 million/year in state tax revenue.<sup>73</sup> To contextualize the revenue importance of a healthy Bristol Bay ecosystem, in 2010 Alaska

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<sup>68</sup> Chambers, Dave, Robert Moran, and Lance Trasky. *Bristol Bay's Wild Salmon Ecosystems and Pebble Mine: Key Considerations for a Large-Scale Mine Proposal*. Wild Salmon Center and Trout Unlimited., Jan, 2012. Print. Pg. 84

<sup>69</sup> Ibid.

<sup>70</sup> Ibid.

<sup>71</sup> Ibid.

<sup>72</sup> Ibid.

<sup>73</sup> Ibid.

as a whole raised \$122.4 million in fisheries related taxes.<sup>74</sup> In comparison to the revenue value of the fishery resources, based on 2000-2009 industry financials for the PLP, aggregate net income from the Pebble mine’s 2011 median value would be \$43.81 billion.<sup>75</sup> Despite the impressive size of this projected net income, shareholders and the international market will keep a majority of the value. The primary sources of tax revenue given to the state of Alaska will come from the Mining License Tax, levied on the net income of mining operations which will total \$3.07 billion overall or \$39.36 million per year for 78 years.<sup>76</sup> Thus, considering the above-mentioned numbers, mining development will generate \$21.59 million more in tax revenue than the fishing industry currently generates. While this increase may seem beneficial to state legislators and officials, we must consider the intrinsic value of each resource. Assuming that mineral extraction doesn’t experience any of the technical challenges often realized during development, tax revenue will only last for the finite window of 78 years. This revenue is greatly outweighed by the long-term, sustainable generation of fishery related taxation that has the potential to benefit the State of Alaska far beyond the termination of mining activity. In addition, state officials risk the complete collapse of the Bristol Bay fishery resource and commercial, subsistence, and recreational use if mining development is permitted. Recent scientific research bolsters the economic importance of the Bristol Bay wild salmon ecosystem by concluding “high population diversity, driven by abundant, complex habitats, buffers against population fluctuation and provides a reliable source of

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<sup>74</sup> Ibid.

<sup>75</sup> Chambers, Dave, Robert Moran, and Lance Trasky. *Bristol Bay’s Wild Salmon Ecosystems and Pebble Mine: Key Considerations for a Large-Scale Mine Proposal*. Wild Salmon Center and Trout Unlimited., Jan, 2012. Print. Pg. 84

<sup>76</sup> Ibid.

income to local communities.”<sup>77</sup> These advantages stand in stark contrast to the finite, boom and bust cycles common to the hard-rock mining industry.

All Pacific salmon are anadromous, meaning they are born and reared in freshwater, migrate to the ocean, then return to natal waters to spawn and die. Pacific Salmon spawn in the gravel beds of rivers, streams, and lakes.<sup>78</sup> After freshwater rearing they migrate to salt water and are widely distributed over the North Pacific Ocean and Bering Sea during the marine years of their lives.<sup>79</sup> Upon maturation, after one to seven years (depending on species and stock), they return to their home rivers and natal breeding grounds to spawn.<sup>80</sup> Spawning takes place between late summer and early winter, after which the majority of the salmon die. The prolific salmon populations that return to Bristol Bay each year from the Pacific Ocean support a complex and interdependent ecosystem, contributing to nutrient cycling of plant life and providing sustenance for a variety of animals. A variety of animals directly consume salmon carcasses and eggs, and algae and other vascular plants utilize organic matter and nutrients provided by the salmon.<sup>81</sup> Upland animals and most aquatic food webs depend upon salmon as an important part of their diets. For example, the Brown bear population in the Bristol Bay drainage is extremely high due the nutrients provided by salmon. In some areas, the density exceeds one bear per square mile.<sup>82</sup> At least 138 animal species,

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<sup>77</sup> Ibid.

<sup>78</sup> Groot, Cornelis. *Pacific Salmon Life Histories*. UBC Press, 1991. Print. Pg. 32

<sup>79</sup> Ibid.

<sup>80</sup> Ibid., pg. 35

<sup>81</sup> Naiman, Robert. *Riparia: Ecology, Conservation, and Management of Streamside Communities*. London: Elsevier Academic, 2005. Print. Pg. 34

<sup>82</sup> "Brown Bear Management." *Brown Bear*. Ed. ADF&G. Web. 19 Dec. 2011. <<http://www.adfg.alaska.gov/index.cfm?adfg=brownbear.main>>.

from killer whales to owls, depend on salmon for sustenance to some degree.<sup>83</sup> The complex, inter-dependent, and stable nature of the Bristol Bay ecosystem is central to the commercial, recreational, and subsistence needs of the area.

The Pebble deposit and proposed mine site is located between the Upper Talarik Creek (draining to the east and south), and the North and South Fork of the Koktuli River (draining to the west and southwest).<sup>84</sup> The Koktuli River and Upper Talarik both reside in the Nushagak and Kvichack drainages, respectively.<sup>85</sup> Historically, the Kvichack River drainage is the world's single most productive sockeye salmon watershed, and the Nushagak River is the largest producer of the other four Pacific salmon species in the Bristol Bay drainages.<sup>86</sup> After preliminary discoveries in the area by another company, Northern Dynasty acquired mineral rights in 2001, and between 2002 and 2005, exploratory drilling revealed the presence of a huge porphyry sulfide deposit now known as West Pebble.<sup>87</sup> Northern Dynasty Minerals Ltd. (NDM) and Anglo American have stated that the deposit "rank(s) among the world's most important accumulations of copper, gold and molybdenum," further asserting that Pebble is the second largest copper mineral deposit in the world.<sup>88</sup> In 2007, NDM entered a 50:50 partnership with Anglo

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<sup>83</sup> Chambers, Dave, Robert Moran, and Lance Trasky. *Bristol Bay's Wild Salmon Ecosystems and Pebble Mine: Key Considerations for a Large-Scale Mine Proposal*. Wild Salmon Center and Trout Unlimited., Jan, 2012. Print. Pg. 84

<sup>84</sup> "NDM Permits to Build Dams or Embankments." *Tailings Impoundment*. Northern Dynasty Mines. Web. 3 Jan. 2012. <<http://dnr.alaska.gov/mlw/mining/largemine/pebble/2006/damaap.pdf>>

<sup>85</sup> "Pebble Partnership Images." Web. 23 Dec. 2011. <[http://www.pebblepartnership.com/images/LandStatus\\_D01-map.jpg](http://www.pebblepartnership.com/images/LandStatus_D01-map.jpg)>

<sup>86</sup> Parker, Geoffrey, Frances Raskin, Carol Ann Woody, and Lance Trasky. *Pebble Mine: Fish, Minerals, and Testing the Limits of Alaska's "Large Mine Permitting Process"* Rep. 1st ed. Vol. XXV. Duke University School of Law, June 2008. Print. Alaska Law Review.

<sup>87</sup> "Save Bristol Bay." *Save Bristol Bay*. Web. 20 Dec. 2011. <<http://www.savebristolbay.org/for-the-press/news-archive/alaskas-pebble-mine-fish-versus-gold>>.

<sup>88</sup> Parker, Geoffrey, Frances Raskin, Carol Ann Woody, and Lance Trasky. *Pebble Mine: Fish, Minerals, and Testing the Limits of Alaska's "Large Mine Permitting Process"* Rep. 1st ed. Vol. XXV. Duke University School of Law, June 2008. Print. Alaska Law Review.

American to permit, construct and operate the Pebble project.<sup>89</sup> Both companies share equal ownership and compose the Alaska-based Pebble Limited Partnership (PLP). Based on the most recently available estimates, the Pebble deposit contains 80.6 billion pounds of copper, 5.6 billion pounds of molybdenum, and 107.4 million ounces of gold.<sup>90</sup> Using the U.S. Geological Survey's 2010 American Market prices indexed to 2011 dollars, the deposit's estimated worth is \$476.84 billion.<sup>91</sup> Considering the historic inconsistency and volatility of mineral prices, perhaps a more accurate measure of the Pebble deposit's value should be based upon the indexed medium mineral prices from 1975 to 2010 (longest data set available). Under this median measure, the deposit is valued at \$276.6 billion.<sup>92</sup> This value does not denote the profit of the mine because it does not take into consideration the costs necessary to obtain the minerals.

The PLP has asserted that mining development projects bring in new and diverse economies to areas where few other activities are viable. According to mining proponents, Southwest Alaska is one of the most economically depressed areas in the country, where jobs are scarce and the cost of living is high.<sup>93</sup> The PLP ensures that they will support a regional and Alaska-hire focus, create workforce development programs, provide 1,000 high-skill, high wage operation jobs, and 2,000 construction phase jobs over the 30-60 year lifespan of the mine.<sup>94</sup> Mining advocates also stress that the global

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<sup>89</sup> "Northern Dynasty Minerals Ltd. - Welcome to Northern Dynasty Minerals - Thu Apr 19, 2012."

*Northern Dynasty Minerals*. Web. 20 Nov. 2011.

<<http://www.northerndynastyminerals.com/ndm/home.asp>>.

<sup>90</sup> Chambers, Dave, Robert Moran, and Lance Trasky. *Bristol Bay's Wild Salmon Ecosystems and Pebble Mine: Key Considerations for a Large-Scale Mine Proposal*. Wild Salmon Center and Trout Unlimited., Jan, 2012. Print. Pg. 81

<sup>91</sup> Ibid.

<sup>92</sup> Ibid.

<sup>93</sup> "Opportunity." *Pebble Limited Partnership*. Web. 15 Dec. 2011.

<<http://www.pebblepartnership.com/opportunity>>

<sup>94</sup> Ibid.



demand for copper is currently at an all-time high, and is a strategic metal for the U.S. economy. Copper is the most efficient conductor of electricity and has many uses in the automotive industry.<sup>95</sup> It is also used as molding material to produce a variety of essentials ranging from the toothbrush to kitchen plumbing.<sup>96</sup> A PLP publication proclaimed that more copper and other minerals in the deposit makes the “modern day life” possible, providing necessary elements for industrial machinery, construction, automotive parts, as well as assisting the path toward energy efficient technologies.<sup>97</sup>

As of now, PLP has yet to release an official prefeasibility study of the size and scope of the mine, yet preliminary proposals provide a general idea of the mine’s specifications.<sup>98</sup> The current project description of the proposed development includes ten major components:

1. Open pit at Pebble West and underground block caving at Pebble East. The definition of an open pit mine is “an excavation or cut made at the surface of the ground for the purpose of extracting ore and which is open to the surface for the duration of the mine’s life.”<sup>99</sup> To expose the desired ore, development of an open pit mine requires the excavation and relocation of extremely large quantities of waste rock. Underground block caving is used to harvest large quantities of lower grade ore bodies. Development requires the caving and extraction of large volumes of rock. The open pit mine at Pebble West will be approximately 2000

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<sup>95</sup> “Project.” *Pebble Limited Partnership*. Web. 15 Dec. 2011. <<http://www.pebblepartnership.com/project>>

<sup>96</sup> “Project.” *Pebble Limited Partnership*. Web. 15 Dec. 2011. <<http://www.pebblepartnership.com/project>>

<sup>97</sup> *Ibid.*

<sup>98</sup> Chambers, Dave, Robert Moran, and Lance Trasky. *Bristol Bay’s Wild Salmon Ecosystems and Pebble Mine: Key Considerations for a Large-Scale Mine Proposal*. Wild Salmon Center and Trout Unlimited., Jan, 2012. Print. Pg. 11

<sup>99</sup> “Basics of an Open Pit Mine.” *Mine Engineer.Com Provides Mining, Gold, Copper, Coal, Mineral, Information*. Web. 15 Jan. 2012. <[http://www.mine-engineer.com/mining/open\\_pit.htm](http://www.mine-engineer.com/mining/open_pit.htm)>.

- feet deep and cover two square miles and the underground mine at Pebble East would be of comparable size and 5,000 feet deep.<sup>100</sup>
2. Five large dams composed of waste rock and earthen-fill material that would span a cumulative nine linear miles.<sup>101</sup> Three of the largest dams are expected to be 740 ft. by 3 miles long, 700 ft. by 2.9 miles long, and 710 ft. by 1.3 miles long.<sup>102</sup> The dams would create and contain ponds or “tailings,” covering at least 10 square miles and store chemically reactive ore-processing wastes.<sup>103</sup> The largest of the three dams would be the largest in the world, and the dam complex is designed to hold between 2.5 and 10 billion tons of mine waste, nearly enough to bury the city of Seattle, WA.<sup>104</sup>
  3. A deep-water port on the west side of Cook Inlet to load ore onto ocean freighters.<sup>105</sup>
  4. A 104-mile access road to provide transportation from the mine facilities to the Cook Inlet port.<sup>106</sup>
  5. A mill to process the ore extracted from mining operations.<sup>107</sup>
  6. A series of stream diversion channels, wells and other devices created to: (a) prevent water from filling the open pit, (b) extract water used to process ore, (c)

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<sup>100</sup> Parker, Geoffrey, Frances Raskin, Carol Ann Woody, and Lance Trasky. *Pebble Mine: Fish, Minerals, and Testing the Limits of Alaska's "Large Mine Permitting Process"* Rep. 1st ed. Vol. XXV. Duke University School of Law, June 2008. Print. Alaska Law Review.

<sup>101</sup> Ibid., pg 13

<sup>102</sup> "Initial Application Report." Knight Piesbold Consulting, Northern Dynasty Mines, Inc., Sept. 2006. Web. 5 Dec. 2011. <<http://dnr.alaska.gov/mlw/mining/largemine/pebble/2006/damaap.pdf>>.

<sup>103</sup> Ibid., pg. 13

<sup>104</sup> "About Pebble Mine." *Save Bristol Bay*. Web. 15 Dec. 2011. <<http://www.savebristolbay.org/about-the-bay/about-pebble-mine>>.

<sup>105</sup> Parker, Geoffrey, Frances Raskin, Carol Ann Woody, and Lance Trasky. *Pebble Mine: Fish, Minerals, and Testing the Limits of Alaska's "Large Mine Permitting Process"* Rep. 1st ed. Vol. XXV. Duke University School of Law, June 2008. Print. Alaska Law Review. Pg. 13

<sup>106</sup> Ibid.

<sup>107</sup> Ibid.

- transport ore concentrate in a slurry through pipelines, and (d) transport wastes in a slurry through pipelines.<sup>108</sup>
7. Two 100-mile-long, fifteen inch-diameter pipelines that would run parallel to the access road. One pipeline would be used to transport slurry of copper ore concentrate from the mill to the port; the second would return slurry water to the mine site.<sup>109</sup>
  8. Four pipelines that would transport mine wastes from the mill to waste storage facilities and reclaim water from waste facilities to transport mill.<sup>110</sup>
  9. A 300-megawatt power plant located on the Kenai Peninsula, across from Cook Inlet.<sup>111</sup>
  10. More than 100 miles of transmission lines and undersea cables used to transmit electricity from the power plant to the mine site.<sup>112</sup>

The combined, overall footprint of development associated with the open-pit, dams, and operation facilities will cover some 18,000 acres or 28 square miles.<sup>113</sup> The mine complex would require more electricity and water than Anchorage, Alaska's largest city.<sup>114</sup> The upper sections of Talarik Creek and Kaktuli Rivers will be dewatered to process the ore and fill tailings ponds, amounting to approximately 14 lineal miles of totally de-watered riverbed.<sup>115</sup> In addition, approximately 45 lineal miles of riverbed will

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<sup>108</sup> Ibid.

<sup>109</sup> Ibid., Pg. 14

<sup>110</sup> Ibid.

<sup>111</sup> Ibid.

<sup>112</sup> Ibid.

<sup>113</sup> Hauser, William. *Potential Impacts of the Proposed Pebble Mine on Fish Habitat and Fishery Resources of Bristol Bay*. Rep. Fish Talk Consulting, 2007. Print. Pg. 6

<sup>114</sup> Ketchum, Robert. "Bristol Bay." *News Watch*. Web. 20 Jan. 2012.

<<http://newswatch.nationalgeographic.com/2011/10/18/bristol-bay/>>. Pg. 6

<sup>115</sup> Ibid., 6

be partially dewatered.<sup>116</sup> Groundwater in the vicinity will also be pumped for development, altering the cycle of recharging stream flow. The waste-to-metals ratio in the Pebble site would be at least 189 to 1.<sup>117</sup> The latest projection for the mineral resource at Pebble is 10.78 billion tons, but when processed, approximately 99% would become tailings waste (10.67 billion tons).<sup>118</sup> The waste rock will be contaminated with a variety of toxic metals, most notably antimony, arsenic, copper, manganese, molybdenum, selenium, and zinc.

The environmental impact from the Pebble project could be severe and irreversible. The proposed Pebble mine is 30 times the size of the largest mine in Alaska.<sup>119</sup> Estimates project that the project would produce between 2.5 and 9 billion tons of waste<sup>120</sup> containing elements, such as copper and other heavy metals, that would threaten municipal water supplies, several fishery areas (including spawning and breeding ground for world renowned populations of salmon), wildlife health and recreation areas.<sup>121</sup> If this project moves forward, the toxins would have to be contained and treated in perpetuity, a near impossible task considering challenges of the local environment. The Bristol Bay landscape is extremely water saturated. Thousands of lakes and ponds cover the landscape, interwoven with hundreds of streams, all connected

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<sup>116</sup> Ibid., 6

<sup>117</sup> Parker, Geoffrey, Frances Raskin, Carol Ann Woody, and Lance Trasky. *Pebble Mine: Fish, Minerals, and Testing the Limits of Alaska's "Large Mine Permitting Process"* Rep. 1st ed. Vol. XXV. Duke University School of Law, June 2008. Print. Alaska Law Review. Pg. 14

<sup>118</sup> "Updated Mineral Resource Estimate for Pebble Prospect." *Pebble Limited Partnership*. 1 Feb. 2012. Web. 25 Nov. 2011. <<http://www.pebblepartnership.com/node/201>>.

<sup>119</sup> "Pebble Mine Is Far Too Risky Size Place and Sulfur Make the Mining Unwise." *Fairbanks Daily News-Miner*. Feb. 2011. Web. 20 Feb. 2012. <[http://www.newsminer.com/view/full\\_story/11681367/article-Pebble-Mine-is-far-too-risky--Size--place-and-sulfur-make-the-mining-unwise](http://www.newsminer.com/view/full_story/11681367/article-Pebble-Mine-is-far-too-risky--Size--place-and-sulfur-make-the-mining-unwise)>.

<sup>120</sup> "Northern Dynasty Minerals Ltd. - Welcome to Northern Dynasty Minerals - Thu Apr 19, 2012." *Northern Dynasty Minerals*. Web. 20 Nov. 2011. <<http://www.northerndynastyminerals.com/ndm/home.asp>>.

<sup>121</sup> Moran, Robert. *Pebble Mine: Hydrogeology and Geochemistry Issues*. Sept. 2007. Web. Dec. 2011. <[http://www.fish4thefuture.com/pdfs/Moran\\_Hydrogeology\\_Geochemistry\\_8\\_9\\_07.pdf](http://www.fish4thefuture.com/pdfs/Moran_Hydrogeology_Geochemistry_8_9_07.pdf)>

by swampy tundra meadows and bogs. In a constant state of flooding, the mine would require perpetual pumping to divert toxic laden and cyanide-laced leach waters into a 20-square mile lagoon.<sup>122</sup> The lagoon would require constant monitoring, and would be contained by a series of earthen dams, one of which would be larger than the Three Gorges Dam complex in China.<sup>123</sup> Technical literature fails to show an example of any similar tailings impoundment that has not released toxic contaminants into the environment, especially following site closure.<sup>124</sup>

The risk of toxic leakage into the fragile Bristol Bay watershed is dangerously compounded by the fact that the development would occur in one of the most seismically active and volcanic areas on the planet.<sup>125</sup> Alaska experiences magnitude 6-7 earthquakes at least six times a year and one earthquake magnitude eight or larger approximately every 13 years.<sup>126</sup> Scientists have questioned whether the dam could withstand the impact of a large earthquake, such as the 9.2 shock that hit the city of Anchorage in 1964.<sup>127</sup> Because the Pebble site straddles the Kvichak and Nushagak river drainages, any release of waste into the surface or groundwater could potentially harm Bristol Bay's salmon and the livelihoods of the Alaska Natives, commercial fisherman, and the sport fishing business owners, all of whom depend on the salmon for their economic support, subsistence hunting and fishing, and cultural well-being. A recent

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<sup>122</sup> Ketchum, Robert. "Bristol Bay." *News Watch*. Web. 20 Jan. 2012. <<http://newswatch.nationalgeographic.com/2011/10/18/bristol-bay/>>.

<sup>123</sup> Ketchum, Robert. "Bristol Bay." *News Watch*. Web. 20 Jan. 2012. <<http://newswatch.nationalgeographic.com/2011/10/18/bristol-bay/>>.

<sup>124</sup> Chambers, Dave, Robert Moran, and Lance Trasky. *Bristol Bay's Wild Salmon Ecosystems and Pebble Mine: Key Considerations for a Large-Scale Mine Proposal*. Wild Salmon Center and Trout Unlimited., Jan, 2012. Print. Pg. 11

<sup>125</sup> Department of Natural Resources. *Tailings Impoundment A Initial Application Report*. Sept. 2006. Web. Dec. 2011. <<http://dnr.alaska.gov/mlw/mining/largemine/pebble/2006/damaap.pdf>>.

<sup>126</sup> "Alaska Earthquake Hazard Safety Division." *Earthquake Risk in Alaska*. Web. 15 Dec. 2011. <[http://www.dggs.dnr.state.ak.us/seismic\\_hazards\\_earthquake\\_risk.htm#AlaskaEarthquakeStats](http://www.dggs.dnr.state.ak.us/seismic_hazards_earthquake_risk.htm#AlaskaEarthquakeStats)>.

<sup>127</sup> "About Pebble Mine." *Save Bristol Bay*. Web. 15 Dec. 2011. <<http://www.savebristolbay.org/about-the-bay/about-pebble-mine>>.

review of 25 large-scale mines in the U.S. revealed that 19 violated state and federal requirements for water-quality standards.<sup>128</sup> The same study shows that of these 25 mines, 100 percent predicted compliance with the required water quality standards before operations began, yet 76% of the mines didn't meet those standards.<sup>129</sup> These studies contextualize the promises that the mining companies have made, highlighting that although developers exhibit a confidence in mitigation and containment strategies, there is concrete evidence that damage to local ecosystems is highly likely. In addition to the primary threats of acid mine drainage and tailings dam failure, construction-related contamination of ground and surface water can result from: accidental discharge of process water, leakage from a post-mining pit lake, pipeline failures, toxic dust, and "settleable" and suspended solids deposited in lakes and streams.<sup>130</sup> These various sources of contamination can adversely affect the health and function of aquatic ecosystems, changing water chemistry, and altering food webs.

Although the Pebble Partnership proposes 2,000 jobs for the first phase of the mining operation, that number would later drop to 1,000 long-term jobs. Opponents insist that, while jobs may be created, at least 12,000 jobs related to salmon fishing and processing would slowly be eliminated should the salmon migration be negatively affected.<sup>131</sup> Commercial and subsistence fishing opportunities have supported the state

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<sup>128</sup> Kuipers, J.R., A. S. Maest, K. A. MacHardy, and G. Lawson. *Comparison of Predicted and Actual Water Quality at Hardrock Mines: The Reliability of Predictions in Environmental Impact Statements*. Butte, MT: Kuipers and Associates, 2006. Print. Pg. 195

<sup>129</sup> Kuipers, J.R., A. S. Maest, K. A. MacHardy, and G. Lawson. *Comparison of Predicted and Actual Water Quality at Hardrock Mines: The Reliability of Predictions in Environmental Impact Statements*. Butte, MT: Kuipers and Associates, 2006. Print. Pg. 195

<sup>130</sup> Chambers, Dave, Robert Moran, and Lance Trasky. *Bristol Bay's Wild Salmon Ecosystems and Pebble Mine: Key Considerations for a Large-Scale Mine Proposal*. Wild Salmon Center and Trout Unlimited., Jan, 2012. Print. Pg. 11

<sup>131</sup> Fisher, Steve. "Fishers of Nation's Largest Salmon Run Fight Proposed Mine." *National Geographic*. 7 Oct. 2011. Web. Dec. 2012. <[news.nationalgeographic.com/news/2011/10/11-salmon-pebble-mine/](http://news.nationalgeographic.com/news/2011/10/11-salmon-pebble-mine/)>.

of Alaska and local populations for countless generations and with proper management should continue to flourish for the foreseeable future. The sustainable nature of the existing industry in Bristol Bay is unique and could not be emulated by a finite window of jobs associated with mining development. Above all, opponents of the mine argue that Alaskans should not risk Bristol Bay's health for the sake of a mining operation that will benefit few locals or the state. Because of the tax system for hard-rock mining, state and local governments would receive limited revenues, with nearly all profits going to companies outside of Alaska.<sup>132</sup> Steve Fisher, writing for *National Geographic News*, highlights that for the tight knit fishing community of Bristol Bay, it's about more than just jobs; "it's a way of life that ties generations to each other, and the watershed where they live."<sup>133</sup> "Salmon are the number one source of life here," explains Bobby Andre, a Yup'ik elder and lifelong Bristol Bay resident: "They're the most important source of food. But they also have great cultural and spiritual value to my people."<sup>134</sup> If the Pebble mine is granted the necessary permits, the creation infrastructure would allow for the development of additional mining claims by lowering economic barriers. Mining claims in the immediate vicinity of the Pebble mine cover over 500,000 acres; their development could create devastating cumulative environmental impacts and forever change the unique qualities of the Bristol Bay ecosystem.<sup>135</sup>

Few authorities involved in the Pebble project proposal refute that the project carries significant risks to the local fisheries and environment. The crux of debate centers

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<sup>132</sup> "Save Bristol Bay." *Save Bristol Bay*. Trout Unlimited. Web. 20 Dec. 2011.

<<http://www.savebristolbay.org/for-the-press/news-archive/alaskas-pebble-mine-fish-versus-gold/>>.

<sup>133</sup> Fisher, Steve. "Fishers of Nation's Largest Salmon Run Fight Proposed Mine." *National Geographic*. 7 Oct. 2011. Web. Dec. 2012. <[news.nationalgeographic.com/news/2011/10/11-salmon-pebble-mine/](http://news.nationalgeographic.com/news/2011/10/11-salmon-pebble-mine/)>.

<sup>134</sup> "Save Bristol Bay." *Save Bristol Bay*. Trout Unlimited. Web. 20 Dec. 2011.

<<http://www.savebristolbay.org/for-the-press/news-archive/alaskas-pebble-mine-fish-versus-gold/>>.

<sup>135</sup> "Mining Claims Near Pebble." July 2010. Web. Jan. 2011.

<<http://www.groundtruthtrekking.org/Issues/MetalsMining/MiningClaimsNearPebble.html>>.

around whether the risks can be managed, and whether the unique and sensitive local ecosystem has the capacity to sustain function during and after development. Sean Magee, the Pebble Partnership's director of public affairs, conceded that although "there are plenty of examples of bad mining practices, especially in the American West," most occurred decades ago, when environmental standards weren't as high as today.<sup>136</sup> According to Magee, "there are plenty of great examples of hard-rock mining that have safely co-existed with fisheries," including Northwest Alaska's Red Dog Mine, the interior regions Fort Knox gold mine, and SE Alaska's Greens Creek mine.<sup>137</sup> Lauren Oakes, conservation programs officer with Trout Unlimited Alaska (environmental non-governmental organization) responded to Magee's comments, stating that all three of the mines in Alaska that he referenced have adversely affected the local environment. Red Dog alone, she says, has had more than 100 EPA violations and been sued for contaminating local food resources.<sup>138</sup> Opposition voices to the development of Pebble not only cite the poor legacy of other mining projects in the area, but also the unprecedented size and impact of the current proposal. Considering the magnitude of what can be gained in comparison to what can be lost with such a large mineral development, fierce opposition is not surprising or unwarranted. We must respect and embrace the state and federal permitting processes that have facilitated development proposals throughout the country. As the following chapter will demonstrate, the EPA plays an essential role in the permitting process, assisting in the evaluation of whether the risks of such a development will outweigh the perceived benefits.

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<sup>136</sup> "Save Bristol Bay." *Save Bristol Bay*. Trout Unlimited. Web. 20 Dec. 2011.  
<<http://www.savebristolbay.org/for-the-press/news-archive/alaskas-pebble-mine-fish-versus-gold>>.

<sup>137</sup> [Ibid.](#)

<sup>138</sup> [Ibid.](#)



## Chapter 2:

### **Applying CWA 404(c) to the Pebble Mine Proposal in Bristol Bay**

The EPA is only one of four different agencies that manages and facilitates the 404 permitting process, and has been accordingly delegated specific responsibilities enacted by Congress. These responsibilities include developing and interpreting policy, reviewing and commenting on individual permit applications, and denying or restricting the use of any area as a disposal site.<sup>139</sup> This thesis aims to support the EPA's ability to deny or restrict a permit specifically under section 404(c) of the CWA. In order to investigate whether or not the permitting process in Bristol Bay should be prohibited by EPA authority under CWA jurisdiction, we must analyze specifically whether the Pebble Project will have, as articulated by the 404(c) statute, **“an unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreational areas.”**<sup>140</sup> Although the distinction of “unacceptable adverse effect” allows for some variance in interpretation, according to EPA regulations, “Unacceptable adverse effect means impact on an aquatic wetland ecosystem which is likely to result in significant degradation of municipal water supplies (including surface or groundwater) or significant loss of or damage to fisheries, shellfishing, or wildlife habitat or recreation areas.”<sup>141</sup> In the preamble to CWA Section

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<sup>139</sup> "Section 404 Permitting." *Home*. Web. 20 Dec. 2011.  
<<http://water.epa.gov/lawsregs/guidance/cwa/dredgdis/>>.

<sup>140</sup> *Ibid*.

<sup>141</sup> Chambers, Dave, Robert Moran, and Lance Trasky. *Bristol Bay's Wild Salmon Ecosystems and Pebble Mine: Key Considerations for a Large-Scale Mine Proposal*. Wild Salmon Center and Trout Unlimited., Jan, 2012. Print. Pg. 75

404(c) regulations, the EPA stated that “where it is possible it is much preferable to exercise this authority before the Corps (Army Corps of Engineers)...has issued a permit, and before the permit holder has begun operations.”<sup>142</sup> To further contextualize the legal meaning of ‘unacceptable adverse effect,’ it should be noted that in crafting the Section 404(c) regulations, the EPA made the distinction that even in the absence of a permit application identifying specific discharge proposals, “there are instances where a site may be so sensitive and valuable that it is possible to say that any filling of more than X acres will have unacceptable adverse effects.”<sup>143</sup> This distinction proves to be highly relevant in the case of Bristol Bay because although the PLP has submitted preliminary project proposals, no development specifics have been finalized. Consequently, the EPA 404(c) permitting investigation must take into account both the available development proposals and the viability of avoiding unacceptable adverse effects in an extremely sensitive ecosystem regardless of project details. This chapter will provide a site characterization and forecasted extent and location of adverse environmental impacts for each specific 404(c) designation: municipal water supplies, fishery areas, wildlife, and recreational areas. The provided information will reveal the necessity and legitimacy of an EPA 404(c) ruling in order to avoid unacceptable, adverse damage to the Bristol Bay watershed.

Before addressing each statute of 404(c) individually, we must take note of the general risks associated with hard-rock mining development that will affect all statutes, namely water pollution. Open-pit mining requires the excavation of large quantities of waste rock in order to extract the desired mineral ore. The ore is subsequently crushed

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<sup>142</sup> Ibid.

<sup>143</sup> Ibid.

into finely ground tailings to be processed with various chemicals and other separation processes to extract the final product.<sup>144</sup> This invasive type of mining generally creates four main types of water pollution: heavy metal contamination and leaching, processing chemicals pollution, erosion and sedimentation, and acid mine drainage.<sup>145</sup> These four types of water pollution could all adversely affect all four designations of 404(c), considering how crucial high water quality is to the complex, interdependent function of the Bristol Bay watershed.<sup>146</sup> Processing chemicals pollution occurs when chemical agents such as cyanide or sulfuric acid that are used to separate the mineral from ore spill, leak, or leach from the mine site to nearby water bodies. These chemicals are highly toxic. In the absence of proper mitigation and maintenance, erosion and sedimentation resulting from construction can also adversely affect water quality. Erosion and sedimentation due to general weathering or extreme events such as seismic activity exposes soil and rock that is carried into the watershed. Excessive sedimentation can clog riverbeds and smother vegetation, wildlife habitat, and aquatic organisms.<sup>147</sup> Numerous studies have shown that mining practices generally produce significant sources of sediment and can cause suspended solids to enter aquatic ecosystems.<sup>148</sup> The Pebble Mine and its associated facilities would generate and be required to manage an enormous amount of sediment from land clearing and gravel extraction.

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<sup>144</sup> "Mining and Water Pollution." *Safe Water Drinking Foundation*. Web. Dec. 2011.

<<http://www.safewater.org/PDFS/resourcesknowthefacts/Mining+and+Water+Pollution.pdf>>.

<sup>145</sup> *Ibid.*

<sup>146</sup> Parker, Geoffrey, Frances Raskin, Carol Ann Woody, and Lance Trasky. *Pebble Mine: Fish, Minerals, and Testing the Limits of Alaska's "Large Mine Permitting Process"* Rep. 1st ed. Vol. XXV. Duke University School of Law, June 2008. Print. Alaska Law Review. Pg. 6

<sup>147</sup> "Mining and Water Pollution." *Safe Water Drinking Foundation*. Web. Dec. 2011.

<<http://www.safewater.org/PDFS/resourcesknowthefacts/Mining+and+Water+Pollution.pdf>>.

<sup>148</sup> Chambers, Dave, Robert Moran, and Lance Trasky. *Bristol Bay's Wild Salmon Ecosystems and Pebble Mine: Key Considerations for a Large-Scale Mine Proposal*. Wild Salmon Center and Trout Unlimited., Jan, 2012. Print. Pg. 64

The formation of acid mine drainage has been described as one of the largest environmental problems facing the mining industry, and acid mine drainage is the single greatest threat to the salmon and salmon habitat in the Bristol Bay drainage.<sup>149</sup> It impacts the water quality in two critical ways: It lowers pH (increases acidity), and it increases the presence of dissolve metals to potentially toxic levels.<sup>150</sup> Sulfuric acid is produced when sulfides in the rocks are exposed to air and water.<sup>151</sup> When large amounts of rocks containing sulfide are excavated from an open pit mining operation, sulfuric acid is produced and acid mine drainage occurs. The acid will continue to leach from the rocks as long as it is exposed to air and water, and it can take hundreds, even thousands of years until the sulfides fully leach out. Acid drainage can be carried from the mine site through rainwater and surface drainages and deposited into nearby rivers, streams, lakes, and groundwater resources. Heavy metal pollution occurs when metals such as copper are excavated and subsequently exposed to water, leaking into nearby watersheds and threatening wildlife, fishery areas, and water quality. Countless fish kills resulting from the release of acid and metals from mine sites into nearby water sources have been reported from areas worldwide. Acidic drainage is estimated to have cost the Canadian mining industry between 2 and 5 billion dollars.<sup>152</sup> The mining industry has spent massive amounts of money attempting to prevent, mitigate, control, and stop the release of acid mine drainage, yet it remains one of the greatest environmental liabilities. This risk is especially acute in an environment as economically and ecologically valuable as Bristol Bay. There is widespread recognition that no hard-rock surface mines exist today

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<sup>149</sup> Ibid.

<sup>150</sup> Ibid., Pg. 51

<sup>151</sup> "Mining and Water Pollution." *Safe Water Drinking Foundation*. Web. Dec. 2011.  
<<http://www.safewater.org/PDFS/resourcesknowthefacts/Mining+and+Water+Pollution.pdf>>.

<sup>152</sup> Ibid., Pg. 4

that can demonstrate that acid mine drainage can be stopped once it occurs on a large scale.<sup>153</sup> Predicting the potential for acid mine drainage is highly variable and difficult, and further investigation will prove that mining development in such an important and fragile ecosystem greatly threatens the future health of the region. Heavy metal contamination and leaching, processing chemicals pollution, erosion and sedimentation, and acid mine drainage could all adversely affect Bristol Bay's wildlife, municipal water supplies, fishery areas, and recreation industry in an unacceptable manner. While water pollution threatens all statutes of 404(c), we must also explore the designations individually to further understand an EPA decision in Bristol Bay.

The 404(c) designation of *Fishery Areas* (including spawning and breeding areas) is the most pertinent part of the clause in consideration of the Pebble mine proposal in Bristol Bay. Nordstrom and Alpers (1999) reported that millions, perhaps billions of fish have been killed from mining activities in the U.S. in the past century.<sup>154</sup> The Bristol Bay watershed provides spawning grounds for trophy rainbow trout and all five species of Pacific salmon, including the largest sockeye salmon runs on earth in addition to a variety of other fish and wildlife species. These species all depend on the clean water and undisturbed habitat they currently enjoy to survive. The proposed mining operations pose substantial threats to these irreplaceable fishery areas that should be seriously investigated and considered as a part of EPA deliberations.

Taking into consideration the scale and lifespan of the Pebble Mine, cumulative impacts on fishery areas and spawning grounds could be severe and irreversible. Nearly all the interconnected waters within the direct vicinity of the Pebble mining claims

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<sup>153</sup> Ibid., Pg. 19

<sup>154</sup> Jennings, S.R., and P.S. Blicher. *Acid Mine Drainage and Effects on Fish Health and Ecology: A Review*. Tech. Bozeman, MT: Reclamation Research Group, LLC, June 2008. Print. Pg. 7

provide important habitat for rearing, migration, spawning, and overwintering of sockeye, chinook, and coho salmon in addition to arctic grayling, rainbow trout, dolly varden, northern pike, and other freshwater species.<sup>155</sup> Iliamna Lake, immediately downstream of the Pebble claims, is the largest Sockeye rearing lake in Alaska and one of the most productive rearing lakes in the world. The Koktuli River, bordering part of the mine site, produces about a quarter to over half of the Chinook salmon in the Nushagak system (one of the most prolific rivers in the entire watershed).<sup>156</sup> In 2004 approximately 13,900 Salmon spawned in the S. Fork of the Koktuli River.<sup>157</sup> The Upper Talarik, which also borders a section of the mine site, provided habitat for approximately 124,000 spawning Sockeye Salmon and 47,100 spawning Coho salmon in 2004.<sup>158</sup> Because of the interconnectedness of the Bristol Bay watershed, potential adverse impacts will not be limited to streams in the direct vicinity. Water quality can be compromised throughout the entire watershed if toxic leakage is serious enough.

The footprint of the mine and tailings ponds will cover 30 square miles of fishery habitat and fully or partially dewater approximately 60 stream miles plus associated tributaries and wetlands.<sup>159</sup> Pebble developers have proposed taking 2 million gallons of water daily to support mining operations.<sup>160</sup> Dewatering fish habitat could threaten rearing, migration, and spawning and adversely affect the reproductive capacity

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<sup>155</sup> *Sport Fisheries*. Alaska Department of Fish and Game. Web. Nov. 2011. <<http://www.sf.adfg.state.ak.us/AnadromousRegPDFs/swt/ILI250.pdf>>.

<sup>156</sup> Alaska. Department of Fish and Game. *Survey of the Chinook Salmon Sport Fishery in the Lower Nushagak River, Alaska*. By Thomas Cappiello and Jason Dye. Vol. 06-68. 2006. Print. Fishery Data Series. Appendix B, available at <http://www.sf.adfg.state.ak.us/FedAidPDFs/fds06-68.pdf>

<sup>157</sup> Hauser, William. *Potential Impacts of the Proposed Pebble Mine on Fish Habitat and Fishery Resources of Bristol Bay*. Rep. Fish Talk Consulting, 2007. Print. pg. 10

<sup>158</sup> Ibid.

<sup>159</sup> Ibid.

<sup>160</sup> Rickstad, Erik. "Alaska's Bristol Bay World-famous Salmon Rivers Threatened by Pebble Mine. Help Save Them!" Web. 15 Dec. 2011. <<http://www.orvis.com/intro.aspx?subject=4571>>

of fish populations. Dewatering will also affect stream productivity because the average velocity of stream flow will be reduced. Reducing stream velocity will in turn reduce the capacity of the stream to move substrate materials and fine materials.<sup>161</sup> These materials will subsequently settle in the streambed and smother food organisms and fish eggs.<sup>162</sup> Construction of an access road may require as many as 120 stream crossings, 24 of which currently provide nearly 1200 acres of spawning habitat for up to 552,000 sockeye salmon and other species.<sup>163</sup> This habitat will be seriously threatened by construction and road activity. Construction of the Port Facility at Cook Inlet could also directly destroy freshwater streams and wetlands within the footprint of the facility in addition to intertidal and upland habitats.<sup>164</sup>

The creation of a mine site, access road, power and transmission corridor, and port facility will also result in habitat fragmentation. Fragmentation will disrupt migration routes between different spawning and rearing areas, marginalizing the productivity of fishery areas.<sup>165</sup> A pipeline will transport the ore slurry from the mine to the port at the Cook Inlet and another pipeline will transport reused water from the port back to the mine.<sup>166</sup> After some years of use, these pipes will be susceptible to corrosion and breakage, releasing heavy metal sulfide concentrates, dissolved heavy metal ions, and processing chemicals in to adjacent streams and aquatic habitats.<sup>167</sup> Although the access roads will be specifically constructed for the Pebble project, they will also provide access

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<sup>161</sup> Hauser, William. *Potential Impacts of the Proposed Pebble Mine on Fish Habitat and Fishery Resources of Bristol Bay*. Rep. Fish Talk Consulting, 2007. Print. pg. 7

<sup>162</sup> Ibid., pg. 11

<sup>163</sup> Ibid.

<sup>164</sup> Ibid.

<sup>165</sup> Ibid., pg. 12

<sup>166</sup> Ibid., pg. 13

<sup>167</sup> Ibid.

for other residential, commercial, and recreational users. Road infrastructure will increase the impact of human activity in this pristine environment. A larger human impact in the area could adversely affect the pristine nature of the watershed.

Because the Pebble deposit is located in one of the most seismically active areas in North America, potential adverse effects will largely depend upon earthquake activity. Failure of any aspect of the mining infrastructure will result in unacceptable adverse impacts. Because the large dams containing toxic waste must be contained in perpetuity we should consider the consequences of even a minor dam failure. Cumulative effects of smaller earthquakes and storm events will reduce the integrity of the access road, port facility, and tailings storage ponds. In time, the accumulation of natural processes or the likelihood of a larger, isolated seismic event could cause the dams to breach. Earthen dams also routinely fail because water pressure persistently erodes and takes advantage of weak spots in the embankments.<sup>168</sup> If a dam fails through consistent weathering or an isolated event, billions of tons of mining waste, including toxic materials, could wash down any or all three streams that will be diverted to fill the tailing ponds.<sup>169</sup> The silt load alone of a dam failure would adversely affect spawning habitat and productivity of fish populations. These adverse effects could also be felt throughout the entire watershed considering the interconnectedness of the various river systems. Water quality could be destroyed and fish populations in the Kvichak and Nushagak rivers could be significantly lowered or even eliminated. The failure of a much smaller tailings dam at the Brewer Gold Mine in South Carolina killed all of the fish in the Lynches River for 49 miles

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<sup>168</sup> Ibid., pg. 14

<sup>169</sup> Ibid.



downstream.<sup>170</sup> This was an extremely small spill in comparison to the billions of gallons of water and over 10 billion tons of waste that could potentially be released from the Pebble site.

The International Commission on Large Dams has gathered global data on reported tailings dam's failures, breaches, and mudflows worldwide, reporting 72 tailings dam accidents in the United States and 11 in Canada between 1960 and 2000.<sup>171</sup> According to the World Information Service on Energy (WISE), 85 major mine tailings dams failed between 1960 and 2006.<sup>172</sup> Twenty-four of the 85 tailings dams that failed were copper or gold mines, and failures occurred in all types of tailings dam construction.<sup>173</sup> The majority of failures occurred at operating mines, and 39% of them occurred in the United States.<sup>174</sup> This statistic indicates that many failures were not just a consequence of dated technology or limited regulation.

Each species of salmon returns to their natal stream to spawn. The salmon's remarkable ability to return to their home waters to spawn depends upon fragile chemical balances throughout their respective watersheds. During the early years of rearing (smolt stage) young salmon generate an imprint of the chemical composition of their natal water. After maturation at sea, upstream migration towards spawning grounds is guided by the amazing ability to discriminate between the chemical compositions of different stream

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<sup>170</sup> Chambers, Dave, Robert Moran, and Lance Trasky. *Bristol Bay's Wild Salmon Ecosystems and Pebble Mine: Key Considerations for a Large-Scale Mine Proposal*. Wild Salmon Center and Trout Unlimited., Jan, 2012. Print. Pg. 35

<sup>171</sup> Ibid.

<sup>172</sup> Ibid.

<sup>173</sup> Ibid.

<sup>174</sup> Ibid.

waters and thus identify and move towards their stream of birth to spawn and die.<sup>175</sup> In order to return to spawning grounds after years of maturation at sea, adult salmon continuously utilize olfaction, a primary sensory system. Olfactory function (sense of smell) conveys important information to the salmon, enabling them to mate, locate food, discriminate kin, avoid predators, and locate spawning beds.<sup>176</sup> Generally speaking, all salmon, trout and char require cold, relatively pure, well-oxygenated water that is free of heavy sediment loads and chemical contaminants in order to maintain necessary olfactory function.<sup>177</sup>

The Pebble Partnership has revealed that about ninety-five percent of the metal produced by the mine will be copper.<sup>178</sup> Concentrations of copper above natural levels can be highly toxic to aquatic species and cause irreversible harm. Copper is a neurobehavioral toxicant to fish, and it has been widely demonstrated that copper disrupts normal function of the olfactory system.<sup>179</sup> More specifically, copper interferes with the ability of fish to detect and respond to chemical signals in their respective environments. Chemosensory deprivation has serious implications for salmon because they rely on their sense of smell to find food, avoid predators, form social dominance hierarchies, navigate from the ocean to freshwater spawning habitats, avoid disease, and assess the reproductive status of prospective mates.<sup>180</sup> Any toxic leakage or dam failure would have

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<sup>175</sup> "Integrative and Comparative Biology." *Cortisol and Pacific Salmon: A New Look at the Role of Stress Hormones in Olfaction and Home-stream Migration*. Web. 20 Apr. 2012. <<http://icb.oxfordjournals.org/content/42/3/574.full>>.

<sup>176</sup> Tierney, Keith B. *Review, Olfactory Toxicology in Fishes*. Vol. 96. 2010. Print. Aquatic Toxicology. Pg. 1

<sup>177</sup> Ibid.

<sup>178</sup> Parker, Geoffrey, Frances Raskin, Carol Ann Woody, and Lance Trasky. *Pebble Mine: Fish, Minerals, and Testing the Limits of Alaska's "Large Mine Permitting Process"* Rep. 1st ed. Vol. XXV. Duke University School of Law, June 2008. Print. Alaska Law Review. Pg. 17

<sup>179</sup> Ibid.

<sup>180</sup> Ibid.

disastrous consequences, affecting the sensory functions of fish and destroying fishery area habitat.

Assuming that dam failure doesn't occur, fishery areas could still be adversely affected in an unacceptable manner. As previously discussed, acid mine drainage is considered one of the greatest environmental liabilities associated with mining.<sup>181</sup> Due to the sulfides in the ore, the majority of rock at the proposed Pebble Mine is considered "reactive" rock, at high risk for acid and metals pollution.<sup>182</sup> When the sulfides in the excavated rock are exposed to air and water, they react to form acid that increases copper and other harmful pollutants downstream. Rain, which is acidic, can also mobilize and wash copper and other metals into salmon habitat from the mining regions.<sup>183</sup> Even miniscule increases (2 parts per billion) of copper in freshwater streams and rivers harm salmon, damaging their olfactory senses and causing them to become disoriented and lose their ability to migrate successfully to spawning grounds.<sup>184</sup> Numerous elements, in addition to copper, such as zinc, cadmium, mercury, iron, lead, aluminum, and selenium are released at hard-rock mining sites, further increasing the deadly effects on fish populations.<sup>185</sup>

The fishery areas in Bristol Bay are important and unique as an isolated entity, but are also greatly inter-connected with other aspects of the ecosystem. Degradation of the fishery areas in Bristol Bay would in turn adversely affect the other designations of 404(c), namely wildlife and recreational areas. Many findings show that management of

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<sup>181</sup> Jennings, S.R., and P.S. Blicher. *Acid Mine Drainage and Effects on Fish Health and Ecology: A Review*. Tech. Bozeman, MT: Reclamation Research Group, LLC, June 2008. Print. Pg. 7

<sup>182</sup> *Draft Environmental Baseline Studies 2006 Study Plans. Geochemical Characterization and Metal Leaching/Acid Rock Drainage*. Rep. Northern Dynasty Mines, July 2006. Print.

<sup>183</sup> Woody, Dr. Carol Ann. *Summary Of: Copper: Effects on Freshwater Food Chains and Salmon A Literature Review*. Tech. Trout Unlimited, 2007. Print. Fisheries Research and Consulting.

<sup>184</sup> Ibid.

<sup>185</sup> Ibid.

aquatic and terrestrial ecosystems must view spawning salmon and their carcasses as important habitat components for sustaining the production of fish as well as other salmon dependant species within watersheds.<sup>186</sup> Adversely affecting salmon populations would in turn threaten the entire ecosystem because most aquatic food webs and other wildlife depend on salmon as an important part of their diets. Resident fish of other species and juvenile salmon feed directly on the flesh of spawned out and dead fish and on salmon eggs that were not properly buried.<sup>187</sup> Pacific salmon return significant amounts of marine nutrients from the Northern Pacific Ocean back to land, and into freshwater watersheds.<sup>188</sup> This cycle is a major link among marine, freshwater, and terrestrial ecosystems as salmon move important nutrients across ecosystem boundaries. Many studies overwhelmingly show that the primary production in lakes and streams in Bristol Bay is increased by the nutrients released by salmon carcasses such as nitrogen.<sup>189</sup> During years of maximal salmon numbers in a mass-balanced model of nitrogen in the riparian zone of Lynx creek, Alaska, marine-derive nitrogen (nitrogen derived from salmon populations) accounted for 25% of total nitrogen output.<sup>190</sup> Marine derived nitrogen supplies more than 90% of the diet for brown bears in Alaska.<sup>191</sup> Considering the fact that only 10%-30% of salmon eggs deposited by a female will survive to emerge

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<sup>186</sup> Cederholm, Jeff, Matt Kunze, Takeshi Murota, and Atuhiro Sibatani. *Pacific Salmon Carcasses: Essential Contributions of Nutrients and Energy For Aquatic and Terrestrial Ecosystems*. Publication. 10th ed. Vol. 24. Fisheries Management and Habitat. Print. Pg. 6

<sup>187</sup> Hauser, William. *Potential Impacts of the Proposed Pebble Mine on Fish Habitat and Fishery Resources of Bristol Bay*. Rep. Fish Talk Consulting, 2007. Print. Pg. 5

<sup>188</sup> Cederholm, Jeff, Matt Kunze, Takeshi Murota, and Atuhiro Sibatani. *Pacific Salmon Carcasses: Essential Contributions of Nutrients and Energy For Aquatic and Terrestrial Ecosystems*. Publication. 10th ed. Vol. 24. Fisheries Management and Habitat. Print. Pg. 7

<sup>189</sup> Ibid.

<sup>190</sup> Naiman, Robert. *Riparia: Ecology, Conservation, and Management of Streamside Communities*. London: Elsevier Academic, 2005. Print. Pg. 184

<sup>191</sup> Ibid.

as a fry, contributions of marine nutrients from salmon eggs are also significant.<sup>192</sup> A variety of insects, birds, small and large mammals also utilize the carcasses directly and indirectly and readily consume salmon eggs. In addition to benefitting numerous animal species, the nutrients are transported into the groundwater, benefitting the riparian vegetation. Simply stated, if the productivity of salmon populations in Bristol Bay is compromised, the entire ecosystem will be at risk of decline or collapse. In order to ensure the continued health and sustainability of the Bristol Bay ecosystem, it will be of the utmost significance to protect healthy salmon runs in the region and the current mining claims will cause unacceptable adverse to these runs.

The second designation critical to 404(c) is wildlife. The diverse wildlife in Bristol Bay currently enjoy pristine, healthy habitat and many species could undoubtedly face various types of adversity in the wake of mining development. According to the Pebble Partnership Pre-Permitting Environmental/Socio-Economic Data Report Series, 40 species of mammals are known or are suspected to occur within the proposed mine site and transportation areas.<sup>193</sup> The caribou is the most abundant large mammal in Bristol Bay and is harvested in large numbers by both subsistence and sport hunters.<sup>194</sup> The proposed mine site is located within the annual range of the Mulchatna caribou herd. The Mulchatna caribou herd numbered as many as 193,000 in 1996, though the population has declined substantially in recent years.<sup>195</sup> More than one quarter of all the collared caribou in the area were located at the proposed site at least once during the time

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<sup>192</sup> Cederholm, Jeff, Matt Kunze, Takeshi Murota, and Atuhiro Sibatani. *Pacific Salmon Carcasses: Essential Contributions of Nutrients and Energy For Aquatic and Terrestrial Ecosystems*. Publication. 10th ed. Vol. 24. Fisheries Management and Habitat. Pg. 9

<sup>193</sup> "Report N - Terrestrial Wildlife and Habitats." *Pebble Limited Partnership*. Web. 20 Jan. 2012. <<http://www.pebblepartnership.com/documents/report-n-terrestrial-wildlife-and-habitats>>. Pg. 1

<sup>194</sup> *Ibid.*, pg. 2

<sup>195</sup> Healy, Carol. *Caribou Management Report*. Tech. Alaska Department of Fish and Game, 2001. Print. Division of Wildlife Conservation. Pg. 2

their collars were active, suggesting that a large number of caribou used the mine site for at least a short period of time.<sup>196</sup> The largest numbers of caribou move through the greater deposit area during the post-calving season, when they are trying to escape mosquitoes and parasitic flies.<sup>197</sup> Aerial surveys of the mine study area in the post-calving period produced estimates of approximately 10,000 caribou on July 1, 2004, approximately 5,000 caribou on June 28, 2006, and approximately 2,100 caribou on June 27, 2007.<sup>198</sup> Larger numbers of caribou have been recorded in the past, most notably 100,000 caribou in late June 1996 and 180,000 caribou in early July 1997.<sup>199</sup> The above-mentioned numbers depict that the Mulchatna caribou herd is currently experiencing a decrease in population. This decrease could be further compounded by mining development and greatly threaten the herd's long-term stability.

Due to the massive amount of nutrients that the salmon provide in the Bristol Bay Watershed, brown bears also enjoy healthy and dense populations in the region, among the highest in Alaska. Brown bear activity is common near the proposed mine site and transportation corridor areas. Upper Talarik Creek and the salmon streams crossed by the access corridor are essential brown bear concentration streams, where bears seasonally feed on returning and spawned-out salmon. An impressive 31 sightings were recorded on surveys in 2004, 35 in 2005, 31 in 2006, and 16 in 2007.<sup>200</sup> Incidental sightings during other wildlife surveys in and near the mine study area totaled 39 brown bears in 2004 and 69 in 2005.<sup>201</sup> The proposed transportation corridor that would be developed in

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<sup>196</sup> Ibid., pg. 2

<sup>197</sup> "Report N - Terrestrial Wildlife and Habitats." *Pebble Limited Partnership*. Web. 20 Jan. 2012. <<http://www.pebblepartnership.com/documents/report-n-terrestrial-wildlife-and-habitats>>. Pg. 2

<sup>198</sup> Ibid.

<sup>199</sup> Ibid.

<sup>200</sup> Ibid, pg. 3

<sup>201</sup> Ibid.

association with the mine contained moderate densities of brown bears and low densities of black bears.<sup>202</sup> Fifteen brown bears were observed during a helicopter survey of salmon-spawning streams in August 2004, and substantially more were suspected to be present in vegetation along the streams.<sup>203</sup>

Moose, wolves, coyotes and wolverines also enjoy healthy habitat sighted in both the proposed mine site and transportation corridor.<sup>204</sup> Beavers were also observed to have large populations in the deposit area, numbering 113 active colonies in October 2005.<sup>205</sup> The proposed mine site provides important habitat for many of the above-mentioned mammals because they are winter use areas. Winter use areas allow animals to survive through tough winters because they tend to be sheltered and in valleys. If the mine is developed, important winter use habitat will be destroyed, greatly challenging the population distribution of the above-mentioned species.

Surveys have successfully mapped relative distribution, abundance and breeding status of large raptors in the proposed mine site. The bald eagle was the most abundant nesting species (30% of 2005 nests), followed by the golden eagle (20%), rough-legged hawk (14%) and gyrfalcon (13%).<sup>206</sup> Bald eagle nests were found along the lower north and south forks of the Kuktuli River, Upper Talarik Creek and Lower Talarik Creek; and golden eagle, gyrfalcon and rough-legged hawk nesting habitats were found in the Upper Talarik Creek and Kuktuli River drainages.<sup>207</sup> In the transportation study area, eight species of raptors and common ravens were identified and bald eagle and golden eagle

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<sup>202</sup> Ibid.

<sup>203</sup> Ibid., pg. 4

<sup>204</sup> Ibid.

<sup>205</sup> Ibid.

<sup>206</sup> Ibid.

<sup>207</sup> Ibid.

nests were the most abundant.<sup>208</sup> Thirty-seven species of waterbirds were observed during nesting, brood-rearing, molting and migration surveys in the mine study area, and thirty-four species of waterbirds were observed in the proposed transportation corridor.<sup>209</sup> A variety of shorebird species were observed in the mine study area, and six of the fourteen species observed were designated as common breeders in the area.<sup>210</sup> Sparrows were by far the most abundant breeds in the proposed mine site and transportation corridor of the various landbird and shorebird species observed, while warblers, thrushes, and finches were also common.<sup>211</sup>

Iliamna Lake, in close proximity to the proposed mine site, is renowned for its unusually large population of harbor seals that establishes a permanent presence in a freshwater environment. These seals feed exclusively on freshwater fish. Salmonids were a primary form of nutrients and data shows “a strong reliance on adult sockeye salmon during July and August,” when 98% of seal feces contained salmon remains.<sup>212</sup> Total counts of the seals reached 276 seals in 2005 and 313 seals in 2007.<sup>213</sup>

Two distinct populations of beluga whale may also be affected by the proposed mine: the Bristol Bay stock and the Cook Inlet stock. The Bristol Bay stock was estimated at 1,555 animals in 1994.<sup>214</sup> Based on population estimates, the National Marine Fisheries Service lists the Bristol Bay stock as stable and at or near its historic

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<sup>208</sup> Ibid., pg 5

<sup>209</sup> Ibid., pg 7

<sup>210</sup> Ibid., pg. 9

<sup>211</sup> Ibid.

<sup>212</sup> Hauser, William. *Potential Impacts of the Proposed Pebble Mine on Fish Habitat and Fishery Resources of Bristol Bay*. Rep. Fish Talk Consulting, 2007. Print.

<sup>213</sup> "Report N - Terrestrial Wildlife and Habitats." *Pebble Limited Partnership*. Web. 20 Jan. 2012. <<http://www.pebblepartnership.com/documents/report-n-terrestrial-wildlife-and-habitats>>. pg. 10

<sup>214</sup> Lowry, LF, and KJ Frost. *Distribution and Abundance of Beluga Whales in Bristol Bay, Alaska*. Publication. 1st ed. Vol. 95. Alaska Beluga Whale Committee Rep, 1993-1994. Print. Pg. 14



size.<sup>215</sup> The Cook Inlet stock of beluga whales is genetically isolated from other populations and was listed as an endangered species in 2008 under the Endangered Species Act.<sup>216</sup> The Cook Inlet beluga whale stock declined 47 percent between 1994 (estimated 653 whales) and 1998 (estimated 347 whales).<sup>217</sup> Salmon compose a significant amount of the prey base for both stocks of Beluga Whales. The whale populations are small and could be adversely affected by a reduction in prey. In addition to sustenance concerns, chemical and noise pollution from the drainages into the bay could adversely affect whale populations. Anthropogenic sources of sound in the Cook Inlet (small and large vessels, aircraft, oil and gas drilling, marine seismic surveys, pile driving, and dredging) can compromise the abilities of beluga whales to find prey and survive.

Apart from the threat of habitat destruction, increased population footprint, and the resulting impact on the Bristol Bay environment, the primary potential adverse affect of mining development on wildlife would be the destruction of the watershed and salmon populations. Salmon carcasses supply a critical source of energy for the wildlife of Bristol Bay and provide nutrients for the riparian vegetation along spawning streams. This vegetation also supports many different types of wildlife in Bristol Bay. In a uniquely interconnected system of biodiversity, salmon are not only the foundation of Bristol Bay but are at most risk of mining development's impact. Accumulating evidence indicates that many animal's reproductive cycles and seasonal distribution are closely

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<sup>215</sup> Ibid.

<sup>216</sup> "NOAA Fisheries." *Beluga Whale Management and Recovery*. Web. 20 Apr. 2012. <<http://www.fakr.noaa.gov/protectedresources/whales/beluga/management.htm>>.

<sup>217</sup> Ibid.

linked to the local spawning run of salmon.<sup>218</sup> Scientist Hunt et al found that the number of Bald Eagles wintering along the Skagit River in Washington was directly correlated with chum salmon escapement.<sup>219</sup> Numerous other studies have documented a similar connection between the abundance of spawning salmon and eagle distribution and reproductive success. Ben-David (1997) found that reproductive timing in the female mink of Chicagof Island, Alaska, shifted to coincide with the availability of salmon carcasses; spawning salmon provides animals' young with a window of high abundance and enhances chances of survival.<sup>220</sup> Many of the hibernation energy requirements for brown bears are met by consuming salmon carcasses because salmon are more nutrient dense than virtually any source of food available to bears along the Pacific Northwest Coast.<sup>221</sup> Coastal Alaskan brown bears obtain almost all of their carbon and nitrogen from salmon (94% +/- 9%).<sup>222</sup> Wilson and Halupka (1995) speculated that if a stream lost its salmon population, the "spatial distribution of wildlife consumers, their nutritional status, and their reproductive success are likely to be altered."<sup>223</sup> If the healthy salmon populations of Bristol Bay are altered as a result of mining development, wildlife would face unacceptable adverse challenges.

Recreation, the third designation under 404(c), would not exist without the health and pristine nature of the Bristol Bay area. The current threats to ecosystem function of the region due to potential mining development also greatly threaten recreation

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<sup>218</sup> Cederholm, Jeff, Matt Kunze, Takeshi Murota, and Atuhiro Sibatani. *Pacific Salmon Carcasses: Essential Contributions of Nutrients and Energy for Aquatic and Terrestrial Ecosystems*. Rep. BioScience, 2002. Print. Fisheries Management/Habitat. Pg. 11

<sup>219</sup> Ibid, pg. 11

<sup>220</sup> Ibid.

<sup>221</sup> Ibid.

<sup>222</sup> Ibid.

<sup>223</sup> Ibid, pg. 12

opportunities. In addition to subsistence and commercial fishing industries, the recreation industry in Bristol Bay is of significant size and importance for the Alaskan economy. Total recreation, including sport-fishing, sport-hunting, and wildlife viewing/tourism currently accounts for 1,252 jobs.<sup>224</sup> In 2005, an estimated 50,752 recreational visitors to the Bristol Bay region spent approximately \$91 million on trip related expenditures in Alaska.<sup>225</sup> Sport fishing in Bristol Bay generates \$60 million annually; and anglers looking for world renowned fishing experiences on rivers such as the Nushagak, Mulchatna, Koktuli and Kvichak support more than 800 full- and part-time jobs.<sup>226</sup> Most trips and spending in Bristol Bay are related to sport fishing, although both hunting and other “non-consumptive” trips such as wildlife viewing and bird watching were also frequent and contributed to a large portion of overall of spending.<sup>227</sup> In addition to direct impact on the regional community and economy, recreational visitor spending indirectly creates jobs (multiplier jobs), most commonly in the transportation, accommodation, and trade sectors of the economy.<sup>228</sup>

Mining activity and increased development associated with mining has the potential to detrimentally impact the current size of the recreation industry by directly impacting the fish, wildlife and pristine habitat that currently attracts recreation opportunity. Development will also negatively impact opportunities for sport fishing in the area by increasing infrastructure in the region and subsequent human activity in the

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<sup>224</sup> Duffield, John. "Economics of Wild Salmon Watersheds: Bristol Bay, Alaska." Trout Unlimited, Feb. 2007. Web. Dec. 2011. <[http://www.housemajority.org/coms/hfsh/trout\\_unlimited\\_report.pdf](http://www.housemajority.org/coms/hfsh/trout_unlimited_report.pdf)> Pg. 16

<sup>225</sup> Ibid.

<sup>226</sup> "Save Bristol Bay, Sportfish." *Save Bristol Bay*. Trout Unlimited. Web. 25 Dec. 2011. <<http://www.savebristolbay.org/about-the-bay/sportfish>>

<sup>227</sup> Duffield, John. "Economics of Wild Salmon Watersheds: Bristol Bay, Alaska." Trout Unlimited, Feb. 2007. Web. Dec. 2011. <[http://www.housemajority.org/coms/hfsh/trout\\_unlimited\\_report.pdf](http://www.housemajority.org/coms/hfsh/trout_unlimited_report.pdf)> Pg. 16

<sup>228</sup> Ibid.

area.<sup>229</sup> This increase will diminish the pristine and isolated appeal of Bristol Bay that currently attracts recreation interests.

In consideration of sport fishing, studies have shown that two primary factors drive the expenditures for services of remote fishing lodges in Bristol Bay drainages: the desire for large rainbow trout as a target species in addition to King Salmon, Silver Salmon, and other species, and the pristine and isolated nature of the sport fishing lodges.<sup>230</sup> The potential development of the Pebble mine could result in road access that would impact crowding and the size and abundance of targeted fish species in the region.<sup>231</sup> Nearly 80% of non-resident clients opposed developing road access in the Bristol Bay area and nearly 60% stated that they would not fish in Bristol Bay if road access was developed in the area.<sup>232</sup> 30.5% of residents felt that road access would cause them to stop fishing in the Bristol Bay area.<sup>233</sup> Studies and documented public sentiment clearly show an overwhelming opposition to development in Bristol Bay in consideration of recreational opportunities of the area. The development of the Pebble mine would certainly adversely impact the recreational industry.

The final designation of EPA jurisdiction under 404(c) is *Municipal Water Supplies*. Dredge and fill activity associated with Pebble Mine operations have the potential to adversely affect municipal water supplies in the region. Open pit mining, by its nature, consumes, diverts, and can pollute important municipal water resources. As was outlined by the threats to fishery areas and wildlife in the region, municipal water

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<sup>229</sup> Ibid.

<sup>230</sup> Ibid., Pg. 46-48

<sup>231</sup> Ibid., Pg. 58

<sup>232</sup> Ibid., Pg. 61

<sup>233</sup> Ibid., Pg. 58.

supplies can be threatened by acid mine drainage, heavy metal contamination and leaching, pollution from processing chemicals, and erosion and sedimentation. Water pollution created from the mine's waste rock would have to be contained in perpetuity in a seismically active and highly permeable environment. The challenges of constant pumping and other maintenance to avoid water pollution would constantly threaten Bristol Bay's current clean municipal water.

Under the Safe Drinking Water Act (SDWA), the EPA lists contaminants that may require a national drinking water regulation in the future.<sup>234</sup> During a public stakeholder meeting on June 16, 2011, the EPA revealed a short list of 32 chemicals it is considering for regulation in water supply under the SDWA.<sup>235</sup> Molybdenum, one of the elements to be mined by PLP, has been designated a contaminant and listed on EPA's SDWA "Contaminant Candidate List."<sup>236</sup> A 2003 World Health Organization Report reveals that "Levels of molybdenum in drinking-water do not usually exceed 10 ug/litre"; however in areas near molybdenum mining operation, the molybdenum concentration in finished water can be as high as 200 ug/litre.<sup>237</sup> In addition to Molybdenum contamination, Pebble Mine construction will likely impact drinking water through leaching heavy metals and other contaminants from waste rock, tailings, and waste containment facilities.

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<sup>234</sup> "Safe Drinking Water Act (SDWA)." *Home*. Web. 20 Dec. 2011.

<<http://water.epa.gov/lawsregs/rulesregs/sdwa/>>.

<sup>235</sup> "Environmental Law Insight - Updates and Analysis from Taft's Environmental Trial Lawyers." *U.S. EPA Reveals Short List for Potential Regulation as Drinking Water Contaminants : Environmental Law Insight*. Web. 20 Apr. 2012. <<http://www.taftenvironmentallawinsight.com/water/us-epa-reveals-short-list-for-potential-regulation-as-drinking-water-contaminants/>>.

<sup>236</sup> *Fact Sheet: Final Third Drinking Water Contaminant Candidate List (CCL 3)*. Rep. US EPA Office of Water, Sept. 2009. Web. Dec. 2011.

<[http://www.epa.gov/ogwdw000/ccl/pdfs/ccl3\\_docs/fs\\_cc3\\_final.pdf](http://www.epa.gov/ogwdw000/ccl/pdfs/ccl3_docs/fs_cc3_final.pdf)>.

<sup>237</sup> *Molybdenum in Drinking-water*. Rep. World Health Organization, 2011. Web. Jan. 2012.

<[www.who.int/water\\_sanitation\\_health/dwq/.../molybdenum.pdf](http://www.who.int/water_sanitation_health/dwq/.../molybdenum.pdf)>.

To summarize the research presented in Chapter Two, the Pebble Limited Partnership has presented an open pit mining project that will likely damage water quality, compromise ecosystem and habitat integrity, and increase overall human footprint in Bristol Bay in an adverse and unacceptable manner. This closely interconnected watershed is at high risk of being exposed to toxic water contamination, namely acid mine drainage and toxic leakage, and could disrupt the fragile chemical balance that currently allows salmon to return to their natal waters to spawn. The salmon populations of Bristol Bay are not only highly sensitive to mining development, but also support the commercial, subsistence, and recreational value of the region. Although the EPA is only required to reference one designation of 404(c) to stop the permitting process, all four statutes are at risk of being adversely affected in an unacceptable manner. There is overwhelming evidence that the risks posed by mining development have the potential to destroy the Bristol Bay ecosystem and the communities it supports. 404(c) was established to protect areas like Bristol Bay, and the EPA must fulfill its' constitutional obligation and authority by stopping the Pebble Mine permitting process.

### **Chapter 3:**

## **Track Records of the Pebble Limited Partnership and an Overview of Relevant Mining Projects in Alaska**

The aim of Chapter Two was to provide the reader with a characterization of each 404(c) designation, accompanied by a forecasted extent and location of adverse impacts. We cannot accurately predict the details of environmental impacts caused by mining development; we can only offer potential outcomes. Despite the inability to present more than projections, investigation into the track records of the two mining companies (Anglo American and Northern Dynasty) and the environmental legacies left by similar development projects in the area, will contribute clarity to the potential adverse effects forecasted in Chapter Two. The Pebble Limited Partnership has attempted to assure skeptics and locals that the Pebble project is “committed to developing a comprehensive project plan that is environmentally responsible...cooperative, respectful development that co-exists with reverence and care for the land, people, wildlife and surrounding fisheries is part of the PLP’s core values.”<sup>238</sup> By looking at the historical track records of the two involved mining companies, we can contextualize the above-mentioned commitments and further evaluate whether development in Bristol Bay will adversely affect the local ecosystem.

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<sup>238</sup> "Respectful Resource Development." *Pebble Limited Partnership*. Web. 27 Dec. 2011. <<http://www.pebblepartnership.com/environment>>.

Although it is only in the pre-feasibility and pre-permitting research stage, the Pebble project has already violated state law. In February of 2010, the state of Alaska issued 45 water violation fines extending over the past three years of exploration activity.<sup>239</sup> The Pebble developers were fined for unauthorized water use at various drilling sites. The Department of Natural Resources wrote to the two involved mining conglomerates on January 14, 2010, stating that the violations were “at a minimum, a trespass against the state’s property and resource interests.”<sup>240</sup> Although no real environmental damage has been found due to the breach of state rules and the land-use permit, the Pebble Partnership’s inability to facilitate the “environmentally responsible...cooperative, respectful development” that they have committed to is disconcerting for the possibility of future exploration and development.<sup>241</sup> PLP’s inability to abide by state regulations in the pre-permitting research stage brings in to question the mining companies’ ability to responsibly facilitate such a large-scale mining project. Although the consequences of the above-mentioned water violations are minimal, similar negligence during the 75-year lifespan of the mine could have irreversible and devastating consequences.

In August of 2007, Anglo American PLC announced that it was partnering with Northern Dynasty Partnership in the development of the Pebble copper and gold mine.<sup>242</sup> Cynthia Carroll, the chief executive of Anglo American, insisted that her company “is

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<sup>239</sup> Bleumink, Elizabeth. "Pebble Mine Developers to Pay Fine over Water-use Violation." Anchorage Daily News. Web. 20 Jan. 2012. <<http://www.adn.com/2010/02/12/1136582/pebble-mine-developers-to-pay.html>>.

<sup>240</sup> Ibid.

<sup>241</sup> "Respectful Resource Development." *Pebble Limited Partnership*. Web. 27 Dec. 2011. <<http://www.pebblepartnership.com/environment>>.

<sup>242</sup> Mattera, Philip. *Anglo American's Track Record: Rhetoric or Reality? Community, Worker Safety, Public Health, and Environmental Problems at Anglo American Mining Operations*. Tech. July 2008. Web. <[www.infomine.com/publications/docs/Mattera2008.pdf](http://www.infomine.com/publications/docs/Mattera2008.pdf)>.Pg. 4



committed to the highest international standards for community relations, environmental protection and health and safety.”<sup>243</sup> The London-based mining conglomerate professes to uphold high standards of corporate and social responsibility, but a review of its track record raises cause for concern. Anglo American’s past mining operations have led to the unacceptable degradation of various rivers and streams and adverse impacts on wildlife and subsistence communities. This history should serve as an important part of EPA deliberations. Anglo American’s questionable track record is compounded by the fact that they have never operated a large sulfide mine in sensitive salmon habitat or in the harsh Arctic and seismically active conditions comparable to those of the Bristol Bay watershed.<sup>244</sup>

A study conducted by Philip Mattera, a corporate researcher in Washington D.C., investigated the track record of the Anglo American mines that were most similar to the proposed Pebble Mine in Alaska. Mattera’s findings call into question whether Anglo American should be considered a model of responsible corporate citizenship. In South Africa, Anglo American’s platinum operations have experienced frequent problems with spills and accidental discharges due to the overflow of tailings return-water dams and pollution-control dams, in addition to pipeline breaks.<sup>245</sup> In 2006 and 2007 raw sewage seeped through containment dams at a pump station and flowed into a local tributary, contaminating the watershed and endangering local wildlife and aquatic species.<sup>246</sup> The same platinum operations were found to be a major cause of sulfur dioxide emissions. At a 2003 public meeting in Rustenburg, company officials admitted that emissions levels of

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<sup>243</sup> Ibid.

<sup>244</sup> Ibid.

<sup>245</sup> Ibid, pg. 8

<sup>246</sup> Ibid, pg. 8

sulfur dioxide had been increasing and the result was “not a pretty picture of what is being done to the environment.”<sup>247</sup> At this time, Anglo American was putting approximately 150 tons of sulfur dioxide into the atmosphere each day, leading to accusations that the severe pollution was making local children sick.<sup>248</sup>

In Zimbabwe, Anglo American’s Iron Duke mine located in the Iron Mask mountain range near the Yellow Jacket River seriously polluted local water resources. A 2000 study in the journal of *Environmental Geology* found an extremely high level of acidity in the mine drainage, including pH readings roughly equivalent to that of battery acid.<sup>249</sup> A 2004 study by scientists from the University of Zimbabwe revealed that approximately 42,000 gallons of acidic wastewater was seeping from the Iron Duke mine’s drainage ponds into groundwater each day.<sup>250</sup> Scientists also found a significant deterioration of water quality in the Yellow Jacket River; a portion of the river had become “virtually fish-less” because of the toxic sediments that coated the riverbed.<sup>251</sup>

The Jerritt Canyon mine, a gold mine owned by an Anglo American subsidiary in Elko, Nevada once had the reputation of being the largest single source of airborne mercury emissions in the United States. In 2000, the EPA database showed that Jerritt Canyon was releasing 9,400 pounds of mercury into the air.<sup>252</sup> The large amounts of mercury emissions caused by this mine adversely affected local bodies of water and fish populations downwind of the mine. State agencies issued public notices for fisheries in the area that exceeded fish consumption limits for mercury set by the EPA. Because of

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<sup>247</sup> Ibid, pg. 8

<sup>248</sup> Ibid.

<sup>249</sup> Ibid, pg. 10

<sup>250</sup> Ibid.

<sup>251</sup> Ibid.

<sup>252</sup> Ibid, pg. 11

the excess pollution, the Nevada Department of Wildlife issued a notice for nearby Wild Horse Reservoir; recommending just one meal per month of bass and catfish, and the Salmon Falls Creek Reservoir in Idaho, recommended that children eat no more than one meal per month of walleye, smallmouth bass, or perch.<sup>253</sup> In addition to mercury emissions, the Jerritt Canyon mine was implicitly involved with deterioration of water quality in five neighboring streams: “surface monitoring points in drainages below the mine’s waste rock dumps on Burns Creek, Mill Creek, Jerrit Creek, Snow Creek, and Sheep Creek showed violations of secondary federal drinking water standards for TDS [total dissolved solids] and sulfate.”<sup>254</sup> Groundwater monitoring wells below the tailings impoundment showed levels for chloride and total dissolved solids that were more than 10 times federal drinking water standards between 1993 and 2004; excessive levels of arsenic and sulfate were also occasionally noted.<sup>255</sup>

In Ghana, At the Obuasi mine operated by another Anglo American subsidiary, water pollution has been a major issue. A study in 2007 published by the *West African Journal of Applied Ecology* found that stream waters in the near vicinity of the mine are “significantly polluted” by arsenic, mercury, iron, and, to some extent, copper, nickel and zinc.<sup>256</sup> Studies found levels of arsenic concentrations significantly higher than the World Health Organizations permissible maximum guidelines. These high levels of arsenic have “rendered the river without life and the community has been barred from drinking water.”<sup>257</sup>

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<sup>253</sup> Ibid.

<sup>254</sup> Ibid, pg. 12

<sup>255</sup> Ibid.

<sup>256</sup> Ibid, pg. 13

<sup>257</sup> Ibid, pg. 14

Northern Dynasty, a Vancouver based mining company, has attempted to assure Alaskans that management and mitigation of development practices will suffice to reduce impact of the Pebble mine, despite the fact that nowhere in the world has a mine of this size left the environment undamaged. Rio Tinto currently owns nearly 20 percent of all investments in Northern Dynasty. Despite assurances of minimal impact on the Bristol Bay environment, similar to those of Anglo American, Northern Dynasty and Rio Tinto also have an inconsistent track record that should be investigated in consideration of the Pebble mine permitting process.

The Grasberg Mine in West Papua, Indonesia was largely run by Rio Tinto and has reportedly caused “massive environmental destruction” in the area due to the dumping of waste, including toxic metals, into Indonesia’s river system.<sup>258</sup> The Grasberg mine is currently the largest copper and gold mine in the world, although Pebble could rival its’ size and mineral potential. WALHI, the largest environmental non-governmental organization in Indonesia comprised of over 438 organizations, stated that the mine has already disposed one billion tons of tailings into the local river system, resulting in copper concentrations in local rivers that double the legal limit.<sup>259</sup> Projections show that throughout the life of the mine, 3.5 billion tons of the mine’s toxic tailings will be dumped into local waterways.<sup>260</sup>

In 2006, WALHI published a report concerning the environmental impacts of the Freeport copper and gold mine operation in Papua. Local findings reveal that Rio Tinto

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<sup>258</sup> "Rio Tinto: A Shameful History of Human and Labour Rights Abuses And Environmental Degradation Around the Globe." *London Mining Network*. Web. 15 Feb. 2012.

<<http://londonminingnetwork.org/2010/04/rio-tinto-a-shameful-history-of-human-and-labour-rights-abuses-and-environmental-degradation-around-the-globe/>>.

<sup>259</sup> Ibid.

<sup>260</sup> Ibid.

hasn't complied with water quality laws and regulations, and that the Indonesian Ministry on the Environment has not enforced environmental laws because they are being bribed by mining authorities.<sup>261</sup> The report further states that the Freeport mine did not adhere to standards for construction of the tailings dam (which has subsequently breached water quality standards), was negligent in waste rock management, and is continuing to pollute the Otomona Ajkwa River system.<sup>262</sup> Environmental tests in the area have demonstrated that metal particulates in the river downstream from the mine are double 2005 amounts.<sup>263</sup> These high metal concentrations have had devastating impacts on local vegetation, and increased fish and wildlife mortality. Fish in the river directly below the mine contain up to 100 times the amount of copper in their systems in comparison to nearby freshwater areas not downstream of the mine.<sup>264</sup>

Rio Tinto also owns and operates the Bingham Canyon mine. The Bingham Canyon mine in Utah is currently the largest open pit mine in the United States and should be evaluated as a serious reference in consideration of potential development of the Pebble mine, which would be 3 times its' size. The Bingham Canyon mine is an open pit copper, gold, silver, and molybdenum mine located 28 miles southwest of Salt Lake and covers roughly 27,000 acres of the Utah desert.<sup>265</sup> Approximately 6 billion tons of rock has been harvested from the open pit, which is  $\frac{3}{4}$  of a mile deep and  $2\frac{3}{4}$  miles

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<sup>261</sup> Wilson, Vernor. *Indigenous Empowerment: The Pebble Mine and Environmental Justice in Bristol Bay, Alaska*. Rep. Brown University, May 2008. Web.

<[envstudies.brown.edu/theses/.../VernerWilsonThesis.pdf](http://envstudies.brown.edu/theses/.../VernerWilsonThesis.pdf)> Pg. 30

<sup>262</sup> Ibid.

<sup>263</sup> Ibid.

<sup>264</sup> Ibid.

<sup>265</sup> Gestring, Bonnie. "EARTHWORKS." *Problems with the Bingham Canyon Mine*. Jan. 2011. Web. 15 Feb. 2012.

<[http://www.earthworksaction.org/library/detail/problems\\_with\\_the\\_bingham\\_canyon\\_mine/](http://www.earthworksaction.org/library/detail/problems_with_the_bingham_canyon_mine/)>.Pg. 1

wide.<sup>266</sup> The mine has proven to be a serious source of environmental contamination and is the second most polluting mine in the US by toxic releases.<sup>267</sup> The north zone of the mine is proposed to be listed as one of America's most significant hazardous waste sites.<sup>268</sup> Mining activities in the area have caused damage to fish and wildlife habitat, water pollution, and public health and safety risks.

The Great Salt Lake lies within close proximity to the Bingham Canyon Mine and is one of the Western Hemispheres most significant migratory bird habitats. In February 2008, the US Department of Interior Fish and Wildlife Service engaged in legal action against mining companies for the release of hazardous substances from the mines facilities, including selenium, copper, arsenic, lead, zinc and cadmium.<sup>269</sup> According to biologists, the release of hazardous pollutants has adversely affected natural resources, including species of migratory birds and the ecosystems they rely on such as wetlands, marshes, freshwater wildlife habitats, playas, riparian areas and freshwater ponds.<sup>270</sup> The pollution has also damaged fish and wildlife habitat and the lawsuit aims to recover compensation for public losses for damage to natural resources due to the release of hazardous substances.

The Bingham Canyon mine has also polluted 72 square miles of aquifers in its direct proximity, rendering water for thousands of Salt Lake residents undrinkable.<sup>271</sup> Toxic waste was released from the mine's refinery and smelter facilities into the

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<sup>266</sup> Ibid.

<sup>267</sup> Ibid.

<sup>268</sup> Ibid.

<sup>269</sup> Ibid.

<sup>270</sup> Ibid.

<sup>271</sup> Rickstad, Erik. "Alaska's Bristol Bay World-famous Salmon Rivers Threatened by Pebble Mine. Help Save Them!" Web. 15 Dec. 2011. <<http://www.orvis.com/intro.aspx?subject=4571>>

groundwater, contaminating water with high concentrations of selenium and arsenic.<sup>272</sup>

Both of these pollutants are toxic to birds, fish and amphibians.

To further build a contextual analysis of the potential adverse affects of the Pebble Mine, we must also look at the history of other mines in Alaska, many of which have had varying compliance records. The Red Dog Mine in Northwestern Alaska is North America's largest zinc mine and in 2006 was the "top toxic polluter in the United States" for the sixth year in a row, according to the U.S. EPA's Toxic Release Inventory.<sup>273</sup> Like the Pebble mine, the waste rock and chemicals leaching from the Red Dog mine must be contained in perpetuity to prevent ecosystem damage. EPA research reveals that upwards of 320,000 pounds of methanol, lead and zinc had leached into the air as "fugitive emissions."<sup>274</sup> Despite its' disastrous environmental legacy, the local environment of the Red Dog mine greatly differs from the propose Pebble deposit. There is 100 to 600 feet of permafrost beneath the Red Dog mine site, resulting in minimal shallow groundwater flow in comparison to the surface.<sup>275</sup> This results in limited linkages between ground water and the mine waste discharge. Near the Proposed Pebble Mine area, porous glacial till and small amounts of permafrost provide a direct connection between ground and surface waters, carrying a high risk of contaminated

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<sup>272</sup> Gestring, Bonnie. "EARTHWORKS." *Problems with the Bingham Canyon Mine*. Jan. 2011. Web. 15 Feb. 2012.

<[http://www.earthworksaction.org/library/detail/problems\\_with\\_the\\_bingham\\_canyon\\_mine/](http://www.earthworksaction.org/library/detail/problems_with_the_bingham_canyon_mine/)>.Pg. 3

<sup>273</sup> Wilson, Vernor. *Indigenous Empowerment: The Pebble Mine and Environmental Justice in Bristol Bay, Alaska*. Rep. Brown University, May 2008. Web.

<[envstudies.brown.edu/theses/.../VernerWilsonThesis.pdf](http://envstudies.brown.edu/theses/.../VernerWilsonThesis.pdf)> Pg. 18

<sup>274</sup> Ibid.

<sup>275</sup> Chambers, Dave, Robert Moran, and Lance Trasky. *Bristol Bay's Wild Salmon Ecosystems and Pebble Mine: Key Considerations for a Large-Scale Mine Proposal*. Wild Salmon Center and Trout Unlimited., Jan, 2012. Print. Pg. 78

groundwater with mine waste discharge.<sup>276</sup> Red Dog Mine has produced 487 million pounds of toxic compounds in comparison to Pebble's estimated 10.8 billion tons of tailing waste.<sup>277</sup> This comparison shows that contamination that is currently occurring at Red Dog is likely to happen at the Pebble Mine site on an even larger scale.

In addition to the Red Dog Mine, Juneau's Green River gold, zinc, silver and lead mine was ranked as the second top polluter in Alaska, seventh top polluter in the nation.<sup>278</sup> The environmental legacy of poorly managed mining projects in sensitive habitats has classified the State of Alaska as the largest emitter of toxic substances into the land, air and water among all states.<sup>279</sup> The amount of toxic material released into the environment from Alaska's various industrial operations increased by 900,000 pounds in 2004, reaching 44 million pounds of toxic release in 2005.<sup>280</sup>

Unlike many of the above-mentioned mine sites, the proposed Pebble project is in a largely pristine region. The spring and surface waters of Bristol Bay currently contain extremely low concentrations of dissolved minerals and the introduction of even small amounts of additional dissolved mineral could produce significant changes in the water chemistry.<sup>281</sup> Proposing to safely contain toxic waste with one of the world's largest impoundments (in perpetuity) in a region that is seismically active, prone to extreme weather conditions, and characterized by complex hydrology, constitutes an enormous

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<sup>276</sup> Ibid.

<sup>277</sup> Ibid.

<sup>278</sup> Ibid.

<sup>279</sup> Wilson, Vernor. *Indigenous Empowerment: The Pebble Mine and Environmental Justice in Bristol Bay, Alaska*. Rep. Brown University, May 2008. Web. <envstudies.brown.edu/theses/.../VernerWilsonThesis.pdf> Pg. 18

<sup>280</sup> Ibid.

<sup>281</sup> Chambers, Dave, Robert Moran, and Lance Trasky. *Bristol Bay's Wild Salmon Ecosystems and Pebble Mine: Key Considerations for a Large-Scale Mine Proposal*. Wild Salmon Center and Trout Unlimited., Jan, 2012. Print. Pg. 55



risk.<sup>282</sup> All proposed safeguards must work forever. Given the potential adverse impacts of the Pebble mine development, an industry with a flawless environmental track record would be highly scrutinized under the CWA and EPA reviewing process. The highly questionable track record of the two mining companies involved with development, coupled with the environmental degradation of similar mines constructed in Alaska, highlights the extreme danger of allowing the Pebble mine to be constructed. Highlighting how unsuccessfully Anglo American and Northern Dynasty have historically fulfilled commitments of environmental and social stewardship powerfully bolsters the potential adverse affects outlined in Chapter Two. What will be different about this mine? This chapter does not aim to discredit mining development in cases where construction is feasible and reasonable considering the affected ecosystem. Mining technology and environmental mitigation practices have improved considerably, yet large-scale mining projects continue to be plagued by challenges in predicting ground and surface water quality impacts. The EPA cannot rely upon lofty proclamations and promises by the PLP to make a 404(c) decision. The agency must consider sound scientific data and reputation of Anglo American and Northern Dynasty. The historical track records presented in this chapter, coupled by the poor environmental legacies of relevant mines in Alaska, highlight unacceptable adverse affects of development in consideration of the Pebble mine.

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<sup>282</sup> Chambers, Dave, Robert Moran, and Lance Trasky. *Bristol Bay's Wild Salmon Ecosystems and Pebble Mine: Key Considerations for a Large-Scale Mine Proposal*. Wild Salmon Center and Trout Unlimited., Jan, 2012. Print. Pg. 12



## **Chapter Four:**

### **Review of Past EPA 404(c) Rulings, Precedents, and the Legal Decision-Making Process**

The EPA has used CWA 404(c) authority in 12 circumstances since 1972, only once in the Western United States. Past 404(c) designations have only been made in the case of overwhelming evidence and a thoughtful, rational decision-making process. The 404(c) veto process occurs in a series of steps. In the first step, the EPA Regional Administrator notifies the Army Corps of Engineers and the developer of his or her intention to issue a public notice of a Proposed Determination to withdraw, prohibit, deny, or restrict the specification of a defined area for discharge of dredged or fill material.<sup>283</sup> If the Regional Administrator feels that a development project will potentially incur unacceptable adverse effects upon the affected ecosystem, a notice of the Proposed Determination is published in the *Federal Register*.<sup>284</sup> The third step is a period of public comment, where a public hearing is usually held.<sup>285</sup> Next, a recommended determination or withdrawal occurs. In this step, the Regional Administrator prepares a Recommended Determination to withdraw, prohibit, deny, or restrict the specification of a defined area for disposing of dredged or fill material and forwards it, accompanied with the administrative record, to the EPA Assistant

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<sup>283</sup> "Clean Water Act Section 404(c): "Veto Authority"" *Home*. Web. 20 Jan. 2012. <[http://water.epa.gov/lawsregs/guidance/cwa/dredgdis/404c\\_index.cfm](http://water.epa.gov/lawsregs/guidance/cwa/dredgdis/404c_index.cfm)>.

<sup>284</sup> *Ibid*.

<sup>285</sup> *Ibid*.

Administrator for Water.<sup>286</sup> In the fifth step, the EPA Assistant Administrator contacts the Corps and developer, providing them with 15 days to take corrective action to prevent unacceptable adverse affects.<sup>287</sup> The last step, the Final Determination, occurs when the Assistant Administrator affirms, modifies, or rescinds the Recommended Determination and publishes a notice of final intent to the *Federal Register*.<sup>288</sup>

In order to complete an analysis aiming to prove that the EPA has the responsibility to invoke 404(c) in the case of the PLP permit proposal, we must consider the legal standards the agency is bound by to make a decision that will be upheld in a federal court in the case of an appeal. EPA deliberators are readily aware of past legal precedents in consideration of their decision-making process, and will follow a strict set of guidelines to maintain consistency and uphold binding legal standards. Under the US Supreme Court's ruling in *Marbury v. Madison*, 5 U.S. 137 (1803), the US federal courts have the authority to judicially review statutes enacted by Congress, but the Constitution sets no clear limit on judicial review of government agencies other than articulation of Congressional statutes. This inconsistency was addressed in the 1984 case *Chevron U.S.A Inc., v. Natural Resources Defense Council Inc.*, when the Supreme Court set forth a standard legal test to determine the legitimacy of a government agency's interpretation of a Congressional statute which it administers. In an opinion by Justice John Paul Stevens, the Supreme Court created a two-part analysis by which to evaluate the legitimacy of a government agency's decision-making process:

(1) "First, always, is the question whether Congress has spoken directly to the precise question at issue. If the intent of Congress is clear, that is the end of the matter; for the

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<sup>286</sup> Ibid.

<sup>287</sup> Ibid.

<sup>288</sup> Ibid.

court as well as the agency must give effect to the unambiguously expressed intent of Congress."<sup>289</sup>

"If the Court determines Congress has not directly addressed the precise question at issue, the court does not simply impose its own construction of the statute . . . Rather, (2) [I]f the statute is silent or ambiguous with respect to the specific question, the issue for the court is whether the agency's answer is based on a permissible construction of the statute."<sup>290</sup>

The two-part analysis by which a federal court must evaluate a federal agency's decision-making process, as articulated by justice Stevens, outlines that as long as an agency's interpretation of a statute is concurrent with Congressional intent, that agency is acting within Constitutional authority. In the case of Pebble mine, under judicial review the EPA must interpret "unacceptable adverse affects" in a way that is concurrent Congressional intent under 404(c) of the CWA. The 1983 case of *Motor Vehicle Manufacturers Associate of the United States, Inc., v. State Farm Mutual Automobile Insurance Co.* (463 U.S. 29 (1983)) further clarified the Constitutional limits of a federal agency by judging specifically upon the application of a statute. Justice Byron White articulated that under the "arbitrary and capricious" standard, "a reviewing court may not set aside an agency rule that is rational, based on consideration of the relevant factors, and within the scope of the authority delegated to the agency by the statute."<sup>291</sup> He also stated "the (federal) agency must examine the relevant data and articulate a satisfactory explanation for its action including a "rational connection between the facts found and the choice made."<sup>292</sup> The ruling of this case clarified the process by which federal agencies like the EPA are held accountable to make Constitutional and legal rulings. A

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<sup>289</sup> "FindLaw | Cases and Codes." *CHEVRON U.S. A. v. NATURAL RES. DEF. COUNCIL*, 467 U.S. 837 (1984). Web. 20 Jan. 2012. <<http://caselaw.lp.findlaw.com/cgi-bin/getcase.pl?court=us>>.

<sup>290</sup> Ibid.

<sup>291</sup> "MOTOR VEHICLE MFRS. ASSN. v. STATE FARM MUT., 463 U.S. 29 (1983)." 302 *Found. US Supreme Court*. Web. 5 Jan. 2012. <<http://caselaw.lp.findlaw.com/cgi-bin/getcase.pl?friend=nytimes>>.

<sup>292</sup> Ibid.

court evaluating the constitutionality of a federal agency's decision-making is not judging whether it believes an opinion or ruling is right, merely that it was reached in a reasonable, non-arbitrary, and rational manner. In the case of 404(c) in Bristol Bay, the EPA must examine the relevant data (scientific, economic, social) and clearly articulate a conclusion of its findings in consideration of potential unacceptable adverse affects. The crux of this investigative process is that the EPA must be able to present a rational and valid link between the evidence gathered and the conclusion reached. The link cannot be seen as arbitrary or capricious. The above-mentioned legal history is crucial to the case of the Pebble mine because it provides the context in which EPA administrators will make a decision. A 404(c) ruling will not be made unless administrators trust that decision will be upheld in a court of law.

By reviewing past 404(c) rulings, we can better understand the factors that constitute a legitimate 404(c) case and the process by which the EPA reaches a Final Determination. Powerful legal precedents have been set from past rulings, and by drawing connections between past cases and the current proposal to develop the Pebble mine, we can add clarity to an EPA ruling in Bristol Bay.

The most recent case of EPA veto authority under 404(c) was exercised in January of 2011 for the Spruce No. 1 Mountaintop Coal Mine in Logan County, West Virginia.<sup>293</sup> The Spruce No. 1 Mine is an existing surface coal mining operation developed by Mingo Logan Coal and owned by Arch Coal. Mingo Logan applied for permits to expand the

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<sup>293</sup> "Law and the Environment : Environmental Lawyer & Attorney : Foley Hoag Law Firm : Boston, Washington D.C." : *Spruce No. 1 Surface Mine : Law and the Environment*. Web. 15 Jan. 2012. <<http://www.lawandenvironment.com/tags/spruce-no-1-surface-mine/>>.

mine, potentially making it the largest mountaintop removal operation in Appalachia.<sup>294</sup> After investigation, the EPA recognized that the mountain streams within the Central Appalachian eco-region have some of the richest aquatic animal diversity of any area in North America, including some of the highest concentrations of salamanders in the world.<sup>295</sup> The streams within Spruce No. 1 mine provide important habitat for over 40 species of amphibians and reptiles, 4 species of crayfish, and 5 species of fish, as well as numerous birds, bats, and other mammals.<sup>296</sup> The Spruce No.1 mine would eliminate crucial physical, chemical, and biological functions provided by these streams and consequently result in the loss of populations that depend on that habitat for survival. Expansion of the mine would bury streams on site and mining waste would leach pollutants into downstream waters, adversely affecting wildlife communities that utilize the streams.

The proposed mine project would have disposed 110 million cubic yards of coal mine waste, burying more than six miles of high-quality streams in Logan County, West Virginia.<sup>297</sup> This area would also be inundated by millions of tons of mining waste from the dynamiting of more than 2,200 acres of mountains and forestlands.<sup>298</sup> The proposal would also bury more than 35,000 feet of high quality streams under mining waste, eliminating all fish, small invertebrates, salamanders, and other wildlife.<sup>299</sup> Downstream waters of the buried streams would potentially become polluted with unhealthy levels of

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<sup>294</sup> "The Williamson Daily News - EPA Plans to Veto Spruce No 1 Surface Mining Permit." *The Williamson Daily News*. Web. 20 Feb. 2012.  
<[http://www.williamsondailynews.com/view/full\\_story/4037633/article-EPA-plans-to-veto-Spruce-No--1-surface-mining-permit](http://www.williamsondailynews.com/view/full_story/4037633/article-EPA-plans-to-veto-Spruce-No--1-surface-mining-permit)>.

<sup>295</sup> "Final Determination Summary." *Spruce Number One Surface Mine*. US EPA. Web. 5 Jan. 2012.  
<<http://water.epa.gov/lawsregs/guidance/cwa/dredgdis/spruce.cfm>>.

<sup>296</sup> Ibid.

<sup>297</sup> Ibid.

<sup>298</sup> Ibid.

<sup>299</sup> Ibid.

salinity and toxic levels of selenium.<sup>300</sup> Degraded water quality could cause permanent damage to ecosystems, killing wildlife, impacting birdlife, reducing habitat value, and increasing susceptibility to toxic algal blooms.

After extensive study, a public hearing, and a review of more than 50,000 public comments, the EPA opposed the proposed project.<sup>301</sup> EPA Assistant Administrator for Water Pete Silva stated that “The proposed Spruce No. 1 mine would use destructive and unsustainable mining practices that jeopardize the health of Appalachian communities and the clean water on which they depend.”<sup>302</sup> The EPA concluded, based upon thorough scientific research, “the mine would result in significant environmental impacts from burying over 6.6 miles of ecologically valuable streams under mining waste and would also cause unacceptable adverse environmental effects to wildlife in downstream waters.”<sup>303</sup> The final determination came after the mining company failed to produce an agreement that would lead to a significant decrease in impacts to the environment and Appalachian communities, and the EPA decided to prohibit any further development in the area.<sup>304</sup>

In the case of the Spruce No. 1 Coal Mine, the EPA gathered extensive data, and reached the conclusion in a rational and thorough manner that development would adversely affect water quality, wildlife, and local communities in an unacceptable manner. Various justifications for the 404(c) ruling in this case can be related to proposed development in Bristol Bay. The environmental value of the Central

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<sup>300</sup> Ibid.

<sup>301</sup> "EPA Halts Disposal of Mining Waste to Appalachian Waters at Proposed Spruce Mine." *EPA*. Environmental Protection Agency. Web. 15 Feb. 2012.  
<[http://www.epa.gov/agingepa/press/epanews/2011/2011\\_0113\\_1.htm](http://www.epa.gov/agingepa/press/epanews/2011/2011_0113_1.htm)>.

<sup>302</sup> Ibid.

<sup>303</sup> "Final Determination Summary." *Spruce Number One Surface Mine*. US EPA. Web. 5 Jan. 2012.  
<<http://water.epa.gov/lawsregs/guidance/cwa/dredgdis/spruce.cfm>>.

<sup>304</sup> Ibid.



Appalachian eco-region was emphasized in deliberations, and the same emphasis should be placed upon Alaska's famous watershed in Bristol Bay. The Assistant Administrator for water stated that destructive and unsustainable mining practices threaten the local communities and clean water on which they depend. A pristine and healthy watershed in Bristol Bay is instrumental towards the health of local communities. Subsistence harvest of fish and game provides around 20% of calories for the region,<sup>305</sup> and wild salmon compromise 52% of the average family's diet.<sup>306</sup> Commercial fishing related jobs account for nearly 75% of local employment, and Bristol Bay accounts for one third of all earnings from commercial salmon fishing in Alaska.<sup>307</sup>

The projected environmental impact cited in the Spruce No. 1 Coal Mine case is relatively small compared to the potential degradation Pebble mine development in Bristol Bay. While mine waste discharged into streams would bury more than six miles of high-quality streams and development would destroy more than 2,200 acres of mountains and forestlands in West Virginia, the overall footprint of the Pebble deposit would cover 18,000 acres. In consideration of development in W. Virginia, the EPA ruled that potential for toxic leaching into downstream waters would adversely affect wildlife and water quality. Open-pit mining construction in Bristol Bay carries enormous risk of toxic leakage that would not only devastate ecosystem function in the immediate vicinity of the development, but could also potentially destroy hundreds of miles of streams and rivers throughout the entire watershed.

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<sup>305</sup> "Issues." *Bristol Bay Fisheries*. Ground Truth Trekking. Web. Jan. 2011. <[www.groundtruthtrekking.org/issues/fisheries/bristolbay.html](http://www.groundtruthtrekking.org/issues/fisheries/bristolbay.html)>.

<sup>306</sup> "Save Bristol Bay, Subsistence." *Save Bristol Bay*. Trout Unlimited. Web. 15 Dec. 2011. <<http://www.savebristolbay.org/about-the-bay/subsistence>>

<sup>307</sup> Parker, Geoffrey, Frances Raskin, Carol Ann Woody, and Lance Trasky. *Pebble Mine: Fish, Minerals, and Testing the Limits of Alaska's "Large Mine Permitting Process"* Rep. 1st ed. Vol. XXV. Duke University School of Law, June 2008. Print. Alaska Law Review. Pg. 7

A second example of 404(c) designation occurred on November 23, 1990, when the EPA prohibited the placement of dredged or fill material associated with the 1.1 million acre-foot Two Forks Proposal in Colorado. This project aimed to develop a dam and water supply reservoir in the S. Platte River in Jefferson and Douglas counties.<sup>308</sup> The Two Forks project was proposed by the Denver Water Department for the purpose of creating a water supply impoundment that would help to provide the city of Denver with a dependable and long-term water supply.<sup>309</sup> The proposed Two Forks dam and reservoir would store flows from the South Platte river basin and trans-mountain water diversions from the west slope of Colorado.<sup>310</sup> The specific area that would be adversely affected by development is the segment of the South Platte River between the proposed dam site and the upstream reaches of the reservoir flood pool. The reservoir would directly affect 30.1 miles of river including 8.8 miles of the N. Fork on the South Platte, and 21.3 miles of the main channel of the South Platte.<sup>311</sup>

In consideration of the 404(c) statutes, the EPA specifically referenced potential adverse affects on the aquatics and recreation opportunities of the region. The EPA highlighted the “extraordinary value of the intrinsic, physical, chemical, and biological components of the aquatic environment,” and the important link between the valuable fishery resources of the area and the aquatic ecosystem that sustains it.<sup>312</sup> Any alteration of the aquatic ecosystem could cause severe and irreversible loss to the stream fisheries.

The aquatic nature of the South Platte, characterized by a series of riffle and pool

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<sup>308</sup> Final Determination of the US. Environmental Protection Agency’s Assistant Administrator for Water Pursuant to Section 404(c) of the Clean Water Act Concerning the Two Forks Water Supply Impoundments Jefferson and Douglas Counties, Colorado. Publication. US EPA, Nov. 1990. Web. <[water.epa.gov/lawsregs/guidance/wetlands/upload/TwoForksFD.pdf](http://water.epa.gov/lawsregs/guidance/wetlands/upload/TwoForksFD.pdf)> pg. 76

<sup>309</sup> Ibid. pg. 3

<sup>310</sup> Ibid. pg. 4

<sup>311</sup> Ibid. pg. 8

<sup>312</sup> Ibid.

complexes, has established fishery habitat that sustains healthy populations of rainbow and brown trout populations.<sup>313</sup> Water quality, volume, velocity, depth, temperature, spawning and breeding habitat, and food sources all support significant fish densities and sizes.<sup>314</sup> Construction of the dam and reservoir would destroy 281 acres of riffle pool complexes and 299 acres of riparian wetlands.<sup>315</sup> Development would also result in the direct loss of 38,162 pounds of trout biomass.<sup>316</sup> In reference to final deliberations, the EPA referenced the U.S. Fish and Wildlife Service conclusion that “there will be unavoidable, irreplaceable losses to aquatic resources if Two Forks is built.”<sup>317</sup>

The EPA also investigated the adverse effects on recreation opportunities in the proposed development site. The proposed dam and reservoir location was described as a year round recreation area where the river corridors natural stream gradients, level areas, vegetation patterns, and scenic quality provide for a variety of recreation activities. The forest service recognized this area of the South Platte as one of the most heavily used recreation areas on the Front Range.<sup>318</sup> The majority of recreation use occurs along the main channel of the South Platte during the summer, when up to 4,000 people are present at any one time.<sup>319</sup> Studies showed that 158,000 recreational visitor days directly and indirectly associated with the river would be immediately affected.<sup>320</sup> The South Platte offers fisherman with “big water” experience and the combination of aesthetic attributes and select fishing opportunities has renowned that South Platte fishery with international

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<sup>313</sup> Ibid. pg. 11

<sup>314</sup> Ibid.

<sup>315</sup> Ibid. pg. 13

<sup>316</sup> Ibid.

<sup>317</sup> Ibid. pg. 11

<sup>318</sup> Ibid.

<sup>319</sup> Ibid. pg. 12

<sup>320</sup> Ibid. pg. 13

notoriety.<sup>321</sup> There are 13.9 miles of the South Platte designated as “Gold Medal Trout Water” that would be affected by the 1.1 million acre foot Two Forks proposal.<sup>322</sup> Gold Medal designation identifies Colorado Waters “...which offer the greatest potential for trophy trout fishing and angling success.”<sup>323</sup> The three miles of the South Platte that stretch from the Cheesman Dam to the Wigwam club support a sustainable trout population that has shown an exceptionally high inherent carrying capacity, and review of the administrative record show biomass estimates in excess of 400 pounds per acre.<sup>324</sup> In addition to fishing, the area attracts canoeing, kayaking, tubing, camping, and scenic viewing. The majority of recreation activities are directly or indirectly related the health and pristine nature of the South Platte River.

After thorough consultation with the project applicants and upon consideration of the administrative record and public comment on the proposed determination, the EPA concluded that the proposal would result in unacceptable adverse impact to fishery and recreational values.<sup>325</sup> The EPA conclusion was based upon two independent grounds:

1. “First, EPA finds that the effects are unacceptable in light of the significant loss of or damage to these resources that would occur as a result of the subject projects, which loss or damage is avoidable because practicable, less damaging alternatives are available”<sup>326</sup>
2. “Second, EPA has concluded that even if no less damaging practicable alternatives were available, the significance of the damage to fishery and

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<sup>321</sup> Ibid.

<sup>322</sup> Ibid.

<sup>323</sup> Ibid.

<sup>324</sup> Ibid.

<sup>325</sup> Ibid. pg. 76

<sup>326</sup> Ibid. pg. 6

recreational areas caused by the projects would be so great that they would constitute an unacceptable adverse effect under Section 404(c)”<sup>327</sup>

The EPA’s two justifications for the Final Determination articulated that although they didn’t believe that applicants pursued a proposal that minimized damage to the environment, even if no alternative options were available, adverse affects would still be unacceptable. In other words, regardless of due diligence and cooperation exercised by the developers, their project could not be supported under standards of the CWA.

The EPA Final Determination of the Two Forks project case specifically referenced valuable fishery resources that rely on a healthy aquatic ecosystem and the recreation value afforded by a healthy watershed. In Bristol Bay, the salmon populations depend on a healthy aquatic ecosystem in a uniquely important way. Because of the necessity to return to natal grounds to spawn, salmon not only require healthy habitat to survive, but also require the balance of extremely sensitive chemical levels to spawn. If the salmon populations suffer, the stability of the entire watershed and the wildlife it supports is at extreme risk. Post-development mitigation may not be able to restore chemical balances and the salmon populations could be lost forever if they are compromised. The EPA considered the amount of trout biomass in the South Platte in its decision to refuse development of the two forks project. Fish biomass in the South Platte pales in comparison to the populations in Bristol Bay, home to the largest salmon runs in the world. The EPA also referenced general recreation and sport fishing in defense of its final determination of the two forks proposal. Bristol Bay not only has fish populations that far exceed the South Platte in biomass, sport fishing notoriety, and recreation capacity, but also supports massive commercial interests. Plainly stated, while the Bristol

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<sup>327</sup> Ibid.

Bay can be related to the South Platte River in general characteristics, the Alaskan watershed far exceeds the South Platte in fishery quality, recreational value, and ecosystem biodiversity. The EPA's conclusion of the Two Forks case clearly stated that regardless of practicable alternatives that would be less damaging to the environment, development could not be allowed due to the high risk of unacceptable adverse effects. The same justification should be used in Bristol Bay. It is nearly impossible to mitigate salmon returns after a population collapse considering the delicate and extremely complex role of olfactory function and chemical levels in the water that facilitate spawning and the return to spawning grounds. If the salmon don't return, the entire ecosystem (including 404(c) designations of wildlife and recreation) will be forever compromised.

The third and final case that this thesis will address occurred on February 1, 2008, when the EPA initiated the 404(c) process to review the proposed Yazoo Backwater Area Pumps Project. This Army Corps Civil works project was designed to address flooding concerns in a 630,000-acre area located between the Mississippi and Yazoo rivers in west central Mississippi. The main component of development was a 14,000 cubic feet per second pumping station that would pump surface water out of the Yazoo Backwater Area during high water events on the Mississippi River. According to the Corps, the Yazoo Backwater Area contains between 150,000 and 229,000 acres of wetlands, as well as a large network of streams, creeks, and other aquatic resources. This area is home to some of the richest wetland and aquatic resources in the nation, including a highly productive floodplain fishery, hardwood forest, and important migratory bird foraging grounds. These wetlands also provide habitat for various animal and plant species, including the

federally protected Louisiana Black Bear and Pondberry plant. As stated by the Forest Service Environmental Impact Survey “ the lands in the lower Mississippi Delta are noted for high value fish and wildlife resources. The area serves as an integral part of the economic and social life of local residents and sportsmen from around the nation.”<sup>328</sup> The EPA decided to use 404(c) jurisdiction because the construction and operation of the proposed pumps would dramatically alter wetland function.

The EPA’s Final Determination concluded that the discharge of dredged or fill material in connection with the construction of the proposed Yazoo Backwater Area Pumps Project, as well as the two alternative proposals offered by the Army Corps in February 2008, and subsequent operation of the 14,000 cfs (Cubic Feet/Secod) pumping station would result in unacceptable adverse effects on fishery areas and wildlife.<sup>329</sup> The EPA based its recommendation upon a conclusion that the proposed discharge of fill material into 43.6 acres of wetlands in connection with construction and the pumping station and subsequent secondary impacts would result in the unacceptable adverse effects on at least 67,000 acres of wetlands, significantly degrading critical ecological function that support wildlife and fisheries resources.<sup>330</sup> Additionally, administrators expressed concern that “the proposed mitigation would not fully compensate for the potential impacts of the project, as identified in the FSEIS (Forest Service Environmental Impact Statement), and that the suggested environmental benefits associated with the project’s reforestation component have not been substantiated.”<sup>331</sup> The EPA emphasized

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<sup>328</sup> "EPA to Hold Public Hearing on Yazoo Pumps Project." *EPA- Home*. Web. 21 Feb. 2012.< <http://water.epa.gov/lawsregs/guidance/cwa/dredgdis/notice.cfm>> pg. 1

<sup>329</sup> Final Determination of the U.S. Environmental Protection Agency’s Assistant Administrator for Water Pursuant to Section 404(c) of the Clean Water Act Concerning the Proposed Yazoo Backwater Area Pumps Project, Issaquena County, Mississippi. Publication. US EPA, August 2008. Print. pg. 9

<sup>330</sup> Ibid.

<sup>331</sup> Ibid.

that potential adverse impacts should be viewed in the context of the “significant cumulative losses across the Lower Mississippi River Alluvial Valley (LMRAV), which has already lost over 80 percent of its bottomland forested wetlands, and specifically in the Mississippi Delta where the proposed project would significantly degrade important bottomland forested wetlands.”<sup>332</sup>

The EPA’s Final Determination concerning the Yazoo Backwater area was justified by an unacceptable adverse effect on fishery areas and wildlife. As cited by the investigation, development would degrade ecological functions of one of the richest wetland and aquatic resources in the nation that supports wildlife and fisheries resources that serve as integral parts of the economic and social well-being of local residents and sportsmen nation-wide. Bristol Bay is not only one of the richest aquatic resources in the nation, it is also the most biologically diverse freshwater ecosystem and supports the world’s largest remaining salmon runs. These delicate salmon returns depend exclusively on the pristine ecological function of the Bristol Bay watershed, and the health of wildlife in the area depends primarily on stable salmon populations. The economic and social livelihood of local residents depends upon the fully functioning Bristol Bay watershed, and sportsmen world-wide are attracted to the ecosystem’s pristine wonder. The state of Alaska also greatly benefits from the watershed’s economic value. The civil works pumping project conducted for the Yazoo Backwater area didn’t require nearly the infrastructure or potential environmental risk associated with the Pebble Mine. In addition the Yazoo pumping project could be feasibly terminated upon indicated adverse impact upon fishery or wildlife values. As one of the world’s largest open pit mines, once the Pebble mine is constructed, it must be contained and managed in perpetuity,

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<sup>332</sup> Ibid. pg. 10



regardless of environmental costs.

The three above-mentioned cases cannot be directly related to the 404(c) investigation currently underway in Bristol Bay. Each case has specific considerations unique to each ecosystem and local community. The power of looking at these cases comes primarily from observing the process by which the EPA conducts an investigation and reaches conclusions. The quality and value of the ecosystem is evaluated and considered, both intrinsically from an environmental aspect and materially from a local communities aspect. The EPA then has to pass judgment upon how much development would damage a given area in a rational and reasonable way and conclude whether potential damage will be unacceptable under the standards of the CWA and the permitting process. Looking at these three cases places increased historic perspective upon the viability of the Pebble mine project and the important decisions the EPA will have to make. Considering legal track record presented in this chapter, we can conclude that in order to maintain consistency and uphold legal obligation the EPA should invoke 404(c) in the case of Bristol Bay and deny the PLP's development proposals.

## **Conclusion:**

### **An Environmentally Responsible and Economically Feasible Solution: EPA Responsibility to Invoke 404(c) and Refuse Pebble Mine Permits**

Looking primarily at the decision-making process under 404(c) of the CWA, this thesis has sought to highlight the intricacies of the permitting process in Bristol Bay and empower the legitimacy and necessity of EPA involvement to facilitate sensible and economically viable development projects around our nation. Specifically, this analysis investigated the ecological and commercial integrity of the Bristol Bay ecosystem, the mining claims and project description, the forecasted extent and location of unacceptable damage to specific statutes articulated by 404(c), the track records of Anglo American and Northern Dynasty mining conglomerates and the environmental legacy of similar mining projects in Alaska, and the legal precedents of previous 404(c) rulings. Considering the inherent risk of unacceptable, adverse damage to the human, natural, and economic resources of Bristol Bay as a result of proposed mining development, the EPA has the legal authority and Congressional responsibility to reject Pebble Mine proposal through the 404(c) permitting process.

Vigorous enforcement and consistency in approach is critical to any credible environmental protection program. Congress recognized this fact when it enacted the CWA in 1972 and completely revolutionized water pollution control. The Clean Water Act is responsible for extraordinary advances in improving the quality of our nation's

watersheds, reversing the historic trend of wetland losses, and restoring streams and rivers degraded by pollution. The Congressional objective of the Clean Water Act is to “restore and maintain the chemical, physical, and biological integrity of the Nations waters.”<sup>333</sup> Congress specifically intended the CWA section 404 to protect our nation’s precious wetland areas. As Senator Muskie, a primary sponsor of the CWA stated:

*“There is no question that the systematic destruction of the Nation's wetlands is causing serious, permanent ecological damage. The wetlands and bays, estuaries and deltas are the Nation's most biologically active areas. They represent a principal source of food supply. They are the spawning grounds for much of the fish and shellfish which populate the oceans, and they are passages for numerous upland game fish. They also provide nesting areas for a myriad of species of birds and wildlife. The unregulated destruction of these areas is a matter which needs to be corrected and which implementation of section 404 has attempted to achieve.”*<sup>334</sup>

The success of the complex regulatory structure, created by the CWA and largely facilitated by the EPA, ultimately depends on effective enforcement. Contemporary failure of EPA enforcement is largely due to hostility from political leadership and Congress. Despite lack of political support, unless the structure of the CWA is legally amended or repealed, it remains the law of the land and the obligation of the EPA to enforce. EPA officials must adhere to lawful policy initiatives and regulations, and our political leaders must strive to empower EPA authority in order to maintain sensible and consistent enforcement of the CWA. Senator Lisa Murkowski (R),

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<sup>333</sup> Rusinko, Rosalie. *Bersani v. EPA: Wetlands Protection - The EPA Veto Power under the Clean Water Act*. Rep. 2nd ed. Vol. 7. Pace Environmental Law Review, 1990. Print. Article 7. Pg. 375

<sup>334</sup> Ibid.

quoted in September of 2011 regarding her position on Pebble mine and section 404(c) of the CWA, asserted that “Attempts to prejudge development in the Bristol Bay area before permit application has been submitted would make a mockery out of the federal environmental review process.”<sup>335</sup> While Murkowski’s sentiment is supported by various mining proponents, it overlooks the fact that under the Clean Water Act, the EPA has the legitimate power to intervene in the 404 permitting process before final permit applications are submitted, and should retain the same amount of credibility given to the Army Corp of Engineers. Fearing that toxic waste from the Pebble mine could adversely affect wild salmon in her home state, Washington state Senator Maria Cantwell (D) has already asked the head of the Environmental Protection Agency to seriously consider ruling under 404(c) to stop the proposed mine.<sup>336</sup> Cantwell faces opposition from Alaska Republican Representative Don Young, who has introduced a bill that would eliminate any EPA power to end CWA permitting processes.<sup>337</sup> Young asserted that “Projects in Alaska and across the country have been shut down or delayed time and time again by the EPA, which serves only as an extension of the administration’s anti-resource development stance,” while Cantwell welcomed EPA scrutiny, saying it will be crucial “to have a science-driven independent process evaluating the potential risks,” of the mine.<sup>338</sup> Don Young’s pro-development legislation would eliminate the structural mechanism of checks and balances central to almost every aspect of our federal government, granting the Army Corps of Engineers total authority over development

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<sup>335</sup> "Pebble Mine, with Obvious Risks, Will Sadly Pass Permit Process." *Letters to the Editor*. Web. 21 Feb. 2012. <<http://www.adn.com/2011/09/15/2070753/pebble-mine-with-obvious-risks.html>>.

<sup>336</sup> "Lawmakers Dueling over Proposed Alaska Gold Mine." *McClatchy*. Web. 10 Feb. 2012. <<http://www.mcclatchydc.com/2011/09/11/123663/lawmakers-dueling-over-proposed.html>>.

<sup>337</sup> *Ibid.*

<sup>338</sup> *Ibid.*

under the CWA. Alaska's large mine permitting process, associated state statutes and regional land use plans place priority on resource extraction over conservation of renewable resources. As a result, the State of Alaska has never denied a permit for a large mine.<sup>339</sup> The EPA's Constitutional review of CWA permits is crucial to maintaining a thoughtful and environmentally responsible approach to development projects in our country.

Despite many voices of criticism that question the EPA's authority to overturn the Pebble Mine, legislative history validates the EPA role in the 404c process. In the 1990 case *Bersani v. EPA*, the developers of a shopping mall legally challenged an EPA 404(c) Final Determination. The ruling addressed the relationship between the EPA and the Army Corps of Engineers regarding the issuance of CWA section 404 permits, the promulgation of interpretive regulations, and the section 404(c) veto.<sup>340</sup> The decision of this case articulated that the EPA exercises "paramount authority to administer the CWA...EPA's interpretations are controlling."<sup>341</sup> Although the EPA and Army Corps share oversight of Section 404 implementation, the EPA is uniquely capable of considering the environmental impact of development projects and therefore holds highest authority to make decisions regarding permit authorization.<sup>342</sup> The courts have shown consistent deference to EPA final determinations in cases where developers have appealed 404(c) vetoes. Although the EPA must conform to a strict procedure to reach a final determination (as noted in Chapter 4), as long as that process is reasonably adhered

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<sup>339</sup>Chambers, Dave, Robert Moran, and Lance Trasky. *Bristol Bay's Wild Salmon Ecosystems and Pebble Mine: Key Considerations for a Large-Scale Mine Proposal*. Wild Salmon Center and Trout Unlimited., Jan, 2012. Print. Pg. 11

<sup>340</sup> Ibid.

<sup>341</sup> Ibid. 378.

<sup>342</sup> Ibid.

to the authority and legitimacy of EPA under the CWA has historically been supported by the courts. In the case of Bristol Bay, the EPA must embrace its constitutional obligation to make the reasonable and thoughtful decision to protect the watershed and terminate the 404 permitting process.

Despite the overwhelming evidence supporting a reasonable EPA 404(c) ruling in Bristol Bay, there is a larger political context upon which these decisions will be made. The EPA is responsible for making a ruling in Bristol Bay at a time when its' legitimacy as an agency is highly scrutinized. A weak economy, coupled by industrial competition from rising powers such as China and India, have caused many to question the amount of industrial development we sacrifice for environmental protection. The radically partisan and politicized atmosphere that currently defines our country has made it extremely difficult to pass legislation or create legal infrastructure that prioritizes environmental protection over development. Proponents of environmental conservation must focus on protecting existing mechanisms and legal infrastructure to promote environmental stewardship. EPA authority under the CWA is a powerful tool that must be defended to protect Bristol Bay and should be further empowered to stop future development projects in fragile, irreplaceable, and valuable ecosystems.

A 404(c) ruling in Bristol Bay is not bolstered by the justification of protecting the environment at all costs and sacrificing economic and industrial stability. At first glance, the Pebble deposit appears vastly more valuable than the wild salmon ecosystem of Bristol Bay, but the deeper analysis provided by this thesis reveals that as a renewable resource, the value of a wild salmon ecosystem is greater over time than the extraction of non-renewable minerals. Bristol Bay provides significant existing economic benefit and

human use value in the forms of the commercial and recreational industries, subsistence tradition, non-market passive use value, and state tax revenue (As noted in Chapter 1 pages 4-8). The true economic value, market value plus extrinsic passive use value, of the wild salmon ecosystem should be carefully considered.<sup>343</sup> These values could all be destroyed by mining development. By evaluating the economic benefits of both the Bristol Bay fishery and Pebble deposit, we must highlight that the ecological risk posed by the mine inherently has substantial economic costs. The EPA identified 156 mine sites with \$24 billion of potential cleanup costs, including 19 sites with liabilities exceeding \$50 million each.<sup>344</sup> Acid mine drainage is expected to multiply the costs by at least 1,000%, and 58% of the indentified sites will require over 40 years of treatment (20% will require perpetual treatment).<sup>345</sup> Few mining companies in the past have compensated taxpayers for reclamation costs, and when the mines are eventually abandoned and included in the Superfund program (federal governments program to clean up hazardous waste sites), federal taxpayers will be responsible for the first 10 years of treatment costs, after which those costs fall to state taxpayers.<sup>346</sup>

This thesis doesn't aim to defend all government regulations, including many environmental regulations that could be reformed or made more efficient. Public criticism of our political, bureaucratic and economic institutions underpins the function of our democracy. Nevertheless, we must continue to value the important work that the EPA has done to reconcile industrial development with environmental conservation over a long-term trajectory of sustainable use polices. By enacting a 404(c) ruling, the EPA is

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<sup>343</sup> Ibid. pg. 84

<sup>344</sup> Ibid. pg. 86

<sup>345</sup> Ibid.

<sup>346</sup> Ibid.

not strictly siding with environmentalists and sacrificing economic development. The 404(c) process is designed to restrict development projects that are not reasonable considering thorough scientific, social, and economic data. The protection of Bristol Bay adheres to the long-standing ideals of Pinchot's Conservation Ethic (as noted in the Introduction) by taking into consideration an economic evaluation of development. Considering the larger issues of environmentalism and federal regulations in America, a reasonable 404(c) ruling to protect Bristol Bay reconciles both development and conservation interests and supports a long-term, sustainable economic model. EPA authority under the CWA has greatly helped to bridge the politicized disconnect between development and environmental preservation interests on a case-by-case basis. An EPA 404(c) ruling will empower the protection of resources in Bristol Bay and will greatly assist and facilitate the future protection of our nation's indispensable natural resources.



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