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A CALL FOR CONSISTENCY: OPEN SEAWATER INTAKES, DESALINATION, AND THE CALIFORNIA WATER CODE

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COMMENT

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I. INTRODUCTION

California has a long history of drought and water-supply shortages. Climate change and a growing population will increase the demand for clean freshwater.[1] This is especially true in the arid landscape of Southern California, which historically has relied on imported water from the Sacramento-San Joaquin Delta and the Colorado River.[2] With these water sources over-tapped to the point of ecosystem collapse, Southern California cities are searching for alternative water-supply options.[3] Desalination, the process of extracting salt from water, is touted as the holy grail of water-supply solutions.[4] California's intermittent

[1] *See* CAL. DEP'T OF WATER RES., WATER DESALINATION FINDINGS AND RECOMMENDATIONS 2 (2003), *available at* www.water.ca.gov/desalination/pud_pdf/Findings-Recommendations.pdf (the population of California is expected to increase by 600,000 per year, which will impact the demand for drinking water); GREGORY FREEMAN, MYASNIK POGHOSYAN & MATTHEW LEE, LOS ANGELES ECONOMIC DEVELOPMENT CORP., WHERE WILL WE GET THE WATER? SOUTHERN CALIFORNIA'S FUTURE WATER STRATEGIES 2 (2008) (Southern California residents are projected to increase by 6 million people from 2007-2030), *available at* www.waterwebster.com/documents/SCLC_SoCalWaterStrategies_000.pdf.

[2] *See* FREEMAN ET AL., *supra* note 1, at 2.

[3] *See, e.g.*, *Municipal Water District of Orange County Desalination Feasibility Studies*, MUN. WATER DIST. OF ORANGE CNTY. www.mwdoc.com/pages.php?id_pge=68 (last visited Feb. 20, 2011), and *Long Beach Seawater Desalination Project*, LONG BEACH WATER DEP'T, www.lbwater.org/desalination/
desal_overview.php (last visited Feb. 20, 2011).

[4] *See* HEATHER COOLEY, PETER H. GLEICK & GARY WOLFF, DESALINATION, WITH A GRAIN

droughts[5] make the promise of an unlimited source of freshwater from the Pacific Ocean particularly alluring.[6]

Seawater desalination, however, can cause significant damage to marine ecosystems.[7] One method of obtaining water for desalination is through open seawater intakes, which kill many forms of marine life, from small plankton and larvae to large mammals and sea turtles.[8] Alternative technologies to withdraw seawater for desalination, such as sub-seafloor intakes, are available and could greatly reduce impacts to marine life.[9] Despite the existence of less environmentally destructive alternatives, the majority of new desalination plants in California plan to use open seawater intakes.[10] One example is the City of Carlsbad, currently working with a private company, Poseidon Resources, Inc. ("Poseidon"), to build a 50-million-gallon-per-day ("MGD") desalination facility using open seawater intakes.[11]

Open seawater intakes are currently used throughout California by coastal power plants employing a cooling technology known as "once-through cooling."[12] In 2010, the California State Water Resources Control Board ("State Water Board") passed a policy to phase out once-through cooling because of its devastating impacts on marine

OF SALT, A CALIFORNIA PERSPECTIVE 1 (2006), *available at* www.pacinst.org/reports/desalination/desalination_report.pdf.

[5] *See* CAL. DEP'T OF WATER RES., *supra* note 1, at 2.

[6] *See* COOLEY ET AL., *supra* note 4, at 2.

[7] In addition to impacts from water intake mechanisms discussed in this Comment, seawater desalination also has significant environmental impacts through energy demand, greenhouse gas emissions, and brine discharge. *See, e.g.*, CAL. DEP'T. OF WATER RES., *supra* note 1, at 4 (desalination systems using reverse osmosis technology require approximately 30% more energy than existing interbasin supply systems currently delivering water to Southern California); FREEMAN ET AL., *supra* note 1, at 2. (if energy for a desalination plant is from a fossil fuel source, then it could be a significant source of greenhouse gases); COOLEY ET AL., *supra* note 4, at 60-64 (brine and other discharge from desalination plants into the ocean can have significant impacts on the marine environment).

[8] *See, e.g.*, COOLEY ET AL., *supra* note 4, at 59-60 (desalination plants using open seawater intakes kill marine life through entrainment and impingement); CAL. STATE WATER RES. CONTROL BD., WATER QUALITY CONTROL POLICY ON THE USE COASTAL AND ESTUARINE WATERS FOR POWER PLANT COOLING DRAFT FINAL SUBSTITUTE ENVIRONMENTAL DOCUMENT 29 (2010) [hereinafter DRAFT FINAL SED] (acknowledging consensus among state and federal agencies that power plants using open seawater intakes have degraded marine life and partially contributed to declining fisheries and impaired coastal habitats).

[9] *See* Symposium, *Desalination in California: Should Ocean Waters Be Utilized to Produce Freshwater?*, 57 HASTINGS L.J. 1343, 1348 (2006).

[10] Thirteen out of the twenty proposed desalination plants in California plan to use open seawater intakes. *See* COOLEY ET AL., *supra* note 4, at 31, tbl.4.

[11] *See* Symposium, *supra* note 9, at 1355.

[12] *See* CAL. STATE WATER RES. CONTROL BD., WATER QUALITY CONTROL POLICY ON THE USE COASTAL AND ESTUARINE WATERS FOR POWER PLANT COOLING DRAFT FINAL SUBSTITUTE ENVIRONMENTAL DOCUMENT 1 (2010) [hereinafter FINAL SED].

ecosystems.[13] Despite this clear policy, several companies have proposed to build desalination plants adjacent to existing once-through-cooled power plants with the intent to share their open seawater intakes.[14] These companies suggest desalination plants will have no net impact on the marine environment because the power plant is already withdrawing large volumes of water through open seawater intakes.[15] This is a short-sighted presumption at best, given that many of the existing power plants will cease withdrawing large volumes of water under California's policy to phase out once-through cooling.

In California, the Federal Water Pollution Control Act[16] ("Clean Water Act") and the state Porter-Cologne Water Quality Control Act[17] ("Porter-Cologne Act") govern the withdrawal of water for industrial uses, such as desalination plants, and demand that the best location, design, and technology be used in order to minimize impact on marine life.[18] Recent federal case law established parameters under the Clean Water Act to protect marine life from once-through-cooled power plants.[19] These parameters provide useful guidance on the application of the Porter-Cologne Act to seawater desalination in California.

With over twenty desalination plants currently proposed around the state,[20] it is critical for California to establish a policy that properly applies the Porter-Cologne Act and protects our marine environment

[13] *See* CAL. STATE WATER RES. CONTROL BD., STATEWIDE WATER QUALITY CONTROL POLICY ON THE USE OF COASTAL AND ESTUARINE WATERS FOR POWER PLANT COOLING (May 4, 2010) [hereinafter STATEWIDE WATER QUALITY CONTROL POLICY].

[14] For a list of proposed desalination plants in California, including those that plan to co-locate with once-through-cooled power plants, *see* COOLEY ET AL., *supra* note 4, at 31, tbl.4.

[15] *See, e.g.*, CAL. REG'L WATER QUALITY CONTROL BD., SAN DIEGO REGION, ORDER NO. R9-2009-0038 AMENDING ORDER NO. R9-2006-0065 (NPDES NO. CA0109223) WASTE DISCHARGE REQUIREMENTS FOR THE POSEIDON RESOURCES CORPORATION CARLSBAD DESALINATION PROJECT DISCHARGE TO THE PACIFIC OCEAN VIA THE ENCINA POWER STATION DISCHARGE CHANNEL 1 (2009), *available at* www.swrcb.ca.gov/rwqcb9/board_decisions/adopted_orders/2009/R9_2009_0038_rev1.pdf [hereinafter AMENDED CARLSBAD DESALINATION PROJECT NPDES PERMIT].

[16] Clean Water Act, 33 U.S.C.A. §§ 1251-1387 (Westlaw 2011).

[17] Porter-Cologne Water Quality Control Act, CAL. WATER CODE §§ 13000-14076 (Westlaw 2011).

[18] Clean Water Act § 316(b) pertains only to water withdrawn for cooling purposes at industrial facilities and thus does not directly apply to water withdrawn for desalination. 33 U.S.C.A. § 1326(b) (Westlaw 2011). The Porter-Cologne Act governs water withdrawn for "cooling, heating, and industrial processing," which includes desalination. CAL. WATER CODE § 13142.5(b) (Westlaw 2011). These issues are explored in more detail in Part III, *infra*.

[19] *See* Riverkeeper, Inc. v. U.S. EPA, 358 F.3d 174 (2d Cir. 2004); Riverkeeper, Inc. v. U.S. EPA, 475 F.3d 83 (2d Cir. 2007), *rev'd on other grounds sub nom.* Entergy Corp. v. Riverkeeper, Inc., 129 S. Ct. 1498 (2009).

[20] *See* COOLEY ET AL., *supra* note 4, at 3.

while providing freshwater for a thirsty California. This Comment argues that the federal and state standards for reducing marine life mortality from power-plant intakes should be applied to a statewide policy for new desalination projects in California. Under this framework, open seawater intakes should not be permitted for new desalination plants.

Part II of this Comment provides an overview of the history and technology of desalination as well as environmental impacts of open seawater intakes and alternative intake technologies. Part III surveys existing state and federal laws addressing open seawater intakes and suggests a framework for applying these laws to desalination projects. Part IV argues that new desalination plants should not be permitted to use open seawater intakes because doing so would be inconsistent with California law and would undercut other California efforts to protect marine life. Part V presents the Carlsbad Desalination Project as a case study of how existing state law has been improperly applied to grant water permits. Part VI concludes with a summary of why a statewide desalination policy should be implemented consistent with state law.

II. DESALINATION OVERVIEW

Desalination, the process of separating salt from water, is not a new technology. It is an ancient concept, dating back to when salt, not water, was a precious commodity.[21] Over time, demand for freshwater increased, especially on naval ships.[22] This demand gave rise to innovation, and in 1852 a British patent was granted for a device to convert salt water to freshwater.[23]

The United States' interest in desalination has varied over the past fifty years.[24] In the 1960s, then-Senator John F. Kennedy strongly supported the idea of large-scale commercial desalination.[25] The Saline Water Conversion Act of 1971[26] created the Office of Water Research and Technology, which advanced many technologies used in desalination today. Then in the 1980s, President Reagan cut federal funding for nonmilitary desalination research.[27] Over a decade later, interest and funding increased resulting in the Water Desalination Act of 1996, which authorized $30 million over six years for desalination research and

[21] *Id*. at 11.
[22] *Id.*
[23] *Id.*
[24] *See generally id.* at 11-12.
[25] *Id*.
[26] The Saline Water Conversion Act of 1971, Pub. L. No. 92-60, 85 Stat. 159.
[27] COOLEY ET AL., *supra* note 4, at 12.

studies.[28] Recently, the United States Bureau of Reclamation has been working to publish a collection of literature on desalination to provide a basis for further research and development.[29] To date, the U.S. government has invested nearly $2 billion on basic research and development for desalination.[30] Private companies are also investing in the advancement of desalination technology.[31]

Today, desalination plants varying in size can be found in every U.S. state and throughout the world, including in Saudi Arabia, Japan, China and many European countries.[32] There are several different types of desalination technologies. The two most common forms of desalination are thermal evaporation and membrane technology.[33] Thermal evaporation, or distillation, mimics the natural hydrologic cycle to extract salt from water.[34] Membrane technology, such as reverse osmosis,[35] mimics the biologic process of osmosis.[36] It is often preferred over thermal evaporation or distillation because it is generally cheaper and requires less energy.[37] Membrane technology also has the added benefit of removing microorganisms and organic contaminants through the membranes.[38] Modernly, membrane technology is used more often than other desalination technologies.[39] In the U.S. close to 70% of desalination plants use reverse osmosis membrane technology.[40]

[28] The Water Desalination Act of 1996, Pub. L. No. 104-298, 110 Stat. 3622.

[29] *See* COOLEY ET AL., *supra* note 4, at 12.

[30] *See id.*

[31] *See id.*

[32] There is no consistent term for this process; it is also known as desalinization, desalination, or desalting. *See* COOLEY ET AL., *supra* note 4, at 10. For a description of different types of desalination technologies and how they work, *see id.*

[33] *See* COOLEY ET AL., *supra* note 4, at 13.

[34] *See id.*

[35] Osmosis is defined as movement of a solvent (such as water) through a semi-permeable membrane into a solution of higher solute concentration that tends to equalize the concentrations of solute on the either side of the membrane. MERRIAM WEBSTER DICTIONARY.

[36] *See* COOLEY ET AL., *supra* note 4, at 13.

[37] *See id.* Note that while reverse-osmosis plants use less energy than thermal-evaporation plants, the process of desalination is still very energy-intensive. Seawater desalination is more energy-intensive per acre-foot than brackish-water desalination or water recycling. For comparison purposes, current desalination systems using reverse-osmosis technology require about 30% more energy than existing interbasin supply systems currently delivering water to parts of Southern California. CAL. DEP'T OF WATER RES., *supra* note 1, at 4.

[38] *See* COOLEY ET AL., *supra* note 4, at 13.

[39] *See id.* at 22.

[40] *See id.*

A. DESALINATION IN CALIFORNIA

Many different types of water bodies can serve as a source for desalination. The two most common sources in California are seawater from the Pacific Ocean and brackish water from fossil aquifers.[41] The main difference between seawater and brackish water is the concentration of salt.[42] Brackish water has less salt content, requires less energy, and is cheaper to desalinate via reverse osmosis than seawater.[43] Although California has brackish water aquifers, given the vast size of the Pacific Ocean and the small number of brackish bodies of water by comparison,[44] the majority of proposed desalination plants in California plan to use seawater.[45] Comparatively, 51% of U.S. desalination plants use brackish water as source water, 26% use river water, and less than 10% use seawater. [46] The remaining plants mostly use wastewater and pure water for high-quality industrial purposes.[47]

Traditionally, desalination has played a minor role in California's water-supply portfolio.[48] In 2002, the California Legislature recognized the need to learn more about desalination and enacted Assembly Bill 2717, which directed the Department of Water Resources to establish a Desalination Task Force.[49] The Task Force was required to study and make recommendations regarding "potential opportunities for the use of seawater and brackish water desalination."[50] The Task Force speculated that although desalination would only contribute less than 10% of the total water-supply needs of the state, it could still "provide significant value," including increasing the water supply.[51] The Task Force also recognized that the environmental impacts of seawater desalination could cause a "potential impediment" to its widespread application.[52]

At the time of this writing, there are over twenty proposals for large-scale desalination plants in California ranging from .3 MGD to 50

[41] *See id.* at 11.

[42] *See* FREEMAN ET AL., *supra* note 1, at 17.

[43] *See id.*; *see also* COOLEY ET AL., *supra* note 4, at 13.

[44] FREEMAN ET AL., *supra* note 1, at 17.

[45] *See* COOLEY ET AL., *supra* note 4, at 31.

[46] *Id.* at 22, fig.6.

[47] *See id.* at 21-22.

[48] *See id.* at 25.

[49] A.B. 2717 (2002 Cal. Stat. ch. 957); *see also* CAL. DEP'T OF WATER RES., *supra* note 1, at iii.

[50] CAL. DEP'T OF WATER RES., *supra* note 1, at iii.

[51] *Id*. at 1.

[52] *Id*. at 3.

MGD.[53] Thirteen of these proposed plants intend to use open seawater intakes.[54]

B. ENVIRONMENTAL IMPACTS: OPEN SEAWATER INTAKES DEVASTATE MARINE ECOSYSTEMS

Seawater desalination poses an array of potential environmental impacts including high energy demands,[55] greenhouse gas emissions,[56] and discharges of highly concentrated salty brine.[57] However, the greatest potential impact is caused by open seawater intakes.[58] Many scientists agree that the threats to marine ecosystems from desalination plants using open seawater intakes are "greater, harder-to-quantify [than other threats] . . . and may represent the most significant direct adverse environmental impact of seawater desalination."[59]

Open seawater intake systems withdraw large volumes of water from oceans, bays, and estuaries through large pipes to supply water for industrial processes such as desalination or cooling power plants.[60] These intake pipes sit below the water's surface but above the seafloor, and they pull in water and marine life through the water column.[61] Open seawater intakes kill and injure wildlife through processes known as

[53] COOLEY ET AL., *supra* note 4, at 31. Note that these figures represent the amount of freshwater that could be produced on a daily basis, not the amount of source water required to produce that amount. Depending on the type of technology used and the design of the plant, seawater desalination can require significantly more source water than the amount of freshwater it produces. For example, Poseidon's proposed Carlsbad Desalination Project will require 304 MGD of source water to produce 50 MGD of freshwater. *See* AMENDED CARLSBAD DESALINATION PROJECT NPDES PERMIT, *supra* note 15, at 1 (2009) (the total flow rate of source water to operate at full production is 304 MGD; 107 MGD will be used to produce 50 MGD of potable water and 57 MGD of wastewater, the remaining 197 MGD of source water not used for production will be used to dilute the brine wastewater).

[54] *See* COOLEY ET AL., *supra* note 4, at 31.

[55] *See* CAL. DEP'T OF WATER RES., *supra* note 1, at 4 (desalination systems using reverse osmosis technology require approximately 30% more energy than existing interbasin supply systems currently delivering water to Southern California).

[56] *See* FREEMAN ET AL., *supra* note 1, at 2 (if energy for desalination plant is from fossil-fuel source, then it could be a significant source of greenhouse gases).

[57] *See* COOLEY ET AL., *supra* note 4, at 60-64 (brine and other discharge from desalination plants into the ocean can have significant impacts on the marine environment).

[58] Tom Pankratz, *An Overview of Seawater Intake Facilities for Seawater Desalination*, THE FUTURE OF DESALINATION IN TEXAS, VOL. 2: BIENNIAL REPORT ON SEAWATER DESALINATION 1 (Texas Water Development Board 2004).

[59] *Id*.

[60] *See* COOLEY ET AL., *supra* note 4, at 59-60; FINAL SED, *supra* note 12, at 1.

[61] *See* Detlef Gille, *Seawater Intakes for Desalination Plants*, 156 DESALINATION 249, 249-50, 254 (2003).

impingement and entrainment.[62] Impingement occurs when larger organisms such as fish, marine mammals and turtles are sucked in with the seawater and become trapped or "impinged" on the screens covering the opening of the intake pipes.[63] Entrainment occurs when smaller organisms, such as plankton and larvae, are killed as they pass through the screens and are drawn into the plants or "entrained."[64]

Most of what is known about the effects of entrainment and impingement on marine ecosystems has been learned from studying once-through-cooled power plants.[65] Open seawater technology (a pipe in the water column sucking in a large volume of water at a high velocity) is the same whether the seawater is ultimately used to cool a power plant or as source water for a desalination plant.[66] Further, the average volume of water withdrawn per day at once-through-cooled power plants is equivalent to the anticipated volume of the proposed large-scale desalination plants in California.[67] Thus, a comparison between once-through cooling and desalination processes is apt. The impacts of large-scale open seawater desalination facilities in California can be predicted by examining the impacts on ecosystems near once-through-cooled power plants.

Many state and federal agencies acknowledge that open seawater intakes devastate aquatic ecosystems. [68] For example, a single power plant using open seawater intakes for once-through cooling "might impinge a million adult fish in just a three-week period, or entrain some three to four billion smaller fish and shellfish in a year, destabilizing wildlife populations in the surrounding ecosystem."[69] The United States Environmental Protection Agency ("U.S. EPA") found that open seawater intakes used for power-plant cooling kill threatened and endangered species and have impacted the viability of commercial and recreational fish stocks.[70] These intake systems cause:

> reductions of threatened and endangered species; damage to critical

[62] *See* COOLEY ET AL., *supra* note 4, at 59.

[63] *See, e.g.*, Riverkeeper, Inc. v. U.S. EPA (*Riverkeeper I*), 358 F.3d 174, 181 (2d Cir. 2004); FINAL SED, *supra* note 12, at 29-30.

[64] *See, e.g.*, *Riverkeeper I*, 358 F.3d at 181; FINAL SED, *supra* note 12, at 29-30.

[65] *See* COOLEY ET AL., *supra* note 4, at 59.

[66] *See id.*

[67] *See id.* at 31, tbl.4 (listing the capacity of proposed desalination plants); FINAL SED, *supra* note 12, at 33, tbl.2 (listing the average flow rate of water withdrawn from existing power plants).

[68] DRAFT FINAL SED, *supra* note 8, at 15.

[69] *Riverkeeper I*, 358 F.3d at 181.

[70] CAL. OCEAN PROT. COUNCIL, *Resolution Regarding the Use of Once-Through Cooling Technologies in Coastal Waters* (Apr. 20, 2006).

> aquatic organisms, including important elements of the food chain; diminishment of a population's compensatory reserve; losses to populations including reductions of indigenous species populations, commercial fisheries stocks, and recreational fisheries; and stresses to overall communities and ecosystems as evidenced by reductions in diversity or other changes in system structure and function.[71]

For over thirty years, power plants in California have used open seawater intakes for once-through cooling.[72] Currently, nineteen once-through-cooled power plants are located along California's coast, bays, and estuaries.[73] Combined, these power plants are permitted to withdraw over fifteen billion gallons of seawater per day.[74] Several state agencies, including the Ocean Protection Council and State Water Board, have recognized that intake systems for once-through cooling have caused significant damage to California's marine ecosystems.[75]

The true impact from decades of use of open seawater intake systems may never be fully understood because comprehensive monitoring and evaluation of the surrounding ecosystems was not done.[76] What is known is startling. The State Water Board estimates that these systems kill an estimated seventy-nine billion fish and other marine life annually.[77] This includes threatened and endangered species such as Delta smelt.[78]

The ecological losses from open seawater intakes used for once-through cooling are estimated in the millions of dollars, and there are additional market losses of commercially and recreationally important species.[79] In the Southern California Bight[80] eleven coastal power plants kill up to 30% of the total number of recreational fish annually caught in

[71] *Id.*

[72] *See* CAL. STATE WATER RES. CONTROL BD., SCOPING DOCUMENT: WATER QUALITY CONTROL POLICY ON THE USE COASTAL AND ESTUARINE WATERS FOR POWER PLANT COOLING 78 (2008) [hereinafter 2008 SCOPING DOCUMENT].

[73] *See* FINAL SED, *supra* note 12, at 3, tbl.1 (2010)

[74] *See id.*

[75] *See, e.g.*, CAL. OCEAN PROT. COUNCIL, *supra* note 70; FINAL SED, *supra* note 12, at 1.

[76] *See, e.g.*, 2008 SCOPING DOCUMENT, *supra* note 72, at 12-17.

[77] 2008 SCOPING DOCUMENT, *supra* note 72, at 1.

[78] *See id.*

[79] CAL. ENERGY COMM'N, ISSUES AND ENVIRONMENTAL IMPACTS ASSOCIATED WITH ONCE-THROUGH COOLING AT CALIFORNIA'S COASTAL POWER PLANTS: STAFF REPORT 31 (CEC-700-2005-013) (2005).

[80] The Southern California Bight is approximately 400 miles of coastline from Point Conception in Santa Barbara County, California to Cabo Colnett, just south of Ensenada, Mexico. *See* SOUTHERN CALIFORNIA COASTAL WATER RESEARCH PROJECT, www.sccwrp.org/ResearchAreas/RegionalMonitoring/BightRegionalMonitoring.aspx (last updated Jan. 24, 2011).

that region.[81]

The concentration of power plants in a given area can also factor into the magnitude of environmental destruction. The cumulative impact of multiple open seawater intakes in bays could increase environmental damage when they are located in highly biologically productive regions that serve as nurseries for marine life.[82] For example, in Santa Monica Bay, three power plants using once-through cooling cycle 13% of the Bay's water every six weeks,[83] which means that in an eleven-month period, the entire volume of Santa Monica Bay is cycled through these power plants. Open seawater intakes also have significantly harmed the San Francisco Bay-Delta Estuary. All of the imperiled and economically important salmon species that migrate through the Sacramento and San Joaquin River watersheds must attempt to pass by two once-through-cooled power plants.[84] Unsurprisingly, many of these fish get sucked into the intake pipes and die; records for these plants show that they kill threatened and endangered species.[85]

While desalination is an attractive solution to California's water problems, it presents many other hazards when associated with open seawater intakes. The damage caused by open seawater intakes is well documented from its use in once-through-cooled power plants.[86] California has a new statewide policy to phase out once-through cooling, aimed at reducing (and in some cases eliminating) the impingement and entrainment impacts associated with open seawater intakes used at power plants.[87] However, there is currently no statewide policy regarding seawater intakes used for desalination. Regardless of whether the water is ultimately used to cool a power plant or for desalination, the tremendous impacts on marine life are the same. Thus, in order to truly protect our marine ecosystems from entrainment and impingement impacts, California should not allow open seawater intakes for new desalination plants.

[81] CAL. ENERGY COMM'N, *supra* note 79, at 31.

[82] *See id.* at 30-31.

[83] *Id*. at 31.

[84] *See* U.S. ENVTL. PROT. AGENCY, CASE STUDY ANALYSIS FOR THE PROPOSED SECTION 316(b) PHASE II EXISTING FACILITIES RULE, PART E: SAN FRANCISCO BAY/DELTA ESTUARY E3-15 (EPA 821-R-02-002) (2002), *available at* http://water.epa.gov/lawsregs/lawsguidance/cwa/316b/phase2/casestudy_index.cfm.

[85] *See id.*

[86] *See* FINAL SED, *supra* note 12, at 29.

[87] *See id. at* 1.

III. LEGAL FRAMEWORK

The federal Clean Water Act[88] and the state Porter-Cologne Act, codified in the California Water Code,[89] both establish rules for open seawater intakes.[90] Open seawater intakes are addressed federally in Clean Water Act section 316(b)[91] and at the state level in California Water Code section 13142.5(b). Both laws are designed to protect marine life by requiring the best technology available to minimize impacts on the environment.[92]

In California, the State Water Board has the authority to implement provisions of the Clean Water Act and the Porter-Cologne Act, and to set statewide policies to protect water quality.[93] Additionally, there are nine Regional Water Quality Control Boards ("Regional Boards") that share responsibility for implementing the Clean Water Act and the Porter-Cologne Act.[94] Regional Boards are semi-autonomous agencies responsible for setting water-quality and waste-discharge standards for their regions.[95] Regional Boards issue permits, including National Pollution Discharge Elimination System (NPDES) permits under the Clean Water Act, determine compliance with those permits, and take appropriate enforcement actions.[96] Under this framework, the Regional Water Boards are responsible for issuing NPDES permits for power plants and desalination facilities.[97] California's water agencies perform a dual role in that they are responsible for implementing both state law and federal law through delegated administrative authority.[98]

A. CLEAN WATER ACT SECTION 316(B): ENVIRONMENTAL GROUPS CHALLENGE REGULATIONS

Clean Water Act section 316(b) governs open seawater intakes for

[88] Clean Water Act, 33 U.S.C.A. §§ 1251-1387 (Westlaw 2011).

[89] CAL. WATER CODE § 13142.5(b) (Westlaw 2011).

[90] *See* 33 U.S.C.A. §§ 1251-1387; CAL. WATER CODE § 13142.5(b).

[91] 33 U.S.C.A. § 1326(b).

[92] *See id.*; CAL. WATER CODE § 13142.5(b).

[93] *See* CAL. WATER CODE § 13001 (Westlaw 2011); *see also* WaterKeepers N. Cal. v. State Water Res. Control Bd. 126 Cal. Rptr. 2d 389, 391-92 (Ct. App. 2002).

[94] *See* CAL. WATER CODE § 13001 (Westlaw 2011). For a map of the nine Regional Water Boards, see www.waterboards.ca.gov/waterboards_map.shtml.

[95] *See* California State Water Resources Control Board Website on the Water Boards Structure, www.swrcb.ca.gov/about_us/water_boards_structure/.

[96] *See id*.

[97] *See* CAL. WATER CODE § 13001 (Westlaw 2011).

[98] *See* CAL. WATER CODE §§ 13160, 13164 (Westlaw 2011); *see also WaterKeepers*, 126 Cal. Rptr. 2d at 391-92.

industrial processes, such as power plants, that withdraw water to cool the facility.[99] It does not govern the intake of water used for desalination.[100] Nevertheless, open seawater intakes and the accompanying impingement and entrainment impacts are identical whether the seawater is ultimately used for power-plant cooling or desalination.[101] Therefore, legal interpretations of section 316(b) are instructive for how California should regulate desalination.

Section 316(b) states that "[a]ny standard established pursuant to [section 301 or section 306 of this Act] and applicable to a point source shall require that *the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.*"[102] Currently, there are no regulations implementing this section of the Clean Water Act.[103]

U.S. EPA once promulgated regulations implementing section 316(b), but the agency suspended them after the U.S. Court of Appeals for the Second Circuit found many of the provisions invalid.[104] Without regulations in place, states must use their best professional judgment when issuing permits under section 316(b).[105] To aid them in this determination, states are looking to two important Second Circuit decisions, commonly referred to as "*Riverkeeper I*"[106] and "*Riverkeeper II.*"[107] Importantly, these cases hold that restoration projects cannot be used in lieu of the best technology available to reduce environmental impacts.[108]

[99] 33 U.S.C.A. § 1326(b) (Westlaw 2011).

[100] Clean Water Act section 316(b) applies only to "cooling water intake structures," which the U.S. EPA has defined as the total physical structure used to withdraw water, at least 25% of which is used for cooling purposes. 40 C.F.R. § 125.81; *see* 33 U.S.C.A. § 1326(b). Since desalination plants withdraw water for the purposes of separating the salt from water (and do not withdraw at least 25% of the water for cooling purposes), desalination plants are not covered under Clean Water Act § 316(b). *See* DRAFT FINAL SED, *supra* note 8, at 57.

[101] *See* COOLEY ET AL., *supra* note 4, at 59.

[102] 33 U.S.C.A. § 1326(b) (emphasis added).

[103] *See* 72 Fed. Reg. 37,107 (July 9, 2007); Memorandum from Benjamin Grumbles, Assistant Administrator U.S. Envtl. Prot. Agency, to Regional Administrators, Implementation of the Decision in *Riverkeeper, Inc. v. EPA*, Remanding the Cooling Water Intake Structures Phase II Regulation (Mar. 20, 2007), *available at* http://water.epa.gov/lawsregs/lawsguidance/cwa/316b/phase2/upload/2007_07_19_316b_phase2_implementation-200703.pdf; *see also* U.S. EPA Website on Clean Water Act § 316(b) implementation, http://water.epa.gov/lawsregs/lawsguidance/cwa/316b/index.cfm.

[104] *See* Memorandum from Benjamin Grumbles, *supra* note 103.

[105] *See id*.

[106] Riverkeeper, Inc. v. U.S. EPA (*Riverkeeper I*), 358 F.3d 174 (2d Cir. 2004).

[107] Riverkeeper, Inc. v. U.S. EPA (*Riverkeeper II*), 475 F.3d 83 (2d Cir. 2007), *rev'd on other grounds sub nom.* Entergy Corp. v. Riverkeeper, Inc., 129 S. Ct. 1498 (2009).

[108] *See Riverkeeper I*, 358 F.3d 174; *Riverkeeper II*, 475 F.3d 83.

In 2001, over thirty years after the Clean Water Act was enacted, U.S. EPA promulgated rules to implement section 316(b).[109] Known as the "Phase I Rule," these regulations applied to new power plants and manufacturers that withdrew more than 2 MGD and used 25% or more of that water for cooling processes.[110] The Phase I Rule allowed for consideration of restoration measures as mitigation for cooling-water intake structures.[111] These rules were challenged by a coalition of environmental groups for having several loopholes, including allowing after-the-fact restoration in lieu of adopting the best technology available to minimize adverse environmental impact.[112]

In *Riverkeeper, Inc. v. U.S. EPA ("Riverkeeper I")*, a coalition of environmental organizations led by Riverkeeper, Inc., challenged U.S. EPA's Phase I Rule. [113] The Second Circuit ruled in 2004 that allowing restoration to count as mitigation for damage caused by cooling-water intakes is "plainly inconsistent" with the Clean Water Act and Congress's intent.[114] While restoration measures may be beneficial to the environment, they "have nothing to do with the location, design, [or] construction" of the cooling structures.[115] Restoration measures might attempt to counterbalance the impacts of entrainment and impingement by improving habitat elsewhere and incubating new marine life. However, they do not "minimize those impacts in the first place" as the Clean Water Act requires.[116]

In 2004, U.S. EPA adopted the "Phase II Rule" under section 316(b) for existing power plants that withdrew over 50 MGD of water.[117] The Phase II rule for existing power plants also contained a provision allowing restoration measures as mitigation for cooling-water intake structures.[118] Environmental groups filed a lawsuit challenging the Phase II Rule in *Riverkeeper, Inc. v. U.S. EPA* ("*Riverkeeper II*").[119] In 2007,

[109] *See* U.S. ENVTL. PROT. AGENCY, NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM REGULATIONS ADDRESSING COOLING WATER INTAKE STRUCTURES AT NEW FACILITIES, 66 Fed. Reg. 65,256 (Dec. 18, 2001).

[110] *See* 40 C.F.R. § 125.80 et seq.; 66 Fed. Reg. 65,256 (Dec. 18, 2001).

[111] *See Riverkeeper I*, 358 F.3d 174.

[112] *See id.*

[113] *See id.*

[114] *See id.* at 189. Note that the Clean Water Act vests original jurisdiction to review Clean Water Act regulations in the U.S. Court of Appeals. 33 U.S.C.A. § 1369(b)(1) (Westlaw 2011).

[115] *Riverkeeper I*, 358 F.3d at 189.

[116] *Id*.

[117] 40 C.F.R. 125.90 et seq.; 69 Fed. Reg. 41,576 (July 9, 2004).

[118] 40 C.F.R. 125.90 et seq.; 69 Fed. Reg. 41,576 (July 9, 2004).

[119] Riverkeeper, Inc. v. U.S. EPA (*Riverkeeper II*), 475 F.3d 83, 109 (2d Cir. 2007), *rev'd on other grounds sub nom.* Entergy Corp. v. Riverkeeper, Inc., 129 S. Ct. 1498 (2009).

the Second Circuit upheld its holding in *Riverkeeper I* by ruling in *Riverkeeper II* that restoration measures cannot be used as a substitute for the technology standards required under section 316(b).[120]

Another aspect of *Riverkeeper II* was whether U.S. EPA can consider costs when determining performance standards for section 316(b).[121] That specific issue was later addressed by the United States Supreme Court.[122] Importantly, the Supreme Court did not grant certiorari regarding the Second Circuit's holding that after-the-fact restoration is not a substitute for employing the best technology available to avoid adverse impacts in the first place.[123]

After the *Riverkeeper II* decision, U.S. EPA suspended the Phase II Rule and instructed states to use their best professional judgment when issuing water permits under section 316(b) for existing power plants.[124] U.S. EPA is currently working on new rules to implement section 316(b) in accordance with the *Riverkeeper* decisions,[125] and these new rules would apply to all states.

The federal guidance on open seawater intakes used for power plant cooling is a useful framework to apply to open seawater intakes used for desalination.[126] Clean Water Act section 316(b) is aimed at minimizing adverse impact to the environment, and in interpreting that section, the Second Circuit held that after-the-fact restoration cannot be used to make up for an insufficient technology. Although section 316(b) does not apply to desalination facilities directly, the legal analysis and interpretation in the *Riverkeeper II* cases can logically be applied to the California Water Code, which mimics section 316(b) and also covers desalination.

B. RESTORATION IS NOT MITIGATION UNDER CALIFORNIA WATER CODE SECTION 13142.5(B)

In California, the preeminent state water law is the Porter-Cologne Act, which was enacted in 1969 and codified in the California Water

[120] *Id*.

[121] *See id.* at 111.

[122] *See* Entergy Corp. v. Riverkeeper, Inc., 129 S. Ct. 1498 (2009) (holding that EPA may choose to consider costs when determining the best technology available standard).

[123] *Id.* at 1505; *see* Riverkeeper, Inc. v. U.S. EPA (*Riverkeeper I*), 358 F.3d 174, 184 (2d Cir. 2004); *Riverkeeper II*, 475 F.3d at 97.

[124] *See* Memorandum from Benjamin Grumbles, *supra* note 103.

[125] *See id.*

[126] As explained in Part II B above, the impacts from open seawater intakes used at California power plants and proposed desalination facilities are comparable, because the volume and velocity of water withdrawn are comparable.

Code.[127] California Water Code Section 13142.5(b) governs the intake of water used for industrial facilities. Although it shares some of the same language and purpose of protecting marine life as Clean Water Act section 316(b), section 13142.5(b) is broader and distinct in many important ways.

Section 13142.5(b) provides that "[f]or each new or expanded coastal powerplant or other industrial installation using seawater for cooling, heating, or industrial processing, *the best available site, design, technology, and mitigation measures feasible shall be used to minimize the intake and mortality of all forms of marine life*."[128]

The first important distinction from the Clean Water Act is that section 13142.5(b) governs seawater for other "industrial installation[s]" and "industrial process[es]" aside from heating or cooling, and thus governs the intake of water used for desalination.[129] The California Water Code also includes mandates on the best site and design to avoid intake and mortality of marine life for the entire facility.[130] This is a clear distinction from the Clean Water Act, which focuses only on the intake structure itself. Arguably, the broader scope of section 13142.5(b) means that if a better location or a better design exists to reduce mortality of marine life (such as sub-seafloor intakes), then that location or facility design would be required.

Another important distinction from the Clean Water Act is that section 13142.5(b) includes the term "mitigation,"[131] specifically requiring that "the best . . . mitigation measures feasible shall be used to minimize the intake and mortality of all forms of marine life."[132] Does this mean that after-the-fact restoration measures could be used in lieu of technology to reduce marine-life mortality under the California Water Code? Based on the plain meaning of the statute, the answer is no.

It is a widely accepted canon of statutory construction that the "meaning of a statute must, in the first instance, be sought in the language in which. . .[it] is framed, and if that is plain, the sole function of the courts is to enforce it according to its terms."[133] California courts concur with this rule.[134] Additionally, if necessary after looking at the

[127] *See* CAL. WATER CODE §§ 13000-14076 (Westlaw 2011); *see also* City of Burbank v. State Water Res. Control Bd., 108 P.3d 862, 865 (Cal. 2005).

[128] *See* CAL. WATER CODE § 13142.5(b) (Westlaw 2011) (emphasis added).

[129] DRAFT FINAL SED, *supra* note 8, at 58.

[130] CAL. WATER CODE § 13142.5(b).

[131] *Id*.

[132] *Id*.

[133] Caminetti v. United States, 242 U.S. 470, 485 (1917).

[134] Koenig v. Johnson, 163 P.2d 746, 750-51 (Cal. Dist. Ct. App. 1945) (holding that if there

plain meaning of the statutory language, California courts look to legislative history and to the reasonableness of the proposed construction when interpreting statutes.[135] Thus, in reviewing a state agency's application of a state law (for example, a Regional Water Board's decision to issue a water permit for a desalination facility under Porter-Cologne), a California court would follow three steps: (1) examine the language of the statute itself; (2) if the statutory language is not clear, consider legislative history and other extrinsic aids; and (3) if the first two steps do not reveal the meaning of the statute, apply reason, practicality and common sense.[136]

In the first step, also known as the "plain reading" rule, the court looks at common grammar and sentence structure.[137] If the statute is silent or ambiguous with respect to the specific question, then the court would go on to the second step to examine extrinsic evidence, such as legislative history.[138] In the final step, the court would consider whether the agency's interpretation is based on a permissible construction of the statute using "reason, practicality and common sense."[139] In this final step, courts consider matters outside the plain language, including "context, the object in view, the evils to be remedied, the history of the times and of legislation upon the same subject, public policy and contemporaneous construction."[140]

The plain meaning of section 13145.5(b) is clear.[141] The term "mitigation" is a noun form of the transitive verb "mitigate," which means "to make less severe or intense."[142] The sentence structure also helps to elucidate the plain meaning: measures, or steps, should be used to mitigate, or make less severe, the intake and mortality of marine life. In order to minimize intake and mortality, it logically follows that steps

is doubt as to the intent of the legislature, the court may resort to extrinsic aids to interpret it)

[135] MacIsaac v. Waste Mgmt. Collection & Recycling, Inc., 36 Cal. Rptr. 3d 650, 655 (Ct. App. 2005).

[136] Id. at 655-656.

[137] Ctr. for Biological Diversity v. Cnty. of San Bernardino, 111 Cal. Rptr. 3d 374, 392 (Ct. App. 2010).

[138] *MacIsaac*, 36 Cal. Rptr. 3d at 656.

[139] *Id.* This process follows the Supreme Court test for federal statutory interpretation articulated in Chevron, U.S.A., Inc. v. Natural Res. Def. Council, Inc., 467 U.S. 837 (1984). Note that when state agencies interpret and enforce federal law, such as the Clean Water Act, the *Chevron* federal test would be applied. Since this analysis examines state law, the state test is used.

[140] *MacIsaac*, 36 Cal. Rptr. 3d at 656 (quoting American Tobacco Co. v. Superior Court, 255 Cal. Rptr. 280, 282 (Ct. App. 1989)).

[141] Literal language of a statute may be disregarded only to avoid absurdities or to uphold the clear, contrary intent of the legislature. *See* Disabled & Blind Action Comm. v. Jenkins, 118 Cal. Rptr 536, 541 (Ct. App. 1974).

[142] BLACK'S LAW DICTIONARY 1023 (8th ed. 2004).

need to be taken *before* marine life is killed. Reducing the amount of marine life initially taken in through pipes and killed qualifies as a mitigation measure.

After-the-fact restoration of habitat does not qualify as a mitigation measure pursuant to section 13142.5(b) because it does not minimize intake or mortality and thus conflicts with the plain meaning of the statute. Restoration is an attempt to restore ecosystems *after* killing marine life through entrainment or impingement, not before, as the law requires. This interpretation is consistent with the holdings of both *Riverkeeper* cases.[143]

Because the meaning of section 13145.5(b) is plain, no further steps of statutory interpretation are necessary. Nonetheless, the second and third steps also support the conclusion that after-the-fact restoration cannot be used lieu of technology to comply with this law. Looking to extrinsic evidence, there is scant legislative history regarding this section of the Porter-Cologne Act. It is, however, entirely consistent with the language to presume that the California Legislature did not want to limit alternatives for minimizing the intake and mortality of marine life to strictly "site, design and technology," but instead allowed for other "before the fact" mitigation. Lastly, a plausible and common-sense reading that harmonizes the inclusion of the term "mitigation measures" with the clear mandate to minimize intake and mortality in the first place is that the term is a catch-all phrase for alternative measures besides those expressly stated in the statute, but the statute still requires the efforts to be made before the fact.[144]

The *Riverkeeper I* and *II* holdings are binding on U.S. EPA. Thus, through the U.S. EPA's delegated authority, California may not issue water permits under section 316(b) to new or existing power plants using restoration in lieu of best technology available.[145] Although section 316(b) does not apply to desalination plants, the *Riverkeeper I* and *II* holdings are instructive as to why after-the-fact restoration should not count as best technology available. Section 13142.5(b) and section 316(b) share the same purpose of protecting marine life and share much of the same language. From a policy perspective, it makes little sense for California to prohibit restoration as mitigation for the impacts of open seawater intakes when they are used for power plants, but not when they are used for desalination. This result is nonsensical from a legal

[143] Riverkeeper, Inc. v. U.S. EPA (*Riverkeeper I*), 358 F.3d 174, 189 (2nd. Cir. 2004); Riverkeeper, Inc. v. U.S. EPA (*Riverkeeper II*), 475 F.3d 83, 97 (2d Cir. 2007), *rev'd on other grounds sub nom.* Entergy Corp. v. Riverkeeper, Inc., 129 S. Ct. 1498 (2009).

[144] *Riverkeeper I*, 358 F.3d at 189.

[145] *Riverkeeper I*, 358 F.3d 174; *Riverkeeper II*, 475 F.3d 83.

perspective, because section 13142.5(b) makes no distinction between power plants and desalination.[146]

C. EXISTING POLICY TO PROTECT MARINE LIFE FROM OPEN SEAWATER INTAKES

As discussed above, U.S. EPA is currently working on new rules to implement section 316(b) in accordance with the *Riverkeeper* decisions.[147] Because the new rules will implement a federal law, they would apply to all states, including California. Rather than waiting for U.S. EPA to promulgate rules, California recognized that it has the right to go beyond whatever federal minimum standard is eventually set and developed its own policy. In 2010 the State Water Board established statewide policy addressing entrainment and impingement impacts from once-through cooling pursuant to the Clean Water Act and the Porter Cologne Act.[148]

In 2006, the California Ocean Protection Council[149] passed a resolution urging the State Water Board to develop a statewide policy on once-through cooling.[150] In its resolution, the Ocean Protection Council recognized that entrainment and impingement impacts of open seawater intakes used for once-through-cooled power plants cause significant, ongoing harm to California's aquatic habitats.[151] The Ocean Protection Council urged the State Water Board "to implement section 316(b) and more stringent state requirements requiring reductions in entrainment and impingement at existing coastal power plants . . . [and] to achieve a 90-95% reduction in impacts."[152]

Following the Ocean Protection Council's resolution, the State Water Board began developing a policy to address impingement and entrainment at coastal power plants.[153] The State Water Board

[146] *See* CAL. WATER CODE § 13142.5 (b) (Westlaw 2011).

[147] *See* Memorandum from Benjamin Grumbles, *supra* note 103.

[148] *See* FINAL SED, *supra* note 12, at 11

[149] The Ocean Protection Council is an entity with the authority to coordinate "activities of state agencies that are related to the protection and conservation of coastal waters and ocean ecosystems to improve the effectiveness of state efforts to protect ocean resources." CAL. PUB. RES. CODE § 35615(a)(1) (Westlaw 2011).

[150] CAL. OCEAN PROT. COUNCIL, *supra* note 70.

[151] *Id.*

[152] *Id.*

[153] The State Water Board received extensive public comment on the formulation of the policy, including recommendations to include desalination as part of the policy. The State Water Board decided against including desalination, and instead expressed its intention to address desalination impacts separately at a later (and yet to be determined) date. *See* FINAL SED, *supra* note 12, at 57.

recognized that open seawater intakes associated with once-through cooling "reduc[e] important fisheries" and have "contribut[ed] to the overall degradation of the State's marine and estuarine environments."[154] In May 2010, the State Water Board adopted a final policy setting a standard for power plants to reduce entrainment and impingement incrementally over the next fourteen years.[155] As a result of the new policy, many of the older coastal power plants might choose not to upgrade their intake systems and cease operation, which would mean that the open seawater intakes would also cease operation. Other plants might choose to upgrade to less environmentally damaging cooling methods that would use significantly less seawater and therefore reduce the amount of harm to the environment.[156]

When developing its policy for power plants, the State Water Board acknowledged that open seawater intakes are currently proposed for new desalination facilities.[157] The State Water Board decided not to include provisions for intakes used for desalination, noting that a policy directed specifically at power plants would more "effectively address the unique characteristics" of power plants.[158] Importantly, the State Water Board stated that it should develop a separate policy to "address all desalination facilities."[159] To ensure that any gains made to protect the marine environment from the once-through cooling policy are not undone by desalination facilities using open seawater intakes, the State Water Board should establish a desalination policy consistent with its once-through cooling policy.

IV. NEW DESALINATION PLANTS IN CALIFORNIA SHOULD NOT BE PERMITTED TO USE OPEN SEAWATER INTAKES

Along California's coast privately owned corporations and municipal water districts are proposing to build desalination facilities using open seawater intakes.[160] Many of these projects plan to share intake pipes with existing once-through-cooled power plants that have

[154] *See* FINAL SED, *supra* note 12, at 1.

[155] *See* STATEWIDE WATER QUALITY CONTROL POLICY, *supra* note 13, at 12-14.

[156] Closed-cycle wet cooling, which recirculates the water rather than cycling it through only once, and air-cooling both significantly reduce the amount of water used for cooling and thus significantly reduce the impact on aquatic life. *See, e.g.*, 2008 SCOPING DOCUMENT, *supra* note 72, at 28. These proven technologies are already in use at inland power plants. *See* CAL. ENERGY COMM'N, *supra* note 79, at 40-43.

[157] FINAL SED, *supra* note 12, at 57.

[158] *Id*.

[159] *Id*.

[160] *See* COOLEY ET AL., *supra* note 4, at 31.

been ravaging coastal ecosystems for decades.[161] New desalination plants should not be permitted to use open seawater intakes, because alternative technology is available and building new desalination plants with open seawater intakes would negate state efforts to protect marine life.

Open seawater intakes for desalination facilities are not necessary. There are alternative technologies that can be used to obtain source water, such as sub-seafloor intakes, which greatly reduce harm to wildlife. Rather than removing water from the water column (as an open seawater intake does), sub-seafloor intakes withdraw water from below the ocean floor, either through wells drilled into sub-seafloor aquifers (where the geological sub-strata allow this technology), or through man-made galleries (where geological conditions prohibit wells).[162] This virtually eliminates entrainment and impingement impacts.[163] Sub-seafloor intakes also act as a pretreatment system and have the added benefit of reducing energy demand of the final product water.[164]

Desalination plants using sub-seafloor intakes are typically smaller than plants using open seawater intakes, because the volume of water flowing through the intake is less.[165] If California prohibits open seawater intakes for desalination, it would likely mean that large-scale facilities would be infeasible, and instead, smaller facilities would be built.[166] As of the time of this writing, only seven of the over twenty proposed desalination plants in California are considering the use of sub-seafloor intakes.[167]

Although sub-seafloor intakes could potentially eliminate impingement and entrainment impacts, they have the potential to damage freshwater aquifers if not sited carefully.[168] If sited in areas where the impact on aquifers has been thoroughly studied, and the appropriate designs and locations are chosen to "minimize the intake and mortality of all forms of marine life"[169] as required by the section 13142.5(b), sub-

[161] *See, e.g., id.;* FINAL SED, *supra* note 12, at 57.

[162] *See* COOLEY ET AL., *supra* note 4, at 77.

[163] *See* CAL. DEP'T OF WATER RES., *supra* note 1, at 5.

[164] *See* COOLEY ET AL., *supra* note 4, at 60 (while sub-seafloor intakes could potentially eliminate impingement and entrainment impacts, there is concern that they could cause damage freshwater aquifers).

[165] *See* Gille, *supra* note 61, at 251-52.

[166] Requiring smaller desalination plants would not necessarily change the amount of freshwater that could be produced. Instead of having a few large facilities producing water that then has to be transported long distances to the water users, there would be more small desalination plants producing water locally that would not have to be transported as far.

[167] COOLEY ET AL., *supra* note 4, at 60.

[168] *Id*.

[169] *See* CAL. WATER CODE § 13142.5(b) (Westlaw 2011).

seafloor intakes are a superior option for desalination in California.

State efforts to protect marine life will be undermined if desalination facilities are permitted to use open seawater intakes. During the five-year period in which the State Water Board worked on the policy to reduce the entrainment and impingement impacts from open seawater intakes at once-through-cooled power plants, Regional Water Boards were simultaneously approving permits for desalination facilities intending to build their plants next to these power plants in order to share the open seawater intake pipes.[170] Many of these desalination facilities planned to withdraw millions of gallons of seawater everyday from the very same intake pipes discouraged for use for once-through cooling.[171]

If allowed to use open seawater intakes, desalination plants will perpetuate the destruction caused by once-through cooling. The cumulative impacts of multiple open seawater desalination facilities would negate any potential environmental benefits envisioned by the State Water Board's policy to phase out once-through cooling.[172] Regulation of all industrial seawater intakes is necessary if the State Water Board hopes to meet the California Water Code's goal of "minimizing the intake and mortality of all forms of marine life."[173]

V. THE CARLSBAD DESALINATION PROJECT: A CASE STUDY

Without a statewide policy on desalination, several proposals for desalination facilities are moving forward.[174] In the absence of such a

[170] For example, in 2006 the Santa Ana Regional Water Quality Control Board issued an NPDES permit for the 50 MGD Poseidon Seawater Desalination Facility in Huntington Beach, California, with plans to share an intake pipe currently used by the Huntington Power Generating Station for once-through cooling. *See* CAL. REG'L WATER QUALITY CONTROL BD., SANTA ANA REGION, ORDER NO. R8-2006-00634 (NPDES NO.CA8000403). Also in 2006, the San Diego Regional Water Quality Control Board issued an NPDES permit for the 50 MGD Carlsbad Desalination Project, with plans to share an intake pipe currently used by the Encina Power Station for once-through cooling. *See* CARLSBAD DESALINATION PROJECT NPDES PERMIT, *supra* note 15. In 2007, the Central Coast Regional Water Quality Control Board approved an NPDES permit for the .05 MGD Ocean View Plaza Desalination Facility, which will not share intake pipes with an existing once-through-cooled power plant but will use open seawater intakes. *See* CAL. REG'L WATER QUALITY CONTROL BD., CENTRAL COAST REGION, ORDER NO. R3-2007-0040 (NPDES NO. CACA0050016).

[171] For example, for its proposed Huntington Desalination Facility in Huntington Beach, California, Poseidon proposes to share intake pipes with the Huntington Beach Power Station, and for its Carlsbad Desalination Project, Poseidon proposes to share intake pipes with the Encina Power Station. These two power plants are slated to stop using the intake pipes for once-through cooling under the State Water Board's new policy. *See* STATEWIDE WATER QUALITY CONTROL POLICY, *supra* note 13, at 12-13, tbl.1.

[172] *See supra* notes 12-15 and accompanying text.

[173] *See* CAL. WATER CODE § 13142.5(b) (Westlaw 2011).

[174] *See* COOLEY ET AL., *supra* note 4, at 31.

policy, Regional Water Boards are left to apply their own interpretation of section 13142.5(b) when issuing permits for desalination projects. One example is the Carlsbad Desalination Project, proposed by Poseidon Resources, Inc.

Poseidon is a privately held company that has been working since 1998 to build a 50 MGD desalination plant in Carlsbad, California.[175] In a startling example of inefficiency, the desalination plant needs approximately 304 MGD of seawater in order to produce 50 MGD of freshwater through reverse osmosis technology.[176] This proposed project is enormous when compared to the desalination plants currently in use in California. Most active desalination plants in the state are small, ranging from .002 to .6 MGD and are used for industrial processes and aquarium use.[177]

The San Diego Regional Water Quality Control Board ("San Diego Regional Board") had an opportunity to set an important precedent when it issued a water permit to Poseidon Resources for the Carlsbad Desalination Project.[178] Unfortunately, it failed to reasonably apply the Porter-Cologne Act standards and did not follow guidance from the *Riverkeeper* decisions.

In May 2009, the San Diego Regional Board issued a final order granting Poseidon an NPDES permit for the Carlsbad Desalination Project based on Poseidon's intent to co-locate with the Encina Power Station[179] and to rely on the open seawater intake system currently used for the power plant's once-through cooling process.[180] Remarkably, the permit also accepted Poseidon's plans to fund a wetlands restoration project as its way of mitigating the intake and mortality of marine life from the open seawater intakes under California Water Code Section 13142.5(b).[181]

[175] *See* Symposium, *supra* note 9, at 1355.

[176] AMENDED CARLSBAD DESALINATION PROJECT NPDES PERMIT, *supra* note 15, at 1 (the total flow rate of source water to operate at full production is 304 MGD; 107 MGD will be used to produce 50 50MGD of potable water and 57 57MGD of wastewater, the remaining 197 MGD of source water not used for production will be used to dilute the brine wastewater).

[177] *See* COOLEY ET AL., *supra* note 4, at 26; *see also* CAL. COASTAL COMM'N, SEAWATER DESALINATION AND THE COASTAL ACT 15 (2004).

[178] *See generally* CARLSBAD DESALINATION PROJECT NPDES PERMIT, *supra* note 15.

[179] *See id.*

[180] DRAFT FINAL SED, *supra* note 8, at 26.

[181] Petition for Writ of Mandamus at 2, Surfrider Found. Inc., v. Cal. Reg'l Water Quality Control Bd., San Diego Region, No. 37-2010-00090436-CU-MW-CTL (Cal. Super. Ct. filed Apr. 22, 2010).

A. RELYING ON RESTORATION VIOLATES THE CALIFORNIA WATER CODE

In the final order adopting the NPDES permit for the Carlsbad Desalination Project, the San Diego Regional Board also approved Poseidon's Flow, Entrainment and Impingement Minimization Plan ("Minimization Plan") required under the California Water Code.[182] Poseidon's Minimization Plan relies on restorative measures, specifically wetlands creation, in order to purportedly satisfy the requirement under section 13142.5(b),[183] that the facility implement "mitigation measures . . . to minimize the intake and mortality of all forms of marine life."[184] As discussed in Section III *supra*, the plain meaning of section 13142.5(b), is that efforts should be undertaken to *prevent* killing marine life, not to restore habitat *after* marine life is killed. The San Diego Regional Board failed to follow the plain meaning of the California Water Code in approving the Minimization Plan and the NPDES permit, which that allows for after-the-fact restoration measures in lieu of best site, design, technology, or mitigation measures. A coalition of environmental groups filed a lawsuit challenging the NPDES permit on these grounds; that suit, which is currently pending in the Superior Court of California, County of San Diego.[185]

B. CO-LOCATING WITH THE ENCINA POWER STATION UNDERMINES THE ENVIRONMENTAL BENEFIT INTENDED BY THE ONCE-THROUGH COOLING POLICY

Poseidon's intent to build next to the Encina Power Station in order to share an intake pipe is short-sighted and would undercut the environmental benefit intended by the State Water Board's policy to reduce entrainment and impingement at coastal power plants. Under the policy, the Encina Power Station is scheduled to cease use of its once-

[182] AMENDED CARLSBAD DESALINATION PROJECT NPDES PERMIT, *supra* note 15.

[183] *See id.* at 9.

[184] CAL. WATER CODE § 13142.5(b) (Westlaw 2011).

[185] After the State Water Board refused to review a petition, Surfrider Foundation filed a petition for a writ of mandamus in the California Superior Court against the San Diego Regional Water Board, alleging that the Regional Water Board violated the California Water Code by issuing the NPDES permit for the Poseidon plant and allowing it to co-locate with the Encina Power Station and to use restoration as a mitigation measure. *See* Petition for Writ of Mandamus at 2, Surfrider Found. Inc., v. Cal. Reg'l Water Quality Control Bd., San Diego Region, No. 37-2010-00090436-CU-MW-CTL (Cal. Super. Ct. filed Apr. 22, 2010). As of the time of this writing, the petition is still pending.

through cooling systems by 2017.[186] After that date, Poseidon can no longer use water from the power plant as its source water;, instead, it must withdraw its own water through the open seawater intakes in order to keep operating.[187]

When the San Diego Regional Water Board issued Poseidon's NPDES permit for the Carlsbad Desalination Project, it assumed that the desalination plant would be "operating in conjunction with the power plant" and thus concluded that the Poseidon intake would not increase the volume or the velocity of the power station's cooling-water intake or "the number of organisms impinged and entrained by the Encina Power Station cooling water intake structure."[188] In light of the fact that the Encina Power station will have to stop using the intake pipes by 2017,[189] it makes little sense for the San Diego Regional Board to allow Poseidon to continue to withdraw water through the open seawater intake pipes. In fact, the Carlsbad Desalination Project would withdraw 11% more water annually than the co-located Encina Power Station withdraws on average.[190] This would negate any environmental benefit that would be gained when the Encina Power Station ceases to use once-through cooling.

If the Carlsbad Desalination Project were to use open seawater intakes to withdraw water for cooling its facility, then Clean Water Act section 316(b) would apply, and the project would not be allowed with its current configuration. Additionally, under the plain meaning of California Water Code section 13142.5(b) and the reasoning set forth in the *Riverkeeper* cases, after-the-fact restoration is not allowed in lieu of best technology available to minimize environmental impacts. The Carlsbad Desalination Project exemplifies the tragic reality in California that open seawater intake technology is subject to a different standard if it is used for drinking water rather than cooling water. It also underscores the urgent need for a consistent statewide policy to address intake structures for desalination.

VI. CONCLUSION

Seawater desalination may have a role in California's future water-supply portfolio. However, permitting new desalination plants to

[186] STATEWIDE WATER QUALITY CONTROL POLICY, *supra* note 13, at 14.

[187] *See* AMENDED CARLSBAD DESALINATION PROJECT NPDES PERMIT, *supra* note 15, at 1.

[188] CAL. REG'L WATER QUALITY CONTROL BD., SAN DIEGO REGION, ORDER NO. R9-2006-0065 (NPDES NO. CA0109223) F-49.

[189] STATEWIDE WATER QUALITY CONTROL POLICY, *supra* note 13, at 12, tbl.1.

[190] AMENDED CARLSBAD DESALINATION PROJECT NPDES PERMIT, *supra* note 15, at 1.

use open seawater intakes would undermine state efforts to protect marine life from the impacts of these intakes currently in use at coastal power plants. Further, to permit new desalination facilities to use open seawater intakes and to allow restoration projects to offset the destruction to marine life violates the mandates of the California Water Code and is inconsistent with federal case law. Fortunately, there are alternative technologies available, such as sub-seafloor intakes, that better protect marine life and should be pursued.

Large-scale desalination plants are new to California,[191] but the laws protecting our marine environment are not. The current need for freshwater should not cloud the judgment of decision makers who are responsible for following long-standing state and federal mandates to protect marine life. These laws are no less important in times of a water crisis.[192] Consistent and well-reasoned environmental policy should be followed at all times.

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[191] *See* COOLEY ET AL., *supra* note 4, at 25.

[192] *See* Governor of Cal., Exec. Order No. S-06-08 (2008) (proclaiming drought and ordering immediate action to address situation).

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