

Fishing for Food and Fodder: The Transnational Environmental History of Humboldt
Current Fisheries in Peru and Chile since 1945

by

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Dissertation submitted in partial fulfillment of
the requirements for the degree of Doctor of Philosophy in the Department of
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ABSTRACT

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Abstract

This dissertation explores the history of industrial fisheries in the Humboldt Current marine ecosystem where workers, scientists, and entrepreneurs transformed Peru and Chile into two of the top five fishing nations after World War II. As fishmeal industrialists raided the oceans for proteins to nourish chickens, hogs, and farmed fish, the global “race for fish” was marked by the clash of humanitarian goals and business interests over whether the fish should be used to ameliorate malnutrition in the developing world or extracted and their nutrients exported as mass commodities, at greater profit, as a building block for the food chain in the global North. The epicenter of the fishmeal industry in the 1960s was the port city of Chimbote, Peru, where its cultural, social, and ecological impacts were wrenching. After overfishing and a catastrophic El Niño changed the course of Peruvian fisheries in 1972, Chile came to dominate world markets by the early 1980s due to shifting marine ecologies along its coast that shaped the trajectory of the ports of Iquique and Talcahuano. As Peruvian anchoveta stocks recovered in the 1990s, new environmentalist voices—from local residents to international scientists—emerged to contest unsustainable fisheries practices. This study demonstrates how global, transnational, and translocal connections shaped Humboldt Current fisheries as people struggled to understand the complex correlation between fish populations, extractive activity, and oceanic oscillations within a changing geopolitical context.

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List of Abbreviations

CAG	Guano Administration Company (Compañía Administradora del Guano, Peru)
CENDOPES	Center for Fisheries Documentation (Centro para la Documentación Pesquera, Peru)
CONAPACH	Chilean Artisanal Fishermen's Federation (Confederación Nacional de Pescadores Artesanales de Chile)
CORFO	Chilean Development Corporation (Corporación del Fomento)
CPPS	Permanent Commission for the South Pacific (Comisión Permanente para el Pacífico Sur)
CSA	Center for Environmental Sustainability (Centro para la Sostenibilidad Ambiental, Universidad Peruana de Cayetano Heredia)
EEZ	Exclusive Economic Zone (as defined by UNCLOS)
FAO	U.N. Food and Agricultural Organisation
IFFO	International Fish Meal and Fish Oil Organisation
IFOP	Fisheries Development Institute (Instituto de Fomento Pesquero, Chile)
IMARPE	Peruvian Ocean Research Institute (Instituto del Mar del Perú)
MSC	Marine Stewardship Council
MSY	Maximum sustainable yield theory

SPRFMO	South Pacific Regional Fisheries Management Organisation
UNCLOS	United Nations Convention on the Law of the Sea
VR	Vanguardia Revolucionaria (Peru)

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Introduction

Between 1947 and 1982, South American Pacific coastal nations engaged in an ongoing, undeclared maritime war with the United States, a conflict which led their navies to seize nearly 250 U.S. vessels and produced endemic diplomatic tensions with Ecuador, Peru, and Chile. “[D]amned piracy!” exclaimed the American Tunaboat Association manager Augusto Felando regarding another new seizure in 1971.¹ Claiming 200-mile territorial seas, these emerging fishing powers staked their position in the global race for fish after World War II. “As the industrial revolution angles into the depths of the oceans,” the *Los Angeles Times* observed, “nations are fishing for far larger catches than tuna.”² For Peru and Chile, the ultimate prize was the silvery shoals of anchoveta, sardines, and jack mackerel, which provided the raw material for fishmeal—a new commodity used in animal feed in the global North, where “the appetite for it seemed to be insatiable.”³ Cooked, pressed, and ground into the yellow-brown powder of fishmeal, the tiny fishes harvested off the Peru-Chile coast played a central role in the

¹ J. Bassett, “Troubled Waters,” *Los Angeles Times*, February 2, 1971, E1.

² R. Buffum, “It’s More Than Tuna,” *Los Angeles Times*, January 25, 1973, D1.

³ Arthur F. McEvoy, *The Fisherman’s Problem: Ecology and Law in the California Fisheries, 1850-1980* (Cambridge: Cambridge University Press, 1986), 209.

global rise of industrial chicken, pig, and more recently fish farming in the postwar era. These proteins have provided essential but largely hidden nutrients for the global industrial food chain since the late 1950s, when Peru and Chile became the world's top producers almost overnight. Long the site of contentious battles over ocean resources such as whales and tuna, Southeast Pacific fisheries assumed a new significance as the Peruvian and Chilean fishmeal economies took shape in the post-World War II era.

This dissertation explores the industrialization of Humboldt Current fisheries, where, since the 1940s, two of the top five global fishing nations⁴ have grappled with environmental limits and powerful interest groups within a shifting international political, socio-economic, and legal landscape. As U.S. and European industrial farms raised more chickens, pork, and fish to satisfy the growing consumer demand for “healthy” meats, fishmeal industrialists raided the oceans for the proteins that nourished them.⁵ The explosive growth of fishmeal and oil as export commodities came at the expense of locally-aimed programs to improve the nutrition of impoverished

⁴ The “top five” figure refers to total marine capture fishing (ocean and inland) globally in 2004. Peru and Chile are the only Latin American fishing nations in the top ten producers. FAO, *State of World Fisheries and Aquaculture 2006* (Rome: FAO Fisheries and Aquaculture Department, 2007), 9, accessed September 29, 2011, available from <ftp://ftp.fao.org/docrep/fao/009/a0699e/a0699e.pdf>. As of 2010, Peru remained in second place after China, and Chile ranked seventh. See Figure 4 in FAO, *The State of World Fisheries and Aquaculture 2010* (Rome: FAO Fisheries and Aquaculture Department, 2010), 13, accessed September 29, 2011, available from <http://www.fao.org/docrep/013/i1820e/i1820e01.pdf>.

⁵ Fishmeal is not generally used in cattle feeds.

populations, as the desire for cheap meat in the global North eclipsed the promise that international scientists and civil servants had once seen in using these ocean resources directly to combat world hunger. Instead of a mechanism for utilizing the by-products of canned or frozen seafood, fishmeal for animal fodder became the principal destiny of the species that constitute the base of the Southeast Pacific marine food web. Boom and bust cycles transformed three important fishmeal cities—Chimbote, Peru; and Iquique and Talcahuano, Chile (see **Appendix A-1**)—as industrialists moved capital and technology in search of the most abundant fish populations. These shifts took place as global demand grew, highlighting the intersection of translocal and transnational processes of change. The massive transfer of energy in the form of marine proteins from the Southeast Pacific to the global North became a key factor in the rapid expansion of meat and fish consumption during the post-World War II era.

The evolution of industrial fisheries in the Southeast Pacific offers historians the opportunity to invigorate the growing practice of transnational history through engaging with both the natural and the human sciences. Tellingly, the specialization of academic disciplines that characterized late-twentieth and early-twenty-first century scholarly inquiry was alien to the thinking of Prussian naturalist Alexander von Humboldt, for whom the oceanographic current at the center of this study was named.⁶

⁶ Laura D. Walls, *The Passage to Cosmos: Alexander Von Humboldt and the Shaping of America* (Chicago: University of Chicago Press, 2009); Jorge Cañizares-Esguerra, *Nature, Empire, and*

We cannot build a marine environmental history without moving beyond these now-entrenched conceptual boundaries. This dissertation draws insights from economic history, transnational studies, marine science and policy, political ecology, and cultural studies. In five distinct but chronologically overlapping chapters, it offers an historically- and ecologically-grounded narrative of how industrial fisheries developed along the coast of the Humboldt Current marine ecosystem after World War II, and examines those impacts at both the (trans)local and (trans)national scales. The resulting history, moreover, has significant implications for contemporary global environmental policy and the intensifying debates about how best to manage wild fisheries. It suggests that not only have ecological processes shaped the histories of human society in their specific, localized contexts, but such historical relationships offer keys to resolving pressing policy concerns currently under debate in the social and natural sciences, including resource exhaustion, pollution, food security, and climate change.

The larger story about this extractive industry in Chile and Peru hinged, this dissertation shows, on the ecological cycles of the Humboldt Current. My research shows how the oceanographic conditions of this marine ecosystem have influenced the

Nation: Explorations of the History of Science in the Iberian World (Stanford: Stanford University Press, 2006).

political and economic development of fisheries along the Peru-Chile coast, as ecological conditions shift and fish populations migrate with the recurrence of intra-seasonal, annual, inter-annual, and multi-decadal climatic fluctuations. The Humboldt Current provides a biogeographical frame within which to examine the relationship between the people and interests at play in the fishmeal industry, the economies they support, and the fish upon which they depend. This dissertation thus demonstrates how nature's agency has shaped these human and animal food webs, both regionally and globally: the oceanographic shifts of El Niño, which occurred simultaneously with industrial fishing in the postwar era, influence the fluctuations in fish populations in a cyclical way. Thus this is not a straightforward story of decline but rather one with successive collapses and renewals at different sites in the marine ecosystem. While susceptible to overfishing and natural variations, the anchoveta, sardines, and jack mackerel at the center of the marine food web and the fishmeal industry are also ecologically resilient, able to support the recovery of the ecosystem.

Transnationalism scholars are now turning to the translocal as a way of understanding the entanglements between processes of change that transcend national boundaries.⁷ Proposing a "multiscalar approach" to migration studies, geographers

⁷ Arjun Appadurai, "Sovereignty without territoriality: Notes for a postnational geography," *The Anthropology of Space and Place: Locating Culture* (S. M. Low and D. Lawrence-Zúñiga, Wiley-Blackwell: 337-350), 2003; Katherine Brickell and Ayona Datta, eds., *Translocal Geographies: Spaces, Places, Connections* (Burlington, VT: Ashgate, 2011): 4. Another example is from Jonathan Barton and Warwick Murray, who in examining the fruit and salmon export industries in Chile called

Katherine Brickell and Ayoni Datta seek to understand “not just economic exchanges...but the negotiation of a wider range of spaces and place,” in local-local connections within and across national boundaries.⁸ “Reasserting this multiscalar approach to translocality,” they wrote, “means that we have to take seriously the material, embodied, and corporeal qualities of the local—the places where situatedness is experienced.”⁹ In Humboldt Current fisheries, the ebbs and flows of human and natural resources were linked to not only processes of global political economy but to oceanographic and ecological forces at multiple scales. While Chapters One and Two explore the broader international connections between trade, technology, and capital, Chapters Three and Four examine specific, translocal transformations in Peruvian and Chilean industrial fishing ports across the post-World War II era.

This dissertation aims to understand past cycles in Southeast Pacific fisheries at a moment when the world’s oceans are facing a crisis of widespread depletion and

for a “more grounded consideration of the complex and uneven geography of economic globalisation that does not privilege analysis at any one scale and that seeks to elucidate the links between the 'global' and the 'local'.” Jonathan R. Barton and Warwick E. Murray, “Grounding Geographies of Economic Globalization: Globalised Spaces in Chile's Non-Traditional Sector, 1980-2005,” *Tijdschrift voor economische en sociale geografie* 100.1 (2009): 81-100.

⁸ Brickell and Datta, *Translocal Geographies*, 10. They also incorporate Bordieu’s notion of habitus as way of rethinking the translocal (13).

⁹ Brickell and Datta, *Translocal Geographies*, 6.

industry overcapitalization. But it will not tell a linear story of irreversible ecological decline.¹⁰ Humboldt Current fisheries offer a case study for the interaction between dynamic, cyclical change in the human and natural ecosystems and an exceptionally valuable vantage point from which to examine the links between marine ecology, political economy, and global industrial food production. The urgency of policy debates surrounding global fisheries management also necessitate interdisciplinary engagement with ocean and fish ecology, a call to which marine environmental historians are increasingly responding.¹¹

In addition to the enormously important anchoveta, other Humboldt Current fish species costar in this historical narrative—most importantly sardines, mackerel, and tuna, but hake and even whales have also played a role in the shifting geopolitics and marine ecologies of this region. In examining the linkages among people, fish and marine mammal species, ocean currents, and economic forces in the Humboldt Current marine ecosystem, this study helps illuminate the role of little understood climate fluctuations in shaping the Peruvian and Chilean fishmeal economy, with impacts on

¹⁰ Such as in Mark Kurlansky, *Cod: A Biography of the Fish That Changed the World* (New York: Walker and Co., 1997).

¹¹ See for example, Jeremy B. Jackson, Karen E. Alexander, and Enric Sala, eds., *Shifting Baselines: The Past and the Future of Ocean Fisheries* (New York: Island Press, 2011); M.G. Schechter, N.J. Leonard, and W.W. Taylor, eds. *International Governance of Fisheries Ecosystems: Learning from the Past, Finding Solutions for the Future* (Bethesda, MD: American Fisheries Society, 2008); Mary C. Finley, "The Tragedy of Enclosure: Fish, Fisheries Science, and Foreign Policy, 1920-1958," Ph.D. dissertation, University of California, 2007.

the food web at the local, regional, and global scales. It tells the story of people and environments dramatically transformed by the boom and bust of fishmeal and other industrial fisheries along the South American Pacific coast during the last sixty years. The resilience of the pelagic schooling fishes and of the Humboldt Current marine ecosystem to date suggests an environmental narrative in which species can recover from collapse. At the same time it contributes to the ongoing search for public policies that can contribute towards the long-term conservation and sustainable use of marine resources.

I. The Humboldt Current and the global environmental significance of its fisheries

The spectacular growth of the Peruvian and Chilean fishing industry depended upon access to the nutrient-rich Humboldt Current, a cold upwelling zone along the west coast of South America that forms the world's most productive marine ecosystem (see **Appendix A-2**).¹² Extending north from southern Chile (~45°S) to the waters off Peru and Ecuador (~4°S), the Humboldt Current System consists of three smaller upwelling subsystems and is subject to large-scale climatic fluctuations that directly impact the distribution, size and density of fish populations, due to intra-seasonal,

¹² In terms of fish biomass. Andrew Bakun and Scarla J. Weeks, "The Marine Ecosystem Off Peru: What Are the Secrets of Its Fishery Productivity and What Might Its Future Hold?" *Progress in Oceanography* 79, no. 2-4 (2008): 290-99.

annual, inter-annual, and multi-decadal oceanographic cycles.¹³ A poleward undercurrent flows east along the Equator, turning south when it meets the Peru-Chile trench (to about 42°S).¹⁴ In addition, every two to seven years, *El Niño* (the Child, named for its usual occurrence in the Christmas season) brings warmer waters to the South American Pacific coast, reshaping relationships among marine species in the trophic structure and producing crises in commercial fisheries.¹⁵ Although *El Niño* (also called the *El Niño* Southern Oscillation, ENSO) has been recorded by climatologists for centuries, some believe that the increased intensity of events towards the end of the twentieth century could be linked to human-caused global warming.¹⁶

Marine mammals and other predators such as swordfish and tuna depend on the Humboldt Current's abundant schooling fishes—most importantly anchoveta (*Engraulis ringens*), Spanish sardine (*Sardinops sagax*), and jack mackerel (*Trachurus murphyi*)—for

¹³ Vivian Montecino and Carina B. Lange, "The Humboldt Current System: Ecosystem Components and Processes, Fisheries, and Sediment Studies," *Progress in Oceanography* 83 (2009): 65, 68.

¹⁴ Montecino and Lange, "The Humboldt Current System," 66.

¹⁵ While *El Niño* most frequently occurs every three to five years, the U.S. National Oceanic and Atmospheric Administration (NOAA) notes that "in the historical record this interval has varied from two to seven years." See National Weather Service, Climate Prediction Center information page, available from http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ensofaq.shtml.

¹⁶ See Institut de Recherche Pour le Développement, "El Niño Affected By Global Warming," *ScienceDaily*, December 21, 2007, accessed October 05, 2011, available from <http://www.sciencedaily.com/releases/2007/12/071220133426.htm>.

sustenance (see **Appendix B**). But these fish schools migrate within the region, exhibiting what scientists call “adaptive strategies in space and time” based on the extreme fluctuations in temperature and habitat.¹⁷ The low-oxygen zone off the Peru-Chile coast is an important area for denitrification, a process which influences the way oceans share carbon dioxide with the atmosphere.¹⁸ Understanding the way fish interact with habitat and ocean chemistry in this region is thus crucial for measuring processes of global environmental change. It is also key for fisheries management: the Humboldt Current region has historically supplied up to 20% of global fish production and 80% of fishmeal exports, and the disappearance of its fish stocks would reduce world supplies by as much as 50% and wreaked havoc in commodity markets.¹⁹ In this marine ecosystem and its fishmeal economy, ocean currents, climatic change, and fish are powerful agents of historical change.

¹⁷ Arnaud Bertrand, Marceliano Segura, Mariano Gutiérrez, and Luis Vásquez, "From Small-Scale Habitat Loopholes to Decadal Cycles: A Habitat-Based Hypothesis Explaining Fluctuation in Pelagic Fish Populations Off Peru," *Fish and Fisheries* 5 (2004): 296-316.

¹⁸ The South Pacific Oxygen Minimum Zone constitutes the world's fourth largest *hypoxic* (low-oxygen) region. Montecino and Lange, "The Humboldt Current System," 67. For the relationship of hypoxia to fisheries, see Jeffrey Richards, Anthony Farrell, and Colin Brauner, eds. *Hypoxia* (Elsevier, 2009).

¹⁹ Statistic from R. W. Hardy and Albert G.J. Tacon, "Fish Meal: Historical Uses, Production Trends and Future Outlook for Sustainable Supplies," in *Responsible Marine Aquaculture*, ed. R.R. Stickney and J.P. McVey (New York: CABI, 2002), 315; global production percentages from UNEP, Permanent Commission for the South Pacific (CPPS), "Humboldt Current." in *Global International Waters Assessment*, ed. Ulla Li Zweifel (Kalmar, Sweden: University of Kalmar, 2006), 19.

The Humboldt Current is defined by scientists as a “Large Marine Ecosystem,” an ecoregion defined geographically by current understandings of biological productivity and oceanographic processes which influence the trophic (food web) relationships among species.²⁰ It is one of the world’s three major eastern boundary current upwelling systems, which form along the eastern edge of the Pacific and Atlantic Oceans: the Humboldt Current off the South American Pacific coast, the California Current in the Northern Hemisphere and the Benguela Current off the western coast of Africa in the South Atlantic. These regions have major importance for global fisheries production, particularly because of the puzzling relationship between sardine (*Sardinops*) and anchovy (*Engraulis*) subspecies common in all three. In what marine scientists now term alternating fisheries regimes, sardine and anchovy populations—which serve a similar purpose in the marine food web as prey for larger species—alternate in their dominance of the marine ecosystem on an inter-decadal temporal scale. In the post-World War II era, the Humboldt Current has been a key site of scientific studies that seek to understand the relationship between these fish populations and to oceanographic processes (such as water temperature), with major implications for global

²⁰ It is important to note that there are multiple forms of defining marine ecoregions and these are contested by various groups of scientists. However, the Humboldt Current Large Marine Ecosystem (LME)—or Humboldt Current System—remains a key framing concept for many scientific studies, and it fits the purpose of this dissertation, which takes this entire region and its fisheries as a biogeographical unit. See M. Spalding, et al., "Marine Ecoregions of the World: A Bioregionalization of Coastal and Shelf Areas," *BioScience* 57, no. 7 (2007): 573-83.

fisheries management, since such relationships affect the viability of industrial fisheries and government-established quotas. As of this writing, a full scientific understanding of these relationships remains elusive.²¹

Intrigued by the “amazing production of small pelagic fish” in the Humboldt Current, generations of marine scientists have sought to unlock its “secrets,” past and future.²² In the autumn of 1802, during his voyage to the west coast of South America, nineteenth-century Prussian naturalist Alexander von Humboldt observed the chilly ocean current. “It brings the cold waters of the high southern latitudes to the coast of Chili,” he noted,

follows the shores of this continent, and of Peru, first from south to north, and is then deflected from the bay of Arica onwards from south-south-east to north-north-west...On that part of the shore of South America, south of Payta, which inclines furthest westward, the current is suddenly deflected in the same direction from the shore, turning so sharply to the west, that a ship sailing northward passes suddenly from cold into warm water.²³

²¹ See Alec D. MacCall, “The Sardine-Anchovy Puzzle,” in *Shifting Baselines: The Past and the Future of Ocean Fisheries*, eds. Jeremy B. Jackson, Karen E. Alexander, and Enric Sala (New York: Island Press, 2011), 47-58.

²² Vivian Montecino and Carina B. Lange, “The Humboldt Current System: Ecosystem Components and Processes, Fisheries, and Sediment Studies,” *Progress in Oceanography* 83 (2009): 65-79; ecosystem’s “secrets” from Bakun and Weeks, “The Marine Ecosystem Off Peru,” *ibid*; J. Jackson, K. Alexander, and E. Sala, eds., *Shifting Baselines*, *ibid*.

²³ Although the account was formally published much later, Humboldt notes in the text that his observations of the current were based on his visit in autumn of 1802. Alexander von Humboldt, *Cosmos: A Sketch of a Physical Description of the Universe*, Vol. I, trans. E.C. Otté (London: H.G. Bohn, 1849), 313-314.

These observations about the coastal current appear to be remarkably consistent with contemporary scientific understandings. Although not as sophisticated as the 2009 illustrations (**Appendix A-2**), a 1943 map by the U.S. Army Service Forces illustrates what Humboldt had described a century and a half prior (**Appendix A-3**). Humboldt's transoceanic travels brought the perspective of scale to his scientific vision—his methodological emphasis on systemic environmental change and the links between human and natural climate shifts resonates in the twenty-first century focus on ecosystems as units of study and the growing interest in incorporating the human sciences into ecological analysis.²⁴

Yet Humboldtian science also helped to advance “a technocratic political program aimed at placing enlightened, globe-trotting scientists in positions of power,” as historian Gregory Cushman points out, and “often belittled Creole achievements under colonial rule.”²⁵ Such structures of power help define a starting point for this dissertation, since the presence of “globe-trotting scientists” and their patronage networks was hardly unique to nineteenth-century contexts. Later generations of scientists and civil servants came to study the Humboldt Current, but this time at the request of coastal states with an eye to its exploitation. Many expressed awe at the

²⁴ On the integration of human and natural sciences in the Humboldtian vision, see Walls, *Passage to Cosmos*.

²⁵ Gregory T. Cushman, "Humboldtian Science, Creole Meteorology, and the Discovery of Human-Caused Climate Change in South America," *Osiris* 26 (2011): 23.

highly productive sea alongside the arid coastal desert. "In contrast to the barrenness of the coast, there is a peculiar wealth of certain forms in the open ocean" off Peru, wrote U.S. fisheries scientist Robert E. Coker in 1908:

More striking still are the immense schools of small fishes, 'the anchobetas' ..., which are followed by numbers of bonitos and other flocks.... The long files of pelicans, the low-moving black clouds of cormorants, or the rainstorms of plunging gannets probably can not be equaled in any other part of the world.²⁶

In the following decades, successive waves of "globe-trotting scientists" observed the richness of these waters. During the 1920s, for example, U.S. ornithologist Robert Cushman-Murphy studied the characteristics of the sea bird colonies and their foraging patterns in Peru and Chile.²⁷ Two separate teams of U.S. experts came at the behest of the Peruvian and Chilean governments in the 1940s, comprised of scientists from U.S. Fish and Wildlife Service, who produced detailed reports about the marine riches off their coasts and prospects for industrial development. A decade later, United Nations civil servants and "technical experts" with the Food and Agricultural Organization (FAO) also traveled to the Southeast Pacific, implementing marketing campaigns to

²⁶ Robert E. Coker, "The Fisheries and the Guano Industry of Peru," Paper presented at the *Fourth International Fishery Congress* (Washington, D.C., 1908): 338, available from <http://fishbull.noaa.gov/28-1/coker.pdf>.

²⁷ E. Schweigger, *El Litoral Peruano* (Lima: Universidad Nacional Federico Villareal, 1964); Coker, "The Fisheries and the Guano Industry of Peru;" R.C. Murphy, "The Oceanography of the Peruvian Littoral with Reference to the Abundance and Distribution of Marine Life," *Geographical Review* 13, no. 1 (1923): 64-85.

increase local fish consumption and helping to found local research institutions that would study and inform state management: now the Peruvian Ocean Institute (Instituto del Mar del Peru, IMARPE, founded 1960), and the Institute for Fisheries Development in Chile (Instituto de Fomento Pesquero, IFOP, 1964).

For U.S. fisheries scientists, Southeast Pacific waters have offered a testing ground for shifting understandings of large-scale, linked oceanic processes, as well as imagined fishing grounds that they hoped would pave the way for U.S. industrial exploitation. Beginning in the 1950s, these U.S. experts studied the Eastern Tropical Pacific (a biogeographical region extending from Baja California to the Ecuador-Peru border²⁸) and the overlapping Humboldt Current marine ecosystem in search of a clues about the natural cycles that, alongside overfishing, played a role in the collapse of the California sardine. Fisheries scientist and self-styled “biopolitician” Wilbert MacLeod Chapman played a leading role in efforts to build coalitions between science, industry, and government for the expansion of U.S. West Coast fisheries into more distant regions of the Pacific. Chapman, who built his early career in government and academic institutions in Washington and California, then served as the first assistant to the Undersecretary of State for Fish and Wildlife, before joining the private sector (American Tunaboat Association and later Van Camp Sea Foods), helped forge an interdisciplinary

²⁸ This rough definition corresponds to Spalding, et al’s 2007 definition in the context of their discussion of the need to revise the definition of marine ecoregions for the purpose of designing effective conservation strategies. Spalding, et al, “Marine Ecoregions.”

scientific collaboration in ocean studies that historian Harry Scheiber called “the new oceanography.”²⁹

Building on—and investing heavily in—this deepening technocratic gaze over the “Pacific fisheries frontier,” U.S. industrialists sought to expand their fortunes by investing in Humboldt Current fisheries in the 1950s and early 60s. A joint venture between San Francisco-based firm Wilbur-Ellis and Peruvian industrialist Manuel Elguera established the first commercial fishmeal plant in Chimbote, Peru, in the early 1950s.³⁰ Harvey Smith, the U.S. Gulf Coast “fishmeal king,” established operations in northern Chile in 1963, just as the chicken industry in the southeastern United States experienced a great expansion and firms were becoming vertically integrated, producing their own specially-formulated foods.³¹ Other U.S.-based agro-industrial and

²⁹ Harry N. Scheiber, “Wilbert Chapman and the Revolution in U.S. Pacific Ocean Science and Policy, 1945-1951,” In *Nature in Its Greatest Extent: Western Science in the Pacific*, ed. Philip F. Rehbock (Honolulu: University of Hawai‘i Press, 1988), 223-44; McEvoy, *The Fisherman’s Problem*, 194, 203.

³⁰ There is a discrepancy in the literature over when this plant was actually built. Jaysuño Abramovich claims that Peruvian industrialist Manuel Elguera began producing fishmeal in Chimbote in 1955 (see J. Abramovich, “La Industria Pesquera en el Perú: Genesis, Apogeo y Crisis,” Lima: Centro de Investigaciones Económicas y Sociales, Universidad Nacional Federico Villarreal, 1973), but Michael Roemer notes that this plant was built in 1950 as a joint venture with Wilbur-Ellis. M. Roemer, *Fishing for Growth: Export-led development in Peru, 1950-1967* (Cambridge: Harvard Press): 82-83.

³¹ William Boyd, “Making Meat: Science, Technology, and the Industrialization of American Poultry Production.” *Technology and Culture* 42 (2001): 631-64; W. Boyd and M. Watts, “Agro-Industrial Just-in-Time: The Chicken Industry and Postwar American Capitalism,” in *Globalising Food: Agrarian Questions and Global Restructuring*, eds. D. Goodman and M. Watts (New York:

pharmaceutical firms also dabbled in Humboldt Current fishmeal production during the 1950s and 60s, many of them are today among the country's largest conglomerates, including Cargill, General Mills, and Pfizer. But with regime shifts and volatility in local supplies due to climatic fluctuations, most of these firms abandoned the South American Pacific coast by the early 1970s in search of new investment opportunities, such as soymeal, the primary competing commodity on global markets.

Overall in Peru and Chile, therefore, local magnates retained control of fishmeal production despite the varying presence of foreign capital in the industry. The Peruvian industrialist Luis Banchero Rossi built a formidable business empire based in part on a local monopoly of fishmeal production that yielded him significant power at not only the national but international levels. In 1960, the first big year for Peruvian fishmeal on world commodity markets, Banchero negotiated for Peru nearly two-thirds of the global fishmeal quota set at the Europe-dominated producers' trade association meeting in Paris.³² A celebrated icon of Peruvian business and economic history, Banchero was mysteriously murdered on New Year's Day in 1972, when he was found in his country

Routledge, 1997), 139-62; S. Striffler, *Chicken: The Dangerous Transformation of America's Favorite Food* (New Haven: Yale University Press, 2005).

³² "Triunfó la anchoveta en Paris," *Pesca* 1.2 (1960), 29-31. See also International Fishmeal and Fish Oil Organization, "A Brief History of the Organization," 4, accessed November 22, 2011, available from <http://www.iffonet.net/downloads/50YearHistoryBooklet.pdf>.

home bound, gagged, and bludgeoned to death; his gardener was subsequently convicted while his secretary-lover went free, despite public ire surrounding rumors of a love triangle conspiracy. Intrigue aside, his death preceded the total collapse of the industry: later that year a strong El Niño combined with the impact of a decade of overfishing wiped out the Peruvian anchoveta fishery. The left-wing military regime of General Juan Velasco Alvarado soon nationalized the ailing fishmeal industry, which remained nearly bankrupt for over a decade, with the state-run Pesca Perú attempting to maintain an estimated 27,000 permanent workers as boats and plants remained idle.³³

El Niño's impact on the Peruvian fishery in 1972 allowed Chile to solidify its position as a competitor on global commodity markets. The recurrence of this climate phenomenon has repeatedly caused major shifts in fishing cycles, warming the cold waters off the Peru-Chile coast on a variable, interannual cycle (every two to seven years) and causing the anchoveta schools to disappear or greatly diminish in size and distribution as they search for cooler temperatures. In Chile, following a period of intense public-private investment in fisheries infrastructure in the northern cities of Iquique and Arica, the 1965 El Niño brought a crisis to the industry and precipitated the government takeover of many firms by the state-run Chilean Development Corporation (Corporación de Fomento, CORFO). Right-wing military dictator General Augusto

³³ "El gobierno asume monopolio de la industria pesquera," *Expreso* (Lima), May 8, 1973, 3.

Pinochet reprivatized fishing firms after 1973, leading to highly concentrated ownership within the sector and the Chilean agro-export industry more generally. During this period the Italian-born industrialist Anacleto Angelini, who entered the sector in 1956 with the purchase of the Eperva fishmeal plant in Arica, further consolidated his holdings in the region's fisheries.³⁴ Fishmeal became the core of an expanding business empire through which, by the time of his death in 2007, he controlled not only much of the fisheries but also the Chilean forestry and energy sectors.³⁵ Revered in business and government circles for his entrepreneurial accomplishments, Angelini's image was one of low-profile austerity—in contrast to the reputed opulence of Banquero's bachelor lifestyle. He was also despised for his involvement in egregious social and environmental injustices, including the usurpation of indigenous lands and the clandestine release of chemicals into waterways by the forestry giant Celulosa Arauco.³⁶

Yet marine ecology and political boundaries proved more important to the success of the dynamic Chilean fishmeal industry than business innovation. In the 1970s

³⁴ "Anacleto Angelini [obituary]," *The Times (London)*, September 6, 2007; "Obituary of Anacleto Angelini, Italian-born Croesus of modest habits who built up the largest conglomerate in Chile," *The Daily Telegraph (London)*, August 30, 2007.

³⁵ Nicolás Majluf, Nureya Abarca, Darío Rodríguez, and Luis Arturo Fuentes, "Governance and Ownership Structure in Chilean Economic Groups," *Revista Abante* 1, no. 1 (1998): 111-39.

³⁶ In 2006 Greenpeace awarded Angelini with the "Condorazo" prize for the ecological disasters created by his pulp mills. "Anacleto Angelini: Chilean forestry billionaire," *The Independent (London)*, September 4, 2007.

and 80s, shifting ecological conditions yielded a sudden abundance of Spanish sardine and jack mackerel in Chilean waters. The fishmeal subsector incorporated these species as raw material, while the use of sardine and other species for fishmeal was banned in Peru under the left-wing military regime. Within Chilean waters, industrial fleets could also travel from the northern ports of Arica and Iquique to harvest farther south, thus continuing to supply fishmeal plants while Peruvian anchoveta populations struggled to recover. Some producers sold or relocated their plants to the central-south Chilean coast, where the city of Talcahuano became (and remains today) the new center of the fishing industry. All along the West Coast of the Americas, fishmeal industrialists moved capital and technology in pursuit of fluctuating fish stocks—from California to Peru and southward to Chile thereafter. Although the nature of ocean fisheries made the source for their harvests more geographically flexible than most forms of industry, fishing companies thus mirrored a common process in the transnational flows of capital in the search for more profitable conditions.

Because of their ecological and commercial importance, Humboldt Current fisheries have become a major arena for policy debates. As economists Andy Thorpe and Elizabeth Bennett have noted, “the fugitive nature of the [fisheries] resource, its propensity to straddle territorial waters, and the potential for irreversible

overexploitation make stocks extremely vulnerable to unregulated market forces.”³⁷

Described by Robert E. Coker in 1908 as “the most valuable resource of the waters of Peru,” the anchoveta (*Engraulis ringens*) is now considered “the most heavily exploited fish in world history” by the U.N. Food and Agricultural Organization; it remains the top fish species harvested worldwide.³⁸ Other small schooling species such as sardines and jack mackerel also remain key inputs for fishmeal production, which is used today in higher proportion for aquaculture (fish farming) than for poultry and hog feeds.³⁹ This new global source of demand for fishmeal and oil sustains the pressure on forage fish stocks.

³⁷ Andy Thorpe and Elizabeth Bennett, "Globalisation and the Sustainability of World Fisheries: A View from Latin America," *Marine Resource Economics* 16 (2001): 144.

³⁸ Coker, "The Fisheries and the Guano Industry of Peru," 338. Top fish species in terms of volume. FAO, *The State of World Fisheries and Aquaculture* (Rome: FAO, 2010), 15.

³⁹ Lisa Deutsch, Sara Gräslund, Carl Folke, Max Troell, Miriam Huitric, Nils Kautsky, and Louis Lebel, "Feeding Aquaculture Growth through Globalization: Exploitation of Marine Ecosystems for Fishmeal," *Global Environmental Change* 17, no. 2 (2007): 238-49.

II. Interdisciplinary upwelling: The environmental history of fish and oceans

All who...delight to create to themselves an inner world of thought must be penetrated with the sublime images of the infinite, when gazing around them on the vast and boundless sea....

Alexander von Humboldt, *Cosmos* (1849)⁴⁰

An increasing number of scholars are looking towards the world's oceans as "in-between" spaces where flows of people, wealth, resources, and waste crisscross the globe in ways that are historically and ecologically significant.⁴¹ "Rediscovered as a crucial space of globalization—and one with a fragile and imperiled ecology of their own—oceans have swung insistently into view," wrote historian Kären Wigen.⁴² Yet even as ocean and maritime histories probe the deep seas and the humans who explored, studied, lived from, and fought over their resources, the ocean remains largely out of reach to human observation. Thus technology is central to the study of ocean history: "The sea's opacity forces the use of indirect methods to gain knowledge of its

⁴⁰ Humboldt, *Cosmos*, 315.

⁴¹ Sandya Shukla, and Heidi Tinsman. *Imagining Our Americas: Toward a Transnational Frame* (Durham: Duke University Press, 2007), viii.

⁴² Kären Wigen, Introduction in *Seascapes: Maritime Histories, Littoral Cultures, and Transoceanic Exchanges*, ed. Jerry H. Bentley, Renate Bridenthal, and Kären Wigen (Honolulu: University of Hawai'i Press, 2007), 1.

depths," noted historian Helen Rozwadowski, and its mystery has inspired "imagination and desire" in ocean-goers who ponder its vastness.⁴³

Previous social science studies of Chilean and Peruvian fisheries have provided insight into social and economic conditions associated with the development of this industry.⁴⁴ Sociologist Rachel Schurman traced the rise of an entrepreneurial class in southern fisheries under Pinochet in Chile and has examined labor and environmental

⁴³ Helen M. Rozwadowski, "Ocean's Depths," *Environmental History* 15 (2010): 521, 522; Jerry H. Bentley, Renate Bridenthal, and Kären Wigen, *Seascapes: Maritime Histories, Littoral Cultures, and Transoceanic Exchanges* (Honolulu: University of Hawai'i Press, 2007); Daniel Finamore, *Maritime History as World History* (Gainesville: University Press of Florida, 2004); Alex Roland, W. Jeffrey Bolster, and Alexander Keyssar, *The Way of the Ship: America's Maritime History Reenvisioned, 1600-2000* (Hoboken, NJ: John Wiley & Sons, 2008).

⁴⁴ Particularly insightful have been a series of studies published by U.K. researchers: Alonso Aguilar Ibarra, Chris Reid, and Andy Thorpe, "Neo-Liberalism and the Latin 'Blue Revolution': Fisheries Development in Chile, Mexico and Peru," (Portsmouth, U.K.: Centre for the Economics and Management of Aquatic Resources, University of Portsmouth, 1998); Alonso Aguilar Ibarra, Chris Reid, and Andy Thorpe, "The Political Economy of Marine Fisheries Development in Peru, Chile, and Mexico," *Journal of Latin American Studies* 32, no. 2 (2000); Alonso Aguilar Ibarra, Chris Reid, and Andy Thorpe, "Neo-Liberalism and Its Impact on Overfishing and Overcapitalisation in the Marine Fisheries of Chile, Mexico and Peru," *Food Policy* 25(2000); Andy Thorpe, Alonso Aguilar Ibarra, and Chris Reid, "The New Economic Model and Marine Fisheries Development in Latin America," *World Development* 28, no. 9 (2000); Andy Thorpe and Elizabeth Bennett, "Globalisation and the Sustainability of World Fisheries: A View from Latin America," *Marine Resource Economics* 16(2001); Chris Reid et al., "Mainstreaming Fisheries into Latin American Development Strategies," *International Development Planning Review* 27, no. 4 (2005); Andy Thorpe et al., "When Fisheries Influence National Policy-Making: An Analysis of the National Development Strategies of Major Fish-Producing Nations in the Developing World," *Marine Policy* 29(2005). Studies from boom-era Peru include, W. P. Appleyard, "Peru: A Case Study in the Establishment of a Food Fish Industry for a Developing Country," *Journal of the Fisheries Research Board of Canada* 30 (1973): 2236-41; J.R. Coull, "The Development of the Fishing Industry in Peru," *Geography* (1974): 322-31; B.B. and R.M. Smetherman, "Peruvian Fisheries: Conservation and Development," *Economic Development and Cultural Change* 21, no. 2 (1973). See also notes below.

sustainability in export-based fish processing.⁴⁵ Her 1996 article on hake and abalone exports criticized the lack of environmental sustainability in Chile's neoliberal export model.⁴⁶ Sociologists Solange Duhart and Jaqueline Weinstein examined labor conditions in the industrial fisheries of northern Chile during the 1980s, and Chilean economist Julio Peña-Torres has studied the impact of fishing regulations on concentration of ownership and economic efficiency in the sector.⁴⁷ Nonetheless, most of

⁴⁵ Rachel A. Schurman, "Chile's New Entrepreneurs and the "Economic Miracle": The Invisible Hand or a Hand from the State?" *Studies in Comparative International Development* 31, no. 2 (1996): 83-109; "Economic Development and Class Formation in an Extractive Economy: The Fragile Nature of the Chilean Fishing Industry, 1973-1990," (Ph.D. diss., University of Wisconsin, 1993); "Fish and Flexibility: Working in the New Chile," *NACLA Report on the Americas* 37, no. 1 (2003): 36-41; "Shuckers, Sorters, Headers, and Gutters: Labor in the Fisheries Sector," in *Victims of the Chilean Miracle: Workers and Neoliberalism in the Pinochet Era, 1973-2002*, ed. Peter Winn (Durham: Duke University Press, 2004), 298-336; "Snails, Southern Hake and Sustainability: Neoliberalism and Natural Resource Exports in Chile," *World Development* 24, no. 11 (1996): 1695-709; "Uncertain Gains: Labor in Chile's New Export Sectors," *Latin American Research Review; Austin* 36, no. 2 (2001): 3-29; R.A. Schurman and Beth Sheehan, "Chile: Chiloé Island Wrestles with Free Market Forces," *Report on the Americas* 25, no. 4 (1992): 8-11.

⁴⁶ Rachel A. Schurman, "Snails, Southern Hake and Sustainability: Neoliberalism and Natural Resource Exports in Chile," *World Development* 24, no. 11 (1996).

⁴⁷On labor in the northern fisheries see S. Duhart and J. Weinstein, *Pesca Industrial: Sector Estratégico Y De Alto Riesgo* (Santiago, Chile: Colección de Estudios Sectoriales No. 5, Academia de Humanismo Cristiano, 1988). Most notable among Peña-Torres publications on Chilean fisheries are: J. Peña-Torres, "Individual Transferable Fishing Quotas in Chile: Recent History and Current Debates," *ILADES-Georgetown University Working Papers*, no. Inv. 139 (2002), available from <http://econpapers.repec.org/paper/ilailades/inv139.htm>; "Harvesting Preemption, Industrial Concentration and Enclosure of National Marine Fisheries," *Environmental & Resource Economics* 14, no. 4 (1999): 545-71; "The Political Economy of Fishing Regulations: The Case of Chile," *Marine Resource Economics* 12 (1997): 253-80; "Regulación Pesquera En Chile: Una Perspectiva Histórica," *Cuadernos de Economía* 33, no. 100 (1996): 367-95; "Economic Analysis of Marine Industrial Fisheries" (Ph.D. Diss., University of London, 1996).

the existing scholarship takes little account of the ecological dimension of oceans and fisheries.

In California, the rise and fall of the tuna and sardine fisheries intersected with the emergence of fishmeal as a commodity before production shifted to Peru.⁴⁸ Historian Arthur F. McEvoy explained that although fishmeal was a “byproduct” from which “the only real profit in the [sardine-packing] business came.”⁴⁹ After the sardine industry collapsed in the 1940s, fishers, boat owners, and packers migrated some of their capital and technology to the Southeast Pacific. However, McEvoy’s brief assessment of the Peruvian trajectory—which was intimately linked to the rise and fall of California sardines—overlooked the underlying dynamism of the region’s fisheries: “The history of the Peruvian anchoveta fishery, from foundation to boom to ultimate collapse during the early 1970s, reprised in practically every detail that of its California progenitor.”⁵⁰ While Peruvian fishmeal was part of a broader process in which the pursuit of ocean resources drove the movement of capital and people through space and time, this dissertation shows that the translocal dynamism of Southeast Pacific fisheries hinges on smaller-scale shifts in the marine ecosystem which—though tied to global economic processes—create different impacts at the local level.

⁴⁸ McEvoy, *The Fisherman’s Problem*.

⁴⁹ McEvoy, *The Fisherman’s Problem*, 140.

⁵⁰ McEvoy, *The Fisherman’s Problem*, 155.

While focusing on the human experience of environmental change, this dissertation seeks to make explicit the connections between commodity production and ecological cycles in the Humboldt Current. As anthropologist Anna L. Tsing has pointed out, scholars and producers of popular culture often depict the nature of capitalist expansion on the resource frontier as a frenzied period of unbridled extraction until all the resources are gone. With the advent of new technologies, humans set their gaze upon new objects of extraction that were previously out of reach through what she called the “techno-frontier.”⁵¹ Since the vast majority of ocean resources are not visible from the surface, emerging fishing technologies—very much tied to World War II and postwar U.S. economic, military, and diplomatic imperatives—made possible the expansion of California fisheries beyond local waters. Northern scientists’ quest to study the trans-Pacific linkages among fisheries ecosystems, including those of the Humboldt Current, greatly aided the forging of a new interdisciplinary approach to oceanography during this period. Despite asymmetries in power and resources, Gregory Cushman has shown how scholars from the global South have also played key roles in the development of climate science and conservation—if often through projects that were beholden to U.S. Cold War policy interests.⁵²

⁵¹ A. Tsing, “Natural Resources and Capitalist Frontiers,” *Economic and Political Weekly* (29 November 2003): 5101.

⁵² Cushman, “Choosing between Centers of Action.”

The intensification of industrial fishing along the Southeast Pacific “resource frontier” draws parallels with previous boom-and-bust experiences in California fisheries and the history of industrial fisheries more broadly, in that it created a short-lived period of overinvestment and cultural excess in several sites along the coast. But it was not a singular story of ecological decline, in which species disappeared permanently solely as a result of fishing pressure, but rather an interconnected set of cycles of abundance and collapse spurred by natural ecological changes in conjunction with human activity, whose local environmental impact varied along the coast. The sheer abundance of this region’s fisheries and their biological mysteries gave these species, and the climatic forces that shaped them, a distinctive causality.

While environmental historians seek to bring science into history, marine ecologists have also increasingly looked to the role of humans and historical processes of change in their embrace of an ecosystemic approach to resource management. “Let us not forget that it is our monstrous appetite,” wrote Daniel Pauly, head of the University of British Columbia Fisheries Center and founder of the Sea Around Us Project, “which is one of the key reasons why we can’t live sustainably on this planet.”⁵³ Calling for “new coalitions among disciplines that traditionally have been isolated,” a 2006 report in *Science* cited the need to consider the “demographic, economic,

⁵³ Daniel Pauly, “Fish as Food: A Love Affair, Issues Included,” *Huffington Post*, November 12, 2009, accessed August 10, 2011, available from <http://www.huffingtonpost.com/dr-daniel-pauly/fish-as-food-a-love-affair-354399.html>.

sociopolitical, and cultural factors” impacting ecosystem change as well as the connections among local, regional, and global processes.⁵⁴ Drawing from marine science and history, for example, Mary Carmel Finley’s critique of the politics surrounding the “maximum sustainable yield” theory, a calculation used to determine fishing quotas based on population estimates, contributes to our critical understanding of how humans and their institutions have (mis)managed ocean resources in the postwar era.⁵⁵ The 2011 edited volume *Shifting Baselines* also responds to this call, building on Daniel Pauly’s theory that contemporary understandings of ocean fisheries must be informed by a historical perspective and interdisciplinary research in order to understand the extent of ecological decline in marine environments.⁵⁶ Incorporating essays by both scientists and historians, this volume creates a portrait of global fisheries that is both historically-specific and ecologically-centered, while engaging policy questions and looking towards future challenges in fisheries questions. My research compliments this interdisciplinary initiative, which highlights the importance of the Pacific in global environmental

⁵⁴ Stephen R. Carpenter, et al. "Millennium Ecosystem Assessment: Research Needs." *Science, New Series* 314, no. 5797 (2006): 258.

⁵⁵ Mary Carmel Finley, "The Tragedy of Enclosure: Fish, Fisheries Science, and Foreign Policy, 1920-1958" (Ph.D. Diss., UC-San Diego, 2007).

⁵⁶ J. Jackson , K. Alexander, and E. Sala, eds., *Shifting Baselines: The Past and the Future of Ocean Fisheries* (New York: Island Press, 2011). Pauly argued that the depth of change can be too easily underestimated when scientists view current ecosystem states without historical knowledge, because dramatically altered trophic structures and relationships become normalized in the absence of historical data (3).

processes and knowledge production, by linking the ecological changes scientists describe to the shifting dynamics of industrial fisheries in the Southeast Pacific.

Three key coastal cities—Chimbote, Peru; and Iquique and Talcahuano, Chile (**Appendix A-1**)—serve as sites for examining the translocal connections among the human and environmental impacts of the fishmeal industry. In Chimbote during the 1960s, the boom drew migrants from northern Peru and the Andes in search of work; renowned Peruvian writers José María Arguedas portrayed the wrenching cultural and environmental transformation that took place in the world's then-largest fishing port, in his last novel, *The Fox from Up Above and the Fox From Down Below*.⁵⁷ The dramatic changes in Chimbote and their account by Arguedas has subsequently drawn the attention of contemporary literary scholars interested in processes of “transculturation.”⁵⁸ Such debates enrich the study of fisheries industrialization by analyzing the multivalent cultural experience of environmental change.

Smell is a powerful dimension of life and work in fishing cities. Fish odors create a nuisance for residents and drive away tourists, creating a fundamental conflict with

⁵⁷ J.M. Arguedas, *El Zorro de Arriba y el Zorro de Abajo* (Lima: Editorial Horizonte, 1971).

⁵⁸ Priscilla Archibald, "Urban Transculturations," *Social Text* 93, no. 25 (2007): 91-113; Antonio Cornejo Polar, Gonzalo Portocarrero, Julio Ortega, and Alberto Flores Galindo, *Los Hervores De Chimbote* (Chimbote: Río Santa Editores, 2006); Misha Kokotovic, *The Colonial Divide in Peruvian Narrative: Social Conflict and Transculturation* (Sussex Academic Press, 2007); Alberto Moreiras, "The End of Magical Realism: Jose Maria Arguedas's Passionate Signifier," in *The Exhaustion of Difference: The Politics of Latin American Cultural Studies* (Durham: Duke University Press, 2001), 184-207.

those whose living depends on outside visitors.⁵⁹ In Chimbote, Iquique, and Talcahuano, the issue of smell was a major feature of local debates surrounding industrialization. As Nathan Clarke showed in his 2009 dissertation, "Traces on the Peruvian Shore," Chimbote became the center of the fishmeal industry after Lima residents complained about odors and local politicians enacted regulations against them.⁶⁰ In Iquique, locals also expressed concern at the stench emitted by the fishmeal plants in the northern downtown area, but when the industry moved south, it became one of Chile's main beach destinations. Talcahuano and Chimbote still struggle with their reputations as "stinking cities." Using smell as a focus of analysis in environmental history not only evokes a different kind of image in the historical imagination; it also opens up new ways of approaching social conflict surrounding fisheries development. The experience of smell furthermore intersects with social science approaches to environmental justice and political ecology that examine popular

⁵⁹ See Connie Y. Chiang, "Monterey-by-the-Smell: Odors and Social Conflict on the California Coastline," *The Pacific Historical Review* 73, no. 2 (2004); Connie Y. Chiang, *Shaping the Shoreline: Fisheries and Tourism on the Monterey Coast* (Seattle and London: University of Washington Press, 2008).

⁶⁰ Nathan Clarke, "Traces on the Peruvian Shore: The Environmental History of the Fishmeal Boom in Chimbote, Peru, 1940-1980" (University of Illinois, 2009).

movements struggling for a more equitable distribution of costs and benefits of resource-based development.⁶¹

“Business as usual,” warned a 2006 article in *Science*, “foreshadow[s] serious threats” to the sustainability of marine ecosystems.⁶² But translating scientific consensus about the Humboldt Current ecosystem into policy and regulations is a highly contested political process. The history of industrial fisheries in the Southeast Pacific, most importantly the fishmeal industry, has direct implications for contemporary policy debates over management regimes for marine fisheries. Ecologist Garrett Hardin’s famous 1968 article, “The Tragedy of the Commons,” argued that commonly-held resources were doomed to overexploitation by self-interested individual users who would have no incentive to conserve without immediate personal gain.⁶³ This claim, which implicitly promotes the privatization of the commons, spawned decades of discussions among social scientists and fisheries managers over how best to protect

⁶¹ See for example the work by Joan Martínez-Alier and Arturo Escobar, respectively. Joan Martínez-Alier, “Environmental Justice as a Force for Sustainability,” In *Global Futures: Shaping Globalization*, ed. Jan Nederveen Pieterse (London: Zed Books, 2000); Joan Martínez-Alier, “Ecology and the Poor: A Neglected Dimension of Latin American History,” *Journal of Latin American Studies* 23, no. 3 (1991): 621-39; Arturo Escobar, “Construction Nature: Elements for a Post-Structuralist Political Ecology,” *Futures* 28, no. 4 (1996): 325-43; Arturo Escobar, “Difference and Conflict in the Struggle over Natural Resources: A Political Ecology Framework,” *Development* 49, no. 3 (2006): 6-13.

⁶² Boris Worm, et al, “Impacts of Biodiversity Loss on Ocean Ecosystem Services.” *Science, New Series* 314 (2006): 790.

⁶³ Garrett Hardin, “Tragedy of the Commons,” *Science, New Series* 162, no. 3859 (1968).

marine resources, still subject in many parts of the world and on the high seas to open-access regimes. Chilean and Peruvian fisheries provide a specific historical context through which to examine the recent implementation of key marine policy management strategies in order to reflect on future possibilities for environmental sustainability in the Southeast Pacific.

The four chapters of this dissertation explore the industrialization of Southeast Pacific fisheries at multiple geographical scales (global, transnational, and translocal) across overlapping time periods. Archival and ethnographic fieldwork took me to 20 archives and libraries in Peru, Chile, the United States, Italy, and Ecuador between 2005 and 2010. I visited 14 fishing cities on the South American Pacific coast, toured eight fishmeal plants, conducted interviews with fishermen, activists, executives, scientists, and government policymakers, and researched in archives in Lima, Santiago, Guayaquil, Rome, Seattle, La Jolla, and Washington, D.C. The story begins by examining the international struggle over access to tuna and baitfish in the East and Southeast Pacific in Chapter One. Historic enemies Chile, Peru, and Ecuador joined to assert their claim to the 200-mile territorial sea, resulting in ongoing clashes with U.S. tuna boats until the United Nations Convention on the Law of the Sea (UNCLOS), finally drafted in 1982, created the Exclusive Economic Zone (EEZ). In the second chapter I examine the rise of fishmeal as a global commodity in the context of repeated, failed international efforts to use fish proteins to combat malnutrition in Peru and Chile, which quickly emerged as

the world's top fishmeal producers after the 1960s. Offering higher profits for less investment, fishmeal for animal feed won out over the social goals of "fish protein concentrate." The coastal city of Chimbote, which became the world's largest fishing port during the 1960s, underwent profound transformation. Its trajectory is the subject of Chapter Three, which explores the impact of the fisheries on the city and its residents. Finally, Chapter Four traces the translocal dynamism of the Chilean fishmeal industry as shifts in the upwelling subsystems and their fish populations create oscillations in the urban industrial development of Iquique and Talcahuano. In the conclusion I briefly discuss linkages with contemporary policy debates through possible avenues for further research: the rise of environmental activism during the 1990s, the emergence of new international regulatory mechanisms to govern high seas fisheries, and market-based approaches to sustainability.

Chapter One

Expanding the Oceanic Frontier and Claiming its Bounty: Pacific Tuna Wars, the International Law of the Sea, and the Chile-Ecuador-Peru Alliance

In early February 1975, tourists gazing over the horizon in the coastal town of Salinas, Ecuador, beheld what had by then become a common sight: eight tuna clippers (seven U.S.-owned and one Panamanian) anchored in the harbor for weeks after their seizure for fishing within Ecuador's territorial waters. The confrontation at sea had been violent in this case. The 18-man crew of the *Neptune*, one of whom ended up with a broken skull and another in jail, said they were "beaten, kicked and jabbed with bayonets," then robbed—and, worse, "the crew's navigator had narrowly escaped being killed when he knocked aside the muzzle of an Ecuadorian sailor's gun just as it fired at him."¹ Much to their chagrin, the Ecuadorian Navy had carried out the raid using a surplus World War II patrol-torpedo ("PT") boat exported from the United States.² "When a few lousy Ecuadorian gunboats rule the Pacific Ocean," skipper David Rico told the *New York Times*, "well I don't know what this world is coming to. [...] I want the

¹ Everett R. Holles, "Tuna Fleet Asks U.S. Aid Off Ecuador," *New York Times* March 3, 1975, 20.

² Holles, "Tuna Fleet."

United States Government to put machine guns on my boat, and I want missiles—same as they're giving to those people in the Middle East—to repel these pirates.'"³

Far from an isolated incident, this was an all too typical episode in the Pacific Tuna Wars, a series of clashes at sea between 1947 and 1982 in which Pacific Latin American navies seized at least 250 U.S. tuna boats, mostly from southern California, in an effort to protect their coastal resources from foreign encroachment.⁴ Following the sardine industry's collapse in the mid-1940s, California producers began to shift their gaze towards new horizons. For these industrialists, the tropical Pacific Ocean—habitat to a variety of migratory tuna species—was an untapped frontier promising untold

³ Jonathan Kandell, "U.S. Tuna Men Held in Ecuador Are Bitter and in Fighting Mood," *New York Times* 2/18/75: 2. David Rico was skipper of the Southern California clipper *A.K. Strom*.

⁴ Peru and Ecuador were the most aggressive in seizing U.S. tuna boats. An exact figure of boat seizures is unavailable. Historian Gregory Cushman cites a figure of over 250 seizures and US \$6 million in fines by Latin American states (including Ecuador, Peru, and four others unnamed) between 1947-1974. Gregory T. Cushman, "The Lords of Guano: Science and the Management of Peru's Marine Environment, 1800-1973" (Ph.D. diss., University of Texas at Austin, 2003: 441), citing D.C. Loring, "The United States-Peruvian "Fisheries" Dispute," *Stanford Law Review* 23, no. 3 (1971): 391-453; and T. Wolff, *In Pursuit of Tuna: The expansion of a fishing industry and its international ramifications--The end of an era* (Tempe: Center for Latin American Studies, Arizona State University, 1980). Ross Klein reports a total of 220 tuna boat seizures by Peru and Ecuador between 1951 and 1980, based on U.S. Government sources. R. Klein, "David versus Goliath," in *Social Conflicts and Collective Identities*, ed. Patrick G. Coy and Lynne M. Woehrl (Lanham, MD: Rowman and Littlefield, 2000), 80. Another source estimated 240 vessels (167 of them U.S.-owned) seized between 1961-1972 alone by Ecuador and Peru; B.B. and R.M. Smetherman, "Peruvian Fisheries: Conservation and Development," *Economic Development and Cultural Change* 21, no. 2 (1973): 338 (citing Congressional Record, 117:189 [Dec. 6, 1971], pp. H11819-27).

riches.⁵ The U.S. tuna fleet expanded “at a spectacular rate” during World War II and continued to do so in postwar years, incorporating decommissioned Navy vessels and newly-constructed boats designed to pursue the schools farther into the high seas.⁶ By the early 1950s, the Pacific Ocean tuna industry – then based mainly in the eastern tropics between southern California and Peru – contributed 80% of the global tuna catch.⁷

Tuna traveled great distances in their seasonal migrations, and California fishermen planned a trans-Pacific expansion in their pursuit.⁸ Mexican, Central and

⁵ The four most commercially exploited tuna species in the Pacific are skipjack (*Katsuwonus pelamis*), yellowfin (*Thunnus albacares*), bigeye (*Thunnus obesus*), and albacore (*Thunnus alalunga*). J. Sibert, et al, "Biomass, Size, and Trophic Status of Top Predators in the Pacific Ocean," *Science* 314 (2006): 1773. All are found in the Humboldt Current, *except* bigeye, which is found in the Peru-Galapagos ecosystem. See FishBase, “Species in Humboldt Current,” accessed June 25, 2011, available from http://www.fishbase.us/TrophicEco/FishEcoList.php?ve_code=237.

⁶ McEvoy, *The Fishermen’s Problem*, 153, 203.

⁷ U.S. fleets continued to fish for tuna in part to supply California canneries. However, the industry also expanded processing to Latin American coasts: for example, by 1948 most of Costa Rica’s fishing interests were U.S. owned; by the 1950s several U.S.-owned canneries operated in Peru. A. Hollick, *U.S. Foreign Policy and the Law of the Sea* (Princeton, NJ: Princeton University Press, 1981), 72. The percentage calculation is from J. Majkowski, *Global fishery resources of tuna and tuna-like species*, FAO Fisheries Technical Paper No. 483 (2007), 11. Majowski estimated that the historical average during the period that FAO data covers in this study (1950-2006) was 65% of the global tuna catch coming from the Pacific.

⁸ These predators near the top of the marine foodweb generally prefer warmer tropical and subtropical waters; their migrations depend on a variety of factors such as sea surface temperature, oxygen concentration, and – for species such as skipjack and yellowfin, which feed during daylight – water clarity. P. Lehodey, “The pelagic ecosystem of the tropical Pacific Ocean: Dynamic spatial modelling and biological consequences of ENSO,” *Progress in Oceanography* 49 (2001): 446.

South American waters provided the fleets not only with tuna but also with the baitfish required for their harvest.⁹ The U.S. tuna industry thus held a vested interest in maintaining the “freedom of the seas,” the legal principle that had guided high seas governance since seventeenth-century Dutch jurist Hugo Grotius developed it to justify his country’s challenge to Portuguese trade monopolies in the East Indies. The high seas referred to any ocean area beyond the territorial sea, which customary international law recognized as extending out to a distance of three nautical miles from the coast, within which the state enjoyed full sovereignty and jurisdiction.¹⁰ In the context of twentieth-century ocean fisheries, “freedom of the seas” meant “a freedom of access, such that no single user can exclude others from participating directly and simultaneously in the same use.”¹¹ Yet the “alleged equality of all States with respect to their right of access to the high sea and their right to exploit its resources is somewhat illusory,” as U.S. ocean

⁹ See Hollick, *U.S. Foreign Policy*, 68-75. A.F. McEvoy notes that that high seas tuna fishing began “in earnest” during the World War I decade, and that already by 1925 California fishermen fished mostly in Latin American waters (142). It is possible that Latin American states, particularly Mexico, protested earlier than the 1940s, but most likely the U.S. presence was not significant enough—particularly in the absence of domestic policies aimed at fisheries development—to cause great concern prior to the post-WWII period.

¹⁰ Customary international law is based on state practice over time, rather than a formal international treaty or other agreement.

¹¹ The original work was Hugo Grotius, *The Freedom of the Seas* (Latin and English version, Magoffin trans.) [1608], available in English translation from The Online Library of Liberty, accessed June 28, 2011, available from http://oll.libertyfund.org/index.php?option=com_staticxt&staticfile=show.php%3Ftitle=552&Itemid=27; F.L. Christy, “Marine Resources and the Freedom of the Seas,” *Natural Resources Journal* 8 (1968): 424.

policy expert Wesley Marx observed, “because only the great maritime and shipping powers exercise this right on a really large scale.”¹² Traditional maritime powers such as the United States and the United Kingdom, whose technologically advanced fleets fished throughout the world’s oceans, had long upheld the “freedom of the seas” principle, but it was clearly not in the interests of Latin American coastal states whose fledgling fishing industries remained closer to shore.

The North-South confrontation occurred as the United States sought to solidify its position as global superpower, in part by negotiating political conditions favorable to the transnational expansion of its business interests, and the increasing presence of U.S. fishermen in the Eastern Tropical Pacific did not go unnoticed by Latin American states. During the 1940s, Mexico, Panama, and Costa Rica each negotiated with the United States concerning access to the California tuna fleet’s closest fishing grounds. Yet while powerful U.S. West Coast industrialists lobbied Congress for free access to the high seas, other domestic fisheries lobbies (salmon in Alaska, cod in New England) and the oil industry pressured the state to extend its maritime jurisdiction in order to keep foreign fleets out. In September 1945—in the middle of ongoing bilateral negotiations with Mexico over fisheries in the Pacific and Gulf of Mexico regions—U.S. President Harry Truman proclaimed sovereignty over the resources of the continental shelf out to a

¹² Wesley Marx, “The Eastern Tropical Pacific: Fishing for Cooperation,” *Bulletin of the Atomic Scientists* 24.9 (1968): 19.

distance of 12 miles.¹³ The first part of the Truman Proclamation pertained to offshore oil and mineral reserves.¹⁴ The second part cited the “inadequacy of present arrangements for the protection and perpetuation of the fishery resources contiguous to [U.S.] coasts” and the “urgent need to protect coastal fishery resources from destructive exploitation,” establishing

conservation zones in those areas of the high seas contiguous to the coasts of the United States wherein fishing activities have been or in the future may be developed and maintained on a substantial scale. [...] The right of any State to establish conservation zones off its shores in accordance with the above principles is conceded, provided that corresponding recognition is given to any fishing interests of nationals of the United States which may exist in such areas.¹⁵

This unilateral claim set a new legal precedent for similar actions by other coastal states on behalf of their offshore resources, and numerous Latin American states issued

¹³ Hollick, *U.S. Foreign Policy*, 68-69. In 1946 Mexican officials seized two U.S. shrimp vessels near Campeche, off the Yucatán Peninsula. Although the two states negotiated a bilateral agreement pertaining to Pacific Coast fisheries in December 1946, Mexico seized additional vessels in early 1947 as the two countries continued bilateral negotiations (70-71).

¹⁴ *Proclamation 2667: Policy of the United States With Respect to the Natural Resources of the Subsoil and Sea Bed of the Continental Shelf*, text at John T. Woolley and Gerhard Peters, *The American Presidency Project*, accessed February 15, 2011, available from <http://www.presidency.ucsb.edu/ws/?pid=12332>.

¹⁵ *Proclamation 2668: Policy of the United States with Respect to Coastal Fisheries in Certain Areas of the High Seas*, text at John T. Woolley and Gerhard Peters, *The American Presidency Project* accessed February 15, 2011, available from <http://www.presidency.ucsb.edu/ws/?pid=12332>.

declarations of their own soon thereafter.¹⁶ The Proclamation maintained the principle of free navigation and the traditional territorial sea but avoided any precise definition of the size, area, or depth of the “high seas contiguous to [U.S.] coasts” in which jurisdiction or “conservation zones” would be established. As legal scholar Ann Hollick pointed out, the Truman Proclamation staked an ambiguous claim with respect to fisheries jurisdiction, reflecting the conflicting positions within domestic fisheries vying for protection from U.S. policy on the territorial sea. This ambiguity was a political weakness upon which Peru, Ecuador, and Chile—quite literally—seized.

¹⁶ Although most scholars cite the Truman Proclamation as the legal precedent for subsequent Latin American territorial claims, shifting notions of sovereignty and jurisdiction over coastal waters dated at least from the World War II-era Declaration of Panama (1939), which designated a “security zone” extending 300 to 500 miles from the coast, within which American signatories pledged not to tolerate acts of belligerence. Hollick, *U.S. Foreign Policy*, 78, 78n82 (citing *Foreign Relations 1939*, V, 35). Smetherman and Smetherman also report that early in World War I, “A Peruvian delegate to the Pan American Union presented a memorandum on the rights of neutrals to prevent hostile actions off their coasts.” B.B. and R.M. Smetherman, *Territorial Seas and Inter-American Relations* (London: Pall Mall Press, 1975), 4, citing T. Wolff, “Peruvian-United States Relations over Maritime Fishing, 1945-1969,” Occasional Paper No. 4 (Kingston, RI: The Law of the Sea Institute, March 1970), 2. However, since the authors gave no date, since their claim is inconsistent with Hollick’s, and since I was unable to check the source of their citation, I am not considering this memorandum as part of the precedent. The precise nature and extent to which the Truman Proclamation set such a precedent has been amply discussed by legal and policy scholars. The earliest responses by Latin American states did not define the territorial sea as a specific distance from the shore. Hollick distinguishes between two sets of Latin American claims; the first [Mexico, Panama, Argentina, Costa Rica] “established varying degrees of national jurisdiction or sovereignty over the continental shelf and the superadjacent waters without reference to a particular distance criterion,” while the second [Chile, Peru, Ecuador] “incorporated under national sovereignty the continental shelf and offshore waters to a distance of 200 miles” (Hollick, *U.S. Foreign Policy*, 68.)

In the Southeast Pacific, where the rich waters of the Humboldt Current yielded one of the world's most productive marine ecosystems, the heated debate over territorial seas soon took on a new urgency. There the most commercially-important species of tuna—skipjack (*Katsuwonus pelamis*), yellowfin (*Thunnus albacares*), and albacore (*Thunnus alalunga*)—foraged on *anchovetas* and sardines in the nutrient-rich upwelling system. Tuna typically swam in greater numbers in the warmer waters off Ecuador and Peru, but the Nasca Front flowing from northern Chile each March supported an important tuna fishery there as well.¹⁷ Except for occasional expeditions, however, U.S. fishing in the region had been relatively slight until the late 1940s. On the other hand, Chile was highly concerned with the postwar return of European and Japanese whalers in the Antarctic and sub-Antarctic waters of the South Pacific. Chilean whalers from the *Compañía Industrial INDUS* and the Macaya family hoped to gain control of the industry when long-distance fleets disappeared during World War II.¹⁸ Although Peru's interest in whaling was minimal by the 1940s when the development of the tuna and anchovy

¹⁷ S. Heileman, et al., "XVII-56 Humboldt Current: LME #13," NOAA, *Large Marine Ecosystems of the World* [web publication], accessed July 07, 2011, available from http://www.lme.noaa.gov/index.php?option=com_content&view=article&id=59:lme13&catid=41:briefs&Itemid=72.

¹⁸ ASIPES/Luis Salvo González, *Historia de la Industria Pesquera en la Región del Bio Bio* (Talcahuano, Chile: ASIPES, 2000), 65. For a more detailed account written by a Talcahuano native and local historian, see Juan Hernández Aguayo, *Donde Viven Las Ballenas: Actividades Balleneras en Isla Santa María y Chome del Pionero Juan Macaya Aravena* (Concepción, Chile: Editora Anibal Pinto, 1998).

industry was underway, the northern port of Paita had been a major hub for New England whalers in the nineteenth century.¹⁹ In 1954 a whaling expedition became the object of a major diplomatic incident when shipping magnate Aristotle Onassis sent his fleet to Peruvian-claimed waters in direct defiance of the 200-mile claim and international whaling conservation agreements. Off Ecuador, the converging currents around the Galapagos Islands hosted one of the most biologically diverse marine environments on Earth, including important foraging grounds for tuna. With much at stake, Chile, Peru, and Ecuador soon emerged as the protagonists of an entrenched battle over Humboldt Current resources.

The legal and diplomatic struggle to control access to these fisheries began in 1947, when Chile and Peru declared sovereignty over a 200-mile territorial sea. That same year U.S. industrialists also discovered “a rich tuna fishing ground sixty miles off the Peruvian coast.”²⁰ Ecuador issued a more limited decree in 1951 but joined with Chile and Peru in affirming the 200-mile claim in the 1952 Santiago Declaration.²¹ With this declaration, Chile, Ecuador, and Peru sought to control access to a total area of over

¹⁹ W. L. Lofstrom, *Paita, Outpost of Empire: The Impact of the New England Whaling Fleet on the Socioeconomic Development of Northern Peru, 1832–1865* (Mystic Press, 1996).

²⁰ Smetherman and Smetherman, *Territorial Seas*, 91, cited in Hollick, *U.S. Foreign Policy*, 82n95; and Letter to A. Hollick from August Felando, American Tuna boat Association, 2/22/77, cited 82n96.

²¹ Ecuador’s 1951 claim was to a 12-mile territorial sea and control of fisheries above the continental shelf and to a depth of 200 meters. (See Hollick, *U.S. Foreign Policy*, 8-485 and 83n100)

three million square kilometers of coastal waters.²² The U.S. tuna industry, backed by its government, forcefully rejected this claim, thus touching off 35 years of diplomatic conflict while a series of international conferences wrestled with the challenge of crafting a new law of the sea.

This chapter explores the role of the Humboldt Current coastal states—Chile, Peru, and Ecuador—in an international diplomatic and environmental conflict that would eventually lead in 1982 to the approval of a new legal regime for the world’s oceans, the United Nations Convention on the Law of the Sea. As this battle for resource rights raged in the Pacific, accusations of piracy were heard from all sides, as well as occasional gunfire. Other Latin American nations joined in the struggle, issuing various decrees and seizing several tuna boats, but Chile, Peru, and Ecuador were the first and most vehement in defining their maritime claim at 200 nautical miles. Chile was instrumental in advancing this claim in the field of international law.²³ After the 1952 Santiago Declaration, however, Peru and Ecuador became the most tenacious defenders

²² *The Sea Around Us* project posts estimated surface area for countries’ EEZs in km². The areas are as follows: Chile 2,000,254 km²; Peru 906,454 km²; and Ecuador 236,597 km². Sea Around Us Project, “EEZ Waters of Chile,” accessed January 14, 2011, available from http://www.searoundus.org/eez/152_87.aspx; “EEZ Waters of Peru,” available from <http://www.searoundus.org/eez/604.aspx>; “EEZ Waters of Ecuador,” <http://www.searoundus.org/eez/218.aspx>.

²³ Francisco Orrego Vicuña, *The Exclusive Economic Zone: A Latin American Perspective*, (Boulder, Colo.: Westview Press, 1984).

of this principle in practice, using the tactic of tuna boat seizures to disrupt foreign fishing in their waters.

While the transoceanic migrations of tuna drew California fleets farther out to sea, their little-understood ecology also became the focus of marine scientists and the new multinational research and policy institutions they created. The Inter-American Tropical Tuna Commission (IATTC)—the first multinational fisheries body of its kind—was first conceived in 1949 through a treaty between the United States and Costa Rica. Although perhaps initially conceived to serve U.S. interests, officials ultimately discovered that it was ill-suited to this purpose as more Latin American coastal states joined the IATTC. Chile, Ecuador, and Peru created the Permanent Commission of the Southeast Pacific (CPPS), a research and policy organization dedicated specifically to Humboldt Current resources, with the 1952 Santiago Declaration. While their fishing and navy vessels clashed in direct confrontations at sea, coastal states sought to advance their interests in the emerging regulatory regime through research and diplomacy.

U.S. fisheries scientist Wilbert MacLeod Chapman was the foremost tuna warrior, dedicating his career in both the public and private sectors to the West Coast industry's trans-Pacific expansion. Chapman earned his Ph.D. in Biology at the University of Washington. Son of a salmon fisherman from the Columbia River Basin, he held positions in top U.S. fisheries research institutions as well as the government—researching tropical Pacific fisheries for wartime supplies to U.S. troops at the California

Academy of Sciences, as director of the UW School of Fisheries, and as the first Special Assistant to the U.S. Department of State (1948-1951). A man who built his career forging strategic alliances between government, industry, and science, he was instrumental in founding California research institutions in the wake of the sardine collapse during the 1940s and in negotiating the IATTC with Costa Rica in 1949. After leaving the State Department, Chapman worked as adviser to the California tuna industry, as director of research for the American Tunaboat Association and later as an executive in the Van Camp Sea Food Company (later Ralston Purina).²⁴ The debate over territorial seas and fishery zones was to Chapman a central concern. He shared the conviction that the high seas should operate as a first-come, first-serve system, governed solely by the capacity of each fisherman until reaching a pre-determined maximum limit: "There is a crop to be taken in the international common. Each takes according to his ability. When the safe crop is taken, all stop the harvest."²⁵ The resources were there 'for the taking' and should not be allowed to go to waste. Restricting the "freedom of the seas" would, in his view, restrict the ability of human society to benefit from the exploitation of this food source. This view relied on the calculations of science — which would determine the 'safe crop,' a maximum sustainable yield (MSY) which the fishery

²⁴ McEvoy, *Fishermen's Problem*, 188-189.

²⁵ W.M. Chapman "United States Policy on High Seas Fisheries," *U.S. Department of State Bulletin* Vol. XX, No. 498 (Jan. 16, 1949): 67-71, 80, accessed December 20, 2010, available from <http://www.archive.org/stream/departmentofstat2049unit>.

could theoretically sustain and continue to reproduce—to which participants of the fishery would limit themselves, thus creating a natural order in this open-access system.²⁶ It also provided a justification for U.S. fleets' demand for unimpeded access to Eastern Tropical Pacific marine resources.

Great technological change in Pacific tuna fisheries during the late 1950s and early 1960s further galvanized the conflict. Gear improvements accelerated the race for fish: the introduction of nylon nets in 1956 liberated fishermen from the use of cotton, which was heavy when wet, easily damaged, and difficult to repair. With the invention of the power block in 1959—a device that mechanized the hauling of the net—purse seiners were able to significantly increase their catches, rendering the older baitfishing method obsolete. By the early 1960s nearly all California bait boats had been converted to seiners. “The modern, steel-hulled tuna clipper, with its ability to pluck yellowfin three miles offshore for consumption 5,000 miles away became a symbol of ‘injustice,’” Wesley Marx noted in 1968.²⁷ The increasingly high-tech foreign tuna fleets off the

²⁶ The maximum sustainable yield (MSY) theory asserts that by using data on fish populations and reproduction, biologists can calculate a quantity of fish whose commercial capture can be withstood without species collapse on an indefinite basis. For a critique of the politics surrounding the creation of the maximum sustainable yield theory, see M.C. Finley, “The Tragedy of Enclosure: Fish, Fisheries Science, and Foreign Policy, 1920-1958,” (Ph.D. Diss., University of California, 2007). MSY theory has also been criticized by ecologists because it does not take into account the natural fluctuations of and variations within the fish populations. See C. Townsend, M. Begon, and J. Harper, *Essentials of Ecology* (Wiley-Blackwell, 2003), 411.

²⁷ Marx, “The Eastern Tropical Pacific,” 19.

coasts of South American Pacific nations threatened their aspirations to build up a local fishing industry and compelled Chile, Peru, and Ecuador to align against them.

Their unlikely alliance was premised on a shared stake in Humboldt Current resources despite a history of terrestrial and maritime border disputes among themselves. Peru and Ecuador had a longstanding struggle over Amazonian territories dating to the mid-1880s that escalated into war during the 1940s. Peru lost a significant portion of its southern territory, including the rich fishing grounds between Arica and Tacna, following defeat in the War of the Pacific (1879-1884). The legacy of this conflict continues to impact Peru-Chile diplomatic relations today in an unresolved dispute, before the International Court of Justice at the Hague since 2008, over how the maritime boundary extends out from the coast. This controversy stems from differing interpretations of the 1952 and 1954 agreements forged in this context of territorial waters and coastal fishing rights. Peruvian, Ecuadorian, and Chilean seizures of each others' vessels were also not uncommon during this period of fisheries development. The regional alliance among these three countries, each of which hoped to exploit the extraordinary riches of the Humboldt Current to strengthen their national economies, was not only key in advancing the 200-mile claim but also unprecedented at the level of inter-American relations.

Few scholars have recognized the significance of the Tuna Wars and the Chile-Ecuador-Peru alliance in American political-economic and environmental history. A

view of the entire 35-year history of this conflict from the regional perspective of the Chile-Ecuador-Peru alliance and the environmental frame of the Humboldt Current reveal this conflict's relevance beyond specific regimes. U.S. economist Cynthia McClintock and Peruvian scholar Fabián Vallas discussed Peru's seizure of "two U.S. tuna boats" during the military regime of Gen. Juan Velasco Alvarado (1968-75), which prompted the United States to rescind military aid based on the Pelly Amendment and Velasco to expel the U.S. military mission, resulting in a decline in military personnel from forty-one to six in the few months following the incident.²⁸ Similarly, U.S. historian Frederick Pike characterized Ecuador's seizure of U.S. tuna boats in the 1970s as an alternative outlet for its economic nationalism because the expropriation of oil interests would have thwarted the military regime's "economic hopes."²⁹ Both scholars treat these seizures as isolated events attributable to U.S. relations with specific national(ist) regimes and ultimately derivative of oil interests. While Ecuadorian and Peruvian domestic politics did have a significant role in the tone of international negotiations over the territorial sea, this approach ignores the deeper roots of the conflict over fisheries development and the interdependency that characterized North-South relations in the context of Pacific tuna fisheries.

²⁸ Cynthia McClintock and Fabian Vallas, *The United States and Peru : Cooperation at a Cost* (New York: Routledge, 2003).

²⁹ F. Pike, *The United States and the Andean Republics* (1977), 343-344.

More than simple displays of economic nationalism, the Pacific Tuna Wars demonstrate how marine ecosystems shaped the geography of post-World War II capitalism. The interrelationships among highly-migratory predators, their prey, and shifting ocean currents drove the movement of capital from North to South (and sometimes back again). In the Southeast Pacific the Humboldt Current formed a new basis for historic enemies to align and strengthen their claim to these contested marine resources in the global race for fish. The tuna fishery helped lay the initial foundation for the rise of fishmeal in Peru and Chile, which far surpassed the former in importance during the 1960s with the involvement of local entrepreneurs. This conflict highlights the unlikely success of so-called Third World nations in using their marine wealth to shape the postwar geopolitical order on the high seas.

1.1. Elusive catch: Pacific fisheries expansion and the 200-mile claim, 1941-1952

Throughout the twentieth century, technological and engineering developments in maritime fishing intensified the exploitation of high-demand species such as tuna, salmon, and whales in the Pacific Ocean. Japanese, European, and U.S. fleets greatly reduced their presence in distant-water fisheries during World War II so that their boats and personnel could contribute to the war effort. In the United States at least 400 fishing boats were converted into Navy surveillance vessels: “Small caliber guns are being

mounted on the erstwhile tuna clippers and depth bomb chutes built in the sterns,” reported a 1941 article in *Popular Mechanics*.³⁰ Many workers were drafted into service; Japanese fishermen and cannery workers were imprisoned in internment camps; and non-naturalized Italian fishermen of California were prohibited from employment in offshore fisheries—resulting in a 50% reduction in West Coast fish production in 1942.³¹ “Since Pearl Harbor the Government has taken hundreds of the biggest, most efficient fishing boats for overseas, coast-patrol and antisub work,” stated a 1943 article in *Time*, “has drafted thousands of husky young fishermen into the Army, has shipped carloads of nimble-fingered Jap fishermen and cannery workers to internment camps.”³² But amidst wartime meat shortages, U.S. domestic demand for fish grew. In California those few boats that remained in operation relied on Navy escorts to complete their nighttime sardine harvests, much of which were destined for military provisions: in 1942-43 the armed forces bought an estimated 80% of canned sardines and 25-30% of fresh fish.

³⁰ “Adventures of the Deep Sea Fishermen,” *Popular Mechanics* (Dec. 1941): 168, accessed January 15, 2011, available from http://books.google.cl/books?id=9dkDAAAAMBAJ&lpg=PA168&ots=2zXw18_QPb&dq=seiners%20bait%20net&pg=PA28#v=onepage&q&f=true.

³¹ “Fishing Troubles,” *Time*, July 27, 1942, accessed January 15, 2011, available from <http://www.time.com/time/magazine/article/0,9171,802369,00.html>; William C. Richardson, “Fishermen of San Diego: The Italians,” *San Diego Historical Society Quarterly* 27.4 (1981), accessed January 19, 2011, available from <http://www.sandiegohistory.org/journal/81fall/fishermen.htm>.

³² “The Seafood Boom,” *Time*, April 19, 1943, accessed January 15, 2011, available from <http://www.time.com/time/magazine/article/0,9171,884916,00.html>.

Captains and crew who persisted during those years earned handsomely, as *Time* put it, “mak[ing] money in netfuls.”³³

The development of maritime fishing in the greater Pacific went hand in hand with promoting the interests of the United States during and after the war, as tuna became the prime target of U.S. West Coast industrialists looking to expand their fishing grounds. On September 25, 1945, U.S. fisheries scientist Wilbert Chapman (then at the California Academy of Sciences) sent a letter to John J. Heimburger, Executive Secretary to the Republican Congressional Food Study Committee, noting that “tuna and tuna-like fishes swarm” in the Central and South Pacific: “It is probable that no food resource of equal quantity has been made available to our nation since the opening of the Middle West to agriculture. The crux of the matter at the present time is how we are to secure the privilege of exploiting this resource for our fishermen.”³⁴ Chapman’s files indicated that he sent copies of a similar letter on the same date to at least 26 individuals in the House and Senate, as well as others in the press and the Navy. Industrialists were also quick to remind their representatives of the debt the U.S. government owed them: “these same fisheries have been used from time immemorial down to the last World War as a training ground for naval seamen and as a part of the war machine and of preparation

³³ “The Seafood Boom.”

³⁴ Letter from Chapman to John J. Heimburger, Exec. Secretary to the Republican Congressional Food Study Committee, September 25, 1945; W.M. Chapman Papers, UW Special Collections, Box 6 Folder 23.

for war," Montgomery Phister, President of the American Tuna boat Association, wrote to the Governor of Oregon in 1946, in a letter urging U.S. Government support for the expansion of West Coast industry in the Pacific basin.³⁵ "[T]he productive capacity of [tropical Pacific] tuna stocks has scarcely been touched," Chapman wrote in 1946, when 90% of the California fleet's tuna catch came from south of the U.S. border.³⁶ With ever-improving technology and gear, tuna clippers were by then "equipped to stay at sea for as much as four or five months continuously, cruise as much as 9,000 miles without touching port, and bring back under refrigeration as much as 400 tons of tuna."³⁷

Northern fleets followed the tuna southward into the contested maritime frontier zone off the western coast of South America, where the abundant schools were, according to skippers like David Rico and U.S. government officials, free for the taking. Initially the boats fished with live bait: a "chummer" threw small fish such as sardines and anchovy into the water in order to attract the tuna, which were then plucked individually and in rapid succession by a skilled team of fishermen using lines and poles. "When they're 'biting good,' fish rain onto the deck with machine-gun rapidity,"

³⁵ Montgomery Phister (American Tuna boat Assn.) to Hon. Earl Snell (Governor of Oregon), Letter, September 16, 1946, 2; UW Special Collections Chapman Papers, Box 6, Folder 13.

³⁶ Wilbert Chapman, "Tuna in the Mandated Islands," *Far Eastern Survey* 15:20 (October 9, 1946), 317.

³⁷ Chapman, "Tuna in the Mandated Islands," 318.

wrote *Wall Street Journal* correspondent Lewis Hochstrasser.³⁸ But this method required the storage of a large tank of water on board the vessel, up to 100 tons.³⁹ It also required fleets to sail nearer to the coast in order to harvest the bait that teemed in coastal waters. U.S. firms commonly requested permission to enter Peru's three-mile zone to catch anchovies for bait.⁴⁰ The Peruvian anchoveta (*Engraulis ringens*) was considered ideal for this purpose because of its ability to withstand crowding and live for two to three months in the on-board tanks.⁴¹ Nonetheless U.S. crews would haul bait not only from South American waters, but also from the Pacific Islands in the West and to fishing grounds in the Central Pacific.⁴² By 1950, only 10 to 15% of bait was harvested in U.S. waters, while 82% of the U.S. yellowfin and skipjack were taken by baitboats, most of them based in San Diego.

³⁸ Lewis B. Hochstrasser, "Tuna by the ton," *Wall Street Journal*, July 24, 1947, 1.

³⁹ "Adventures of the Deep Sea Fishermen," *Popular Mechanics* (Dec. 1941): 28, accessed January 15, 2011, http://books.google.cl/books?id=9dkDAAAAMBAJ&lpg=PA168&ots=2zXw18_QPb&dq=seiners%20bait%20net&pg=PA28#v=onepage&q&f=true.

⁴⁰ As early as 1936 Van Camp Seafoods Co. of San Diego requested permission to enter Peruvian waters to take bait. Cushman, "The Lords of Guano," 437.

⁴¹ William C. Richardson, "Fishermen of San Diego," *San Diego Historical Society Quarterly* 27, no. 4 (1981), 24.

⁴² Letter from Chapman at CA Academy of Sciences to John J. Heimbürger, Exec. Secretary to the Republican Congressional Food Study Committee, January 25, 1945; W.M. Chapman Papers, UW Special Collections, Box 6 Folder 23.

To Pacific American coastal nations from Mexico to Chile, these foreign fishing companies threatened the resource base that was to provide raw materials to their nascent fisheries export industries, and clashes erupted all along the coast over access to tuna and baitfish. When the U.S. tuna industry refused to recognize the Southeast Pacific nations' claims to a 200-mile fishing zone, they retaliated by seizing and fining U.S. boats caught fishing too close to shore.⁴³ U.S. fisheries scientist Milton Lobell, stationed at CORFO in Chile, wrote to Wilbert Chapman at the State Department in October 1948: "the sooner official steps are taken to arrive at some type of modus vivendi the better off our fishing industry will be."⁴⁴ On December 2, 1948, at 7 a.m., an "unidentified plane" machine gunned San Diego tuna clippers *Liberator*, *City of San Diego*, and *Sun Ray*, 10 miles off shore and 70 miles southeast of Corinto.⁴⁵ The fishermen reported that they had been on their way to Puntarenas, Costa Rica, for refueling when the attack occurred, and that the plane departed when they put out their

⁴³ Historian Greg Cushman reported that the earliest known seizure of a tuna boat was by the Peruvian Navy in 1947. Cushman, "Lords of Guano," 440. However I am unable to find any reporting on such seizure in U.S. newspapers, including Los Angeles Times which reports widely on matters of U.S. West Coast fishing industry, suggesting that if this information is correct, it was likely not a U.S. boat.

⁴⁴ Milton Lobell to Chapman, October 21, 1948, Chapman papers, UW Special Collections, Box 12, Folder 26.

⁴⁵ Letter to William E.S. Flory (Deputy of the Special Asst. to the Under Secretary) from Harold Cary, Gen. Mgr, ATA, 12/3/48; Chapman papers, Box 12, Folder 1. See also "Plane Off Nicaragua Fires on U.S. Vessels," *New York Times*, December 4, 1948, 5.

U.S. flags.⁴⁶ Although the U.S. Embassy in Nicaragua opened an investigation, dictator Anastasio Somoza denied that the plane belonged to his country.⁴⁷ By 1949 U.S. tuna boats were also having troubles with Mexico, Costa Rica, Panama, Colombia, and Ecuador over bait and tuna fishing in their coastal waters.⁴⁸

In May of 1949, the United States signed a convention with Costa Rica for the establishment of an international commission for tuna research in the Eastern Tropical Pacific, which became the Inter-American Tropical Tuna Commission (IATTC).⁴⁹ The IATTC conducted extensive research voyages throughout the Eastern Pacific, where scientists worked to develop and apply the theory of “maximum sustainable yield” – the level at which a species’ annual harvest can be sustained without causing the population

⁴⁶ “3 U.S. Tuna Ships Report Attack by Unidentified Planes,” *The Washington Post*, December 4, 1948.

⁴⁷ “Shooting at Boats Denied,” *New York Times*, December 4, 1948, 4.

⁴⁸ See Chapman papers: Letter from American Embassy in D.F., Mexico, to Chapman at Dept. of State, enclosing a copy of letter from Enrique Romay, Dir. Gen. of the Fisheries and Allied Industries Technical Office of the Mexican Govt, dated May 26, 1949, stating that they will not grant permits to foreign boats (or non-coop Mexican boats) to fish in Mexican territorial waters because the fishing rights are reserved for legally organized Fishermen’s Cooperative Societies – boats must be contracted by Coop societies; as well as other items in same folder concerning Costa Rica and Panama (Box 14 Folder 15).

⁴⁹ In January the United States had also signed a similar agreement with Mexico, but most literature cites the Costa Rica agreement as the precipitating one for the IATTC formation (see David Loring, “The United States-Peruvian “Fisheries” Dispute,” *Stanford Law Review* 23, no. 3 (1971): 437n190; Marx, “The Eastern Tropical Pacific,” 20. Loring cites 1952 as the year the IATTC’s independent research team was established (Loring 437n190). Milner B. Schaefer was named head of IATTC in 1951, “Fisheries Research Head Named,” *New York Times*, January 17, 1951, 44.

to collapse—to migrating tuna stocks through catch quotas. In reality the theory and its associated research drew more from the drive to commercially develop Pacific tuna fisheries than from an ecologically-oriented desire to preserve marine ecosystems.⁵⁰

Leaders in the South viewed the IATTC with skepticism, perceiving it as an institution dominated by Northern interests in which they were reluctant to participate. Although Ecuador and Peru later joined the IATTC, their involvement in the early years of the organization, if any, was limited—and the U.S. fishing fleet was the only one that could actually fill its annual quota.⁵¹

Peruvian and Chilean industrialists struggled against economic barriers in their access to fishing technology that was created and manufactured abroad, as well as to other materials required for industrialization, such as tin for canning.⁵² But as U.S. capitalists relocated to the fishing grounds of the Southeast Pacific, North-South capital

⁵⁰ U.S. historian Mary Carmel Finley has criticized “maximum sustainable yield” theory (MSY) for being a management tool more politically- than ecologically-informed. See Finley, “The Tragedy of Enclosure.”

⁵¹ Although both Ecuador and Peru are now members, by 1968 neither Peru nor Chile adhered to the IATTC, while Ecuador resigned after joining from 1961-68; Panama joined in 1953; in 1964 Mexico joined, in 1968 Canada joined, and Japan in 1970 (Loring, “The United States-Peruvian ‘Fisheries’ Dispute,” 437n90). See also Marx, “The Eastern Tropical Pacific,” 20.

⁵² Chapman reported in 1946 that a state-of-the-art tuna clipper could cost as much as US \$525,000 each. Wilbert Chapman, “Tuna in the Mandated Islands,” *Far Eastern Survey* 15:20 (1946), 318. An article in *Popular Mechanics* five years earlier had cited a figure of “upwards of \$120,000 each.” “Adventures of the Deep Sea Fishermen,” *Popular Mechanics* (Dec. 1941): 29, accessed January 15, 2011, available from http://books.google.cl/books?id=9dkDAAAAMBAJ&lpg=PA168&ots=2zXw18_QPb&dq=seiners%20bait%20net&pg=PA28#v=onepage&q&f=true.

flows and entrepreneurial partnerships assisted greatly in the transfer of fishing technology to the region.⁵³ In 1949 and 1951 tuna canning plants were established in Ecuador with international capital and expert “technical assistance” from FAO, while in Chile and Peru the organization experimented with fish flour and “fish protein concentrate” for local human consumption.⁵⁴ Facing rising costs and dwindling sardine and tuna stocks off California, small-scale San Diego fishermen transferred or sold their boats and machinery to Peru and northern Chile, while major U.S. tuna producers Van Camp, Star Kist, and others established their own canneries there. As American Tuna boat Association president August Felando later recalled:

We come back to 1946, 1947, 1948, 1949, we are developing this whole area all the way down to Peru, getting boats back from the Navy, getting new boats built. There was tremendous development. All you have to do is head south, and then we're starting this development down in Peru. In 1958 I went to Callao and I saw all of these boats coming in fully loaded. It reminded me of my sardine days. A blind man could see what was happening. All you had to have was smell and you knew what was going on. What you had, therefore, is the tuna industry; in fact, the people, the main players, being exposed to the world.⁵⁵

⁵³ In some cases, coastal nations required foreign firms to establish processing plants on land.

⁵⁴ U.S., Danish, and Ecuadorian capital installed a tuna canning plant; in 1951 the FAO provided “technical assistance” to Ecuador to install a tuna canning plant. Charles E. Egan, “Foreign Financing of Industrialization in Caribbean, Americas, New Big Stimulus,” *New York Times* August 07, 1949; “Se harán gestiones para instalar en el país una planta enlatadora de pescado,” *El Comercio (Quito)*, September 28, 1951.

⁵⁵ August John Felando, interview by Robert G. Wright, San Diego Historical Society Oral History Program, September 09, 1995, accessed January 24, 2011, available from <http://gondolin.ucsd.edu/sio/ceo-sdhsOH/felando.html>.

Northern capitalists both large and small were enticed by the evident potential of southern waters. One San Pedro fisherman named Larry “was convinced by people at Star Kist to go down to Peru and see what he could do down there,” Felando said, with his tuna boat *Sun King*.⁵⁶ During a moment of crisis in its U.S. operations in the 1950s, the “world’s largest tuna-fish packer” Van Camp Sea Foods, Inc., built four canneries in Peru and one in Ecuador (along with others in Puerto Rico, Samoa, and on the African Atlantic coast), taking advantage of abundant fish and cheap labor.⁵⁷

Tensions between U.S. West Coast fishermen and the navies of the South, especially Ecuador and Peru, intensified in 1951. Early that year, Ecuador raised the cost of fees and permits, and on March 6 officials proclaimed a 12-mile territorial sea⁵⁸— although not as bold as the 200-mile claim Peru and Chile had already announced, it was far greater than the 3-mile territorial sea still recognized by the United States at that time. The United States took three months to protest the Ecuadorian claim, and shortly

⁵⁶ Felando, interview.

⁵⁷ “Corporations: Tuna Turnaround,” *Time*, January 18, 1963, accessed January 24, 2011, available from <http://www.time.com/time/magazine/article/0,9171,874707,00.html>. By 1938 Van Camp already had locations all along the Pacific American coast, in Astoria, OR; Monterey, CA; San Simeon, CA; Avila, CA; Avalon, CA; Newport Beach, CA; San Diego, CA; Guaymas, Sonora, MX; Puntarenas, Costa Rica; and Lima, Peru (*Pacific Fisherman’s News* (Vol. 4 – No. 12, June 14, 1948), in Chapman Papers, Box 12 Folder 1).

⁵⁸ Finley, “The Tragedy of Enclosure,” 426, citing *Commercial Fisheries Review* April 1951, 51, and Chapman to President of Ecuador, August 15, 1952, FAO Archive-Rome, RG 14 FI 158, Folder “D.B. Finn, ATA Affair (Osorio) 1952-55.” *Registro Oficial (Ecuador)*, March 6, 1951, 1, cited in Loring, “The United States-Peruvian “Fisheries” Dispute,” 402n43.

thereafter Ecuador began seizing tuna boats: the *Narico* off Puerto Bolivar on September 15, 1951, the *Notre Dame* at five miles northeast of La Plata Island on November 4, and the *Sun Pacific* on July 30, 1952, together fined an estimated total of over US\$25,000.⁵⁹ Additionally, Guayaquil-based newspaper *Universo* reported that Peruvian and Japanese fishers were “poaching” around the Galapagos Islands—one of the richest and most ecologically vulnerable areas of the Southeastern Pacific—in late 1951.⁶⁰ On January 1, 1952, Ecuador prohibited foreign flag vessels altogether from entering the 12-mile territorial zone, requiring special permits to fish in the waters of the Galapagos. “Tuna interests in the United States appear to be the chief victims of the ban,” stated a news brief in *The Washington Post*.⁶¹

Unwilling to recognize these unilateral claims, U.S. tunamen—dependent on coastal nations for bait and resupplying their vessels, as well as for tuna harvests themselves—faced an impasse not only with Ecuador but also with Peru. General Manager of the ATA Harold Cary had warned Wilbert Chapman, ATA’s incumbent Director of Research, of the potential for confrontations in April 1951:

⁵⁹ Neftalí Ponce Miranda, *Dominio Marítimo* (Quito, Ecuador: n.p., 1971), 85. See also “Impónese multa a barco pesquero que arribó con un cargamento de atún,” *El Comercio* (Quito), September 16, 1951.

⁶⁰ “Poaching off Galapagos Charged,” *New York Times*, December 17, 1951, 37.

⁶¹ “Ecuador bans fishing by foreign vessels,” *The Washington Post*, February 01, 1952, B13.

...there seems to be a feeling in Peru that we should not fish anywhere near Peru and that they are planning to seize the first vessels that appear in Peruvian waters. Their definition of Peruvian waters is not clear to me but I believe it covers some 200 miles. I do not know how genuine this threat is but it will bear watching.⁶²

Evidently U.S. tuna leaders had given little weight to the 1947 claims by Chile and Peru, since four years later Cary remained confused about their “definition” of territorial waters and was unsure whether to take the issue seriously, despite the incidents that had already taken place.

At a meeting in Santiago on August 18, 1952, representatives of Chile, Ecuador, and Peru took decisive action to more assertively stake their claim to Humboldt Current resources. Citing the need for “conservation, development, and utilization” of their marine resources, they jointly declared “sovereignty and exclusive jurisdiction” over the coastal seas and their resources, including those on and below the seabed, up to a minimum distance of 200 miles from each nation’s shoreline.⁶³ The so-called Santiago Declaration also created an international organism, the Permanent Commission for the South Pacific (CPPS), to advocate for CEP interests in the international community and

⁶² Harold F. Cary to Chapman, April 25, 1951, Chapman Papers, UW Special Collections, Box 12, Folder 14.

⁶³ Declaration on the maritime zone: Chile, Ecuador, and Peru (No. 14758), 08/18/52, accessed February 01, 2011, available from http://untreaty.un.org/unts/1_60000/28/18/00054896.pdf.

collect information on topics pertinent to ocean resource management.⁶⁴ Reaffirming the Chilean and Peruvian proclamations of five years before, the 1952 declaration unified these three countries' maritime policies in the context of postwar foreign fisheries expansion into the Southeastern Pacific—a position they maintained throughout the following decades, as Peruvian political cartoons from 1954 and 1972 demonstrate.⁶⁵ Their meeting was “a rare case of Latin American regional cooperation,” in the words of David Loring, between each other over both land and sea borders.⁶⁶ The ratification of the Santiago Declaration met with protests from the United States, United Kingdom, the Netherlands, Sweden, and Denmark.⁶⁷

⁶⁴ Declaration on the maritime zone. See “Organización de la Comisión Permanente de la Conferencia Sobre Explotación y Conservación de las Riquezas Marítimas del Pacífico Sur.”

⁶⁵ Kito, “La unión hace la fuerza,” *La Nación* (Lima, Peru), September 8, 1954, 2; “Peru, Chile, y Ecuador reiteran su soberanía en las 200 millas,” *Documenta* (Lima) no. 23-24 (1972): 4.

⁶⁶ Loring, “The United States-Peruvian,” 402.

⁶⁷ Loring, “The United States-Peruvian,” 404.



Figure 1.1: Ecuador, Peru, and Chile join in defense of the 200-mile thesis. Kito, "La unión hace la fuerza," *La Nación* (Lima, Peru), September 8, 1954, 2.

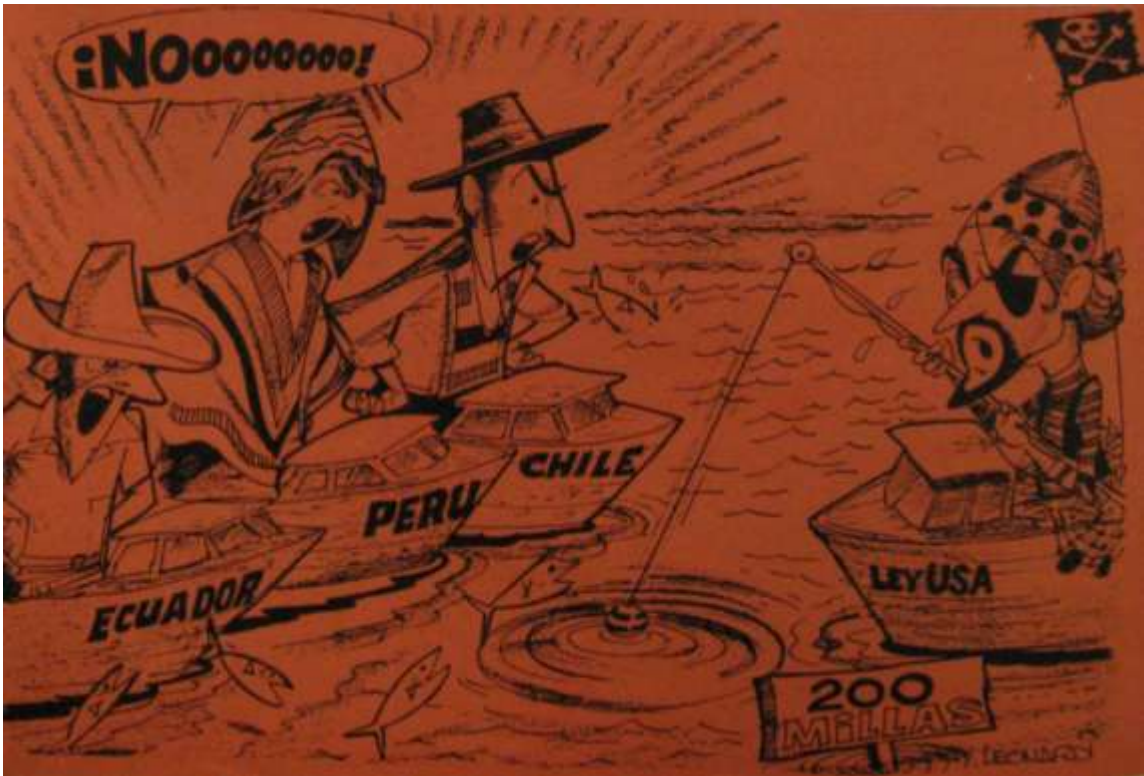


Figure 1.2: The Velasco government commemorates the 20-year anniversary of the CEP agreement. “Peru, Chile, y Ecuador reiteran su soberanía en las 200 millas,” *Documenta* (Lima, Peru) 23-24 (1972): 4.

Predictably, immediately after the Santiago Declaration was published, the confrontations continued. On August 25, Peru’s National Fisheries Society (SNP) complained that 22 U.S. tuna clippers with a total capacity of 6,600 tons were operating off the northern Peruvian coast, entering three-mile territorial waters at night to take tuna.⁶⁸ Two days later, the Quito-based newspaper *El Comercio* reported that a U.S. tuna boat had fired on a Peruvian vessel in Ecuadorian waters; in the following months

⁶⁸ “Peru accuses U.S. ships,” *New York Times*, August 25, 1952, 2.

Ecuador seized at least six U.S. tuna boats off its coast.⁶⁹ But the contested maritime resources of the Humboldt Current included more than just tuna and baitfish: more than half the known species of whales are also found in the Southeast Pacific region.⁷⁰

1.2. Testing the limits of resource claims: From “whale war” to *modus vivendi*, 1952-1967

A new player had by then emerged in the global race for fish, determined to single-handedly challenge—and humiliate—the South American nations in the wake of their recent declaration. In 1950, amidst a worldwide glut in oil and fat supplies following the war, Greek-Argentine shipping magnate Aristotle Onassis expanded his enormous business portfolio to include whaling. He founded the Olympic Whaling

⁶⁹ Luis Vidal, “Dícese que un pesquero de EE.UU. disparó contra nave peruana en aguas del país,” *El Comercio (Quito)*, August 27, 1952. For 6 tuna boats seized by Ecuador, see Shigeru Oda, *Fifty Years of the Law of the Sea* (Martinus Nijhoff, 2003), 56 (citing *New York Times* articles on August 25, October 22, and October 25, 1952).

⁷⁰ See UNEP, “Regional Seas Profile: South-East Pacific Region,” p.11 [available from http://www.unep.org/regionalseas/programmes/nonunep/sepacific/instruments/r_profile_sep.pdf, accessed 02/01/11]. In addition to articulating the 200-mile claim and concerns over shared fishing resources of the Humboldt Current, the Santiago Declaration pronounced “Regulations for maritime hunting in the waters of the South Pacific,” whose text referred exclusively to whaling. U.S. scientist Wesley Marx argued in 1968 that at the time of the Santiago Declaration, whaling was practically the *only* “conservation issue” in the Eastern Tropical Pacific (ETP), adding that “If anything, the ETP suffered from underfishing.” (Marx, “The Eastern Tropical Pacific,” 19.) However, CEP concerns over *future* exhaustion of fish stocks by foreign powers—including not only whales but also tuna and baitfish, as well as bottom-dwelling white fish such as hake—must not be underestimated. As this chapter shows, clashes over tuna were frequent and persistent, demonstrating the ongoing importance of this resource in the development plans of CEP.

Company, with head offices in New York, a subsidiary in Montevideo to which he later transferred ownership of the fleet, and captains and crew consisting of Germans and a handful of Norwegians.⁷¹ “[A] gambler in the international business world whose sporting instincts were aroused by the excitement and risk that whaling represented,” Onassis purchased a T-2 tanker which he converted into a factory ship, the *Olympic Challenger*, along with 12 corvettes that became whale catchers, at a shipyard in Germany.⁷² He later also purchased the U.S. Navy surplus frigate *Stormont*, converted it into a luxury yacht, and built on its hull an ice-breaker prow and fittings for an amphibious plane and super-speedboat, for use in his fleet.⁷³ With part of the fleet registered in Panama and the rest in Honduras, the company avoided the stipulations of international conventions regulating the hunting of whales to which the traditional maritime nations had committed.⁷⁴ Former German and Norwegian crew members, resentful of the deceit and unscrupulous treatment they received from Onassis during the expeditions, later revealed that not only did the fleet refuse to observe the official

⁷¹ Johan Nicolay Tønnessen and Arne Odd Johnsen, *The History of Modern Whaling* (University of California Press, 1982), 534.

⁷² Tønnessen and Johnsen, *The History of Modern Whaling*, 536.

⁷³ “Ice breaker for Millionaire,” *New York Times*, February 21, 1953, 4.

⁷⁴ Tønnessen and Johnsen, *The History of Modern Whaling*, 535.

quotas and opening and closing dates of the hunting seasons—it also indiscriminately killed calves and nursing mothers, outlawed by international conventions since 1931.⁷⁵

The *Olympic Challenger* expedition of 1954 incited a major international confrontation between the Onassis fleet and Peruvian forces. The “*Peruanische Walkrieg*” (“Peruvian whale war”), as German scholar Klaus Barthelmess termed the incident, began when the fleet departed Hamburg en route to the Southeast Pacific, passing through the Panama Canal on August 25.⁷⁶ Despite Peru’s warning that it would deploy naval force if necessary, Panama—where the *Olympic Challenger* mothership was registered—refused to take action to prevent the fleet from operating within the 200-mile coastal zone.⁷⁷ In early October, Chilean, Ecuadorian, and Peruvian representatives met in Santiago to reaffirm their claim.⁷⁸ The sentiment was also iterated in a political

⁷⁵ Tønnessen and Johnsen, *The History of Modern Whaling*, 538; Klaus Barthelmess, “Die Gegner der ‘Olympic Challenger’ Wie amerikanische Geheimdienste, Norweger und Deutsche das Walfangabenteuer des Aristoteles Onassis beendeten,” *Polarforschung* 79 no.3 (2009): 155-176, accessed December 14, 2010, available from <http://epic.awi.de/Publications/Bar2010f.pdf>.

⁷⁶ Barthelmess, “Die Gegner der ‘Olympic Challenger’,” 160. See also “Peru: Tycoon’s Triumph,” *Time*, December 27, 1954, accessed December 14, 2010, available from <http://www.time.com/time/magazine/article/0,9171,857889,00.html>. Johan Nicolay Tønnessen and Arne Odd Johnsen note that the Onassis fleet first sailed to the Southeast Pacific in the 1950-51 season, apparently without confrontation with South American coastal nations. However, some of the details surrounding the 1954 incident remain murky and their confirmation is beyond the scope of the present chapter.

⁷⁷ “Panama Bars Requests, Refuses to Keep Whaleships from Waters Near Peru, Chile,” *New York Times*, September 18, 1954, 3.

⁷⁸ Sam Pope Brewer, “3 Latin Lands Join in Fishing Defense,” *New York Times*, October 10, 1954, 4.

cartoon printed a month before in the Peruvian newspaper *La Nación* with the caption, “*La Unión Hace La Fuerza*,” in which men of the three countries, armed with swords, together proclaimed, “*Todo por el mar que nos baña.*”⁷⁹

In mid-November, an Onassis agent in Hamburg stated—apparently in mockery of the CEP claim and Peru’s promise of recourse to military intervention to defend it—that the fleet was successfully carrying out its whaling activities within the 200-mile limit.⁸⁰ Peruvian military dictator Manuel Odría promptly mobilized the Navy and Air Force to take control of the situation. On November 16, an aircraft bombed (but did not hit) the *Olympic Challenger*, and two catcher vessels received machine-gun fire; in all, although the whalers suffered only light damage, five ships were seized and forced into port, while the remaining ships fled north towards Panama.⁸¹ But Onassis barely flinched at the US \$3 million fine that the Peruvian authorities assessed on the fleet for whaling in territorial waters without a permit: he had recently taken out a US \$15 million anti-confiscation insurance policy with Lloyd’s of London, which covered

⁷⁹ Kito, “El Refran Ilustrado [political cartoon]” *La Nación (Lima)*, September 08, 1954, 2.

⁸⁰ “Peru: Tycoon’s Triumph;” Loring, “The United States-Peruvian “Fisheries” Dispute,” 404. Reports from the fleet via Panama stated that three of the ships were seized outside the 200 mile limit, at 380 and 300 miles respectively. See “Limit rejected by Panama,” *New York Times*, November 17, 1954, 15.

⁸¹ “Peru’s Navy Seizes 5 Onassis Whalers,” *New York Times*, November 17, 1954, 1; “Limit rejected by Panama,” *New York Times*, November 17, 1954, 15. See also “Peru: Tycoon’s Triumph,” and Loring, “The United States-Peruvian “Fisheries” Dispute.”

damages as well as lost time. Thus, while the \$3 million check paid to the Peruvian government was said to constitute “the biggest private check ever paid in Peru,” the magnate himself came out “not only unscathed but possibly money ahead.”⁸²

By registering his company in New York and having it controlled by a U.S.-American board of directors, Onassis secured access to U.S. Navy surplus vessels (available for purchase only by U.S. citizens), which he then transferred to the Montevideo subsidiary. In 1954 the U.S. government charged Onassis, an ex-Congressman, and eight other U.S. businessmen with committing fraud in arranging the purchase of the vessels by a non-U.S. citizen.⁸³ Moreover, German scholar Klaus Barthelmeß suggests that the CIA likely had a role in inducing Peruvian forces to take action against Onassis on this particular occasion, as a way of sabotaging his shipping interests in the context of his possible monopoly on oil shipments to the United States from Saudi Arabia.⁸⁴ Shortly after the ordeal, Onassis sold his whaling fleet to a Japanese concern.

The Onassis incident was highly symbolic for nations of the South in their struggle for global justice on the high seas. An article in London-based *The World Today*

⁸² “Peru: Tycoon’s Triumph,” The former quotation is reported by *Time* as a remark by the unnamed “chief collector of revenue for the Peruvian government.”

⁸³ See “Ex-Congressman, 8 Others are Accused of Ship Fraud,” *New York Times*, February 02, 1954, 1.

⁸⁴ Barthelmeß, “Die Gegner der ‘Olympic Challenger,’” 155.

reported a statement by the Peruvian foreign minister on December 3, 1954, in which he declared: “the world must accept the fact that America is elaborating its own code of rights based on social needs which are at variance with the freedom of the seas.”⁸⁵

Nonetheless, despite the magnitude of the incident and the importance of whaling for the Chile-Ecuador-Peru claim overall, the majority of clashes that took place both before and after concerned the repeated encroachment of tuna and bait fishers.

These continued with vigor in early 1955, involving larger fleets using factory ships for processing the catch at sea. In February, Peruvian frigates *Rodriguez*, *Castilla* and *Aguirre*—the same warships that had participated in the capture of the Onassis fleet—seized eight U.S. tuna boats, including the Tacoma, WA-based mothership *Alaska Reefer* and others from various West Coast ports. Evidencing the increasingly routine nature of such seizures, the *New York Times* reported that the crewmen were released to “mingle with crowds celebrating the traditional Mardi gras carnival” in the port of Talara.⁸⁶ Two of the boats then captured by Peru, the Seattle-based freezer ship *Arctic Maid* and tuna clipper *Santa Ana*, were again captured the following month by the Ecuadorian Navy near Dead Man’s Island outside the Gulf of Guayaquil. The remainder of their 15-boat fleet escaped, but crewman William Peck of the *Arctic Maid*

⁸⁵ “Territorial Waters and the Onassis Case,” *The World Today* 11.1 (1955): 2; cited in Oda, *Fifty Years*, 57 n49.

⁸⁶ “Peru releases crews,” *New York Times*, February 21, 1955, 3.

was wounded in the leg during the chase.⁸⁷ In September, representatives of the United States, Peru, Ecuador, and Chile met in Santiago to discuss issues of fisheries “conservation” — though for the United States “the ultimate subject,” wrote *New York Times* correspondent Tad Szulc, “is to bring the three nations...to abandon their claims of sovereignty” over the 200-mile coastal zone.⁸⁸ The group was, however, unable to reach a compromise.

Although negotiations with the U.S. government were unsuccessful, the American Tuna boat Association was able to reach bilateral agreements with Peru and Chile in the years that followed—arriving, privately and temporarily, at the kind of terms for which Milton Lobell had advocated in his 1948 letter to Chapman. U.S. legal scholar David Loring suggested that the Peruvian government was more willing to accommodate the tuna industry, rather than the U.S. government as a whole, because Peru had greater bargaining power in that relationship and a private agreement would not compromise its overall legal position on the 200-mile claim.⁸⁹ In January 1956, Peru issued a Supreme Decree, drafted in cooperation with the ATA, which stipulated that

⁸⁷ “Ecuador Captures Two U.S. Vessels,” *New York Times*, March 29, 1955, 14.

⁸⁸ Tad Szulc, “Chile’s problems abroad complex,” *New York Times*, September 17, 1955, 3.

⁸⁹ Loring, “The United States-Peruvian “Fisheries” Dispute,” 443.

the government would grant fishing licenses to foreign vessels for yellowfin and skipjack tuna, baitfish, and—surprisingly—whales.⁹⁰

Chile, on the other hand, seldom seized U.S. tuna boats, likely due in part to the fact that the tuna populations were typically less numerous off the Chilean coast. However, on December 14, 1957, the Chilean Navy ordered 23 U.S. tuna boats into the port of Iquique, firing “warning shots” when they were unable to reach them by radio.⁹¹ The vessels fled Chilean waters despite pursuit by military planes, but the U.S. Embassy later announced that the appropriate permits would be purchased.⁹² Chilean authorities seized a different U.S. tuna boat on December 28, stating that a fleet of 15 to 18 vessels had been fishing within the 200-mile limit but that the others had escaped when ordered into port.⁹³ Perhaps drawing on the success of the previous year’s agreement with Peru, the American Tuna boat Association again took the lead in resolving the situation: ATA manager Harold Cary flew to Santiago to participate in negotiations with the Chilean

⁹⁰ Loring, “The United States-Peruvian “Fisheries” Dispute,” 443n204, citing Supreme Decree, January 05, 1956, “Regulations to Grant Fishing Permits to Foreign Ships to Fish in Jurisdictional Waters of Peru,” as discussed in Hearings on Miscellaneous Fishery Legislation before the Subcomm. on Merchant Marine and Fisheries of the Senate Comm. on Commerce, 90th Cong., 1st Sess. 97-99 (1967).

⁹¹ “Chile to fine U.S. ships: Violation of territorial waters charged,” *New York Times*, December 15, 1957, 8.

⁹² “U.S. boats leave after Chile threat,” *The Washington Post and Times Herald*, December 16, 1957, A9.

⁹³ “Chile detains U.S. vessel despite pact,” *Los Angeles Times*, December 29, 1957.

government.⁹⁴ “Our organization will do all it can to lessen the possibility of incidents between American flag tuna boats and your Government,” Cary wrote in a January 2 letter to Chile’s Foreign Minister Luis Melo Lecaros, “to the end that the atmosphere of friendship which has marked the relations between Chile and the United States may be maintained.”⁹⁵ The following day, the parties announced an accord by which the boats would pay for permits and taxes—rather than the fines previously assessed—for fishing within the coastal zone.⁹⁶

The ATA regarded these *modi vivendi* as small victories in protecting its interests. In March 1959, Chile took what the ATA deemed “a quite satisfactory initial step” in solidifying U.S. tuna boats’ access to local coastal resources, through a decree similar to the one negotiated with Peru in 1956.⁹⁷ “We have been working for this for some years,” stated an ATA memo dated April 2, “... it is so necessary for us to treat a precise knife edge of policy between getting bait and fuel in a country and losing the right to fish tuna

⁹⁴ “U.S. Tuna Ships in Pact: Fishing Group to Pay Chilean Fees, Avoiding Fines,” *New York Times*, January 04, 1958, 30.

⁹⁵ Harold F. Cary to Luis Melo Lecaros, Letter, January 2, 1958, 2; Chapman Papers, UW Special Collections, Box 50, Folder 9.

⁹⁶ “U.S. Tuna Ships in Pact.”

⁹⁷ See “Free Translation from Diario Oficial de la Republica de Chile, No. 24,299 of March 20, 1959: Regulation Concerning Permits to Foreign Vessels to Fish in Chilean Territorial Waters,” Chapman Papers, UW Special Collections, Box 50, Folder 9.

freely on the high seas....”⁹⁸ In Chapman’s view, the U.S. tuna industry had reached a mutual understanding, bilaterally with Peru and Chile, in which each maintained his own interpretation of “territorial sea” while maintaining an amicable commercial relationship that sidestepped the international legal issue: “They know what we mean by territorial sea in their decree, we know what they mean, we continue to exercise the rights of the United States under international law with their full knowledge, and not only are there no hard feelings, but there is a good warmth of friendship.”⁹⁹ The United States, for its part, held steadfast to the traditional three-mile definition, while the industrialists paid the nominal fees in order to maintain access and keep the peace.¹⁰⁰ The agreements appeared to quell the vigorous clashes for a few years.

Instead, Peruvian authorities turned their attention to Chilean vessels encroaching at the southern maritime border, as each nation struggled to compete in fishmeal production for global markets using anchoveta and sardine stocks that straddled their contested maritime boundary. Immense schools of these tiny fish and the marine life that feeds upon them swarmed all along the coast of Peru and in

⁹⁸ American Tuna boat Association to The Resources Committee, Memo re: Chilean decree on bait and tuna fishing in territorial waters, April 2, 1959, 1; W.M. Chapman Papers, University of Washington Special Collections, Box 50, Folder 9.

⁹⁹ W.M. Chapman (Dir. of Research, ATA) to Fred E. Taylor (UFW, Dpt. of State), Letter, April 2, 1959; FOREIGN REPORT Chile No. 59-1, Appendix I, 2. Chapman Papers, UW Special Collections, Box 50, Folder 9.

¹⁰⁰ Chapman to Taylor, Letter, April 2, 1959; FOREIGN REPORT, Appendix 1, 2.

northern Chile, but scientists deemed Peruvian waters to be superior.¹⁰¹ “The privilege of taking bait in the Peruvian territorial sea is simply more valuable than the same for Chile,” wrote Wilbert Chapman in a letter to U.S. Fish and Wildlife official Fred E. Taylor in 1959, “not only because of the greater area of bait availability along the Peruvian coast, but also its greater proximity to more tuna.”¹⁰² Chapman noted that most tuna had been found in an angle between Iquique in northern Chile and Ilo in southern Peru, from 15-80 miles off the coast.¹⁰³ FAO fisheries scientist Ivan Popovich, stationed at the Institute for Marine Resource Research in Lima, did not recommend to Van Camp executive Carl Hedreen that his company invest in Arica. The fish tended to concentrate in an eddy between Ilo and Atico, he observed, and thus the “best fishing area for Arica...would be north in Peruvian waters.”¹⁰⁴

¹⁰¹ Indeed, fisheries scientists now identify “three well-defined upwelling subsystems” in the Humboldt Current System, of which the northernmost zone (off the coast of Peru) is the most productive. They consist of: “(1) a productive seasonal upwelling system in central-southern Chile; (2) a lower productivity and rather large ‘upwelling shadow’ in northern Chile and southern Peru; and (3) the highly productive year-round Peru upwelling system.” Vivian Montecino and Carina B. Lange, “The Humboldt Current System: Ecosystem Components and Processes, Fisheries, and Sediment Studies,” *Progress in Oceanography* 83 (2009): 65.

¹⁰² Chapman to Taylor, Letter, April 2, 1959; FOREIGN REPORT, Appendix 1, 3.

¹⁰³ By no coincidence, this corresponds to part of the area under debate as part of the Chile-Peru maritime boundary dispute currently before the Hague. Chapman to Taylor, Letter, April 2, 1959; FOREIGN REPORT, Appendix 1, 3.

¹⁰⁴ Carl A. Hedreen to “File,” Memorandum re: “Luncheon meeting with Dr. Popovich of the Instituto de Estudios de Recursos Marinos – October 15, 1963,” October 16, 1963. Chapman Papers, UW Special Collections, Box 59, Folder 20.

Conflicts soon emerged between Peruvian and Chilean fleets over access to these transboundary resources. Although a 1954 trilateral agreement between Peru, Chile, and Ecuador stipulated a “tolerance zone” of ten miles on each side of the maritime border, excluding the 12-mile zone closest to the coast, diplomatic relations became strained when boats followed the schooling fishes too far on the other side.¹⁰⁵ Following a series of reports of “illegal” fishing by Chilean boats, Chile’s Director of Agriculture and Fisheries, Virgilio Mannarelli, ordered in February 1961 that all the fishing companies between Arica and Antofagasta be warned not to “violate Peruvian waters.” Chilean fishers continued to infringe, however: boats owned by the Italian-born Chilean magnate Anacleto Angelini, who built his first fishmeal plant in Arica in 1956, were reported fishing off the coast of Peru soon thereafter.¹⁰⁶ These minor clashes marked the

¹⁰⁵Governments of Peru, Chile, and Ecuador, *Agreement on the Special Maritime Boundary Zone*, December 4, 1954, accessed November 24, 2011, available from <http://www.un.org/depts/los/LEGISLATIONANDTREATIES/STATEFILES/CHL.htm>.

¹⁰⁶ Both Chilean and Peruvian boats were accused and/or caught fishing on the other side of the maritime boundary. J. Manuel Casanueva R., “Sobre violación de aguas peruanas or embarcaciones pesqueras chilenas,” February 23, 1961, Archivo Siglo XX, Santiago, Chile, Ministerio de Agricultura V1482; J. Manuel Casanueva R., “Ref: Oficio confidencial No. 21 sobre pesca de embarcaciones chilenas en aguas peruanas,” August 9, 1961, Archivo Siglo XX, Santiago, Chile, Ministerio de Agricultura V1482; Ministro de Defensa (Chile) to Ministro del Interior (Chile), “Obj: R/c. medidas que se adoptan con pesqueros extranjeros por transgression disposiciones vigentes,” October 4, 1961, Archivo Siglo XX, Santiago, Chile, Ministerio de Agricultura V1482.

beginning of a long and contentious conflict over the Peru-Chile maritime boundary, currently (as of December 2011) before The Hague for adjudication.¹⁰⁷

For the U.S. tuna industry, negotiating a *modus vivendi* with Ecuador was less straightforward than it had been with Peru and Chile, which were increasingly more vested in fishmeal by the early 1960s. On May 25, 1963, Ecuadorian naval vessels approached the U.S. tuna boats *Ranger* and *White Star* 13 miles off the coast, ordering them to sail to port to be sanctioned for fishing in territorial waters. But when the captains of the 19 other boats in the San Diego-based fleet decided to escort the seized clippers in protest, the naval vessel *Jambelí* fired a shot across one of their bows.¹⁰⁸ “The tuna tempest stirred a wave of excitement around the State Department as word of a shooting incident spread,” the *New York Times* reported.¹⁰⁹ The skippers of the *Ranger* and *White Star* periodically reversed their engines in defiance as they were towed into port.¹¹⁰ Eventually, all 21 tuna boats and their 400 U.S. crewmembers—reported by Ecuadorian authorities to be “hostile” and “rebellious” after their capture—anchored in

¹⁰⁷ See International Court of Justice, “Maritime Dispute: Peru V. Chile,” case docket, accessed November 25, 2011, available from <http://www.icj-cij.org/docket/index.php?p1=3&p2=3&code=pc&case=137&k=88>.

¹⁰⁸ Conflicting news reports state that the shot was fired across the bow of either the *Mary Barbara* or the *Hornet*.

¹⁰⁹ “U.S. Bids Ecuador Free Tuna Boats,” *New York Times*, May 30, 1963, 3.

¹¹⁰ “21 U.S. Tuna Vessels in Custody: Ecuador,” *Chicago Tribune*, May 30, 1963, 9.

Puerto Esmeralda to await a diplomatic resolution.¹¹¹ The ordeal dragged on for weeks, as U.S. consular officials negotiated with Ecuadorian officials for the release of the boats and their crews. The State Department, meanwhile, “appealed to all involved ‘to keep their shirts on.’”¹¹²

Labor groups on the U.S. West Coast organized in solidarity with the fishermen to exert pressure on the Ecuadorian government, demanding the release of their compatriots. On June 3, the Fishermen’s Union Local 33 picketed a cargo ship carrying Ecuadorian bananas at the Los Angeles Harbor, and 300 dockworkers from the International Longshoremen’s and Warehousemen’s Union honored the picket line.¹¹³ “It is a shakedown on the part of the Ecuadorian government and we don’t want our government to pay this blackmail to settle the issue,” John J. Royal, secretary-treasurer of Fishermen’s Local 33 of Southland-San Diego, told the *Los Angeles Times*.¹¹⁴ “It is high time that this nibbling away at the freedom of the seas came to an end,” complained an editorial in the *Chicago Tribune*, “and the first order of business should be the release of

¹¹¹ “Colombia [*sic*] Rejects U.S. Plea to Free Tuna Boats,” *Washington Post*, June 1, 1963, A8; “Plea to Free Ships Spurned by Ecuador,” *Chicago Tribune*, June 01, 1963, SA7.

¹¹² “Colombia [*sic*] Rejects U.S. Plea.”

¹¹³ “Dockers Honor Picket Line in Ecuador Row,” *Los Angeles Times*, June 04, 1963, 23.

¹¹⁴ “Dockers Honor Picket Line.”

the American fishing boats.”¹¹⁵ U.S. Secretary of State Dean Rusk sent Ambassador Maurice Bernbaum, along with officials of the Navy and the Department of the Interior, to negotiate with Ecuadorian authorities.¹¹⁶ The following week, another U.S. tuna boat, the *Espiritu Santo*, narrowly avoided reigniting the conflict when it sailed directly to the port of Salinas to purchase a license, rather than obtaining it before entering Ecuadorian waters – despite “technical difficulty” during the bureaucratic process, authorities eventually awarded the permit without incident.¹¹⁷

These events occurred amidst the unfolding of a national political crisis in Ecuador. On July 11, 1963, a military junta removed the left-wing regime of President Carlos Julio Arosemena Monroy from power, with suspected involvement by the CIA.¹¹⁸ Several months later the U.S. government quietly reached an agreement with the new regime regarding the fishing dispute.¹¹⁹ According to this agreement, the United States would respect a 12-mile coastal zone within which Ecuador would have jurisdiction over fisheries, including the right to tax foreign vessels, while Ecuador agreed not to

¹¹⁵ “Ecuador’s Long Arm,” *Chicago Tribune*, June 02, 1963, 20.

¹¹⁶ “U.S. and Ecuador Set Fishing Talks,” *New York Times*, June 06, 1963, 12.

¹¹⁷ “U.S. Tuna Boat In and Out of Ecuador’s Net,” *Chicago Tribune*, June 15, 1963, A4.

¹¹⁸ Loring, “The United States-Peruvian “Fisheries” Dispute,” 392, 407-408.

¹¹⁹ Scholars characterize this *modus vivendi* as a “secret” agreement, but actually it was reported in a small section of the *Los Angeles Times*. “U.S., Ecuador Tuna Agreement Reported,” *Los Angeles Times*, September 27, 1963, 4.

seize foreign boats beyond the 12-mile limit. The Tuna Wars had disrupted Ecuadorian exports to the United States, according to former Ecuadorian Foreign Minister Neftalí Ponce Miranda, not only due to dockworkers' boycotts of Ecuadorian goods, but also because it delayed trade negotiations as Ecuador sought a reduction of import tariffs for Panama hats.¹²⁰ The agreement helped to restore trade relations, while also protecting Ecuador's main tuna processing city, Manta, from U.S. fleets, and designating a 40-mile national reserve in which fishing with nets was prohibited altogether.¹²¹

However, the temporary peace came to an abrupt end when the political winds shifted yet again in Ecuador. In fact, the agreement itself contributed to the destabilization of the military junta.¹²² On November 21, 1966, appearing before the National Constituent Assembly (*Asamblea Nacional Constituyente*), former President Arosemena attacked the military junta's concession of fishing within the 200-mile zone, saying that Ecuador had failed to uphold the Santiago Declaration.¹²³ David Loring also characterized the *modus vivendi* as "a de facto renunciation of the 200-mile limit" — a reasonable assessment, in light of the tripartite *Convenio Complementario* of November 18,

¹²⁰ Ponce Miranda, 89, 90. Ponce was Foreign Minister from 1948-52 and 1963-64.

¹²¹ Ponce Miranda, *Dominio Marítimo*, 97-98.

¹²² David Loring wrote, "Discovery of the *modus vivendi* in June 1965 created one of the major issues that later brought down the military junta in Ecuador" ("The United States-Peruvian "Fisheries" Dispute," 408). However the details surrounding the supposed "secrecy" of the agreement are unclear.

¹²³ Ponce Miranda, *Dominio Marítimo*, 101.

1964, in which CEP agreed to “proceed in common accord for the juridical defense of the 200-mile maritime zone” and promised not to sign treaties that would interfere with this principle.¹²⁴ But Ponce Miranda, who had participated in the negotiations while serving his second term as Foreign Minister, defended the Ecuadorian position, arguing that by *conceding* to U.S. boats the *permission* to fish between 12 and 200 nautical miles from the coast under negotiated terms, the administration had actually secured recognition of its claim through participation in this “informal” bilateral agreement.¹²⁵ The incident “became a weapon of attack and political revenge,” he complained.¹²⁶

In the United States, as resentment grew towards Ecuador, some called for a halt to foreign aid while the dispute continued. “The solution of the Ecuadorian piracy of our tuna fleet is ridiculously simple,” wrote L.A. resident Louis D. Statham in a letter to the *Los Angeles Times*: “[...] Our government should... deduct [the ransom paid] from the foreign aid give-away installment next due Ecuador.”¹²⁷ Although the State Department had aimed to keep U.S. foreign policy apart from its dealings with Ecuador over fisheries claims, in 1965 a “freedom of the seas amendment” was added to the Foreign

¹²⁴ Loring, “The United States-Peruvian “Fisheries” Dispute,” 408; Ponce Miranda, *Dominio Marítimo*, 108.

¹²⁵ Ponce Miranda, *Dominio Marítimo*, 96.

¹²⁶ Ponce Miranda, *Dominio Marítimo*, 101.

¹²⁷ Louis D. Statham, “Ecuador Plan” [Letter to the Editor], *Los Angeles Times*, July 30, 1963, A4.

Assistance Act, stipulating that the imposition of fines on U.S. vessels would be a factor in determining aid.¹²⁸

Clashes involving U.S. tuna boats in Peruvian waters continued during the mid-1960s, amidst a booming fishmeal industry that had earned Peru a top ranking among world fishing nations almost overnight. Several incidents in 1965 and 1966 reflected a renewed escalation of the conflict: in early 1965, at least three San Diego tuna boats were seized and fined, including one that had been detained when dropping off an ill seaman in port. “ ‘We don’t know what caused this latest action,’ ” ATA general manager August Felando told the *Los Angeles Times*, “ ‘...it was sort of quiet last year.’ ”¹²⁹ In December, shotgun pellets fired from a Peruvian Navy tugboat wounded two men aboard the U.S. tuna boat *Mayflower* when skipper Manuel Graca refused to hand over the vessel’s documents. A report of the incident radioed by the skipper from an accompanying vessel also indicated that the tugboat “rammed” a skiff beside the *Mayflower*.¹³⁰ In October of the following year, U.S. tuna boat captain Manuel Clintas informed the ATA that the captain of the Peruvian port Talara, Jorge Villarroel [sic?],

¹²⁸ Loring, “The United States-Peruvian “Fisheries” Dispute,” 440. This sentiment was reiterated in 1967: the *Washington Post* reported that the U.S. threatened to cut off aid to Peru and Chile because of continuing tuna boat seizures [J.Y. Smith, “Aid Cutoff Threatened in Fishing Rights Row,” *Washington Post* February 24, 1967, A5.

¹²⁹ “San Diego Tuna Boat Seized by Peru Navy,” *Los Angeles Times*, June 12, 1965, 20.

¹³⁰ “Peruvians Fire on U.S. Tuna Boat; 2 Wounded,” *Los Angeles Times*, December 07, 1965, 3.

had threatened to bomb U.S. tuna boats if they continue to fish in the 200-mile zone without licenses. The supposed threat came after 14 tuna boats sailed into Talara in an “anchor-in” demonstration of protest and support for three vessels, the *Sun Europa* and *Ronnie S.* of San Diego and the *Eastern Pacific* of Tacoma, that had been seized the previous week.¹³¹

Amidst recurring tuna boat seizures during this key period in Southeast Pacific fisheries development—at a moment when the U.S. West Coast industry struggled to compete through expanding its spheres of operation not only to CEP coastal waters but also to South Pacific Islands and the Caribbean Sea—some skippers became seasoned arbiters in high-seas seizures. In August 1967 the *Los Angeles Times* featured a story on Roland Virissimo, “the man many regard as the top skipper in the U.S. tuna fleet,” whose 170-foot seiner the *Hornet* had been seized three times in Ecuadorian and Peruvian waters, including the June 1963 21-boat protest leading to the U.S.-Ecuador agreement, as well as in June 1965 and January 1967 by Peru. “They are a bunch of gangsters, pirates,” he told the reporter. Virissimo said he preferred to be seized by Peruvians, who he deemed to be “more on the ball” than Ecuadorians. Many of the Peruvians also spoke English and were familiar with his hometown of San Diego, where they had attended Navy school. The Ecuadorians, he went on, “don’t know who is the

¹³¹ “Tuna Boats Get Bomb Threat,” *Los Angeles Times*, October 06, 1966, 3.

boss. You might have to wait around in one of their ports for one week or a month until they decide what to do with you.” Virissimo also reported continuing harassment by Ecuadorian patrol vehicles, on one occasion a plane buzzing low overhead and a gunboat that “crept up close” during the night, then later “turned on their searchlight and siren and raked us with the light.”¹³² The *modus vivendi* now over, Ecuador continued to adamantly defend its 200-mile claim to the international community: as he told *Los Angeles Times* reporter David Belnap, “...this is not a matter we will put up for discussion with anyone.”¹³³

1.3. Until the bitter end: Tuna Wars and the military regimes of Peru and Ecuador, 1967-1982

Keen industry executives like Wilbert Chapman observed the link between the ongoing hostilities in the Southeast Pacific and the growing desires of developing nations worldwide, including newly independent African nations, to build up their long-distance fisheries. Chapman advocated for the defeat of the 200-mile doctrine, and he hoped these fledgling long-distance fishing nations—such as Chile, which he

¹³² “Fishing Skipper Hits at Gunboat ‘Pirates,’” *Los Angeles Times*, August 27, 1967, B3.

¹³³ David F. Belnap, “3 Latin Nations Asked to Confer on Fishing,” *Los Angeles Times*, December 11, 1967, 14.

commented in 1967 was “now seeking to get out of the 200 mile Chile-Ecuador-Peru lineup” – would uphold the freedom of the seas in the interest of their own fleets.¹³⁴ Nonetheless, citing the problems with Pacific South American nations two years before, Chapman recommended against Van Camp’s investment in long-range tuna vessels, instead using short range vessels and cold storage in coastal ports.¹³⁵ The U.S. West Coast tuna industry was in the process of relocating overseas: following an industry crisis in the 1950s, amidst high U.S. wages and competition from Japanese tuna imports, Van Camp rapidly expanded production into Samoa, Puerto Rico, the African Atlantic Coast, Peru, and Ecuador.¹³⁶ “In the prime seasons at the beginning of the year and in midsummer,” the *New York Times* reported in 1968, “most of the United States tuna fleet of 50 vessels is off Ecuador and Peru.”¹³⁷ After 1966, when the Ecuadorian government tripled the licensing fee, the U.S. fleet found it “uneconomical” to purchase licenses and no longer did so, except when “obliged to do so by Ecuadorian gunboats.”¹³⁸

¹³⁴ W.M. Chapman to Warren Shapleigh, Glenn Copeland, Peter Buchan, Gordon Broadhead, “Re: Joe Madruga and a new Tuna Clipper,” December 26, 1967, 2; Chapman papers, UW Special Collections, Box 85, Folder 8.

¹³⁵ Chapman to Shapleigh, et al., “Re: Joe Madruga.”

¹³⁶ “Corporations: Tuna Turnaround,” *Time*, January 18, 1963, accessed February 08, 2011, available from <http://www.time.com/time/magazine/article/0,9171,874707,00.html>.

¹³⁷ Paul L. Montgomery, “U.S. to Confer With Latins on Fishing Rights,” *New York Times*, April 08, 1968, 20. Montgomery also reports that of 200,000 tons of tuna caught on Pacific Coast of Lat. Am. “last year” [1967], US vessels accounted for 75%; Ecuador 6%.

¹³⁸ Montgomery, “U.S. to Confer.”

Technological developments in boat engineering accelerated the harvesting efficiency and capacity of distant-water fishing fleets throughout this period. The tuna industry's shift from baitfishing to purse seining during the 1950s and early 1960s reduced the dependence of U.S. fleets on coastal nations, while also providing a major impulse to the locally operated fisheries in Peru and northern Chile. Purse seining can be used by boats of varied sizes, to capture a range of schooling fish species. The method involves encircling a school of fish with a net, usually with the assistance of a small skiff, then cinching the bottom like a drawstring so as to capture the entire school. Its adaptability made seining well-suited to the most important commercial fisheries in the epipelagic zone (up to 200 meters deep) of the Southeast Pacific: principally tuna, anchovies, and sardines. Industrialists soon discovered that their California-built bait boats could easily be converted into seiners; San Pedro fisherman Larry's *Sun King* was the first successful conversion, circa 1958.¹³⁹ Peruvian *bolicheras*—protagonists of the impending fishmeal boom in Peru that would soon transform global commodity markets—were in many cases second-hand seiners from the U.S. West Coast, with nets specially adapted to the small size of the *anchoveta*. Moreover, switching from tuna to anchoveta or sardine fishing required little more than changing a seiner's net to a

¹³⁹ August John Felando, interview by Robert G. Wright, San Diego Historical Society Oral History Program, September 05, 1995, accessed January 24, 2011, available from <http://gondolin.ucsd.edu/sio/ceo-sdhsOH/felando.html>.

smaller mesh size. This versatility facilitated the transition to fishmeal production during the boom years.

By the late 1960s, major U.S. concerns such as Van Camp, Star Kist, and others owned a significant share of the booming Peruvian fishing industry. After 1968, the left-wing military regime of Gen. Juan Velasco Alvarado implemented avowed anti-imperialist policies in order to transform the domestic economy, including a zealous reaffirmation of the 200-mile doctrine. Perhaps the most serious incident between U.S. tuna boats and the Peruvian Navy occurred during the Velasco regime: in February 1969, the Peruvian Navy fired on U.S. tuna boats fishing 26 to 50 miles from the coast. Urgent radio messages sent from the *San Juan* during the incident claimed that the vessel had been hit by 60 machine-gun bullets. Owner Ed Gann, master Verne Bowman, and skipper John Virissimo, as reported by the *Los Angeles Times*, described how a Peruvian warship had “cruised among eight U.S. fishing boats for about three hours starting before dawn...,” followed by a “20 mile chase.”¹⁴⁰ The *Mariner* and its 13-man crew were eventually taken to the port of Talara where the captain paid a \$2,000 fine as a condition of his release.¹⁴¹

¹⁴⁰ Harry Trimbord, “Peruvian gunboat fires on U.S. vessel, Seizes Second,” *Los Angeles Times*, February 15, 1969, A1.

¹⁴¹ Trimbord, “Peruvian gunboat.”

In the wake of the recent Peruvian expropriation of International Petroleum Company (a subsidiary of Standard Oil) on October 9, 1968, tensions were high in U.S.-Peruvian relations at that moment.¹⁴² U.S. Secretary of State William P. Rogers expressed “serious concern” to Peruvian Ambassador Fernando Berckemeyer over the incident.¹⁴³ Indiana University professor William B. Hutchinson, a former Peace Corps volunteer and an anthropologist specializing in South America, wrote a letter to the editor of the *Los Angeles Times* in which he explained, “I have become extremely concerned about the growing national sentiment against Peru.” Hutchinson insisted that the expropriation of IPC and the recent tuna boat seizure were “in no way related,” adding that “[t]he goals of U.S. diplomacy should not be the rupture of relations with Peru.”¹⁴⁴ While talks were taking place in May 1969 concerning the IPC expropriation, the State Department announced the suspension of military equipment sales to Peru in retaliation for recent boat seizures.¹⁴⁵ Several days later, Premier Ernesto Montagne announced the expulsion of U.S. Army, Navy, and Air Force missions and rejected the visit of Governor Nelson

¹⁴² Benjamin Welles, “U.S.-Peru Accord for Sale of Arms is Reported Near,” *New York Times*, June 15, 1969, 1.

¹⁴³ “Peruvians attack U.S. fishing boats and capture one,” *New York Times*, February 15, 1969, 1.

¹⁴⁴ William B. Hutchinson, “Problems of U.S. and Peru” [Letter to the Editor], *Los Angeles Times*, March 01, 1969, B4.

¹⁴⁵ “Peru Denied Arms After Seizing Boat,” *The Washington Post*, May 18, 1969, 18.

Rockefeller, special envoy of President Richard Nixon, on his inter-American “fact-finding tour.”¹⁴⁶

Although the military ban lasted only a few months, it further strained relations with Peru. Amidst Latin American nations’ complaints about “cumbersome and humiliating” aid policies and U.S. tariff policies which disadvantaged their exports, the *New York Times* described U.S.-Peruvian relations as at “their lowest level in many years.”¹⁴⁷ Clashes with Ecuador also continued on June 20, 1969, when the government seized several tuna boats, accusing U.S. fishing firms of “provocation” by deliberately sending their boats into their territorial waters.¹⁴⁸ On August 2, the United States, Chile, Ecuador, and Peru met in Buenos Aires to deliberate the issue—inconclusively, once again.¹⁴⁹

As they had during the 1963 incident, California labor unions pressured the U.S. government to act on behalf of the tuna fishermen in the ongoing international dispute.

¹⁴⁶ “U.S. Military Aides Expelled by Peru; Rockefeller Barred,” *New York Times*, May 24, 1969, 1.

¹⁴⁷ “U.S.-Peru Accord for Sale of Arms is Reported Near,” *New York Times*, July 15, 1969, 1; Benjamin Welles, “U.S. Will Help ‘Revitalize’ Hemisphere Development,” *New York Times*, June 21, 1969, 3.

¹⁴⁸ “U.S. Trawlers are Released by Ecuador,” *Chicago Tribune*, June 21, 1969, N2; “U.S. Tuna Boats Provocative, Ecuador Says,” *Chicago Tribune*, June 22, 1969, A8.

¹⁴⁹ David F. Belnap, “U.S.-Latin Talks Seek to Resolve ‘Tuna War,’” *Los Angeles Times*, August 04, 1969, A5. The article also mentions a “preliminary meeting” of U.S./CEP in Santiago, from April 17-19, 1968, but the June 1969 clashes between the United States and Peru delayed the negotiations. Another conference was previously held in Santiago in 1955, but the parties were also unable to reach an agreement.

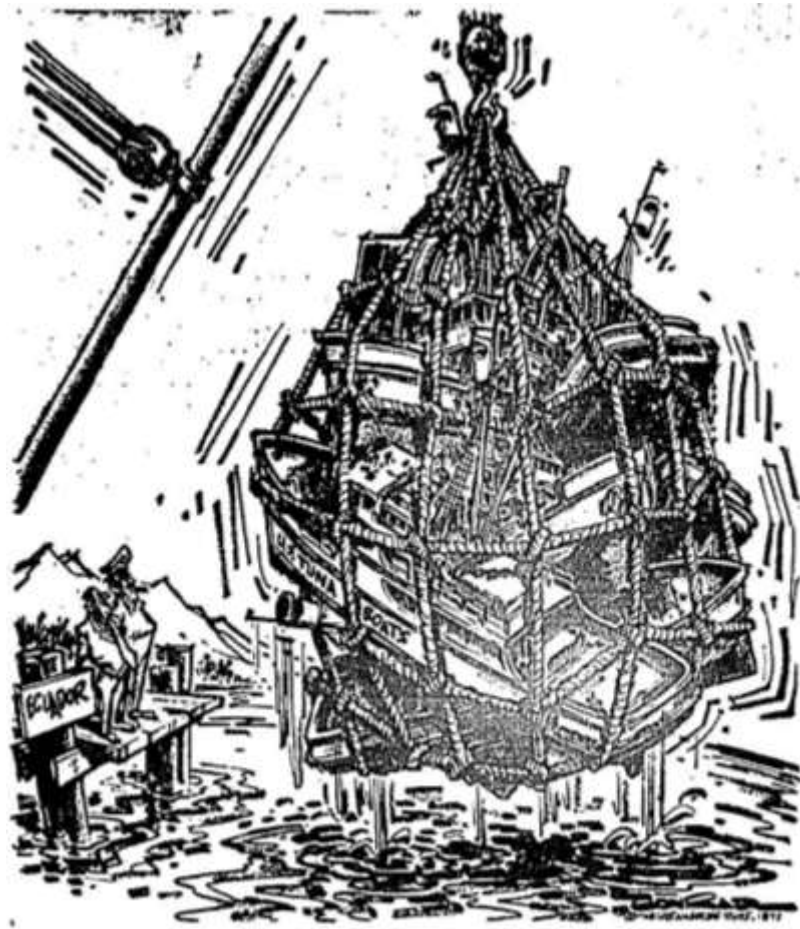
In March 1970, John J. Royal of Fishermen's Local 33 of Southland-San Diego drafted a letter to President Nixon, demanding the government "protection" that the fishermen "so rightly deserve." On behalf of the organization and its affiliates, Royal threatened "to embark upon an all out embargo by American labor against the commodities and products coming from these countries and, further, take every step we can within OUR power to see that no cargo from these vessels is discharged in American ports...[in order to] avoid the inevitable bloodshed and probable loss of lives" that he argued the ongoing conflict would bring.¹⁵⁰ In fact, the number of seizures in 1970 dropped to four from 14 the previous year, but this was likely due to poor fishing off the Southeast Pacific coast that season.¹⁵¹

Indeed, the contest was far from over: in January 1971, a new rash of tuna boat clashes erupted. During one incident, Roland Verissimo's *Hornet* was once again fired upon, and the *Apollo*—the world's largest tuna boat on its maiden voyage—was seized and fined. U.S.-made patrol boats and a destroyer on loan to Ecuador at the time were used in the operation. The United States swiftly halted military sales, surplus equipment transfers, aircraft purchases, credits, and economic assistance to Ecuador—

¹⁵⁰ G. Christian Hill and Hal Lancaster, "Tuna fishermen face woes besides scare over mercury," *Wall Street Journal*, December 23, 1970, 4.

¹⁵¹ Letter from John J. Royal to President Richard M. Nixon, March 3, 1970; cited in Loring, "The United States-Peruvian "Fisheries" Dispute," 427n167.

aid totaling nearly US \$29 million—for 12 months.¹⁵² The *Los Angeles Times* ran a cartoon in which an Ecuadorian fishing net hauled in nothing more than U.S. tuna boats, while the officials looking on exclaimed, “Per pound, they’re worth more money than fish!”¹⁵³



“Per pound, they’re worth more money than fish!”

Figure 1.3: Ecuador Scooping up U.S. Tuna Boats. *Los Angeles Times*, January 20, 1971, C6 (ProQuest Historical).

¹⁵² Frank Starr, “U.S. Halts Arms Aid to Ecuador,” *Chicago Tribune*, January 19, 1971, 3.

¹⁵³ “Editorial Cartoon,” *Los Angeles Times*, January 20, 1971, C6.

An editorial in the *Chicago Tribune* hailed the move, saying that such extreme measures were the only way to “bring some sense” to Ecuadorian authorities: Washington would have to “[turn] off the golden spigot.”¹⁵⁴ Yet the *New York Times* disagreed with the policy, arguing it would “only arouse much of Latin America against the United States, seen as a bully unwilling to grant poor countries offshore rights comparable to those it claims for itself.”¹⁵⁵ In a characterization of the Ecuadorian President, the *Wall Street Journal* called upon long-held stereotypes of extravagance and emotionalism in Latin American politics to mock Velasco’s claims:

The Americans have attacked Ecuador’s sovereignty and dignity and ‘civilization is mortally threatened,’ says President Jose Maria Velasco. In angry, finger-waving speeches at the white colonial-style palace here, the gaunt 78-year-old president calls the U.S. tuna fishermen ‘pirates’ and castigates their ‘voracious greed.’¹⁵⁶

Throughout February the controversy was hotly debated in major U.S. newspapers, and in March, nationwide boycotts of Ecuadorian imported commodities—primarily bananas but also cocoa, Panama hats, fishmeal, and canned fish—were organized to protest Ecuadorian seizures of San Diego tuna boats. Union members and fishermen’s

¹⁵⁴ “Hoist on our own petards,” *Chicago Tribune*, January 20, 1971, 12.

¹⁵⁵ “Of Fish, Oil, and Oceans,” *New York Times*, January 22, 1971, 38.

¹⁵⁶ William M. Carley, “Who Owns the Ocean? Along Ecuador’s Shore, That’s a Hot Question,” *Wall Street Journal*, February 17, 1971, 1.

wives from the International Longshoremen's and Warehousemen's Union (ILWU) Local 33 comprised nearly 500 picketers at the Long Beach, California, port who prevented the unloading of a shipment of Standard Fruit bananas on March 15, 1971.¹⁵⁷ Along with ILWU Local 33, the boycott had "the full support of organized labor" — including United Cannery and Industrial Workers of the Pacific (Seafarers International Union) and AFL-CIO Los Angeles County Labor Federation.¹⁵⁸

The year 1972-73 was paramount for Humboldt Current fisheries, especially for Peru, where the coincidence of *El Niño* with intense overfishing led to the collapse of the *anchoveta* stocks which had until then been the basis of its decade-long boom. After an amendment to the Fishermen's Protective Act in October 1972, discontented reactions in Lima included a protest outside the U.S. Embassy during which "schools dismissed students to take part in angry demonstrations... Windows were broken, and at one point demonstrators hurled a dead fish into the embassy compound."¹⁵⁹ In January 1973, Peru seized 16 U.S. tuna boats—the largest number the country had ever intercepted—and fined eight of them.¹⁶⁰ On May 8, 1973, General Velasco nationalized the Peruvian

¹⁵⁷ Jerry Ruhlow, "Pickets prevent unloading of Ecuador fruit at Long Beach," *Los Angeles Times* March 16, 1971, 3.

¹⁵⁸ Ruhlow, "Pickets prevent unloading."

¹⁵⁹ David F. Belnap, "Latin 'Tuna War' Escalates," *Washington Post*, April 12, 1973, K7.

¹⁶⁰ "Peru seizes 16 U.S. tuna boats, fines 8," *Washington Post*, January 19, 1973, A22.

fishing industry, expropriating U.S. firms Gold Kist, Cargill, Star Kist, Van Camp (Ralston Purina), Gloucester Peruvian (General Mills), and Pesquero Meilian (International Proteins Corporation).¹⁶¹ The Peruvian government later compensated U.S. tuna companies Star Kist and Van Camp for the expropriation amidst great international public controversy.¹⁶² Nonetheless, U.S. tunamen professed their continued preference for the “much more professional” Peruvian seizures over Ecuador’s, since the former “have well-oiled procedures for processing and releasing” the boats, as well as more reasonable fines.¹⁶³

After a three-year ban on military sales to Ecuador, the United States “quietly resumed” them in late 1974.¹⁶⁴ Yet by the following February the conflict had yet again flared up, with the seizure of one Panamanian and seven U.S.-owned tuna clippers whose crews, held in the port of Salinas for several weeks while their release was negotiated, had reported violence and pillaging by the Ecuadorian officials at sea. The CIA released a report claiming that recent seizures reflected a power struggle within the armed forces in which the Navy sought to “assert itself” against the growing strength of

¹⁶¹ *New York Times*, May 09, 1973, 3.

¹⁶² See David F. Belnap, “Compensation for seizures discussed,” *Los Angeles Times*, November 30, 1973, D16.

¹⁶³ David F. Belnap, “No relaxation in ‘Tuna War’ seems likely,” *Los Angeles Times*, February 16, 1973, B1.

¹⁶⁴ “U.S. quietly resumes arms sales to Ecuador,” *Los Angeles Times*, December 01, 1974, B3.

the Army.¹⁶⁵ When Ecuadorian authorities ordered the boats to sail 100 miles north to the fish processing port of Manta, A.K. *Strom* skipper David Rico—who demanded missiles and machine guns for his vessel “to repel these pirates”—vowed to douse his catch with fuel oil rather than give it up. “I’m scared to death,” his wife Diana Rico told the *Los Angeles Times*. “All hell is breaking loose,” said Cathy Da Silva, whose husband captained the *City of Lisbon*, “...I’ve just about had it.” A delegation of fishermen’s wives planned to fly to Washington, D.C., that week to demand federal action.¹⁶⁶ North Hollywood resident Peter Peel criticized the U.S. government in a letter to the editor: “...our government appears to be too chicken to deal appropriately with the pirates of Ecuador. May I suggest, therefore, that the tuna fleet be issued with letters of marque and reprisal and be permitted to refit with suitable armor and armament?”¹⁶⁷ Other letters expressed support for boycotts of Ecuadorian products and for sending the Marines along with the tuna boats to the contested Southeast Pacific zone.¹⁶⁸ In early March—over a month after the boats had been taken to port—a scuffle aboard the *Neptune*, in which “shots were fired and blows were exchanged,” resulted in the arrest

¹⁶⁵ “Tuna Boat Seizures Laid to Power Struggle in Ecuador,” *Los Angeles Times*, February 14, 1975, A29.

¹⁶⁶ “Boat seizures: Wives of tuna crews live in fear,” *Los Angeles Times*, February 16, 1975, 3.

¹⁶⁷ Peter H. Peel, “Tuna seizures” [Letter to the editor], *Los Angeles Times*, February 19, 1975, D4.

¹⁶⁸ See “Bananas,” *Los Angeles Times*, March 21, 1975, D6; “Letters to the Times,” *Los Angeles Times* May 20, 1975, C6.

of 18 crew members. Reports of the incident conflicted, with the Ecuadorians stating that two drunken crewmen had attacked the guards stationed on board, while an ATA spokesman claimed that the fight began when the boat's navigator discovered one of the guards vandalizing the pilothouse.¹⁶⁹

In the United States, the fishing industry on both East and West Coasts also increasingly complained about the presence of factory fleets from the Soviet Union, Poland, East Germany, and Japan.¹⁷⁰ The West Coast tuna industry had long argued that such a move would damage their operations because of their heavy dependence on faraway fishing grounds: In March 1974, Felando wrote to the *Los Angeles Times*, "[W]e believe [Sen. Warren G. Magnuson's] call for unilateral action to extend U.S. fishery jurisdiction to 200 miles would destroy the tuna fishery of California, Puerto Rico, and American Samoa."¹⁷¹ Nonetheless, on January 28, 1976, the U.S. Senate finally voted to extend the U.S.-controlled fishing zone to 200 miles from its coast.¹⁷² The San Diego-

¹⁶⁹ Douglas Watson, "Ecuador arrests 18 in fight on U.S. boat," *Los Angeles Times*, March 07, 1975, A3.

¹⁷⁰ John Kifner, "Beleaguered fleet tells take of foreign fishing off New England," *New York Times* January 30, 1976, 2. See also Don Bishoff, "Russians off the coast," *Los Angeles Times* October 09, 1966, W28.

¹⁷¹ August Felando, "Letters to the Times: U.S. Tuna Group Rejects Call for 200-Mile Limit," *Los Angeles Times*, March 30, 1974, A4.

¹⁷² John Kifner, "Beleaguered fleet tells take of foreign fishing off New England," *New York Times* January 30, 1976, 2; "Michael C. Jensen, "Senate vote to extend fishing limit to 200 miles could bring global changes," *New York Times*, January 30, 1976, 2.

based industry was by then already in decline, and by late 1976, U.S. tuna vessels had begun a trend of reflagging to other states (including Ecuador, Costa Rica, and New Zealand) to avoid a new U.S. ban on taking yellowfin in the Pacific because of high porpoise mortality.¹⁷³ That same year, negotiations began in the six year-long Third United Nations Convention on the Law of the Sea (UNCLOS III).

The United States fought Peru and Ecuador over the 200-mile claim to coastal resources until the bitter end. In November 1979, Peru seized eight U.S. tuna boats, and reportedly had two Ecuadorian boats in custody as well.¹⁷⁴ Citing recent seizures not only by Peru and Ecuador but also by Costa Rica, *Los Angeles Times* reporter David C. Williams lamented that the U.S.-Latin American tuna boat disputes were “poison[ing]” inter-American relations.¹⁷⁵ On November 6, 1980, in express retaliation for continual boat seizures, the U.S. added Ecuador to the list of countries from which tuna imports were banned.¹⁷⁶ Two days later, Peru issued what was estimated the highest fine ever levied on a captured U.S. tuna boat, at just over US\$1 million. That amount was

¹⁷³ “Tuna seiners switch flags to skirt ban,” *Los Angeles Times*, December 28, 1976, A3.

¹⁷⁴ “8 U.S. Tuna Boats Seized by Peru; 125 Crewmen Held,” *Los Angeles Times*, November 15, 1979, F27.

¹⁷⁵ David C. Williams, “American Tuna Boats Bait Latin Nations,” *Los Angeles Times*, April 13, 1980, E5.

¹⁷⁶ Juan de Onis, “U.S., in Reprisal, Bans Imports of Tuna from Ecuador,” *New York Times*, November 07, 1980, 7. Other countries whose tuna imports were banned included Canada, Costa Rica, and Mexico.

nonetheless trumped by Ecuador the following January, when it fined the *Rosa D.*— which claimed to be passing through Ecuadorian waters with its hold full of tuna on the way to Panama for engine repairs—US\$1.2 million following a skirmish near the Galapagos Islands in which, yet again, a former U.S. Navy destroyer was used.¹⁷⁷ “It is no wonder we are the laughingstock of other nations,” complained Charles L. Huddleston in a letter to the *Los Angeles Times*.¹⁷⁸

In 1982, delegates at the third meeting of the United Nations Convention on the Law of the Sea (UNCLOS III) drafted an international legal regime for ocean governance that put an effective end to this 35-year conflict. The new regime legitimated the historic claim by Chile, Ecuador, and Peru by creating the Exclusive Economic Zone (EEZ), in which nations exercise control over access to resources in the sea out to a distance of 200 nautical miles from their coasts.¹⁷⁹ UNCLOS entered into force 159 signatories in 1994 and is the current governing international legal convention on the

¹⁷⁷ Paul Nussbaum, “\$1.2 million is stiffest fine ever on seiner,” *Los Angeles Times*, January 21, 1981, SDA1.

¹⁷⁸ Charles L. Huddleston, “Tuna Boat Fine Highest Ever Levied,” *Los Angeles Times*, February 02, 1981, C4.

¹⁷⁹ It also stipulated a 12-mile territorial sea. See United Nations Convention on the Law of the Sea, drafted 10 December 1982. See particularly Part II on the territorial sea and Part V on the EEZ. Accessed February 20, 2011, available from http://www.un.org/Depts/los/convention_agreements/texts/unclos/UNCLOS-TOC.htm.

high seas, though ironically, neither the United States nor Peru has signed.¹⁸⁰ Its major achievement, nonetheless, was finally concluding the long debate over states' control over coastal resources in designating the 200-mile zone. The EEZ validated the original 1947 claim, thus demonstrating "the tremendous influence 'peripheral' Third World countries have had," in the words of historian Gregory Cushman, "on global environmental politics during the twentieth century."¹⁸¹ Fruit of a series of hard-won battles in which developing nations successfully contested the encroachment of technology- and capital-rich nations into their fishing grounds, this was ultimately a victory for the Chile-Ecuador-Peru alliance.

Conclusion

In the political economic shuffle that followed World War II, developing nations endeavored to stake a new position in the emerging international order on the high seas. Leaders of Pacific Latin American coastal nations observed high-tech, long-distance fleets from the North marauding the waters off their shores while their own fleets and processing industries were unequipped to capitalize on those resources. The 200-mile

¹⁸⁰ "Status of the Convention and its implementing Agreements," United Nations, updated January 08, 2010, accessed February 20, 2011, available from <http://www.un.org/Depts/los/LEGISLATIONANDTREATIES/status.htm>.

¹⁸¹ Cushman, "The Lords of Guano," 442.

maritime claim by Chile, Ecuador, and Peru, was a legal strategy that employed the language of “conservation” but aimed first and foremost at designating coastal resources to local industrialization. The protracted diplomatic conflict surrounding this claim brought the eventual success of the tripartite Chile-Ecuador-Peru alliance in the expansion of their own industries. Although the influx of technology, capital, and expertise from the North boosted the early development of Southeast Pacific tuna and fishmeal processing, the Peruvian and Chilean fishmeal boom that followed remained primarily in the hands of national entrepreneurs, and Ecuador emerged as the region’s primary tuna producer.

A new geography of Pacific fisheries was forged between 1947 and 1982. The struggle for control of Humboldt Current resources lay at the heart of revolutionary transformations in the global food system that took place during the postwar era. While protein-poor South American Pacific nations forcefully resisted the encroachment of fleets whose states did not recognize the 200-mile zone, the voracious seafood markets of the North—especially the United States and Japan—enjoyed an abundance of Pacific tuna. But by the 1960s, the baitfish upon which the tuna harvest had originally depended became the raw material, in much higher volumes, for the new fishmeal boom in the Southeast Pacific. UNCLOS III redefined the governance of high seas fisheries, even for those nations that did not sign or ratify the convention, because it represented for the first time a general consensus in finally granting coastal states control of their

offshore resources to 200 miles. Nonetheless, in the 1980s, the U.S. tuna industry moved its harvest to the Central and West Pacific, building canneries to process the harvest in the South Pacific and Caribbean islands. While shifting political-economic tides sent tuna fishermen in search of new oceanic frontiers, the fishmeal economies of Peru and Chile took center stage in fisheries' development along the Southeast Pacific coast.

Chapter Two

Protein From the Sea: The Global Rise of Fishmeal and the Industrialization of Southeast Pacific Fisheries

An ambitious mission brought Bibiano Fernández Osorio y Tafall, distinguished Spanish biologist, to Chile in 1949. Exiled in Mexico after the Spanish Civil War, Osorio-Tafall left his adopted home to head the regional office of the newly-created U.N. Food and Agricultural Organization (FAO) in Santiago.¹ In doing so, he joined a new international cadre of civil servants dedicated to tackling what they believed to be the single most important issue facing humankind: world hunger. With expertise in marine ecosystems, Osorio-Tafall was convinced that fisheries would be central to this endeavor.² The primary objective of FAO policy in Latin America, he believed, should be “to feed the population by utilization of cheap and abundant fish” based on producing not for export, as local governments preferred, but for domestic

¹ Susana Pinar, “La Genética Española en el Exilio y su Repercusión en la Ciencia Mexicana,” in *De Madrid a México: El exilio español y su impacto sobre el pensamiento, la ciencia y el sistema educativo mexicano*, eds. A. Sánchez Andrés and S. Figueroa Zamadio (Morelia, México: Univ. Michoacana de San Nicolás de Hidalgo, 2001), accessed September 06, 2010, available from http://dieumsnh.qfb.umich.mx/madridmexico/lagenetica_esp%C3%B1ola.htm.

² Pinar, “La Genética Española en el Exilio.” While a doctoral student in Spain, Osorio-Tafall had studied the “potencialidad alimentaria” [nutritional potential] of phytoplankton in the Mar de Cortés, and later worked as a consultant for the guano industry in Mexico – both fields highly relevant to the marine resources off the coast of Peru and Chile.

consumption.³ Yet Osorio-Tafall and his FAO colleagues were not the only ones who recognized the value of untapped ocean resources off the coast of western South America. Humanitarian desires to use the region's fishes to combat malnutrition through direct local consumption clashed with efforts by businessmen and policymakers, from both North and South, to produce fishmeal for animal feed. In the 1950s and 60s, these competing visions represented vastly different projects for the political economy of the emerging international capitalist system: whether the *anchoveta* and other small pelagic fish that flourished in Peruvian and Chilean coastal waters would offer a solution to the problem of hunger in the developing world, or whether their industrialization represented an opportunity to consolidate new business empires based on the rich nutrient base of the Humboldt Current marine ecosystem.

In the aftermath of World War II, food shortages and commodity price swings greatly preoccupied political leaders in the North, anxious to maintain stability as well as to secure the United States' position as global superpower. Journalists wrote about the alleviation of hunger and malnutrition not only as a matter of world peace but of the salvation of humanity. "One of [war's] breeding places is among hungry peoples who in desperation follow political quacks and saber-rattling despots," wrote columnist

³ Memo from B.F. Osorio Tafall to D.B. Finn, "Establishment of the Latin American Fishery Council," July 24, 1950, 1. FAO Archive-Rome, RG 14FI158.

Malvina Lindsay in the *Washington Post* in 1946.⁴ “Continued starvation, besides threatening revolution, anarchy, and social chaos,” Walter H. Waggoner wrote in the *New York Times*, “will retard the birth rate, stunt the bodies and twist the limbs not only of today’s children but of generations to come.”⁵ For social-minded international civil servants like Bibiano Osorio-Tafall, marine fisheries in the Southeast Pacific offered hope for improving the production and distribution of food, and especially of proteins, in developing countries.

To industrialists on the U.S. West Coast, however, developing Peruvian and Chilean fisheries was an entrepreneurial exercise in transforming ocean resources into commercial capital by harvesting, refining, and selling them as concentrated proteins to the highest bidder. They often used the discourse of collective social goals to justify economic expansion using the unexploited resources of the Pacific. “[S]omething over 1,000,000 tons of fish that could be used for human needs and improvement of the California economy dies and goes to waste in the sea each year,” complained Wilbert M. Chapman, self-styled “biopolitician” and then-Director of Research at Van Camp Sea Foods of San Diego, where during the 1950s and early 60s the state had legislated restrictions on fishing anchovies and a prohibition on using them to make fishmeal in

⁴ Malvina Lindsay, “Perpetual Problem: Who Shall Eat?,” *Washington Post*, May 09, 1946, 8.

⁵ Walter H. Waggoner, “To Free the World From Hunger,” *New York Times*, May 19, 1946, SM10.

order to avoid resource collapse.⁶ Observers reported an abundance of anchovies off the southern coast of California, but since the sardine fishery had collapsed in the early 1950s, the processing plants and fishing boats of Monterey and San Francisco continued to languish in port for lack of raw material.⁷ But off the coast of western South America swarmed immense schools of *anchoveta*, sardines, and mackerel, while giant tuna and swordfish migrated throughout the Pacific and along the coast, from California to the Chile-Peru maritime boundary, where policymakers were actively seeking to develop industrial fisheries. Facing waning local supplies of sardines and tuna, fishing firms in California sold or transferred defunct boats, equipment, and even entire processing plants to the expanding operations in Peru and Chile.

⁶ W.M. Chapman, "Industry and the Economy of the Sea," lecture presented at the "California and the World Ocean" Conference, 1964, 63-76. See also Harry N. Scheiber, "Wilbert Chapman and U.S. Pacific Ocean Science Association," in R. MacLeod and P. F. Rehbock, *Nature in its Greatest Extent: Western Science in the Pacific* (Honolulu: University of Hawaii Press, 1988): 223-244. Prior to his career in the private sector, Chapman was Director of the University of Washington School of Fisheries (1947-48), position he left to accept a post as the first Special Assistant to the Undersecretary of State for Fish and Wildlife (1948-51). Chapman went on to become Director of Research for the American Tunaboat Association and later Director of the Division of Resources at Van Camp Sea Food Company, which was acquired by Ralston Purina in 1968, at which point he became Director of Marine Resources. (Philip M. Roedel, "In Memoriam: Wilbert McLeod Chapman and Milner Benny Schaefer," *NOAA Fisheries Bulletin* 69.1 (1970), accessed September 29, 2010, available from <http://fishbull.noaa.gov/69-1/inmemoriam.pdf> .

⁷ Scientists would later determine that there is an "interdecadal" relationship between anchovy and sardine populations, where the populations fluctuate in inverse relationship to one another. See A. D. MacCall, "The Sardine-Anchovy Puzzle," in *Shifting Baselines: The Past and the Future of Ocean Fisheries*, ed. Jeremy B. Jackson, Karen E. Alexander and Enric Sala (New York: Island Press, 2011).

Men in the fish business like Chapman recognized that fishmeal—whether for animal feed or as protein concentrates for human consumption—was a highly lucrative investment. By the 1960s fishmeal, especially from Peru, was a key input in the growing poultry and swine factory farm industry in the United States and Northern Europe. U.S. consumption of “white meats” climbed steadily during the post-World War II era. Specially-formulated feeds that incorporated fishmeal replaced the nutrients that free-range animals would otherwise obtain by foraging on open land.⁸ The proteins in fishmeal allowed chickens and pigs to grow in confined spaces, resulting in a faster time-to-market and increased weight.⁹ Beginning in the late 1950s, the explosion in fishmeal production using *anchoveta* and sardines caught off the coast of Peru and northern Chile drove down world prices of fishmeal. By 1962 fishmeal futures contracts were even being traded on the New York and London stock markets, allowing investors in the global North to speculate on the fluctuating populations of fish in the Southeast Pacific.

This chapter will tell an international story about how the industrialization of Peruvian and Chilean fisheries transformed the global production and trade of fishmeal

⁸ Before the explosion of Peruvian and Chilean fishmeal production, the United States had also been a major producer of the commodity, made from menhaden in the U.S. South as well as from packing plant wastes in the Northeast and West Coast.

⁹ In the early years of the industry the chemical properties of fish proteins were so poorly understood that researchers referred simply to the mysterious “unidentified growth factor.”

in the decades following World War II. It examines why and how, amidst efforts to combat malnutrition both locally and globally, the industrialization of these fisheries focused ultimately on fishmeal production for animal feed. In taking a broad transnational frame, this story highlights the entanglements and contradictions among the visions of key individuals and institutions in the emerging postwar international order and how these impacted fisheries' development at the local scale. Historians of science Arthur F. McEvoy and Harry N. Scheiber have critically examined the rise of "the new oceanography" in the postwar era among California-based scientists, as the visionary Wilbert M. Chapman sought to unite the interests of industry, government, and business to study and expand production across the "Pacific fisheries frontier," both in his own career and in lobbying to create institutions that would embody this alliance.¹⁰ Historian Gregory Cushman has built on this work in challenging the impact of North-South asymmetries of power in the Cold War context of "Big Science" in the Pacific.¹¹ On the other hand, historian Amy Staples examined the struggles within the U.N. Food and Agricultural Organization between humanitarian ideals and political-

¹⁰ A.F. McEvoy, *The Fisherman's Problem: Ecology and Law in the California Fisheries, 1850-1980* (Cambridge: Cambridge University Press, 1986); Harry N. Scheiber, "Wilbert Chapman and the Revolution in U.S. Pacific Ocean Science and Policy, 1945-1951," in *Nature in Its Greatest Extent: Western Science in the Pacific*, ed. Philip F. Rehbock, 223-44 (Honolulu: University of Hawai'i Press, 1988).

¹¹ Gregory T. Cushman, "Humboldtian Science, Creole Meteorology, and the Discovery of Human-Caused Climate Change in South America," *Osiris* 26 (2011): 19-44.

economic prerogatives of the dominant powers, the United States and Great Britain, in setting the policy agenda.¹² My research combines these perspectives with archival research in Peru, Chile, the United States, and the FAO-Rome headquarters to better understand how these conflicting visions played out at the local level and among individuals within institutions, and in turn how local imperatives helped shape the rise of fishmeal as a global commodity.

As efforts to use small pelagic or “forage” fisheries for direct human consumption floundered, the availability of cheaper chickens, eggs, and pork chops at supermarkets—particularly in the global North—depended on the commodification of fish proteins and their systematic redistribution from marine ecosystems to industrial meat farms. Not only was fishmeal fundamental to the rise and consolidation of U.S. agribusiness giants such as Cargill, Ralston Purina, and Heinz during the 1960s and 70s, it also contributed to the formation of new national elites in Peru and Chile. In the long run, most of the capital, technology, and government subsidies directed towards the industry ultimately favored fishmeal entrepreneurs, not the poor of the coastal nations whose waters made the bonanza possible. Efforts by the FAO and national governments to stimulate direct local consumption of fisheries resources, including programs to incorporate “fish protein concentrate” (FPC, or “fish flour,” versions of fishmeal suitable

¹² Amy L.S. Staples, *The Birth of Development: How the World Bank, Food and Agriculture Organization, and World Health Organization Changed the World, 1945-1965* (Kent, OH: Kent State University Press, 2006).

for human consumption) into foods for undernourished populations, faltered in the face of rising demand for “white meats” such as chicken breasts and pork chops in the global North. Although the production of FPC was a site where the multiple economic and humanitarian interests could have converged, after decades of tests and pilot programs this project ultimately failed by the end of the 1960s due to insufficient investment in infrastructure and consumer markets. The collapse of the Peruvian anchoveta in 1972 and political turmoil in Chile during the early 1970s ultimately sealed the fate of these export-oriented industrial fisheries.

2.1. The California Pre-History of Fishmeal: Expanding business empires and the birth of modern oceanographic science in the “Pacific fisheries frontier,” 1918-1964

In California the production of fishmeal from sardines became an increasingly profitable enterprise in the years following World War I, when overproduction of sardines first encouraged their “reduction” for use in animal feeds and fertilizers.¹³ The north Pacific sardine fishery—once “the largest fishery on the [U.S.] west coast”—supplied the fabled canneries of Monterey, San Francisco, and Southern California

¹³ McEvoy, *The Fisherman’s Problem*, 140.

through the end of World War II.¹⁴ Fish waste and whole fish not used in canning became meal, flour, oil, or fertilizer in reduction plants usually owned by the canneries themselves.¹⁵ With no limits on sardine extraction, production fast outpaced demand for canned sardines, and processing of whole fish into meal took off after 1918, effectively subsidizing the production of canned fish because of already depressed prices.¹⁶ California fishmeal entrepreneurs included large and small capitalists, even single families involved in the fish business.¹⁷ “Investing in a plant that reduced sardine was one way for fishing families to get rich,” as U.S. fisheries biologist Edward Ueber and Alec MacCall put it in 1992.¹⁸ On the other hand, as historian Arthur F. McEvoy explained, canneries not attached to fishmeal plants could not compete: California

¹⁴ Edward Ueber and Alec MacCall, “The rise and fall of the California sardine empire,” NOAA online doc. no. 92104, 1992: 32, accessed September 13, 2010, available from <http://swfsc.noaa.gov/publications/CR/1992/92104.PDF>. Although northern California was the heart of the industry in terms of production volumes, the sardine fishery also operated off the coast of Washington and Oregon (see 39).

¹⁵ Ueber and MacCall, “The rise and fall,” 41; McEvoy, *The Fisherman’s Problem*, 140.

¹⁶ McEvoy, *The Fisherman’s Problem*, 140; Ueber and MacCall, “The rise and fall,” 33. McEvoy notes that the El Niño event of preceding years caused the sardines harvested to be too low in oil to be processed by the canneries, so industrialists used whole fish for reduction for the first time at a large scale.

¹⁷ Ueber and MacCall, “The rise and fall,” 41.

¹⁸ Ueber and MacCall, “The rise and fall,” 40.

industrialist F. E. Booth, for example, “had no choice but to make as much fishmeal as he could or abandon his business to competitors.”¹⁹

This trend did not sit well with California authorities, who opposed the industry’s utilization of edible fish to produce fertilizer and animal fodder. The state thus enacted several pieces of legislation after 1919 strictly limiting the reduction of whole fish to fishmeal.²⁰ But capital and technology reconfigured to sidestep this legislation, most significantly by producing fishmeal from whole sardines on factory ships such as the *Peralta* floating outside the three-mile jurisdiction of California State Law.²¹ From 1934 to 1946, the sardine industry boomed; in the 1936-37 season, fishermen brought in the largest single-species catch ever landed off the U.S. West Coast.²² As much as four-fifths of the total California sardine harvest directly supplied plants during the 1930s, making fishmeal up to 20% cheaper than its closest competitor, processed meat scrap, and greatly improving the productivity of California poultry

¹⁹ McEvoy, *The Fisherman’s Problem*, 140.

²⁰ J. D. Messersmith, “The Northern Anchovy (*Engraulis Mordax*) And Its Fishery 1965–1968,” *State of California Department of Fish and Game, Fisheries Bulletin* 147 (1969): 7; September 28, 2011, available from <http://content.cdlib.org/view?docId=kt187001f9&brand=calisphere>.

²¹ E. Ueber and A. MacCall, “The Rise and Fall of the California Sardine Empire,” in *Climate Variability, Climate Change, and Fisheries*, ed. M. H. Glantz, 31-47: Cambridge University Press, 2005, 33-34; McEvoy, *The Fisherman’s Problem*, 140-141.

²² Ueber and MacCall, “The rise and fall,” 35; the FAO reports the 1936 peak harvest at 791,100 tons. FAO, “Species fact sheet: *Sardinops caeruleus*,” FAO internet resource, accessed September 29, 2010, available from <http://www.fao.org/fishery/species/2894/en>.

producers during the difficult economic climate of the Great Depression.²³ By 1946, 101 fishmeal plants operated in California.²⁴ Fishmeal, not canned fish for human consumption, was the substance of the California sardine industry, and it also fueled the expansion of the state's chicken business through the transfer of marine proteins to the new industrial food chain.

Off the west coast of South America, Peruvian and Chilean governments were also taking steps to develop industrial fisheries by the early 1940s, when some firms produced canned fish for export to U.S. markets. Many of the commercially-important pelagic fishes of the Eastern North Pacific—sardines, anchovy, mackerel, tuna, swordfish—are biologically similar or even indistinguishable from fish populations in the Humboldt Current. A handful of small-scale fishmeal plants also operated in Peru and Chile by the late 1940s, although they did not yet produce or export high volumes. The earliest reference to a fishmeal plant in this region states that in 1923, the Peruvian government authorized a Japanese engineer by the last name of Nakashima to establish a fish canning plant and study the possibilities for industrial development of the fisheries.²⁵ The Peruvian state-owned Guano Administration Company (*Compañía*

²³ McEvoy, *The Fisherman's Problem*, 145. McEvoy notes that "major purchasers" of fishmeal included Globe and Taylor, General Mills, Quaker Oats, and Ralston-Purina.

²⁴ Ueber and MacCall, "The rise and fall," 41.

²⁵ "His activity led to the planning of the possibility to produce fish meal and also obtain fish oil for industrial purposes." Freyre, "Fishery Development," 392); W.G. Clark, "Lessons from the

Administradora de Guano, CAG) had been studying fishmeal production since the late 1930s, and had developed commercial ties—including arrangements for equipment and vessel purchase, credit, and shipping with U.S. firms in California and New York.²⁶ In 1940, CAG reported having studied the menhaden fishery between Virginia and the North Carolina border, as well as fisheries of Seattle, Anacortes, and Tacoma, WA, and San Francisco, Los Angeles, Monterrey, and San Pedro, CA. The report noted the universal similarity of fishmeal processing equipment, which made second-hand plants and machinery accessible to incipient firms. CAG planned to purchase a factory ship (“*fábrica flotante*”) from Polarina Fisheries, Inc., of San Francisco, and two small, “low-cost” fishing boats.²⁷ It also mentions that the California Press Manufacturing Company offered to sell a terrestrial plant and a possible arrangement for shipping with Grace Lines.²⁸ At first CAG vehemently opposed the development of a fishmeal industry based on the *anchoveta* fishery in the Humboldt Current, claiming that intensive extraction of the seabirds’ food would harm the production of *guano*, deposits of seabird

Peruvian anchoveta fishery,” *California Cooperative Oceanic Fisheries Investigations* 19 (1975-1976): 57.

²⁶ CAG (1940). See also Gregory Cushman, “The Lords of Guano: Science and the Management of Peru’s Marine Environment, 1800-1973” (Ph.D. diss., University of Texas at Austin, 2003).

²⁷ CAG, 342-43.

²⁸ CAG, 353.

droppings found in high concentrations on small islands off the coast of Peru and northern Chile. CAG wanted to explore fishmeal, nonetheless, as a possible alternative to guano, but its pilot plant, built in 1944, never ended up producing any. It was later sold to a rising Peruvian entrepreneur, Manuel Elguera, in a joint venture with San Francisco-based Wilbur Ellis Company.²⁹

Government officials and aspiring industrialists preached zealously about the untapped potential of ocean resources. Luis Aníbal Lagos, ex-Director General of the Chilean Department of Fishing and Hunting (*Departamento de Pesca y Caza*), boasted in 1940 that “the Californian Stanley Hiller...declared that just in terms of exportable anchovies and sardines, we possess riches much greater than nitrates.”³⁰ During the 1940s, the governments of Peru and Chile each commissioned studies by the U.S. Department of Fish and Wildlife (USFW) in attempts to identify opportunities for industrial development. A team of USFW scientists traveled to the Peruvian coast in

²⁹ There is a discrepancy in the literature over when this plant was actually built. Jaysuño Abramovich claims that Peruvian industrialist Manuel Elguera began producing fishmeal in Chimbote in 1955, “La Industria Pesquera en el Perú: Genesis, Apogeo y Crisis,” Lima: Centro de Investigaciones Económicas y Sociales, Universidad Nacional Federico Villarreal, 1973, but Michael Roemer notes that this plant was built in 1950 as a joint venture with Wilbur-Ellis; Roemer, *Fishing for Growth*, 82-83.

³⁰ Luis Aníbal Lagos, *La realidad de nuestro problema pesquero* (Valparaíso: Liga Marítima de Chile, 1940), 1-2: “...el californiano Stanley Hiller, quien, después de recorrer los diversos sectores marítimos de Chile, declaró que sólo por el capítulo de anchoas y sardinas exportables, poseíamos una riqueza mucho más grande que la del salitre.”

1941 and produced a 371-page document assessing the potential of Peruvian fisheries.³¹

Following the U.S. mission, the Peruvian government purchased the *Pacific Queen*, a fishing vessel which the team had brought for research, as well as at least two other U.S.-built “modern purse-seining fishing boats.”³² U.S. fisheries biologist Milton J. Lobell, who participated in the Peru mission, also went on to participate in the USFW study of Chilean coastal waters two years later. Lobell remained in Chile briefly to work at the state-run Chilean Development Corporation (*Corporación del Fomento*, CORFO), which had established the *Compañía Pesquera Arauco* and was experimenting with trawl-fishing by the early 1940s. In 1945 Milton A. Hill, U.S. Military Attaché to Chile, reported that a U.S. firm had recently invested \$200,000 in a company in Antofagasta and supplied it with 50 U.S.-built fishing vessels. “Development of a large fishing industry is a prime concern of the Chilean government,” Hill noted. “Natural resources seem almost limitless, and the only real limitation is in the reluctance of Chilean capital to embark on new ventures.”³³ It is unclear, however, whether the latter observation—if

³³ “Comments on Current Events No. 169,” Milton A. Hill, Military Attaché in Chile, to the Department of State, Washington, D.C., Feb. 19, 1945; File no. 800.00; Santiago, Chile: Embassy general records for 1945, Record Group 84; National Archives Building, College Park, MD.

accurate—stems from a general avoidance of risk or more deliberate resistance to the presence of U.S. firms in the fishing sector during the era of import substitution industrialization.

The United States' military-technological imperative during World War II helped foster a novel vision of the Pacific Ocean among West Coast scientists who participated in wartime and early postwar research. Wilbert Chapman, who in 1943 sailed throughout the Central and South Pacific on assignment from the U.S. military to search for new sources of protein for Allied troops, heralded the "Pacific fisheries frontier" as the future of western U.S. scientific and industrial expansion.³⁴ He subsequently spent much of his career attempting to build coalitions among commercial fisheries, government, and science. By the late 1940s the California sardine harvest was in precipitous decline, following its peak harvest of 791,100 tons in 1936.³⁵ In Monterey, fishmeal production ceased in 1950, with the canneries operating only on fish trucked in from Southern California until finally closing in 1957. When that industry went bust, state authorities set out to prevent the same fate from befalling the anchovy.³⁶ In this context Chapman, along with other prominent California scientists such as his good

³⁴ Scheiber, "Wilbert Chapman," 227; McEvoy, *The Fisherman's Problem*, 192 n24.

³⁵The FAO reports the 1936 peak harvest at 791,100 tons (FAO, "Species fact sheet: *Sardinops caeruleus*," FAO internet resource, accessed September 29, 2010, available from <http://www.fao.org/fishery/species/2894/en>).

³⁶ Ueber and MacCall, "The rise and fall," 39, 41.

friend and colleague Milner B. Schaefer, forged an inter-institutional, interdisciplinary oceanographic science that combined research in chemistry and physics with marine biology and data collection on upwelling and horizontal currents throughout the Pacific.³⁷ “No individual had a greater influence...on the development of the new oceanography in Pacific Ocean studies,” wrote legal historian Harry N. Scheiber.³⁸ Although some marine biologists locate the rise of ecosystems-based fisheries management as late as the 1990s, this movement towards the integration of disciplines in ocean science and a broad biogeographical approach across the “Pacific fisheries frontier” had roots in the political-scientific realignment of the immediate postwar years.

Brought together by Chapman’s leadership, scientists of this “new oceanography” sought to understand the interactions of complex oceanic and climatic processes throughout the Northern and Southern Hemispheres, paving the way for the expansion of U.S. tuna and fishmeal interests in the coming decades. The University of California’s Scripps Institution of Oceanography (SIO) and the Hawai’i-based Pacific Oceanic Fishery Investigations (POFI) were two key institutions in these early postwar research efforts. The collapse of the California sardine industry intensified the political-economic imperative to assess and develop the fisheries resources of the Pacific. Near the end of his contract with CORFO, Lobell wrote to Wilbert Chapman (then Special

³⁷ Scheiber, “Wilbert Chapman,” 232.

³⁸ Scheiber, “Wilbert Chapman,” 226.

Assistant to the Undersecretary of State for Fish and Wildlife) expressing his interest in finding a job with the U.S. government and articulating his vision for the future of Pacific fisheries: “I believe very strongly that our California fishing industry sooner or later will have to rely to a considerable extent on supplies from the west coast of Latin America....”³⁹ By the time Lobell wrote this letter in 1948, U.S. tuna producers were embroiled in what would become a protracted diplomatic conflict over access to migrating tuna and access to baitfish—primarily anchovies and sardines—off the coasts of Peru, Chile, and Ecuador.

North-South relations during the Cold War powerfully shaped the dynamics of “Big Science” and its patronage networks in the Pacific during the in 1950s and 60s, historian Gregory Cushman has demonstrated, as U.S. technocrats sought to bring Latin American scientists into their sphere of influence in the context of large-scale projects to understand ocean-atmospheric interactions including El Niño.⁴⁰ Many of the scientists who participated in the establishment, jointly with FAO funds, of nationally-based scientific research institutions in Peru and Chile—Instituto del Mar del Peru (IMARPE,

³⁹ Milton J. Lobell (CORFO) to W.M. Chapman, Oct. 21, 1948. Chapman Papers, UW Special Collections, Box 12, Folder 12-26.

⁴⁰ G. Cushman, “Choosing between centers of action: Instrument buoys, El Niño, and Scientific Internationalism in the Pacific, 1957-1982,” in *The Machine in Neptune’s Garden: Historical Perspectives on Technology and the Marine Environment*, edited by Helen M. Rozwadowski and David K. Van Keuren (Sagamore Beach, MA: Science History Publications, 2004), 133-82.

1960) and Instituto de Fomento Pesquero (IFOP, 1964)—had gained experience and training in the California Current or on FAO fisheries missions in other parts of the world.⁴¹ UCSD-Scripps fisheries biologist Milner B. Schaefer, for example, was a central figure in the studies of Peruvian fisheries, particularly after the 1953 El Niño event impacted the distribution of tuna there.⁴² Following their assignments in Peru, FAO scientists Gunnar Saetersdal and Ivo Tilic went to Chile to work with IFOP, while others moved on to work at headquarters in Rome or with the private sector in Peru.⁴³ Like Osorio-Tafall, they were part of a transnational group of scientists, technocrats, and intellectuals who helped to build the world’s industrial fisheries through their studies in emerging fishing nations during this era. In some cases, South Americans also built successful careers by migrating north in pursuit of training: Peruvian fisheries technician Alejandro Bermejo obtained his Bachelor’s degree at the University of Washington in Seattle and later worked under Schaefer on the Inter-American Tropical Tuna Commission (IATTC), which Peru had refused to join, in the late 1950s. In 1960 Bermejo

⁴¹ See Ueber and MacCall, “The rise and fall,” 43.

⁴² Cushman, “Choosing between centers of action,” 142.

⁴³ Bill Doucet went to headquarters in Rome, and Bill Arnesen took a contract with the Graña group in Peru. Zacarias Popovici of Instituto de Investigación de los Recursos Marinos (Peru), to Milner Schaefer, Dir. Marine Resources Institute, Scripps, Jan 22, 1964 (University of Washington Special Collections, W.M. Chapman Papers, Box 63, Folder 17). Norwegian fisheries scientist Gunnar Saetersdal worked in South America from 1961-67, arriving first to Peru and later moving to Chile. Ole J. Ostvedt, “Gunnar Saetersdal: 20 April 1922-10 July 1997,” *ICES Journal of Marine Science* 56 (1999): 126-27. Article No. jmsc.1999.0434, accessed September 30, 2010, available from <http://icesjms.oxfordjournals.org/content/56/1/126.full.pdf>.

went on to found the most important Peruvian fishing industry trade magazine, *Pesca*, and spent the rest of his life researching and networking throughout the Americas, especially on the Pacific Coast, as the magazine's editor.⁴⁴ In the Cold War context, U.S. political-economic prerogatives dominated these emerging transnational scientific relationships, but IFOP and IMARPE also trained local scientists and remain two of the world's leading research institutions on Southeast Pacific fisheries.

2.2. The Challenge of Hunger: The FAO Mission and the rise of national fisheries in Chile and Peru in the post-World War II era

In 1943, U.S. President F.D. Roosevelt convened a meeting of delegates from 44 nations in Hot Springs, Virginia, to discuss the creation of a permanent institution "that would bring the new information in agriculture, science, and economics together in order to provide the world's people with adequate

⁴⁴ Alejandro Bermejo to W. M. Chapman, April 3, 1970. University of Washington Special Collections, W.M. Chapman Papers, Box 63, Folder 17. In his letter Bermejo, who lived in Lima, mentioned having recently traveled to Seattle, San Diego, Los Angeles, San Francisco, New York, and Washington D.C., as well as to Arica and Iquique, Chile, "in fish bussiness [sic]." He was also planning a trip to Cuba. Bermejo mentions his work with Schaefer and the IATTC in Alejandro Bermejo, "El Profeta de la Escasez," *Pesca* 1.2 (1960): 32. The IATTC was founded in 1950 with funding from the United States (90%), Costa Rica, and Panama.

nutrition.”⁴⁵ The formal establishment of the Food and Agricultural Organization in 1945 was in fact the result of decades-long lobbying efforts by visionary scientists and technocrats from the United States and Europe who sought to wage “a war against want” amidst the new international order that was beginning to take shape. But the FAO was also plagued by tensions among member countries, as historian Amy L. Staples has shown, and its policies reflected a compromise between the stated goals of improving the nutrition of the world’s poor and the political-economic agendas of member countries. One of the primary questions facing leaders of the new institution was whether it would work to stimulate agricultural production and stabilize prices as a regulatory agency or simply collect and distribute information, as an advisory body. While developing nations were eager for food aid and local industrial development, U.S. and U.K. leaders were reluctant to sponsor a large-scale restructuring of global commodity markets that could disadvantage producers at home. This tension, Staples notes, “continued to shape FAO history for the next thirty years.” Its work—carried out mostly by appointed “expert” staff and mandated by biannual meetings of member nations—ultimately focused on

⁴⁵ Amy L. Staples, *The Birth of Development: How the World Bank, Food and Agriculture Organization, and World Health Organization Changed the World, 1945-1965* (Kent, OH: Kent State University Press, 2006), 77.

technical assistance aimed at stimulating local food production rather than the international redistribution of resources from areas of agricultural surplus.⁴⁶

The FAO Regional Office for Latin America, headquartered in Santiago, opened in 1949. On one of his first tours, newly-appointed Director Bibiano Osorio-Tafall traveled to various countries to promote the formation of a regional fisheries organization. He lamented that there was little emphasis on fish as a protein source and that FAO should work to change this view, noting that promoting the development of regional fisheries for food production was one of the international agency's most important priorities.⁴⁷ But among local government representatives, Osorio-Tafall's reception was merely lukewarm:

[T]he Fisheries Service officials in these countries agreed that increased production should be at the disposal of the population to provide abundant and cheap food. However, they did not seem interested in the promotion of scientific knowledge of marine resources based on international cooperation.⁴⁸

Without a well-established field of fisheries science in most South American nations, there was little academic support for the state's goals.⁴⁹ When they arrived in the South,

⁴⁶ Staples, *The Birth of Development*, 76-78, 98.

⁴⁷ B.F. Osorio Tafall to D.B. Finn (1950). FAO Archive-Rome, RG 14FI158.

⁴⁸ B.F. Osorio Tafall to Kask, [(no title) Report on fisheries tour of Latin America], Doc. 0051909, 19 May 1950. FAO Archive-Rome, RG 14FI158.

⁴⁹ Osorio-Tafall also mentioned the common belief that "biology is a hobby of little consequence."

FAO experts from northern European fishing nations were notably disappointed with the state of the industry. One of the first FAO fisheries experts sent to Chile, Norwegian fisheries biologist Finn Einarssen described his dismay to Osorio-Tafall in 1950: he complained about a lack of cooperation and even distrust between the fishermen and local Chilean technicians, a deplorable ignorance about “modern” fishing gear and motors, a lack of “competition” in the marketplace, and tariff barriers preventing the importation of adequate equipment. He urged the FAO to “use its influence to persuade the government to do something about the situation.”⁵⁰ Similarly, FAO technician Olsen reportedly noted that Chilean fishermen “work in very primitive and sad conditions” despite the abundance of Chilean seas.⁵¹ Overcoming such infrastructural obstacles through training and investment in infrastructure was precisely the aim of FAO fisheries technical assistance programs.

More troubling to the FAO’s mission, however, was the reticence Osorio-Tafall noted among industrialists—specifically in Peru and Chile—to gear development towards national nutritional programs and markets:

When it was explained that the role of the FAO is not to concede loans and that the development of fisheries activities within each country must

⁵⁰ Finn Einarssen, to Osorio Tafall, May 4, 1950. FAO Archive-Rome, RG 14FI158.

⁵¹ The boletín reports the individual’s name as “Oleson,” but this is likely a typo, because no one of that name is registered as working with FAO-Chile at the time. However I have not yet been able to identify the full name of the technician cited. *Boletín Informativo*, Dir. Gen Pesca y Caza, No. 13, Aug 1954, 4. Archivo Siglo XX; Ministerio de Agricultura V1085, 1954.

first satisfy the domestic market and improve the nutrition of the natives, they did not hide their disappointment. This reaction was particularly noticeable in Chile and Peru among industry representatives.⁵²

Although FAO found supporters among government technocrats interested in addressing social inequalities, its humanitarian priorities clashed with private industry's export-oriented agenda and need for credit. Rather than foreign-led technical assistance whose terms would be dictated by an international agency, industrialists hoped to obtain credit to purchase equipment on the international market as well as training in order to establish and operate their own fishing enterprises.

Although FAO's humanitarian imperative evidently clashed with local entrepreneurial designs among fisheries industrialists and policymakers, Chilean physicians and chemists had worked towards improving popular nutrition since at least the late 1920s. Their initiatives came amidst increasing attention to the link between poverty and malnutrition in Europe, where scientists decried the lack of access to "protective foods" (vitamin- and protein-rich items such as fresh produce and milk, eggs, and meat) and the adverse effects of poor diets on health and welfare. During the 1930s, a group of U.K. scientists—most notably John Boyd Orr, later the first FAO Director General (1945-48) and winner of the Nobel Peace Prize for his work in nutrition (1949)—explored the connections between food, agriculture, and nutrition in the world

⁵² B.F. Osorio Tafall to Kask, [(no title) Report on fisheries tour of Latin America], Doc. 0051909, 19 May 1950 (FAO Archives, RG 14FI158).

economy in the context of the Great Depression, bringing their concerns to the agenda of the League of Nations in 1935.⁵³ League-appointed physiologists and chemists began to collect and study nutritional information in order to define international standards, urging the creation of national nutrition committees, of which there were at least 20 by mid-1938.⁵⁴ The inter-war evolution of nutritional science and policies to improve the health of local populations contextualizes the transnational dimension of emerging state public health policies in Latin America during the 1930s in countries such as Mexico, which historian Sandra Aguilar-Rodríguez has examined in its local context, as well as in Chile.⁵⁵

One of the principal tasks of nutrition experts at the national level was to inculcate the working classes and rural poor with certain dietary habits as part of a “civilizing” mission. In 1937, the Chilean Ministry of Health created the National Nutrition Council “with the objective,” Minister of Public Health Dr. Eduardo Cruz Coke declared, “of studying ways to resolve the deficiencies in the dietary regimen of

⁵³ Staples, *The Birth of Development*, 72-73 and 73n21. The June 1935 report by Drs. E. Burnet and Wallace R. Aykroyd, “Nutrition and Public Health,” was part of the agenda of the 16th League of Nations Assembly on September 11, 1935. John Boyd Orr’s most notable publication was *Food, Health, and Income: Report on a Survey of Adequacy of Diet in Relation to Income* (London: Macmillan, 1936).

⁵⁴ Staples, *The Birth of Development*, 73-74.

⁵⁵ Sandra Aguilar-Rodríguez, “Nutrition and Modernity: Milk Consumption in 1940s and 1950s Mexico,” *Radical History Review* 110 (2011): 36-58.

our popular classes.”⁵⁶ Echoing the concerns of European scientists, experts in Chile discussed “*el problema de la alimentación*” (the “nutrition problem”) as one that stemmed from a lack of animal proteins in peoples’ diets. However, to political leaders, feeding the hungry masses was also a matter of political stability and a path towards becoming a modern nation modeled after European states, where foods like milk and fish were somewhat more common in local diets—in part due to the efforts of scientists like Orr.⁵⁷ A 1937 editorial in *El Mercurio* welcomed the creation of the National Nutrition Council, proclaiming that Chile’s miserable masses suffered from an “increasing weakness” due to their ignorance of “proper” eating habits. “[O]ur people do not know how to eat,” the article complained, “The worker does not eat, he ingests; he does not feed himself, rather he tries to assimilate everything which comes within his reach, without discrimination

⁵⁶ The Consejo Nacional de Alimentación was created by Decreto No. 80 del Ministerio de Salubridad (Feb. 12, 1937) “con el objeto de estudiar la manera de resolver las deficiencias del régimen alimenticio de nuestras clases populares.” Eduardo Cruz Coke/Consejo Nacional de Alimentación, “Plan de Gobierno Presentado por el Ministro de Salubridad,” *Suplemento de la Revista Chilena de Higiene y Medicina Preventiva* 1 (Santiago, Chile: Impr. Universo, 1937): 3.

⁵⁷ Aguilar-Rodríguez, “Nutrition and Modernity.” Paulo Drinot noted that food riots in Peru in 1919 strengthened the symbolic link between food security and social chaos. Paulo Drinot, “Food, Race, and Working-Class Identity: *Restaurantes Populares* and Populism in 1930s Peru,” *The Americas* 62.2 (2005): 245-270. In 1905 food riots also occurred in Chile. See Benjamin Orlove, “Meat and strength: the moral economy of a Chilean food riot,” *Cultural Anthropology* 12.2 (1997): 234-268. Both incidents centered on the provision and marketing of meat: while the Chilean riot concerned popular protests against cattle tariffs, the Peruvian one concerned the scarcity of meat in Lima due to the increased use of pasture for export-wool production (Drinot 251).

and without any notion of hygiene or economy.”⁵⁸ Invoking images of barbarism, this editorial suggested that the mandate of the National Nutrition Council was to teach the poor how to feed themselves. As Aguilar-Rodríguez pointed out in the Mexican case, such state-led efforts to reshape eating habits often targeted working-class women in ways that reproduced gender and class hierarchies.⁵⁹ In order to reach the women largely responsible for preparing food in the home, for example, the Council prepared informational pamphlets such as one published in 1939, “What should my family eat?”⁶⁰ Such popular education campaigns—inspired in part by U.S. home economics programs—became one of the basic strategies of state- and FAO-led projects in Chile during the 1940s and 50s.⁶¹ Another approach took the form of fixed-menu “*restaurantes populares*” — inspired by the success of similar establishments in Peru during the early

⁵⁸ The writer cited the “*endeblez creciente*” of the popular classes, as evinced allegedly by the wretched physical state of poor people waiting for medical treatment, which the writer linked to lack of sufficient food. Later, the editorial went on, “[N]uestro pueblo no sabe comer.... El trabajador no come, ingiere; no se alimenta, sino que trata de asimilar todo lo que cae dentro de su alcance, sin discernimiento y sin noción alguna de la higiene o de la economía.” “Por el futuro de la raza,” *El Mercurio*, February 14, 1937: 5.

⁵⁹ Aguilar-Rodríguez, “Nutrition and Modernity,” 52.

⁶⁰ Ministerio de Salubridad, Previsión y Asistencia Social/Consejo Nacional de Alimentación, “Que debe comer mi familia?” Folleto de divulgación no. 1, 1939.

⁶¹ See Graciela Mandujano, “Program for Rural Chile,” *Marriage and Family Living* 4.3 (1942): 59. The article is based on a presentation Mandujano made at a conference hosted by the Home Economics Section of the World Federation Education Association.

1930s⁶²—which aimed to provide nutritionally-complete meals to workers eating outside the home, rather than separate menu items that would allow the consumer to omit certain food groups out of choice or ignorance.⁶³

The superior nutritional value of fish proteins and the availability of vast ocean resources off the coast of Chile and Peru seemed to offer an ideal solution to the “nutrition problem.” However, the industrialization of seafood in this region depended not just on the ability to extract and sell large volumes of fish but also on the availability of refrigeration facilities, machinery imported from Europe or the United States, and

⁶² In 1932, the Peruvian government of Sánchez Cerro (1931-33) decreed a law creating thirteen state-funded restaurants in the Lima-Callao area, meant to provide working-class populations with alternating daily three-course meals, high in nutritional value and low in cost. Drinot explains that the initiative came in the context of racialized debates about the lack of sanitation in popular working-class eating establishments in Lima, which were primarily Asian-owned. Paulo Drinot, “Food, Race, and Working-Class Identity: *Restaurantes Populares* and Populism in 1930s Peru.” *The Americas* 62, no. 2 (2005): 256. The Benavides government (1933-39) continued the program, which reportedly served millions and had expanded to the provincial mining town of La Oroya by 1941 (Drinot, see notes 38-41). Such establishments were “...elements in a ‘civilizing mission’ that corresponded to increasingly prevalent ideas about, on the one hand, the socially backward and yet politically dangerous character of Peru’s urban working classes and, on the other, the social role of the state in shaping society through its influence in various fields, including public health and nutrition” (248).

⁶³ Consejo Nacional de Alimentación, “Plan de Gobierno Presentado por el Ministro de Salubridad,” *Suplemento de la Revista Chilena de Higiene y Medicina Preventiva* 2 (Santiago, Chile: Impr. Universo, 1937): 3. By 1937 *restaurantes populares* operated in the cities of Santiago, Valparaíso, Viña del Mar, and Concepción, some publishing their menus in the local newspaper. “Restaurantes populares en provincias,” *El Mercurio* February 16, 1937, 3. The article specifically cites as inspiration for the Chilean restaurants, “tal buen éxito [que] han alcanzado [los restaurantes populares] en la vecina República del Perú.” In 1938 the National Nutrition Council published “Nutritional Regimens for Economical Restaurants for Adults,” offering recipes and preparation instructions for a variety of stews with vegetables, meat, or fish, as well as salads and sandwiches.

other materials such as tin for canning. Marketing and distribution posed serious challenges for the increase of fish sales. Low sales of fish stemmed in part from what one Chilean consumer described as the “homerich struggle” that the public routinely endured in the fish markets, where they were able to purchase a few kilos only by pushing and shoving (“*a fuerza de empujones*”) before speculators bought up the supplies and resold them at prohibitive prices.⁶⁴ A lack of refrigeration facilities for the preservation and transport of highly-perishable fish proteins also contributed to the problem. The Chilean National Nutrition Council had already contemplated this issue in the context of the livestock sector: one of its first recommendations was for the establishment of cold-storage infrastructure in order to stimulate cattle ranching in the Magallanes region of the extreme south.⁶⁵

Similarly, Peruvian indigenous villagers in the rugged Andean highlands were among the most malnourished but had little access to the abundant fish off the coast. The *Servicio Inter-Americano de la Producción de Alimentos*, established in 1943 in cooperation with the U.S. government, was charged with increasing and improving production and distribution of fish products in Peru—but it is unclear what impact, if

⁶⁴ A. López Villar, “Pescado Barato” [Letter to the Editor], *El Mercurio*, January 2, 1937, 3. Prices were set by the state at the time, but informal markets thwarted the price control effort.

⁶⁵ Eduardo Cruz Coke/Consejo Nacional de Alimentación, “Plan de Gobierno Presentado por el Ministro de Salubridad,” *Suplemento de la Revista Chilena de Higiene y Medicina Preventiva* 1 (Santiago, Chile: Impr. Universo, 1937): 3, 9.

any, this organization ultimately had.⁶⁶ Other times, inadequate processing infrastructure led to sanitation problems: in 1945, for example, a shipment of 700 cases of Chilean canned sardines exported to Ecuador had to be destroyed upon arrival due to contamination.⁶⁷ During World War II food shortages, trade disruptions, and a drop in Japanese canned tuna production temporarily opened the U.S. market to canned bonito (a genetically-related species often packaged and sold as tuna) and liver oil. Nonetheless, the high cost of tin, the subsequent re-initiation of Japanese fisheries, and new postwar U.S. tariffs on imported tuna limited the expansion of this enterprise and eventually put most producers out of business. The tuna industry's crisis despite the availability of raw materials eventually led new capital (both foreign and domestic) to invest in the sector in the following decade, but the fishmeal boom soon eclipsed tuna production.⁶⁸ Ultimately, industrialists would have to overcome serious logistical constraints in order to augment local fish consumption. Since Chile and Peru possessed limited capital to invest or lend to producers in order to address this problem, unlike the case of U.S. meat packers who created their own infrastructure to distribute products

⁶⁶ Fiedler 119. It is unclear whether Chile participated in this program.

⁶⁷ "Comments on Current Events No. 169," Milton A. Hill, Military Attaché in Chile, to the Department of State, Washington, D.C., Feb. 19, 1945; File no. 800.00; Santiago, Chile: Embassy general records for 1945, Record Group 84; National Archives Building, College Park, MD.

⁶⁸ Star Kist established the Compañía Pesquera Coishco (near Chimbote, Peru) in 1955 with boats from California; the first plant purchased by Peruvian fishmeal magnate Luis Banchemo Rossi was a tuna cannery (La Florida) in Chimbote that same year.

using the railroads, low-tech and limited-input industrialization such as that required for fishmeal production was a more viable alternative for generating profits in this context.

U.S. observers also perceived cultural barriers to increasing fish consumption. U.S. Consul Edward Dow observed in 1936 that “as a whole, the Chilean public who are heavy meat consumers in relation to their purchasing power for food, show no great desire to obtain larger supplies of fish.”⁶⁹ Montgomery Phister, President of the San Diego-based American Tunaboat Association, similarly insisted in 1948: “Tuna is not desired as a food, either canned or fresh, by any of the peoples of Latin America and it has proven to be too expensive an item for consumption in any country other than the United States.”⁷⁰ At the same time, technology for harvesting fish rapidly expanded the capacity to extract raw material from the oceans. The state-run Chilean Development Corporation (CORFO) created the Arauco Fishing Company in 1938, which was experimenting with the use of bottom trawlers to catch *merluza* (hake; *Merluccius gayi gayi*) by dragging huge nets across the ocean floor in the deep, cold waters off the

⁶⁹ “Improvement of Fishing Industry in Chile,” Edward A. Dow, American Consul General, to Secretary of State, Washington, D.C., April 27, 1936; File no. 825.628, voluntary report no. 36; Vol. 8; Santiago Consular General Records for 1936; Record Group 84; National Archives Building, College Park, MD.

⁷⁰ Montgomery Phister (American Tunaboat Association) to W.M. Chapman (Director, University of Washington School of Fisheries), June 17, 1948 (UW Special Collections, Chapman Papers, Box 14, Folder 3).

central-south coast.⁷¹ Thus, to stimulate demand, state-led consumer education programs in the 1940s aimed to teach Chilean housewives and schoolchildren about fish: why to eat it; how to purchase, clean, and prepare it. A 1942 ad in the women's magazine *Revista Eva* depicted a *merluza* salesman offering free recipes and home-delivery of the fish via tricycle equipped with an icebox (**Figure 2.1**).⁷²

⁷¹ "Notas sobre pesca," *El Mercurio*, April 18, 1943, 3. A public-private initiative between CORFO and the Arauco Fishing Company began trawling for *merluza* (hake) in deep waters off the central coast around 1941. According to this article, early experiments in trawling off the coast of Chile date back to at least 1928, when the Chilean government contracted "Mr. Luebbert," former Director of Fisheries for the German state of Hamburg. The article mentions the CORFO involvement with an unnamed private company (probably Arauco), and that the rise of trawling had upset local fishermen, inspiring the Congreso de Pescadores en Coquimbo to demand its prohibition.

⁷² "Venta de Pescado a Domicilio" [Print ad], *Revista Eva* 2 (1942).

VENTA DE PESCADO A DOMICILIO

Todas las mañanas pasa uno de estos triciclos por su casa; lleva toda clase de pescado fresco. Sin molestias de ninguna clase Ud. puede comer pescado todos los días, con evidente ahorro en su presupuesto. Para cualquiera explicación sobre precios, calidad o entregas diarias, etc., llame a estos teléfonos, o al 63036.

MERLUZA DE ALTA MAR	PESCADERIA CENTRAL. — Parque Forestal 884. Teléfono 80179.
\$ 2.40 KILO	PESCADERIA V. MACKENNA. — V. Mackenna 572. Teléfono 80991.
\$ 1.50 C/U.	PESCADERIA PROVIDENCIA. — Providencia 1419. Teléfono 47668.
	PESCADERIA RUÑOIA. — Av. Irarrázaval 2535, Teléfono 44235.
	PESCADERIA VEGA. — Puerto 335. Teléfono 63036.
	PESCADERIA MAPOCHO. — Mapocho 1572. Teléfono 63036.
	PESCADERIA 10 DE JULIO. — 10 de Julio 332. Teléfono 50327.
	PESCADERIA MATADERO. — Franklin 910. Teléfono 53712.

REMITIMOS GRATIS RECETAS DE PESCADO

COMPAÑIA PESQUERA ARAUCO

Figure 2.1: Ambulant fish sales in Santiago. “Venta de Pescado a Domicilio,” *Revista Eva* (Santiago, Chile) No. 2 (1942).

The Arauco Fishing Company, the Dirección de Pesca y Caza, and the Ministry of Health collaborated in the “Campaign to Increase Hake Consumption” (*Campaña Pro-fomento del Consumo de Merluza*), offering colorful pamphlets offering recipes and shopping tips that marketed trawl-caught *merluza* to the working classes as economical and nutritious (Figure 2.2). Depicting a small, nuclear family with a single child and a blond-haired mother, these images clearly suggest a marketing model imported from

the global North, although further research is required to establish the specific transnational genealogy of the print campaign itself. Limited by poor infrastructure and cultural preferences for meat, however, the domestic market in Chile for fresh fish consumption was still too small to absorb the enormous quantities harvested by the trawling method. Osorio-Tafall reported that in 1949, approximately half of the *merluza* catch by Arauco—“the most important supplier of cheap fresh fish for the Santiago market”—was used to produce fishmeal.⁷³

⁷³ Tafall report to Kask, May 1950, FAO Archives, RG 14FI158. The report also noted that FAO was involved in experiments and demonstrations using fishmeal in livestock feed in rural areas.



Figure 2.2: Recipe pamphlet to stimulate domestic consumption of hake (merluza).
Departamento de Educacion Sanitaria / Campana Experimental Pro Aumento del Consumo de la Merluza, “Consuma merluza,” Santiago: Talleres Gráficos de los FF. CC. del Estado, 1953. Courtesy Biblioteca Nacional de Chile.

As Chile faced widespread food shortages in the early 1950s, President Gabriel González Videla solicited international technical assistance. FAO and the International Bank for Reconstruction and Development (IBRD) conducted an extensive study of agricultural production in 1951, and that year the FAO fisheries technical assistance

program began its work.⁷⁴ But FAO's approach to fisheries focused more on issues of consumption and nutrition than on structural impediments to marketing and distribution. Danish fisheries economist John Fridtjof worked for FAO in Chile from 1951-53 studying local markets and organizing campaigns ostensibly aimed at stimulating the fish economy as well as improving public welfare through better nutrition.⁷⁵ In the coal-mining town of Lota, Fridtjof collaborated with state authorities (*Dirección de Pesca y Caza* and the *Ministerio de Salubridad*) and the *Compañía Carbonífera e Industrial de Lota* to implement the "Fisheries Extension Program," including advertising in print, radio, and theater productions, improvements in market stalls, trucks for distributing fish, the formation of a local fishermen's union, and an "educational campaign" consisting of lesson plans to be taught in Company schools.⁷⁶ Fridtjof also organized neighborhood "Local Fish Committees" (*Comités Pesqueros Locales*)—as of 1954 there were 50 of them—charged with teaching people to "[seek] in

⁷⁴ IBRD and FAO. "The Agricultural Economy of Chile." Washington, D.C.: IBRD and FAO, 1952.

⁷⁵ Erik M. Poulsen, "Report to the Government of Chile on Biological Investigations on Food Fishes of Chile with Special Attention to the Merluza (Hake)," FAO Report No. 45 (1952):8; John Fridtjof, "Informe al Gobierno de Chile Sobre Fomento del Consumo de Pescado," Informe FAO/ETAP No. 271 (1954): 12.

⁷⁶ Moises Hernandez Ponce, Dir. Gen. de Dir. de Pesca y Caza (Valparaíso), to Min. de Ag. (Santiago), REF: Envía Plan de Extensión Pesquera en Lota, elaborado por Comisión ad-honorem designada por Decreto Supremo No. 1101, No. 1713, 23 Dic 1953; Archivo Siglo XX, Min de Agricultura V1085, 1954. The Cía. Carbonífera estimated its workforce at 10,000—one-fourth of the total population cited by the company in its correspondence. See also Dr. Edwyn P. Reed, Dir. Gral. Subrogante, "Editorial," Boletín Informativo, Dir. Gen Pesca y Caza, No. 15, Oct 1954. Archivo Siglo XX, Min de Agricultura V1085, 1954.

the sea what the soil cannot give them.”⁷⁷ The FAO claimed a 45% increase in fish consumption in one district of Santiago following these campaigns. By the mid-1950s, although fish had not necessarily become the preferred cuisine of most Chileans, the high rates of fish consumption during Semana Santa every April required the government to mobilize the nation’s entire fleet capacity from Iquique to Puerto Montt to supply Santiago for the holiday using airplanes.⁷⁸

The FAO also collaborated with the Chilean Nutrition Institute to develop recipes enriched with “fish flour” (also known as fish protein concentrate, or “FPC”), a type of fishmeal which has been processed using a fresher raw material and using technologies to remove fishy odor and flavor.⁷⁹ In 1953 the FAO awarded fellowships to two Chileans to study “scientific baking” in the United States, presumably with an eye to promoting emerging techniques of supplementing popular nutrition with fish flour

⁷⁷ Dr. Virginio Gomez of Dir. Gen. Pesca y Caza, Memorandum Informativo a Los Comites Pesqueros Locales, 13 Abr 1954, p. 2. Ministerio de Agricultura V1085, 1954; Archivo Siglo XX (Santiago, Chile).

⁷⁸ One year the use of Air Force planes to fly in 10 tons of frozen tuna (purchased from the U.S.-owned boat *Star Kist*) ended in a disastrous crash. (FAO archives, NE Dodd Outgoing letters to Chile, doc. 21)

⁷⁹ B.R. Stillings and G.M. Knobl define fish protein concentrate as follows: “The concept of fish protein concentrate (FPC) is based on the more efficient use of our fishery resource by converting under-utilized fish to acceptable products for human consumption. FPC is not a single product. It is rather a family of products produced by different processes. Each member in the family of products has different characteristics and can be used for different purposes.” B.R. Stillings and G.M. Knobl, “Fish Protein Concentrate: A New Source of Dietary Protein,” *Journal of the American Oil Chemists’ Society* 48.8: 412-414.

through government food programs.⁸⁰ That year, the organization conducted fish flour “acceptability tests” using a 150 kg sample produced by South African firm Marine Oil Refiners, Inc. Staff at the Chilean Nutrition Institute created recipes (including soups, pastas, potatoes, beans, beet leaf pie, beef stew, and coffee cake), and served the foods to employees in order to evaluate the taste, texture and quality of the final product; participants found most of the foods to be acceptable in taste and smell.⁸¹ The Institute also tested bread made with fish flour among 140 Santiago schoolchildren for 50 days, during which time the children reportedly “ate all of it and no remarks whatsoever showing that they disliked it in any way were made.”⁸² Five years later, in 1958, the United Nations Children’s Fund (UNICEF) established a plant at Quintero on the central coast.⁸³ But the UNICEF-Quintero project was plagued by administrative problems

⁸⁰ A. Vergara, “Extensive report on the fish flour experiment in Chile,” FAO/Rome Doc. no. 053431, 1954 [electronic document].

⁸¹ Vergara, “Extensive report.” It is unclear how many people tried the initial recipes because of inconsistencies in this document. Marine Oil Refiners was one of two organizations involved in South African government-sponsored attempts starting in 1952 to manufacture fish flour for human consumption. E.R. Pariser, M.B. Wallerstein, C.J. Corkery, and N.L. Brown, *Fish Protein Concentrate: Panacea for Malnutrition?* (Cambridge: MIT Press, 1978), 14.

⁸² A. Vergara. “Extensive report,” 7.

⁸³ In January 1954, FAO officials B.F. Osorio Tafall (Regional Director) and A. Vergara (Nutrition Representative for Latin America) were in Chile to discuss the possibility of installing a plant to produce fish flour for human consumption. See Hugo Trivelli Faranzolini, Dir. Nac. de Ag. (Santiago), to Min. de Ag. (Santiago), REF: “Instalación de una fábrica de harina de pescado para consumo humano,” No. 0416, 25 Ene. 1954; Archivo Nacional de Chile, Siglo XX, Ministerio de Agricultura, V1085, 1954. The plant was later transferred to the Chilean government (to be managed by CORFO) and operated until 1964.

related to a lack of coordination among the various institutions involved (UNICEF, the Chilean National Health Service, and Swiss company ISESA, which also produced fishmeal at a separate plant in Quintero) and the lack of a centralized authority to control the product. The Quintero plant produced approximately 15 tons of FPC which were used in trials in Chile (in Salamanca, Illapel, and as a product called “Leche-Alim,” a milk substitute developed by the National Health Service), and in Peru, where in 1959-60, Dr. George G. Graham treated children and infants at the British Hospital in Lima who suffered from protein-deficiency diseases (marasmas and marasmic kwashiorkor).⁸⁴ Ultimately, mismanagement, a poor quality product, and economic inefficiency led to the definitive closure of the Quintero plant in 1965. In all, international and national agencies carried out four separate projects to test or produce fish flour in Chile between 1953 and 1973, but none of them resulted in large-scale commercial production of FPC.⁸⁵ One reason for this outcome was poor public reception of the product: a 1962 editorial cartoon published in the Lima newspaper *La Prensa* parodies a hospital worker serving a fishmeal-enriched meal so stinky that both server and diner had to wear nose-plugs

⁸⁴ E.R. Pariser, C J. Corkery, M. B. Wallerstein, and N. L. Brown, *Fish Protein Concentrate: Panacea for Protein Malnutrition?* (Cambridge, MA and London: MIT Press, 1978), 146-152, passim. Note, p. 196 of this source contradicts the claim on p. 151 that UNICEF-Quintero FPC supplied the British American Hospital project, indicating that the FPC for this study was provided by VioBin.

⁸⁵ Pariser, et al, *Fish Protein Concentrate*, see Chapter 8.

(Figure 2.3).⁸⁶ In addition to the administrative problems that MIT scientists Pariser, et al, wrote about in their 1978 study, producers would have to remove the fishy taste and smell from the food additive in order for FPC to attain commercial success, even in state-sponsored institutional programs.



Figure 2.3: Fishmeal-enriched hospital rations in parody. "Ensayos para un nuevo alimento," *La Prensa* (Lima), July 2, 1962, 8.

⁸⁶ "Ensayos para un nuevo alimento," *La Prensa* (Lima), July 7, 1962, 8.

2.3. Collapse and Boom: North-South Currents in Fishmeal Industrialization, 1950-1971

Bibiano Osorio-Tafall noticed in 1950 that fishmeal produced from Chilean hake “has a great demand and commands high prices.” He was mistaken, however, in his vision of the industry’s future: “I am doubtful that in Chile this activity can continue growing as a primary activity.”⁸⁷ From 1950-1973, world fisheries harvests tripled while direct fish consumption remained stagnant.⁸⁸ The increased harvests, due in large part to Peruvian anchoveta landings, went almost exclusively to the production of fishmeal for livestock feeds. Despite the rise of soymeal as a competitor for fishmeal during the 1940s, Peruvian and Chilean fishmeal producers held a captive global market.⁸⁹ By 1954, international demand for fishmeal was so strong that Chilean aviculturists complained that its exportation created a shortage for domestic feed producers, who that year would be forced to import a replacement product—a called meat-based protein supplement “*carnarina*”—from Argentina.⁹⁰

⁸⁷ B.F. Osorio Tafall to Kask, [(no title) Report on fisheries tour of Latin America], Doc. 0051909, 19 May 1950: (FAO Archive, Finn Files – 14FI158, (IMG 2895)

⁸⁸ McEvoy, *The Fisherman’s Problem*, 190.

⁸⁹ McEvoy, *The Fisherman’s Problem*, 134.

⁹⁰ Following a meeting between the aviculturists and fishmeal producers, the two sides agreed to set annual quotas for supplies of fishmeal to domestic chicken producers. Moises Hernandez Ponce, Dir. Gen. de Dir. de Pesca y Caza (Valparaíso), to Min. de Ag. (Santiago), REF:

Scholars describe the 1950s as the era of the “designer chicken,” when U.S. breeders successfully experimented with hybridization to create broiler pedigrees that would be more marketable to consumer tastes; they also used genetics and nutritional science to manipulate the biological attributes of birds in order for them to grow bigger and faster.⁹¹ However, most studies on the rapid expansion of this industry in the United States have overlooked the importance of fishmeal. Particularly in the early postwar years, most poultry feeds relied on this commodity to provide the precisely-formulated nutrients that the birds required for growth (indeed, survival) on industrial farms, without the mobility and varied diet they would otherwise get by foraging seeds and insects.⁹² Nutritional scientists discovered that fish-based proteins were unparalleled in their ability to rapidly increase the weight of broilers—a characteristic

Memorandum sobre reuniones entre avicultores y fabricantes de harina del Estado, No. 740, 29 May 1954; Archivo Siglo XX, Min de Agricultura V1085, 1954).

⁹¹ William Boyd, "Making Meat: Science, Technology, and the Industrialization of American Poultry Production," *Technology and Culture* 42 (2001): 657; Glenn E. Bugos, "Intellectual Property Protection in the American Chicken-Breeding Industry." *Business History Review* 66, no. 1 (1992): 129. "[A]s the chicken was made over into more efficient machine for converting corn and soybeans into animal flesh protein," wrote agriculture and energy expert William Boyd, "the broiler industry became a vehicle for channeling the increased throughput of Midwestern corn and soybeans into high-value food products for retail supermarkets" (646).

⁹² Poultry feeds account for up to 70% of operating costs in broiler production. Boyd, "Making Meat," 646; Bugos, "Intellectual Property Protection," 148. Poultry feeds typically contain more than 70 ingredients, many of them agricultural commodities—typically 60% cereals by weight—whose prices fluctuate on international markets. Boyd, 646 n.5; Henning Steinfeld, et al, "Livestock's Long Shadow: Environmental Issues and Options," (Rome: FAO, 2006), 40.

they dubbed the “unidentified growth factor.” Fishmeal played a similar role in the burgeoning swine industry during this era. Despite industry efforts to find substitutes for fishmeal in animal diets, synthetic, plant- or other animal-based protein feedstuffs proved unable to produce the same results.⁹³ California poultry and swine producers remained “strongly loyal” to fishmeal, McEvoy noted, even when prices of competing commodities were low.⁹⁴ Without it, California eggs and broilers became too expensive because the efficiency in production dropped, and they were unable to compete with those produced in the Midwest, where producers used soymeal and a synthetic amino acid and also enjoyed a geographical advantage in distribution.⁹⁵

The demise of the sardine fishery in the Northeast Pacific and the structure of California fisheries regulations opened a new era of opportunity for Peruvian and Chilean fisheries beginning in the 1950s. In the absence of the sardines, observers reported an increasing abundance of anchovy off the coast of Southern California—evidence of what scientists now understand as the shifting interdecadal relationship

⁹³ Richard D. Miles and Jacqueline P. Jacob, “Fishmeal: Understanding why this Feed Ingredient is so Valuable in Poultry Diets,” University of Florida, Institute of Food and Agricultural Sciences, document PS30, accessed March 20, 2008, available from <http://edis.ifas.ufl.edu> (cited 3/20/08), 1997; Francis Palmer, “Can plant proteins replace fishmeal?” *Feed Mix* 10:5 (2002), 23-25. Available from http://www.allaboutfeed.net/poultry/id1607-4567/can_plant_proteins_replace_fishmeal.html (cited 3/20/08).

⁹⁴ McEvoy, *The Fisherman’s Problem*, 199n59.

⁹⁵ McEvoy, *The Fisherman’s Problem*, 218 and 218n58.

between these two fish populations, whereby sardine and anchovy “regimes” alternate in ecosystem-dominance in a complex relationship with El Niño cycles.⁹⁶ From 1949 to 1965, however, California state law prohibited the reduction of whole anchovies to fishmeal, despite industrialists’ ongoing efforts to change this policy.⁹⁷ Wilbert Chapman complained about these restrictions in 1964 and decried their negative impact on the fish business: without the anchovy, surviving California firms could not compete with cheap Peruvian fishmeal made from anchoveta in international commodity markets.⁹⁸ That year, the California Cooperative Oceanic Fisheries Investigations (CalCOFI) Committee presented a proposal to fish anchovy as a way of encouraging the recuperation of sardine stocks, as scientists believed the two were competitors within the ecosystem. California authorities issued a limited number of permits for anchovy fishing under an experimental management program in 1965, but by then the fishmeal boom in Peru was already underway.⁹⁹

The collapse created a surplus of boats and equipment for fishmeal processing and an increased demand for fishmeal imports in the United States. While fisheries

⁹⁶ For the most recent summary of this relationship from a marine-science perspective, see A. MacCall, “The Sardine-Anchovy Puzzle,” in J. B. Jackson, ed., *Shifting Baselines: The Past and the Future of Ocean Fisheries* (New York: Island Press, 2011): 47-57.

⁹⁷ Messersmith, “The Northern Anchovy,” 8.

⁹⁸ W.M. Chapman, “Industry and Economy of the Sea,” Conference Proceedings, “California and the World Ocean” 1964: 63-76.

⁹⁹ Messersmith, “The Northern Anchovy,” 10.

scientists and government agencies in California, Chile, and Peru forged international institutional relationships, the infusion of capital and technology from North to South generated an economic impulse for the industrialization of Southeast Pacific sardine and anchovy fisheries (later also jack mackerel). The brokerage of fish processing equipment from the U.S. West Coast to buyers in the South depended on “a worldwide network of people who had previously worked in the production and management of California’s sardine fishery.”¹⁰⁰ Sometimes this was accomplished by firms established specifically for the trade of this used equipment.

California fishing firms and families sold purse seiners—fishing boats which capture schooling fish such as tuna, sardines, and anchovies by encircling and cinching the net to form a “purse”—as well as entire fishmeal plants to Southeast Pacific entrepreneurs; other U.S. firms simply established operations in the region. In some cases, purse seiners from San Diego and fishermen from San Francisco traveled to the South, teaching fishing methods or contracting their labor for fishing work or the installation and operation of machinery. “Some men sold their vessels,” wrote NOAA scientists Ueber and MacCall, “delivered them in South America and stayed on as

¹⁰⁰ Ueber and MacCall, “The rise and fall, 44.

skippers of the vessel.”¹⁰¹ After selling his plant to a firm in South Africa, California fishing entrepreneur Sal Ferrante went to Peru to help set up a plant from 1958-60.¹⁰²

Peru imported mostly fishmeal and oil equipment, while California industrialists sold the newer and more expensive machinery to South Africa, another rising fishmeal nation of the South.¹⁰³ Southeast Pacific fishers adapted second-hand California seiners, called *bolicheras* in Peru and *goletas* in Chile, to local conditions for the anchoveta fishery. A 1960 ad printed in the Peruvian fisheries trade magazine *Pesca* in 1960 (**Figure 2.4**) announces the first tunaboat converted for use in the Peruvian anchoveta fishery for the Compañía Pesquera Coishco, advertising the services of the local subsidiary of U.S.-owned company Star Kist.¹⁰⁴ Other ads, such as that appearing in a 1961 edition of the same magazine, offered the sale of “more than a dozen” used tuna-sardine boats imported from California, “of great utility for the anchoveta and tuna fishery of Peru.”¹⁰⁵

¹⁰¹ Ueber and MacCall, “The rise and fall, 43.

¹⁰² Ueber and MacCall, “The rise and fall.”

¹⁰³ There is a discrepancy in published sources over the precise opening date of the first commercially-operating fishmeal plant in Peru and whether it was with U.S. machinery, U.S. capital, or both. J. Abramovich claims that Manuel Elguera began producing fishmeal in Chimbote as part of a joint venture with San Francisco-based Wilbur Ellis in 1955. See J. Abramovich, “La Industria Pesquera en el Perú: Genesis, Apogeo y Crisis,” Lima: Centro de Investigaciones Económicas y Sociales, Universidad Nacional Federico Villarreal, 1973. However, but Roemer notes that this plant was built in 1950 (*Fishing for Growth*, 82-83).

¹⁰⁴ *Pesca* 1.2 (1960): 27.

¹⁰⁵ *Pesca*, 2.6 (1961): 76.

Large vessels (75 to 100 feet long) from California sold at half price or even 10% of their value, and small ones (less than 75 feet long) often sold at a loss.¹⁰⁶ Local shipyards grew in importance as they produced new boats based on the same model, well-suited to the relatively calm waters near the shore characteristic of Peru and Northern Chile. Limited change in fishmeal technology and relatively light use of the machinery before the sardine crash made the equipment easily adaptable and replicable.

The infusion of capital and expertise in fisheries following World War II came to the Southeast Pacific not only from the U.S. West Coast and the FAO but also from Spanish and Italian immigrants. In the late 1930s and 40s, exiles from the Spanish Civil War brought their insight and experience in pelagic fisheries along with a culinary heritage that prized cured anchovies. Sociologist Jaysuño Abramovich compiled information on ownership within Peru's fishmeal industry in the late 1960s and found that in 1968, near the height of the boom, 41.73% of fishmeal was produced by industrialists classified in his study as "recién llegados," or recently arrived immigrants, and "national" concerns (which included the former) produced 61.60%.¹⁰⁷ Abramovich claimed in his 1973 monograph that Spanish fishermen were the first to spot large schools of anchoveta off the coast of Peru. One group of fishermen arrived there after first trying their luck in Chile: "These fishermen arrived in Peru, since in Chile

¹⁰⁶ Ueber and MacCall, "The rise and fall," 42.

¹⁰⁷ Abramovich, "La industria pesquera," 57-58.

EN VENTA



**BOLICHERAS
USADAS DE
CALIFORNIA**

actualmente en operación - totalmente equipadas

Hay más de una docena de embarcaciones en venta. La mayoría son atuneras-sardineras, de gran utilidad para la pesca anchovetera y atunera del Perú. Para informes sobre características de las embarcaciones, precios y condiciones de pago, favor de dirigirse por escrito a: Revista PESCA, Apartado N.º 2218, Lima-Perú.



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Figure 2.4: Used California sardine seiners for sale in Peru. *Pesca*, 2.6 (1961): 76.

they did not find the opportunities for which they had hoped.”¹⁰⁸ In Chile, nonetheless, the rapidly growing fishmeal industry was the seed of Italian-born Anacleto Angelini’s business empire. Angelini—who arrived in Chile in 1948 and ranked number 119 on *Forbes* magazine’s list of billionaires in 2006—started his career by investing in fishmeal in the North (beginning with Eperva and later incorporating additional plants in the North) as well as chicken processing, later expanding into forestry (Celulosa Arauco y Constitución, S.A.) and petroleum (Compañía Petróleos de Chile, COPEC).¹⁰⁹

To be sure, Northern capital was also fundamental to the foundation of Peruvian and Chilean industrial fisheries during the boom. Because poultry feed was the most significant cost in broiler production, it “became a source of competitive advantage,” historian Roger Horowitz explained in his 2006 study of U.S. meat production.¹¹⁰ In 1960, Ralston Purina established fishmeal plants in Chimbote, Culebras, and Ilo, Peru.¹¹¹

¹⁰⁸ “Estos pescadores llegaron al Perú, pues en Chile no encontraron las oportunidades que habían esperado.” (Abramovich, “La industria pesquera,” 16).

¹⁰⁹ Adam Bernstein, “Billionaire Anacleto Angelini, 93, started empire in Chile with \$100,” *Washington Post*, August 31, 2007, accessed September 30, 2010, available from <http://www.washingtonpost.com/wp-dyn/content/article/2007/08/30/AR2007083002125.html>; “Anacleto Angelini: Chilean forestry billionaire,” *The Independent*, September 5, 2007, accessed September 30, 2010, available from <http://www.independent.co.uk/news/obituaries/anacleto-angelini-401392.html>; “Anacleto Angelini: Tycoon who profited from Pinochet’s rule and became Chile’s richest man,” *The Sunday Times*, September 6, 2007, accessed September 30, 2007, available from <http://www.timesonline.co.uk/tol/comment/obituaries/article2395089.ece>.

¹¹⁰ Roger Horowitz, *Putting Meat on the American Table* (Baltimore: Johns Hopkins University Press, 2006), 132.

¹¹¹ Abramovich, “La industria pesquera,” 18.

New York-based International Proteins Corporation, along with U.S. feed producers Star Kist, Cargill, Gold Kist, and Hamburg, Germany-based Gildemeister, were among the foreign-owned firms which, Abramovich estimated, accounted for 21.33% of the Peruvian fishmeal produced in 1968.¹¹² U.S. pharmaceutical concern Chas. Pfizer and Company installed a fishmeal plant in Iquique, Chile, in 1964, and in 1966, the firm purchased six fishing boats—to be operated with cutting-edge echo-sounding technology and spotter planes—to supply it.¹¹³

Aside from their desire to invest in the lucrative business of fishmeal production, U.S. feed producers engaged in backward integration in order to secure their supply of one of the most expensive and volatile inputs—fishmeal was the most effective known protein-source for chicken and hog feeds.¹¹⁴ By establishing operations in Peru and Chile, these firms also reduced their financial vulnerability to international price swings

¹¹² Abramovich, “La industria pesquera,” 60. The chicken producing operations of the U.S. Southeast were large and integrated. The integrators control all stages of the production chain. Many of them originated in the agricultural (rather than processing) side of the industry, hatching and feeding chicks, then contracting with growers to produce the broilers for slaughter using the company’s own pre-formulated feeds. Bugos, “Intellectual Property Protection,” 1992, 129, 147, 148n35; Horowitz, *Putting Meat*, 114.

¹¹³ “Pfizer 1st Quarter Net Set Record,” *Wall Street Journal*, April 28, 1964, 23; “Pfizer, Big Drug Concern, Goes into Fishing Business,” *Wall Street Journal*, April 15, 1966, 18.

¹¹⁴ Feed producers also contracted with growers to ensure a market for their products. (Horowitz 2006, 132; see also Bugos, “Intellectual Property Protection,” 148). They also began to use linear programming to determine least-cost ration calculations, providing the flexibility to respond rapidly to price changes by adjusting their formulations. (Boyd, “Making Meat,” 646 n.5). See also Abramovich, “La industria pesquera,” 39-40.

based on fluctuating production. Like other agricultural commodities, fishmeal supplies relied on the productivity of natural ecosystems, and production throughout the year was not constant but rather concentrated in a few months when the target species were abundant. Moreover, the Southeast Pacific experiences extreme fluctuations in temperature and ocean current every five to seven years, dramatically impacting fish reproduction and distribution. Depending on the seasonal production of other fishmeal producing countries as well as quantities in reserve, the price on the international market could at times drop below the cost of production; similarly it could skyrocket, driving up demand for other protein sources such as soymeal.¹¹⁵ The sharp increase in Peruvian production toward the end of the 1950s precipitated a drop in world prices to 50% of their previous value in 1960. In the early 1970s, when the anchoveta fishery collapsed, a sudden drop in world fishmeal supplies also created a crisis for farmers.

Peru's dominance as the principal fishmeal producer on the global market not only provided an advantage to foreign investors—it also empowered national entrepreneurial elites *vis-a-vis* their capital-rich Northern counterparts who produced elsewhere. Amidst the crisis in world fishmeal prices, in October 1960 producers convened in Paris and established a quota system in which Peru was assigned 60% of

¹¹⁵ Moises Hernandez Ponce, Dir. Gen. de Dir. de Pesca y Caza (Valparaíso), to Min. de Ag. (Santiago), REF: Libre disponibilidad de las divisas provenientes de la exportación de productos de la pesca, No. 873, 28 Junio 1954. Archivo Siglo XX, Min de Agricultura V1085, 1954.

the global total, 600,000 tons.¹¹⁶ Fishmeal magnate Luis Banchemo Rossi, who represented Peru at the meeting, then formed the National Fishing Consortium which controlled over 90% of the country's fishmeal production and monopolized its commercialization in the commodity markets.¹¹⁷ For this reason, economists Rosemary Thorp and Geoffrey Bertram argued in their 1978 study that fishmeal was "the only really successful locally-controlled export sector of the period."¹¹⁸ Foreign penetration in the Peruvian industry, they suggested, occurred to a limited extent from 1962-1965, but by the end of the decade it stagnated and some firms had begun to withdraw.¹¹⁹ Fishmeal is distinct from other South American export commodities in that—despite the importance of foreign capital in the early postwar years—Peruvian and Chilean fisheries have had a relatively larger proportion of national ownership and led to the creation of non-traditional national elites as represented by Banchemo in Peru and Angelini in Chile.

After 1956 Peru became the epicenter of a spectacular boom in fishmeal made from whole Peruvian *anchoveta*. Abundant fish stocks located close to the coast, comparatively low capital requirements, and a lack of government regulation promised

¹¹⁶ "Triunfó la anchoveta en París," *Pesca* 1.2 (1960), 29-31.

¹¹⁷ L.B. Rossi, "El desarrollo de la industria pesquera es obra exclusiva del sector privado," in *El Pensamiento de Luis Banchemo* (Lima: SNP [1972]), [n.p.].

¹¹⁸ Rosemary Thorp and Geoffrey Bertram, *Peru 1890-1977: Growth and Policy in an Open Economy* (London: Macmillan, 1978).

¹¹⁹ Thorp and Bertram, *Peru*.

high profits, resulting in a meteoric rise in fishmeal production almost overnight. By 1960 Peru was the world's top producer of fishmeal, and by 1964 it was the leading fishing nation altogether, accounting for 40% of total global fish production (9 million tons) in terms of weight.¹²⁰ In 1967, 70 to 80% of U.S. fishmeal imports for broiler feeds were from Peru.¹²¹ Producers in the north of Chile hoped to emulate this commercial success, and CORFO actively promoted the industry's rapid development with credits and investments in infrastructure through a 1960 law to increase production in the northern town of Iquique, still suffering from economic depression following the collapse of international nitrate markets. While Peru remained the global center of this new industry based on the enormous quantities of anchoveta close to its shores, a smaller stock of anchoveta also swam off northern Chile, along with other profitable reduction fisheries (mainly Spanish sardines and jack mackerel). By the end of the 1960s, the South American fishmeal boom was in full swing, with Peruvian anchoveta harvests reaching an all-time high of over 13 million tons in 1971.¹²² However, in 1972

¹²⁰ J.R. Coull, "The Development of the Fishing Industry in Peru," 328; William R. Lux, "The Peruvian Fishing Industry: A Case Study in Capitalism at Work," *Revista de Historia de América* 71 (1971): 144.

¹²¹ "Fish Meal and Oil Group Planning Washington Meeting," *Feedstuffs* January 7, 1967, clipping in Chapman Papers, UW Special Collections, box 62, folder 11.

¹²² FAO, "Species Fact Sheet: *Engraulis ringens*," [date unknown], available from <http://www.fao.org/fishery/species/2917/en> (accessed 30 Sept. 2010). Thorp and Bertram cite a figure of 12 million tons as the all-time high, in 1970 (*Peru, 1890-1977*, 247).

heavy fishing pressure combined with the oceanographic impact of El Niño and resulted in a devastating collapse of anchoveta stocks, sending the industry and global commodity markets into crisis and marking the end of this first boom phase in Southeast Pacific fisheries.

2.4. Closing the "Protein Gap": The Ghostly Afterlife of Fish Protein Concentrate (FPC) in the 1960s

In the United States, during the Humboldt Current boom years of the 1960s, there were renewed calls to promote FPC and its use in undernourished populations— but without any reflection on the causes of previous failures. Boosters continued to call attention to the potential of FPC to bridge the so-called “protein gap” between populations in the developing world who had little access to proteins and consumers in industrialized countries who ate more meat than ever before. But after 1961 FPC became the subject of a protracted debate over the product’s suitability for human consumption in the United States, which centered around a legal conflict between the U.S. Food and Drug Administration (FDA) and the Bureau of Commercial Fisheries over its approval for commercial use and domestic distribution. *Time* magazine wrote about fish flour as a kind of superfood that not only “can restore balance to the diet at a daily cost of only half a cent per person,” but “is virtually odorless and tasteless” and “blends well in

soups, noodles, gravy, bread—even cookies and milk shakes.”¹²³ Industry executive and lobbyist Pedro A. San Juan (Interlandia Corporation) boasted about the possibilities of FPC as a nutritional supplement in processed foods for the malnourished:

...for less than a penny a day per individual, slum children in our own country could be provided with a healthy diet based entirely on FPC enrichment...that such a diet would insure their normal physical and mental development...that they could drink it in Coca-Cola...eat it in crackers...in a sauce over spaghetti or rice...in tortillas, pancakes or any other edible concoction without tasting the added FPC.¹²⁴

U.S. Vice President Hubert Humphrey declared in 1967 that fish flour was not only “a tremendous breakthrough in the war on hunger” but also “may be the greatest boon to mankind in helping to give him a sound body and a sound mind since, I guess, the beginning of time.”¹²⁵ Unlike fishmeal for animal feeds, FPC was produced using higher quality standards for the raw material and special chemical processes designed to eliminate odor and flavor and to produce a fine powder that could be easily incorporated into foods. However, despite its technological and biological promise and

¹²³ “Nutrition: Protein for Everybody,” *Time*, March 17, 1967, accessed September 21, 2010, available from <http://www.time.com/time/magazine/article/0,9171,836831,00.html>.

¹²⁴ Pedro A. San Juan, President, Interlandia Corp., to W.M. Chapman, Dir. of Marine Resources, Ralston Purina Co., RE: International Marine Protein Producers Association, Jan. 14, 1970. UW Special Collections, Chapman Papers, Box 59, Folder 20.

¹²⁵ “Nutrition.”

considerable institutional support from both the U.S. government and the private sector, fish flour ultimately failed once again to meet these lofty expectations.

In 1961 the Illinois-based VioBin Corporation, which produced and exported FPC in New Bedford, MA, from 1954-71, requested approval from the U.S. Food and Drug Administration (FDA) for distribution of the product in the domestic market.¹²⁶ The FDA initially objected on the basis that fish flour made from whole fish is “filthy” and “adulterated” due to the use of whole fish and thus is not suitable for human consumption.¹²⁷ While the FDA investigated the “wholesomeness” of FPC and its acceptability in U.S. markets through laboratory analyses, market research, media campaigns, and senate hearings, finally approving FPC in 1967, with significant restrictions on the type of fish (hake only) and consumer packaging (one pound units).¹²⁸ Meanwhile, state agencies in Chile and Peru continued their work to develop the product for local populations—the original stated goal of the U.N. pilot projects during previous decades.

In 1961 a panel of fishmeal experts recommended a joint Peru-Chile program as top priority for fish protein concentrate “action programs,” some of which were already

¹²⁶ Jerry Ruthlow, “Use of Anchovy as Animal Fodder Hit,” *Los Angeles Times*, December 27, 1979, WS1.

¹²⁷ “Nutrition;” see also Pariser, et al, *Fish Protein Concentrate*, 24-26.

¹²⁸ Pariser, et al, *Fish Protein Concentrate*, .

underway.¹²⁹ U.S. food chemist E.R. Pariser (of the Bureau of Commercial Fisheries College Park Laboratory) accompanied FAO fisheries expert Frederick E. Popper to Peru to evaluate the possibilities for the industry, though FAO did not end up building a plant.¹³⁰ In an era when the fishmeal industry was booming, Peruvian policymakers were enthusiastic about producing FPC and industrialists looked to expand into new markets. Like the Chileans, they hoped to obtain, install, and operate the equipment necessary to produce it domestically.¹³¹ In 1962, Dr. B.N. Nicol noted that the Peruvian government and industrialists were developing “suitable processing facilities” and conducting clinical testing of fish flour.¹³² At least one FPC product was patented and licensed to Carlos Varrando Bruera in 1962-64, which was produced by a company

¹²⁹ FAO, “Report on the meeting of an expert panel on fish meal and fish flour for human consumption,” Washington, D.C., Sept. 28-29, 1961, FAO Fisheries Reports No. 2, Doc. 21824/E (1962), 3. FAO Archive-Rome.

¹³⁰ FAO, Dirección de Pesca, “Consideraciones sobre una propuesta para elaborar en Peru concentrados de proteína de pescado,” Roma: FAO, 1962, 2.

¹³¹ “Las conversaciones efectuadas por el Sr. Popper [FAO fisheries representative in Peru] revelaron el alto interés del Gobierno del Perú por la mencionada campaña de promoción del consumo así como el de los fabricantes de harina de pescado en adquirir y operar el equipo necesario para la elaboración de los concentrados de proteína de pescado en cantidad suficiente para abastecer esta campaña y poder, posteriormente, satisfacer la demanda pública interna por tales productos.” (FAO, Dirección de Pesca, “Consideraciones sobre una propuesta para elaborar en Peru concentrados de proteína de pescado,” Roma: FAO, 1962, 1).

¹³² “Notes of Dr. B.N. Nicol Prepared for Use at the Expert Panel on Fish Meal and Fish Flour for Human Consumption,” Appendix B of Memo from Charles Butler, Chief of Div. of Industrial Research, Bureau of Commercial Fisheries, [Meeting minutes from Meeting of FAO Expert Panel on Fish Meal and Fish Flour for Human Consumption], Aug. 24, 1962 (UW Special Collections, Chapman Papers, Folder 102-2).

called CIVSA and used in a bread enrichment program and a school breakfast program sponsored by the Ministry of Public Health. The Peruvian firm Nicolini Hermanos, S.A. experimented with using FPC in enriched noodles.¹³³

Other disagreements also contributed to the failure of FPC in Peru. The unwillingness of Ezra Levin, patent holder for the VioBin process, to cede any control of the patent for the purpose of industrial development generated conflicts within the industry. International Proteins Corporation executive Max Cohen wrote to Wilbert Chapman in 1969 that he had urged Levin to “put the Viobin process into the hands of serious and experienced fishing people,” especially with respect to Peru:

Levin had had a bad experience in Peru several years ago where he says he was threatened with bodily harm because he refused to give exclusive rights to his process to the “strong man” there in fish meal (presumably Bancharo). He said he was surrounded by armed men and told if he didn’t give exclusive rights, he would never be able to operate in Peru.¹³⁴

By the end of the 1960s, Peruvian and Chilean fishmeal empires were firmly entrenched. Luis Bancharo Rossi—one of the most powerful and notorious men in the global industry—was intent upon retaining national (indeed, personal) control over the industry. Levin was no match for his coalition, particularly in the context of the difficulties he was having in developing a commercially successful enterprise on the

¹³³ Pariser et al, *Fish Protein Concentrate*, 197.

¹³⁴ Max Cohen, Intl. Proteins Corp., to W. M. Chapman, Aug. 6, 1969, p.3 (UW Special Collections, Chapman Papers, Box 61, Folder 7).

basis of his patented process. He did not, in the end, give exclusive rights, nor was FPC ever industrially produced in Peru.

The Chilean government took an active role in attempting to implement fish flour feeding programs throughout the 1960s.¹³⁵ The Chilean Fisheries Development Institute (IFOP), officially established in 1964 with a five-year grant from FAO (1963-68), improved the FPC production process in the late 1960s.¹³⁶ IFOP scientists later proposed to build a “multiple protein complex” for industrial production of a variety of fish-based products from a variety of marine sources, depending on supplies of raw material and

¹³⁵ “Notes of Dr. B.N. Nicol Prepared for Use at the Expert Panel on Fish Meal and Fish Flour for Human Consumption,” Appendix B of Memo from Charles Butler, Chief of Div. of Industrial Research, Bureau of Commercial Fisheries, [Meeting minutes from Meeting of FAO Expert Panel on Fish Meal and Fish Flour for Human Consumption], Aug. 24, 1962 (UW-Special Collections, Chapman Papers, Folder 102-2). The text states: “...the Government of Chile is in process of convening a meeting early in November 1962, including representatives of the Ministry of Health, UNICEF, WHO and FAO to consider the best method of utilizing this valuable foodstuff. It has been suggested by the Chilean Government that this flour might be added to wheat flour for the bread provided in school feeding programs; [...] arrangements have also been made for quality control through the Department of Public Health, and planning for improved nutrition is accepted government policy.”

¹³⁶ Following the negative experience in Quintero, FAO/IFOP strongly resisted involvement in FPC projects, but following FAO’s withdrawal in 1968, IFOP openly directed research at FPC development. Pariser et al, *Fish Protein Concentrate*, 152-53.

prices on the international market.¹³⁷ However, due to the turmoil and regime change in Chile during the early 1970s, these plans never came to fruition.¹³⁸

FDA approval for FPC in U.S. markets strategically came through just as the U.S. AID program “Food from the Sea for Undernourished People of the World” was prepared to get underway. AID selected Chile, along with Morocco and Korea, as the sites for three FPC feasibility studies.¹³⁹ However, one of the goals of the AID program was to develop overseas markets for FPC produced in the United States, not necessarily to stimulate local industry in the recipient country. After some confusion and no doubt annoyance on the part of Chilean officials who thought the U.S. was offering to install a pilot plant, they agreed to accept a 250-ton shipment of FPC produced by the Alpine Marine Protein Industries (owner of the production rights to the VioBin process as of 1967). Outrageously, of the original 1000 tons Alpine contracted with AID to produce, only 172 tons were acceptable for shipment by AID; 100 of those were allotted to Chile.

¹³⁷ Pariser et al, *Fish Protein Concentrate*, 154-55. The CPI group of IFOP proposed the multiple protein complex, which CORFO considered funding, but a project by Astra to develop anchovy in the north was also under consideration. Internal political divisions among socialists and communists in the institution caused Astra to withdraw its proposal.

¹³⁸ The Allende government was interested in developing FPC, in part to help offset milk shortages which became more severe during his regime due to the withdrawal of U.S. support of the National Health Service milk program. Construction of the industrial protein complex never began following the 1973 coup in Chile.

¹³⁹ Although Peru was one of the 16 countries studied by the AID representatives, its exclusion given the abundant anchoveta populations in its coastal waters, was perhaps a political decision that reflected an ongoing diplomatic dispute over the encroachment of the U.S. tuna fleet into Peruvian fishing grounds. Pariser et al, *Fish Protein Concentrate*, 47-48.

Only 500 kg of FPC actually arrived at the Santiago airport. Worst of all, Chilean bioassays determined that the product was of poor quality—inferior even to what remained from the Quintero plant production.¹⁴⁰ By December 1969 AID had frozen the feasibility study and terminated its contract with Alpine. AID had also contracted General Oceanology, Inc., a Cambridge, MA-based consulting firm, to conduct a study of FPC beginning in 1968, which the firm completed without regard for previous work that had been done, finally presenting its report in June 1970. However, by that time, administrative shifts under Nixon (who terminated the Office of the War on Hunger and reduced the Food from the Sea Program) and regime change in Chile ended U.S. efforts to promote FPC in Chile.¹⁴¹

At the 1968 meeting of the U.N. Economic and Social Council, U.S. ambassador Arthur Goldschmidt distributed chocolate chip cookies enriched with fish flour to his colleagues. While the diplomats were “munching happily away,” the *Los Angeles Times* reported, Goldschmidt presented them with a variety of products—pasta, cereals, “high-

¹⁴⁰ Pariser et al, *Fish Protein Concentrate*, 158. In 1979 the *Los Angeles Times* reported that in 1970 the FDA had approved FPC for human consumption and that year AID purchased 900,000 pounds of FPC for export to Chile. The article also reports that the VioBin FPC plant was sold to Alpine Marine Co. in partnership with James Tolin, but the plant closed in 1972 because of the increased price of hake (attributed to fishing by Russian fleets). Ezra Levin’s process (used by Marine Protein, Inc.) was called “azeotropic extraction,” which was supposedly tasteless and odorless. Along with the VioBin plant Tolin bought a barge containing reduction equipment that had been financed by the U.S. government and used briefly at a Washington State Reservation (presumably Neah Bay). Jerry Ruthlow, “Use of Anchovy as Animal Fodder Hit,” *Los Angeles Times*, December 27, 1979, WS1.

¹⁴¹ Pariser, et al, *Fish Protein Concentrate*, 159.

protein soft drinks resembling chocolate milk," "cola-type beverages," and baby food—designed by U.S. firms for sale and distribution in "protein-short areas."¹⁴² But in an institution that had been experimenting with FPC in the developing world for nearly two decades, the ambassador's overture seemed rather absurd, and served mainly to highlight the drive of U.S. capital to develop new markets. By then, as U.S. AID embarked on a final, unsuccessful attempt to promote FPC as the solution to world hunger, business was losing interest in its potential to become a profitable enterprise. MIT food scientist Nevin S. Scrimshaw believed marketing and distribution—elements which Pariser, et al, argued were not considered in any of the FPC-Chile programs—were the primary problem commercial developers of the product would face among protein-deficient populations with little purchasing power.¹⁴³ Alfred A.H. Keil, naval engineer at MIT and member of an interdisciplinary team that was studying the economics of FPC, wrote to Wilbert Chapman in 1969, "we are coming closer and closer to the point that we feel the case for FPC was overstated, that it is economically not necessarily the solution for developing countries (to put it mildly), and that its major use

¹⁴² "U.S. Demonstrates Uses of Fish Meal," *Los Angeles Times*, November 22, 1968, 21.

¹⁴³ Pariser et al, *Fish Protein Concentrate*, see Chapter 8. Nevin S. Scrimshaw, Head of Dept. of Nutrition at MIT, to W. Chapman, Dec. 6, 1966 (UW Special Collections, Chapman Papers, Box 62, Folder 2).

could be in developed countries.”¹⁴⁴ Sensing that the fishing bonanza in the Southeast Pacific was nearing its end, International Proteins Corporation executive Max Cohen preferred to set his sights on yet undiscovered sources of marine wealth: “I am not...one of those who think Peru is the ‘end,’” he wrote; “On the contrary, I’ve always felt that there must be two or three other ‘Perus’ around the world. [...] But our goal is a good business, not just a lot of fish.”¹⁴⁵

“[T]he prospects for the development of a fish protein concentrate industry,” U.S. social scientist Sargent Russell noted in 1969, “depend on the concerted effort of many groups interested in promoting human welfare.”¹⁴⁶ The numerous institutions involved in the production trials of FPC, their clashing goals and approaches, and the lack of communication among them due to inefficient and disconnected bureaucracies all contributed to the demise of this transnational project. In order to operate the industry for the benefit of the hungry, state or intergovernmental subsidies needed to finance the costs because the product had an insufficient commercial market. In an era

¹⁴⁴ A.H. Keil, of MIT Dpt. of Naval Architecture and Marine Engineering, to W.M. Chapman, 2 Oct 1969 (UW Special Collections, Chapman Papers, Box 62, Folder 2).

¹⁴⁵ He went on, “Although the two may end up coinciding, my instinct is that there is always time to ‘get in’ after the hard questions have been answered (and paid for).” Max Cohen, Intl. Proteins Corp., to W. M. Chapman, Aug. 6, 1969, p.4 (UW Special Collections, Chapman Papers, Box 61, Folder 7).

¹⁴⁶ Sargent Russell, “The Potential for Fish Protein Concentrate in Developing Countries,” *The Journal of Developing Areas* 3.2 (1969): 177-190.

when international concern about hunger and food security was at a peak, the world's oceans became a new frontier for the science and technology of food production. At least 40 countries made documented attempts to develop and commercially produce fish-based protein concentrates for human consumption from the 1930s to the 1970s, none of which had resulted in large-scale production.¹⁴⁷

Conclusion

In 1947, U.S. fisheries biologist Milton J. Lobell wrote to the U.S. State Department that the fisheries of western South America “should be developed with Western Hemisphere capital and people and with a view toward integrating the

¹⁴⁷ Attempts to isolate fish proteins for human consumption in a commercial and industrial setting date from at least the late 1800s. The International Exhibition of 1876 in Norway featured biscuits made from “fish flour” which, according to [the U.S. Commission of Fish and Fisheries bulletin,] “were in good condition after having been kept for ten years in an unsealed jar.” The Commission of U.S. Fish and Fisheries also wrote enthusiastically about Goodale’s Extract of Fish, “an article of food which promises to be of much commercial value,” adding “I cannot avoid the conclusion that a new source of food is within reach which at no distant day may contribute materially to human welfare.” Report of the Commissioner, U.S. Commission of Fish and Fisheries, 1879: 139-141, cited in E. Pariser, et al, *Fish Protein Concentrate*, 1978: 12-13. Pariser, et al, explain that fish flour became known as fish protein concentrate (FPC) after 1962 (255, n1). See also Pariser, et al, 168. In the 1930s, scientists in Germany, Norway, and South Africa, and Iceland worked further to develop the protein supplement, and again in the early 1950s in South Africa and Iceland—multiple efforts in different countries which were largely independent of one another, and which invariably ended without commercial success. Pariser, et al, 10-15.

industry and conservation measures for the benefit of the Western Hemisphere.”¹⁴⁸ In a sense, Lobell’s prescription was mildly prophetic: transnational flows of capital and people were indeed central to the industrial development of the fisheries in Peru and Chile. However, following the imperative of the Monroe Doctrine, this hemispheric vision implicitly aimed to place the people and resources of the West at the disposal of U.S. capital and political interests. Lobell’s words smoothed over the dramatically unequal distribution of financial and technological resources between North and South. It was an imbalance that FAO technocrats like Osorio-Tafall, who in 1950 doubted the industrial potential of fishmeal, were unable to overcome. Twenty years later, in the heyday of fishmeal production, plans to use Humboldt Current fisheries resources to end world hunger—whether fresh, canned, frozen, or as concentrated protein powder—had all but withered away. U.S. “Big Science” expansion throughout the “Pacific fisheries frontier,” however, was well-established, both in terms of primary data collection and through a network of allied scientists in the global South trained at or in conjunction with Northern institutions.

In the Kennedy-era vision of social policy, fish flour appeared to offer a simple technological solution to a situation that actually reflected vast structural inequalities in wealth and resource distribution at the global scale. By administering fish proteins to

¹⁴⁸ Milton J. Lobell (working for CORFO in Chile) to W.M. Chapman (at State Dept), Oct. 21, 1948, UW Special Collections, Chapman Papers, Box 12, Folder 12-26.

the poor, they hoped to avoid a social revolution while still sidestepping true social reform. E.R. Pariser, et al, pointed out that “high technology nutrition interventions” such as FPC, which failed to actually increase the protein/calorie supply for those at “nutritional risk” or increase their economic demand, “are to one degree or another only token palliatives offered by wealthy nations or local ruling elites in lieu of addressing the social and political factors underlying malnutrition.”¹⁴⁹

The projects in Chile and Peru failed to establish any successful, continuously-producing commercial FPC plant—yet the two countries had by the 1960s already become the world’s top producers of fishmeal, and multiple patented technologies existed to process the same raw material for human consumption. Yet despite decades of institutional support for using fish flour for human consumption, the fate of FPC was already sealed. Requiring less capital investment in machinery and personnel, anchovies and sardines processed into fishmeal, using crude industrial processes and under sanitary conditions not acceptable to consumers in U.S., Peruvian, or Chilean markets, proved to be more profitable to most firms. Whereas canneries used expensive imported machinery, more workers, and different sanitation standards while processing, fishmeal required little human labor and the fish were often processed rotten, thus reducing costs on land. Meanwhile, fish were abundant and cheap, regarded even as

¹⁴⁹ Pariser et al, *Fish Protein Concentrate*, 232.

“trash” by some, making raw material supplies readily available during production seasons.

The demise of the U.S. FPC program had a significant impact on the development of fishmeal commodity markets and the fishing industry itself in Chile and Peru, since politically—along with the transfer of U.N.-funded agencies to national governments and waning support for FAO’s humanitarian goals—it cleared the way for industrial production of fishmeal for export. Even though the North-South flows of technology and expertise leading to the fisheries’ industrialization were shaped by a U.S.-dominated Cold War political agenda and foreign economic interests, these projects failed partly because of a lack of interest among local industrialists in the context of high global demand for animal feed commodities. Without significant investment in local infrastructure and markets to develop new products that incorporated odorless technologies and continued to raise consumer awareness, FPC could not become a commercial success.

When the Peruvian anchoveta fishery collapsed in 1972, the global crisis it produced was not humanitarian but political-economic in nature, as Northern farmers faced a shortage of fishmeal and thus a rise in prices of chickens, eggs, and pigs. The advances in fishing technology, nutrition science, and food processing capabilities that created this industry contributed primarily to the foundation of powerful business empires—both nationally, in Peru and Chile, and in the United States—that extracted

and processed huge quantities of Southeast Pacific anchovies and sardines to feed industrially farmed animals. “If we have anchovies to feed chickens, they could certainly be used to better advantage to feed humans,” UCLA biochemist and research nutritionist Benjamin Ershoff complained to the *Los Angeles Times* in 1979. “The public has to ask if the fish meal manufacturer’s welfare should take precedence over world need.”¹⁵⁰ Rather than closing the “protein gap,” the fishmeal boom widened the gulf between affluent U.S. consumers and hungry people in the developing world.

¹⁵⁰ Jerry Ruthlow, “Use of Anchovy as Animal Fodder Hit,” *Los Angeles Times*, December 27, 1979, WS1.

Chapter Three

The smell of money: Visions of progress and cultures of excess in boomtown Chimbote, Peru

As the epicenter of the Peruvian fisheries boom, the arid coastal town of Chimbote became center stage for the world's most important fishmeal producing nation during the 1960s. Sold to U.S. and European animal feed producers as a protein-rich additive, the odorous brown powder made from ground whole fish—mainly anchovies, but also sardines, jack mackerel, and hake in the Southeast Pacific—fetched high profits on global commodity markets. To contemporary foreign observers, the emergence of the Peruvian fishing industry was “an overnight sensation”¹ and “a matter of world interest”: the Peruvian fishmeal boom stood as “a case study in capitalism at work in an area where conditions are supposed to preclude its efficacy.”² In 1962, just over a decade after the first plants began producing fishmeal, Peru produced 70% of the global supply.³ The total installed capacity of the fishmeal plants in Chimbote had

¹ B.B. and R.M. Smetherman, "Peruvian Fisheries: Conservation and Development," *Economic Development and Cultural Change* 21, no. 2 (1973): 338.

² W.R. Lux, "The Peruvian Fishing Industry: A Case Study in Capitalism at Work," *Revista de Historia de América* 71 (1971): 137.

³ Ivo Tilic, "Capacidad de producción de la industria de harina de pescado en el Perú," Informe No. 4, Callao: Instituto de Investigación de los Recursos Marinos, 1962: 4. However, R. Thorp and G. Bertram cite a vastly different figure of 40% of the total global supply in the year 1964, *Peru 1890-1977: Growth and Policy in an Open Economy* (London: Macmillan, 1978), 242.

multiplied by a factor of 19 during the previous six years, and the registered tonnage of its industrial fishing fleet had increased 39 times.⁴ Along with Chimbote's new steel mill, the booming fishing industry precipitated a demographic explosion—the urban population increased 14 times between 1940 and 1961, from 4,000 to nearly 60,000 inhabitants—as migrants poured in from the Andean highlands and the North Coast in search of work.⁵

Yet Chimbote in the twenty-first century is no longer the “promised land” that observers once imagined.⁶ “Entering the city is rather like putting your head inside a rotting fish,” warned Llama Travel’s online *Peru Guide* in 2009.⁷ Indeed, its reputation for the thick and repulsive stench of fishmeal has long outlasted the once-abundant fish in the Ferrol Bay. In its heyday, Chimbote, the “Stinking City,” became internationally known for the odor which, “distasteful and penetrating, hovers incessantly over the metropolis, leaking into the remotest corner of the tightest building.”⁸ Day and night

⁴ Tilic, “Capacidad,” 6; Ivo Tilic, “Información estadística sobre embarcaciones utilizadas en la pesca industrial en el Perú, 1953-1962,” Informe No. 8, Callao: Instituto de Investigación de los Recursos Marinos, 1963: 11.

⁵ Peruvian National Census, Vol. III: Departments of Lambayeque/La Libertad/Ancash (Lima: INE, 1940), 7; Peruvian National Census, Vol. II: Ancash (Lima: INE, 1961), 6.

⁶ The phrase was first used by former customs official Enrique Tovar in his 1924 book, *Tierra de Promisión* (Lima: Sociedad Editorial Au-tour du Monde).

⁷ “North Coast: Chimbote,” *Peru Guide* (Llama Travel), accessed April 10, 2009, available from http://www.peru-guide.com/peru_06_The_North_Coast_050_Chimbote.htm.

⁸ “‘Stinking City’ Center of Key Peru Industry,” *Los Angeles Times*, June 6, 1971, 8.

during the fishmeal boom, millions of tons of *anchoveta* were extracted by some of the same boats that had supplied Cannery Row before the sardines disappeared in California.⁹ The desert ecosystem bore the ecological costs of this growth. In the city's industrial core, dozens of fishmeal factories with growing *barriadas* (slums) sandwiched between them shared sticky, squalid air during times of production, while the bay received organic waste effluents from fishmeal as well as heavy metals from the steel mill. Despite their heavy ecological consequences, on land and at sea, these industries nonetheless represented opportunities for economic gain for those who were able to participate in the bonanza: "For all its unpleasantness," conceded a *Los Angeles Times* reporter in 1971, "the smell of fish meal is the smell of money for Peru."¹⁰

One hundred years earlier, when construction began on the railroad that would connect the anthracite coal mines of the Peruvian Andes in the east to the Ferrol Bay in 1871, Chimbote was a tiny agricultural and fishing hamlet that had produced guano,

⁹ As explained below, following the California sardine collapse in the late 1940s and early 1950s, fishing boats and entire plants were sold and/or transferred to locations along the Peruvian coast, facilitating the development of the industry through the cheap transfer of technology. Firms with commercial linkages to Peruvian fisheries from the U.S. West Coast came from San Diego and Monterrey, CA, as well as shipbuilders from Seattle, WA. Marco Shipbuilders of Seattle began operating in 1953 and later established Marco Chilena, in Iquique, which is the only location still actively producing. Accessed October 29, 2010, available from <http://shipbuildinghistory.com/history/shipyards/5small/inactive/marco.htm>.

¹⁰ "'Stinking City'."

sugar, and coal during the colonial and early republican eras.¹¹ Despite the absence of any organized industry, early twentieth-century observers—both foreign and domestic—had extolled the area’s potential for economic development because of its protected harbor and natural resource endowment.¹² It was not until World War II, however, that industrial fishing began there in order to produce fish liver oil and canned tuna for export.¹³ Meanwhile, the Peruvian state initiated plans to build a new steel mill in Chimbote as part of its efforts to reduce dependence on foreign imports, in an era when many Latin American governments adopted import substitution industrialization (ISI) policies that aimed to shift the balance of trade away from raw material exports and the importation of manufactured products. But while steel production stagnated, the availability of second-hand boats and fishmeal plants from the defunct California sardine industry facilitated the large-scale extraction and processing of the anchovies and sardines teeming in the bay, leading to a spectacular fishmeal boom from 1957 to 1972.

¹¹ Existing accounts of early economic activities in Chimbote are thin and unreliable. Here I cite J.G. Blas, *Chimbote: Crisol del Nuevo Perú* (Chimbote: Católica Editores, 1995), 41. Additionally, the novel by José María Arguedas based on ethnographic fieldwork, *The Fox From Up Above and the Fox From Down Below*, mentions Chimbote having been a cotton port in the past (Lima: Editorial Horizonte, 1983 [1971]), 67. On the Peruvian guano industry through 1973, see Gregory T. Cushman, "The Lords of Guano: Science and the Management of Peru's Marine Environment, 1800-1973" (Ph.D. diss., University of Texas at Austin, 2003).

¹² V. Pezet, "Monografía de la Bahía de Chimbote," *Boletín de la Sociedad Geográfica-Lima* Año 22, Tomo 26 (1912): [n.p.]; Tovar, *Tierra de Promisión*.

¹³ B. Caravedo Molinari, *Estado, Pesca, y Burguesía, 1939-1973* (Lima: Teoría y Realidad, 1979).

Chimbote and its fishmeal boom constitute a key episode in Latin America's long history of natural resource exports. Scholars in various disciplines have explored the implications of resource-based commodity booms for the economies and societies of the developing world. Some economists have centered on the question of whether the abundance of natural resources constitutes a "resource curse" that ultimately hinders long-term economic growth of countries dependent on their extraction and export for revenues.¹⁴ Other social scientists examine the policies and practices of management in common pool resource regimes and how these shape the use and conservation of those resources.¹⁵ Recent work among economic historians, on the other hand, explores the production, trade, and consumption of primary exports all along the commodity chain, widening the geographical scale of research and expanding its scope to include an

¹⁴ The field is large, but a few recent examples of these studies include: Jonathan Isham, Michael Woolcick, Lant Pritchett, and Gwen Busby, "The Varieties of Resource Experience: Natural Resource Export Structures and the Political Economy of Economic Growth," *World Bank Economic Review* 19, no. 2 (2005): 141-174; James A. Robinson, Ragnar Torvik, and Thierry Verdier, "Political foundations of the resource curse," *Journal of Development Economics* 79, no. 2 (2006): 447-468; Jeffrey W. Sachs and Andrew M. Warner, "The big push, natural resource booms and growth," *Journal of Development Economics* 59 (1999): 43-76; Jean-Philippe C. Stijns, "Natural resource abundance and economic growth revisited," *Resources Policy* 30, no. 2 (2005): 107-130.

¹⁵ A good overview of these debates within social science is Craig Johnson, "Uncommon Ground: The 'Poverty of History' in Common Property Discourse," *Development and Change* 35, no. 3 (2004): 407-433. See the introduction for a more in-depth discussion of the "tragedy of the commons" literature.

examination of cultural and social forces which play a role in these processes.¹⁶

Reaching across these disciplinary boundaries, the rise and fall of Chimbote's fishmeal industry in the second half of the twentieth century offers a case study for the local impact of a marine-based export industry with profound implications for natural resource sustainability, economic development, and environmental change both locally and globally.

But in order to understand the transformations that took place in Chimbote during this period, it is necessary to go beyond economic interpretations of the process of industrial development to examine deeper questions of meaning and historical agency.¹⁷ In the midst of the rapid transformation that took hold of boomtown Chimbote, a culture of excess—a lifestyle that prioritized short-sighted economic gains at the expense of ecological sustainability—characterized the policies and practices of individuals in government, industry, and labor. While the dramatic rise and sudden death of fishmeal magnate Luis Banchemo Rossi seemed symbolic of the boom-and-bust

¹⁶ The most notable of these recent studies is the edited collection: Steven Topik, Carlos Marichal, and Zephyr Frank, *From Silver to Cocaine: Latin American Commodity Chains and the Building of the World Economy, 1500-2000* (Durham: Duke University Press, 2006).

¹⁷ For a discussion of the environmental-historical approach (defined as “combin[ing] history and political economy with structure and agency”), see R. Lipschutz, “Environmental History, Political Economy, and Change: Frameworks and Tools for Research and Analysis,” *Global Environmental Politics* 1:3 (2001): 74. As discussed below, U.S. literary scholar Priscilla Archibald also argued for the need to incorporate empiricism and attention to the agency of historical actors in Latin American cultural studies; see her article “Urban Transculturations,” *Social Text* 93, no. 25 (2007): 91-113.

cycles of the fisheries, the fishermen themselves became notorious for squandering their newfound wealth immediately upon return to port. By emphasizing agency, as Priscilla Archibald suggests in a 2007 article on Chimbote,¹⁸ and by empirically-grounding our analyses of culture, we gain a much-needed perspective on the depth and complexity of the processes of change that Chimbote has undergone throughout the twentieth century – intertwined stories in which people dream of more prosperous futures, make choices about how to reach their goals, and live with the consequences of their mistakes.

While the golden age of the boom ushered in an era of prosperity and conspicuous consumption among *chimbotanos* (Chimbote residents), the short-lived bonanza soon met its ecological and economic limits. When the anchoveta fishery collapsed in 1972, a reformist military regime led by General Juan Velasco Alvarado (1968-1975) responded by nationalizing fishmeal production and the industrial fleet while encouraging worker mobilization and participation. Despite attempts to coopt the powerful labor movement by repressing independent organizations during this era, Chimbote remained a key center of political organizing. As industrial pollution and resource exhaustion made the city into one of Peru’s worst urban ecological disasters, the mismanagement of Peruvian fisheries was aggravated by a weak and inefficient state which, marked by political instability, lacked the capacity and foresight to implement or

¹⁸ P. Archibald, “Urban Transculturations.”

enforce environmental protections against overfishing and air and water pollution.

Local unions, meanwhile, focused their considerable political momentum on partisan battles over industry control and vessel ownership—culminating in the climactic 1976 fishermen’s strike against the re-privatization of the fishing fleet—rather than on less tangible quality-of-life issues related to pollution and long-term sustainability of the industry. In the absence of any serious program to slow or reverse the ecological decline of this important coastal city, Chimbote continued its steep trajectory toward ecological disaster until new, environmentally-oriented political actors emerged during the 1990s.

A wide array of characters, including scientists, politicians, industrialists, labor leaders, intellectuals, and even former Peruvian president Alejandro Toledo (2001-2006), have come from or crossed paths with Chimbote during its fishmeal boom. This chapter integrates historic accounts by scientists and international development experts, health and sanitation professionals from the United States, census records, official statistics, government publications, newspaper articles, maps, photographs, and visits to Chimbote. It also draws from a novel by Peruvian literary figure José María Arguedas, urban planning records from architects Josep Lluís Sert and Paul Lester Wiener, as well as personal interviews with current and former Chimbote residents, including labor leaders and environmentalists. The expansion of one of Peru’s most important industries depended on the vast energy and nutrients in the Department of Ancash: anthracite coal and hydroelectric power in the Andes, abundant fish in the Ferrol Bay,

and the even greater wealth of marine proteins circulating in the coldwater upwelling ecosystem off the coast.

3.1. Abundance and opportunity: From coastal hamlet to “the Peruvian Pittsburgh.”

“Few littoral waters of the globe teem with fish and with other edible products as do those of Peru,” remarked U.S. ornithologist Robert Cushman Murphy in 1923, “and yet in no other enlightened country are fisheries more restricted to methods which...are such as the Indians have followed from immemorial times.”¹⁹ Murphy, who conducted fieldwork in Peru in 1919 and 1920 on sea birds, was shocked to find that there was “not a single organized fishing industry” along the entire Peruvian coastline.²⁰ In awe he observed the immense schools of anchovies and sardines, “such multitudes of herrings as I had never previously beheld,” all along the cold coastal current. In his 1912 report to the Geographical Society of Lima, Peruvian geographer Victor Pezet recognized the particular promise of Chimbote’s Ferrol Bay, calling it “excessively rich in fish, in terms of both abundance and quality, among which one [finds] the most delicate and delicious species that one could possibly desire.”²¹ Pezet listed 68 species known to local

¹⁹ R.C. Murphy, “Fisheries Resources in Peru,” *The Scientific Monthly*, 16:6 (1923): 595.

²⁰ Murphy, “Fisheries Resources.”

²¹ Pezet, “Monografía,” [n.p.].

fishermen. But Murphy, studying the dynamics of the Humboldt Current ecosystem, deemed the Peruvian *anchoveta* the “most abundant and important fish of the entire Peruvian littoral.”²² He marveled at the sight of the “quivering, silvery creatures,” which “seem to be packed together like sardines in a tin, except that their heads point all in one direction as their legion, which somehow seems more like an individual organism than a conglomeration of millions, streams through the gauntlet of its diverse and ubiquitous enemies.”²³ Thriving on the plankton-rich waters of the coastal upwelling, the tiny Peruvian anchoveta was at the center of the Southeast Pacific food web.

Murphy’s observations from aboard a steamer near Huarney, a town about 164 kilometers south of Chimbote, dramatically illustrate the key role the anchoveta played in the trophic²⁴ structure of the Humboldt Current marine ecosystem:

During the afternoon of February 20, 1920, ...I estimated that a hundred schools of anchoveta were within sight. At times, when the bonitos [large tuna-like fish] attacked them from beneath, large areas of the surface would be so broken by the leaping of the little fishes that the ocean hissed as though a deluge of rain were descending upon it. The most remarkable sight of all was the manner in which whole herds of sea-lions were lolling and frolicking among the anchovetas, gorging themselves to the limit of their capacity.²⁵

²² Murphy, “Fisheries Resources,” 600.

²³ Murphy, “Fisheries Resources,” 601.

²⁴ Ecologists use the term “trophic” to refer to the relationships among organisms in the food chain..

²⁵ Murphy, “Fisheries Resources,” 601.

Publishing his findings in a 1923 article in the *Scientific Monthly*, Murphy also remarked on the potential for the development of a fish meal and oil industry similar to that based on the menhaden fishery of the southeastern United States. Similarly, Pezet concluded that “one can place in [the Ferrol Bay] the hope of seeing it converted into a great industry in the future, destined to feed many of the working classes who dedicate themselves to that pleasant trade.”²⁶ This hope for development and prosperity was one that many Peruvians placed in Chimbote during the coming decades.

The richness of Peru’s coastal waters contrasts sharply with the hot, dry desert that stretches from far south of the Peru-Chile border all the way to the northern region of the country. Yet this environment, and the anchoveta itself, had sustained indigenous civilizations for centuries before the Spanish conquest.²⁷ Pezet saw great promise in the area’s natural resources; to him Chimbote’s underdevelopment was due simply to the lack of people to irrigate and cultivate the land. Its climate was “quite healthful and benign,” surely suitable for the fairest of immigrants—presumably European or upper-class *limeños* (natives of Lima)—as “one does not use nor does one need either parasol or

²⁶ Pezet, “Monografía,” [n.p.].

²⁷ R. Shady, “La alimentación de la Sociedad de Caral-Supe en los orígenes de la civilización,” In *Seminario Historia de la Cocina Peruana* (Lima: Universidad de San Martín de Porres, 2007), 23-43.

umbrella.”²⁸ He lauded its potential to host the “more well-off classes,” assuring his readers that “there are means to satisfy all [necessities] and even to live in comfort and luxury. [...] Chimbote is a settlement destined to be well-provided by everything one could desire...”²⁹ Pleasant temperatures, the potential for large-scale agricultural development, and its relative proximity to Lima (400 km north of Lima on the Pan-American Highway) made this location ideal for easy living and summer getaways.

But until 1871, Chimbote was nothing more than a “miserable fishing village,” Pezet admitted, home to a few dozen indigenous families living in reed huts. That year Chimbote rose to the status of a “port open to world commerce” when construction commenced on the railroad that would serve the mines of the Huaylas Valley (*Callejón de Huaylas*) in the Andes to the east of the Ferrol Bay.³⁰ Railroad baron Henry Meiggs—dubbed the “Yankee Pizarro” by one scholar³¹—is revered as the city’s founder.³² The U.S.-born entrepreneur was responsible for executing the railroad project designed by Polish engineer Ernesto Malinowski and his team. Within the first three months of the project, the population grew by a factor of nearly ten, and the reed huts were replaced

²⁸ Pezet, “Monografía,” [n.p.].

²⁹ Pezet, “Monografía,” [n.p.]..

³⁰ Pezet, “Monografía,” [n.p.].

³¹ W. Stewart, *Henry Meiggs, Yankee Pizarro* (Durham: Duke University Press, 1947).

³² Pezet, “Monografía,” [n.p.].

by wooden houses with zinc roofs that Meiggs had ordered to be built for those working on the railroad.³³ He designed the layout of the city, Pezet reported, in the form of 60 blocks of 100 square meters each, separated by five streets parallel to the coast and 10 transverse ones of 20 feet wide, except for one of 60 meters that would be the main street. Meiggs designated one block as a plaza with a church, one block for the market, and land for the customs and fiscal offices.³⁴ By the turn of the twentieth century, this small settlement on the Peruvian North Coast had the makings of a U.S.-style company town.

On the other hand, both Peruvian and foreign statesmen had long recognized the strategic potential of the Ferrol Bay for military and industrial operations. During the War of the Pacific (1879-1884), Chilean forces headed by Commander Patricio Lynch occupied Chimbote and ransacked the customs office as well as the sugar estate of Dionicio Derteano in nearby Tambo Real.³⁵ Following the war, as diplomatic tensions lingered between Chile and Peru, U.S. policymakers seeking to consolidate a sphere of influence in the Americas under the Monroe Doctrine became concerned with the lack of adequate ports, coaling and repair facilities for U.S. warships along the South Pacific Coast. Diplomatic historian Seward Livermore explained how Latin American media

³³ Pezet, "Monografía," [n.p.].

³⁴ Pezet, "Monografía," [n.p.].

³⁵ Gutiérrez, *Chimbote*, 42.

speculated about where U.S. loyalty would lie, given the navy's dire need for service stations in the South, in the event of a military conflict between either country and its neighbors—particularly if access to Valparaíso, then the most important Pacific South American port, were lost. In that context, Seward remarked, "Chimbote possessed the strategic qualifications to make it into one of the principal diplomatic weapons in the possession of the Peruvian government."³⁶ Victor Pezet agreed with this assessment, noting that the port was "unrivaled along the entire South Pacific coast" and was surely "destined to be the arsenal of Peru."³⁷ In fact, negotiations concerning the possibility of establishing a U.S. navy port at Chimbote took place between the U.S. and Peruvian governments several times in the late 1880s, but the two parties were never able to come to an agreement because of Peruvians' demand for backing against their neighbors in ongoing border disputes and the U.S. requirement of exclusive jurisdiction. In 1881, U.S. diplomat Stephen A. Hurlburt secured permission to use Chimbote as a coaling station for U.S. warships, noting that "Chimbote Bay is by far the best on the Pacific coast, and the coal mines in the interior, to which it is the entrance by way of the rail-road under construction, furnish ample supplies, of good quality, of inexhaustible quantity, and at

³⁶ S.W. Livermore, "American Strategy Diplomacy in the South Pacific, 1890-1914," *Pacific Historical Review* 12:1 (1943): 34.

³⁷ Pezet, "Monografía," [n.p.].

low prices."³⁸ International politics and local geography, it seemed, had converged to create in Chimbote the opportunity for a glorious future.

Despite Chimbote's strategic importance, however, it was not until the eve of the Second World War that coordinated plans to industrialize the area took shape. In the early 1940s, Peruvian policymakers incorporated the town into a Regional Development Plan that aimed to transform it into the site for Peru's premier iron, coal, and steel industry.³⁹ Foreign consultants who visited the area immediately recognized its potential. In 1941 U.S. engineer E.J. Clearly determined, with an eye towards industrialization, that Chimbote possessed "the best natural bay that exists on the west coast of South America."⁴⁰ The Santa River, which flows down from the mountains just north of the populated area, reportedly carries the highest volume of water of any river flowing into the Pacific Ocean.⁴¹ Extensive deposits of anthracite coal east of Chimbote

³⁸ Hurlbut to Blaine, No. 572, October 5, 1881, Papers Relating to the Foreign Relations of the United States, 1881, 938. Cited in Livermore, "American Strategy," 34 n. 4. In 1889 the Harrison administration reopened negotiations, but still the parties were unable to reach an agreement.

³⁹ In 1941, U.S. consulting firm N.A. Brassert Co., commissioned by the Peruvian government to assess the iron ore deposits in Marcona (Ica province) and to determine the most suitable location for an industrial port, recommended Chimbote. "Historia: 50 años de la Primera y más Grande Siderúrgica," Empresa Siderúrgica del Perú S.A.A., accessed September 14, 2009, available from <http://www.sider.com.pe/sidernet/principal.html>.

⁴⁰ E.J. Clearly, "Chimbote: El Pittsburgh Peruano en Potencia," *Boletín de la Escuela Nacional de Ingenieros* (Lima, Peru), 3:17 (1944): 3-27. Trans. J. F. Aguilar Revoredo (originally published in *Engineering News-Record*, Sept. 1944): 19.

⁴¹ Clearly, "El Pittsburgh Peruano," 15.

in the Huaylas Valley eventually supplied fuel for Peru's first steel mill, Siderperú (inaugurated in 1956), which processed iron ore from the Marcona mine in the southern province of Ica.⁴² Soon various projects were under way to establish the infrastructure that would transform this small farming and fishing town into a major industrial center, including a mechanized port and a hydroelectric plant at the Duck Canyon (*Cañón del Pato*) on the Santa River 80 miles towards the interior.⁴³ Some of these projects were financed by a loan from the U.S. Export-Import Bank to the Peruvian government, approved in 1942.⁴⁴ In 1943, the state created the Peruvian Corporation of Santa to administer Siderperú.⁴⁵ Chimbote was to become, as Clearly put it, the "Peruvian Pittsburgh."⁴⁶

⁴² The iron ore was shipped by sea from Marcona, while the coal was transported by train from the mountains. Clearly, "El Pittsburgh Peruano."

⁴³ Clearly, "El Pittsburgh Peruano," 5.

⁴⁴ Clearly, "El Pittsburgh Peruano," 7.

⁴⁵ "Historia: 50 años de la Primera y más Grande Siderúrgica," Empresa Siderúrgica del Perú S.A.A., accessed September 14, 2009, available from <http://www.sider.com.pe/sidernet/principal.html>. At its inauguration, the *Sociedad de Gestión de la Planta Siderúrgica de Chimbote y de la Central Hidroeléctrica del Cañón del Pato* (SOGESA) was also created to take over the mill's administration. See also C. Langdon White and Gary Chenkin, "Peru moves onto the iron and steel map of the Western Hemisphere," *Journal of Inter-American Studies* 1 No. 3 (1959), 382-383, 385.

⁴⁶ Clearly, "El Pittsburgh Peruano." Not all observers agreed with the plans to build an integrated steel mill in Peru, however. Some engineers advised the Peruvian government that a smaller operation based on domestic scrap would be more appropriate given the costs of operation and of first transporting iron ore and coal to the plant, then the finished steel to Lima. "For those who believe that a national steel industry is justifiable at any price," concluded White

3.2. The “promised land” becomes the “problem city.”

When U.S. geographer George R. Johnson snapped an aerial photograph of Chimbote in 1929 (**Figure 3.1**), the town remained largely as Meiggs had designed it, with its modest size and gridded street pattern. The Pan-American Highway, running parallel to the coast, traversed the town center and connected it to the capital city of Lima.

and Chenkin in a 1959 article, “Chimbote stands as a new El Dorado; for more dispassionate persons, however, the iron and steel plant at the mouth of the Santa is a costly monument to economic nationalism” (White and Chenkin, “Peru moves,” 386). The authors believed that in addition to high overall operating costs, Chimbote was not located close enough to any mass-consuming markets, and that the total output of the Siderperú mill—estimated at 60,000 tons annually—was not sufficient to take advantage of the savings that large-scale production yields (384).



Figure 3.1. Aerial view of Chimbote, Peru (1929), showing gridded layout of town center. Published in George R. Johnson, *Peru from the Air* (American Geographical Society, 1930). Photo used by permission from the AGS.

As the photograph illustrates, the rainless climate of the Peruvian coastal desert created a landscape largely devoid of vegetation. International experts who arrived in Chimbote during the 1940s to take part in the “vast program of industrialization” then getting underway encountered what they felt was a dramatically inhospitable setting.⁴⁷ To U.S. engineer E.J. Clearly, Chimbote was uncivilized, a “place that possesses few

⁴⁷ Clearly, “El Pittsburgh Peruano,” 3.

comforts.”⁴⁸ Aside from the lack of basic data and qualified personnel, he noted, locals seeking firewood continually robbed the stakes placed in the ground by project engineers.⁴⁹ “It is hard to imagine how a population of 4,000 inhabitants...has been able to survive under these conditions,” he complained.⁵⁰ The government officials and engineers who intended to turn Chimbote into a modern industrial city had much work to do in order to create a habitat deemed suitable by the foreign experts who advised them.

Clearly and other U.S. experts identified sanitation and disease as the most pressing problems for people living and working in the area. The built area of the town center was surrounded by wetlands which, health workers believed, left the growing population vulnerable to contagious disease outbreaks. In the context of wartime efforts to integrate the Americas and provide supplies to Allied troops, health and sanitation were not only prerequisites for industrial development—they were also strategic concerns. “In disease, the Americas find a foe more formidable than Hitler,” wrote George Dunham of the Office of the U.S. Coordinator of Inter-American Affairs.⁵¹

⁴⁸ Clearly, “El Pittsburgh Peruano,” 4.

⁴⁹ Clearly, “El Pittsburgh Peruano,” 17.

⁵⁰ Clearly, “El Pittsburgh Peruano,” 16.

⁵¹ Dunham, “Health Work in Hemisphere Development,” *American Journal of Economics and Sociology* 4.1 (1944): 111.

“Chimbote, like the Panama Canal,” Dunham went on, “must conquer malaria, must have safe water supply and sewage disposal facilities before the promise of industrial development can be fulfilled. Otherwise, men cannot work efficiently in the town.”⁵² In 1942, following a resolution among Foreign Ministers of American states to collaborate on public health programs in the Western Hemisphere, the U.S. government established the Inter-American Cooperative Health Program to administer joint funds from various U.S. institutions, among others the Rockefeller Foundation, and 18 participating Latin American governments.⁵³ Chimbote—where disease endemics were a recurring problem and water supplies consisted of “untreated spring water...distributed through the town by donkey carts”—became a focal point of the Cooperative Health Program’s efforts.⁵⁴ Beginning in 1943, engineers set about filling and draining the so-called “malaria

⁵² G. C. Dunham, “Health Work,” 119.

⁵³ G.C. Dunham, “Today’s Global Frontiers in Public Health,” *American Journal of Public Health* 35.2 (1945): 90.

⁵⁴ Dunham, “Today’s Global Frontiers,” 93. Dunham cites “endemic malaria, intestinal parasites, and outbreaks of water-borne diseases” as having “continuously” afflicted Chimbote around 1940. Peruvian scholar Marcos Cueto, however, argues that the public health campaigns were largely preventative in measure, because there had *not* been any serious outbreak of malaria prior to the campaign (Marcos Cueto, *El Regreso de las Epidemias: Salud y Sociedad en el Perú del Siglo XX* [Lima: Instituto de Estudios Peruanos, 2000], 161). In his 2000 monograph which makes extensive use of the Rockefeller Foundation Archive, Cueto wrote of agreements between the Rockefeller Foundation and the Peruvian government (through the Ministry of Health) “between 1941 and 1948” for projects relating to not only malaria, but also yellow fever (Cueto, *El Regreso*, 162). Cueto later noted that the Corporación Peruana del Santa supported the anti-malaria campaign in Chimbote in 1944 (*El Regreso*, 164).

swamps,” consisting of 887,000 square meters of coastal wetlands.⁵⁵ Other sanitation projects funded by this cooperative agreement included the establishment of water and sewage facilities as well as a hospital.⁵⁶ Whether or not these sanitation projects, as Peruvian scholar Marcos Cueto argues in his 2000 monograph on disease in twentieth century Peru, actually *accelerated* migration from the highlands to the coast remains unclear.⁵⁷ But the infrastructure they provided unquestionably facilitated the establishment of Chimbote’s urban core. At the same time, by draining the wetlands and changing the population distribution of both humans and non-human organisms, they irrevocably transformed the coastal ecosystem, one of the first ecological costs of industrial development.

Order and efficiency—the preconditions for modern industry and a manageable working class, they thought—would depend not just on the eradication of disease, but also on the creation of a clean and manageable cityscape. When E.J. Clearly flew over Chimbote in 1944, he was favorably impressed by its layout, noting, “the city was drawn

⁵⁵ Cueto, 161; Dunham, “Health Work,” 120; Dunham, “Today’s Global Frontiers,” 93. E.J. Clearly also noted the presence of U.S. sanitation workers “on loan” to the Peruvian government involved in these works (“El Pittsburgh Peruano,” 5).

⁵⁶ Cueto, *El Regreso*, 161; Dunham, “Health Work,” 120. Ironically, when Majors B.A. Whisler and R.K. Horton of the U.S. Army Sanitary Corps visited Chimbote in December of that year to oversee the projects, Whisler contracted a parasite (*Endamoeba histolytica*, spread through food or water contaminated with feces) and had to return to the United States (Clearly, “El Pittsburgh Peruano,” 17).

⁵⁷ Cueto, *El Regreso*, 164.

in geometric form, like a chess board, which is so typical of the small towns in the United States.”⁵⁸ Clearly attributed this visually-pleasing, geometric design to Meiggs’ creative genius. But the architectural vanguard of the 1940s had a more critical opinion of its layout. In 1947 the government hired Town Planning Associates, the New York-based architectural firm run by renowned modernist Spanish architect Josep Lluís Sert and his colleague Paul Lester Wiener, to design a master plan for the city that would “control chaotic growth.”⁵⁹ In their 1949 pilot plan presentation display, Sert and Wiener reported that Chimbote’s urban core “could hardly be spoken of as a Civic Center. The oversized, unpaved, and treeless plaza seems to be deserted even on the special occasion of a religious procession.... Only a half-built church, poor shops and ramshackle cafés are found scattered around the plaza.”⁶⁰ If Peruvian authorities intended to make Chimbote into an industrial center that retained its status as a resort town, as propaganda frequently depicted, Sert and Wiener recommended that more attention be paid to the practical layout of neighborhoods and commercial districts as well as to aesthetics and recreational spaces.

⁵⁸ Clearly, “El Pittsburgh Peruano,” 5.

⁵⁹ “Chimbote: Plan Piloto Presentation Display,” Josep Lluís Sert Papers, Graduate School of Design, Harvard University, Folder B75T, panel 1B.

⁶⁰ “Chimbote: Plan Piloto Presentation Display,” Josep Lluís Sert Papers, Graduate School of Design, Harvard University, Folder B75T, panel 6C.

Sert and Wiener conceived a design whose civic center was to include large areas of grass-covered lawns.⁶¹ Although an odd and perhaps infeasible choice for such an arid climate, the architects' desire to establish green spaces and to strategically place facilities for the "cultivation [of] mind & body" reflected a new, more holistic view of urban quality of life. The complete design also included self-contained neighborhood units, low-rise worker housing with courtyards, and a municipal plaza designated as the place for congregation and civic expression. Although this scheme differed from the mixed developments with high rise towers more typical of the International School of Modern Architecture to which Sert belonged, the project's vision was at the vanguard of modern urban design.⁶² Adding further to the promise of the city plan, New York gallerist Samuel Koontz also initiated a collaboration between Sert and German painter Hans Hofmann as part of the exhibition "The Muralist and the Modern Architect," whereby the artist designed a series of murals to be incorporated into a bell tower, a plaza, and a large concrete slab in Chimboté's civic center. Hofmann's intention was, in the words of one critic, to "help transform the tedium of modernity's public spaces" —

⁶¹ A 20-panel presentation display prepared by Town Planning Associates showed plans for land use in the urban core, including a significant amount of green space (representing grass) that the architects intended to plant in the city. "Chimboté: Plan Piloto Presentation Display," Josep Lluís Sert Papers, Graduate School of Design, Harvard University, Folder B75T, panel 3B, 1949.

⁶² Mary Daniels, "Shaping and Reshaping Latin American Cities," *ReVista: Harvard Review of Latin America* (Winter 2003), accessed September 18, 2009, available from <http://www.drclas.harvard.edu/revista/articles/view/193>.

and though the murals were never completed *in situ*, a series of oil paintings remain and continue to circulate today in exhibitions of Hofmann's work.⁶³ The *Chimbote Project* was one of eight Latin American city plans for which Town Planning Associates was commissioned during the 1940s and 50s, none of which were ever realized in the end.⁶⁴ Following the demise of the project—one in which both local and transnational hopes for Chimbote's illustrious future had been placed—began a new era of social, economic, and ecological disorder that no one had anticipated.

Ultimately, the city's infrastructure was unprepared for the rapid demographic growth of later decades. This would have been the case even if the plan had been implemented. The *Chimbote Project* envisioned a population of 40,000 inhabitants, but this number was surpassed by nearly 30% by the time the next census was taken: between 1940 and 1961, the urban population of Chimbote jumped from 4,243 to

⁶³ A. Merjian. "Hans Hofmann: Circa 1950 [Exhibition review]," ARTINFO.COM [originally published in *Modern Painters*, April 2009], accessed April 7, 2009, available from <http://www.artinfo.com/news/story/30824/hans-hofmann/>. In recent shows of both Hofmann's and Sert's work the project has been commemorated as a key moment in each of their careers, as well as for modernist architecture within Latin America and beyond (M. Bacon, "Josep Lluís Sert's evolving concept of the urban core," in *Josep Lluís Sert: The Architect of Urban Design, 1953-1969* (2008): 77-113).

⁶⁴ "Five Civic Centers in South America," *Architectural Record* (August 1953): 121-135. Although the plan was never realized, Sert and Wiener reported that the pilot plan was approved by the Peruvian Council of Urbanism and the Ministry of Public Works, and that work on the master plan had begun. "Chimbote: Plan Piloto Presentation Display," Josep Lluís Sert Papers, Graduate School of Design, Harvard University, Folder B75T; See also Sert Papers, Folder SA328.

58,990.⁶⁵ In 1961, 93% of *chimbotoños* self-identified as migrants.⁶⁶ Many families built their homes with adobe bricks and reeds harvested from what remained of the nearby wetlands (**Figure 3.2**). Meiggs' company-built wooden housing from the turn of the



Figure 3.2. Alejandrina Calonge Mendoza, who migrated from the Andes mountains to Chimbote with her family, in front of her home (c. 1956). Ms. Calonge arrived in Chimbote in 1943 with her sister and worked in the canneries beginning at age 13. Note the use of woven reeds and adobe bricks to build these homes. (Photo courtesy of Elsa Baltodano).

⁶⁵ "Chimbote: Plan Piloto Presentation Display," Josep Lluís Sert Papers, Graduate School of Design, Harvard University, Folder B75T; Peruvian National Census, Vol. III: Departments of Lambayeque/La Libertad/Ancash (Lima: INE, 1940), 7; Peruvian National Census, Vol. II: Ancash (Lima: INE, 1961), 6.

⁶⁶ Peruvian National Census, Vol. II: Ancash (Lima: INE, 1961), 6.

twentieth century, it turned out, did not ultimately supersede the reed huts of earlier generations, as Victor Pezet had imagined in 1912. Made from locally-available resources, the adobe-and-reed constructions were far more economical for cash-strapped newcomers, and since the region receives almost no rainfall, they were surprisingly well-suited to the climate of the area. To many observers, however, such modest structures were the unmistakable symbols of underdevelopment.

Although Peruvian officials hailed Chimbote as a symbol of the country's industrialization and economic independence, the reality on the ground was quite different. In 1957, columnist Wilfredo Peláez Gularte complained in the Lima newspaper *La Prensa* that the reputation bestowed upon Chimbote as Peru's "port of the future" was unwarranted. He declared Chimbote a "problem city" with a "tragic and devastating panorama," overpopulated with slums and neglected by public officials. "[Chimbote] does not justify...the picture that is painted daily of it, nor can it be considered a point of reference for the future of the country. It is a poor city, and without the resources that would allow it to live independently."⁶⁷ Perpetually dependent on Lima for capital and expertise, Chimbote had not yet lived up to its image as a "promised land."

⁶⁷ W. Peláez Gularte, "Chimbote, Ciudad-Problema," *La Prensa*, April 19, 1957, 8.

The troubles Chimbote faced were representative of broader transformations taking place across Peru, as thousands of families migrated from rural areas—particularly the Andes and arid northern provinces—to coastal cities in search of opportunities for socioeconomic advancement. The story of former president Alejandro Toledo (2001-2006) is emblematic of the hardships migrant families faced—a story which undoubtedly helped boost his popularity during the election campaign, when he was affectionately known as “*el cholo*” (a pejorative colloquial term for indigenous-descent Andeans). Toledo moved with his family from the Andean town of Cabana, in the Department of Ancash, to Chimbote in 1952. Like many other recently-arrived *chimbotanos*, Toledo’s father, a mason, built an adobe house on a vacant plot of land without electricity or running water. Despite the work of the Inter-American Cooperative Health Program during the previous decade, the rapidly growing settlements on the periphery of the town continued to lack basic services and sanitation. “They hauled their water from a well 50 yards away,” reported a 2002 article in the Peace Corps’ *World View Magazine*, “and raised chickens and guinea pigs in the dust of the backyard where a large open flowing sewer served as the local toilet and community trash dump.” The eighth of 16 children, Toledo worked shining shoes in the local hotel, likely to end up working at the Siderperú steel mill or one of the many fishmeal plants by then operating in Chimbote. But Toledo instead found an unlikely destiny. When Peace Corps volunteers Joel Meister and Nancy Deeds helped him win an International

Rotary Club scholarship and gain admittance to the University of San Francisco during the 1960s, he began a professional trajectory that transformed him into the organization's greatest success story: he went on to study at Stanford and later worked at the World Bank and Harvard University, before winning the presidency on his third attempt in 2001.⁶⁸ The Peace Corps' work in Chimbote—its stated goal in 1966 to “eas[e] this community into the twentieth century”—probably resulted less in significant structural changes⁶⁹ than in the staff's personal and professional development and the formation of deep relationships among volunteers and with local residents. Luciano Geraldo (1938-2010) is one example: a local teacher in Chimbote, Geraldo married a Peace Corps volunteer from Wyoming and later returned with her to live there. Until shortly before his death in 2010, he taught Spanish in Wyoming schools, and he continued to lead students from the town of Casper on study abroad programs in Peru

⁶⁸ T. Bridges, “Alejandro Toledo: The making of a president in Peru,” *World View Magazine* 15:2 (2002), accessed May 11, 2009, available from <http://www.worldviewmagazine.com/issues/article.cfm?id=89&issue=22>.

⁶⁹ See the publicity announcement in *Bulletin of the Atomic Scientists* (April 1966): 49, accessed October 29, 2010, available from <http://books.google.cl/books?id=WggAAAAMBAJ&lpg=PA49&ots=pZvk33OwyD&dq=peace%20corps%20chimbote&pg=PA49#v=onepage&q&f=false>. The ad shows identical pictures of Chimbote and suggests to prospective volunteers that they shouldn't expect to make significant changes during their two-year assignments, in order to gear volunteers' expectations towards smaller, incremental gains. Other journals probably carried this ad as well.

until shortly before his death.⁷⁰ The presence of the Peace Corps in Chimbote and other Peruvian towns and the asymmetrical hemispheric relationships it facilitated was yet another way in which transnational North-South linkages shaped the burgeoning city in the 1960s.

Living conditions in Chimbote worsened following a major earthquake in 1970, drawing even more international attention to the locale. Researching for the International Urbanization Surveys sponsored by the Ford Foundation between 1970 and 1972, John Robin and Frederick Terzo visited the city after the quake and were more than unimpressed. They cited a preliminary report by the United Nations Development Program that had described Chimbote as “a mere collection of shacks.” It was “almost a ‘non-place,’” the original report noted:

nothing exists there apart from a large collection of nondescript buildings. Indeed, the only buildings which might be said to characterize Chimbote are the SOGESA Steel Mill and the fish meal factories from whose bowels belches the dreadful and all-prevading [*sic*] smell of fish meal, and whose waste products have fouled the waters of the bay.⁷¹

⁷⁰ Luciano Giraldo [Obituary], *Trib.com Online News*, August 25, 2010, accessed October 28, 2010, available from http://trib.com/lifestyles/announcements/obituaries/article_85301694-b086-11df-86b8-001cc4c03286.html.

⁷¹ Cited J.P. Robin and F.C. Terzo, *Urbanization in Peru* (New York: The Ford Foundation, International Urbanization Survey, 1972), 58. The date and title of the original UNDP report were not cited in the source.

After visiting the city themselves, Robin and Terzo declared that “the people there cannot wait.” By this time, the Peruvian fishmeal industry had grown exponentially for more than a decade, attracting more and more settlers, and the earthquake’s destruction of the departmental capital Huaraz further encouraged the flow of migrants.

Environmental conditions in the city—particularly in the *barriadas* swelling in the outskirts—were not only unsanitary due to domestic waste, but also polluted with industrial toxins from steelmaking and rotting organic matter emitted by the fishmeal plants. If before the earthquake Chimbote was a “problem city,” as Peláez claimed in the early years of the boom, in its aftermath it was now proclaimed by international experts to be “the worst urban environment we have seen since leaving India.”⁷²

3.3. From steel to fishmeal: Realizing the dream of industrialization

Inaugurated in 1956, the Siderperú steel mill—a project planned and executed by the state as part of a program of import substitution industrialization—attracted the first waves of immigrants to Chimbote. Aside from the construction of the mill and its supporting infrastructure (a dock in the north end of the bay and a railroad towards the interior), a handful of tuna canneries, including the first plant owned by magnate Luis

⁷² Robin and Terzo, *Urbanization*, 61.

Banchero Rossi,⁷³ also provided employment in the 1940s and 50s. During World War II, Peruvian firms exported canned tuna and the nearly identical species called *bonito* to U.S. markets. Boats and equipment were imported from California, and some of the major U.S. tuna producers established operations in Peru, such as Star Kist. This firm purchased the Coishco Fishing Company (named for the port town adjacent to Chimbote) in the 1950s and brought vessels from California.⁷⁴ However, the canning industry did not experience the same exponential growth as fishmeal later did. Domestic consumption was limited, and following the war the industry's U.S. market share was reduced by the reactivation of other major tuna producers, particularly Japan, as well as by protective barriers put in place by the United States against the importation of Peruvian tuna.⁷⁵ Moreover, as the better-equipped and technologically-advanced fleets of U.S. West Coast firms chased these highly-migratory fish southward.⁷⁶ U.S.

⁷³ "Chimbote está orgulloso de él," *Boletín de la Cámara de Comercio, Agricultura, e Industria de la Provincia del Santa*, reprinted in *El Pensamiento de Luis Banchero* (Lima: Sociedad Nacional de Pesquería/Editoriales Unidas, [1972?]), [n.p.].

⁷⁴ Rosemary Thorp and Geoffrey Bertram refer to this purchase as a takeover, *Peru 1890-1977: Growth and Policy in an Open Economy* (London: Macmillan, 1978): 247 n86. Coishco is a bay just to the north of Chimbote which is connected to the city by a mountain tunnel. Due to their proximity and to the high concentration of fish processing plants in both areas, the production of Coishco is often included in figures for Chimbote.

⁷⁵ Facing pressure from the West Coast tuna lobby, the U.S. Food and Drug Administration prohibited the labeling of Peruvian "bonito" as "tuna," although the two products are nearly indistinguishable.

⁷⁶ J. Bassett, "Troubled Waters," *Los Angeles Times*, February 7, 1971, E1.

boats seized by Peruvian forces for operating within the claimed 200-mile territorial sea were usually directed into local ports and fined for operating without a permit, as was the case when the San Diego-based San Juan was forced into Chimbote's harbor with a warning shot from a Peruvian Navy destroyer in 1965.⁷⁷

Nonetheless, by 1959, Chimbote had the highest concentration of canneries of any Peruvian port (followed closely by Callao) with a total of 11—nearly a third of the national total.⁷⁸ A graphic history of Chimbote's labor movement (excerpt in **Figure 3.4**) depicted the story of people who migrated to the town during this period, constituting a new phase in the city's historical narrative and collective identity.⁷⁹ The publication describes how workers—called “*enganchados*” (literally, the “hooked ones”)—were

⁷⁷ “San Diego Tuna Boat Seized by Peru Navy,” *Los Angeles Times*, June 12 1965, 20.

⁷⁸ A. Freyre, “Fishery Development in Peru,” *Studies in Tropical Oceanography* 5 (1967): 398.

⁷⁹ L. Pretel Leiva and C. Tocón Armas, *Movimiento Sindical en Chimbote: Historia Gráfica, 1940-1960* (Chimbote: Instituto de Promoción y Educación Popular, 1984).



Figure 3.3. A local man is depicted telling the story of the migrants who arrived to Chimbote during the fisheries boom. (Trans.: New proletarian concentrations surged with the fisheries 'boom.' Thousands of people from the highlands and coast arrived in Chimbote in search of work.") Adapted from Luis Pretel Leiva and Carmen Tocón Armas, *Movimiento Sindical En Chimbote: Historia Gráfica, 1940-1960* (Chimbote, Perú: Instituto de Promoción y Educación Popular, 1984), 20.

lured to work in the tuna canneries from northern coastal cities such as Trujillo and from the Andean highlands with false promises by company representatives. Upon arrival, however, they were left with little choice but to accept the poor conditions of the jobs offered them, having abandoned their homes and indebted to the recruiters for the expenses of the trip.⁸⁰ The cannery workers eventually organized to appeal for

⁸⁰ Pretel and Tacon, *Movimiento Sindical*, 18.

improvements in labor conditions, forming connections with other local unions.

Alejandrina Calonge Mendoza (who appears in **Figure 3.2** above) migrated to Chimbote from the Andes with her family in 1943 and worked in the canneries beginning at age 13. In 1957, Calonge was elected to represent her employer, La Florida, in the leadership of the nascent Syndicate Union of Santa. She later traveled to Mexico to participate in a meeting of the International Labor Organization, where she presented a report on the conditions faced by working-class women in Chimbote, pronouncing her support for the implementation of the eight-hour workday. Calonge had been the first woman to represent Chimbote at an international labor event, and although she left behind her labor activism shortly thereafter when La Florida declared bankruptcy, her daughter Elsa Baltodano recalled in 2009 with great pride: "Alejandrina Calonge carried the name of Chimbote beyond the borders of our fatherland."⁸¹ Calonge acted as an international representative for the city's burgeoning union movement, helping Chimbote earn a reputation for its organized labor alongside its increasing notoriety for urban squalor.

⁸¹ Interview by the author with Elsa Baltodano, February 6, 2009 (Chimbote, Peru). The quoted text is from a caption Baltodano wrote for a photo of her mother which she had entered into a local contest for historical photographs of the city. According to Beatriz Gil, Lorgio Baltodano left a less laudable legacy in the history of the Chimbote labor movement: in the context of APRA's waning power during the ensuing years, together with several associates he made secret deals with factory owners, staged fake factory closings, and generally "conducen al sindicalismo chimbotano al punto más bajo de su historia" (B. Gil, "El APRA y el movimiento sindical chimbotano," Lima: Pontificia Universidad Católica del Perú, Serie Publicaciones Previas No. 7 (1974), 6-7).

Dramatic growth in Peru's fishmeal industry occurred during the late 1950s and 1960s, transforming the structure of global commodity markets. These changes impacted Chimbote more than any other location along the fishmeal-producing South American Coast, from Paita near the Peru-Ecuador border to Talcahuano in the south of Chile. Prior to that time, canneries had produced fishmeal at a small scale using fish scraps from the canning process.⁸² As the tuna industry stagnated in the early 1950s, some firms began using whole anchoveta as a raw material.⁸³ Although administrators of the state-run *guano* monopoly, the Guano Administration Company (CAG), pressured the Peruvian government to limit industrial extraction of anchoveta during the 1950s in order to protect the food source of the guano-producing birds, the measures which were enacted were ultimately unable to detain the explosive growth of the industry that later ensued.⁸⁴ Fishmeal has also been used as a fertilizer, but the boom coincided with a

⁸² The earliest reference to a fishmeal plant in Peru states that in 1923, the government authorized a Japanese engineer by the last name of Nakashima to establish a fish canning plant and study the possibilities for industrial development of the fisheries. "His activity led to the planning of the possibility to produce fish meal and also obtain fish oil for industrial purposes." (Freyre, "Fishery Development," 392).

⁸³ W.G. Clark, "Lessons from the Peruvian anchoveta fishery," *California Cooperative Oceanic Fisheries Investigations* 19 (1 1975-1976): 57.

⁸⁴ Thorp and Bertram, *Peru, 1890-1977*, 246. In 1941, the CAG was to install and operate a fishmeal plant that had been purchased by the government following the government-commissioned report by the U.S. Fisheries Mission, but the plant was never put into operation. Thorp and Bertram, *Peru, 1890-1977*, 244; Freyre, "Fishery Development," 392. For an analysis of the role of technocrats in the development of Peruvian guano and the initial rise of industrial anchoveta fishery, see G. Cushman, "The Lords of Guano."

growing market in the North for white meat, a significant portion of it raised on South American anchovies. Following the collapse of the California sardine and low production in Scandinavian fisheries during 1957-58, dwindling world supplies, cheap imports of second-hand plants and boats, and the expansion of the U.S. and European animal feed industry combined to make Peruvian fishmeal production highly profitable, thus setting off a period of rapid expansion in the sector.⁸⁵

Chimbote became the epicenter of the fishmeal boom, surpassing Callao in terms of new industrial growth due initially to lesser competition from other fishing firms and lax regulations for the establishment of processing facilities.⁸⁶ In the early 1960s, a polemic in Lima-Callao over smells produced by fishmeal factories operating on the Avenida Argentina led to greater environmental controls in the production process, such as requiring the installation of filters to reduce atmospheric emissions. The victory of the *limeño* interest groups in passing legislation for pollution control caused most fishmeal producers to relocate to Chimbote—the emerging core of the industry located about 400 km north of Lima—and to other coastal cities where no such legislation existed.⁸⁷ In 1955 Peruvian industrialist Manuel Elguera installed one of the first

⁸⁵ Clark, “Lessons;” Thorp and Bertram, *Peru, 1890-1977*, 244.

⁸⁶ Conversation with Hernán Peralta Bouroncle, October 12, 2009 (Lima, Perú).

⁸⁷ Nathan Clarke, “Traces on the Peruvian shore: The environmental history of the fishmeal boom in Chimbote, Peru, 1940-1980” (Ph.D. diss., University of Illinois, 2009). See Chapter Four, especially p. 144-166.

commercial fishmeal plants in Chimbote in the sector of La Boquita. The plant, which he purchased from the California firm Wilbur-Ellis, had originally operated in Monterrey, CA.⁸⁸ From a total of six fishmeal plants in 1956 the number climbed to 27 in 1962 (about one-fourth of all fishmeal plants reportedly installed in Peru at the time)—more than fourfold increase in six years.⁸⁹ The resulting processing capacity increased by a factor of 19, jumping from a total of 30 tons per hour to 566 tons per hour of raw material in the same period. Even more dramatically, Chimbote's total industrial fishing fleet capacity (24 boats with a capacity of 462 registered tons in 1953) multiplied 39 times, comprising 303 boats with 18,050 registered tons by 1962.⁹⁰ In 1964 Peru was the world's leading fishing nation, accounting for 40% of total world production (9 million tons) in terms of weight.⁹¹

The sharp increase in Peruvian production toward the end of the decade combined with a fall in world prices to 50% of their previous value in 1960. In October of that year world Peru won 60% of the global quota for fishmeal production at the

⁸⁸ J. Abramovich, *La Industria Pesquera en el Perú: Genesis, Apogeo y Crisis* (Lima: Universidad Nacional Federico Villarreal, 1973), 17-18. Abramovich states that this was the first fishmeal plant to be installed in Peru, but that claim contradicts other reports cited above. It is possible, however, that this was the first plant dedicated to using whole anchoveta as its raw material specifically for the industrial production of fishmeal, rather than the production of meal for research purposes or using cannery scraps.

⁸⁹ Tilic, "Capacidad," 3.

⁹⁰ Tilic, "Información estadística," 11.

⁹¹ Lux, "The Peruvian Fishing Industry," 144.

international meeting of producers in Paris.⁹² The industry's expansion slowed by 1963, when a tax increase on fish landings prompted a lockout by the industrialists, to which the fishermen responded with a month-long strike.⁹³ Moreover, that year the effects of overfishing became apparent: whereas most of the harvest had formerly come directly from the bay or within the first 10 miles from shore, in 1963 the fishermen found themselves obligated to sail farther out than their boats were equipped to handle.⁹⁴ Consequently, a high number of sunken boats (more than 200 by one account) and the insurance payments demanded by the owners further aggravated the weakening financial situation in the sector. A credit crisis ensued, and after 1964 the total number of fishmeal plants in Peru declined from 150 to 100.⁹⁵ The downturn was further aggravated by the 1965 El Niño and consequent drop in the anchoveta harvest.⁹⁶ The following year, the Peruvian government declared a total allowable catch of eight million tons and a three-month closure to allow for recovery of stocks, leading the

⁹² "Triunfó la anchoveta en París," *Pesca* 1.2 (1960), 29-31.

⁹³ Thorp and Bertram report that by 1963 between 60 and 80% of the capital and assets of the industry was financed by debt (*Peru, 1890-1977*, 245).

⁹⁴ Personal communication from Hernán Peralta Bouroncle to the author, 10/30/09.

⁹⁵ Thorp and Bertram, *Peru, 1890-1977*, 245.

⁹⁶ Thorp and Bertram, *Peru, 1890-1977*, 246.

industrialists to accelerate their investment in harvesting and processing capacity in order to compete for the diminishing resources.⁹⁷

The golden years of the boom (1957-1963) were a time of great prosperity for the fishermen. They were in a sense the most important element of the extractive process; without them the plants would have no fish to process. Thus, as one contemporary observer put it, while those who worked in the fishmeal plants—or worse yet, in the canneries—were very poorly paid, the fishermen could earn in a single trip, as much as a professor or bank employee in a month.⁹⁸ And until 1962, when the effects of over-fishing first became evident, the anchoveta fishing boats (*bolicheras*) could often make as many as three trips just within the bay in a single day.⁹⁹ The fishermen in that era were said to wear gold jewelry and light their cigarettes with 500-*sol* bills (about US\$20 at that time).¹⁰⁰ Their notoriety, if apocryphal, was symbolic of the economic success and wasteful consumption associated with the boom. Not only was their heyday short lived,

⁹⁷ Thorp and Bertram, *Peru, 1890-1977*.

⁹⁸ Interview by the author with Hernán Peralta Bouroncle, February 25, 2009 (Lima, Perú).

⁹⁹ Interview with Peralta.

¹⁰⁰ Interview by the author with Hernán Peralta, February 19, 2009 (Lima, Peru); E. Ballón y J.M. Salcedo, "Reportaje a Chimbote," *Quehacer* 3 (Mayo 1980): 67.

however; this image of wealth and success belied the conditions of poverty and political struggle in which most *chimbotanos* lived.¹⁰¹

By the late-1960s, the city had begun to draw the attention of intellectuals and political activists in Lima. French sociologist Denis Sulmont (now a nationalized Peruvian) wrote his doctoral thesis about Chimbote under the direction of Alain Touraine and later went on to publish numerous studies about the Peruvian labor movement during his tenure as a professor at the Pontifical Catholic University of Peru in Lima.¹⁰² “Chimbote was the door through which I introduced myself in 1967 to the popular world of Peru, choosing this country and this city,” he later wrote.¹⁰³ Sulmont’s extensive personal collection of photographs from 1967, the year he began his fieldwork, provide ethnographic evidence of Chimbote at the height of the fishmeal boom.¹⁰⁴ In the *barriadas* Sulmont photographed, there is no pavement, electricity, or running water, and most homes are made of reeds bundled or woven together. Children played in the street

¹⁰¹ See article in *Pesca* about poverty in Chimbote.

¹⁰² D. Sulmont, “La sociología francesa en el Perú,” *Boletín del Instituto Francés de Estudios Andinos* 36:1 (2007), 86; see also D. Sulmont, “Chimbote: Constitución de un Bloque Popular Regional,” Pontificia Universidad Católica del Perú, Jornadas de Balance de Estudios Urbano-Industriales (Lima, 13-18 Diciembre 1982); “Conflictos laborales y movilización popular: Perú, 1968-1976,” *Revista Mexicana de Sociología* 40:2 (1978).

¹⁰³ D. Sulmont, “Chimbote,” 1.

¹⁰⁴ D. Sulmont, personal photographic archive (Lima, Peru).

in the hillside communities while smoke hovered around the factories near the bay below.¹⁰⁵

Another *limeño* drawn to the coastal “melting pot” was Peruvian sociologist Hernán Peralta Bouroncle. He graduated from the National Agrarian University of La Molina in the late-1960s. Peralta worked in Chimbote as an organizer for the left-wing political party Revolutionary Vanguard (VR) from 1971 to 1983.¹⁰⁶ “I found in Chimbote the laboratory of my life,” he explained in a 2009 interview.¹⁰⁷ But Peralta was frustrated by the culture of excess he observed among the fishermen: “Everything was cash, everything was sex...I never belonged to that world,” he recalled:

With what a fisherman earned in a week, could have lasted him for two months. What did they do? They wasted it and lived in shacks...instead of building a house. [...] A boat captain who didn't spend his money and didn't have four or five women [and a ton of kids], all of whom he supported, you know?...an austere man would save his money and within three years he could buy himself a boat.¹⁰⁸

¹⁰⁵ These characteristics were visible in many of the photographs of the Chimbote area from Sulmont's collection. One captures this scene particularly well: [View of Denis Sulmont standing on Chimbote hillside with *barriada* below and bay at bottom, smoke visible], photog. by Denis Sulmont, in the personal archive of Denis Sulmont (Lima, Peru).

¹⁰⁶ The Revolutionary Vanguard was founded in 1965 and based in Lima's intellectual and student movements. Its two primary spheres of action were in the fishing and mining sectors. Kenneth Roberts, *Deepening Democracy? The Modern Left and Social Movements in Chile and Peru* (Stanford University Press, 1998), 208; interview with Peralta, May 8, 2009.

¹⁰⁷ Interview with Peralta, February 19, 2009.

¹⁰⁸ Interview with Peralta, February 19, 2009.

In Peralta's view, the fishermen's irreverent spending on alcohol and women perpetuated their poverty. Deeply committed to his intellectual and political project, Peralta lamented that fishermen who had the economic means to improve their quality of life during the *anchoveta* boom preferred to spend it on luxuries and extramarital affairs. Nor was resource conservation or pollution high on the political agenda of any of the active organizations in Chimbote at the time. The explosive social and political context of boomtown Chimbote was forged among a milieu of conflicting agendas among fishmeal magnates and their mafias, local fishermen and union leaders, student activists from Lima and abroad, Peace Corps volunteers, and even renowned Peruvian novelist José María Arguedas.

This metamorphosing cultural world became an intellectual refuge for Arguedas (1911-1969) near the end of his life. A native Quechua-speaker born in the Andean province of Andahuaylas, Arguedas graduated with an Anthropology degree from the Universidad Mayor de San Marcos in Lima and later became professor of Ethnology in the National Agrarian University of La Molina. Many of his literary works (*Blood Party*, 1941; *Deep Rivers*, 1958; *All the Bloods*, 1964) treated the topic of the cultural encounter between indigenous and mestizo and European-descent coastal Peruvians. In the mid-1960s, at just over 50 years of age, Arguedas became enthralled with Chimbote and undertook an ethnographic study of the city, both as part of his scholarly work and as a form of therapy for his ongoing struggles with depression. The resulting novel, *The Fox*

From Up Above and the Fox From Down Below (hereafter *The Foxes*), was the last one Arguedas wrote before committing suicide in the bathroom of the Agrarian University on November 28, 1969.¹⁰⁹ Framed around characters in the mythology of the Andean province of Huarochirí, the fox from above (representing the culture of the Andes) meets the fox from below (representing the culture of the coast) in the setting of Chimbote during the height of the fishmeal boom.¹¹⁰ In letters to his colleagues and the diary entries that eventually formed part of the novel's narrative, Arguedas proclaimed his perplexity at the processes taking place in Chimbote, calling it "a giant whirlpool" and an "unfathomable human hotbed."¹¹¹ "I have the city, I think, in my gut," he wrote in 1967.¹¹² "It thrills me but I do not ultimately understand what is happening in Chimbote and in the world."¹¹³ This sentiment of bewilderment, chaos, and confusion permeates the novel—often in a sharply critical tone.

¹⁰⁹ J.M. Arguedas, *El Zorro de Arriba y el Zorro de Abajo* (Lima: Editorial Horizonte, 1971). All translations are by the author unless otherwise noted.

¹¹⁰ Arguedas himself wrote the first Spanish-Quechua bilingual version of this text, believed to have been originally redacted by Spanish conquistador Francisco de Ávila in 1598 with the title *Dioses y Hombres de Huarochirí* (IEP-Lima, 1966).

¹¹¹ J.M. Arguedas to J. Murra, 14 April 1967, in J. Murra, and M. López-Baralt, eds., *Las Cartas de Arguedas* (Lima: Pontificia Universidad Católica del Perú, 1998), 153, 181.

¹¹² J.M. Arguedas to John Murra, 26 December 1967, in Murra and López-Baralt, *Las Cartas*, 167.

¹¹³ Arguedas, *The Foxes*, 81.

At a basic level, the novel provides a socioeconomic and ecological register of boomtown Chimbote. Arguedas strove to portray its reality as accurately as possible: he reported to a colleague in 1967 that he had collected data on 3,645 fishermen and 3,840 workers, in addition to conducting five interviews with men who had migrated from the Andes, during his research for the narrative.¹¹⁴ Peruvian geographer César N. Caviedes, who also witnessed the boom-era transformation of Chimbote, deemed *The Foxes* “a source of timely and accurate documentary evidence” in his 1986 essay on the novel.¹¹⁵ A literary master, Arguedas dramatically conveyed the seascape of boomtown Chimbote, stained with bloody water and dead fish, its atmosphere choked by the rancid haze spewing out of smokestacks built too low:

The stench of the sea displaced the reek of the smoke from the boilers in which millions of anchovies were coming apart, melting, exhaling that rather foodlike odor as they were boiling and sweating oil. The dense odor of the waste matter, of blood, of the tiny entrails trampled in the trawlers and hosed out over the sea, and the smell of the water that gushed out of the factories onto the beach made jellylike worms rise up out of the sand; that stench kept drifting along at ground level and rising.¹¹⁶

¹¹⁴ J.M. Arguedas, letter to John Murra, 1 February 1967, in Murra and López-Baralt, *Las Cartas*, 142.

¹¹⁵ C.N. Caviedes, "The Latin American Boom-Town in the Literary View of José María Arguedas," In W.E. Mallory and P. Simpson-Housley, eds., *Geography and Literature: A Meeting of the Disciplines* (Syracuse: Syracuse University Press, 1986), 58.

¹¹⁶ J.M. Arguedas, *The Fox From Up Above and the Fox From Down Below*, trans. Frances Horning Barraclough (Pittsburgh, 2000), 43.

Besides this wrenching critique of fishmeal's environmental and aesthetic impact on the Chimbote shoreline, Arguedas narrated the harvest and unloading of anchoveta as well as the processing of fishmeal in the plants with an impressive degree of technological detail. Throughout the text, Arguedas drew clear parallels between the setting, characters, and events in the novel and in real-life Chimbote of the 1960s. Braschi, the industrialist whose money and power is behind the industry and its local mafia in the novel, is a reference to the magnate Luis Banchemo Rossi. "We pay Braschi for everything," mumbled Chaucato, captain of one of Braschi's boats, while receiving oral sex from a prostitute.¹¹⁷ The crazy Moncada, who wandered around the city shouting about the structures of power that governed the port, was a real person who lived in Chimbote until several years after Arguedas' death; his two sons were active participants in local politics during the early 1970s.¹¹⁸ Numerous other elements of the novel—including a Peace Corps volunteer named Maxwell—echoed processes, people, and events that had shaped both the natural and human ecosystems of the city.

¹¹⁷ Arguedas, *The Foxes* [1971], 41. Banchemo was said to own many of the city's brothels.

¹¹⁸ Interview with Peralta, February 19, 2009. Crazy Moncada's sons participated actively in the political opposition movement organized by the left-wing political party Revolutionary Vanguard, whose activities are described in greater detail below.

Critics and contemporary observers agreed that Chimbote was the epicenter of the profound socio-cultural changes taking place across Peru at the time.¹¹⁹ In *The Foxes* Arguedas offered an insightful critique of the problems confronting the city, particularly social inequality, the abuses of the industrialists, the controversial role of foreign capital, and the extreme environmental costs of these transformations. “How the hell...do these factory owners make every little anchovy give birth to dollar bills,” Chaucato the boat captain complained, “setting fire to violent iron? We, bring them the material, dammit. I make the sea give birth...”¹²⁰ But Chaucato worked for Braschi and was thus subservient to greater powers—much as Chimbote was, in Arguedas’ view, subordinate to the transnational capitalist order: “Just like the big ‘pussy’ Chimbote [does anything] when they send orders from New York to Lima and from Lima to Chimbote,” Zavala said, comparing the city to the prostitute Narizona who was in his company at that moment.¹²¹ At the local, national, and global levels, Chimbote and its growing population were subject to a structure of transnational capital in which the whims of the rich—from Peruvian magnates and the Lima elite to foreign corporations—were the order of the day.

¹¹⁹ J. Guzmán Aranda, “Presentación,” in A. Cornejo Polar, et al., *Los Hervores de Chimbote* (Chimbote: Río Santa Editores, 2006), 13.

¹²⁰ Arguedas, *The Foxes*, 34.

¹²¹ Arguedas, *The Foxes*, 47.

The novel's portrayal of indigenous figures and the challenges they faced suggest that Arguedas viewed migrants to Chimbote as suffering a relentless process of exploitation.¹²² Indigenous highlanders abandoned their families, their traditions and principles in the struggle to adapt to a new world. "[H]ere, in Chimbote, everyone's faces get erased, their morale gets crushed, they get stuck into a mold," commented Diego, the visitor from Lima who came to inspect Don Angel's plant in *The Foxes*. "Who the hell sticks a *lloqlla* into a mold?" Diego went on, using the Quechua word for the avalanche that occurs when a mountain river overflows with the first spring rains.¹²³ "This *lloqlla* eats hunger. The more workers we throw out of the factories, the more arrive from the mountains. And the slums grow and grow..."¹²⁴ Indigenous Andeans were at once driven by an unstoppable process (the inevitable advance of modern capitalism, represented as a powerful avalanche) and stewards of their own lives and livelihoods. In the portrait Arguedas painted, all shared the blame in the systematic destruction of Chimbote.

¹²² U.S. literary critics have vigorously debated the process of *transculturation* as conveyed by Arguedas and what the totalizing force of Western, capitalist culture and its structures of power mean for the individuals who confront them. See especially the 2007 debate between Priscilla Archibald and Alberto Moreiras (P. Archibald, "Urban Transculturations," *Social Text* 93, no. 25 (2007): 91-113; A. Moreiras, "Freedom from Transculturation," *Social Text* 93, no. 25 (2007): 115-121) and the 2001 essay that was the subject of Archibald's 2007 critique: A. Moreiras, "The end of magical realism: Jose Maria Arguedas's passionate signifier," in *The Exhaustion of Difference: The Politics of Latin American Cultural Studies* (Durham: Duke Press, 2001), 184-207.

¹²³ Arguedas, *The Foxes*, 89.

¹²⁴ Arguedas, *The Foxes*, 89.

3.4. The fate of fishmeal and the “revolution from above”

Turmoil in Peruvian national politics also impacted the Chimbote fishmeal industry. On October 3, 1968, the left-wing military government of General Juan Velasco Alvarado wrested power from President Fernando Belaúnde Terry, who had held office since 1963. Nationalist, populist, and statist, the Velasco regime embarked upon a program of “revolution through reform imposed from above,” in the words of political scientist Dirk Kruijt, passing an average of two acts per working day.¹²⁵ “The Peruvian junta is the foremost example of one of the most fascinating phenomena in Latin America,” wrote the *Los Angeles Times* five years later: “the emergence of military men who have abandoned their traditional defense of the status quo and committed themselves to bringing about genuine social revolution.”¹²⁶ Yet unlike other revolutions in the region, this one was not based on popular mobilization: “The very lack of any genuine impetus from below,” British historian Eric Hobsbawm noted in a 1971 essay in the *New York Review of Books*, “...has already pushed the armed forces into the virtually unique role of not just telling the civilians what to do, but actually being the government

¹²⁵ D. Kruijt, *Revolution by decree : Peru, 1968-1975* (Amsterdam: Thela Publishers, 1994), 101.

¹²⁶ E. Conin, “Is Peru’s military revolution the key to the future?” *Los Angeles Times*, April 22, 1973, L3.

and administration.”¹²⁷ The state-led reformism of the new regime was a profound influence on current Venezuelan president Hugo Chávez, who met Velasco in 1974 when he traveled to Peru as a military cadet.¹²⁸ Velasco enacted anti-imperialist reforms, radically changing the ownership and management structure of major sectors of the economy by taking control of foreign-owned industries. Among Velasco’s first actions was the expropriation of the International Petroleum Company operations in Talara, which he declared “a day of national dignity.”¹²⁹

The regime did not turn its attention to the fisheries until 1970. That year the newly-established Ministry of Fisheries nationalized the sale and distribution of fishmeal, creating the Peruvian Fishmeal and Oil Commercialization Company – though surprisingly the measure met with little resistance from the national fishmeal elite, who remained largely in control within the state-run institution. At the same time, however, Fisheries Minister General Javier Tantaleán Vanini insisted that the fishing industry itself would not be expropriated: “We do not see the need to nationalize,” Tantaleán

¹²⁷ E. Hobsbawm, “Peru: The Peculiar ‘Revolution’,” *New York Review of Books* 17:10 (1971), accessed November 9, 2009, available from http://www.nybooks.com/articles/article-preview?article_id=10351.

¹²⁸ Fernando Gualdoni, “Los hijos del general,” *Foreign Policy Edición Español* (Junio-Julio 2006), accessed October 26, 2010, available from <http://www.fp-es.org/los-hijos-del-general-0>.

¹²⁹ Krujit, *Revolution by decree*, 101.

declared at his first press conference on February 5 of that year.¹³⁰ Nonetheless, the “Westward March” slogan printed on all official fisheries documents succinctly iterated the regime’s aggressive position towards ocean resources, referring to its claim to the 200-mile territorial sea—a claim that had served to justify dozens of U.S. tunaboat seizures during the previous decades. The notion of a westward march also had a deeper symbolism in the context of the encounter between indigenous Andean immigrants and the modernizing industrialism of the coast taking place in Chimbote during this era. The generals unequivocally pushed for expansion in the sector that constituted one of their most powerful economic weapons.

In 1970, the Peruvian anchoveta catch reached an all-time high of over 12 million tons.¹³¹ A lack of reliable data and considerable scientific uncertainty surrounding the oceanographic processes driving El Niño made harvest predictions difficult.

Nonetheless, scientific studies by FAO and the Peruvian Ocean Research Institute (IMARPE) recommended catch limits of no more than eight to 10 million tons.¹³²

However, recommended limits were consistently exceeded in practice, and the three-month closed season established in 1966 had clearly been unable to decrease the

¹³⁰ “Nada de estatizar la industria pesquera,” *Expreso*, February 2, 1970, 1; “Ministro Tantaleán dice que no es necesario estatizar industria pesquera en el Perú,” *La Prensa*, February 6, 1970, 2.

¹³¹ Thorp and Bertram, *Peru, 1890-1977*, 247.

¹³² Thorp and Bertram, *Peru, 1890-1977*, 247; Clark, “Lessons,” 57. IMARPE was funded by UNDP and FAO.

pressure on anchoveta stocks: by the early 1970s the industry was debt-ridden and gravely overcapitalized, with a processing capacity at least three times that year's official quota of 10 million tons.¹³³ A strong harvest in 1970-1971 encouraged business as usual among Peruvian industrialists and government policymakers: the resilience of fish stocks by the end of 1971 had led scientists to mistakenly conclude, as FAO scientist W.G. Clark recalled, that the anchoveta fishery was "a model of successful management, by biological standards if not economic ones."¹³⁴ Meanwhile, the government plainly encouraged the industry's continued development: "We want the current [firms] to improve their quality and to further exploit the marine resources," Tantaleán told the press; "We will not detain the progress of extraction by any means."¹³⁵

But 1972 was a disastrous year for Peruvian fisheries. First, on New Year's Day, fishmeal magnate Luis Banchero Rossi—"one of the heroes of Peruvian modernization"¹³⁶—was murdered under mysterious circumstances in his country home outside Lima. Then, within the first few months of that year, scientists at the Ocean Research Institute realized that there would be unusually low recruitment of new adults

¹³³ Thorp and Bertram, *Peru, 1890-1977*, 246, citing Abramovich, *La Industria Pesquera*, 80.

¹³⁴ Clark, "Lessons," 57.

¹³⁵ "Nada de estatizar la industria pesquera."

¹³⁶ J. Ortega, "Noticia Prologal," in G. Thorndike, *Banchero: Los Adolescentes y Alucinantes Años 60 de Chimbote* (Chimbote: Río Santa Eds., 1995), 11.

into the harvestable population. Nonetheless, the military regime ignored the scientists' recommendation to keep the fishery closed so the adults could spawn, instead allowing it to operate until June.¹³⁷ The ensuing collapse sent the fishmeal industry into a state of utter peril. Many industrialists blamed the catastrophe on El Niño; other observers disagreed. As *New York Times* columnist William Safire blithely put it, in a column criticizing the relentless pressure on stocks placed by high-technology gear: "The fishermen are now in a depression and it serves them right because they lost their sense of pride and courage and respect" for El Niño, by not allowing the fish to spawn.¹³⁸ The precise cause of the catastrophe has been the subject of ongoing scientific and policy debates ever since. As their understanding of how ocean conditions affect anchoveta evolved, some scientists concluded that overfishing caused the collapse while others continue to insist that fishery collapse in anchovy-sardine upwellings (in this case California) result from a complex interaction of human and natural factors "working in concert."¹³⁹ The crash of Peruvian fishmeal had repercussions throughout international

¹³⁷ Clark, "Lessons," 62.

¹³⁸ W. Safire, "El Niño," *New York Times*, August 30, 1973: 33.

¹³⁹ J. Alheit and M. Ñiquen, "Regime shifts in the Humboldt Current ecosystem," *Progress in Oceanography* 60: 2-4 (2004): 201-222; Alec MacCall discusses this debate in the context of the California sardine collapse (the California and Humboldt Currents have ecologically similar traits), "The Sardine-Anchovy Puzzle," in J. Jackson, K. Alexander, and E. Sala, eds., *Shifting Baselines: The Past and the Future of Ocean Fisheries* (New York: Island Press, 2011), 57.

commodity markets, which experienced a shortage of protein feeds and thus rising prices.

On May 7, 1973, the Velasco regime announced the nationalization of the fishmeal industry, assuming the cost of its soaring debts and of maintaining an inactive workforce. Citing an excess in fishing and processing capacity, inadequate financing, and the “social problem” the situation was creating, the government created the state-run firm Pesca Perú and set about reorganizing and consolidating the sector in attempts to address the mounting crisis.¹⁴⁰ Incorporating a total of 27,000 employees, 1,400 boats, and 105 fishmeal plants, in his speech to the nation Tantaleán predicted that this “gigantic firm” would surely be “the biggest that exists” in Latin America at that time.¹⁴¹ A cartoon published in the weekly magazine *Caretas* (**Figure 3.4**) caricatured Tantaleán as an enormously fat fish, labeled “PescaPeru,” having recently gobbled up the fishing industry, with masts, nets, and anchors still hanging from his mouth. “There was no other way,” Tantaleán stated in the image.¹⁴²

¹⁴⁰ D. Sulmont, “Chimbote: Constitución de un Bloque Popular Regional,” Pontificia Universidad Católica del Perú, Jornadas de Balance de Estudios Urbano-Industriales (Lima, 13-18 Diciembre 1982), 9.

¹⁴¹ “El gobierno asume monopolio de la industria pesquera,” *Expreso*, May 8, 1973, 3.

¹⁴² “No había otro camino,” *Caretas* (Lima) No. 477, May 21, 1973.



Figure 3.4. Political cartoon commenting on the nationalization of the Peruvian fishmeal industry (May 7, 1973) and the creation of the huge state-run enterprise Pesca-Perú. The cartoon depicts the Minister of Fisheries, Gen. Javier Tantaletán Vanini, as a giant fish who swallowed the industry whole, uttering, “There was no other way.” *Caretas* (Lima) No. 477, May 21, 1973. (CENDOPES press clippings file, Lima, Peru.)

Unsurprisingly, the industrialists rejected the measure, calling it “unjust, arbitrary and inconvenient” in an editorial published in *Correo*, a daily owned by the Bancharo Group.¹⁴³ The industrialists were particularly angry because, they said (and had complained throughout the 1960s), the government had never supported their efforts to develop and that the entire industry had been built by sheer enterprising will

¹⁴³ “Estatización de la pesquería,” *Correo*, May 8, 1973. CENDOPES Press clippings file, Lima, Peru.

and entrepreneurial spirit, only to be disproportionately taxed by the state.¹⁴⁴ On the other hand, the Peruvian Fishermen's Federation (FPP)—which was based in Chimbote and by then infiltrated by pro-government strongmen—declared its support of Pesca Perú.¹⁴⁵ The regime quickly announced new benefits for its employees, including among others, that those who had worked without a contract ("*eventuales*" or occasional workers) would be hired on permanently.¹⁴⁶ When Velasco was ousted from power in 1975 by General Francisco Morales Bermudez, the government decided to re-privatize the fishing fleet. The plan met with rancor among fishermen, who staged a massive strike in 1976 that lasted 57 days.¹⁴⁷

Chimbote struggled to recover from ecological and economic ruin after the fishery's collapse. In 1978, 90 percent of the city's population lived in slums on the sandy and wetland areas around the urban center, and 75 percent of those residents lacked water and sewage services.¹⁴⁸ The statistics for infant mortality, malnutrition, and disease were also dismal. Many of the excess fishmeal plants were sold to rising

¹⁴⁴ "Estatización de la pesquería."

¹⁴⁵ "Federación de Pescadores al País," *El Comercio* 5/12/73; D. Sulmont, "Chimbote," 7.

¹⁴⁶ "Trabajadores de la pesca dejarán de ser eventuales," *Expreso*, May 24, 1973.

¹⁴⁷ See C. Malpica Silva, "La Desnacionalización de la Flota de PESCAPERU: Una Medida Antihistórica," (Lima: Ediciones Labor, 1976).

¹⁴⁸ Oficina de Desarrollo Urbano Territorial Costa (ODUTC), "Distribución espacio de la población: Plan de acondicionamiento territorial del eje Chimbote-Trujillo," Chimbote: ODUTC, 1978, cited in Ballón and Salcedo, "Reportaje a Chimbote," 67.

fishmeal industrialists in Chile and Ecuador.¹⁴⁹ At the same time, a new fisheries boom was already underway—this time in sardine and jack mackerel canning. Some analysts viewed the recent impulse with little hope: “The arrival of the bonanza will bring nothing more than the increased riches of a very few and the resulting greater poverty of the *chimbotano* people,” social scientists Eduardo Ballón and José María Salcedo grimly predicted in 1980.¹⁵⁰ A survey of workers at major canneries in Lima and Callao in 1983 revealed disturbing details about the risky and uncomfortable conditions workers continued to face. Most women interviewed reported using their fingernails to remove the scales from fish in their factory jobs.¹⁵¹ In addition to working long hours in the cold, handling sharp implements with minimal safety or sanitation equipment, labor was hired at the whim of the hourly and seasonal rhythm of ocean fish harvests. Workers often had to wait unpaid outside the cannery for up to two hours before learning whether there would be fish that day; when there was, some firms locked the bathrooms

¹⁴⁹ Some of this equipment is still in operation: a fishmeal plant I toured in Guayaquil, Ecuador, still used equipment that had been purchased in Peru after the 1972 collapse and nationalization, as well as a steam dryer that had been built and operated in Talcahuano, Chile.

¹⁵⁰ Ballón y Salcedo, “Reportaje a Chimbote,” 69.

¹⁵¹ M. Barrig, M. Chueca, A.M. Yáñez, *Anzuelo Sin Carnada: Obreras en la Industria de Conserva de Pescado* (Lima: Mosca Azul Editores/ADEC, 1985), 21.

and forced workers to stay until all the fish had been processed (usually fourteen hour workdays or longer).¹⁵²

The environmental issues facing the city became increasingly critical during the years that followed. In 1983-84, another major El Niño event imperiled the coast and devastated the scarcely-recovered fisheries once again. A major cholera epidemic broke out in 1991, spreading along the Southeastern Pacific coast in Chile, Ecuador, and later throughout Latin America. In Peru alone nearly 300,000 cases were reported between January 1991 and July 1992.¹⁵³ Foreign observers lauded the Peruvian medical community for its well-coordinated response to the crisis, particularly in applying a treatment developed by a U.S. physician in India during the 1960s.¹⁵⁴ But the conditions leading to the outbreak—lack of clean water foremost among them—are much like those described by experts during the 1940s. Nearly five decades after their environmental engineering projects, the severe inadequacy of local water and sewage infrastructure persisted.

¹⁵² Ibid., 25-26.

¹⁵³ C. Carpenter, "The Treatment of Cholera: Clinical Science at the Bedside," *Journal of Infectious Diseases* 166: 1 (1992): 2-14.

¹⁵⁴ Carpenter, "Treatment."

Conclusion

Boomtown Chimbote was an “evil and magic place,” wrote Peruvian geographer César N. Caviedes, “in which the two worlds of Peru [had] converged.”¹⁵⁵ This pithy observation resonates on multiple levels, for the city was not only at the meeting of the rugged Andes and dry, desert coast—that “unfathomable human hotbed” that so fascinated Arguedas and other intellectuals and activists of the boom era.¹⁵⁶ Built at the place where the Peruvian coastal desert and the icy Humboldt Current meet, Chimbote was a site where foreign and local capital clashed, a forum for the conflicting agendas of various international and national organizations, and a stage for the ongoing battles between organized labor and state control. It was a crucible for twentieth century social, political, economic, and ecological experiments in which leaders and locals alike projected their visions of progress, as they sought to industrialize in order to forge a modern, autonomous, and prosperous nation.

In some respects, the trajectory that Chimbote ultimately followed represents the local consequences of a familiar pattern of natural resource booms and busts in modern Latin America. In the absence of effective government policies, overexploitation and industrial pollution eventually placed limits on the expansion of the industry. The

¹⁵⁵ Caviedes, “The Latin American Boomtown,” 59.

¹⁵⁶ J.M. Arguedas to J. Murra, 14 April 1967, in Murra and López-Baralt, *Las Cartas*, 181

Peruvian anchoveta collapse of 1972 is a classic case for scientists and policymakers in international fisheries management, as an example of the importance of catch quotas. But the resilience of the Humboldt Current marine ecosystem and the stocks of anchoveta and sardine, among other commercially-important fish species, led to a different outcome than many other commodity histories. Chimbote transitioned to a canning industry based on sardines during the 1980s, and the eventual return of anchoveta populations during the 1990s became the focus of a (by then much-reduced) fishing fleet. Beyond the interannual recurrence of El Niño, the longer-term cycles of this marine ecosystem allow adjustments in fisheries management schemes in order to prevent another resource collapse.

Yet advances in resource management have not translated into improvements in environmental justice. In the early twenty-first century, Chimbote continues to face the social and environmental consequences of fishmeal industrialization—of the culture of excess that characterized resource extraction and of the organic waste generated by fishmeal plants that elsewhere in the world has long been recycled back into the production cycle. Despite recent legislation to limit pollution, Llama Travel's 2009 description of Chimbote as "the most foul-smelling city in Peru" not only echoes boom-era accounts of the city, it also symbolizes the environmental problems its residents face

in the twenty-first century.¹⁵⁷ Nonetheless, for the city's poor, economic survival remains more urgent than long-term environmental health. "Without worrying about niceties, some *chimbotanos* tell us the unpleasant smell brings money."¹⁵⁸ With this in mind, the activists and political leaders of today must find a balance between their visions of progress and the excesses—in extraction, production, consumption, and pollution—that have so deeply plagued Chimbote in its industrial past.

¹⁵⁷ "North Coast: Chimbote," *Peru Guide (Llama Travel)*, accessed April 10, 2009, available http://www.peru-guide.com/peru_06_The_North_Coast_050_Chimbote.htm.

¹⁵⁸ Ballon y Salcedo, "Reportaje a Chimbote."

Chapter Four

From Anchoveta and Sardines to Jack Mackerel: Shifting Ocean Ecologies and the Translocal Dynamism of the Chilean Fishmeal Industry after 1972

In May 1973, the Peruvian Minister of Fisheries announced the nationalization of the industry. “There was no other way,” said Javier Tantaleán Vanini and his words appeared along with his profile on the cover of the Lima weekly *Oiga*.¹ It was a dramatic moment for the revolutionary government because the anchoveta that had supported Peru’s most important export economy had disappeared suddenly in early 1972. With the fishery mostly closed, Peru lost its position as the world’s top producer of fishmeal and tumult ensued in international commodity markets. With the crisis-ridden industry languished with aging equipment and excess capacity, the Velasco government focused its efforts instead on fish for human consumption, building terminals on the coast and in remote Andean locations and supplying them in part with fish caught by Soviet trawlers.

¹ Front cover of *Oiga* No. 524, May 11, 1973. The cover photo had the minister gazing into the distance as if to invoke the Velasco regime’s “westward march” slogan promoting the expansion of the Peruvian empire towards the Pacific.

Yet off Chile during the 1970s ocean conditions gave rise to expanding populations of Spanish sardines (*Sardinops sagax*) and jack mackerel (*Trachurus murphyi*) in two distinct fisheries eco-regions—off Iquique and Arica in the far north, and off Talcahuano in the central-south—that allowed Chilean fishmeal producers to compete with and by 1980 overtake their Peruvian competitors. As the Chilean fishmeal industry grew, Iquique and Talcahuano became two of Chile's most important industrial cities as labor, capital, and technology moved between these and other fishing cities along Chile's coast. This geographic mobility also permitted entrepreneurs and fishermen to adapt to shifting ecological conditions at the local level.

During the early 1960s the northern coastal city of Iquique emerged as the center of Chile's modest fishmeal production by exploiting anchoveta and sardine stocks that straddled the Peru-Chile maritime border zone. But the raw material in this zone was less abundant than farther north in Peruvian waters, and remained highly susceptible to the climatic shifts of El Niño. The emerging industry hub, Talcahuano, was already an important port for artisanal fishing, as well as steel and coal production by 1950. However, it solidified its position as Chile's primary industrial fishing port only after 1974 when jack mackerel—known locally as *jurel*—appeared in great abundance off its shores. These newly available fishing grounds in the central-south provided an alternate to the volatile northern Chilean fish stocks that became increasingly depleted. The geographical and ecological multi-specificity of these fisheries provided a crucial

competitive advantage for the Chilean industry, and it surpassed Peru as the world's top producer by 1980. Only with the recovery of anchoveta stocks in the 1990s did the single-species Chimbote-centered Peruvian fishery regain its supremacy in global markets.

Oceanographic shifts within the Humboldt Current ecosystem not only impacted the Peruvian industry but also shaped the geography of fisheries development in Chile as capital and people moved between north and south—and land and sea—to harvest and process the fish. The decisive impact of changing ecosystems highlights the complex ways in which nature's agency affects human societies and economies—intricacies often lost when histories are written as expressly local, national, or global in scope. This chapter, by contrast, highlights the *translocal* connections between shifts in the marine ecosystem and the rise of distinct regions within the Chilean industry based in the cities of Iquique and Talcahuano. The key to its success lay in exploiting the distinct fish populations as they shifted in density, total number, and spatial distribution within the three upwelling subsystems that late twentieth century marine scientists have now identified in the Humboldt Current system: Iquique provides access to the “upwelling shadow” that straddles the northern Chile and southern Peru maritime boundary and Talcahuano to the seasonal upwelling off the central-south Chilean coast.²

² The third, and most productive, upwelling subsystem is off the northern coast of Peru—with Chimbote at its center, Montecino and Lange, “The Humboldt Current System,” 65.

This chapter explores the translocal dynamism of the Chilean fisheries and interconnections between human and ecological histories of Iquique and Talcahuano as the fishmeal industry changed after the 1972 Peruvian anchoveta collapse. While Iquique transitioned from nineteenth-century nitrate mining to fishmeal production after 1960 and eventually to tourism, Talcahuano was by 1990 the most important fish processing center in Chile. The trajectory of these two cities also illuminates how entrepreneurs and local populations acted to exploit the wealth made possible by ocean ecologies whose shifts they could neither understand nor control. In this “race for fish,” the upper hand was held, at crucial moments, by oceanographic cycles like El Niño that impacted species availability. The chapter ends with Peru’s return to fishmeal supremacy in the late 1990s, when anchoveta stocks recovered. The newly-reprivatized industry maintained pressure on fish stocks until chastened policymakers established a new quota system that finally placed limits on individual firms in terms of their allowable catch in 2008. More significantly, it explores how a new cultural boom—Peru’s “gastronomical revolution”—allowed visionary marine conservationists to anchor ocean conservation issues within a broader national and international terrain by reclaiming the Peruvian anchoveta’s place at the human dinner table.

4.1. From Talcahuano to Iquique and Crash: The Trajectory of Chilean Fisheries to 1965

Located at the mouth of the mighty Bío Bío River, the widest and second-longest river in Chile, the town of Talcahuano was the southernmost seaport at the frontier of a Spanish colony turned republic for over three centuries. The Bío Bío marked the boundary of the indigenous territory of Araucanía during the Arauco War (1536-1862), as the Mapuche peoples fought against encroaching Spanish and Chilean forces for control of the densely-forested territory.³ Built on a peninsula between Concepción Bay and the smaller San Vicente Bay just north of the river, Talcahuano was also a port of calling for cargo ships, commercial whalers, and explorers trying to reach the South Pole. In 1838 French Navy captain Jules Dumont d'Urville, amid an expedition across the South Pacific and towards Antarctica, landed his ships *Astrolabe* and *Zelée* in Talcahuano when crewmembers became ill with scurvy; dozens remained there in hospital while nine more deserted the expedition before d'Urville continued north to

³ Mapuche indigenous groups of southern Chile are regarded by supporters as folk heroes who resisted the conquest of the Inca, and they continue to clash with police over ongoing issues of land and property as the Chilean state sought to “pacify” Araucania.

Valparaíso.⁴ His depiction of the harbor at mid-nineteenth century (**Figure 4.1**) shows numerous ships and a small settlement of modest square buildings.⁵



Figure 4.1: Jules Dumont d'Urville, “Vue de la Rade de Talcahuano,” *Voyage au Pôle Sud et dans l’Océanie sur les corvettes L’Astrolabe et La Zélée*, Gide Paris, 1846, accessed November 20, 2011, available from http://upload.wikimedia.org/wikipedia/commons/7/7a/Atlas_pittoresque_pl_033bis.jpg.

The port earned an international reputation a decade later when the California Gold Rush brought Forty-Niners to Talcahuano *en route* to find fortune in San Francisco.

⁴ Jules Dumont d'Urville and Helen Rosenman, *Two Voyages to the South Seas* (University of Hawai'i Press, 1992), see esp. 126-129.

⁵ Jules Dumont d'Urville, “Vue de la Rade de Talcahuano,” *Voyage au Pôle Sud et dans l’Océanie sur les corvettes L’Astrolabe et La Zélée*, Gide Paris, 1846, accessed November 20, 2011, available from http://upload.wikimedia.org/wikipedia/commons/7/7a/Atlas_pittoresque_pl_033bis.jpg.

Historian John J. Johnson published a colorful analysis of Talcahuano through the eyes of the “swashbuckling, arrogant Anglo-Americans” who visited the port in 1849.⁶ At that time the main industry of Talcahuano was flour milling, owned primarily by foreigners, followed by coal mining in neighboring Lota.⁷ From their diaries and letters Johnson culled a rich description of the physical geography of the port:

As the ships sailed the eight miles from the harbor entrance to Talcahuano the travelers feasted their eyes on the green mountainsides, broken here and there by a patch of corn or wheat, or possibly by a few rows of fruit trees clinging to the slopes—slopes so steep that all on them seemed about to tumble into the bay and cover the thousands of waterfowl that crowded its waters.

Notwithstanding this idyllic portrait, many of the Forty-Niners projected an image of the town of Talcahuano that was decidedly less enthusiastic. During three- to four-week ship layovers, Talcahuano took on a “businesslike appearance.”⁸ Yet most visitors chose to emphasize the atmosphere of debauchery and prostitution, with “plenty of rum holes” and “cockfights and gambling,” the streets muddy when rainy or damp.⁹ “With a smaller harbor, fewer ships, less money, and not quite so many prostitutes, it

⁶ John J. Johnson, “Talcahuano and Concepción as Seen by the Forty-Niners,” *Hispanic American Historical Review* 26, no. 2 (1946): 251.

⁷ Johnson, “Talcahuano,” 260. When the Forty-Niners passed through, charcoal was still the only fuel used for local heating and cooking (255).

⁸ Johnson, “Talcahuano,” 261.

⁹ Johnson, “Talcahuano,” “If Talcahuano was licentious, dirty, and dominated by the rougher classes, Concepción, about nine miles distant, was settled and refined.” (254)

was a miniature San Francisco in '49," Johnson wrote. "Talcahuano was a boom town; money flowed freely; it looked good to many, some stayed."¹⁰

Talcahuano had been a port of call for both long-distance and locally-based whaling fleets in the South Pacific until well after World War II.¹¹ The port and its surrounding towns also constituted a major center for artisanal fisheries with incipient industrial extraction and processing of fish to supply markets as far away as Santiago, nine hours to the north by truck. Beginning in the 1940s fishermen had harvested modest quantities of small pelagic fish—common sardine (*Clupea bentincki*) and anchoveta (*Engraulis ringens*)—within 60 miles of the coast off Talcahuano, although the most important species for artisanal fishers were *sierra* (*Thyrsites atun*, see **Figure 4.2**) and hake (*Merluccius gayi*, or *merluza* in Chilean vernacular).¹² In 1941, the state-run Arauco Fishing Company (*Compañía Pesquera Arauco*), with assistance from CORFO, began trawling for hake off the central-south coast. The trawling method used to catch

¹⁰ Johnson, "Talcahuano."

¹¹ Salvo 64-65. Legal scholar Ann L. Hollick argued that these whaling interests were the main factor leading the Chilean government to assert its 200-mile claim over territorial waters in 1947. Ann L. Hollick, *U.S. Foreign Policy and the Law of the Sea* (Princeton, NJ: Princeton University Press, 1981).

¹² E. Yáñez, M.A. Barbieri, and L. Santillan, "Long-Term Environmental Variability and Pelagic Fisheries in Talcahuano, Chile," *South African Journal of Marine Science* 12 (1992): 175-88.

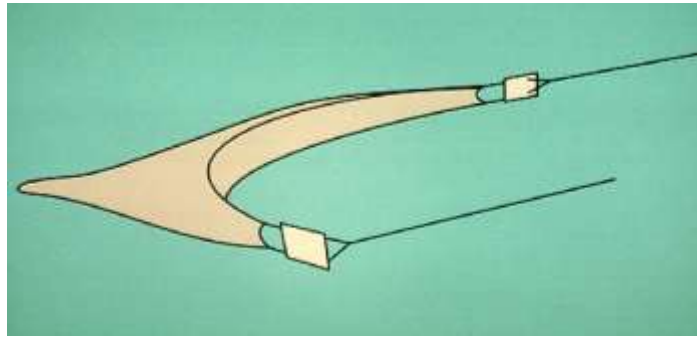
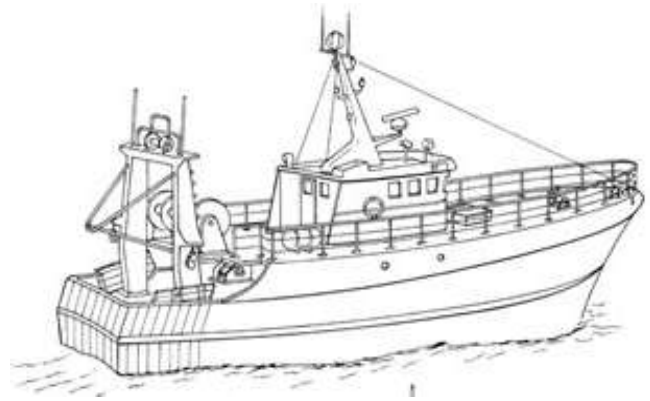


Figure 4.2: Landings of *sierra*, formerly one of the most important species for artisanal fishers in the central-south of Chile, c. 1950s. Photograph by Antonio Quintana. Courtesy of the Archivo Fotografico, Biblioteca Nacional de Chile.

this deep-water species drags a large net in midwater or across the ocean floor (**Figure 4.3**), raking in other creatures in its path, which are typically discarded back into the sea dead. The introduction of industrial trawling for hake thus sparked outrage among local fishermen; their organizations demanded its prohibition to no avail.¹³

¹³ "Notas sobre pesca," *El Mercurio*, April 18, 1943, 3. The article refers to an undated demand made by the Congreso de Pescadores en Coquimbo.

(A)



(B)

Figure 4.3: An industrial trawl net (B), to be dragged in mid-water or across the ocean floor behind a large boat (A), scooping up everything in its path. "Fishing Vessel types: Trawlers, Technology Fact Sheets," In: *FAO Fisheries and Aquaculture Department* [online], Rome, updated May 9, 2001, accessed November 23, 2011, <http://www.fao.org/fishery/geartype/103/en>.

Despite government- and FAO-sponsored campaigns designed to increase its consumption in the 1940s and 50s, trawlers scooped out far greater quantities of hake than local markets could absorb, with the excess used to produce fishmeal.¹⁴ By 1959, at least 29 fishmeal plants operated along the Chilean coast in 1959, mainly around Talcahuano.¹⁵ However, since hake is a fish whose white flesh is low in oil content, it is a poor raw material for fishmeal, and as U.S. consular reports noted, the cost of the hake-based fishmeal was far above the global norm.¹⁶

The northern zone fisheries off Iquique and Arica offered a different panorama. Along the South Pacific Coast near the Peru-Chile border, the Humboldt Current's trajectory curves slightly to the west following the shape of the continent while the vast Atacama Desert stretches along the narrow coastal plain and inland *altiplano*. "[T]he excessive aridity which prevails in this region renders it almost lifeless," observed U.S. geographer Frank Chapman in 1926.¹⁷ As in the Sechura Desert to which the Atacama connects farther north, thick marine fogs—known as *camanchaca* in Chile and *garúa* in

¹⁴ B.F. Osorio Tafall to Kask, [(no title) Report on fisheries tour of Latin America], Doc. 0051909, May 19, 1950. FAO Archive-Rome, RG 14FI158. In 1950 Osorio-Tafall lamented the high proportion of hake being used for fishmeal.

¹⁵ Victor Algrant, Commercial Attaché of US Embassy in Santiago to DOS in D.C., "Chilean Fishmeal Industry," June 10, 1960. U.S. National Records and Archives Administration, College Park, MD, Chile 1960-63, Box 2402.

¹⁶ Algrant, "Chilean Fishmeal."

¹⁷ Frank M. Chapman, "Darwin's Chile," *The Geographical Journal* 68, no. 5 (1926): 371.

Peru—blanket the rainless coast almost daily from June to October.¹⁸ On the pampa between the coastal mountain range and the jagged Andean peaks, “drifting sands form immense dunes” and “an impalpable dust rises in blinding clouds with the slightest wind,” the earth covered with salt basins and sodium nitrate deposits and dotted by a handful of desert oases.¹⁹ But the harsh desert climate of the Peru-Chile coast belied the vast riches of the cold coastal current, which was barely tapped until after World War II.

In 1960, state officials set out to revive the ghost towns that had once thrived with the production of nitrates in the territories Chile took over following the War of the Pacific (1879-83).²⁰ Derived from the dry earth of the highland pampa, nitrates had superseded guano from coastal islands as the region’s most lucrative export until

¹⁸ Philip W. Rundel, "Ecological Relationships of Desert Fog Zone Lichens," *The Bryologist* 81, no. 2 (1978): 277-93.

¹⁹ R.A.F. Penrose, "The Nitrate Deposits of Chile," *The Journal of Geology* 18, no. 1 (1910): 6.

²⁰ Chile claimed the Arica, Tarapacá, and Antofagasta provinces, leaving Bolivia landlocked, while Peru and Chile battled over their terrestrial border until 1929. The 1883 Treaty of Ancón established the terrestrial boundary at the river Sama, north of the formerly Peruvian Tacna and Arica provinces, but whose description in the treaty text later gave rise to a dispute over the precise location of this boundary. In 1922 the two countries submitted the dispute for international arbitration. The Arbitrator, U.S. President Calvin Coolidge, determined in 1925 “that the Southern boundary of the territory covered by Article 3 of the Treaty of Ancon is the provincial boundary between the Peruvian provinces of Arica and Tarapaca as they stood on 20 October 1883,” but in 1929 Chile and Peru signed the Treaty of Lima, with the assistance of U.S. President Herbert Hoover, giving Tacna to Peru and Arica to Chile. See Reports of International Arbitral Awards, Vol. II, 921-958, cited in FAO Legal Office, “Summary of Decisions by International Tribunals including Arbitral Awards, Section 4.2.5. Tacna-Arica Case,” in *Source of International Water Law*, FAO Legislative Study 65 (1998), 246, available from <ftp://ftp.fao.org/docrep/fao/005/w9549E/w9549E00.pdf>.

German chemists developed a synthetic substitute in the early 20th century, bringing economic ruin to dozens of desert mining communities by the 1930s. Three decades later, inspired by the success of Peruvian fishmeal boom, CORFO technocrats crafted a state-led initiative they hoped would “transform Iquique into the most important fishery port of Chile.”²¹ CORFO’s *Plan Pesquero* was announced on March 25, 1960 and included a set of credits and subsidies to stimulate a local fishing economy by building port facilities, financing research, and offering loans of up to 50% of the cost of establishing new plants and purchasing boats and equipment.²² Construction of at least nine new plants was also planned for the region.²³ In 1961, the Ministry of Agriculture further boosted the northern sardine- and anchoveta-based fishmeal industry when it issued Decreto 760, limiting the amount of hake the plants could use for reduction to fishmeal.²⁴ These powerful incentives led industrialists to relocate, establish, or expand new operations in the north, with the resources of Peru’s industry within reach of their fleets.

²¹ Secretaria General de CORFO, “Plan de Fomento Pesquero Para Iquique,” Acuerdo No. 5598, Santiago March 25, 1960, 34, AAF 8627/Doc. 3799, Biblioteca Nacional de Chile.

²² CORFO, “Plan de Fomento,” 34.

²³ Algrant, “Chilean Fishmeal.”

²⁴ Ivo Tilic and Arturo Purcell Maschke, “Consumo y Comercialización de la Harina de Pescado en Chile, Presente y Futuro,” Santiago: IFOP pub. no. 13 (1965), 3-4. It is unclear whether the measure was designed to stimulate direct human consumption of hake, or simply to impulse the northern industry, or both.

In a government memo explaining the rationale for the *Plan Pesquero*, CORFO General Secretary Adolfo Ballas cited the presence of “important fishing enterprises that have an abundance of raw material during eight months of the year” in the northern port of Arica, where Anacleto Angelini had established his first fishmeal venture, *Pesquera Eperva*, in 1956.²⁵ Although lacking in-depth scientific study of local oceanic conditions, Ballas confidently concluded—“without fear of error”—that an equally successful fishing industry could be established in Iquique, 150 kilometers south of Arica.²⁶ In highlighting the “great potential fishery riches” near Iquique and Pisagua, he noted the migratory nature of the sardines, anchoveta, and tuna “that move in great schools in search of food. If these species are not captured when they pass by our littoral, they go elsewhere without benefit to anyone.”²⁷ This comment reflected the notion that was common among scientists, policymakers, and industrialists throughout this story: all resources not utilized by humans were by definition “wasted.”

While Adolfo Ballas was optimistic about his country’s fisheries, U.S. and FAO experts at the time assessed them to be decidedly inferior to those of Peru. In 1959, U.S. fisheries scientist and industry executive Wilbert Chapman highlighted the richness of

²⁵ A. Ballas, CORFO Secretario General, “Plan de Fomento Pesquero para Iquique [cover letter],” March 25, 1960, AAF8627/ Doc. 3799, 2.

²⁶ Ballas, “Plan de Fomento,” 2.

²⁷ Ballas, “Plan de Fomento,” 2.

the angle between Iquique in northern Chile and Ilo in southern Peru, from 15 to 80 miles off the coast, but ultimately stressed the greater presence of tuna as well as baitfish (ie. sardines and anchovetas) along the Peruvian coast.²⁸ FAO scientist Ivan Popovich in 1963 observed that the “best fishing area for Arica...would be north in Peruvian waters,” having determined that the fish tended to concentrate in an eddy even farther north, between Ilo and the town of Atico on the coast of the Arequipa province.²⁹ Confirming the observations of scientists and industrialists from this period, later studies determined that this is one of the three main stocks of anchoveta.³⁰

In his memo, however, Ballas made no mention of the ongoing tensions with Peruvian fishing boats along the border near Arica and with long-distance foreign fleets—whose presence he noted off the Chilean coast—which took tuna in deeper waters and baitfish near the shore.³¹ At the time of his letter in 1960, Peruvian fishmeal dominated international markets and Chilean firms were attempting to emulate their success, often by encroaching into Peruvian waters. In theory, a 1954 agreement

²⁸ W.M. Chapman (Dir. of Research, ATA) to Fred E. Taylor (U/FW, Dpt. of State), Letter, Apr. 2, 1959; FOREIGN REPORT Chile No. 59-1, Appendix I, p.3; Chapman Papers, UW Special Collections, Box 50, Folder 9.

²⁹ Carl A. Hedreen to File, Memorandum re: “Luncheon meeting with Dr. Popovich of the Instituto de Estudios de Recursos Marinos – October 15, 1963,” October 16, 1963; Chapman Papers, UW Special Collections, Box 59, Folder 20.

³⁰ See for example R. Serra, “Changes in Abundance of Pelagic Resources Along the Chilean Coast,” in *FAO Fisheries Reports*, No. 291 (FAO, 1983), 244.

³¹ Ballas, “Plan de Fomento,” 2.

between Peru and Chile had established a “tolerance zone” of ten miles on each side of the maritime border, excluding the 10 mile zone closest to the coast, and the Chilean Ministry of Agriculture and Fisheries had in February 1961 warned its nationals not to “violate Peruvian waters.” Yet later that year, officials were to cite infringements by Angelini-owned fleets—no doubt a common occurrence during these boom years.³²

By 1963, the state-led initiatives had transformed Iquique into the new center of the Chilean fishmeal industry. In the words of *New York Times* columnist Edward C. Burks, “Iquique has found new wealth in the sea,” with 10 plants in Iquique and 56 total across the three northern provinces (Tarapacá, Antofagasta, and Atacama).³³ The balance of national industrial fisheries had shifted dramatically: while Talcahuano had supplied nearly 45% of total Chilean fish landings for industrial uses in 1950 and between 30-40% of the total until 1960, the proportion dropped suddenly to 11% in 1961

³² For the 1954 agreement, see Governments of Peru, Chile, and Ecuador, *Agreement on the Special Maritime Boundary Zone*, December 4, 1954, accessed November 24, 2011, available from <http://www.un.org/depts/los/LEGISLATIONANDTREATIES/STATEFILES/CHL.htm>. Both Chilean and Peruvian boats were accused and/or caught fishing on the other side of the maritime boundary. J. Manuel Casanueva R., “Sobre violación de aguas peruanas or embarcaciones pesqueras chilenas,” February 23, 1961, Archivo Siglo XX, Santiago, Chile, Ministerio de Agricultura V1482; J. Manuel Casanueva R., “Ref: Oficio confidencial No. 21 sobre pesca de embarcaciones chilenas en aguas peruanas,” August 9, 1961, Archivo Siglo XX, Santiago, Chile, Ministerio de Agricultura V1482; Ministro de Defensa (Chile) to Ministro del Interior (Chile), “Obj: R/c. medidas que se adoptan con pesqueros extranjeros por transgression disposiciones vigentes,” October 4, 1961, Archivo Siglo XX, Santiago, Chile, Ministerio de Agricultura V1482.

³³ Edward C. Burks, “Fish meal a boon to port in Chile: New export trade revives dormant city of Iquique,” *New York Times*, May 5, 1963, 4; “Chile’s fisheries expanding fleet: Foreign capital is attracted by booming industry,” *New York Times* July 28, 1963, 96.

and 9% in 1962.³⁴ Although city officials expanded Iquique's industrial sector (*Barrio Industrial*) to house new refrigeration facilities—demonstrating the intent to increase human consumption of harvests—fishmeal remained the most important activity, and a new warehouse was built to collect sacks of the commodity before export.³⁵ As fishmeal cargoes increased, the local newspaper *El Tarapacá* reported how new life came to the town: “The port has presented in recent days a characteristic that is truly exciting, as never, in recent years, had there been more activity in shipments and landings.”³⁶ The article went on to describe in detail the various ships arriving to load their cargoes, mostly fishmeal and oil, departing from Iquique. More critical foreign observers, however, noted that this new prosperity had not done much to improve the living conditions of those who worked in the fisheries: “Iquique's fishermen and fish meal workers,” wrote Burks, “live in wood shacks that can only be described as hovels.”³⁷

³⁴ The statistics cited in this source do not indicate how much of the industrially-processed fish is fishmeal. Between 1950-1960, Talcahuano supplied only 15-25% of total fish landings for direct human consumption. “Talcahuano: Primer Puerto Pesquero,” *Chile Pesquero* No. 11 (1962): 14.

³⁵ “Una nueva area industrial se levantaría en Iquique,” *El Tarapacá* (Iquique), March 10, 1963, 1; “Bodega para 15.000 tns. de harina de pescado quedará habilitada en este puerto,” *El Tarapacá* (Iquique), March 23, 1963, 5.

³⁶ “Enormes cargamentos de harina de pescado, se han registrado,” *El Tarapacá* (Iquique), March 21, 1963, 1.

³⁷ Edward C. Burks, “Fish meal a boon to port in Chile: New export trade revives dormant city of Iquique,” *New York Times*, May 5, 1963, 4.

The *New York Times* attributed Chile's newfound industrial success to the arrival of imported technology, scientists, and international capital. This new foreign influx, the paper suggested, would modernize fishing activities that they believed locals were ill-equipped to do. Chilean small-scale fishermen "who have carried out the tradition of their forefathers for centuries by sailing in their tiny boats," one article declared, "are no match for the modern fish-catchers," referring to the new trawlers built in California, Peru, and Europe.³⁸ Replacing the older, wooden fleet of *goletas anchoveteras* that operated through the end of the 1950s, the first American-style steel seiners were imported from Peru in the 1960s.³⁹ News of the abundant anchoveta schools in the north also attracted capital from all over the world. "Norwegian, South African, Canadian, Japanese, German, and other firms rushed to obtain concessions to install small plants," while Danish, Swedish, German, and U.S. equipment filled Iquique fishmeal factories.⁴⁰ In 1963 even the U.S. Gulf Coast-based "fishmeal king" Harvey Smith brought four *goletas* for use in his majority-owned Chilean Fishing Company (*Compañía Pesquera*

³⁸ "Chile's fisheries expanding fleet: Foreign capital is attracted by booming industry," *New York Times*, July 28, 1963, 96.

³⁹ Solange Duhart and Jacqueline Weinstein, *Pesca Industrial: Sector Estratégico Y De Alto Riesgo*. 2 vols. (Santiago, Chile: Colección de Estudios Sectoriales No. 5, Academia de Humanismo Cristiano, 1988), 48.

⁴⁰ "Chile's fisheries," Burks, "Fish meal a boon."

Chilena).⁴¹ U.S. pharmaceutical concern Pfizer also expanded into Chilean anchoveta fishmeal for animal feed, and the firm reported six fishing boats of its own by 1966, as well as the use of state-of-the-art echo-sounding technology, huge nets, and spotter planes to supply its Iquique plant with raw materials.⁴² Depicting an international *mélange* of capital, expertise, and technology suddenly at the disposal of Northern Chilean fisheries, such reports suggested the possibility of a lucrative new investment opportunity to readers in the global North.

Yet the fate of the nascent industry hinged on the continued presence of the pelagic schooling fishes that at that point flourished in coastal waters. As an unnamed German scientist remarked to the *New York Times*, “Chile’s maritime wealth is incalculable.... But,” he added, “we should not permit too great an increase in fishing of anchovy in the north.”⁴³ Aware that natural limits existed, Chilean authorities did introduce Decree Law 524 in 1964 that established fishing permits with annual harvest quotas. Yet the measure was not effectively enforced, as economist Julio Peña-Torres

⁴¹ “4 modernas goletas pesqueras trajo ayer el Sr. Harvey Smith,” *El Tarapacá* (Iquique), March 23, 1963, 1.

⁴² “Pfizer 1st Quarter Net Set Record; Sales Rose from Like ‘63 Period,” *Wall Street Journal*, . 23; “Pfizer, Big Drug Concern, Goes into Fishing Business,” *Wall Street Journal*, 18. The boats had 140-ton holds and could be filled within 24 hours when fishing at only 15-20 miles offshore. The plant had a 25,000-ton capacity and was operated by Pfizer’s Chilean subsidiary, Pfizer del Mar.

⁴³ “Chile’s fisheries expanding fleet: Foreign capital is attracted by booming industry,” *New York Times* July 28, 1963, 96.

would later remark, and in truth constituted “more of a warning for the private sector than quotas that were actually *implemented*.”⁴⁴ Harvesting and processing capacity in the north was clearly overdeveloped following the frenzied period of investment, with the northern fleet reaching its maximum number of vessels in 1965 (251 in all), mostly dedicated to the harvest of anchoveta, and secondarily sardine, for fishmeal production.⁴⁵

The year 1965 also saw the anchoveta disappear from the northern coast with the onslaught of El Niño. Although the 1965 event was far less catastrophic than that of 1972 for the Peruvian fishmeal industry, it wreaked considerable havoc, leaving bewildered local authorities to hope for their return. In the absence of their most important raw material, as *El Tarapacá* noted, Pesquera Eperva reached an agreement with its workers to fish for sardines although other firms, whose workers were on strike, remained closed.⁴⁶ With industrialists unable to pay their debts to the state, CORFO resolved to take over the ailing enterprises.

Shifts in Humboldt Current fish stocks resonated throughout global commodity markets, while speculators established fishmeal futures trading by April 1967 in an

⁴⁴ Julio Peña-Torres, "Regulación Pesquera En Chile: Una Perspectiva Histórica," *Cuadernos de Economía* 33, no. 100 (1996): 369

⁴⁵ Number of vessels from Serra, "Changes in Abundance," 236, 239.

⁴⁶ "Goletas pescan sardinas por falta de anchovetas," *El Tarapacá*, December 11, 1966, 3.

effort to cash in on supply swings.⁴⁷ At the time, scientists and local officials were aware that the cause of the anchoveta's disappearance was linked to the "warm current" off the coast but they lacked an understanding of the fluctuations within the ecosystem. Some speculated freely, as in a 1967 *Washington Post* article that suggested the temperature changes stemmed from "earthquake tremors in the ocean bed."⁴⁸ As for the region itself, industrial fishing had seemed to "[hold] the promise of prosperity" seven years earlier. Local officials now sought another if improbable avenue to remedy their economic woes. In a country that had no legal divorce until 2004, they floated the idea of converting Iquique into a "divorce resort" which would inject money into the local economy by requiring a three-month residency requirement.⁴⁹

While Chilean pelagic fisheries faced this crisis—a fate which the Peruvian industry would soon meet as well—left-wing governments of the early 1970s forged fishing treaties with the Soviet Union, ceding access to coastal waters in order to supply domestic markets with frozen fish caught with deep-water factory trawlers. Such efforts were part of populist programs that aimed to improve nutrition among low-income people. In 1971, the Peruvian Gen. Juan Velasco Alvarado (1968-75) signed an

⁴⁷ "Trading in fishmeal futures set to begin today," *Wall Street Journal*, 26.

⁴⁸ "Chilean fishing town seeks to become a divorce resort," *Washington Post*, June 10, 1967, A12.

⁴⁹ In order to obtain the divorce, couples would, in completing the residency requirement, spend money on hotels, restaurants, and local entertainment. "Chilean fishing town seeks to become a divorce resort," *Washington Post*, June 10, 1967, A12.

agreement allowing factory trawlers to operate off the Peruvian coast; a decade and a half later, at least 200 trawlers were still active.⁵⁰ In 1972, the Chilean government of Salvador Allende (1970-1973) rented four Soviet trawlers through the state-run Arauco Fishing Company, to be manned by Chilean crews, in addition to signing a treaty much like the Peruvian one that allowed trawlers to fish in territorial waters in exchange for domestic supplies.⁵¹ The Chilean state paid for the Soviet-caught fish with fishmeal when possible.⁵² Raking in enormous quantities of hake (*merluza*), crews processed the fish on board, removing the head and entrails and quick-freezing it in blocks of 22 pounds each.⁵³ Chilean consumers, however, refused to buy it, leaving Arauco Fishing Company cold storage facilities “bursting with unsold Soviet hake” and forcing the government to give away 20 tons to Santiago households.⁵⁴ Such efforts to promote the large-scale, industrialized production of fish for food thus remained ill-suited to local preferences, but local swings in the Humboldt Current continued to drive the movement

⁵⁰ “Peru: Ministro de Pesca Propuso Reducir Flota Soviética en Aguas Peruanas,” *Boletín Pesquero* No. 23 (March 7, 1985): 17-18. USSR allies Cuba and Poland also sent large factory ships during 1970s-80s with international crews (Peruvians were also hired).

⁵¹ “Hoy entregarán los pesqueros soviéticos,” *Diario El Color* (Concepción), January 26, 1972, 9.

⁵² “Russ. Ruining Fish Industry, Chilean Says,” *Los Angeles Times*, April 16, 1972, E15

⁵³ Not only was this an inconvenient size for marketing, but the fish tended to flake apart into a mash when defrosted.

⁵⁴ “Russ. Ruining,” On factory trawling and block-freezing in the North Atlantic at this time, see Paul Josephson, “The Ocean’s Hot Dog: The Development of the Fish Stick,” *Technology and Culture* 49.1 (2008): 41-61.

of capital and technology along the Chilean coast in search of the schooling species used for fishmeal.

4.2. Translocal migrations and Talcahuano's rise to primacy

Localized ecosystemic fluctuations along the Chilean coast dramatically shaped the lives of fishers and their families. Arturo Saldivia, fisherman and former union leader from Talcahuano, recalled in a 2009 interview how men moved between north and south depending on the locations and abundance of fish schools. He grew up in the *caleta* La Gloria in San Vicente, on the south side of the peninsula, fishing with his siblings for subsistence along the shore before learning the trade at sea.⁵⁵ Having fished with his father and other male relatives on small boats (maximum 10 meters long) in the San Vicente Bay, at age 15 Saldivia also spent a year working in the whaling fleet, thinking to himself, "*Pucha*, ...from this I will live, I'll have work until I'm 100 years old!" In the bay and farther out in the Gulf of Arauco, he recalled, "there was an incredibly rich biomass, incredibly rich in species, all kinds of species, pelagic and demersal."⁵⁶ Soon, however, pollution from the Huachipato Steel Company (Compañía Siderúrgica Huachipato) and the National Oil Company (Empresa Nacional del Petróleo, ENAP),

⁵⁵ Arturo Saldivia, interview with the author, Talcahuano, Chile, July 4, 2009.

⁵⁶ Saldivia, interview; "pelagic" species refers to those which live within the upper layer of the water, while "demersal" refers to the lower layer, near but just above the seafloor.

both founded in 1950, drove out fishing communities along the shores of the bay—and by the early 1960s, word of the booming industry in Iquique drew many to the north, where the anchoveta harvest was thriving.

Yet volatility continued to plague northern Chilean and Peruvian pelagic fish stocks, and when the 1965 El Niño struck and sent the northern industry into peril, firms and much of the fleet relocated to the central-south, where the industry continued its steady growth through the end of the decade.⁵⁷ The itinerant fishermen, some now captains of their own boats, also returned, well-trained by their experience working aboard the large northern seiners. Even during this period of expansion, however, in the late 1960s and early 1970s fluctuations in anchoveta and common sardine (*Clupea bentincki*) continued to impact the Talcahuano-based industry. By 1969 some fishers replaced anchoveta nets with those designed for jack mackerel (*Trachurus murphyi*), a slightly larger and deeper-swimming migratory schooling species.⁵⁸ In 1973 the Spanish sardine (*Sardinops sagax*) appeared for the first time in Talcahuano waters, displacing the

⁵⁷ Saldivia, interview; E. Yáñez, M.A. Barbieri, and L. Santillan, "Long-Term Environmental Variability and Pelagic Fisheries in Talcahuano, Chile," *South African Journal of Marine Science* 12 (1992): 181.

⁵⁸ Serra, "Changes in abundance," 241.

common sardine in the local ecosystem.⁵⁹ Fishing effort remained mostly stable around the middle of the decade.⁶⁰

As fish populations fluctuated and firms raced to adopt the most appropriate technologies and locations for their harvest, the industry also underwent a process of consolidation at the national level. After the 1973 overthrow of Socialist president Salvador Allende Gossens, the neoliberal regime of General Augusto Pinochet reprivatized the firms and plants that had been taken over by CORFO during the crisis of the late-1960s, selling them off either as complete operations or as separate pieces of used machinery. In 1975, Talcahuano governor Cpt. Fernando Carrasco Herrera wrote to CORFO executives expressing his urgent support for the request by a new local firm, *Exportmar S.A.*, to purchase used equipment from a CORFO-owned northern plant in the process of “liquidation.” Citing the “very old, grave, and progressive sanitation problem” of “bad smells that invade the city” and “constant epidemics” residents endured, Carrasco emphasized the need for pollution control mechanisms for the liquid waste (*agua de cola*) from the city’s 14 fishmeal plants.⁶¹ The requested machinery would

⁵⁹ Serra, “Changes in abundance,” 235, 238; Yáñez, Barbieri, and Santillan, “Long-Term,” 185. Spanish sardine populations also increased in northern Chile, where they became the most important fishery by the end of the decade, far surpassing the production of the 1960s.

⁶⁰ Serra, “Changes in abundance,” 239.

⁶¹ Cpt. Fernando Carrasco Herrera, “Instalación recuperadora agua de cola proveniente de Industrias Pesqueras de Talcahuano,” April 25, 1975, Archivo Siglo XX, Santiago, Chile, CORFO Files, Vol. 125.

divert the organic effluents away from the bay, where they were otherwise released untreated. By utilizing such technology, industrialists actually increased efficiency by reincorporating some of the proteins and oils back into the production cycle.

In 1976 El Niño again spurred a new migration to the north.⁶² “There was not a single fish here,” Saldivia recalled; “[Not] sardine, not anchoveta, not jack mackerel.”⁶³ He resolved to take his family north to Arica, traveling from Talcahuano by boat, along with others from San Vicente, only to discover that their nets were not appropriate to the conditions there.⁶⁴ Furthermore, the pelagic schooling fish had also disappeared from northern waters.⁶⁵ “It went badly, badly for us. We didn’t even have anything to eat, we had to go to the boats of the other companies, so they would give us something to eat, and we slept usually on the boat.” After three months in Arica, Saldivia heard the fishing for Spanish sardine (*Sardinops sagax*) and bonito (*Sarda chiliensis chiliensis*) was good off Coquimbo in the Norte Chico. He went there instead and sent for his family. Things went very well, he explained. But by 1977 a new, more intensive expansion was

⁶² Serra, “Changes in abundance,” 235.

⁶³ Yáñez, Barbieri, and Santillan in fact cite the 1976 collapse of anchoveta and common sardine populations off Talcahuano, but note the increasing harvest of jack mackerel beginning in 1974 (“Long-Term,” 185). This conflicts slightly with the personal narrative Saldivia offered in the interview as well as other informal accounts I collected during my fieldwork in Talcahuano, where most dated the “jack mackerel boom” as taking off towards the end of the decade.

⁶⁴ Saldivia, interview.

⁶⁵ Serra, “Changes in abundance,” 235.

taking hold of the Talcahuano fishing industry, so when one firm bought a new boat a few months later and set off for the south, Saldivia hitched a ride.⁶⁶

Towards the end of the 1970s, schools of jack mackerel (*Trachurus murphyi*) congregated unusually close to south-central Chilean shores.⁶⁷ These fish typically swim off the Chilean and Peruvian coast (2°N - 51°S, 106°E - 79°W) between 10 and 70 meters of depth, migrating across a broad swath of the Pacific Ocean from the Humboldt Current upwelling where they feed to well beyond the 200-mile Chilean Exclusive Economic Zone to spawn.⁶⁸ Chilean scientists later concluded that “environmental change since the mid 1970s” —specifically, shifts in ocean currents and wind patterns that affected the water temperature and upwelling system—probably caused jack mackerel stocks to move towards the shore.⁶⁹ In closer proximity to the coast they were more accessible to fishermen. These newly-available schools, along with the increase in

⁶⁶ Saldivia, interview.

⁶⁷ Yáñez, Barbieri, and Santillan, "Long-Term," 185. The authors actually date the increasing abundance of jack mackerel beginning in 1974, but this contradicts the personal narrative Saldivia offered in the interview as well as informal accounts from my fieldwork in Talcahuano. It is unclear exactly when the fish appeared significantly close enough to shore to spur this new phase of expansion.

⁶⁸ M.L. Stevenson, "Trawl survey of the west coast of the South Island and Tasman and Golden Bays," March-April 2003 (KAH0304), *New Zealand Fisheries Assessment Report 2004/4*; FAO-FIGIS, "A world overview of species of interest to fisheries, Chapter: *Trachurus murphyi*," accessed July 14, 2005, available from www.fao.org/figis/servlet/species?fid=2309; both cited in FishBase, eds. R. Froese and D. Pauly, accessed November 25, 2011 (version 10/2011), available from www.fishbase.org.

⁶⁹ Yáñez, Barbieri, and Santillan., "Long-Term;" 185-86.

Spanish sardines that followed shortly thereafter, thus supported yet another phase of rapid growth allowing Talcahuano to reclaim its position as the primary fishing port of Chile.

While the central-south region was the most dynamic, regime shifts in the marine ecosystem also affected northern fisheries. By 1979 jack mackerel and, secondarily, Spanish sardine became the two most exploited species in the central-south region, and the same species also dominated the now less voluminous northern fishery, but in reverse—with Spanish sardine harvests greater than those of jack mackerel.⁷⁰ Overall, however, the high catch volumes of jack mackerel and its migratory nature between national and international waters made it the most important fish—both commercially and politically—for Chilean industrialists beginning in this period. From 1978-1992, Soviet factory fleets also fished heavily for jack mackerel outside the 200-mile zone, while marine scientists investigated the possibility of a “Mackerel Belt” circling the Pacific or perhaps even “the entire Earth.”⁷¹ In collaboration with the industrial fleet, they collected data on more than 200 oceanographic cruises during the most intensive

⁷⁰ See Serra, “Changes in Abundance.”

⁷¹ A.A. Elizarov, “Prefacio,” in Dagoberto Arcos and Alexander S. Grechina, eds., *Biología y Pesca Comercial del Jurel en el Pacífico Sur* (Talcahuano, Chile: Instituto de Investigación Pesquera, 1994), 7.

fishing years for this species.⁷² In Chile, jack mackerel-based fishmeal remained the primary engine of the fishing industry. Only a small portion of the catch typically went to the canneries because, as one executive explained, "...about a quarter of the jack mackerel is good for food. The rest will be sent to our fish meal factory."⁷³

In 1980 Chile surpassed Peru in fishmeal production. Although Chile's success was owed in large part to the increasing exploitation of jack mackerel, the Peruvian press was quick to blame this development on fishery closures in the region near the Peru-Chile maritime boundary: "Chile has put itself at the head of world production of fishmeal," complained an article in the Lima newspaper *El Comercio*, "thanks to the advantage given by our *vedas* [fishery closures] along the southern coast."⁷⁴ Peruvian Minister of Fisheries Rene Deustua shared the competitive desire to harvest the straddling stocks before the Chileans could. "[T]he fish is migratory," he reportedly told an audience in Ilo, "and if we abstain from [fishing it] during the *veda*, it will simply fill

⁷² The area between 25 and 41 degrees S was the specific location of the Soviet fishery. During the 1960s USSR long distance fleets began prospecting South Pacific marine resources, undertaking more than 150 scientific research expeditions in the Southeast Pacific during two decades. A.A. Elizarov, "Prefacio," in Dagoberto Arcos and Alexander S. Grechina, eds., *Biología y Pesca Comercial del Jurel en el Pacífico Sur* (Talcahuano, Chile: Instituto de Investigación Pesquera, 1994), 7.

⁷³ Everett Martin, "Vanishing anchovy is hurting, changing fish-meal production in Chile and Peru," *Wall Street Journal*, July 3, 1979, 20.

⁷⁴ "Chile elevó producción de harina por veda en nuestro litoral sur," *El Comercio*, November 11, 1980.

the Chilean nets.”⁷⁵ By 1981, the Peruvian government had lifted the *veda* for anchoveta just along a 150-mile stretch of the southern coast near the Chilean border.⁷⁶ However, Deustua’s objective was evidently driven more by nationalism than a desire to support the fishmeal industry, as he advocated a shift towards fisheries for human consumption. In the early 1980s the processing of sardines into fishmeal was prohibited in order to reserve them for human consumption.⁷⁷ While the socially-oriented aims of the Peruvian regime clashed with the prerogatives of industrialists who generated higher profits producing fishmeal, under Chile’s neoliberal regime no such restriction existed. Biologist Carlos Martínez noted in 1984 that 90% of the northern Chilean catch was sardines harvested within 40 miles from the coast between just south of Iquique to the northern limit at Arica—the same stocks that straddled the maritime border.⁷⁸ Surpassed by its southern neighbor, Peru’s fishmeal industry languished, in part due to

⁷⁵ “Chile elevó...”

⁷⁶ K. Turner, “Carelessness cuts into Peru fishing industry,” *The Telegraph* (London), January 9, 1981, 13, accessed November 25, 2011, available from <http://news.google.com/newspapers?id=MqcrAAAIBAJ&sjid=7PwFAAAAIBAJ&pg=6978%2C1461246>.

⁷⁷ Significant clandestine production did, however, occur.

⁷⁸ “Chile: Estado actual y proyecciones de la actividad extractiva,” *Boletín Pesquero* 3 (10/1984), 14-20.

government policies that limited anchoveta harvests and prioritized the processing of other species for local consumption.⁷⁹

In Chile, entrepreneurs such as Anacleto Angelini, Sergio and Roberto Sarquis (Itata), and Fernández y Cifuentes (Camanchaca) consolidated their fisheries interests into large business empires.⁸⁰ Fishmeal producers also invested heavily in upgrading their harvesting and processing capacity. Sociologists Solange Duhart and Jacqueline Weinstein found that this modernization occurred simultaneously across the production process—design of boats, improvements in machinery, nets, and other gear.⁸¹ When the Peruvian state-owned enterprise Pesca Perú was dismantled after 1976, officials sold used boats and plants to Chile, Ecuador, and even California.⁸² By 1979, fleets

⁷⁹ The outdated 1970s technology remained in use at least through the mid-1990s. “Empresas productivas del norte peruano tiene retraso tecnológico de 25 años,” *El Comercio*. January 19, 1994.

⁸⁰ Magdalena Echeverría, “Radiografía de algunos de los grandes grupos pesqueros de Chile,” *Economía y Negocios/El Mercurio* (July 13, 2007), available from www.economiaynegocios.cl/noticias.asp?id=29623 (accessed April 13, 2008); Damiani Quintanilla, Paola, Carolina Pino González, and Claudia Sanhueza González. “Análisis Al Desempeño De Los Grupos Empresariales En Chile,” Tesis para Lic. Ingeniería Comercial, Universidad de Chile, 2005.

⁸¹ Duhart and Weinstein, *Pesca Industrial*, Vol 1, 47.

⁸² “Gobierno suspended venta de fábricas pesqueras a Chile: Investigan denuncia sobre utilización ilegal de CERTEX,” *La República (Lima)*. June 24, 1983, 2. In 2010, the fishmeal plant I visited in Guayaquil, Ecuador incorporated used Peruvian machinery as well as steam dryers produced in Chile during the 1980s. A 1984 article also cites “Panama and countries of the Middle East and Africa” as purchasers of the Peruvian fleet. “Peru: Se recupera producción pesquera,” *Boletín Pesquero* 1 (1984), 9-10.

incorporated spotter planes and began to operate at night.⁸³ In 1981 Chilean firms began investing in a new, Norwegian-style boat, better suited to the long distances, deeper fishing, and rougher conditions in the southern region.⁸⁴ The Norwegian boats were more stable and powerful in waves and introduced other technological improvements such as setting the net without a *panga* (small skiff used for the setting maneuver in American-style models) and using nets specially designed to sink down faster around the school in a shift to mid-water trawling for jack mackerel.⁸⁵ “Combination” models were equipped to fish with either purse nets for sardines, anchovies, and jack mackerel or mid-water trawl nets used mainly for jack mackerel.⁸⁶ Innovations occurred in processing as well. In 1987 a new method for drying the fishmeal by using steam vapor instead of direct heat increased the nutritional yield of the final product, then rated at a higher grade.⁸⁷ Chilean fishmeal producers thereby moved into a different niche in global commodity markets with their “prime” or “special” grade fishmeal. Peruvian technology still remained largely outdated, forcing plants to produce greater quantities

⁸³ Serra, “Changes in abundance,” 239, 241.

⁸⁴ Duhart and Weinstein, *Pesca Industrial*, Vol 1, 49.

⁸⁵ Interview with industry executive, Coronel, Chile; June 8, 2009.

⁸⁶ “Chile: Estado actual y proyecciones de la actividad extractiva,” *Boletín Pesquero* 3 (1984), 16.

⁸⁷ This occurs because delicate chemical structures of the proteins and other nutrients remain intact when using the vapor drying method. A. Bermejo, “Chile harinero,” *Expreso* 08/25/1990 (CENDOPES, Press clippings file).

of lower-value product in order to turn a profit.⁸⁸ In Chile the upgraded machinery could operate more efficiently with less raw material.

The booming fishing industry in Talcahuano supported a parallel, informal economy: the systematic appropriation of fish from the industrial harvest. While firms modernized their harvesting and processing capacity, the state did not invest in infrastructure under Pinochet's neoliberal policies. Despite its economic importance, Talcahuano lacked adequate port facilities: Most plants were located in the interior of the city, away from the landing area, and the harbor lacked an adequate pier. The fish thus had to be transported in trucks from the docks through town. But at dockside unloading and during land transport, the industrialists lost up to 80 kg per load to "*los gatos*" (the cats, see **Figure 4.4**)—young males who in groups of ten to twenty climbed quickly onto loaded boats or trucks and filled their own nets with the catch.⁸⁹ This occurred regularly and in open view at the overlapping residential and industrial zones of Talcahuano.

⁸⁸ "Empresas productivas del norte peruano tienen retraso tecnológico de 25 años," *El Comercio*, January 19, 1994.

⁸⁹ Luis Pichott, "Los Gatos: Peligroso Robo Organizado a la Industria Pesquera de Talcahuano," *Chile Pesquero*, August 1985.



Figure 4.4: “Los gatos” – the small-time appropriators of fish from the trucks on the way to the fishmeal plants in Talcahuano (c. 1993). Photograph courtesy of Álvaro Andrés Espinoza.

By the mid-1980s social and political discontent with Pinochet was mounting, and activism among fishermen’s unions constituted a powerful force in resisting the regime. The onslaught of El Niño in 1982-83 again squeezed the fishing industry, creating additional hardship for workers at the same time that the economic crisis intensified the impoverishment of non-elites more generally. Fishermen’s unions and other political organizations were forced to limit operations or meet clandestinely during the Pinochet years. Arturo Saldivia, who worked on an industrial seiner upon his return to Talcahuano from Coquimbo in 1977, served as a regional union representative from 1981 through 1993 (Sindicato de Tripulantes de Naves Especiales de

la Provincia de Concepción) and later as president of the national fishing crew members' federation (Federación Nacional de Tripulantes de Chile). In 1983, Chilean fishermen participated in a national strike against poor pay and inadequate provisions at sea.⁹⁰ Such actions were part of the nationwide unrest that unraveled Pinochet's power by the end of the decade. Small-scale fishermen also organized, formally constituting the National Artisanal Fishermen's Confederation (CONAPACH) in 1988, just as industrialists and policymakers began to debate a new general fisheries law.

The need for comprehensive national fisheries legislation had by then become increasingly clear. Although myriad *ad hoc* regulations existed in Chilean industrial fisheries after 1956, none had effectively limited the excessive exploitation of the region's numerous ichthyological riches. Fishery access had since the 1930s been based in part on "historic rights," but a 1978 decree (D.L. 2442) weakened this principle in order to bolster the growth of firms in the process of reprivatization under Pinochet. The northern industry fished the most and produced mainly fishmeal. Sardine and anchoveta fisheries fluctuated dramatically with El Niño conditions, but regulations were poorly enforced and ineffective in limiting the total extraction of the industrial fleets.⁹¹

⁹⁰ Saldivia interview.

⁹¹ Peña-Torres, "Regulación Pesquera," 370.

In 1989 the *Ley Merino* (Merino Law) was proposed to create a regulatory mechanism based on a ranking of the level of overexploitation (“plena explotación” and “productividad excedente,” as proposed). Meant to enter into effect with the transition to democracy in March 1990, it also laid the groundwork for a system of Individual Transferable Quotas (ITQs). The quota system elicited opposition from northern industrialists because it would include zoning that would restrict their ability to relocate their extractive activities from the depleted and volatile northern regions to the growing southern fisheries in Talcahuano and elsewhere.⁹² Industrialists from the south therefore supported the law as a way of limiting their competition.⁹³ CONAPACH and other labor organizations, however, called it a form of “privatization of the sea,” denouncing the political patronage that shaped the assignment of quotas.

By the end of the twentieth century, Chilean industrialists had solidified their position as producers of high-grade fishmeal based on a multi-specific fishery, better capable of adapting to ecosystem fluctuations than the single-species anchoveta fishmeal industry in Peru. Northern fisheries nonetheless suffered from general depletion after 1991: “In Iquique, a port perched on the edge of the towering mountains of the Atacama Desert, the stench of fishmeal plants has disappeared,” wrote Leslie Crawford in the

⁹² Peña-Torres, “Regulacion Pesquera,” 376. See also Eduardo Bitrán, ed., *El Desafío Pesquero Chileno: La Explotación Racional De Nuestras Riquezas Marinas* (Santiago, Chile: Hachette, 1989).

⁹³ Peña-Torres, “Regulacion Pesquera.”

Financial Times that year. "The plants are silent, facing an idle fishing fleet moored in the bay. Even the vultures and pelicans circling overhead look hungry."⁹⁴ In Talcahuano, on the other hand, the jack mackerel fishery continued to thrive throughout the decade, based on harvests from both Chilean and international waters. In 1991, *Lloyd's List* offered its assessment of conditions near the region's most important fishing port: "The situation in the central zone fishery around Talcahuano is considered healthy, with the fleet and available stocks in balance. Owners, however, want to double the size of this fleet which is now catching 2.5 tonnes of oceanic jack mackerel annually."⁹⁵ This fishery yielded even greater landings in the 1990s than in the previous decade of voracious industrial growth in Southeast Pacific fisheries.

At the same time, rising demand from aquaculture producers, particularly in East Asia, Scandinavia, and Chile itself continued to fuel markets for fishmeal. Farmed salmon from the lakes of the far south of Chile transformed the country into the world's second largest salmon producer after Norway by 1995.⁹⁶ Chile became the number one exporter of salmon to the United States, supplying global North mega-retailer Wal-Mart

⁹⁴ Leslie Crawford, "Chile no longer has plenty more fish in the sea," *Financial Times* July 19, 1991, 28 (Proquest).

⁹⁵ "New law could boost orders," *Lloyd's List*, February 25, 1991, 4 (Lexis Nexis).

⁹⁶ "Fish exporting booms in Chile, Peru," *The Globe and Mail (Canada)*, March 13, 1995.

with fillets raised in Patagonian lakes.⁹⁷ The booming salmon industry created a domestic market for fishmeal and oil produced by Chilean firms, transforming the country from an exporter to a net consumer of these commodities. Much of the imported fish meal and oil came from Peru, where industrialists also hoped to capitalize on the worldwide boom in salmon farming. Peruvian fishmeal industrialists finally began upgrading old equipment, in association with international capital from Germany, Denmark, and China, among others.⁹⁸

The success of Chilean fishmeal depended foremost on the marine ecology of the Humboldt Current to provide raw material, and thus on the shifting ocean conditions that drove the fish migrations. In 1993, at the height of the jack mackerel boom, Chilean bio-economist Alvaro Espinoza argued that the fishery was unstable at its current harvest levels, warning against the potential disaster of continued pressure on stocks.⁹⁹ A strong El Niño once again dramatically affected Humboldt Current fisheries in 1997-1998, creating a crisis in both Chile and Peru. Scientists, however, still had a poor

⁹⁷ This monospecific production made the industry highly vulnerable to disease outbreaks. See John Soluri, "Something Fishy: Chile's Blue Revolution, Commodity Diseases, and the Problem of Sustainability," *Latin American Research Review* 46 (2011): 32-54.

⁹⁸ Sally Bowen, "Peru aims to feed on fish farming expansion," *Financial Times (London)* 1991/02/22, p. 26 (Lexis Nexis).

⁹⁹ Alvaro Andrés Espinoza Muñoz, "Sustentabilidad De La Pesquería Del Jurel En La Región Del Bío Bío," (Ph.D. diss., Universidad de Concepción, 1993).

understanding of the reproductive and migration habits of jack mackerel.¹⁰⁰ “There are uncertainties about the true status of the jack mackerel stock in the South Pacific,” Chilean marine scientists Dagoberto Arcos, et al., wrote in 2001, “and future short and long-term prospects for the fishery are far from clear.”¹⁰¹ Meanwhile, industrialists and artisanal fishermen were embroiled in a political battle over the fisheries law (*Ley Corta*) and its assignment of individual transferable quotas. As negotiations thus took place at the national level, the long-distance industrial fleet looked to the frontier of Chile’s ocean territory, where factory vessels from across the Pacific trawled for the migrating jack mackerel.

4.3. Peru’s return to fishmeal supremacy, the rise of local marine conservationism, and the gastronomic revolution

The anchoveta returned to Peruvian coastal waters in the 1990s. Although the industry continued to emphasize volume over value in fishmeal production, the 1990s

¹⁰⁰ Sergio Núñez, Sebastián Vásquez, Patricia Ruiz, and Aquiles Sepúlveda. "Distribution of Early Developmental Stages of Jack Mackerel in the Southeastern Pacific Ocean," in *South Pacific RFMO Chilean Jack Mackerel Workshop*, 2009, available from <http://www.southpacificrfmo.org/assets/Chilean-Jack-Mackerel-Report-and-Papers/02.CHJMWS-Distribution%20of%20early%20developmental%20stages%20of%20jack%20mackerel%20in%20the.pdf>.

¹⁰¹ Dagoberto F. Arcos, Luis A. Cubillos, and Sergio P. Núñez, "The Jack Mackerel Fishery and El Niño 1997-98 Effects Off Chile," *Progress in Oceanography* 49 (2001): 613.

were nonetheless a time of renewal for the fisheries there as anchoveta stocks recovered and allowed Peru to regain its position near the top of global markets.¹⁰² The neoliberal government of Alberto Fujimori also privatized the remaining holdings of Pesca Perú, , passing measures to decommission old boats and promote fishing for human consumption from 1993 to 1998. Pressure on anchoveta stocks to produce fishmeal nonetheless continued to grow, as companies invested their new profits in ever-better technology in order to secure a greater share of the total allowable catch—the so-called “race for fish,” or “*Carrera Olímpica*.”

During the 1990s fish also began to occupy a new role in Peruvian national culture as the gastronomic revolution took shape. Fish is the central ingredient in *ceviche*, Peru’s “culinary flagship.” Peruvian gastronomy and tourism scholar Ricardo Hinostroza credits the *nikkei* (Japanese-descent Peruvians) with impelling the shift in *ceviche* preparation from the traditional version, in which citrus juice “cooked” the fish for several hours, to a shorter marinade time where the fish was served nearly raw, like *sashimi*.¹⁰³ During the 1970s the famed Japanese sushi chef Nobu Matsuhisa co-founded

¹⁰² Martin Aranda, "Evolution and State of the Art of Fishing Capacity Management in Peru: The Case of the Anchoveta Fishery," *Pan-American Journal of Aquatic Sciences* 4, no. 2 (2009): 148.

¹⁰³ Mirko Lauer, and Vera Lauer, *La Revolución Gastronómica Peruana* (Lima, Peru: Universidad San Martín de Porres, 2006), 52.

his first restaurant with a Peruvian.¹⁰⁴ “Lima was the perfect town for a sushi chef,” Nobu recalled, “With the Pacific Ocean nearby, fresh fish was never in short supply. ...[and] there were plenty of Japanese businessmen looking for good sushi.”¹⁰⁵ Along with other master chefs in Lima during this era, Nobu was an integral part of the rising restaurant trend of “signature cuisine,” foreshadowing the coming gastronomic boom.¹⁰⁶

From this process of transnational culinary encounters emerged the *novoandino* style in Peru. It was a “marriage of the international with the national,” as Mirko and Vera Lauer described it, a cuisine “without taboos” based on local ingredients, using the latest culinary techniques with a touch of the old school, and with an emphasis on *lo andino* (the Andean elements).¹⁰⁷ At the same time, in order to be compatible with tourism both within and beyond Peru, the dishes had to be simple and recognizably Peruvian.¹⁰⁸ Gastón Acurio was at the vanguard of this trend. Upon his return to Lima

¹⁰⁴ According to Lauer and Lauer (52), Ricardo Hinojosa argues that the Andes-coast encounter, the rapid increase in fish consumption under Velasco, and the influence of *nikkei* techniques dramatically shortening the marination time of *ceviche* were the defining characteristics of the transformation that took place during the 1960s-70s in Peruvian gastronomy. Scarapato [Lima se comprende comiendo, Sobremesa 2003, p. 2]; Nobu Matsuhisa, as told to Maggie Overfelt [interview transcript], “How chef Nobu built his sushi empire,” *CNN Money*, March 6, 2009, accessed August 16, 2011, available from http://money.cnn.com/2009/03/25/smallbusiness/nobu_fish_story.fsb/index.htm].

¹⁰⁵ Matsuhisa, “How chef Nobu.”

¹⁰⁶ Lauer and Lauer, *La Revolución*, 45.

¹⁰⁷ Lauer and Lauer, *La Revolución*, 40-41.

¹⁰⁸ Lauer and Lauer, *La Revolución*, 41.

from training at *Le Cordon Bleu* in Paris, he co-founded *Astrid y Gastón* in 1994 with his wife, a pastry chef. It was their first venture in what is now a multinational restaurant holding—including the seafood-based *La Mar*—that sold an estimated USD \$60 million in 2008.¹⁰⁹ Nobel Prize-winning Peruvian novelist Mario Vargas Llosa described it as a place where “traditional Peruvian food is the starting point but not the end product: it has been perfected and enriched with personal touches that refine and adapt it to the exigencies of modern life, to the circumstances and opportunities of the present, without betraying its origins but, also, without renouncing invention and renovation.”¹¹⁰ *Novoandino* cuisine celebrates its Andean roots but reaches out to the cosmopolitan world of gourmets both within and beyond Peru.

However, despite the prominence of seafood in *novoandino* cuisine, the anchoveta—which supplies the country’s primary fishery in volume—was altogether absent from this creative and commercial gastronomic revolution. This was no accident: during the fishmeal boom, the anchoveta and other small pelagic fish were labeled “trash” fish, associated with the stench from the fishmeal plants and deemed undesirable to the human palate. Aside from the unsuccessful FPC trials of the 1960s, the potential of the anchoveta as a source of food, let alone culinary inspiration, was

¹⁰⁹ Mario Vargas Llosa, “El sueño del ‘chef’,” *El País (Madrid)*, March 22, 2009, accessed on August 16, 2011, available from http://www.elpais.com/articulo/opinion/sueno/chef/elpepiopi/20090322elpepiopi_14/Tes.

¹¹⁰ Vargas Llosa, “El sueño.”

virtually ignored. Instead, industrial and artisanal boats harvested the fish and delivered them to the plants, typically without refrigeration at any point, where they were pumped out of the holds and stored, macerated, in large tanks waiting to be processed. As the anchoveta decomposed so did the proteins, yielding poorer quality fishmeal—a terrible waste of nutrients in a nation of hungry people.

Internationally-recognized marine biologist Patricia Majluf identified the opportunity to connect the anchoveta to the ascension of Peruvian gastronomy on the national and international scene. Building on three decades of work for conservation, Majluf’s vision for management was broad. “I am trying to cover the entire ecosystem,” she told *Américas* in 1994 about her work to create an island reserve for the largest sea lion colony in the Southeast Pacific Ocean.¹¹¹ Majluf understood that the large-scale extraction of anchoveta limits the productivity of the species that depend on it for food.¹¹² In 2006, when she founded and assumed the directorship of the Center for Environmental Sustainability (CSA) at the Universidad Peruana de Cayetano Heredia, her strategy expanded into new territory: promoting human consumption of the anchoveta through a marketing and distribution campaign.

¹¹¹ Veronica Saenz Porras and Alejandro Balaguer, "Reserved for Sea Lions," *Américas* 46.1 (1994): 28-33.

¹¹² "Patricia Majluf: Hasta los años 50, en toda la costa se comía anchoveta," *Perú21.pe*, March 23, 2007, accessed May 25, 2011, available from <http://peru21.pe/imprensa/noticia/patricia-majluf-hasta-anos-50-toda-costa-se-comia-anchoveta/2007-10-23/116269/>.

The traditional popularity of sardines and anchovies in Mediterranean countries suggested that the Peruvian anchoveta held commercial promise for other forms of consumption besides fishmeal. Noting that anchoveta frozen in blocks or salted and cured in Peru was being exported to canneries in Spain, Majluf insisted, "Why don't we do that here? ...If we really created the markets, we would generate more money and it would be healthier for the ecosystem."¹¹³ Forage fish like anchoveta, wrote Jennifer Jacquet, "have simply gotten a bad rap. These little fish are perfectly tasty but need a facelift in the marketplace."¹¹⁴ So poor was the commercial image of the anchoveta that industrialists petitioned the government to allow it to be marketed internationally with the name "*Sardina Peruana*" (Peruvian Sardine), which it did starting in 2009.¹¹⁵

¹¹³ Patricia Majluf, interview with Christian Navarro Rojas, "No existe un manejo ecosistémico," *El Comercio (Lima)*, September 9, 2006, accessed on August 18, 2011, available from <http://elcomercio.pe/edicionimpresa/html/2006-09-09/ImEcEntrevista0574486.html>.

¹¹⁴ Jennifer Jacquet, "Save Our Oceans, Eat Like a Pig," *The Tyee* (Vancouver, B.C.), April 17, 2007, accessed on 08/10/2011, available from <http://thetyee.ca/Views/2007/04/17/EatLikePigs/>.

¹¹⁵ "ADEX pide que anchoveta sea denominada 'sardina peruana,'" *El Comercio (Lima)*, March 29, 2009, accessed August 18, 2011, available from <http://elcomercio.pe/economia/254127/noticia-adex-pide-que-anchoveta-sea-denominadasardina-peruana>]. See also Cecilia Portelia Morote, "La Sardina Peruana," *Generacion.com*, November 22, 2010, accessed on August 18, 2011, available from <http://www.generacion.com/magazine/1455/sardina-peruana>. An undated product information sheet for available on the website for the Peruvian government's Integrated Foreign Trade Information System (SIICEX) listed *Engraulis ringens* as the scientific name for the fish with the commercial name "Sardina peruana" and the common name "Sardina" (SIICEX, "Sardina Peruana," Sistema Integrado de Información de Comercio Exterior, undated, accessed August 18, 2011, available from <http://www.siicex.gob.pe/siicex/resources/fichaproducto/sardina.pdf>.

Majluf enlisted the support of Gastón Acurio and other top Lima chefs in an ongoing campaign to develop a local market for anchoveta by remaking it as a healthful, environmentally-friendly, and versatile base for Peruvian cuisine. She explained in an interview how the collaboration came about:

I asked where I could get fresh anchoveta. I was put in touch with Juan Bacigalupo, the only one who sells fresh anchoveta in Lima. I tried them. They were delicious, better than the best Spanish sardine (*sardina española*). He gave me a few cans. [...] I was able to get an appointment with Gastón—the only one who could get people to eat such a thing. I went with my cans and I asked him to try it. He did, he said how delicious, what can we do?¹¹⁶

Majluf then set about remaking the image of the anchoveta by casting it as healthy gourmet fare, showcasing the tiny fish at annual Anchovy Week events beginning in 2006. Then-President Alan García publicly demonstrated the government's support of these efforts by eating a meal of anchoveta on national television.¹¹⁷ The García administration incorporated anchoveta into the Integral Nutrition Program (Programa Integral de Nutrición, PIN), created in 2006 as part of its efforts to step-up efforts to reduce malnutrition through meal programs.¹¹⁸ In February 2007 García passed a law (D.S. 002-2007-PRODUCE) affirming the strategic importance of promoting the consumption of anchoveta and its nutritional properties among Peruvians, committing

¹¹⁶ "Patricia Majluf,".

¹¹⁷ J. Jacquet, "Save Our Oceans."

¹¹⁸ Andrés Mejía Acosta, "Analysing Success in the Fight against Malnutrition in Peru," Institute of Development Studies, Working Paper 367 (May 2011): 21.

30% of its food security budget (about USD\$80 million) to anchoveta that year.¹¹⁹ As one of the first projects launched by Majluf as director of the newly-formed CSA, the anchoveta marketing campaign was just one facet of an integrated approach to achieve the center's broader conservation goal of ecosystem-based management.

Beyond these government-sponsored food aid programs, the campaign also revived public debate among fisheries professionals about malnutrition. Some writers observed the apparent paradox of this ongoing socioeconomic challenge, especially acute in the Andean highlands, in the context of the gastronomic revolution.¹²⁰ On the electronic distribution list of the Peruvian NGO Oannes (the Lima-based Hispanic American Forum for Exchange of Information about the Ocean), one member complained about the persistent lack of anchoveta consumption among Peruvians despite the "enormous variety of products based on the anchoveta" that have been created by the Fisheries Technology Institute (Intituto Tecnológico Pesquero), a government-funded research institution charged with developing new fish products.¹²¹ "The objective of the millennium, for us Peruvians," he wrote on another occasion,

¹¹⁹ Jacquet, "Save Our Oceans;" and CSA, "Legislación," CSA-UPCH website, accessed August 18, 2011, available from <http://www.csa-upch.org/front/legislacion>.

¹²⁰ For example, "Paradoja Peruana: Gastronomía Vs. Desnutrición." *Perú Económico* 32, no. 1 (2009): [edición especial].

¹²¹ Antonio Ramírez Castillo, ensayo "La industria harinera y el consumo de anchoveta en Perú" in "Re: [OANNES Foro] ENTREGA DE CONSERVAS ANCHOVETA EN EL PROGRAMA JUNTOS," Oannes Foro, June 28, 2011.

“should be to put the anchoveta in the stomachs of the poorest.”¹²² Others lament the slow pace of progress in increasing anchoveta consumption: “There have been isolated efforts by companies, universities, and state organisms since 1960 and until today we have only gotten to this level [2% of total fish harvested in 2010 used for human consumption] and if we continue like this we will not make an important change.”¹²³ Yet most unquestionably regard the anchoveta as a significant source of protein whose consumption should be redirected towards the populations that lack access to adequate nutrition. A respondent to a 2011 *Economist* article cannily opined, “I am sure that there is a [sic] untapped opportunity not only to feed Peruvians but also to get them canned to the World, they are delicious! Peruvians are smaller but tastier.”¹²⁴

Improved marketing and programs aimed to foster a more equitable distribution of anchoveta for food has complemented new regulatory and policy reforms. In 2009, the Peruvian government introduced an individual quota system to regulate how much anchoveta each vessel takes in a given season. Such a law is a necessary step towards

¹²² Antonio Ramirez Castillo, “Re: [OANNES Foro] La sardina peruana y la desnutrición infantil,” Oannes Foro, March 15, 2011.

¹²³ Luis Alfaro Garfias, “Re: [OANNES Foro] SALVEMOS A LA REYNA ANCHOVETA,” Oannes Foro, November 20, 2010.

¹²⁴ J. Leon, Reader comment on “The next anchovy,” accessed August 18, 2011, available from <http://www.economist.com/node/18651372/comments#comments>. The commenter reported elsewhere on the website that he is Peruvian (<https://www.economist.com/users/jleon/comments>).

another project of the CSA: obtaining certification of the Peruvian anchoveta fishery from the London-based Marine Stewardship Council (MSC).¹²⁵ As Majluf explained in an email to members of the NGO Oannes, the MSC “provides a standardized and explicit reference point for the evaluation of fisheries.”¹²⁶ In order for the problems of global fisheries to be effectively resolved through regulation, there must be common standards internationally for what constitute sustainable fishing practices. There must also be a way of communicating compliance of such standards with the public. The certification process, Majluf pointed out, “can serve as a catalyst for reforms that otherwise would not even be considered.”¹²⁷ A comprehensive evaluation of the Peruvian fishing and fishmeal industry—drawing insight and political leverage from the international actors with whom Majluf has built relationships—illuminates weak points in the commodity web, helping leaders devise appropriate policies.

The anchoveta campaign has found support within the private sector as well. In the context of new legislation, diminishing fish stocks, and shifting consumer tastes, Peruvian fishing companies are increasingly processing anchoveta for human

¹²⁵ CSA, “Legislación,” CSA-UPCH website, accessed August 18, 2011, available from <http://www.csa-upch.org/front/legislacion>. See also the Marine Stewardship Council website, <http://www.msc.org/>.

¹²⁶ P. Majluf, “RE: [OANNES Foro] (MSC ¿Sirve?) Toward a Conservation Ethic for the Sea,” OANNES Foro distribution e-mail list, August 8, 2011.

¹²⁷ P. Majluf, “RE: [OANNES Foro].”

consumption. Social scientists Sigbjorn Tveternas, Carlos Paredes, and Julio Peña-Torres found in their 2011 study that most large and vertically-integrated fishmeal firms in Peru are now producing canned anchoveta for domestic and international consumption.¹²⁸ One firm claimed to be “the world’s ‘fifth or sixth’ exporter of anchoveta,” and planned to soon double its production.¹²⁹ As the General Manager of one of Peru’s largest fishing companies told the newspaper *Gestión*, the anchoveta (by then renamed the “Peruvian Sardine”) reaches “the most demanding markets” in Europe and beyond.¹³⁰ As *The Economist* observed in May 2011, given the new quotas and the uncertainty surrounding fish population dynamics, “some in the fishing industry have realised that selling *anchoveta* as food for people...is more profitable.”¹³¹

¹²⁸ Sigbjorn Tveternas, Carlos E. Paredes, and Julio Peña-Torres, "Individual Fishing Quotas in Peru: Stopping the Race for Anchovies," Lima: Pontificia Universidad Católica del Perú (2011), accessed September 22, 2011, available from http://pucp.academia.edu/SigbjornTveternas/Papers/709856/Individual_Fishing_Quotas_in_Peru_Stopping_the_Race_for_Anchovies.

¹²⁹ The author visited the anchoveta cannery in November 2008.

¹³⁰ “El Ejecutivo [sic] impulsará a la anchoveta como ‘Sardina Peruana’,” *Gestión* (2009), accessed on August 18, 2011, available from <http://gestion.pe/noticia/340279/ejecutivo-impulsara-anchoveta-comosardina-peruana>. See also PROMPEX, “Anchoas y Sardinas,” Undated information sheet for potential investors, accessed on August 21, 2011, available from http://www.prompex.gob.pe/prompex/documents/negociosproductivos/10%20neg_prod-anchoas_y_sardinas.pdf; Eduardo Ferreyros Küppers, “Record de Exportaciones 2010,” PromPerú/Ministerio de Comercio Exterior y Turismo (02/08/2011), accessed on August 21, 2011, available from <http://www.siicex.gob.pe/siicex/resources/estudio/681161928rad71CFA.pdf>, 7.

¹³¹ “Fishing in Peru: The next anchovy,” *The Economist*, May 5, 2011, accessed May 7, 2011, available from <http://www.economist.com/node/18651372>.

Facing both regulatory and ecological limits, industrialists are now being forced to focus on adding value to the resources they harvest, rather than the old model of excessive harvests and low-grade, bulk fishmeal production.

Conclusion

Shifting ecological conditions off the Chilean coast during the 1970s brought a different fortune to industrialists than in Peru following the 1972 anchoveta collapse. Variations in the migration and reproduction patterns of sardines, anchoveta, and jack mackerel in the upwelling subsystems off the coast of Chile and Peru shaped the urban industrial development of the coastal cities Iquique and Talcahuano, as labor and capital relocated in pursuit of the fish. Chilean firms also reoriented their harvesting practices to include the increasingly abundant sardines and jack mackerel in fishmeal production, while Peruvian anchoveta-based industry, reeling from collapse, lagged in upgrading fishing technology and processing equipment until the 1990s.

Although Chilean officials stimulated the creation of industrial fisheries in Iquique with the 1960 *Plan Pesquero*, the jack mackerel boom centered off Talcahuano eventually far surpassed anchoveta and sardines in importance. During the 1970s and 80s, Chilean industrialists took advantage of the opening in world fishmeal markets created by Peru's collapse, but by the 1990s Peruvian fishmeal had begun to recover.

With the new fisheries law of 2008, however, industrialists were forced to confront the limits of available fisheries resources. Incorporating market-based strategies into an ecosystem-based vision of environmental sustainability, Patricia Majluf worked to restore the anchoveta to the human diet in order to decrease pressure on fish stocks.

Conclusion

Too few recognize how much the contemporary global food chain relies upon the large-scale extraction, processing, and export of fishmeal from the Southeast Pacific to industrial livestock and fish farms, relegating the environmental costs (overfishing, air and water pollution) to the people and oceans of Peru and Chile. In this system nutrients are removed from the marine ecosystem and the local human food chain, then transferred *en masse* to distant markets and, eventually, distributed to consumers who are disconnected in every way from the socio-environmental and cultural conditions of their production.

Ecological fluctuations in the Humboldt Current system have profoundly shaped the environmental history of post-World War II industrial fisheries, both within this region and globally. Such changes influence fish reproduction and migration in this complex marine ecosystem, shaping the translocal dynamics of economies, societies, and cultures built around this highly productive upwelling zone. Scientists from the United States, Europe, the Soviet Union, and South America have studied the relationship between these oceanic cycles and the fish populations, as the fishing effort rapidly increased due to technological advances during the postwar era. As nations competed for access to the marine wealth of this region and on the high seas, scientific knowledge became a powerful tool for both industry and government. Thus the Humboldt Current

became one of the most important sites for “Big Science” studies of oceanography and fish biology in the 1960s-70s.¹ But by the 1990s, international marine science had gained greater independence from Cold War geopolitics and industry. Marine biologists Patricia Majluf and Daniel Pauly draw support from international networks of influential scholars and activists to help promote ecosystem-based conservation at the local, national, and global levels. Even with twenty-first century modelling technology and the comprehensive databases available to fisheries scientists, however, a full understanding of the relationship between overfishing, El Niño, and the biology of fisheries such as anchoveta, sardines, and jack mackerel remains elusive.

Volatility is a defining characteristic of both the natural marine ecosystem of the Humboldt Current and the economic cycles of international commodity trading. These two dimensions interact in a dynamic and cyclical, but unpredictable, way. In the Humboldt Current, fish population dynamics are shaped not only by the nutrient cycles of the coastal upwelling but also by oceanic currents and atmospheric patterns at the trans-Pacific and global scale. Commodity markets, and the societies and cultures built upon them, also experience dramatic swings due to the complexity of factors that influence the production and circulation of value in the global economy. In this system nature is a formidable force, but humans also create technologies and practices that

¹ Gregory T. Cushman, "Choosing between Centers of Action: Instrument Buoys, El Niño, and Scientific Internationalism in the Pacific, 1957-1982," in *The Machine in Neptune's Garden: Historical Perspectives on Technology and the Marine Environment*, eds. Helen M. Rozwadowski and David K. Van Keuren, 133-82 (Sagamore Beach, MA: Science History Publications, 2004).

greatly shape natural ecosystems, both terrestrial and oceanic. As William Cronon eloquently stated in his 1993 Presidential Address to the American Society for Environmental History, "Our strategy has been to argue for a dialogue between humanity and nature in which cultural and environmental systems powerfully interact, shaping and influencing each other, without either side wholly determining the outcome."² The trajectory of Humboldt Current fisheries development helps illuminate the complexities of this human-nature dialogue as they unfold among fishing communities responding to a shifting marine ecosystem: in the economy of marine fisheries, neither fish nor fishers can control how natural processes shape or are shaped by extractive activities or interpreted by its diverse cultures and societies.

Farmed chickens, hogs, and fish in the global North, and more recently East Asia and Chile, have been linked to the Southeast Pacific Ocean through an industrial food system and international political economy that are characterized by cycles of boom and bust. This metaphor, which alludes to the initial rapid, frenzied period of investment followed by collapse, crisis, economic and ecological ruin, aptly conveys the dynamic that repeats itself in various times and places throughout this postwar fisheries history. However, boom-and-bust also flattens the dynamic nature of the fluctuations in these systems, which oscillate at varying intervals and degrees of intensity. El Niño tends to

² William Cronon, "The Uses of Environmental History," *Environmental History Review* 17.3 (Fall 1993), 13.

occur every two to seven years, and it invariably impacts the fisheries—but in different ways for different species and at different locations off the Peru-Chile coast. Not all these instances constitute a flat boom-bust trajectory. Moreover, the trend in fisheries harvests and fishing effort during the last sixty years, both in this region and globally, has been upward, despite these localized fluctuations and collapses.

My interest here has been not only to understand the relationship among these large-scale historical processes but also their human experience at the local and translocal levels. The transformation of Chimbote during the 1960s, for example, was of tremendous cultural significance for Peruvian society in a process of rapid urbanization. Renowned novelist José María Arguedas memorialized this historical moment in *The Foxes*, which was based on ethnographic research in Chimbote during the peak, thus providing not only a literary reading of its symbolism but also a kind of socio-cultural register of the magnitude of change in what he called “the giant whirlpool.”³ In the 1990s, new local environmental actors emerged to contest the practices of plants that released their liquid effluents into the bays and spewed thick, smelly smoke throughout Chimbote, Iquique, and Talcahuano. Even though these local movements were not in dialogue with each other like the leaders of fishermen’s labor unions in Chile and Peru

³ J.M. Arguedas to J. Murra, 14 April 1967, in J. Murra, and M. López-Baralt, eds., *Las Cartas de Arguedas* (Lima: Pontificia Universidad Católica del Perú, 1998), 153, 181.

had been, the rise of these new actors—along with marine scientists like Majluf—converged with rising global environmentalism in the late twentieth century.

In writing global history we must contend with multiple scales, taking into account the connections among them. This dissertation thus takes a multiscalar approach to the environmental history of Humboldt Current fisheries. It examines the *international* and the *transnational*, tracing the relationships among and beyond the nation-states struggling for access to coastal and high seas resources in the Southeast Pacific, as well as the *translocal*—networks of scientists, business relationships, flows of commodities, capital, technology, and people, and shared experiences of change across fishing communities—where the logic of the nation-state is peripheral at best. The trajectory of Humboldt Current fisheries demonstrates the need for societies and governments to promote the independent scientific study of environmental phenomena and more effectively incorporate the findings into regulatory mechanisms.

Future directions for Humboldt Current fisheries

The post-World War II history of Humboldt Current fisheries and the towns and economies to which they are linked is of fundamental importance for issues of critical global concern. Two major areas for future analysis intersect with the stories that emerge from this study. Across Chimbote, Iquique, and Talcahuano, environmental

activists emerged in the late-1980s and early 1990s—coinciding as well with global trends—despite the different domestic political contexts (political opening at the end of the Pinochet regime in Chile; new neoliberal regime under Alberto Fujimori in Peru). At the same time, as states and industrialists struggled for access to resources of the high seas, international organizations such as the United Nations have worked to implement international legal and regulatory regimes for ocean fisheries governance in the South and Southeast Pacific. Peru and Chile are each at different stages of implementing individual quota systems in their most important fisheries at the national level. Meanwhile, marine biologists and other conservationists have increasingly promoted consumer-based campaigns as a strategy to pressure demand away from certain target species. The effectiveness of these processes of regulatory design and reform and market-oriented approaches to sustainability are subjects for further study.

I. Rise of (trans)local environmentalism in the 1990s

In 1988, Talcahuano environmental activist Juan Hernández organized the *Comité Ecológico* (Ecological Committee) to formally address the environmental abuses of fishmeal industrialists. Heavy fishmeal production had long since transformed the urban environment of Talcahuano into one of putrid smells and contaminated waters. Hernández indignantly recounted an episode in which a foreigner had visited “when the bays had a layer of grease....[T]hey asked him, what do you think of the smell, he

says this smell...this smells like dollars, it smells like cash.” So Hernández wrote an editorial in the local paper inviting the man to come and live in Talcahuano if he so liked the smell of money! During the 1970s and 80s “here in Talcahuano you couldn’t breathe,” he recalled in a 2009 interview. Hernández dedicated years to denouncing and fighting against the pollution emanated by the fishmeal plants by publishing books and articles in the local press and later by constituting the Ecological Committee, despite fears that he could be “liquidated” for stirring up trouble.⁴ The Committee pressured local industrialists to reduce the gaseous and liquid effluents produced by their plants by installing deodorizers and wastewater treatment equipment—technology that had existed since at least the 1960s, when the polemic over fishmeal smells had gripped Lima at the beginning of Peru’s boom.

In the bold new space opening up for civil-society activism during the late-1980s, residents of Iquique also complained more vociferously about the suffocating air and water pollution from fishmeal plants. “[Y]esterday was the ‘height’ of stench in the city,” lambasted an editorial in *El Pampino* in 1989; “we *iquiqueños* are suffering the same problems of decades past with respect to the bad smells coming from our fishing industry.”⁵ It called attention to the noxious gases—amines and sulfhydic acids—

⁴ Hernández specifically cited fears that government officials worked within the fishing companies and could take violent actions against him for his public denunciations. Juan Hernández, interview with the author, Talcahuano, Chile, June 29, 2009.

⁵ “Los malos olores,” *El Pampino (Iquique)*, February 25, 1989, 5.

released by the smokestacks of the *Barrio Industrial* and cited the need for a “functioning” (not just officially constituted) ecological movement, “like in Talcahuano,” in order to compel industrialists to invest in pollution-reduction technologies. Nonetheless, alluding to the familiar link between smell and money, the article concluded that “it’s not about opposing the fishing industry,” which creates jobs, but “we also cannot sacrifice people’s health.”⁶ Iquique eventually did impose pollution controls on the fishmeal plants that remained and relegated its production to a sector north of the city, next to the duty-free zone, the “Zofri,” established during the 1980s by Pinochet. But industrial expansion in pelagic fisheries ceased with the limited availability and volatility of fish stocks. Although still an important center for fishmeal and oil production, the city remade itself as a tourist destination, with sandy beaches and high-rise hotels, the remaining fishermen mere relics of the urban seascape.

In Talcahuano, on the other hand, the industry was still taking off in the 1990s. Its image as an environmental wasteland with putrid air and contaminated water was by then firmly entrenched. Residents complained of smell, smoke, and ash from the fishmeal plants, describing a layer of grease and filthy waste entering the San Vicente

⁶ “Los malos olores.” A few weeks later *El Pampino* reported legal action requiring six local fishing companies to provide reports to the government “in the case of foul smells,” which later conceded that their employees suffered negative health impacts from their stinky work environment. “De nuevo la ciudad se cubrió con una pestilente nube de gas,” *El Pampino* March 10, 1989, 2; “Corte pidió informes a 6 empresas pesqueras en caso de malos olores,” *El Pampino* March 10, 1989, 2; “Empresarios confirman que sus trabajadores sufren efectos negativos por malos olores,” *El Pampino* March 10, 1989, 5.

bay from the petroleum, steel, and fishing industries. In 1993, near the peak of the *jurel* boom, the bay ignited from a welder's spark, destroying nine fishing boats.⁷ It was a major disaster that testified to the state of contamination, which local residents continued to endure until regulations forced some plants to relocate to other regions of the Concepción metropolitan area, particularly Lota and Coronel, after the late 1990s and early 2000s.

New local actors also emerged in Peru to speak out about the grim conditions in Chimbote, which despite its environmental decline remained one of Peru's most important industrial cities by the end of the twentieth century. Scholars, activists, and journalists became more vociferous about the high levels of air and water pollution in the Ferrol Bay and the incidence of respiratory ailments among city residents, particularly children. In 1991, sociologist María Elena Foronda returned to Chimbote after graduating from the Mexican National University (UNAM) in Mexico City, and founded the city's first environmental NGO, Instituto Natura, to advocate for the professional assessment, conservation, and cleanup of her hometown. Three years later, right-wing dictator Alberto Fujimori arrested Foronda and her partner Oscar Díaz, accused them of terrorist activity, and sentenced them by secret jury to 20 years in prison. The international sponsors of Foronda's environmental work pressured for her humane treatment while her father, a popular union lawyer in Chimbote, appealed to

⁷ "Port fire," *Lloyd's List*, March 9, 1993, 10.

the Supreme Court. They succeeded, but Foronda spent 13 months in a Cajamarca prison in the mountainous northeast before she was released.⁸ In 2003, María Elena Foronda was awarded the Goldman Environmental Prize but was unable to attend the awards ceremony in San Francisco when U.S. officials refused to grant her a visa because the prison sentence appeared on her legal record.⁹

Press exposure such as a photograph printed in *El Comercio* in 1998, which showcased children playing on the beach among dolphin carcasses, helped raise public awareness at the national level of the growing environmental crisis in Chimbote. But such awareness also perpetuated the city's stigmatized image as a socio-ecological disaster zone, a difficult legacy for *chimbotanos* to overcome. Moreover, institutional change in the post-Fujimori era has been sluggish. In November 2008, a walk along the Chimbote shoreline confirmed that the poorest Chimbote residents continued to live alongside immense factories releasing ash suspended in the surrounding air as well as liquid effluents containing fish oils and solids directly into the bay. Although atmospheric emissions regulations were recently passed (2008) for fishmeal plants, Chimbote still lacks sufficient capacity to treat its industrial or residential wastewater.

⁸ Wyatt Buchanan, "Goldman Prize Honors Environmental Crusaders," *San Francisco Chronicle* 4/14/2003, accessed October 29, 2010, available from <http://www.commondreams.org/headlines03/0414-02.htm>.

⁹ Buchanan, "Goldman Prize."

Struggles for environmental justice in urban industrial communities transformed by fishmeal production offer a rich set of cases for comparative study about how local actors engage with private industry and government organisms in their efforts to redress the poor conditions in which they are forced to live near the factories. Chimbote, Iquique, and Talcahuano residents were often ambivalent about the meaning of the smell – associated with prosperity – that permeated their air and clothing. But there was also a relative lack of organization or leadership around the environmental problem, due in part to contexts of political repression, which in the twenty-first century has given way to more coordinated intervention by local actors. Instituto Natura, the environmental NGO run by Foronda in Chimbote, hosts workshops, short courses, and assistance to *chimbotanos* seeking to empower themselves to improve their city's ecological future. In Guayaquil, where one fishmeal plant operates in the middle of the urban settlement "Bastión Popular," sociologist Gabriel Ampuero facilitates the donation of corporate funds towards community development projects including health, computing, education, and other social and vocational initiatives. Localized approaches by environmental leaders and newly-established NGOs can help illustrate strategies for communities impacted by pollution from industry to reclaim and assert their agency.

II. Emerging international alliances for ocean management

Individual quota regimes such as those currently being implemented in Peru and Chile are at the center of fisheries management debates. With their recent experiences and high contributions to global fisheries production, these two nations thus play a central role in emerging regulatory mechanisms for international ocean governance. In the South and Southeast Pacific, the jack mackerel (*Trachurus murphyi*)—Chile’s most important fishery—is the species of priority for the newly-constituted Regional Fisheries Management Organization (RFMO). Following more than a decade of industrial fishing and scientific investigation by Soviet fleets, pressure increased on high seas mackerel stocks after 1989, when a Japanese scientist found a single Chilean jack mackerel in a trawler-haul off New Zealand; the species was then found in increasing abundance across the Pacific.¹⁰ Long-distance Pacific fishing fleets took notice and soon the high seas were replete with international boats harvesting jack mackerel beyond Chile’s territorial waters. The same stocks fished within Chilean (and to a lesser extent Peruvian) territorial waters are shared across the 200-mile limit, migrating throughout a wide range and placing national fishers into competition with international fleets from Peru, Russia, and other South Pacific nations on the high seas.

¹⁰ Bernie Napp, “Charting ocean life, and unknown frontier,” *The Evening Post* (Wellington, NZ) November 14, 2001.

Chile then sought to expand its oceanic sphere of influence with the “Presential Sea” doctrine, which essentially claimed a triangular slice of the Southeastern Pacific of nearly 20 million square kilometers for purposes of economic development—most importantly the jack mackerel fisheries beyond the 200-mile EEZ—at an angle stretching out from its Antarctic territorial claim to well beyond its Pacific Island territories. Chief Admiral of the Chilean Navy Jorge Martínez Busch first advanced the “Presential Sea” thesis in a 1990 lecture in Viña del Mar.¹¹ The Chilean claim figured prominently in international law debates leading up to the 1995 United Nations “Straddling Stock Agreement,” which established guidelines for the stewardship of transboundary fish stocks (i.e. those “straddling” an EEZ and the high seas).¹² Mandated by the 1995 agreement, as of December 2011 nations of the South Pacific are in the process of formulating the regional body (SPRFMO)—for which management of the transboundary jack mackerel stocks is a key item on the agenda.¹³

Peru and Chile continue to be at the center of current international policy and management debates in fisheries and international ocean law. Since 2008, they have

¹¹ José Antonio de Yturriaga, *The International Regime of Fisheries: From UNCLOS 1982 to the Presential Sea* (Martinus Nijhoff Publishers, 1997), 228.

¹² For a discussion of the recent legal history of international policy on straddling fish stocks, see Rebecca Bratspies, “Finessing King Neptune: Fisheries Management and the Limits of International Law,” *Harvard Environmental Law Review* 25 (2001): 213.

¹³ South Pacific Regional Fisheries Management Organisation, SPRFMO website, accessed November 23, 2011, available from <http://www.southpacificrfmo.org/>.

disputed the maritime boundary that intersects the rich fishing zone between the two countries, their case still awaiting adjudication by the International Court at the Hague at the time of this writing. At stake is a triangular-shaped region in the sea extending out from their land border, where stocks of anchoveta and sardine transmigrate. Their claims dispute whether the maritime boundary should extend horizontally or diagonally from the designated point on shore. In May 2011, Peru signed a treaty with Ecuador recognizing the maritime boundary as extending out on the horizontal parallel¹⁴ – gaining an ally in its dispute with Chile but also seemingly undermining its claim for the Tacna-Arica border. The conflict has become a major point of contention in the relations between the three countries and destabilizes the legacy of their historic cooperation in favor of the 200-mile zone.¹⁵

On the other hand, the stirring of global environmental consciousness in the late twentieth century has mobilized a transnational community of conservation-minded marine scientists to put the issue of sustainable fisheries on the agenda of media and

¹⁴ AQ Online, “Peru and Ecuador agree to maritime border,” *Americas Quarterly*, May 04, 2011, accessed November 20, 2011, available from <http://www.americasquarterly.org/taxonomy/term/2826>; “Peru accepts Ecuador’s maritime borders, much to Chile’s chagrin,” *MercoPress*, May 04, 2011, accessed November 20, 2011, available from <http://en.mercopress.com/2011/05/04/peru-accepts-ecuador-maritime-borders-much-to-chile-s-chagrin>.

¹⁵ At least one WikiLeaks cable reported on speculations over The Hague’s probable decision, signaling the ongoing tensions between Peru and Chile over the maritime border issue. Jorge Riveros-Cayo, “WikiLeaks: Chile concerned that court rule in The Hague will favor Peru” *Living In Peru*, February 19, 2011, accessed November 15, 2011, available from <http://archive.livinginperu.com/news/14180>.

policymakers in the global North. Linking conservation to consumer markets through the question of ethical eating, they have marshaled a new tool of international socio-ecological justice movements. Much like boycotts and other strategies of international consumer campaigns, the Peruvian anchoveta sustainable gastronomy campaign asks consumers to place pressure on industrialists and policymakers to shift their practices.¹⁶

Although the demonstrable impact of market- and consumer-based initiatives has been limited in general, the initial results of Patricia Majluf's Anchoveta Week campaign (begun in 2006), while cursory, appeared positive as of May 2011. Direct human anchoveta consumption increased in Peru from 10,000 tonnes in 2006 to 190,000 tonnes in 2010, mostly in canned form—an impressive 19-fold jump.¹⁷ She has drawn support not only from international networks of experts but also key figures from the cultural and business sectors within Peru. The Ministry of Production, which manages Peruvian fisheries, has now extended its marketing efforts to jack mackerel, with the

¹⁶ On the promise and perils of international consumer-based campaigns, both generally and in the seafood sector, respectively, see John D. French and Kristin Wintersteen, "Crafting an International Legal Regime for Worker Rights: Assessing the Literature since the 1999 Seattle WTO Protests," *International Labor and Working Class History* 75 (Spring 2009), 145-168; see esp. 157-160; Jennifer Jacquet, John Hocevar, Sherman Lai, Patricia Majluf, Nathan Pelletier, Tony Pitcher, Enric Sala, Rashid Sumaila, and Daniel Pauly. "Conserving Wild Fish in a Sea of Market-Based Efforts," *Oryx* (2009): 1-12; Jennifer Jacquet, and Daniel Pauly, "The Rise of Seafood Awareness Campaigns in an Era of Collapsing Fisheries." *Marine Policy* 31 (2007): 308-13.

¹⁷ As reported in "The Next Anchovy: Fishing in Peru," *The Economist* 399, no. 8732 (2011): 41.

2011 campaign, “Mackerel for everyone — from ocean to table.”¹⁸ Majluf hopes that new markets for anchoveta and jack mackerel will not only help divert edible fish away from fishmeal production but also reduce pressure on the more popular species like halibut and sea-bass that are at risk for extinction.¹⁹

Amidst the growing movement for sustainable seafood in the global North, one of the broader goals of the anchoveta campaign — to encourage consumers to “eat smaller on the food chain” — has echoed among conservationist voices from Daniel Pauly, Jennifer Jacquet, and other fisheries scientists in the international media.²⁰ At the same time, *New York Times* food writer Mark Bittman lamented his previous ignorance about unsustainable fishing practices, encouraging readers to cook smaller fish such as

¹⁸ “Produce espera colocar 500 toneladas de pescado en campaña por Semana Santa,” *Gestión*, April 2, 2011, accessed August 18, 2011, available from <http://gestion.pe/noticia/736780/quinientas-toneladas-pescado-espera-colocar-produce-campana-semana-santa>.

¹⁹ Alejandra Costa de la Cruz, “Gastón Acurio abre el camino para asegurar la pesca sostenible,” *El Comercio*, March 31, 2011, accessed on April 8, 2011, available from <http://elcomercio.pe/planeta/735703/noticia-gaston-acurio-abre-camino-asegurar-pesca-sostenible>.

²⁰ J. Jacquet, “Save Our Oceans, Eat Like a Pig,” *The Tyee*, April 17, 2007, accessed April 4, 2009, available from <http://thetyee.ca/Views/2007/04/17/EatLikePigs/>; D. Pauly, “Aquacalypse Now: The End of Fish,” *The New Republic*, September 28, 2009, accessed November 28, 2009, available from <http://www.tnr.com/article/environment-energy/aquacalypse-now?page=0.0&id=oUBU7Tnylgcnwsyc50jXwbt3Hm9vWOrXi%2FAKtoekm2HSZDLi8Vm6HmZopJPygUeM>; “Fish as Food: A Love Affair, Issues Included,” *Huffington Post*, November 12, 2009, accessed November 28, 2009, available from http://www.huffingtonpost.com/dr-daniel-pauly/fish-as-food-a-love-affai_b_354399.html.

jack mackerel.²¹ Paul Greenberg, fiction writer and *New York Times* columnist who won the 2011 James Beard Award for his monograph *Four Fish*, decried the use of forage fish in pet food.²² Hollywood actor-activist Ted Danson is one of the founding members of the international marine conservation NGO Oceana and recently published a book promoting ocean conservation, citing among other things the need to avoid large predators in favor of smaller fish.²³ Acclaimed chef and National Geographic Fellow Barton Seaver established a sustainable seafood restaurant in Washington, D.C., and in 2011 toured the United States to promote his cookbook *For Cod and Country*, which includes information such as “fishermen, catch methods, and the fish’s role in the marine ecosystem.”²⁴ U.K. television chef Hugh Fearnley-Whittingstall has lobbied for reform of the European Common Fisheries Policy and takes on the problem of bycatch in the television series “Fish Fight,” in which four prominent chefs shed light on how

²¹ Mark Bittman, "Loving Fish: This Time with the Fish in Mind." *New York Times*, June 10, 2009, accessed on August 18, 2009, available from http://query.nytimes.com/gst/fullpage.html?res=9503E3D61039F933A25755C0A96F9C8B63&page_wanted=all.

²² P. Greenberg, “Cat got your fish?” *New York Times*, March 22, 2009, accessed March 23, 2009, available from <http://www.nytimes.com/2009/03/22/opinion/22greenberg.html>, *Four Fish* (New York: Penguin, 2010).

²³ Ted Danson, *Oceana: Our Endangered Oceans and What We Can Do to Save Them* (New York: Rodale, 2011).

²⁴ Barton Seaver website, accessed November 8, 2011, available from <http://www.bartonseaver.org/>.

seafood is caught and processed.²⁵ While governments negotiate the form and function of regulatory mechanisms such as national and international quota systems, scientists have in the twenty-first century brought their findings to a public beyond the specialized debates of academia and industry in the ongoing search for sustainability in global fisheries.

²⁵ "Hugh's Fish Fight," accessed November 25, 2011, available from <http://www.fishfight.net/>; Ross McGuinness, "Hugh Fearnley-Whittingstall continues to battle to change EU fishing quotas," *Metro*, November 21, 2011, accessed November 22, 2011, available from <http://www.metro.co.uk/news/newsfocus/882458-hugh-fearnley-whittingstall-continues-battle-to-change-eu-fishing-quotas>.

Appendix A

MAPS

Appendix A-1

POLITICAL MAPS OF PERU AND CHILE SHOWING KEY CITIES



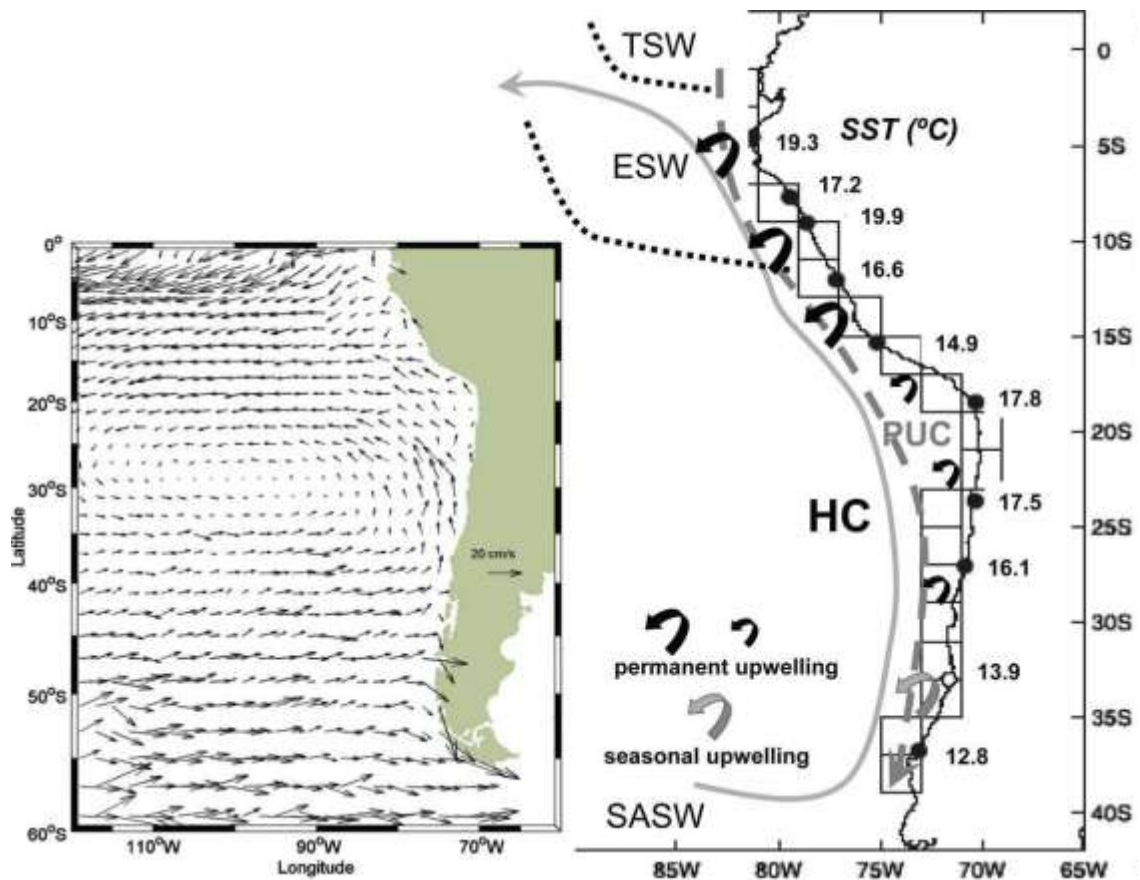
Above: CIA, "Peru Map," *The World Factbook* 2009 (Wash., D.C., CIA, 2009), accessed November 25, 2011, available from https://www.cia.gov/library/publications/the-world-factbook/maps/maptemplate_pe.html.

Right: CIA, "Chile Map," *The World Factbook* 2009 (Wash., D.C., CIA, 2009), accessed November 25, 2011, available from https://www.cia.gov/library/publications/the-world-factbook/maps/maptemplate_ci.html.



Appendix A-2

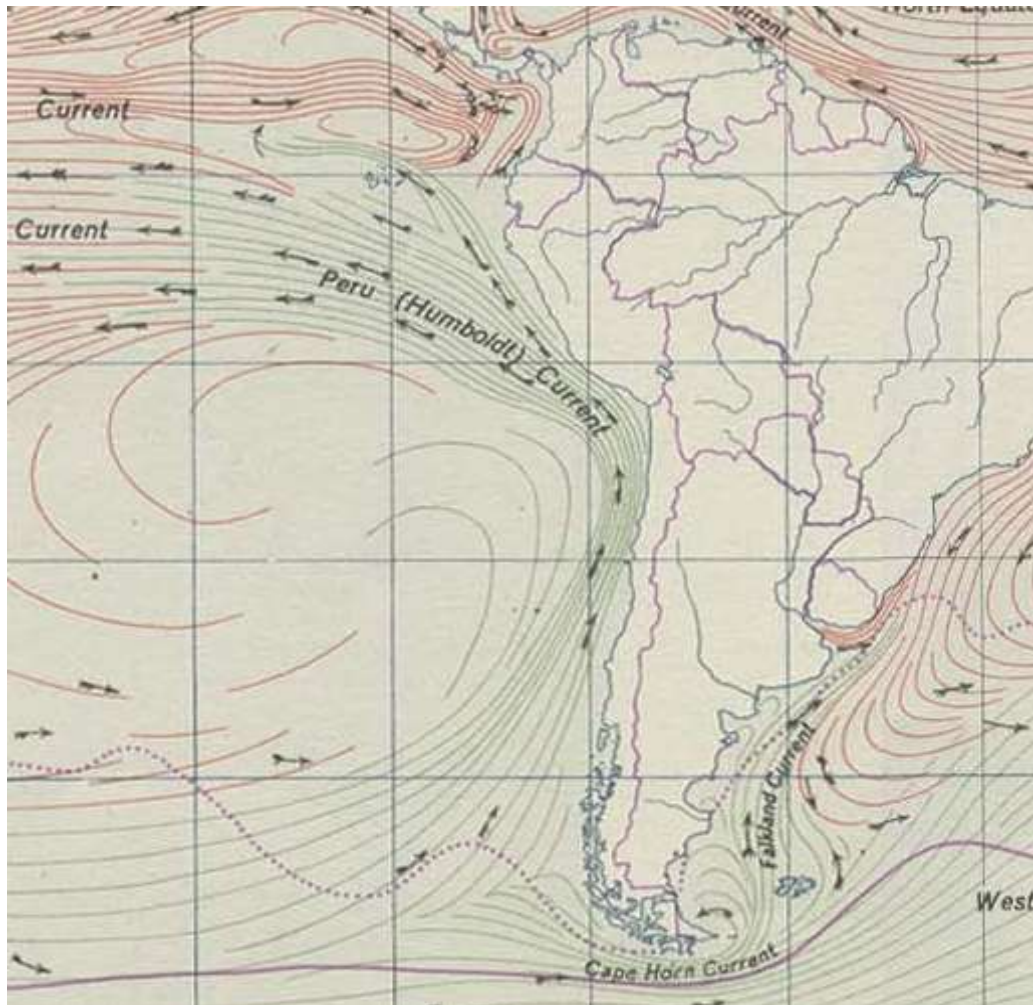
CURRENTS AND UPWELLINGS OF THE HUMBOLDT CURRENT SYSTEM



Left: Map by O. Pizarro, University of Concepción, showing mean surface currents from 1991-2005; Right: Representation of upwelling and long-term mean values of sea surface temperatures (SST in °C). HC=Humboldt Current, represented by grey solid line; PUC=Poleward Undercurrent, represented by grey broken line; TSW=Tropical Surface Waters; ESW=Equatorial Surface Waters; SASW=Sub-antarctic Surface Waters. Graphics and caption adapted from V. Montecino, and C. Lange, "The Humboldt Current System: Ecosystem Components and Processes, Fisheries, and Sediment Studies," *Progress in Oceanography* 83 (2009): 68.

Appendix A-3

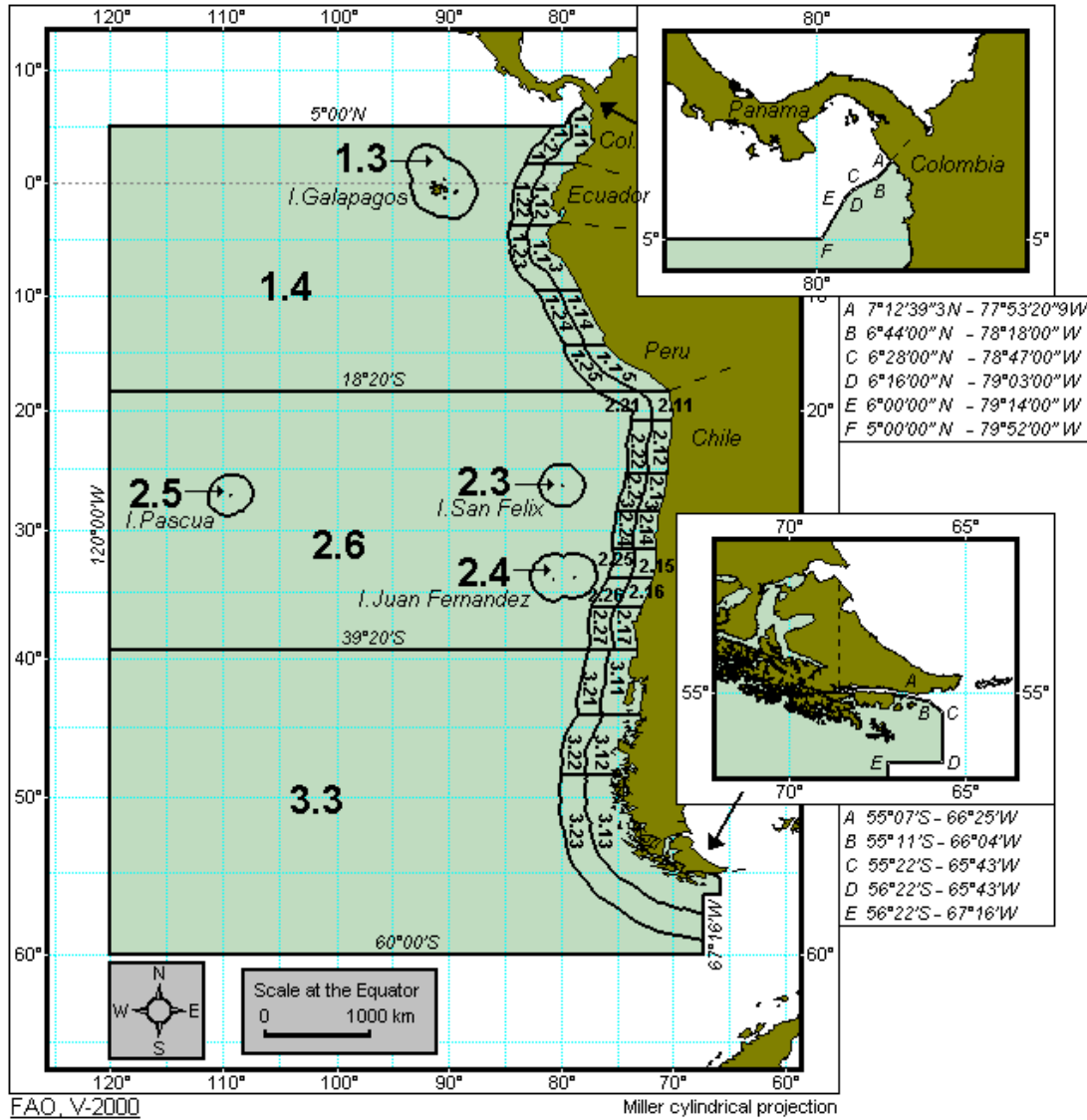
PERU (HUMBOLDT) CURRENT AS PROJECTED BY U.S. ARMY (1943)



United States Army Service Forces, Ocean Currents and Sea Ice from Atlas of World Maps, Army Specialized Training Division. Army Service Forces Manual M-101. 1943 (Perry-Castañeda Library Map Collection, accessed November 22, 2011), available from http://upload.wikimedia.org/wikipedia/commons/a/af/Humboldt_current.jpg.

Appendix A-4

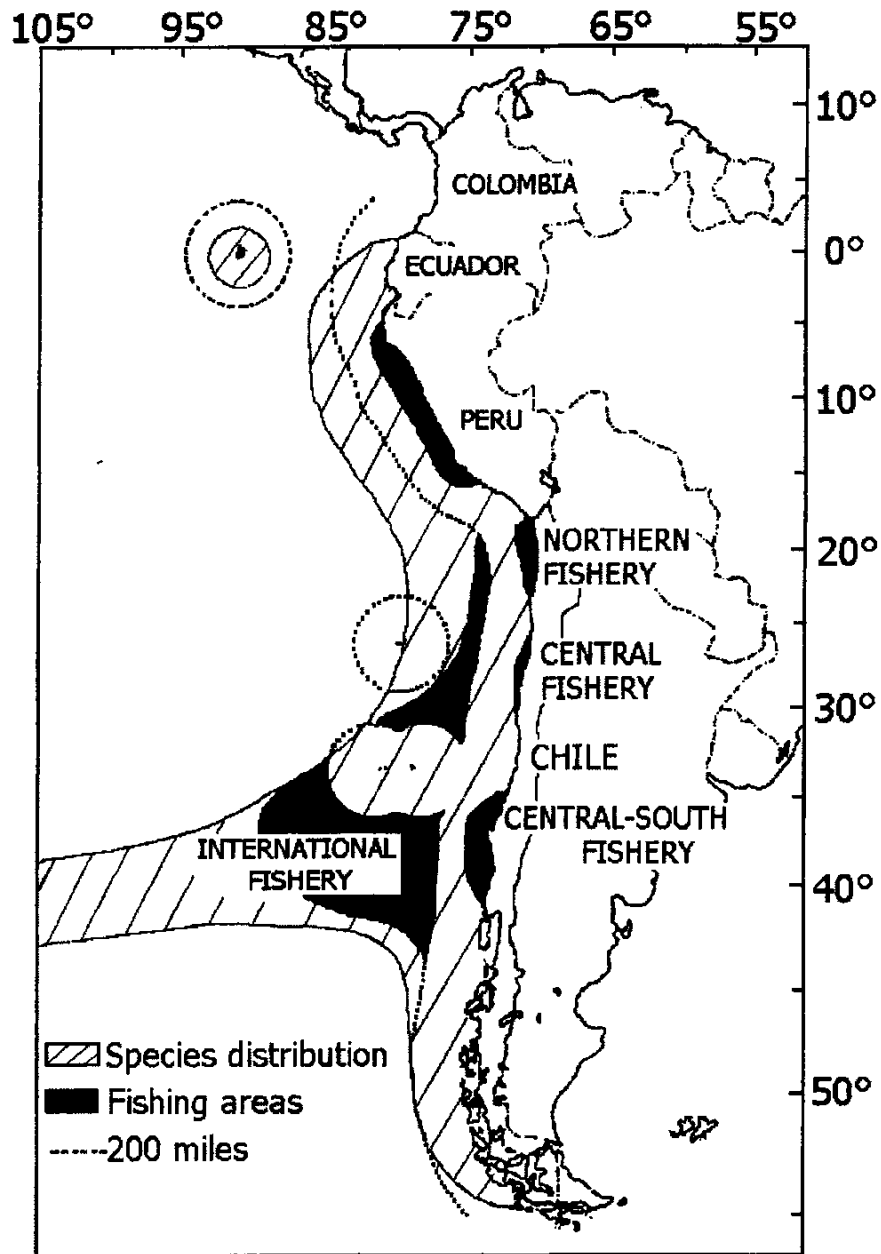
FAO FISHERY AREA 87: SOUTHEAST PACIFIC



Map depicting the designated areas within FAO's coding and data collection regime for the Southeast Pacific. "FAO Fishery Area 87: Southeast Pacific," accessed November 22, 2011, available from <http://www.fao.org/fishery/area/Area87/en#NB0089>.

Appendix A-5

SOUTHEAST PACIFIC JACK MACKEREL (*TRACHURUS MURPHYI*) FISHERY



Map from D. F. Arcos, L. A. Cubillos, and S. P. Núñez, "The Jack Mackerel Fishery and El Niño 1997-98 Effects Off Chile," *Progress in Oceanography* 49 (2001): 599.

Appendix B

BIOGEOGRAPHICAL INFORMATION FOR HUMBOLDT CURRENT FISHES

Appendix B-1

ANCHOVETA



Image: Daniel Ore Villalba, Anchoveta off Callao, Peru, FishBase, accessed November 24, 2011, available from <http://www.fishbase.org/summary/Engraulis-ringens.html>.

Common Name:	Anchovy (Peruvian <i>anchoveta</i>). FAO Species Fact Sheet also indicates this species called <i>sardina</i> in Valparaíso and Talcahuano, Chile.
Scientific Name:	<i>Engraulis ringens</i>
Maximum Size:	20.0 cm
Distribution:	Southeast Pacific: Aguja Point, Peru to Chiloé, Chile (dependent on the coastal extent of the Peru Current).
Biology:	Occurs mainly within 80 Km of coast, forming huge schools, chiefly in surface waters. A filter-feeder entirely dependent on the rich plankton of the Peruvian Current. Utilized as fish meal and oil. “The most heavily exploited species in world history,” according to the FAO species fact sheet.
Source:	Adapted from FishBase, <i>Engraulis ringens</i> , accessed November 24, 2011, available from http://www.fishbase.org/summary/Engraulis-ringens.html , in FishBase, eds. R. Froese and D. Pauly, 2011, www.fishbase.org . See also FAO Species Fact Sheet, accessed November 24, 2011, http://www.fao.org/fi/website/FIRetrieveAction.do?dom=species&fid=2917 .

Appendix B-2

JACK MACKEREL (*JUREL*)

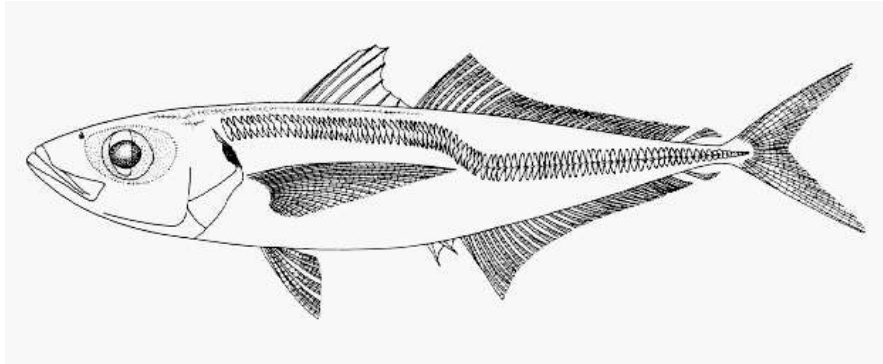


Image: Drawing by T.D. Pedersen, in W. Fischer, F. Krupp, W. Schneider, C. Sommer, K.E. Carpenter and V. Niem (eds.), *Guia FAO para Identificación de Especies para lo Fines de la Pesca, Pacifico Centro-Oriental*, 3 Vols. (FAO, Rome, 1995), accessed November 24, 2011, available from <http://www.fishbase.org/summary/Trachurus-murphyi.html>.

Common Name:	Chilean jack mackerel, Inca scad (<i>Jurel</i>)
Scientific Name:	<i>Trachurus murphyi</i>
Maximum Size:	70.0 cm
Distribution:	Southeast Pacific, off Peru and Chile (also SW Pacific and SW Atlantic)
Biology:	Found in the shore and open oceanic waters. Forms schools. Feeds mainly on fish larvae and small crustaceans. Marketed fresh, utilized canned for human consumption, and also made into fishmeal.
Source:	Adapted from FishBase, <i>Trachurus murphyi</i> , accessed November 24, 2011, available from http://www.fishbase.org/summary/Trachurus-murphyi.html , in FishBase, eds. R. Froese and D. Pauly, 2011, www.fishbase.org .

Appendix B-3

SPANISH SARDINE (*SARDINA ESPAÑOLA*)

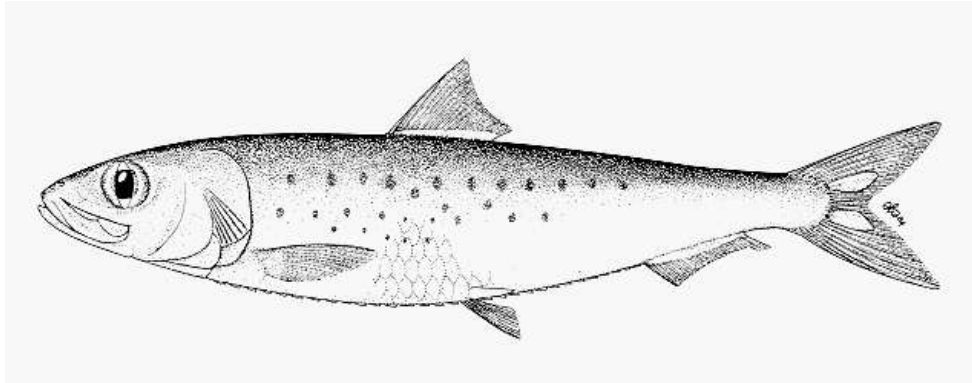


Image: P.J.P. Whitehead, FAO Species Catalogue, Vol. 7, Clupeoid fishes of the world (suborder Clupeoidei). FAO Fish. Synop. 125(7/1):1-303 (Rome: FAO, 1985), accessed November 24, 2011, available from <http://www.fishbase.org/Summary/SpeciesSummary.php?id=1477>.

Common Name:	Spanish sardine, South American pilchard (<i>sardina</i>)
Scientific Name:	<i>Sardinops sagax</i>
Maximum Size:	39.5 cm
Distribution:	Indo-Pacific region
Biology:	A coastal species that forms large schools, feeds mainly on planktonic crustaceans. Young fish feed on zooplankton such as copepod and adults on phytoplankton. Marketed fresh, frozen or canned. Utilized mainly for fish meal; but also eaten fried and broiled.
Source:	Adapted from FishBase, <i>Sardinops sagax</i> , accessed November 24, 2011, available from http://www.fishbase.org/Summary/SpeciesSummary.php?id=1477 , in FishBase, eds. R. Froese and D. Pauly, 2011, www.fishbase.org .

Appendix B-4

HAKE (MERLUZA)

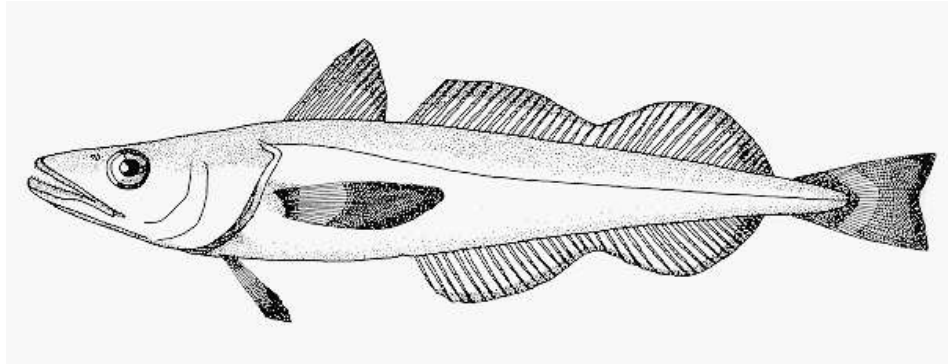


Image: D.M. Cohen, T. Inada, T. Iwamoto and N. Scialabba, FAO Species Catalogue, Vol. 10, Gadiform fishes of the world (Order Gadiformes). FAO Fish. Synop. 125 (10) (Rome: FAO, 1990), accessed November 24, 2011, available from <http://www.fishbase.org/summary/Merluccius-gayi+gayi.html>.

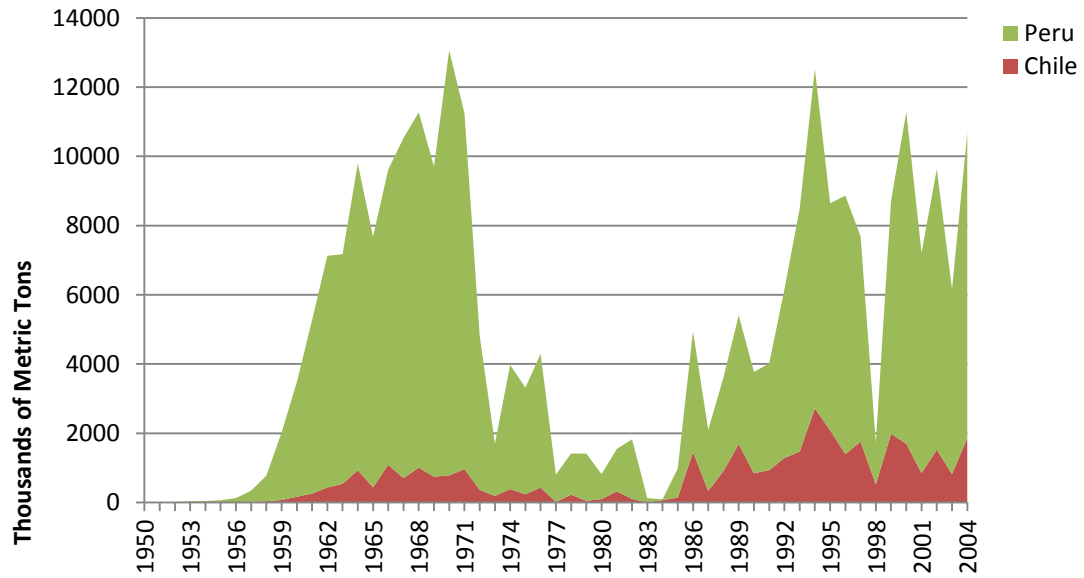
Common Name:	South Pacific hake (<i>merluza</i>)
Scientific Name:	<i>Merluccius gayi gayi</i> (also <i>Merluccius gayi peruanus</i> in Peru and Ecuador)
Maximum Size:	87 cm
Distribution:	Southeast Pacific, off Chile from Arica to Chiloé Island
Biology:	Occurs from the shallow continental shelf to the upper continental slope, on the bottom or in midwater. Moves to southern coastal areas in summer and migrates to northern deeper waters in winter and spring. Spawning occurs at the end of the winter and during the southern spring. Marketed fresh and frozen; eaten steamed, fried, boiled and microwaved; also used for fishmeal.
Source:	Adapted from FishBase, <i>Merluccius gayi gayi</i> , accessed November 24, 2011, available from http://www.fishbase.org/summary/Merluccius-gayi+gayi.html , in FishBase, eds. R. Froese and D. Pauly, 2011, www.fishbase.org .

Appendix C

HARVEST DATA FOR HUMBOLDT CURRENT FISHES, 1950-2005

Appendix C-1

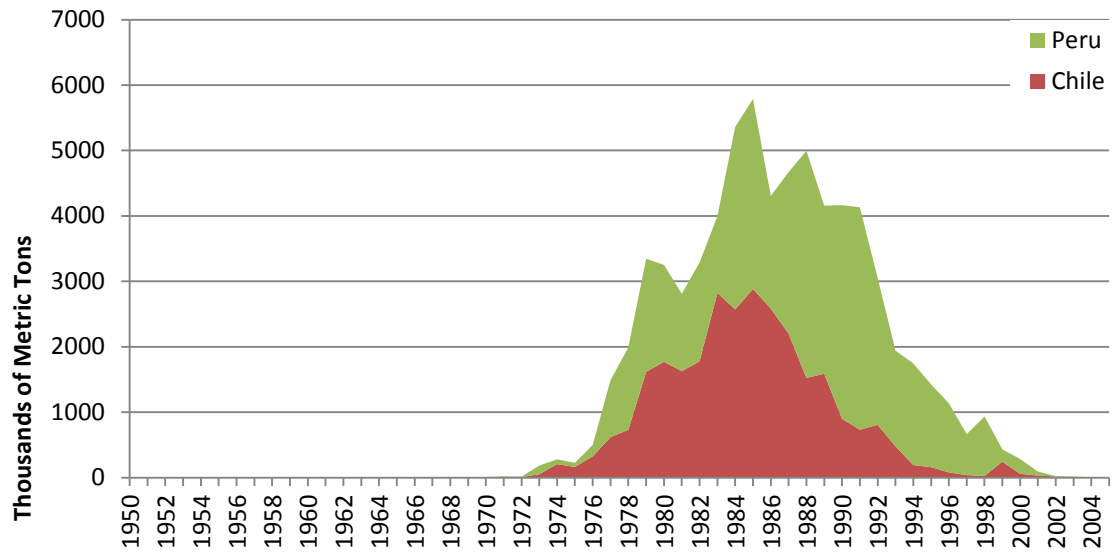
ANCHOVETA (*ENGRAULIS RINGENS*) HARVESTS, 1950-2005



Source: Elaborated by the author using data from FAO Fisheries and Aquaculture Information and Statistics Service (2007).

Appendix C-2

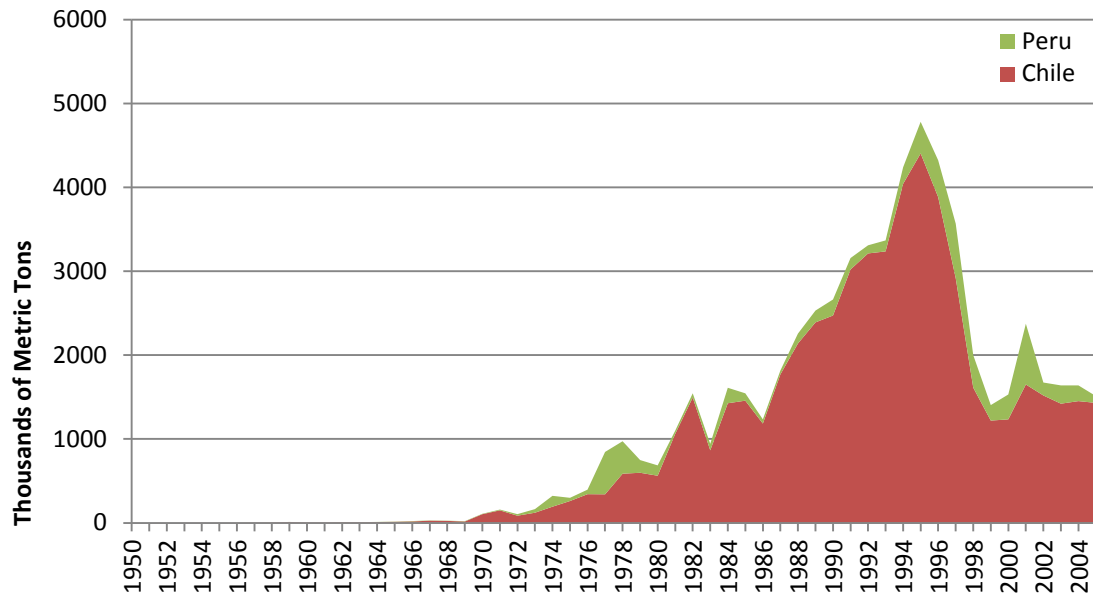
SPANISH SARDINE (*SARDINOPS SAGAX*) HARVESTS, 1950-2005



Source: Elaborated by the author using data from FAO Fisheries and Aquaculture Information and Statistics Service (2007).

Appendix C-3

JACK MACKEREL (*TRACHURUS MURPHYI*) HARVESTS, 1950-2005



Source: Elaborated by the author using data from FAO Fisheries and Aquaculture Information and Statistics Service (2007).

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O. de la Puente (Lima, 2008)
R. Ulloa y R. Moranté (Lima, 2008)
Arturo Huapaya (Lima, 2008)
Guillermo Risco (Valparaíso, 2009)
María Elena Foronda (Chimbote, 2008)
Javier Castro (Chimbote, 2008)
Cosme Caracciolo (Valparaíso, 2005)

Ethnographic sites and plant visits

Guayaquil, Ecuador
 Borsea, S.A.
Tumbes, Peru
Piura, Peru
 Austral, S.A.
Huanchaco, Peru

¹ Note: Listed here are the individuals who formally signed the IRB agreement. I also conducted XX non-recorded interviews (informal), with executives, fishermen, government officials, and local and international scientists.

Chimbote, Peru
 Hayduk, S.A.
 TASA, S.A.

Callao, Peru
 TASA, S.A.

Lima, Peru

Paracas/Pisco, Peru
 Prisco, S.A.

Ilo, Peru

Arica, Chile
 CORPESCA, S.A.

Iquique, Chile
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 Redes Netto

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 San José, S.A.

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Biography

Born in Pittsburgh, Pennsylvania, on October 22, 1979, Kristin Wintersteen attended the University of Washington in Seattle, where she earned Bachelor of Arts degrees in Latin American Studies and Spanish in 2001. Kristin spent two semesters studying in Santiago, Chile, where she took courses at both the Universidad de Chile and the Pontificia Universidad Católica de Chile (2000-2001). Her book chapter titled, "Sustainable Gastronomy: A Market-Based Approach to Improving Environmental Sustainability in the Peruvian Anchoveta Fishery," in *Environmental Leadership: A Reference Handbook*, ed. D. Gallagher, is currently in-press with SAGE, and she previously co-authored the article with John D. French, "Crafting an International Legal Regime for Worker Rights: Assessing the Literature since the 1999 Seattle WTO Protests," *International Labor and Working Class History* 75 (Spring 2009), 145-168. For her dissertation fieldwork, Kristin received major grants from Fulbright-Hays, the Organization of American States, and the Forest History Society, as well as the Stern Dissertation Fellowship from Duke University for writing. She spent the Fall 2011 semester as a Visiting Pre-doctoral Research Fellow at the *desiguALdades.net* interdisciplinary research network on inequalities in Latin America, hosted at the Free University of Berlin.