

RED GOLD

THE MANAGED EXTINCTION
of the
GIANT BLUEFIN TUNA



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*To Mom and Pops,
with love from the sea*



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Abbreviations



AAA	American Anthropological Association
AAUW	American Association of University Women
ABC	Audit Bureau of Circulations
AES	American Ethnological Society
AESS	Association for Environmental Studies and Sciences
BBNJ	[Marine] Biological Diversity [of Areas] Beyond National Jurisdiction (UNCLOS)
BCD	bluefin catch document
BCE	before the Common Era
CCSBT	Commission for the Conservation of Southern Bluefin Tuna
CE	of the Common Era
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COP	Conference of Plenipotentiaries
CPC	Contracting Party to the Convention
DPCIA	Dolphin Protection Consumer Information Act (United States)
e-BCD	electronic bluefin catch document
EC	European Community
EEZ	exclusive economic zone
EU	European Union
EUROPOL	European Union Agency for Law Enforcement Cooperation
FAO	Food and Agriculture Organization of the United Nations
GATT	General Agreement on Tariffs and Trade

GBYP	Grand Bluefin Year Programme
GDP	gross domestic product
GPS	global positioning system
IATTC	Inter-American Tropical Tuna Commission
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICIJ	International Consortium of Investigative Journalists
IGFA	International Game Fish Association
IOTC	Indian Ocean Tuna Commission
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
IPK	Institute for Public Knowledge
IUCN	International Union for Conservation of Nature
IUU	illegal, unreported, and unregulated (fishing)
IWC	International Whaling Commission
JAL	Japan Airlines
LSA	Law and Society Association
MPA	marine protected area
MSY	maximum sustainable yield
MT	metric ton
NGO	nongovernmental organization
NIEO	New International Economic Order
NMFS	National Marine Fisheries Service, a division of NOAA (United States)
NOAA	National Oceanic and Atmospheric Administration, part of the U.S. Department of Commerce
NRDC	National Resources Defense Council
NYU	New York University
PWG	Permanent Working Group
RFB	Reconstruction Finance Bank (Japan)
RFB	regional fisheries body
RFMO	regional fisheries management organization
SCRS	Standing Committee on Research and Statistics
STACFAD	Standing Committee on Finance and Administration
TAC	total allowable catch
UK	United Kingdom

UNCLOS	United Nations Convention on the Law of the Sea
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
VPA	virtual population analysis (model)
WCPFC	Western and Central Pacific Fisheries Commission
WWF	World Wide Fund for Nature

Prologue



The Life *and* Death of Bluefin Tuna

HOMAGE *to an* OCEAN GIANT

The naturalist Sir David Attenborough calls Atlantic bluefin tuna the “superfish.” No wonder: she is, among other things, a fetish, a memory, an ambition, a mystery, a career, a vocation, and a rush.¹ In this book, she is also a beating muscle, a world traveler, an agenda setter, an elusive data point, a legend among anglers, a status-bearing token, and, most fatally, a piece of “red gold.” The cultural biography of this boundless thing of Nature is at once a tragedy, a farce, and an awe-inspired test of the modern capacity to value life itself. The Atlantic bluefin tuna fishery is one of the first in recorded human history. Today there is anxiety about hunting the very last members of her kin.

Unease is warranted. The end of the giant bluefin tuna looms over these pages, not as a prophecy rooted in statistical urgency, so common in popular discourse, but as an invitation to relate to life anew. The fight to stem the slaughter is noble. But whatever its outcome, the dream of an ocean teaming with Atlantic bluefin tuna as ordinarily known only a few decades ago—“giants”—is over. Under the prevailing conditions of valuation, tuna will remain just another commodity for sale, unable to break free from her abstract class of being to become a singular

individual in the dominant society recognized for her indispensability in webs of life.

The bluefin goes unnamed. She is not Tilikum, the deceased orca at Sea World made famous in the film *Blackfish*. Spectators paid to see this massive mammal go mad and kill his keepers as he was kept indefinitely in a chlorinated bathtub that stung and reddened his eyes just like yours and mine would have experienced.

Even so, the bluefin and the orca do share something in common. Just as Tilikum was a casualty of marine parks capitalizing on—and creating value from—the commitment to preserve a natural world facing utter destruction, the very institutions mandated to conserve the bluefin have exterminated her kin over time.² Regulatory regimes in the name of marine conservation have helped to realize the sixth mass extinction now under way in the new planetary epoch termed by some the Anthropocene. The institution that is the subject of this book—the International Commission for the Conservation of Atlantic Tunas (ICCAT)—formed after World War II when the slaughter of sea creatures happened on a scale and at a pace never before known on Earth. Not since the demise of the dinosaurs has the planet experienced such loss of life.

There are three kinds of bluefin tuna the world over but never do they meet as they careen through ocean currents: the Atlantic (*Thunnus thynnus*), the Pacific (*Thunnus orientalis*), and the Southern (*Thunnus maccoyii*). All three look alike. The bluefin calling the Atlantic Ocean home is the largest of all tunas in the family Scombridae, which is made up of fifteen genera and some fifty other species living across the ocean at depths where light still penetrates deep enough for photosynthesis to occur.³ My nieces and nephews will know only by book or word of mouth that—until as recently as a few decades ago—giants twelve feet (three to four meters) in length weighing well over a ton (nine hundred kilograms) swam in schools with mates as big as they raced together on annual migrations. I tell the children to imagine a team of stampeding horses or a pack of lions on the chase below the ocean surface.

With tiny scales and eyes flush to her body—more streamlined than a torpedo—the bluefin contracts her pectoral fins into slots to generate less friction when swimming. She tears through salted water like a bullet, accelerating as if her heart were a Porsche engine. One of the

fastest fish at sea, cheetah-like, exceeding most speed limits on American roadways, she clocks over fifty miles per hour (eighty kilometer per hour).⁴ In fact, the bluefin can cross the entire Atlantic Ocean in forty days,⁵ and somehow find the nine-mile (fourteen kilometers) stretch of the Strait of Gibraltar at its narrowest point to enter the Mediterranean Sea. She enjoys one of the longest migrations of any fish on the planet.

While the bluefin travels epic distances straight across the open ocean, she also dives to depths of three thousand feet (one thousand meters) where water is black and icy cold. Some marine scientists think she communicates with her mates through flickering light. She is endowed with a “pineal window” on top of her head, between her eyes, “as photosensitive as the retina,” which, like other tunas and sharks, allows her to receive faint light as she plays, couples, and chases prey up and down the water column and in low levels of moonlight.⁶

How stunning she is. A line of small triangular finlets in electric yellow rims her upper and lower back by a tail whipping in constant motion, glinting, in contrast with the dark metallic blue on her top and the iridescent silvery white on her belly. She is camouflaged when other creatures view the depths of the sea from above, or the sun and moon from below.

She is the ocean.

But who among us knows the bluefin is warm-blooded? So entrenched are modern taxonomies that it seems normal to separate, categorize, and hierarchize members of the so-called animal kingdom in the fever to define the class of vertebrates known as “fish.”⁷ Defying the assumptions of the naturalists—placing her somewhere on the evolutionary scale between the typical cold-blooded fish and the seafaring mammal—the bluefin can elevate the internal temperature of her viscera, eyes, and brain up to 25 degrees higher than surrounding water. “A body temperature of 80 degrees [F or 27 degrees C]! Why they’re practically mammals!” exclaims the marine scientist Barbara Block.⁸ This trait explains why the muscle of the bluefin and other sushi-grade tuna such as the big eye and the yellowfin is red, not white like the canned albacore and skipjack tunas. The bluefin is prized most for the color, clarity, and fattiness of her flesh. To get a good price at market, fishers must slay her as quickly as possible so that she does not produce

excessive lactic acid out of panic, and marinate herself when she dies. Connoisseurs dislike the metallic taste when she does.

Today the vast majority of bluefin tuna is destined for the fresh sushi and sashimi market. This development dates only from the 1970s with the rise of the global “sushi economy.” Anglers no longer discard the bluefin at docks, or sell her as cheap meat for fertilizer and pet food.¹⁰ Gone are the days when most of her mates went to canneries. The market for raw bluefin tuna has now outpaced in profits what the canneries once made. It is not cost-effective to use filet mignon in readymade TV dinners.

The global trade in raw fish meat exacts a price all people pay, evident in international headlines. It should give us pause that a 613-pound (278-kilo) Pacific bluefin tuna with flesh the color of rubies sold at Tokyo’s Tsukiji Market in January 2019 for an astounding record of U.S.\$3.1 million. This tremendous sale at auction does not reflect the bluefin’s everyday price. Although high prices fetched in early January are not as elevated as the rest of the trading year, extravagant bids are ways for buyers to celebrate the first day of business through great shows of wealth.¹¹ Theodore Bestor writes: “The New Year’s holiday—the longest vacation the Tsukiji traders get—ends on January 5, the day of *hatsuni* (first freight). The arrival of the New Year’s first shipments is marked by ritual, and the biggest rituals surround the auctions for the first tuna, the *hatsumaguro*.”¹² Bluefin from the Pacific is always sold first on Tsukiji’s opening day at the start of the New Year when fish supply is low. This practice is nationalist. The red meat of tuna when paired with white rice is a symbol of good fortune, similar to the image of the rising sun on the Japanese flag.¹³

Short supply when faced with high demand makes for a fabulous price, so the logic goes. Yet how reductive a common understanding of classical economics can be, as if it could rationalize and compress into one simple pricing calculus the extermination wrought by the inequities of capital, class, law, labor, nation, state, colonialism, and empire. It is the interplay of these forces—and the lethal absurdities of their interaction in the name of marine conservation—that this book tries to untangle.

“As with persons, the drama here lies in the uncertainties of valuation and of identity,” Igor Kopytoff writes.¹⁴ The bluefin means many

things to many people, but to member states of ICCAT she signifies, above all else, the truth that economic growth through the global commodities trade is an overriding national-security interest today. This truth is inseparable from another: that acquiescence to the utilitarian logic of fisheries management under extractive capitalism depends on an alienated citizenry's implicit internalization of value commoditized in such a way that it accepts as normal the extermination of an ocean giant—rich in history, complexity, and wonder—as the cost of doing business.

A frequently cited study summarily sounds the alarm: Illegal, unreported, and unregulated (IUU) fishing has contributed to the estimate that 90 percent of large predatory fish such as the bluefin, the swordfish, and the shark have vanished from the sea, eaten or discarded as incidental catch.¹⁵ The bluefin is not immune to the trend of collapse in planetary megafauna. So devastated is the size and number of the Atlantic bluefin tuna that, since 2011, a group of scientists has agreed to catalog her as “endangered” on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species.¹⁶

Some fisheries scientists dispute these figures, and tinker with the estimates. By doing so, they treat the problem as if it is only a matter of exactly measuring the inventory of fish: how many are gone, at what rate, by what mode. This book moves beyond the preoccupation with actuarial accounting methods as the primary means to gauge a crisis. Instead it analyzes the rapid extermination of a former ocean giant understood not as a “tragedy of the commons.”¹⁷ I insist in chapter 2 that this tragedy finds its roots in the commodity form.¹⁸

Despite my reservations about cataloging an unnatural disaster by the mathematics of its rate—as if numbers alone can characterize the scope and magnitude of the loss entailed—the estimates are worth review. The “biomass” or sum of all bluefin tuna said to cluster in the eastern Atlantic peaked in 1958, and declined 74 percent in the historical period between 1957 and 2007. The bulk of this drop, 61 percent, has happened since 2000. Concomitantly, for the bluefin said to bunch in the western Atlantic, the estimate of absolute decline is calculated to be 82 percent between 1970 and 2008.¹⁹

None of these figures gives an account of the decline in the size of the once giant bluefin tuna. Nor do they illuminate the fate of the

fishers long entwined with her capture. Nor do they shed light on the other woes impacting her lifecycle, such as warming water temperatures, ocean acidification, floating (micro)plastics, and the accumulation of toxins such as mercury from coal burning and iron mining. Nor do these estimates consider IUU fishing. Trade experts estimate that the black market in bluefin tuna was worth \$4 billion in the Mediterranean alone from 1998 to 2007.²⁰ I heard in my travels through the IC-CAT network that the dealers trading illegal drugs, arms, and migrants also trade illegal bluefin tuna. That is how profitable she has become.

Atlantic bluefin tuna has built empires through millennia. Her organized capture dates back some three thousand years when the Phoenicians, master sailor-shipbuilders that they were, first developed traps close to shore so that her kin could pass through them during annual migrations, typically from May to July. Deep in a cave on the island of Levanzo off the coast of northern Sicily, a painting of people and animals thousands of years old is anchored, at the bottom, by the distinctive teardrop shape of a giant bluefin tuna.²¹ Towns throughout the Mediterranean basin formed around the traps, with towers built to spot the bluefin in clear coastal waters,²² some protected by fortresses with artillery ready to stem pirates' plunder.²³

The artisanal method of trapping tuna in chambers close to shore is still used today, but it is not as widespread as it once was. Where there were once hundreds of such enterprises across the Mediterranean basin, as of this writing there are only 19, operating in Italy (2), Morocco (10), Portugal (3), and Spain (4). During the 1950s, the traps represented a remarkable 46 percent of the total bluefin tuna catch and 13 percent of the total tuna catch in the Atlantic.²⁴ As commercial fleets adopted more "efficient" year-round fishing methods, the traps lost market favor. From 1962 to 1967, the Japanese longline fleet caught five thousand to twelve thousand tons of bluefin tuna in the southwestern Atlantic in what is now innocuously called by some fisheries scientists the "Brazilian episode." In the zone where fishers captured tropical tunas such as albacore and yellowfin (destination: canneries), the bluefin has become so "fished out" that her kin can no longer support commercial catch in the southern Atlantic Ocean today.²⁵

Capture by bluefin tuna trap has changed enormously in only a few decades. One Italian ex-trap fisher remarked that rather than finance

a *tonnara* and employ a workforce throughout the year, “it made sense to import [other] tuna and put it in cans. There is much money to be made. [The financiers] thought: why should I invest in the *tonnara* not knowing if I will get the returns? The ocean is not secure.”²⁶ The speculation associated with the emerging forms of finance capital changed the fishery as the market for fresh bluefin tuna went global. Speculative finance also transformed the biography of the bluefin into one of “red gold” by entrusting the ICCAT regime with the task of securing the investment member states risked by extracting what has become in only a few decades a very volatile, high-priced fish “stock.”²⁷

The primary methods of bluefin tuna capture are not limited to traps and longlines, the latter of which, as its name suggests, involves baited hooks attached at intervals stretching some forty miles (sixty-four kilometers) to catch fish indiscriminately. Since the mid-twentieth century, boats called purse seiners have encircled shoals of tuna with nets by tightening a noose, bagging fish like sacks of cash on a heist. Since the mid-1990s, these vessels have towed bluefin tuna long distances at slow speed in pouches so that “tuna ranchers” may release and fatten them in cramped, underwater pens. Off the Mediterranean Coast in Spain, I observed divers, some former military men, “sacrifice” the bluefin by a bullet to the head. Gunboats stood watch over the cages twenty-four hours a day to protect the investment these creatures represented.²⁸ Similar to other farmed carnivorous fish, such as salmon and shrimp, aquaculture targeting bluefin tuna contributes to and exacerbates the overfishing problem. To feed the voracious appetite of the bluefin, operators must purchase sardine, mackerel, and other wild fish in bulk, thereby concentrating and extending the vicious cycle of profitable extraction to satisfy sushi lovers in rich countries without abatement.

Outside the Mediterranean basin, on the other side of the Atlantic Ocean, records are not as extensive. Some accounts suggest that Native Americans in present-day Maine killed stranded bluefin tunas in tidal pools by tomahawk before smoking them. In the nineteenth and early twentieth centuries, fishers in the north Atlantic considered her a nuisance because she shredded the nets used to target herring and other commercial fish of the day.²⁹ New Englanders did not eat her then. Some fishers in the western Atlantic adopted harpooning methods from the

whaling industry as they hunted the giants down. In fact, records from 1910 indicate that harpooners sold bluefin tuna to oilers who boiled the fish for fuel in lamps when energy from whales—not petroleum—fired economic growth.³⁰ Today, harpooners electrocute the bluefin at the bow by a javelin they call a “zapper.”³¹

Commercial fishers are not the only ones who wrote the cultural biography of Atlantic bluefin tuna. Recreational fishers, including “roving reporter” Ernest Hemingway, considered the bluefin a portal to a dream.³² In February 1922, Hemingway sent a dispatch to the *Toronto Star Weekly* that reflected the growing popularity of sport fishing among the leisure class. Under the headline “At Vigo, in Spain, Is Where You Catch the Silver and Blue Tuna, the King of All Fish,” Hemingway proclaimed with his distinctive masculinist bravado:

The Spanish boatmen will take you out to fish for them for a dollar a day. There are plenty of tuna and they take the bait. It is a back-sickening, sinew-straining, man-sized job . . . But if you land a big tuna after a six-hour fight, fight him man against fish when your muscles are nauseated with the unceasing strain, and finally bring him alongside the boat, green-blue and silver in the lazy ocean, you will be purified and be able to enter unabashed into the presence of *the very elder gods* and they will make you welcome.³³

Recreational fishers indeed “welcomed” by pole and line “the very elder gods” weighing as much as 1,500 pounds (680 kilos) at lengths of thirteen to fourteen feet (four meters).

Many other stories can be told of the once-giant Atlantic bluefin tuna. One of my own begins in the 1970s when as a child I marveled at the bluefin and the other fantastical treasures that came from the Atlantic’s deep sea: the swordfish with bloated bellies, the sleek mako shark with sandpaper skin, the rainbowed mahi, and the marlin whose sail flopped down her spine like the wooden fences marking the dunes nearby. I had to tilt my head skyward to see these massive game fish through my tortoiseshell glasses in summer as they hung suspended by their tails above the docks of marinas off Montauk and Shinnecock Inlets on eastern Long Island in New York State. Dockhands would weigh them for admiring crowds, congratulating the fight of “man” the

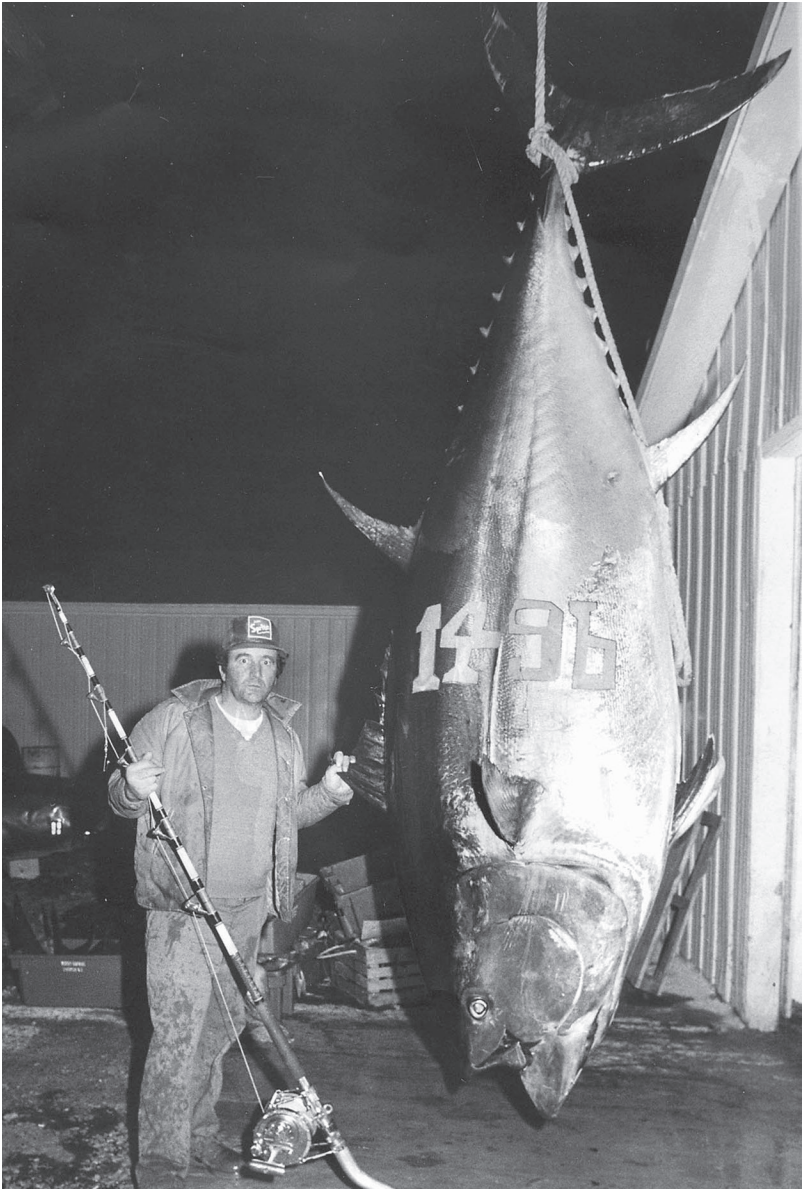


Figure 1. Ken Fraser registers the largest, IGFA all-tackle bluefin tuna ever recorded at 1,496 pounds (679 kilos) on October 26, 1979, caught while trolling Aulds Cove, Nova Scotia, Canada. Photograph courtesy of the International Game Fish Association (IGFA).

“hunter,” while the athletic build of the bluefin, now stiff and dead, would spin and sway from time to time when the wind picked up. Blood dripped down her body and splashed silently onto the wooden planks. Worth not gold but pennies per pound then, the bluefin—three or four times my size—brought trophies to winners in sport tournaments. These fish seem so distant from me now.

I have seen the marine environment degrade catastrophically before my eyes during my lifetime. This observed reality informs and motivates this book. I offer it to pay homage to a majestic sea creature I have learned to “become with.”³⁴

This book aims to expose the predatory—and finally exterminatory—“regime of value”³⁵ underpinning the practices of a regional fisheries management organization (RFMO) that, by treaty, is mandated to master and control the supply of such fish as the bluefin on the high seas in the name of marine conservation. The member states that are party to the ICCAT convention collectively insist on their right to specify, reify, quantify, measure, model, and exploit the risk associated with exporting fish treated as commodified objects in the sphere of exchange.³⁶ ICCAT delegates must learn to downplay, refuse, disavow, erase the splendor of the sea creatures under their remit to execute the task asked of them by international law: to fish as hard as possible under the false assumption that a country’s economic growth from the sea is unlimited. Conserved here, are not Attenborough’s “superfish” but the export markets of well-financed ICCAT member states and the commodity empires derived from them on the world stage.

Contrary to accounts in the news media, this book shows that ICCAT is not inept. In fact, the ICCAT apparatus has worked so well that it has organized with impressive “efficiency” the profitable extermination of a former ocean giant in just a few decades. Perfectly legal this has been. Seen in this light, ocean governance when hinged to a predatory regime of value has, in effect, helped to create the conditions for the sixth mass extinction. This geological event finds its maritime roots not only in demand from an exploding human population in need of food to eat. It is also a result of the intensity of the investment in expanding the fishing effort after World War II.³⁷ The slaughter in fish was just one aspect of what happened when the pace of fossil-fuel consumption and the proliferation of nuclear waste, plastic, cement, and

bones from the domesticated chicken industry, among other ecological disruptions, exploded on Earth during the middle of the twentieth century. Geologists refer to this time as the Anthropocene's "Great Acceleration."

Hemingway's dispatch a century ago needs to be amended. The catch of "silver and blue tuna" no longer ushers the vast majority of people into the presence of the sublime. The news headline today is "The Very Elder Gods Are Dead."³⁸ To create a path that leads to transformed relations between beings—to revalue the lives that have been discounted, discarded, and destroyed—is the challenge institutions such as ICCAT present to modernizers tethered to the rewards of extractive capitalism for sea power. In the words of Rachel Carson, who saw this coming more than seventy years ago, "the black night of extinction has fallen."³⁹ To confront, to refute, to contest the regulatory enactments of conservation that ICCAT represents is to awaken oneself to feel, to engage, to touch, to (re)imagine—that is, to love and to respect—the sea and other nonhuman natures around us in ways that offer another way of being in this world.

Notes



Prologue

1. Simple in approach, trim in form, the tactic I adopt throughout this book to feminize the bluefin in the singular by using the pronouns “she” and “her” is meant to contest and destabilize the commodification of fish. Surely a living being cannot be “it.” I forgo the plural, such as “they” and “them,” because I try to avoid where possible statistically oriented, aggregate registers of speech such as “species” and “population.” I do not want to reduce the bluefin to an abstract “class of being” (Smuts 2001). The feminized, singular pronoun is not meant to conjure up “Mother Nature” per se—although it could—but to remind the reader that nonhuman natures under extractive capitalism, like women’s work, have long been kept off the balance sheet, their worth expunged from cost-benefit calculi. The use of “she” and “her” is not meant at all to reinforce what I call the savior plot in chapter 3, as if the bluefin is a damsel in distress, but to instigate an appeal to respect a fellow living being. Sylvia Wynter reminds us that “scholars necessarily function as the *grammarians* of our order; that is, as ‘men and women’ who are well-versed” in how to arrange a body of facts within a framework consistent with their value system in the society in which they belong (1994, 55; emphasis in original).
2. Malamud 1998.
3. Collette, Reeb, and Block 2001, 1.
4. Safina 1997, 59. The ecologist Carl Safina offers a brilliant discussion of the bluefin’s speed, drag, and agility here.
5. Block et al. 2001, 1313.
6. Ellis 2008, 42–43.
7. Ritvo 1997.
8. Block quoted in Ellis 2008, 37.
9. Issenberg 2007.
10. Roberts 2007, 280.
11. Corson 2007, 249.
12. Bestor 2004, 309.
13. Miyake et al. 2010, 63.
14. Kopytoff 1986, 90.
15. Myers and Worm 2003.

16. As of this writing, the International Union for Conservation of Nature (IUCN) lists the Pacific bluefin tuna as “vulnerable” and the Southern bluefin tuna as “critically endangered.” These designations are based on conservative estimates of decline: <http://www.iucnredlist.org/>.
17. Hardin 1968.
18. Longo, Clausen, and Clark 2015.
19. These figures are based on a summary report by the Principality of Monaco issued in 2009 in an effort to list Atlantic bluefin tuna as “endangered” under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The report relies on the “stock assessment” for Atlantic bluefin tuna conducted in 2008 by ICCAT’s scientific advisory committee.
20. See the report by the International Consortium of Investigative Journalists (ICIJ), “Looting the Seas: How Overfishing, Fraud and Negligence Plundered the Majestic Bluefin Tuna” (2010), partly funded by the Pew Environment Group, at <https://www.ire.org/resource-center/stories/24880/>.
21. Maggio 2000, 9.
22. Longo and Clark 2012, 208.
23. Maggio 2000, 35.
24. Fonteneau 2008, 4.
25. Fromentin and Powers 2005, 285.
26. Fisher quoted in Longo and Clark 2012, 217.
27. Telesca 2017, 2018.
28. Bestor 2000, 59.
29. Roberts 2007, 197.
30. Whynott 1995, 105.
31. *Ibid.*, 1995, 50.
32. Maggio 2000, 139.
33. Hemingway quoted in *ibid.*, 139–40; emphasis added.
34. Haraway 2008.
35. Appadurai 1986.
36. Kopytoff 1986, 73.
37. McNeill and Engelke 2014 write: “The global marine fish catch quintupled between 1950 and 2008, while [human] population growth nearly tripled. As a rough estimate, one can say that 60 percent of the expansion of the marine fish catch derived from population growth.” In other words, about 40 percent of the expansion can be attributed to the intensity of the fishing effort (52–53). Subsidies for fleets from industrialized countries and investments in more “efficient” technology contributed to rapid fish decline, as detailed in Finley 2017.
38. Telesca 2018.
39. Carson 1989 (1950), 93.

Introduction

1. Issenberg 2007.
2. Graeber 2001, 1–2.

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