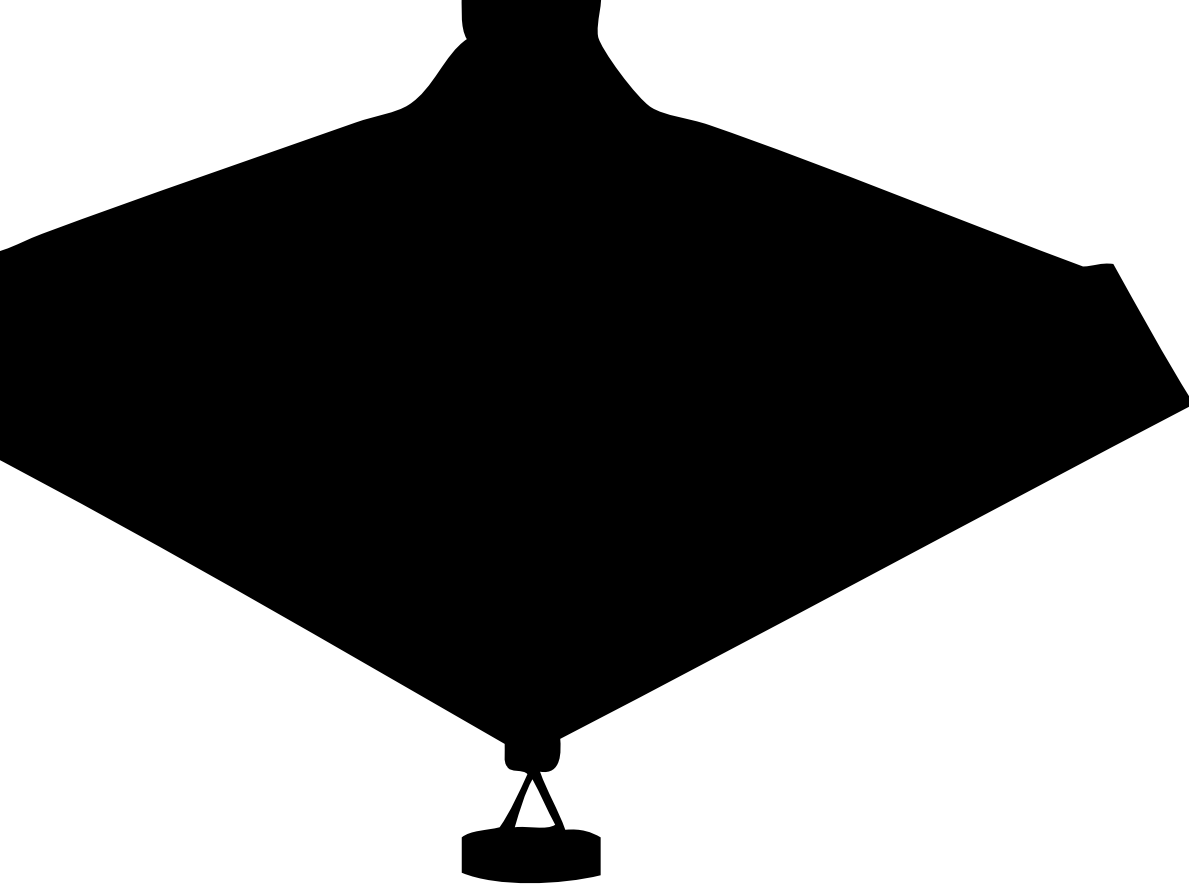


The Empty Promise of Ocean Aquaculture in Hawai`i

Lessons on factory fish farming
from an industrial testing ground



About Food & Water Watch

Food & Water Watch is a non-profit organization working with grassroots organizations around the world to create an economically and environmentally viable future. Through research, public and policymaker education, media and lobbying, we advocate policies that guarantee safe, wholesome food produced in a humane and sustainable manner and public, rather than private, control of water resources including oceans, rivers and groundwater. For more information, visit www.foodandwaterwatch.org.

The Food & Water Watch Fish Program promotes safer and more sustainable seafood for consumers, while helping to protect the environment and support the long-term well being of coastal and fishing communities. For more information, visit www.foodandwaterwatch.org.

Food & Water Watch

1616 P St. NW, Suite 300
Washington, DC 20036
tel: (202) 683-2500
fax: (202) 683-2501
info@fwwatch.org
www.foodandwaterwatch.org

California Office

25 Stillman Street, Suite 200
San Francisco, CA 94107
tel: (415) 293-9900
fax: (415) 293-9908
info-ca@fwwatch.org



The Empty Promise of Ocean Aquaculture in Hawai`i

Lessons on factory fish farming from an industrial testing ground

Executive Summary and Key Facts.....iv	iv
<i>A Brief Overview of Factory Fish Farms in Hawaiian Oceans.....1</i>	1
Comparison of Factory Fish Farms in Hawai`i's Oceans (Current and Projected).....2	2
Poor Stewards.....4	4
Failure to Provide Accurate Information to State Agencies.....4	4
Failure to Complete Required Monitoring/Inadequate Monitoring.....5	5
Losing Control of Hawai`i's Waters.....6	6
Transfer of Kona Blue Water Farms to Keahole Point Fish LLC.....6	6
Late Rent Payments.....6	6
Safe and Stable Jobs?.....7	7
Inadequate and Conflicting State Laws for Regulation of Factory Fish Farms in the Ocean.....8	8
<i>Lawsuits Against Kona Blue Water Farms.....8</i>	8
Economic Comparison Between Ocean Fish Farming and Land-Based Aquaponics.....9	9
<i>And It's Not Even Profitable.....9</i>	9
<i>Comparison of Open-Ocean Aquaculture and Land-Based Recirculating Aquaculture Systems.....10</i>	10
Environmental Concerns.....11	11
<i>Transfer of Disease to Wild Populations.....11</i>	11
<i>Use of Antibiotics and Other Chemicals.....12</i>	12
<i>Interactions with Bottle-Nosed Dolphins.....12</i>	12
<i>Interactions with Sharks.....12</i>	12
<i>Effects on Coral Reef and Alien Species.....13</i>	13
<i>Impacts on Benthos.....14</i>	14
<i>Problems with Feed Composition.....14</i>	14
Cultural Concerns.....15	15
<i>Effects on Aumakua.....15</i>	15
<i>Misappropriation of Cultural Terms.....16</i>	16
<i>Impacts on Ko`a (Traditional Fishing Grounds).....17</i>	17
<i>Impacts on Resources for Ceremonies.....17</i>	17
Conclusions and the Way Forward.....17	17
Recommendations.....18	18
Endnotes.....19	19

Executive Summary

For the past 10 years, Hawai'i's state-controlled waters have been a testing ground for the industrial ocean fish farming industry. After a decade, and an investment of millions in taxpayers' dollars, it is clear that the industry has not lived up to its promises of both economic and environmental sustainability. Instead, industrial fish farming damaged ocean ecosystems, infuriated Native Hawaiian rights groups and contributed little to the local economy.

Similar to concentrated animal feedlots on land for hogs and chickens, open-water aquaculture is the mass production of fish using floating net pens or cages in ocean waters. It is also referred to as open-ocean aquaculture (OOA), ocean fish farming, mariculture and other, similar terms. These factory fish farms can pose real threats to the environment as well as human health. They can cause damage to fragile habitats through use of heavy anchors; spread of disease and parasites from farmed fish to wild fish; entangle or alter behavior in whales, dolphins, sharks, monk seals and other ocean wildlife; release concentrated amounts of fish food, wastes, and any chemicals or antibiotics used in the farms directly into ocean waters; and more. The use of antibiotics may lead to the growth of antibiotic-resistant bacteria, and residues from chemical treatments may remain in the fish and be consumed by unknowing diners.

Hawai'i currently hosts two commercial factory fish farms in its oceans, and the industry is on course to expand production by 900 percent in the next five years.^{1,2} Before the state allows such a drastic increase, it should take time to evaluate whether existing operators have been good stewards of the public's natural resources. Government documents recently obtained through a public information request suggest that this is not at all the case. Especially troubling are the business and environmental practices at Kona Blue Water Farms Inc. (KBWF), an open-water aquaculture site. The company touts itself as sustainable, but has had many documented problems, including interference with marine mammals, use of antibiotics and failure to provide complete and accurate information to the state in a timely manner. The company has also been sued for alleged unsafe working conditions and challenged by Native Hawaiians as being disrespectful of their cultural and traditional practices. As the federal government promotes this industrial experiment, Hawai'i is bearing the burden of the environmental, economic and social impacts.

Thankfully, viable alternatives to ocean fish cages exist which can both meet the need for seafood production and increase food independence in Hawai'i in an environmentally responsible and culturally appropriate way. Traditional coastal fish ponds (*loko i'a*) and land-based recirculating aquaculture systems are two examples already in practice across the islands. The state should focus its aquaculture efforts on promoting these more responsible methods.

The results from the past decade's experimentation with factory fish farms in the ocean clearly show that the state should move swiftly to protect its waters and citizens from future harm. Hawai'i should prohibit the expansion of factory fish farms in its oceans to conserve state resources and protect them for sustainable use and enjoyment of future generations.

One sentiment that has been widely echoed by those in the open-ocean aquaculture industry is that it is all an experiment.³ But an experiment requires objective analysis. Once the experimenter profits from the experiment, a conflict of interest ensues. It is not the role of the industry, but the role of citizens — and the elected officials who represent them — to determine the success or failure of industrial ocean aquaculture. It is time to heed the results and chart a better course for more ecologically and economically sustainable seafood production.

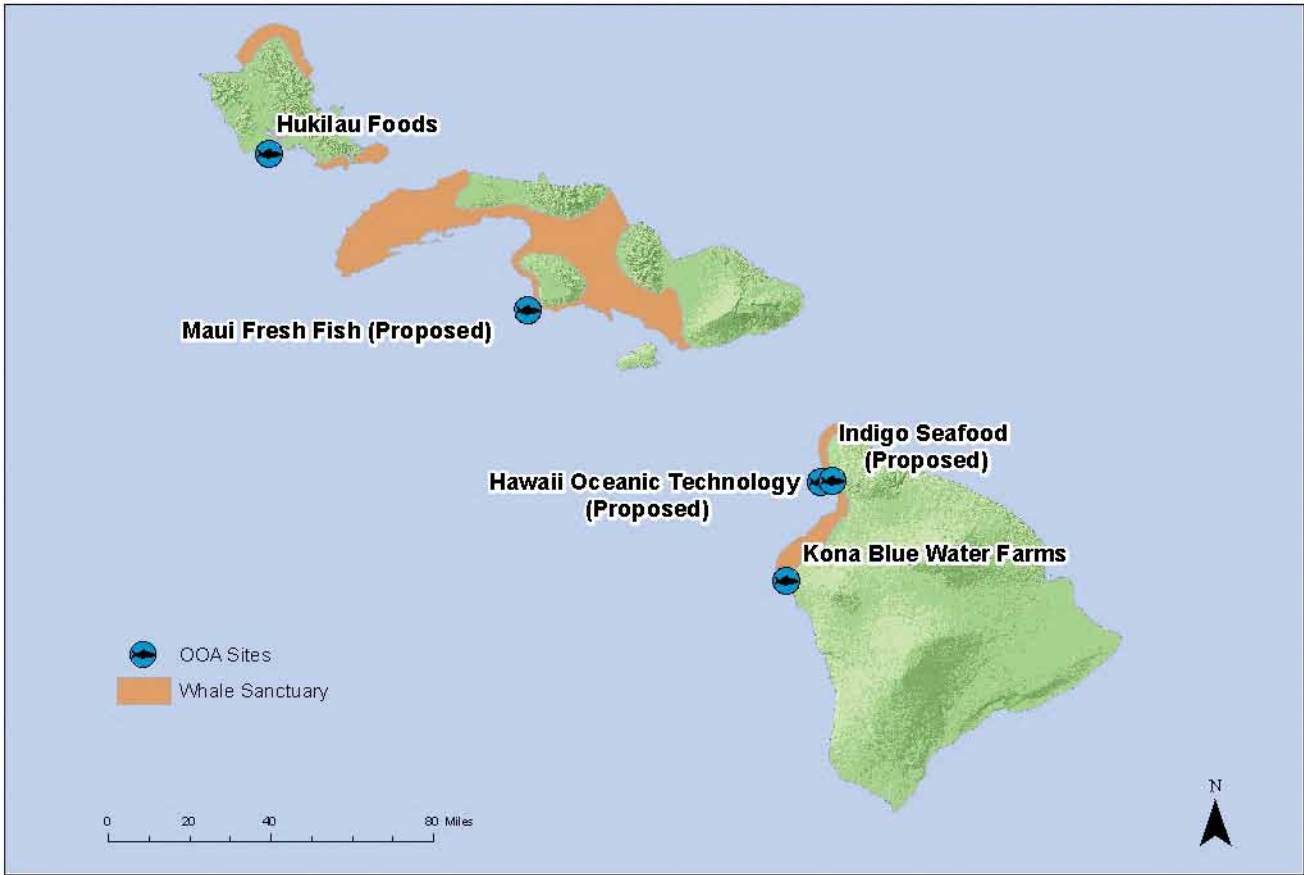
Key Findings

Overall:

- The Hawai`i ocean aquaculture industry has failed to demonstrate that it is environmentally sustainable or financially viable (without government support) on a commercial scale. Hawai`i's state agencies are ill-equipped to deal with the challenges of properly regulating factory fish farms in its oceans, even at its current level of production.
- Industry production is set to increase by more than 900 percent by 2015.⁴
- The Division of Aquatic Resources "identified a trend whereby [offshore aquaculture] applicants often mischaracterize the location of a proposed cage project relative to actual reef ecosystem components and reef resources..."⁵
- Both existing offshore aquaculture tenants in Hawai`i have failed to make timely rent payments at different points throughout their tenancy.
- The 39 jobs projected to be created by 2013 at the Kona Blue Water Farms (KBWF) operation (now owned by Keahole Point Fish LLC) and Hukilau Farms combined will have cost taxpayers over \$84,000 a piece, due to the over \$3.3 million in public subsidies that the companies have benefited directly or indirectly from — not including Hawai`i Act 221 High Tech tax credits.^{6,7,8,9}

Regarding Kona Blue Water Farms:

- Former employees have filed four lawsuits against KBWF for alleged workplace injuries and/or failure to provide a safe work environment.¹⁰
- Interference with bottle-nosed dolphins at KBWF's operations may be occurring at levels "that constitute 'take' under the Marine Mammal Protection Act."¹¹
- The decision to introduce antibiotic-coated feed directly into Class AA¹² Hawaiian waters at the company's site in 2007 was not made by Hawaiian officials or even overseen by Hawaiian veterinary counsel.¹³
- Co-founder and shareholder of KBWF, Dale Sarver, has provided the company's benthic monitoring reports to the state through Deep Blue Research LLC — a company founded by Neil Sims in 2004 to do aquaculture monitoring research.^{14,15,16,17}
- In 2005, KBWF killed a 16-foot tiger shark that repeatedly visited the site.¹⁸ In September 2009, a Galapagos shark bit through and entered one of the company's cages resulting in the release of hundreds of caged fish.¹⁹



Map Created By: Hanna Lee,
Food and Water Watch
Data Source: Hawaii Statewide GIS Program
June 30, 2009



Photo of Maui's pristine coastline, by Christina Lizzi/Food & Water Watch

A Brief Overview of Factory Fish Farms in Hawaiian Oceans

Hawai'i has been ground zero for testing open-ocean aquaculture. In the mid-1990s, the U.S. Department of Commerce tasked the National Oceanic and Atmospheric Administration (NOAA) — the federal agency which manages our ocean resources — with developing a national open-ocean aquaculture (OOA) industry. As part of the initiative, four research facilities were set up using government subsidies.²⁰ Among them was the Hawai'i Offshore Aquaculture Research Project (HOARP), sited off of Ewa Beach, O`ahu. HOARP was founded in 1998 and led by Charles E. Helsley in conjunction with the University of Hawai'i at Manoa.²¹

Prompted by pressure from this emerging, "sustainable" industry, Hawai'i passed Act 176 in 1999, which amended laws governing leasing of Hawai'i's oceans and submerged lands, specifically Chapter 190D of the Hawai'i Revised Statutes. Prior to the amendment, Chapter 190D allowed ocean and submerged lands leasing only for research and development in limited areas. The changes allowed the state to begin leasing waters (including surface, water column and substrate) more broadly and for commercial aquaculture. The permitting, regulation and oversight of operations involves multiple agencies, including the Department of Land and Natural Resources, the Department of Health, the Department of Agriculture, and the Army Corps of Engineers.²²

Soon after amendments to the Submerged Lands Leasing Act, HOARP was renamed and transferred to a private company, Cates International, and in 2001 became the first U.S. commercial open-ocean aquaculture venture.²³ The site and operations are now owned by Grove Farm Fish and Poi LLC; the company does business under the name Hukilau Foods LLC. In 2009, Hukilau requested and was granted a modification to its lease allowing it to scale up from 28 to 61 acres and quadruple production of *moi* (Pacific threadfin) from 1.2 million pounds per year to up to 5 million pounds per year.²⁴ The process is expected to be complete in 2013.²⁵

Comparison of Factory Fish Farms in Hawai'i's Oceans (Current and Projected)

Name	Location	Lease size in acres	Number of cages	Species	Production (peak expected, in pounds)	Lease payments	Jobs	Public funding	Status in January 2010
Kona Blue Water Farms Inc. (Transferred to Keahole Point Farms LLC on January 8, 2010)	Kona, Hawai'i Island	90 ⁱ	5 ⁱⁱ	<i>Kahala</i> (marketed as Kona Kampachi®), additionally allowed to grow <i>mahimahi</i> and <i>mo'i</i> ⁱⁱⁱ	Approximately 771,600 after reconfiguration ^{iv}	\$2100/year or 1% of revenue (as of 01/10 KBWF was in debt to the state on lease payments). ^v Payment for 2009 was approximately \$50,000. ^{vi}	As operated by Kona Blue Water Farms, peak: 49 current: 28 ^{vii} projected: 14 ^{viii}	\$1.8 million from NOAA, ^{ix} \$200,000 in federal stimulus money	Modifying cages; new company owns operation
Hukilau Farms LLC – owned by Grove Farm Fish and Poi LLC	Ewa Beach, O'ahu	61 ^x	8 ^{xi}	<i>Moi</i> (Pacific threadfin) ^{xii}	5 million in three years (current is 1.2 million) ^{xiii}	\$1,400/year or 1% of revenue for 28 acres (it was \$5,100.13 in 2005). ^{xiv} Lease rate should increase	Current: 11, with expansion projected: 25 ^{xv}	\$1.5 million from NOAA ^{xvi}	BLNR hearing on the lease expansion pending
Hawai'i Oceanic Technology Inc. (Proposed)	North Kohala Coast, Hawai'i Island	247 ^{xvii}	BLNR approved three, ^{xviii} goal is 12 ^{xix}	Big eye and yellowfin tuna ^{xx}	12 million after five years in 12 cages ^{xxi}	?	22 by year five ^{xxii}	?	CDUP was contested ^{xxiii} ; currently awaiting judgment of Attorney General

i "Final Supplemental Environmental Assessment for a Modification to Net Pen Designs..." Op. cit. at xxii.
 ii Ibid at iv.
 iii Ibid at iv.
 iv Ibid at 23.
 v Consent to Assignment of GL S-5721. Land Submittal D-25 for Board of Land and Natural Resources Meeting January 8, 2010 at 4.
 vi Sims, Neil Anthony. (2009) Letter to the Editor. "Factual Errors" West Hawai'i Today. 25 January 2010.
 vii "Final Supplemental Environmental Assessment for a Modification..." Op. cit., at 85.
 viii Ibid at 23.
 ix Food & Water Watch, Fishy Farms, October 2007 at 11.
 x "Final Environmental Assessment for Proposed Expansion of Hukilau Foods..." Op cit., at 8.
 xi Ibid at 8.
 xii Ibid at 8.

xiii Ibid at 8.
 xiv State of Hawai'i Department of Land and Natural Resources submittals, GL No. S-5654 February 9 2007.
 xv "Final Environmental Assessment for Proposed Expansion of Hukilau Foods..." Op. cit., at 22.
 xvi Food & Water Watch, Fishy Farms, October 2007 at 12.
 xvii "Final Environmental Impact Statement for the Ahi Aquaculture Project..." Op.cit. at i.
 xviii Minutes from October 23 2009 Board of Land and Natural Resources Meeting at 37.
 xix "Final Environmental Impact Statement for the Ahi Aquaculture Project..." Op. cit. at i.
 xx Ibid at i.
 xxi Ibid at i.
 xxii Ibid at 1-9.
 xxiii Minutes from October 23 2009 Hawai'i Board of Land and Natural Resources Meeting at 27.

Kona Blue Water Farms Inc. (KBWF) is the second OOA operation. KBWF recently transferred lease ownership and operation of its facility to a newly formed company, Keahole Point Fish LLC (KPF).²⁶ KBWF's time in Hawai'i has been marked by repeated amendments and modifications to its lease in a constant struggle to make ends meet. Despite \$1.8 million in funding from NOAA, millions in tax technology credits given to aquaculture operations in Hawai'i, nearly \$10 million from investors, and a product

sold only at high-end restaurants and retailers, the company did not achieve a level of profitability to sustain its grow-out operations.^{27,28}

Founded in 2001, KBWF received the state and federal permits needed for a 90-acre ocean lease off Unualoha Point, Hawai'i Island, in 2004.²⁹ In 2005, KBWF installed its first pair of submersible grow-out cages, and eventually scaled up to eight cages producing approximately 500 tons of *kahala*

or Hawaiian yellowtail, marketed as “Kona Kampachi®” each year.³⁰ The cages are in “Class AA” waters — determined by state law to be kept in their “natural pristine state” prior to KBWF operations there.^{31,32} Although “the support and propagation of shellfish and other marine life” is an allowed use under the law, it is doubtful that lawmakers had intended such facilities to be factory fish farms.³³

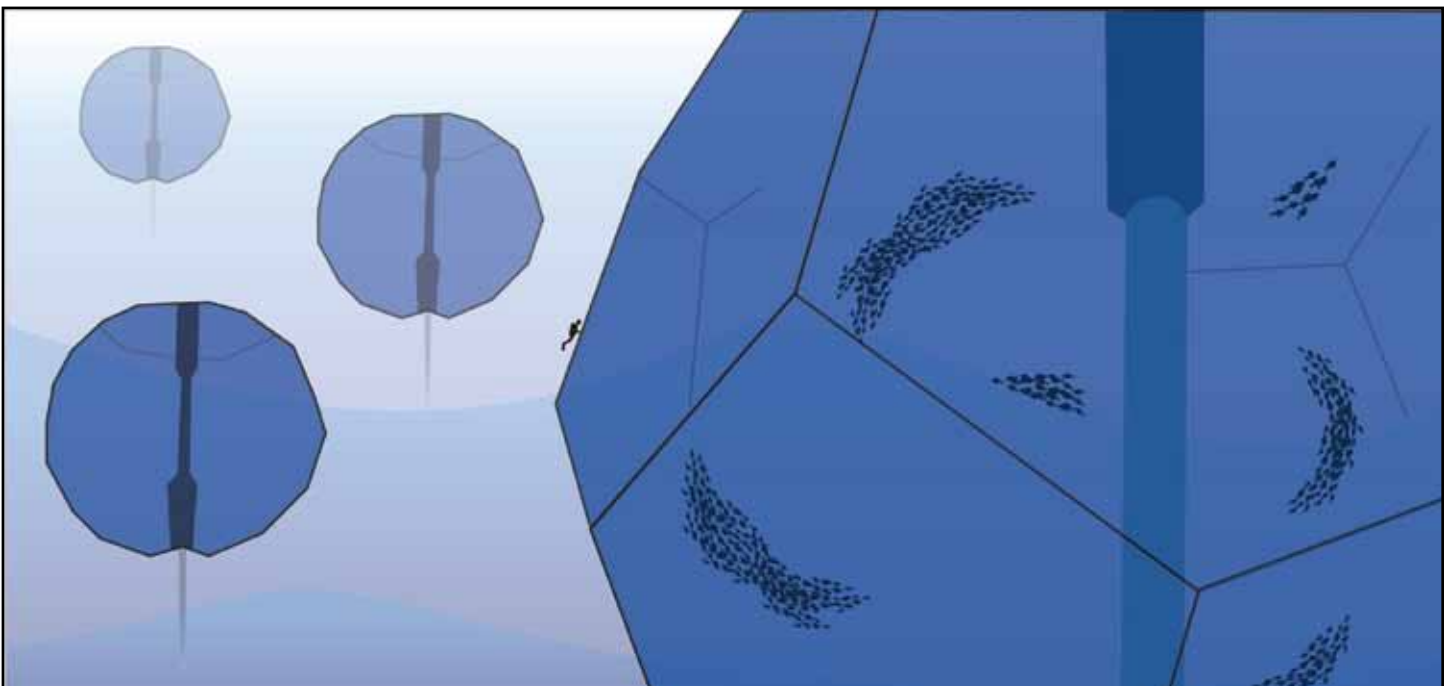
In October 2008, the company announced that it was opening another aquaculture operation in the Sea of Cortez, Mexico, with an estimated production of 500 tons of Kona Kampachi®.³⁴ The company presents mixed messages to the public about its Mexican future, though. In December 2009, an article in *Mexico Living* quoted Sims saying, “We’re very pleased that our expansion plans are progressing.”³⁵ Two months later, an article in *West Hawai‘i Today* quotes him saying they were “reconsidering their expansion plans.” The company may pursue a business model in Mexico similar to the one established in 2010 with KPF. KBWF would retain the marketing and research aspects and a separate company would operate and assume liability for offshore operations.³⁶

Since 2000, several other companies have sought to take advantage of Hawai‘i’s pristine waters for factory fish farming in the ocean. The most recent — and furthest along in the permitting process — has a plan that seems like something out of a science fiction novel. Hawai‘i Oceanic Technology Inc. (HOT) is proposing to raise 6,000 tons of yellowfin and big eye tuna per year, in 12 self-powered un-tethered spherical cages. The proposed cages would be 52 meters in diameter,

hold up to 82,406 cubic meters of water and occupy a 247-acre site located three miles off the North Kohala Coast of Hawai‘i Island.^{37,38} To put it in perspective, each full-size cage would be the width of a professional football field and hold more than 30 Olympic-sized pools worth of water. The lease site itself could fit over 180 professional football fields on its surface.³⁹ Only 10 percent of production is intended for the Hawai‘ian market, with the rest going to the mainland United States and Japan.⁴⁰ Annual sales are projected to be \$120 million.⁴¹ The proposal — which alone would increase Hawai‘i’s OOA production more than 600 percent⁴² — is cause for great concern. Two contested cases have been filed by Native Hawai‘ian’s against the Board of Land and Natural Resources decision on October 23, 2009 to grant the corporation a Conservation District Use Permit to move forward with their plans.^{43,44} As of March 2010, there has been no decision on the cases.

In 2008, Lana‘i fishermen strongly opposed a proposal by Maui Fresh Fish LLC (MFF) to raise *opakapaka* in 7,000-cubic-meter cages within a 100-acre site off the south shore of the island.⁴⁵ MFF prepared an Environmental Assessment (a document required in the permitting process that outlines some of the possible environmental impacts of a project) but is required to propose an alternate site and hold another scoping meeting in order obtain the permits it needs.⁴⁶ As of February 2010, the process has not moved forward.

A fourth company, Indigo Seafood, began meeting with officials and community members in early 2009 to discuss a



An illustration of what the enormous cages planned by Hawai‘i Oceanic Technology could look like. Illustration by Food & Water Watch

new operation. As of March 2010, no public notices have been issued regarding requests for permits.⁴⁷

Two earlier ventures to grow tuna, Ahi Nui Tuna Farms LLC and Ahi Farms, and a third seeking to grow moi, Pacific Ocean Venture, have not been successful to date in obtaining the permits and/or financing for ocean fish farming operations.⁴⁸

Combining projected increases in production at Hukilau Farms, decreases at KBWF and the proposed addition of HOT, overall industry production would increase by more than 900 percent.⁴⁹ Because permitting is done on a case-by-case basis, the overall cumulative impacts of increased production on the ocean ecosystems are not being considered. Given the demonstrated negative impacts of operations at the current production capacity, such a drastic increase is cause for great concern and should be addressed by the Hawai'i legislature.



Poor Stewards

Compliance with state regulations does not guarantee that everything will be fine at the aquaculture sites. KBWF, for example, is reportedly in compliance with state regulations; however, as a *West Hawai'i Today* article reported, based on interviews with state officials, "that doesn't mean the offshore aquaculture operation hasn't reported exceedences (sic) in water quality reports or fish outbreaks or has made all payments on time..."⁵⁰

The state is struggling to keep up with oversight on current offshore aquaculture operations due to resource restraints, conflicting laws and a lack of coordination between agencies. Ocean fish farming corporations have not made their job any easier. Some companies have stretched the state's resources thin by making frequent modifications to permits or providing inaccurate or misleading information in assessment documents. Expansion of the industry would only exacerbate the current burden. It is increasingly clear that the public needs to be vigilant in monitoring ocean fish farming operations. Right now, Hawai'i's natural resources are at risk.

Failure to Provide Accurate Information to State Agencies

Aquaculture companies have not always provided accurate information to state agencies during environmental assessments and reviews. Frequently, OOA operators and applicants cite existing data pertaining to aquaculture that, in reality, is not applicable to Hawaiian waters and impacts on unique coral reef systems. The bulk of existing scientific review and data has come from operations in temperate and sub-tropical waters.⁵¹ The impacts on Hawai'i's resources from open-ocean aquaculture operations are largely unknown, and existing facilities are truly an experiment.

Some companies have taken advantage of loopholes in the permitting process by repeatedly submitting requests for modifications or amendments to their existing leases and permits. Measures taken by KBWF have enabled the company to avoid a cumulative review on the impacts of their project. In March 2008, the State Division of Aquatic Resources stated in a public comment regarding an application to expand the KBWF operation that: "this offshore cage culture project represents a major departure in terms of scale from other proposed reef impact projects which we [the Division of Aquatic Resources] review, and many of its impacts were not evident at first glance, *because the applicant originally proposed a very different physical operation and has then repeatedly gone to the Department for amendments to the original permit.*" (Emphasis added.) The result has been

that agencies have had to review the project in a piecemeal fashion. “Follow-on changes are often not evaluated relative to cumulative or synergistic effects of existing and proposed changes to the permit.”⁵² In other words, by using a piecemeal approach, the company and agencies are not taking all impacts into consideration.

During the Conservation District Use Application process, open-ocean aquaculture applicants have frequently downplayed the potential impacts of their projects on the environment by understating or failing to mention important natural resources located at or near their requested sites. The Division of Aquatic Resources has “identified a trend whereby applicants often mis-characterize the location of a proposed cage project relative to actual reef ecosystem components and reef resources...”⁵³ They “frequently refer to the immediate habitat surrounding the proposed cage site as ‘devoid of marine life,’ and as either being sand or rubble, often with little or no true documented investigation.”⁵⁴ Both coral and live rock are fully protected by Hawai‘i state law. As a proposed steward of an area, it is imperative that aquaculture operators provide “knowledge of their proximity to [such resources] and any long term disturbance or impact proposed by the applicant as necessary for proper review.”⁵⁵ Aquaculture operators and applicants have repeatedly failed to provide detailed studies and photographs to enable such a review.

Additionally, companies have not consistently provided adequate information on endangered species that their operations may affect. For example, in a Draft Supplemental Environmental Assessment submitted to the state in early 2008 for the purpose of modifying a Conservation District Use Permit, KBWF incorrectly stated that the hawksbill turtle species was infrequently found in Hawaiian waters.⁵⁶ In fact, the hawksbill turtle is listed as one of the Significant Natural and Cultural Resources at the nearby Kaloko-Honokohau National Historical Park.⁵⁷ Additionally, in the same document, KBWF claimed that Hawaiian monk seals occurred “rarely in the main Hawaiian Islands.” In fact, an official at the Division of Aquatic Resources cited numbers of Hawaiian monk seals to be “estimated at 60 to 70 in the main Hawaiian islands, with several known to frequent the island of Hawai‘i.”⁵⁸ Having operated at the current lease site off of Unaloha Point, Hawai‘i Island, for almost three years at the time the document was written, such mistakes are an indication of the company’s unwillingness to fully understand and minimize the negative environmental impacts of its operations.



Pacific threadfin (*moi*) harvested from an open-ocean fish farm. Photo by NOAA.

Failure to Complete Required Monitoring/Inadequate Monitoring

In the case of ocean aquaculture, benthic monitoring reveals much more about the true impacts of an operation than simple water-quality tests do. The seafloor, or “benthos,” is the bottom of the ocean, and it includes the many small, often microscopic organisms living there. Between 2005 and 2008, KBWF did little to monitor how its operation may be changing the benthic environment. In the company’s application for expansion in 2008, a very limited amount of benthic testing data was included. Over three years, only five samples had been taken. These included one for each site, with no repeated data for any site sampled. The same five sample sets were used for all analysis.⁵⁹ The small sample size and failure to repeat tests at sites to review changes over time call into question the accuracy of any analysis provided by the company about their impacts on the benthos.

On May 14, 2007, the Division of Aquatic Resources notified KBWF by letter that their current benthic monitoring system was unsatisfactory. The letter said that “at a minimum, the Department of Land and Natural Resources would propose quarterly monitoring of the benthic substrate by drop camera. In addition ... any in-situ cleaning of cages must be pre-approved by the Department of Land and Natural Resources and monitored for impacts to the benthic marine environment.” By March 2008, KBWF still had not complied.⁶⁰ In addition, algal sampling by the company had been inadequate and “questionable in nature.” Furthermore, KBWF had not completed tests requested by the Division of Aquatic Resources which could indicate whether an ecological phase shift was beginning to occur at the site as had happened at the Hukilau Farm’s site.⁶¹ Failure to complete the diagnostic tests and

monitor algal growth demonstrates a lack of regard for averting negative environmental impacts, even at its own site.

Additionally, claims of legitimate third-party monitoring are suspect due to possible conflicts of interest. KBWF President Neil Sims founded Deep Blue Research LLC in 2004 for the purpose of aquaculture research and development.^{62,63} Co-founder and shareholder⁶⁴ of KBWF, Dale Sarver, now president of Deep Blue Research, conducted and submitted the benthic sampling report for KBWF to the Department of Land and Natural Resources in October 2008.⁶⁵

Despite all of this, KBWF had the audacity to request that its benthic monitoring requirements be reduced to once per year.⁶⁶ Additionally, the company has asked for less stringent water quality monitoring requirements.⁶⁷

Losing Control of Hawai'i's Waters

The use of antibiotics in aquaculture has gained attention as a public health concern and ecological threat. Continued doses of antibiotics can alter the composition of marine and freshwater bacteria, making them stronger and antibiotic-resistant. Evidence suggests that these antibiotic-resistant bacteria can, in turn, pass on their antibiotic-resistant genes to other bacteria, including human and animal pathogens.⁶⁸ Antibiotics can also increase pollution around fish farms. When the environment is rid of the naturally occurring bacteria that play a role in processes of decomposition, the discharge from farms — including uneaten food and fecal matter — accumulates more heavily.⁶⁹

Despite the potential ramifications of antibiotic use in aquaculture and the need for careful regulation, the decision to introduce antibiotics into Hawaiian waters at the KBWF site in 2007 was not made by Hawaiian officials or even overseen by Hawaiian veterinary counsel.⁷⁰ Instead, the determination was made over e-mail and phone by officials at U.S. Fish and Wildlife Service in Montana and approved by a federal agency, the Center for Veterinary Medicine at the Food and Drug Administration, more than 4,800 miles away in Maryland.^{71,72}

Transfer of Kona Blue Water Farms to Keahole Point Fish LLC

On January 8, 2010 Board of Land and Natural Resources (which oversees the Department of Land and Natural Resources) gave KBWF permission to transfer its lease to Keahole Point Fish LLC (KPF), a company registered just two months prior in Delaware.^{73,74} The main investor in KPF is Hugh Reilly; Todd Madsen will serve as president. In the past, Reilly has founded two trawling and fish-processing

companies in the United States for the Japanese company Maruha-Nichiro.⁷⁵ Madsen has served as president at OceanSpar, the makers of industrial fish farm cages, for the past three years.⁷⁶

Given the multiple documented failures of KBWF to comply with monitoring requests and the misleading information it provided to decision makers, state resource managers should have reviewed KBWF's behavior at the time the lease was transferred and asked the new operator to explain how it will be a better steward. Instead, the state merely rubber-stamped the permit transfer, providing little incentive for KPF to be considerate of public and cultural resources.

The announcement of transfer was made public only days before the January 8, 2010 Board of Land and Natural Resources meeting at which the decision would be made.⁷⁷ Despite the short notice, the board received over 40 comments from individuals and organizations urging for a one-month deferral of the decision to allow time to assess the qualifications of the candidates and to determine if any conditions should be placed on the transfer of the lease. The board unanimously approved the transfer. Board of Land and Natural Resources members failed to question the applicants who were present at the meeting about their experience or how they proposed to turn the failing project into a profitable enterprise without harming public resources.⁷⁸

Late Rent Payments

Both existing offshore aquaculture tenants in Hawai'i have failed to make timely payments at different times throughout their tenancy in Hawai'i, despite generous tax incentives through Act 221, Hawai'i's High Tech Tax Incentive,



An ocean cage at Kona Blue Water Farms. Photo by NOAA.



Pacific threadfin (*moi*) inside an aquaculture cage. Photo by NOAA.

and large amounts of federal funding. The High Tech Tax Incentive provides up to 100 percent returns (80 percent for investments made after April 2009) on cash investments for Qualified High Tech Companies, including aquaculture facilities. In other words, over the course of five years, aquaculture companies can receive credit against their Hawai'i state taxes in the amount they have invested in their privately owned operations.⁷⁹

In June 2009, KBWF requested approval to pay rent owed to the Board of Land and Natural Resources in installments. Neil Sims, president of the company, explained in his letter: "We are severely cash constrained at the moment." The company owed \$57,990.82 in back rent.⁸⁰ Yet, in a letter to the editor published in *West Hawai'i Today*, Sims claims to have paid the state nearly \$100,000 in lease payments over the prior two years.⁸¹ The claim, however, is unsubstantiated at this time. A subsequent investigative piece in *West Hawai'i Today* in February 2010 reported that records at the Department of Land and Natural Resources show the company has paid \$91,933 to date. There is confusion over where the payments were directed, and state officials could not say if or how the money had been used.⁸²

Cates International also had a problem with paying rent in a timely manner. Now Hukilau Farms LLC, the company's lease is \$1,400 per year or 1 percent of its gross annual revenue. In 2006, at the time of the transfer of the site from Cates International to Grove Farm Fish and Poi LLC, Cates had submitted an annual report for the percentage of rent due from March 4, 2004 to March 8, 2005, which totaled \$5,100.13 or 1 percent of the company's \$510,130.40 in revenue during

that time period. The company had failed, however, to submit and pay rent for the time period of March 2005 to 2006. A condition for the transfer was for Cates International to pay all rents still owed to the state.⁸³

Safe and Stable Jobs?

Although KBWF President Neil Sims testified in *Karlsson vs. Kona Blue Water Farms LLC* that "safe operations were the priority for the company, the highest priority for the company,"⁸⁴ injuries have been relatively common and simple precautions such as maintaining non-skid surfaces on boats have reportedly not been taken.⁸⁵ In testimony for a separate case against the company, Sims admitted to not having "completed any course or study that specifically addressed ... safety and health in the workplace"⁸⁶ and that it was a "fair statement" that he had "no knowledge as to which OSHA [Occupational Safety and Health Act] requirements might apply to [his] operation" other than the reporting of accidents.⁸⁷ Four lawsuits have been filed against the company (see sidebox for more information). One is still awaiting a ruling from the Hawai'i District Court.⁸⁸

Between 2005 and 2006 alone, multiple injuries occurred at the KBWF site. According to Sims, "...there were a couple lifting scuba tanks; there was one lifting a fuel tank; there was one that was associated with repetitive brushing; and there was some associated with lifting feed; one was associated with falling down when one was carrying feed..."⁸⁹ At times, the offshore crew working in teams of only two or three⁹⁰ were responsible for manually transporting nine tons of feed a week⁹¹ from a storage facility to a truck, to a dock, to a boat, and then into the cages.⁹² Employees were not given any formal training in proper lifting techniques to avoid injury.⁹³

Currently, the Hawai'i ocean fish farming industry employs 44 people, including jobs at both of the operating companies' land-based hatcheries. After recently approved modifications are made to both the Hukilau and KBWF site, the industry only projects it will provide 39 jobs.^{94,95,96} This decrease is anticipated despite a projected increase in production from about 2 million pounds to 6 million pounds of fish farmed annually.^{97,98,99} KBWF requested approval to modify its operation in part to eliminate the need for divers. Said Sims: "We believe that the only way for Kona Blue to achieve profitability for our Kona operation is by reducing our reliance on SCUBA divers."¹⁰⁰ Given the safety record for divers (see sidebox), the safety gained may outweigh the jobs lost. However, it also highlights concerns with what kind of jobs the industry is creating and should cause decision makers to think twice about the state's investments.

Inadequate and Conflicting State Laws for Regulation of Factory Fish Farms in the Ocean

Despite state promotion of ocean aquaculture — including financial incentives — Hawai'i's agencies are not prepared to effectively regulate any expansion of the industry and have struggled to regulate the two existing operations. In comments regarding the expansion of KBWF submitted in March 2008, the Division of Aquatic Resources noted that:

“[C]urrent State rules governing aquaculture operations relative to HRS §342D (Water pollution from known Point Source operations) is inadequate as these rules were written on the basis of land-based operations where pollution could be controlled in some way prior to reaching aquatic bodies — this whole concept falls apart when the organisms are maintained in situ within cages in our Class AA waters. Clearly, neither the DOH [Department of Health] nor DLNR [Department of Land and Natural Resources] is adequately prepared in our rules or permits for operations of this sort, raising an immediate need for a inter-governmental task force to address this relatively new industry across Natural Resource Trustee Agency boundaries with the purpose of identifying gaps in existing regulations relative to negative environmental impacts.”¹¹²

Despite millions of dollars given to the industry through federal and state grants, research, and tax incentives, the ocean fish farming industry and the agencies which regulate it have failed to prove that they can be good stewards of Hawai'i's precious ocean resources.

Lawsuits Against Kona Blue Water Farms

Wagner vs. Kona Blue Water Farms LLC – filed December 16, 2009 and not yet resolved. Michael Wagner alleges that throughout his employment as a diver, KBWF “...willfully ignored and violated mandatory provisions and obligations set forth in its own Dive Manual” as well as those “set forth in its own written safety audits.” Additionally, Wagner alleges that the company violated state and federal laws and regulations designed to protect the safety of commercial divers, causing him to suffer injuries.¹⁰¹

Larson vs. Kona Blue Water Farms LLC – filed on September 23, 2008 and voluntarily dismissed in December 2008.^{102 103} Michael Larson alleged that KBWF did not provide him with a “safe, proper and suitable place in and about which to work” and as a result, he suffered injuries that cause him ongoing physical and emotional pain and harm.¹⁰⁴

Karlsson vs Kona Blue Water Farms LLC – filed on May 10, 2007 and dismissed for settlement out of court in December 2008.¹⁰⁵ Alan Karlsson alleged that KBWF did not provide him with a “safe, proper and suitable place in and about which to work” and as a result he suffered injuries which cause him ongoing physical and emotional pain and harm.¹⁰⁶

Labossiere vs Kona Blue Water Farms LLC – filed October 29, 2007 and settled out of court in March 2009.¹⁰⁷ Dean Labossiere alleged that KBWF failed to provide a safe place to work, proper equipment, or adequate and competent crew and supervision, and “failed to obey state and federal regulations which govern maritime operations.” As a result, he alleges that he suffered a severe and disabling back injury.¹⁰⁸

In addition, agencies tasked with regulating and assessing the impacts of ocean aquaculture operations are not provided the financial resources to do so. For example, due to a lack of funding, the Division of Aquatic Resources has not adequately analyzed KBWF's impacts on coral reefs and benthic habitat.¹¹³

Laws regarding ocean aquaculture in Hawai'i are also arguably in conflict with pre-existing uses. Aquaculture activity takes away access to certain ocean spaces from both commercial and recreational fishermen to lease it to singular private interests. This practice is in direct contradiction with section 187A-21 on public fishing grounds in the Hawai'i Revised Statutes, which states: “Except as otherwise provided by law, all fishing grounds appertaining to any government

land or otherwise belonging to the government, except ponds, shall be and are forever granted to the people, for the free and equal use by all persons; provided that for the protection of these fishing grounds, the department may manage and regulate the taking of aquatic life.”

Of greater concern, the current path of industry development is likely in conflict with Article XII, Section 7 of the Hawai‘i State Constitution, which reads: “The State reaffirms and shall protect all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by *ahupua‘a* tenants who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778, subject to the right of the State to regulate such rights.”

Ocean resources have customarily been an important part of Hawaiian traditional culture. Lineal heirs of the land and ocean and traditional, cultural and religious practitioners could be disrupted by ocean fish farms, especially if applicants are not required to prepare an Environmental Impact Statement (EIS), which would contain an analysis of cultural impacts. Both KBWF and Hukilau Foods were not required to complete a full EIS. Instead, the companies completed less rigorous Environmental Assessment reports. An EIS is not required by the current law unless the Department of Land and Natural Resources deems that the project will have a significant impact on environmental resources. More information regarding cultural impacts is outlined in the Cultural Concerns section of this report.

Despite millions of dollars given to the industry through federal and state grants, research, and tax incentives, the ocean fish farming industry and the agencies which regulate it have failed to prove that they can be good stewards of Hawai‘i’s precious ocean resources.

Economic Comparison Between Ocean Fish Farming and Land-Based Aquaponics

Because the existing ocean fish farms in Hawai‘i are private ventures, their financial records are not accessible to the public, despite their use of public resources for private profit. Therefore, the total amount required to fund one farm is unknown. However, we do know that \$13 million is being invested in the expansion of Hukilau Foods.¹¹⁴ (This number does not account for the money initially invested in starting HOARP, or for investments made by Cates International).

Viable alternatives such as recirculating aquaculture systems could be a better investment. A comparison between the Premier Organic Farms’ recirculating aquaponic system in Memphis, Tennessee, and Hukilau Foods of Ewa Beach



Lettuce and other vegetables growing in a recirculating aquaculture system at the University of the Virgin Islands in St. Croix. Photo courtesy of Dr. James Rakocy.

And It’s Not Even Profitable

“Kona Blue remains unprofitable.” – Neil Sims, president of Kona Blue Water Farms Inc.¹⁰⁹

Kona Kampachi® is an expensive sashimi-grade fish found in sushi bars, white-table-cloth restaurants and higher-end retail outlets.¹¹⁰ But the cost consumers pay is even higher than they think, given the amount of taxpayer money that has been spent in vain to try to keep KBWF afloat. KBWF has received \$1.8 million in funding from NOAA, Hawai‘i High Tech Tax Credits and nearly \$200,000 in federal stimulus money through grants and contracts. Between 2005 and 2007, it received nearly \$10 million from a group of investors. Despite all this, in 2009 the company sought further flexibility in its lease terms for experimentation because it could not turn a profit. The only solution, the company claimed, was changing the cage design to reduce the number of employees needed to 14.¹¹¹ Shortly after approval, it sold the ocean factory fish farm site and operations to KPF.

Comparison of Open-Ocean Aquaculture and Land-Based Recirculating Aquaculture Systems

	Hukilau Foods ⁱ Ocean Fish Farming	Premier Organic Farms – Memphis ⁱⁱ Recirculating Aquaponics
Sales in Fish (per year)	\$20 million (projected) for moi	\$22.3 million (projected) for tilapia
Jobs	25 , including hatchery and administration	282 full-time operations and production jobs
Fish Production (per year)	5 million pounds	11.44 million pounds
Additional products (per year)	None	<ul style="list-style-type: none"> • 7.7 million pounds of Boston lettuce/arugula • 16.9 million pounds of baby greens/spinach/mixed greens • 6 million pounds of herbs • 12 million pounds of tomatoes
Additional sales (per year)	None	\$114.5 million in vegetables (Total sales: \$136.8 million in fish and produce)
Initial capital investment	\$13 million now being invested (from private investors and federal fisheries loans) to scale up from 1.25 million pound production levels. ⁱⁱⁱ	\$4.2 million to build fish production unit and tilapia fingerlings and fish food \$50 million total costs (including land, greenhouse construction, cafeteria and daycare facility for employees' children)
Potential profit	Less than \$7 million in the first year ^{iv}	\$78 million in first year (earnings before tax, depreciation and amortization)
Space used	61.59 acres of seafloor plus the water column	100 acres of land
Water used	15.9 million gallons will be constantly flowing through the cages at a rate of 0.5-2.0 kts	40 million gallons of captured rainfall (for tilapia and plant production)
Energy Used	Numbers unavailable.	Zero-impact operation — the system is in alliance with other industries. It will provide heated rain/wastewater for energy plants to use and will get excess energy from the plants to use for its operation

- i Information drawn from: Aquaculture Planning & Advocacy, LLC. "Final Environment Assessment: Proposed Expansion of Hukilau Foods Offshore Fish Farm, Mamala Bay, O'ahu, Hawai'i." July 29, 2009. Sales, Jobs, Fish Production and Initial Capital Investment at p. 22; Space Used at 8; Water Use at 3 (volume of cages) and 28 (current speeds) with calculations conducted by Food & Water Watch for gallons of water based on volume of cages. 1 cubic meter = 264.172052 U.S. gallons
- ii Information provided by Susan Bedwell, CFO, Premier Organic Farms, September 15, 2009. Information on file at Food & Water Watch.
- iii \$13 million is the investment that the company plans to make, as quoted in Aquaculture Planning & Advocacy LLC, Op cit. This figure does not include the money that was invested in starting up the Hawaiian Offshore Aquaculture Research and Demonstration Project, or Cates International, the predecessors of Hukilau Foods. \$13 million does not necessarily represent the money that would be needed to start Hukilau Foods from scratch.
- iv This is a generous calculation. Hukilau Foods projects a total wholesale value of \$20 million when the operation at full capacity, but it does not actually plan to reach full production until year three. \$7 million would be the maximum revenue possible after recuperating the \$13 million investment if the company did reach \$20 million in sales that first year (a lower revenue is actually expected). Plus, because financial figures prior to this expansion were not available, this calculation does not figure in the financial status, or debt, Hukilau was in prior to this expansion.

in Oah`u, Hawai`i, shows that the ventures expect to have similar sales in fish products (with Premier Organic expecting 9 percent more in sales).¹¹⁵ However, Premier Organic Farms will provide **11 times as many jobs** and more than **twice the amount of fish — plus 43 million pounds of produce**. It will also be far more profitable, recuperating start-up costs within the first year and perhaps achieving over **11 times the revenue** that Hukilau Foods expects in year one.

Environmental Concerns

The ocean aquaculture industry has incited a long list of environmental concerns. Unfortunately, many of the common fears have been confirmed by operations in Hawai`i — including impacts on marine mammals, such as bottle-nose dolphins, and the introduction of invasive species. The extent of other environmental impacts has not been determined due to a failure of existing companies to adequately monitor and report on conditions at their sites over a course of time. One sentiment is widely echoed by those in the industry — that it is all an experiment.¹¹⁶

Transfer of Disease to Wild Populations

Due to the nature of ocean aquaculture operations — which are comprised of large mesh-like cages filled with fish

— there is no meaningful separation between water within the cage and that outside. Wastes, excess feed, parasites, disease-causing bacteria and viruses can pass between the “cage environment” and the “wild environment” seamlessly. Captive fish, held in unnatural and stressful conditions, are more likely to develop diseases or be susceptible to parasitic infection than they would be in the wild. Antibiotics used to alleviate outbreaks can have a negative impact on wild fish when applied in-situ (i.e., without taking the cage out of the water) and introducing treatments directly into the water.

Indeed, documented cases of stress-related illnesses requiring in-situ antibiotic treatment¹¹⁷ as well as parasites¹¹⁸ have occurred at KBWF. The Division of Aquatic Resources has stated: “in-situ treatment of diseases or parasites, or concerns regarding endocrine or biodisruptive effects of chemicals used in feeds on native species in adjacent coral reef habitats are a major issue with [Kona Blue Water Farms].”¹¹⁹ As of March 2008, the company was not required to examine wild fish populations for the transfer of disease from KBWF farmed fish to wild fish which frequent the site.¹²⁰ It is unclear whether such tests have been conducted and whether — or to what degree — wild populations have been infected by outbreaks at the farm site.



A variety of vegetables grow in Olomana Gardens, a Hawaiian recirculating aquaculture facility that produces both fish and plants in Waimanalo. Photo by Eileen Flynn, Food & Water Watch.



Interactions with Bottle-Nosed Dolphins

The state has documented cases of deliberate interference with bottle-nosed dolphins at KBWF's operation¹²⁷ and six or seven dolphins are believed to frequent the site daily in search of food.¹²⁸ Their numbers are increasing over time.¹²⁹ The dolphins began appearing when the cages were first installed and a fish escape occurred.¹³⁰ According to the Division of Aquatic Resources, the animals have begun to exhibit "unnatural behaviors."¹³¹ Conditioning of dolphins is a major concern. It can be detrimental to dolphin survival due to altered feeding and social behaviors and the increased potential for entanglement in nets, pens and other gear, or ingestion of foreign objects from the operations. The Division of Aquatic Resources warned KBWF that dolphin conditioning could "be occurring, or soon occur, at levels that constitute 'take' as defined under the Marine Mammal Protection Act."¹³² "Take" is defined as to "harass, hunt, capture, kill or collect, or attempt to harass, hunt capture, kill or collect."¹³³ If true, this could put KBWF in violation of federal law.

Additionally, the periodic use of antibiotic-coated feed documented at KBWF¹³⁴ is cause for concern, as the dolphins frequenting the site are regularly ingesting both escaped fish^{135,136} and wild fish, which feed on the excess food from the cages.¹³⁷ Even in the absence of antibiotics, there is cause for concern, as KBWF's fish are "fed an unnatural diet of fish feed ... containing poultry by-products, which raises issues regarding hormones and other chemical influences prevalent in land-based farming practices."¹³⁸

Interactions with Sharks

Like dolphins, sharks are drawn to aquaculture cages because of the large number of fish in a confined area and the accumulation of wild fish that frequent the sites to take advantage of excess feed. This poses an extreme hazard to employee safety, safety of other ocean users near and around the site, and to the sharks. Additionally, sharks play a significant role in the cultural practices of Native Hawaiians who revere them as *aumakua*, a family guiding spirit. In 2005, KBWF killed a 16-foot tiger shark that had repeatedly visited the site.¹³⁹ The incident sparked outrage in the Native Hawaiian community. In September 2009, a Galapagos shark was documented to have bitten through and entered one of KBWF's cages, releasing farmed fish into the wild. The shark was removed with the help of local fishermen by using a seine net. Hundreds of the escaped fish were quickly consumed by a resident dolphin and a school of native fish known as *uluu*.¹⁴⁰

Use of Antibiotics and Other Chemicals

Fish at KBWF have required antibiotic treatment for stress-related disease and parasites, including streptococcus and skin flukes.^{121 122} The U.S. Fish and Wildlife Service of Montana gave KBWF a permit to use florfenicol, which is explicitly approved only for catfish or freshwater salmonid aquaculture as an extra-label drug use.^{123 124} The impacts of florfenicol on unique Hawaiian marine flora, fauna and other organisms are unknown. In addition to potential environmental impacts, the use of antibiotics in seafood poses a threat to consumers who may experience unexpected allergic reactions after consuming fish with antibiotic residues, or as previously mentioned, through the public health implications of creating drug-resistant pathogens.

According to documents from the Department of Land and Natural Resources, the company is also seeking, or has already obtained, a permit to begin a feed-coated treatment for skin flukes with the drug parziquantel, typically used to treat worms in humans and animals.¹²⁵ The claim by KBWF that they do not use any "preventative antibiotics"¹²⁶ is misleading to consumers and decision makers who may not understand the technical distinction between preventative antibiotics and other uses, and assume that this indicates a company-wide policy against drug use.

Effects on Coral Reef and Alien Invasive Species

It is possible for factory fish farms in Hawaiian oceans to have negative impacts on coral reefs, including “effects of the structure itself on displacement or alteration of natural reef fish populations, transmittal of disease and endosymbionts to nearshore reef populations, and the structures themselves serving as gigantic three-dimensional substrate for invasive seaweed or alien soft coral growth which could then start to invade (through fragmentation, sexual reproduction and/or a vector relationship) the nearshore reefs where such situations do not currently exist.”¹⁴¹

In Hawai`i, 100- to 300-foot depths occur directly adjacent to the shoreline.¹⁴² Many Pacific coral reef habitats occur in deep waters and often extend well beyond 100 feet.¹⁴³ But, according to the Division of Aquatic Resources, ocean aquaculture operations have often failed to “adequately address potential impacts on the adjacent and unique coral reef habitats, or native flora and fauna for areas under consideration which would be necessary for a resource trustee to evaluate possible concerns ...”¹⁴⁴ In fact, the Division of Aquatic Resources stated in comments on the proposed expansion of KBWF that the company’s repeated “argument that cages are located 100-300’ depth (i.e. and therefore not

near coral reef) is misleading and untrue.”¹⁴⁵ KBWF’s close proximity to the shore — less than half a mile out — actually suggests they may be in relatively close proximity to nearby reef resources.¹⁴⁶

No one fully knows the cumulative effects that excessive nutrification from fish feed and feces may have on adjacent reef sites over the years. According to the Division of Aquatic Resources, “nutrification of coral habitats often results in an ecological shift from coral to fleshy algal structure resulting in a decrease in reef species’ diversity, populations, and trophic complexity.”¹⁴⁷ In fact, there have been documented cases of phase shifts at the site currently owned by Hukilau Farms located off of Ewa Beach, O`ahu, characterized by the growth of alien soft coral underneath the cages.¹⁴⁸ At the time they were found, the colonies had already begun to reproduce. DAR noted that this finding “shows that alien species issues as they relate to [ocean aquaculture cages] in nearshore waters serving as a major colonization refuge, are real, and a threat to Hawai`i’s nearshore natural marine ecosystems.”¹⁴⁹ Given the possibility for this scenario to recur at other sites, the Division of Aquatic Resources requested that KBWF report any unknown organisms growing on or around the cages. KBWF responded that the request



An example of a coral reef off the coast of Hawaii. Photo by Kevin Panizza/iStockphoto.

was “ludicrous” and that the company’s intent was “controlling biofouling, rather than identifying it.”¹⁵⁰ With known problems of invasive species and phase shifts occurring at other sites, KBWF’s response demonstrates neglect and an unwillingness to work with state agencies to address environmental impacts before they expand out of control.

Impacts on Benthos

While many ocean aquaculturists often argue that “dilution is the solution to pollution,” experience in Hawai'i has proven otherwise. “Large amounts of nutrients [are] translocated from excess feed and feces into benthic organisms (algae, sponges, bryozoans, etc.), which grow atop the cage mesh and require periodic removal.”¹⁵¹ The removal of the growth typically occurs in-situ (i.e., in the water without removing the cages), enabling the benthic organisms to sink and decay on the ocean bottom. Out of sight out of mind? So it seems. This long-term and persistent nutrient source is “often not accounted for by water quality monitoring of nutrients associated with cage aquaculture.”¹⁵² During studies conducted at what is now Hukilau Farms, a large cyanobacterial mat was found to be growing beneath the cage site.¹⁵³ This finding would not have been reflected in water quality tests. Regular benthic monitoring is needed to determine the true impacts.



Additionally, the barren bottom lands that aquaculture operators like KBWF and Hukilau Farms claim their sites occupy are far more important than such a description suggests. Both the endemic Hawaiian seagrass *Halophil Hawaiiiana* and the sand-forming calcareous alga *Halimeda spp.* form large meadow-like habitats at the depths often used for anchoring cage aquaculture in Hawai'i — what is often called “sand” bottoms or “barren.”¹⁵⁴ According to the Division of Aquatic Resources, “these species are important to providing both shelter and grazing habitat for a wide variety of marine organisms, some of which may be directly associated with near shore coral reefs.”¹⁵⁵

Problems with Feed Composition

When it comes to seafood, the phrase “you are what you eat” should be modified to “you are what the fish you eat ate.” There are multiple concerns with what fish in ocean farming operations are fed, from unnatural items to the amount of wild fish used to make feed.

KBWF has used a feed ingredient that most consumers wouldn’t expect in the fish on their plates: poultry byproducts, such as ground feet, heads and undeveloped eggs.¹⁵⁶ Using these ingredients in aquaculture feed could mean the introduction of hormones and other chemicals used in producing the chickens into Class AA waters — and into the fish people eat.¹⁵⁸ The use of preventative antibiotics and hormone injections in land-based concentrated animal feeding operations is widespread, and no one knows what kind of impact poultry by-products from such farms would have in marine waters. While it is commendable that KBWF is seeking ways to reduce its reliance on wild fish in feed, such testing should be carried out in a controlled closed-loop environment — not Hawai'i’s pristine waters.

Just as the industrial factory farm model of land-based animal production requires a cheap commodity crop for use in feed, so too are factory fish farmers turning to the soy industry to find a solution for their protein-hungry fish. KBWF is conducting trials on soy feed in their land-based hatchery, in conjunction with the U.S. Soy Board. Their soy has not been certified GMO-free. As 91 percent of the soy grown in the United States is genetically engineered, it is highly unlikely that any feed would be GMO-free unless specified.¹⁵⁹ It is troubling to imagine what effects this GMO soy could have on the marine environment if fed in mass quantities to ocean-farmed fish. Soy is high in estrogen, which studies have indicated may have a damaging effect on wild fish populations by affecting their ability to reproduce.¹⁶⁰

Furthermore, companies are sometimes unaware of what exactly they are feeding their fish. In 2007, for example, the Food and Drug Administration recalled animal feed that was



A Native Hawaiian fisherman walking on the offshore Ke'e beach reef in Kauai. Photo by Can Balcioglu/iStockphoto.

“The ocean has enormous historical, cultural and religious importance for Native Hawaiian communities, which could be infringed upon by this new type of ocean use.”
 – Mike Kumukauoha Lee, Cultural Practitioner

tainted with melamine.¹⁶¹ Melamine is an industrial chemical typically found in fire retardants and plastic — it is not meant for consumption.¹⁶² It was three weeks before KBWF was notified that their feed was contaminated. During that time, the feed was being introduced into the ocean environment — and to the fish that would ultimately be eaten by unsuspecting consumers.¹⁶³

Cultural Concerns

“The ocean has enormous historical, cultural and religious importance for Native Hawaiian communities, which could be infringed upon by this new type of ocean use.” – Mike Kumukauoha Lee, Cultural Practitioner¹⁶⁴

Many in the Native Hawaiian community have opposed the ocean factory fish farming industry where these farms’ practices clash with cultural traditions. Native groups have brought contested cases against new operations and challenged proposals for the expansion of existing operations. Concerns include killing animals revered as *aumakua*, the misappropriation of cultural terms, alterations to natural resources needed for cultural and medicinal uses, and impacts on traditional fishing grounds.

Effects on Aumakua

“Kanaka Maoli recognize the ocean as the domain of the mano [shark] and traditionally offered them the first or biggest catch out of respect. By killing one of these sacred animals, Kona Blue has disrespected us and infringed on our religious freedom.” – Kale Gumapac, Alaka`i, Kanaka Council¹⁶⁵

Interaction with sharks is problematic in particular due to the significant role they play for culturally practicing Native

Hawaiians who revere them as *aumakua*, a family guiding spirit or totem. In 2005, KBWF killed a 16-foot tiger shark that was stalking one of its divers.¹⁶⁶ In September 2009, another interaction with a shark was recorded at KBWF. A Galapagos shark bit through and entered one of the cages, releasing many of the farmed fish.¹⁶⁷ Thankfully, in this instance, the shark was removed using a seine net, rather than being killed.¹⁶⁸

Sharks can be attracted to the fish in the cages. These sharks, perhaps more aggressive due to the presence of the fish, can be a threat to other wild fish or marine animals that congregate around the cages and to fishermen fishing near the cages.

Misappropriation of Cultural Terms

Industrial ocean fish farming operations in Hawai'i consistently use the idea of traditional Hawaiian fishponds (*loko i'a*) to validate using Hawai'i as a testing ground for this new type of aquaculture.

Just as there are different forms of land-based farming — from organic, small-scale farms to the large industrial mono-crop operations — aquaculture comes in many forms. *Loko i'a*, the traditional fish ponds used by Native Hawaiians

and which are undergoing a revitalization throughout the state, are multitrophic systems, small ecosystems in and of themselves. Fish are fed using naturally occurring food, and wastes are consumed by other organisms within the system. Perhaps most importantly, the ponds are a community effort, and when they are in full operation, they contribute directly to the food security of local populations.¹⁶⁹ Open-ocean aquaculture operators often mischaracterize their industrial mono-species cage operations as a natural extension of the *loko i'a* system.

KBWF has an entire “Hawaiian Aquaculture” section on their company website that states, “King Kamehameha was known to have some of the biggest fishponds in the islands. Pa'āiea, his favorite ... was inundated by a lava flow in 1801. Kamehameha is said to have offered a lock of his hair — the greatest sacrifice he could make — in order to stop the volcanic eruption. ... Today, Kona Blue is furthering the ancient Hawaiian tradition of aquaculture by leveraging innovative, state-of-the-art hatchery and open ocean grow-out technology. [Kona Blue is located] on the very lava rock created by the flow that covered Pa'āiea more than 200 years ago.”¹⁷⁰ Given the lack of involvement with and outright opposition to KBWF's operations by some Native Hawaiian groups,¹⁷¹ such a statement is an irresponsible portrayal of broad Native Hawaiian support for the open-ocean aquaculture industry.



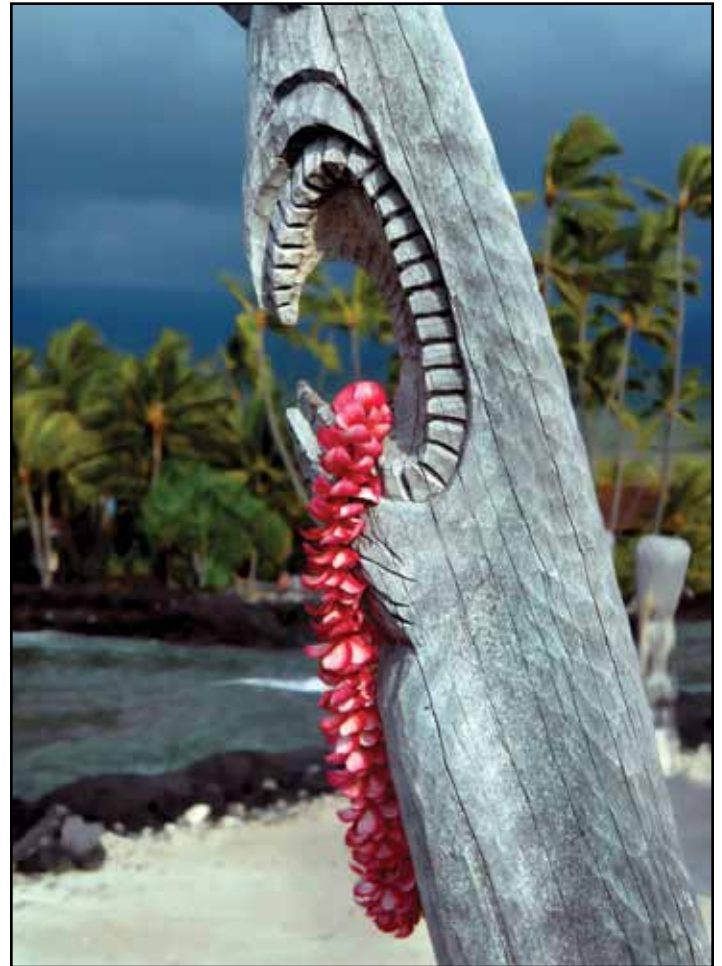
Impacts on Ko`a (Traditional Fishing Grounds)

Ocean fish farms can disrupt *ko`a*, traditional fishing grounds which have been cultivated by Native Hawaiians for centuries. For example, KBWF is located directly off of the coast of Kailua-Kona in a *ko`a*.¹⁷² Oversight agencies have not sufficiently documented the cultural knowledge of traditional *ko`a* sites before approving the use of these areas for some aquaculture operations.¹⁷³ It is well-known that offshore aquaculture cages can act as fish aggregating devices (FADS), disrupting the usual patterns of fish and drawing them to the new stationary objects. This is a major concern for local fishermen.

Impacts on Resources Important for Ceremonies

In a contested case filed against the Conservation District Use Permit for Hawai`i Oceanic Technology, cultural practitioner Mike Kumukaouha Lee highlights the potential disruption of many unique forms of seaweed and invertebrates used for cultural ceremonies. “The medicinal practices, in particular the *mawaewae* ceremony, of which I am a cultural practitioner, for the first born child, using the *pupumo`o*, which is a chiton, an invertebrate, will be adversely impacted by the granting of this CDUA and proposed project.”¹⁷⁴ Lee goes on to list several other grasses, invertebrates and fish that would be adversely impacted by the project. Some of these include “*Limu `aki`aki*, which is used for the practice of *lo`i kalo* to ensure the health and well-being of the *kalo* plant, and ‘*aki`aki*, shoreline rush grass, which is used for spiritual cleansing...”¹⁷⁵ Additionally, the “*hilu pilikoa* fish, *Hinalea `aki lolo* fish, *loli`ele`ele* (black sea cucumber) *puhi kauila*, and the *pāo`o* fish, which are used in my cultural practices, will be adversely effected (sic).”¹⁷⁶ While the concerns listed in the case are particular to the site sought by Hawai`i Oceanic Technology off the North Kohala Coast, Hawai`i Island, it is likely that other sites could have similar impacts on other important natural resources used by cultural practitioners.

Article XII, Section 7 of the Hawai`i State Constitution reads: “The State reaffirms and shall protect all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by *ahupua`a* tenants who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778, subject to the right of the State to regulate such rights.” It is not clear, given the past decade’s experience, that the state can uphold both its obligation to the Native Hawaiian people and continue to promote the open-ocean aquaculture industry.



Conclusions and the Way Forward

The past decade has shown that factory fish farms in Hawai`i’s oceans should be considered a failed experiment. The regulatory structure has not mitigated negative impacts to the environment or to Native Hawaiians. The state’s limited resources should be dedicated to ensuring the responsible use of the public’s natural resources for the future, not for individuals to chase short-term profit.

Less risky methods of aquaculture should be explored and promoted to increase food security and decrease the state’s reliance on imported food. The restoration of *loko i`a* could provide both the impetus for a cultural revival and meet community food needs. When Europeans arrived in 1798, there were an estimated 360 fish ponds producing nearly 2 million pounds of fish per year.¹⁷⁷ Initiatives are already underway across the islands to resume this historic practice.^{178,179} Land-based recirculating systems — including aquaponics — are other alternatives that are successfully in use on the islands and could be expanded to meet demand.¹⁸⁰ An investment in these technologies would provide real returns to Hawai`i — not empty promises.

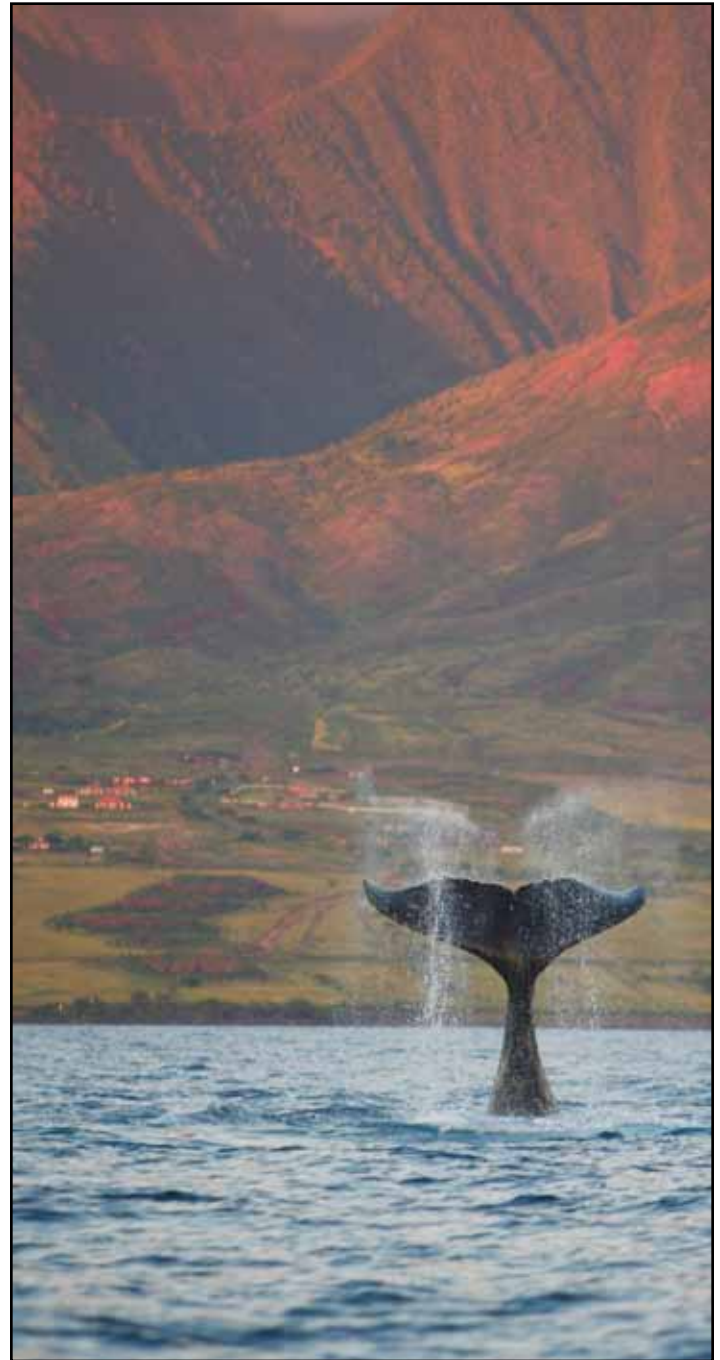
Recommendations

For citizens:

- Ask your decision makers to reconsider allocation of state resources to ocean fish farming.
- See Food & Water Watch's Smart Seafood Guide for sustainable seafood choices.
- Steer clear of Kona Kampachi® and other open-ocean farmed fish.

For policymakers in Hawai'i

- Support House Resolution 245 introduced by Rep. Mele Carroll requesting that the Department of Land and Natural Resources place a moratorium on new permits for open-water commercial mariculture finfish operations.
- Oppose House Bill 2409 introduced by Representative Tsuji which would increase the length of leases for ocean fish farm sites up to 45 years!
- Encourage the reestablishment of *loko i'a* (traditional coastal fishponds) and the development of recirculating aquaculture systems and aquaponics
- The following bills could have helped protect Hawai'i from problems associated with ocean fish farming but did not make it to the hearing stage in the legislature in 2010. Next year, similar pieces should be introduced, discussed and reviewed for passage.
- Senate Bill 2486 introduced by Senator Galuteria to require full Environmental Impact Statements for all ocean aquaculture applicants and to require a royalty payment by aquaculture corporations
- House Bill 2958 introduced by Representatives Hanohano and Carroll to halt the expansion of commercial ocean fish farming, or transfer and expansion of existing leases, except for research purposes.



For federal policymakers:

- Look to Hawai'i to understand the difficulty in regulating open-ocean aquaculture and the massive environmental and cultural ramifications it may cause.
- Do not support legislation that would promote the expansion of offshore aquaculture in the United States, such as H.R. 4363, which would streamline regulation of the industry in federal waters.

Endnotes

- 1 12 million lbs/1,971,600 million lbs (Hukilau current + KBWF once they are up and running again) = 6.08. Data for Hukilau from "Final Environmental Assessment Proposed Expansion of Hukilau Foods Offshore Fish Farm, Mamala Bay, Oahu, Hawai'i." Prepared for Office of Conservation and Coastal Lands, Hawai'i Department of Land and Natural Resources by Aquaculture Planning & Advocacy LLC. July 24 2009 at 8. Data for KBWF from "Final Supplemental Environmental Assessment for a Modification to Net Pen Designs within the Existing Capacity and Farm Lease Area for Kona Blue's Offshore Open Ocean Fish Farm off Unaloha Point, Kona, Hawai'i." Prepared for Office of Conservation and Coastal Land Division, Department of Land and Natural Resources by Kona Blue Water Farms. Kailua-Kona, HI. April 21, 2009 at 23.
- 2 17,771,600 million (Hukilau's additional 3.5 million + HOTs 12 million)/1,971,600 million = 9.01 Data for Hukilau from "Final Environmental Assessment Proposed Expansion of Hukilau Foods Offshore Fish Farm, Mamala Bay, Oahu, Hawai'i." Prepared for Office of Conservation and Coastal Lands, Hawai'i Department of Land and Natural Resources by Aquaculture Planning & Advocacy LLC. July 24 2009 at 8. Data for Hawai'i Oceanic Technology "Final Environmental Impact Statement for the Ahi Aquaculture Project, Kohala Coast, Hawai'i." Prepared for Office of Coastal and Conservation Lands, Hawai'i Department of Land and Natural Resources by Tetra Tech on behalf of Hawai'i Oceanic Technology Inc. May 25, 2009 at i.
- 3 Food & Water Watch. Fishy Farms. October 2007 at 7,9,11.
- 4 17,771,600 million (Hukilau's additional 3.5 million + HOTs 12 million)/1,971,600 million = 9.01 Data for Hukilau from "Final Environmental Assessment Proposed Expansion of Hukilau Foods Offshore Fish Farm, Mamala Bay, Oahu, Hawai'i." Prepared for Office of Conservation and Coastal Lands, Hawai'i Department of Land and Natural Resources by Aquaculture Planning & Advocacy LLC. July 24 2009 at 8. Data for Hawai'i Oceanic Technology "Final Environmental Impact Statement for the Ahi Aquaculture Project, Kohala Coast, Hawai'i." Prepared for Office of Coastal and Conservation Lands, Hawai'i Department of Land and Natural Resources by Tetra Tech on behalf of Hawai'i Oceanic Technology Inc. May 25, 2009 at i.
- 5 Polhemus, Dan. [February 2008] Division of Aquatic Resources. Memorandum to Sam Lemmo, Office of Coastal and Conservation Lands. February 20, 2008. On file at: Food & Water Watch.
- 6 "Final Supplemental Environmental Assessment for a Modification to Net Pen Designs within the Existing Capacity and Farm Lease Area for Kona Blue's Offshore Open Ocean Fish Farm off Unaloha Point, Kona, Hawai'i." Prepared for Office of Conservation and Coastal Land Division, Department of Land and Natural Resources by Kona Blue Water Farms. Kailua-Kona, HI. April 21, 2009 at 23.
- 7 "Final Environmental Assessment Proposed Expansion of Hukilau Foods Offshore Fish Farm, Mamala Bay, Oahu, Hawai'i." Prepared for Office of Conservation and Coastal Lands, Hawai'i Department of Land and Natural Resources by Aquaculture Planning & Advocacy LLC. July 24 2009 at 22.
- 8 The Act 221 High Tech Tax Incentive gives an 80 percent tax credit (previously 100 percent) against Hawai'i State taxes for equity investments for Qualified High Tech Companies, which include aquaculture facilities. Investors are able to receive the credit front-loaded over five years.
- 9 Food & Water Watch. Fishy Farms. October 2007 at 9
- 10 *Michael Larson vs. Kona Blue Water Farms LLC* United States District Court for the District of Hawai'i. CV 08 00428 Filed September 23, 2008.; *Labossiere v. Kona Blue Water Farms, LLC* United States District Court for the District of Hawai'i No. CV07 00540 BMK Filed October 29 2007.; *Karlsson v. Kona Blue Water Farms* United States District Court for the District of Hawai'i No CV07 00242BMK Filed May 10 2007; *Wagner v Kona Blue Water Farms LLC* United States District Court for the District of Hawai'i No CVO9 00600 Filed December 16 2009.
- 11 Polhemus, Dan. [February 2008] Op. cit.
- 12 "It is the objective of class AA waters that these waters remain in their natural pristine state as nearly as possible with an absolute minimum of pollution or alteration of water quality from any human-caused source or actions. To the extent practicable, the wilderness character of these areas shall be protected. No zones of mixing shall be permitted in this class. The uses to be protected in this class of waters are oceanographic research, the support and propagation of shellfish and other marine life, conservation of coral reefs and wilderness areas, compatible recreation, and aesthetic enjoyment." HAR §11-54-3
- 13 Sims, Neil Anthony to Dr. Allen Riggs, Aquaculture Development Program, Hawai'i Department of Agriculture. Personal communication. November 8, 2007. On file at: Food & Water Watch.
- 14 Hawai'i Department of Commerce. Business Registration Database. "Deep Blue Research, LLC" Available at <http://hbe.ehawaii.gov/documents/search.html>, accessed January 29, 2010
- 15 About Us. Kona Blue Water Farms. Available at: <http://www.kona-blue.com/aboutus.php>
- 16 Miller, Erin. [2010] "Kona Kampachi operation in compliance, state officials say." *West Hawaii Today*. February 16, 2010.
- 17 Dulaney, Janie to Department of Land and Natural Resources. Letter. October 22 2008. On file at: Food & Water Watch.
- 18 Lucas, Carolyn. "Fish farm seeks second location." *West Hawaii Today*, May 6, 2006.
- 19 Viezbicke, Justin P. to Neil Sims, Kona Blue Water Farms. Personal communication. September 16 2009. On file at: Food & Water Watch.
- 20 Food & Water Watch. Fishy Farms. October 2007 at 1.
- 21 Food & Water Watch. Fishy Farms. October 2007 at 11.
- 22 Alessi, Michael D. Grassroot Institute. "Catching the Aquaculture Wave." Reason Policy Study 327. Grassroot Study 1004. December 2004 at 10
- 23 Cates, John R. Hukilau Farms, LLC. March 31 2006 Written Testimony on National Ocean Policy Study. Committee on Commerce, Science and Transportation. United States Senate. March 31, 2006.
- 24 "Final Environmental Assessment for Proposed Expansion of Hukilau Foods..." Op. cit., at 8
- 25 "Final Environmental Assessment for Proposed Expansion of Hukilau Foods..." Op. cit., at 22.
- 26 Miller, Erin. [2009] "Kona Blue Close to Changing Hands." *West Hawaii Today*. January 7 2010.
- 27 Food & Water Watch. Fishy Farms. October 2007 at 11
- 28 "Final Supplemental Environmental Assessment for a Modification to Net Pen Designs..." Op. cit., at 9
- 29 Ibid at 8.
- 30 Ibid at 8,20,23
- 31 Hawai'i Department of Health Clean Water Branch. Notice of Proposed Water Pollution Control Permit for Kona Blue Water Farms NPDES Permit No. HI 0021825. October 1, 2009.
- 32 Hawai'i Administrative Rules §11-54-3
- 33 Ibid.
- 34 Wu, Nina. [2008] "Kona Blue to spawn kampachi in Mexico." *Star Bulletin*. October 4, 2008. .
- 35 Mexico Living, December 2009. pp. 38-39.
- 36 Miller, Erin. [2010] "Kona Kampachi operation in compliance, state officials say." *West Hawaii Today*. February 16, 2010.
- 37 "Final Environmental Impact Statement for the Ahi Aquaculture Project, Kohala Coast, Hawai'i." Prepared for Office of Coastal and Conservation Lands, Hawai'i Department of Land and Natural Resources by Tetra Tech on behalf of Hawai'i Oceanic Technology Inc. May 25, 2009 at i.
- 38 Ibid at 1-9.
- 39 Calculation done by Food & Water Watch based on: Tetra Tech Inc. Final Environmental Impact Statement for the Ahi Aquaculture Project, Kohala Coast, Hawai'i. Prepared for Hawai'i Oceanic Technology Inc. Submitted to Office of Coastal and Conservation Lands, Department of Land and Natural Resources. 25 May 2009. Page i and 1-9. Standard size of an Olympic swimming pool is 2500 cubic meters. A professional NFL football field is 120 yards long and 53.3 yards in width.
- 40 "Final Environmental Impact Statement for the Ahi Aquaculture Project..." Op. cit., at xvii.
- 41 Fahey, Jonathan. [2008] "Farming Better Fish." *Forbes.com*. September 24 2008.
- 42 12 million lbs/1971600 million lbs (Hukilau current + KBWF once they are up and running again) = 6.08. Data for Hukilau from "Final Environmental Assessment for Proposed Expansion of Hukilau Foods Offshore Fish Farm, Mamala Bay, Oahu, Hawai'i." Prepared for Office of Conservation and Coastal Lands, Hawai'i Department of Land and Natural Resources by Aquaculture Planning & Advocacy LLC. July 24 2009 at 8. Data for KBWF "Final Supplemental Environmental Assessment for a Modification to Net Pen Designs within the Existing Capacity and Farm Lease Area for Kona Blue's Offshore Open Ocean Fish Farm off Unaloha Point, Kona, Hawai'i." Prepared for Office of Conservation and Coastal Land Division, Department of Land and Natural Resources by Kona Blue Water Farms. Kailua-Kona, HI. April 21, 2009 at 23.
- 43 Lee, Michael Kumukauoha. Kanaka Council Moku `O Keawe. Contested case petition filed with Board of Land and Natural Resources, Hawai'i Department of Land and Natural Resources. October 23, 2009. On file at: Food & Water Watch.

44 Gumapac, Kale. Kanaka Council Moku `O Keawe. Contested case petition filed with Board of Land and Natural Resources, Hawai'i Department of Land and Natural Resources. October 23, 2009. On file at: Food & Water Watch.

45 Maui Fresh Fish LLC. www.mauifreshfish.com Accessed 17 January 2010.

46 Hawai'i Department of Land and Natural Resources "Report to the Twenty-Fifth Legislature of Hawai'i 2009 Regular Session. Implementation of Chapter 190D, Hawai'i Revised Statutes Ocean and Submerged Lands Leasing." December 2008 at 8.

47 McVey, Jim. "Informal Presentation: Indigo Seafood." Kohala Ranch, Hawai'i, May 23, 2009. On file at: Food & Water Watch.

48 Comparison by Food & Water Watch of Hawai'i Department of Land and Natural Resources. "Report to the Twenty-Fifth Legislature of Hawai'i 2009 Regular Session. Implementation of Chapter 190D, Hawai'i Revised Statutes Ocean and Submerged Lands Leasing." December 2008; Hawai'i Department of Land and Natural Resources. "Report to the Legislature of Hawai'i 2006 Regular Session. Implementation of Chapter 190D, Hawai'i Revised Statutes Ocean and Submerged Lands Leasing." November 2005 at 10-11; Hawai'i Department of Land and Natural Resources. "Report to the Legislature of Hawai'i 2005 Regular Session. Implementation of Chapter 190D, Hawai'i Revised Statutes Ocean and Submerged Lands Leasing." at 14-16

49 17,771,600 million (Hukilau additional 3.5 million + HOTs 12 million)/1,971,600 million = 9.01 Data for Hukilau Data for "Final Environmental Assessment for Proposed Expansion of Hukilau Foods Offshore Fish Farm, Mamala Bay, Oahu, Hawai'i." Prepared for Office of Conservation and Coastal Lands, Hawai'i Department of Land and Natural Resources by Aquaculture Planning & Advocacy LLC. July 24 2009 at 8. Data for Hawai'i Oceanic Technology "Final Environmental Impact Statement for the Ahi Aquaculture Project, Kohala Coast, Hawai'i." Prepared for Office of Coastal and Conservation Lands, Hawai'i Department of Land and Natural Resources by Tetra Tech on behalf of Hawai'i Oceanic Technology Inc. May 25, 2009 at i.

50 Miller, Erin. (2010) "Kona Kampachi operation in compliance, state officials say." *West Hawaii Today*. February 16, 2010.

51 Polhemus, Dan. [March 2008] Division of Aquatic Resources. Public comment to Sam Lemmo Office of Conservation and Coastal Lands, re: Draft EA/CDUA HA-3443. 3 March 2008 at 3.

52 Polhemus, Dan. [March 2008] Op. cit., at 2.

53 Polhemus, Dan. [March 2008] Op. cit., at 2.

54 Polhemus, Dan. [March 2008] Op. cit., at 2.

55 Polhemus, Dan. [March 2008] Op. cit., 2.

56 Yates, Chris E. Protected Resources Division of National Marine Fisheries. Public comment re: Draft EA/CDUA HA-3443 for the Expansion of Kona Blue Waters Farms Offshore Aquaculture Facility. 4 February 2008. On file at: Food & Water Watch.

57 DeVerse, Kimber. "Appendix A: Kaloko-Honokohau National Historical Park Resource Overview." Pacific Island Network Vital Signs Monitoring Plan. National Resource Report NPS/PACN/NRR -2006/003 National Park Service. U.S. Department of the Interior. April 2005 at 5.

58 Yates, Chris E. Op .cit.

59 Polhemus, Dan . [March 2008] at 6.

60 Polhemus, Dan . [March 2008] at 7.

61 Polhemus, Dan.[March 2008] at 7.

62 Hawai'i Department of Commerce. Business Registration Database. "Deep Blue Research LLC" Available at <http://hbe.ehawaii.gov/documents/search.html>, accessed January 29, 2010

63 Maui Fresh Fish LLC. (2008) "Proposal for an Offshore Fish Farm with a Hatchery in Maui and a Cage Facility off Lanai." Preliminary Scoping Meeting Document. January 12, 2008 at 2. Available at www.mauifreshfish.com/SCOPING_MEETING_DRAFT6_DOC.doc

64 Miller, Erin. (2010) "Kona Kampachi operation in compliance, state officials say." *West Hawaii Today*. February 16, 2010.

65 Dulaney, Janie Op. cit.

66 Sims, Neil Anthony to Kris Potentis, Engineering Branch of Clean Water Branch, Hawai'i State Department of Health. Personal communication. November 24, 2007. On file at: Food & Water Watch.

67 Sims, Neil Anthony to Kris Potentis, Op.cit.

68 Heuer, Ole. E. et al. "Human Health Consequences of Use of Antimicrobial Agents in Aquaculture," *Clinical Infectious Diseases*, Vol. 49, 2009 at 1248-53.

69 The Bellona Foundation, "The Environmental Status of Norwegian Aquaculture." (No 7). 2003 at 40.

70 Sims, Neil Anthony to Dr. Allen Rigg. Op. cit.

71 Storey, Susan. Aquaculture Drugs Team, FDA-CVM, Office of New Animal Drug Evaluation, Division of Therapeutic Drugs for Food Animals to Neil Anthony Sims, President, Kona Blue Water Farms. Personal communication. November 2, 2007. On file at: Food & Water Watch.

72 Calculation done by Food & Water Watch Staff between Kailua-Kona, Hawai'i and Silver Spring, MD using www.googlemaps.com

73 Parsons, Rob. Food & Water Watch, Personal communication, January 11 2010. On file at: Food & Water Watch.

74 Hawai'i Department of Commerce. Business Registration Database. "Keahole Point Fish, LLC" Available at <http://hbe.ehawaii.gov/documents/search.html>, accessed January 29, 2010

75 Consent to Assignment of GL No. S-5721

76 Ibid.

77 Agenda. Board of Land and Natural Resources, Hawai'i Department of Land and Natural Resources. January 8, 2010. Available <http://Hawaii.gov/dlnr/chair/meeting/index.html>. Accessed 15 January 2010.

78 Parsons, Rob. Op. cit.

79 Act 221, SLH 2001 and S.B. 199, SD1 HD1 CD2, July 2009.

80 State of Hawai'i Department of Land and Natural Resources submittals, GL S05721, August 28, 2009.

81 Sims, Neil Anthony. (2009) Letter to the Editor. "Factual Errors" West Hawai'i Today. 25 January 2010.

82 Miller, Erin. (2010) "Kona Blue lease details murky." *West Hawaii Today*. February 16, 2010.

83 State of Hawai'i Department of Land and Natural Resources submittals, GL S05624, February 9 2007. .

84 *Karlsson v. Kona Blue Water Farms* United States District Court for the District of Hawai'i No CV07 00242BMK Filed May 10 2007 Document 78-14 Deposition of Neil Anthony Sims. Exhibit 7 at 3.

85 *Karlsson v. Kona Blue Water Farms* United States District Court for the District of Hawai'i No CV07 00242BMK Filed May 10 2007 Document 79-4. Recorded Statement of Steven Barnes Exhibit F at 18-21.

86 *Labossiere v. Kona Blue Water Farms, LLC* United States District Court for the District of Hawai'i No CV07 00540 BMK Filed October 29 2007. Document 93-6 Exhibit C at 3

87 Ibid at 5

88 Kona Blue Water Farms LLC Query. PACER Service Center. March 1 2010.

89 *Labossiere v. Kona Blue Water Farms, LLC* United States District Court for the District of Hawai'i No CV07 00540 BMK Filed October 29 2007. Document 93-6 Exhibit C at 18

90 *Karlsson v. Kona Blue Water Farms* United States District Court for the District of Hawai'i No CV07 00242BMK Filed May 10 2007 Document 78-13. Exhibit 6. Deposition of Kydd Pollock at 3

91 *Labossiere v. Kona Blue Water Farms, LLC* United States District Court for the District of Hawai'i No CV07 00540 BMK Document 93-6 Exhibit C. Deposition of Neil Sims at 20

92 *Karlsson v. Kona Blue Water Farms* United States District Court for the District of Hawai'i No CV07 00242BMK Filed May 10 2007 Document 78-13. Exhibit 6. Deposition of Stephen Barnes at 13

93 *Labossiere v. Kona Blue Water Farms, LLC* United States District Court for the District of Hawai'i No CV07 00540 BMK Exhibit B. Deposition of Xeres Krueger at 3.

94 "Final Supplemental Environmental Assessment for a Modification to Net Pen..." Op. cit., at 23.

95 "Final Environmental Assessment Proposed Expansion of Hukilau..." Op. cit. at 22.

96 Calculation performed by Food & Water Watch staff .Combined total of jobs projected by companies in their Final Environmental Assessments after approved modifications from "Final Environmental Assessment Proposed Expansion of Hukilau Foods Offshore Fish Farm, Mamala Bay, Oahu, Hawai'i." Prepared for Office of Conservation and Coastal Lands, Hawai'i Department of Land and Natural Resources by Aquaculture Planning & Advocacy LLC. July 24 2009; "Final Supplemental Environmental Assessment for a Modification to Net Pen Designs within the Existing Capacity and Farm Lease Area for Kona Blue's Offshore Open Ocean Fish Farm off Unaloha Point, Kona, Hawai'i." Prepared for Office of Conservation and Coastal Land Division, Department of Land and Natural Resources by Kona Blue Water Farms. Kailua-Kona, HI. April 21, 2009

97 "Final Supplemental Environmental Assessment for a Modification to Net Pen..." Op. cit., at 17.

98 "Final Environmental Assessment Proposed Expansion of Hukilau Foods..." Op. cit., at 8.

99 Calculation performed by Food & Water Watch Staff. Combined total production after approved modifications. From "Final Environmental Assessment Proposed Expansion of Hukilau Foods Offshore Fish Farm, Mamala Bay, Oahu, Hawai'i." Prepared for Office of Conservation and Coastal Lands, Hawai'i Department of Land and Natural Resources by Aquaculture Planning & Advocacy LLC. July 24 2009; "Final

- Supplemental Environmental Assessment for a Modification to Net Pen Designs within the Existing Capacity and Farm Lease Area for Kona Blue's Offshore Open Ocean Fish Farm off Unaloha Point, Kona, Hawai'i." Prepared for Office of Conservation and Coastal Land Division, Department of Land and Natural Resources by Kona Blue Water Farms. Kailua-Kona, HI. April 21, 2009
- 100 "Final Supplemental Environmental Assessment for a Modification to Net Pen..." Op. cit., at 10
- 101 *Wagner v Kona Blue Water Farms LLC* United States District Court for the District of Hawai'i No CVO9 00600 Filed December 16 2009.
- 102 *Michael Larson vs. Kona blue Water Farms LLC* United States District Court for the District of Hawai'i. CV 08 00428 Filed September 23, 2008 at 3.
- 103 *Michael Larson vs. Kona blue Water Farms LLC* United States District Court for the District of Hawai'i. Amended Notice of Voluntary Dismissal. CV 08 00428 Filed December 8, 2008 at 1.
- 104 *Michael Larson vs. Kona blue Water Farms LLC* United States District Court for the District of Hawai'i. CV 08 00428 Filed September 23, 2008 at 3.
- 105 *Karlsson v. Kona Blue Water Farms* United States District Court for the District of Hawai'i No CV07 00242BMK Filed May 10 2007 ; *Karlsson v. Kona Blue Water Farms* "Stipulation and Order Re:Dismissal with Prejudice." United States District Court for the District of Hawai'i No CV07 00242BMK Filed December 12 2008.
- 106 *Karlsson v. Kona Blue Water Farms* United States District Court for the District of Hawai'i No CV07 00242BMK Filed May 10 2007 at 3.
- 107 PACER. 1:07-cv-00540-BMK Labossiere v. Kona Blue Water Farms, LLC Accessed 5 March 2010.
- 108 *Labossiere v. Kona Blue Water Farms, LLC* United States District Court for the District of Hawai'i No CV07 00540 BMK Filed October 29 2007 at 4.
- 109 "Final Supplemental Environmental Assessment for a Modification to Net Pen..." Op. cit., at 9
- 110 Ibid at 9
- 111 Ibid at 23
- 112 Polhemus, Dan . [March 2008] Op. cit., at 4i.
- 113 Ibid at 2.
- 114 Information drawn from: "Final Environmental Assessment Proposed Expansion of Hukilau Foods Offshore Fish Farm, Mamala Bay, Oahu, Hawai'i." Prepared for Office of Conservation and Coastal Lands, Hawai'i Department of Land and Natural Resources by Aquaculture Planning & Advocacy LLC. July 24 2009 at 22.
- 115 Aquaponics is the practice of raising both fish and plants in a mutually beneficial, land-based, closed looped system. Food & Water Watch. Fishy Farms. October 2007 at 7,9,11.
- 116 Sims, Neil Anthony to Kris Potentis, Op. cit.
- 118 Kona Blue Water Farms LLC. (2007) Land submittal to Board of Land and Natural Resources. Modifications to Conservation District Use Permit (CDUP) No. HA-3118 Related to Offshore Aquaculture. 23 March 2007 at 2.
- 119 Polhemus, Dan . [March 2008] at 9.
- 120 Ibid at 13.
- 121 Sims, Neil Anthony to Kris Potentis, Op. cit.
- 122 Storey, Susan. Op. cit.
- 123 Ibid.
- 124 Approved Drugs for Use in Aquaculture, poster produced by USFWS AADAP Program, AFS Fish Culture Section, AFS Fish Health Section, and FDA Center for Veterinary Medicine, December 2008.
- 125 Frazer, Neil Professor, University of Hawai'i to Sam Lemmo, Administrator, Office of Coastal and Conservation Lands, Department of Land and Natural Resources. Subject: KBW:Praziquantel. 18 August 2009. On file at: Food & Water Watch.
- 126 Kona Blue Water Farms. "Sustainability." <http://www.kona-blue.com/sustainability.php> Accessed 17 January 2010.
- 127 Polhemus, Dan. [February 2008] Op. cit.
- 128 Yates, Chris E. Op. cit.
- 129 Ibid.
- 130 Ibid.
- 131 Polhemus, Dan. [February 2008] Op. cit.
- 132 Ibid.
- 133 Glossary. Office of Protected Resources. U.S. National Oceanic and Atmospheric Administration. Available at <http://www.nmfs.noaa.gov/pr/glossary.htm#take> accessed March 5 2010.
- 134 Storey, Susan. Op. cit.
- 135 Note from Office of Conservation and Coastal Land. Titled "Follow Up Kona Blue Conversation. September 2009." Note. Office of Conservation and Coastal Lands, Hawai'i Department of Land and Natural Resources. On file at: Food & Water Watch.
- 136 Yates, Chris E. Op. cit.
- 137 Polhemus, Dan. [February 2008] Op. cit.
- 138 Polhemus, Dan .[March 2008] Op. cit., at 10-11.
- 139 Lucas, Carolyn. "Fish farm seeks second location." *West Hawai'i Today*, May 6, 2006.
- 140 Viezbicke, Justin P. to Neil Sims, Kona Blue Water Farms. Personal communication. September 16 2009. On file at: Food & Water Watch.
- 141 Polhemus, Dan . [March 2008] Op. cit., at 3.
- 142 Ibid at 9.
- 143 Ibid at 9.
- 144 Ibid at 1.
- 145 Ibid at 9.
- 146 Ibid at 9.
- 147 Ibid at 3.
- 148 Ibid at 3.
- 149 Ibid at 3.
- 150 "Final Supplemental Environmental Assessment for a Modification to Net Pen..." Op. cit., at xiii.
- 151 Polhemus, Dan. [March 2008] Op. cit., at 4.
- 152 Ibid.
- 153 Ibid at 9.
- 154 Ibid at 2-3.
- 155 Ibid at 3.
- 156 Loews, Chris. (2009) "Kona Blue seeks to improve sustainability score." *Seafood News – Environment Sustainability*. 16 October 2009. <<http://www.seafoodsource.com/newsarticledetail.aspx?id=4294975807>>
- 157 Food and Agricultural Organization of the United Nations. Animal Feed Resources Information System. "Poultry by-products meal." Available at <http://www.fao.org/ag/aGA/AGAP/FRG/AFRIS/Data/325.htm>, accessed February 2010.
- 158 Polhemus, Dan. [March 2008] Op. cit., at 10-11.
- 159 "Adoption of Genetically Engineered Crops in the U.S.: Soybean Varieties." Data Set, Economic Research Service, United States Department of Agriculture. www.ers.usda.gov/Data/BiotechCrops/ExtentofAdoptionTable3.htm
- 160 Kidd, Karen. "Effects of Synthetic Estrogen on Aquatic Population: A Whole Ecosystem Study," Freshwater Institute, Fisheries and Oceans Canada.
- 161 Reinberg, Steve (2007) "FDA Recalls Animal Feed Tainted with Melamine From U.S. Supplier." *Washington Post*. May 30 2007
- 162 Ibid.
- 163 Hawai'i Department of Health Clean Water Branch. Document dated Jul 18 2007 regarding complaint against Kona Blue Water Farms and melamine. On file at: Food & Water Watch
- 164 Lee, Michael Kumukauoha. Op. cit.
- 165 Gumapac, Kale et. al. (2009). Letter to Monterey Bay Aquarium regarding "Good Alternative" ranking for US Farmed Yellowtail. Available at: <http://foodandwaterwatch.org/fish/fish-farming/Hawai'i-1/KanakaCouncilLettermc1Final.pdf> Accessed 15 January 2009.
- 166 Lucas, Carolyn. Op. cit.
- 167 Note from Office of Conservation and Coastal Land. Titled "Follow Up Kona Blue Conversation. September 2009." Note. Office of Conservation and Coastal Lands, Hawai'i Department of Land and Natural Resources. On file at: Food & Water Watch.
- 168 Viezbicke, Justin P. Op. cit.
- 169 Kamakau, Samuel. Op. cit., at 47
- 170 "Hawaiian Fish Farming & Kona Blue." *Kona Blue*. 28 Jul 2009 <<http://www.kona-blue.com/Hawaiianaquaculture.php>>.
- 171 Gumapac, Kale et. al. (2009). Op. cit.
- 172 Ibid.
- 173 Ibid.
- 174 Lee, Michael Kumukauoha. Op. cit.
- 175 Ibid.
- 176 Ibid.
- 177 Alessi, Michael D. Op. cit., at 5
- 178 Maui Fish Pond Association. <http://www.mauifishpond.com/> Accessed 27 January 2010.
- 179 He'eia Fish Pond. Kamehameha Schools. 2009. Website. <http://ksdl.ksbe.edu/heeia/index.html> Accessed 27 January 2010.
- 180 Whitton, Kevin. "Liquid Engineering" *Green Magazine*. Available http://greenmagazinehawaii.com/food_v1-3.html Accessed 27 January 2010.



Food & Water Watch*Main Office*

1616 P St. NW, Suite 300
Washington, DC 20036
tel: (202) 683-2500
fax: (202) 683-2501
info@fwwatch.org
www.foodandwaterwatch.org

California Office

25 Stillman Street, Suite 200
San Francisco, CA 94107
tel: (415) 293-9900
fax: (415) 293-9941
info-ca@fwwatch.org

