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Re: RIN 0648-XC007 Comments on Draft National Aquaculture Research and Development Strategic Plan

Food & Water Watch (FWW) is a national consumer action organization that defends and advocates for clean water and safe food, and we appreciate this opportunity to comment on the Draft National Aquaculture Research and Development Strategic Plan (hereafter: Draft Plan).¹

Our comments specific to the structure of the DP are as follows.

1. ***Vision Statement:***

FWW does not agree with the overall vision statement of the DP. It is not possible for large scale aquaculture to “meet high standards for safety, quality, and environmental stewardship with maximum opportunity for profitability and economic growth.” Aquaculture development will inherently impair natural ecosystems, and will interfere with “recreational, fishery, and environmental services needs.” We further feel that it is unrealistic to expect aquaculture to play a significant role in “meet[ing] the increasing demand for seafood” unless environmental and safety standards are almost wholly waived. We suggest the Joint Subcommittee craft a more realistic vision for the DP that focuses on more realistic goals.

2. ***General comments regarding large-scale aquaculture and permit streamlining:***

With the exceptions of fully contained, land-based facilities and most forms of shellfish farming, aquaculture operations have the following problems:

- They consistently pollute the environment with excess feed, waste, antibiotics and other chemicals;
- They endanger wild fish populations through inevitable escapes and disease, increase pressure on wild fish populations that are used as feed and on predator populations that rely upon those fish;
- They fail to provide a healthy product for consumers, as farmed fish have been shown to have higher concentrations of some pollutants and lower concentrations of healthy nutrients such as Omega-3s;

¹ Joint Subcommittee on Aquaculture Research and Development - Department of Agriculture, Agricultural Research Service and the Department of Commerce, National Oceanic and Atmospheric Administration. National Marine Fisheries Service. “Joint Subcommittee on Aquaculture Research and Development Strategic Plan; Notice of availability and request for comments.” 77FR41164. July 12, 2012.

- They endanger human health by serving as reservoirs for the development of antibiotic resistant bacteria;
- They fail to provide significant jobs for coastal communities, may imperil the health of traditional jobs such as commercial fishing, and have negative impacts on recreational fishing and tourism.

Given the negative impacts listed above, we strongly oppose any streamlining or waiving of regulatory requirements for aquaculture facilities as suggested on page 8 of the DP. The government has the obligation to protect the health, safety and welfare of its citizens, environment, and common resources, and regulations such as permitting requirements and NEPA analyses have a crucial role to play in ensuring those obligations are met.

3. ***RE: Strategic Goal 1 - Advance Integration of Aquaculture Development and Integration:***

FWW is broadly concerned with programs that financialize and commoditize natural resources. In our experience, nutrient trading and similar cap-and-trade programs fail to protect environmental resources.

Nutrient trading programs are the wrong strategy for aquaculture facilities. Rather than regulating and mitigating pollution, trading systems allow polluters to simply purchase the rights to pollute. In aquaculture, water flowing out of fish farms can carry excess nutrients, particulates and chemical that pose serious problems to water quality and the environment. Simply allowing these polluters to pay their way out of responsibility for this pollution is an unacceptable management scheme.

A good example of the failure of these sorts of cap and trade schemes is water quality trading. In these systems, pollution abatement is uncertain and unverified, credit purchasers can legally produce pollution hotspots, and low-income populations that use waterways most susceptible to localized impacts suffer disproportionately.

In order to make the most economically efficient pollution changes, regulators allow traders to purchase “offsets,” pollution reductions from other, frequently unregulated, sectors. In water, this frequently involves agricultural runoff and leads to a situation where unregulated farms with unquantified runoff are getting credit for pollution reductions. One can easily imagine a similar situation where polluting aquaculture facilities engage in nutrient trading with similar unaccountability.

Further, FWW is concerned that “identification and expansion of ecosystem service benefits of commercial and public aquaculture (e.g., water quality and habitat restoration due to shellfish planting and harvest operations, shellfish restoration),” could lead to a system referred to as payment for ecosystem services (PES).

Supporters of PES point to other programs, like the US Department of Agriculture’s

CSP and CRP programs as models for new paradigms for PES.² However, while those programs focused on mitigating environmental externalities from agriculture,³ new programs, such as those focusing on deforestation in Costa Rica, focused on a variety of objectives, including both programmatic ones like greenhouse gas mitigation and less easily financed ones like providing scenic beauty for recreation and tourism.⁴

Not surprisingly, it is difficult to attribute changes in deforestation to these PES programs.⁵ For these programs to be successful, they must be matched with command and control mechanisms that make the changes being sought with PES illegal in and of themselves.⁶ Indeed, there is a marked lack of “additionality,” beneficial environmental effects that would not have existed without the payment, when looking at the PES literature.⁷ Efforts to establish the ecosystem service benefits have the same difficulty. It is almost impossible to measure an alternative reality.

Moreover, the methods used to establish these benefits are problematic. Quantifying the contribution of aquaculture to the ecosystem requires analysis using willingness to pay (WTP) for environmental benefits. These are usually accomplished through surveys. Unfortunately, these calculations are subject to significant doubt. Asking about WTPs for complex items, such as environmental and public goods usually seen by respondents as free, is challenging, and can lead to misestimating WTP.⁸

Indeed, the very idea of a WTP determination via survey is problematic. In one survey, the WTP was the same no matter the size of the environmental problem being investigated. This suggests that, rather than measuring the willingness to pay, the survey was measuring primarily the “warm glow” effect of declaring support for an environmental goal.⁹

There are many examples of the absurdity of WTP. One paper estimated that, on average, households were willing to pay up to \$70 annually for protection of the

² See, e.g., Baylis, Kathy, et al. “Agri-environmental policies in the EU and United States: A comparison.” *Ecological Economics*. Volume 65, Issue 4, 2008, at 753-764.

³ Baylis, Kathy, et al. “Agri-environmental policies in the EU and United States: A comparison.” *Ecological Economics*. Volume 65, Issue 4, 2008, at 756.

⁴ Pagiola, Stefano. “Payments for environmental services in Costa Rica.” *Ecological Economics*. Volume 65, Issue 4, 2008, at 712.

⁵ Pagiola, Stefano. “Payments for environmental services in Costa Rica.” *Ecological Economics*. Volume 65, Issue 4, 2008, at 718.

⁶ Pagiola, Stefano. “Payments for environmental services in Costa Rica.” *Ecological Economics*. Volume 65, Issue 4, 2008, at 718.

⁷ Pattanayak, Subhrendu K. et al. “Show Me the Money: Do Payments Supply Environmental Services in Developing Countries?” *Review of Environmental Economics and Policy*. Volume 4, issue 2, summer 2010, at 261.

⁸ Brown, Thomas C. et al. “Which Response Format Reveals the Truth about Donations to a Public Good?” *Land Economics*. May, 1996, 72 (2) at 164.

⁹ Diamond, Peter A. and Jerry A. Hausman. “Contingent Valuation: Is some number better than no number?” *Journal of Economic Perspectives*. Vol 8, Number 4, Fall 1994, at 51.

spotted owl in 1993.¹⁰ In constant dollars, this amount represents almost \$109 in 2011.¹¹ There are approximately 100 million U.S. households, which would imply a total U.S. willingness to pay of over \$10 billion just to protect the spotted owl. Given that the total FY 2012 budget request of the EPA was only \$8.973 billion,¹² which is to protect all environmental interests in the U.S., it's clear the results of WTP surveys don't actually represent what they claim to represent, and that the proposed survey will not measure what it claims to measure.

Establishing the benefit of aquaculture, with neither any guarantee of additionality for environmental goals nor a methodology that translates cleaner water to economic benefit is, at best, hazardous. Making it a milestone assumes that all of those problems can be worked out, and ignores a body of evidence showing that it's unlikely to be successful.

4. *RE: Strategic Goal 2 - Employ Genetics to Increase Productivity and Protect Natural Populations:*

FWW is particularly concerned about the inclusion of this goal. A review of 23 peer-reviewed studies concluded that hatchery-raised fish can harm wild fish through competition for food and habitat, harming the genetic diversity of wild populations and causing wild population declines.¹³ NOAA acknowledges a large number of genetic, ecological, health, and behavioral risks from hatchery fish used to restock diminished wild populations.¹⁴

Due to inevitable escapes, wild populations of fish will certainly be exposed to fish chosen or bred for traits specific to aquaculture. Fish bred for "disease resistance, fast and efficient growth, increased product yield, and lower input costs" may have even more competitive advantages against wild fish that would allow them to directly out-compete wild fish and further jeopardize the wild fish genetic pool.

The inclusion of the phrase "other genetic tools" in outcome point three is even more concerning. FWW opposes the approval of AquaBounty Technologies, Inc.'s GE salmon as it has not been proven safe for human consumption and poses a significant threat to wild fish. We are therefore extremely skeptical of any further use of genetically modified organisms in aquaculture, and feel this language should be removed as it leaves open the possibility that GE fish will escape and interbreed with wild populations of fish.

¹⁰ Loomis, John B. and Douglas S. White. "Economic benefits of rare and endangered species: summary and meta-analysis." *Ecological Economics*. Volume 18 (1996), at 199.

¹¹ Food & Water Watch Calculation using US BLS - Bureau of Labor Statistics, Consumer Price Index, All Urban Consumers - 1913-2010, 1982-84=100.

¹² United States Environmental Protection Agency. "FY 2012 EPA Budget in Brief." Publication Number EPA-190-S-11-001. February 2011, at 1.

¹³ Wild Salmon Center. [Press Release] "Growing risks from hatchery fish" May 14, 2012. http://www.eurekaalert.org/pub_releases/2012-05/ss-grf051412.php

¹⁴ Northwest Fisheries Science Center, NOAA Fisheries Service. "Risks to Wild Populations from Hatchery Fish." <http://www.nwfsc.noaa.gov/resources/salmonhatchery/risks.cfm>

We further oppose the performance measure striving to have a “greater proportion of aquaculture-produced seafood from genetically improved populations.” Early indications in the GE fish approval process suggested that GE salmon will not be labeled despite a strong consumer preference for GE labeling. Promoting genetically modified foods for wild-spread human consumption in the next 5-10 years (the stated timeframe for the DP) is irresponsible given how little is known about their safety.

5. RE: Strategic Goal 3 - Improve Aquatic Animal Health

Disease outbreaks are an inevitable part of the confined nature of aquaculture. This strategic goal focuses primarily on the identification of disease and the design, approval, and use of antibiotics and chemicals to efficiently combat disease, and completely ignores the impacts these chemicals on the environment and human health. It also fails to address the possibility of an increase in foodborne illness from more diseased or toxic seafood on the market due to increased aquaculture production. This is a huge oversight in the DP, and future drafts should include extensive discussion of the risks posed by both aquaculture disease and the treatment of those diseases.

Antibiotics, antifungals, and other chemicals flow from fish farms directly into the waters surrounding them, polluting the environment and disrupting the biotic balance. The residues of these drugs and chemicals, some of which are carcinogens, remain in the farm-raised seafood and pose threats to human health. Aquaculture facilities have been shown to act as reservoirs for the development of antibiotic-resistant bacteria, even further jeopardizing human health.

Rather than promoting an arms-race between aquaculture diseases and veterinary drugs by promoting the research proposed in Strategic Goal 3, the Joint Subcommittee should be promoting research into the impacts of large-scale veterinary drug use and looking for alternatives like closed-loop, recirculating systems to large-scale confined aquaculture facilities.

6. RE: Strategic Goal 4 - Improve Production Efficiency and Well-being and Strategic Goal 5 - Improve Nutrition and Develop Novel Feeds:

FWW will address both of these goals here. Aquaculture increases pressure on wild fish as small wild fish are the primary source of fish meal and fish oil for aquaculture feeds. Feed is the largest input cost for aquaculture and prices, which have been increasing, can only be expected to further inflate as the finite population of small wild fish is exhausted to provide feed to the expanding aquaculture sector. As there is no real alternative to using fish meal and fish oil currently, any promotion of aquaculture is inherently increasing pressure on these already-vulnerable wild fish stocks, and subsequently on all the predator fish and mammals that depend upon them, as well as the coastal communities around the world that use small fish as a primary source of protein.

Soy meal is the most heavily promoted alternative feed for aquaculture. Our extensive research into the promotion of soy as a feed shows that fish fed soy tend to have difficulty digesting this unnatural feed which can lead to the production of more waste and lower growth rates.¹⁵ They also require supplementation to account for nutrient deficiencies. The estrogenic properties of soy may have further consequences. One study found that when eels were fed one type of phytoestrogen present in soy, 11 times more eels became females than in the control group.¹⁶

There is also a growing body of work suggesting that soy consumption on its own may pose human health risks, so consuming soy indirectly via farmed fish may also pose risks. Further, since 94 percent of the soy raised in the United States is genetically modified, feeding soy to farmed fish means that genetically modified food will enter the environment and diets of other marine organisms. There are additional environmental and human rights consequences, as soy production has led to deforestation, soil erosion and reduced biodiversity in South America, and the displacement of indigenous peoples.

The research promoted by the DP should focus on land-based recirculating facilities, which, as a consequence of their carefully controlled environment, can improve growth rates by controlling water temperature and feed inputs. Algae is a promising option as an alternative fish feed, but genetically modified varieties should be avoided.

7. RE: Strategic Goal 6 - Increase Supply of Nutritious, Safe, High-quality Seafood

Open ocean aquaculture will not be the solution to the U.S. seafood trade deficit. Our analysis suggests the United States would need to produce 200 million fish each year to offset the deficit. By our calculations:

- This would require 1.2 million tons of fishmeal (41% of the current estimated global supply);
- It would produce as much nitrogenous waste as the raw sewage from a city of over 24 million people (nearly 9 times the city of Los Angeles);
- Due to escapes, between 1 million to 34.8 million fish could be released into the wild.¹⁷

We do fully support the goals of increasing seafood inspection and safety. Seafood inspection of imported seafood is extremely inadequate, and seafood is the most commonly reported source of foodborne illness. Further development and widespread deployment of techniques to detect toxins, residues, and pathogens in all aquaculture-raised fish (foreign and domestic) should be a high priority.

¹⁵ Food & Water Watch. "Factory Fed Fish: How the Soy Industry is Expanding into the Sea." 2012.

¹⁶ Gatlin, Delbert et al. "Expanding the utilization of sustainable plant products in aquafeeds: A review." *Aquaculture Research*, vol. 38. 2007 at 561.

¹⁷ Food & Water Watch. "Fishy Farms: The Government's Push for Factory Farming in Our Oceans." 2011.

8. RE: Strategic Goal 7 - Introduce Innovative Production Systems

Regardless of the “innovative” method used, all aquaculture that takes place in an open body of water will create pollution and endanger wild fish populations. Strategic Goal 7 should focus on the development of closed, land-based recirculating aquaculture systems, which have potential to provide a diversity of production options while not endangering the natural environment.¹⁸

9. RE: Strategic Goal 9 - Integrate Economic and Social Sciences

As stated previously, FWW opposes permit or regulation streamlining, particularly those that seek to remove individual NEPA requirements or individual permitting requirements. Each aquaculture site will have a unique negative impact on the surrounding environment and should be accounted for uniquely. Further, areas with concentrations of aquaculture facilities should have assessments that consider their combined effects.

We support through socio-economic studies of communities where aquaculture facilities are proposed. Our research reveals that the four U.S. taxpayer-supported factory fish farming experiments – in Hawaii, New Hampshire, and Puerto Rico – have been largely unsuccessful in producing fish or providing jobs.¹⁹

In 2009, the two open ocean fish farms operating in Hawaii employed a total of 44 people. At that time, both companies were planning modifications to their business models. Combined, these modifications would result in an approximate overall 173 percent increase in production, from 2.2 million pounds of fish to 6 million pounds, but would lose five employees — an 11 percent decrease in employment. According to Kona Blue Water Farms, the company needed to reduce the number of divers on staff in order to achieve profitability.

Furthermore, it seems that the few jobs that are offered may not be safe. Four former employees have filed lawsuits against Kona Blue Water Farms, alleging various failures to provide a safe working environment and claiming various physical and emotional repercussions. A much greater loss occurred when a diver was killed at Hukilau Farms in 2011.

Commercial fishermen, recreational fishermen, and tourism in the surrounding areas may also lose jobs and access to fish and fishing grounds due to aquaculture expansion. Aquaculture should not be allowed to claim “job creation” if those jobs come at the cost of commercial fishermen or coastal communities.

¹⁸Food & Water Watch. “RAS: Land-based Recirculating Aquaculture Systems.” 2009.

¹⁹ Food & Water Watch. “Fishy Farms: The Government’s Push for Factory Farming in Our Oceans.” 2011.

We thank you for this opportunity to comment.

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