Finding of No Significant Impact (FONSI)

In support of an Approval of a Supplemental New Animal Drug Application to allow the Production of AquAdvantage Salmon Eyed-eggs in a Hatchery Unit at AquaBounty Technologies, Inc.'s Rollo Bay Facility, PEI, Canada

November 2019

AquaBounty Technologies, Inc. (ABT) has provided data and information to the Food and Drug Administration's (FDA's) Center for Veterinary Medicine (CVM) in support of a supplemental New Animal Drug Application (NADA 141-454) related to AquAdvantage Salmon, a line of genetically engineered (GE) Atlantic salmon[1] that are produced and grown only under the conditions specified in the approved application and additional conditions that may be approved in a supplemental NADA. This line of fish is designed to exhibit a rapid-growth phenotype that allows it to reach 100 g (smolt size) faster than non-GE farm-raised Atlantic salmon. In this supplemental NADA, ABT requests a change in manufacturing conditions to allow production of AquAdvantage Salmon eyed-eggs in a Hatchery Unit at a land-based, freshwater aquaculture facility located near Rollo Bay, Prince Edward Island (PEI), Canada (Rollo Bay facility).

As a part of the NADA review and approval process under the Federal Food, Drug, and Cosmetic Act (FD&C Act), and consistent with the mandates in the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. § 4321 et seq. and FDA's environmental impact considerations regulations (21 CFR part 25), FDA has thoroughly evaluated the potential environmental impacts of this proposed action[2] (i.e., the approval of a supplemental NADA for AquAdvantage Salmon) based on an environmental assessment (EA) prepared by ABT, see the attached EA dated October 29, 2019, and an FDA inspection of the Rollo Bay facility conducted in late June, 2019. This FONSI is based on the analyses and findings presented in ABT's October 29, 2019 EA supporting the supplemental NADA, including consideration and evaluation of a no action alternative (i.e., a decision not to approve the supplemental NADA for egg production in the Rollo Bay Hatchery Unit).

The October 2019 EA supports production of AquAdvantage Salmon eyed-eggs in the Hatchery Unit, and grow out of AquAdvantage Salmon in the Grow Out Unit, at the ABT Rollo Bay facility. Because construction of the Grow Out Unit at the Rollo Bay facility was not complete at the time of FDA's pre-approval inspection of the Rollo Bay facility, the Grow Out Unit was withdrawn by ABT from the supplemental NADA that is currently under consideration; therefore, this FONSI only addresses production of AquAdvantage Salmon eyed-eggs in the Rollo Bay Hatchery Unit. Hatching and grow out of AquAdvantage Salmon in the Rollo Bay Grow Out Unit will be evaluated under a separate supplement to NADA 141-454 when one is submitted by ABT in the future, and if it is determined by FDA that the action does not cause significant environmental impacts, a separate FONSI will be issued for that supplement.

FDA's original November 19, 2015 approval of the AquAdvantage Salmon NADA was limited to the specific set of conditions enumerated and described in the NADA and the approval letter, with the approved new animal drug in the GE animal remaining under FDA regulatory oversight as long as it is produced and marketed. FDA's approval of the AquAdvantage Salmon supplemental NADA would be for the specific set of conditions described in the

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[1] The approved NADA is for the α-form of the opAFP-GHc2 recombinant DNA construct at the a-locus in the EO-1α line of triploid, all-female Atlantic salmon under the conditions of use specified in the application. For ease of reference, this document refers to the NADA and the supplemental NADA as being for AquAdvantage Salmon.

[2] For the purposes of this FONSI, "action" and "approval" may be used interchangeably.

October 2019 EA and as enumerated in FDA's approval letter. These include appropriate controls on the production of the AquAdvantage Salmon, including appropriate physical and biological containment measures. Under the specific conditions of the supplemental NADA for AquAdvantage Salmon, these fish are defined as triploid[3], all-female populations that would be produced as eyed-eggs at either the Bay Fortune facility or Rollo Bay Hatchery Unit on PEI in Canada. Eyed-eggs would be shipped to an FDA-approved land-based grow-out facility near Albany, Indiana, where they would be reared to market size and harvested for processing for food[4] use (e.g., preparation of eviscerated whole fish, fish fillets, steaks, etc.). The conditions that would be established in the approval of the supplemental NADA would limit eyed-egg production to two PEI locations (Bay Fortune and Rollo Bay) and rearing (i.e., grow-out to market size) of AquAdvantage Salmon to one location in Indiana. All previous conditions of approval in the NADA remain in effect[5]. In addition, the conditions would not include raising AquAdvantage Salmon in ocean net pens.

FDA's approval of the supplemental NADA would be for the specific set of conditions described in ABT's EA and as enumerated in FDA's approval letter. All other conditions of approval, covered by the approval letter for the original NADA dated November 19, 2015, as amended in the approval of the supplemental NADA for the Indiana grow-out facility in April 2018, remain in effect. No other conditions would be within the scope of the approval of the original NADA or the supplemental NADA, as no others would be approved by FDA. Any production outside the scope of the approval and supplemental approval would be unapproved and will result in the article, in this case AquAdvantage Salmon, being considered an unsafe new animal drug and, therefore, adulterated within the meaning of section 501(a)(5) of the FD&C Act. ABT must continue to notify FDA about proposed changes in any conditions established in an approved application and obtain FDA approval of a supplemental application for the change where necessary. 21 CFR 514.8. Major and moderate changes, including any additional production facilities, would require the filing and review of additional supplemental NADAs. Like this supplemental NADA, approval of any additional supplemental applications would constitute major agency actions and trigger additional environmental analyses under NEPA, unless otherwise excluded.

As the supplemental NADA approval would only permit production of AquAdvantage Salmon eyed-eggs at a hatchery facility outside of the United States, the areas of the local surrounding environments that are most likely to be affected by the action lie only within the sovereign authority of another country (i.e., Canada). Because NEPA does not require an analysis of impacts in foreign sovereign countries[6], effects on the local environment of Canada have not been considered and evaluated in the EA except insofar as it was necessary to do so

[3] With reference to AquAdvantage Salmon, and throughout the EA, "triploid" means that, based on sampling, at least 95% of released eyed-eggs have three complete sets of chromosomes per cell with a probability of 0.95 (i.e., the probability that these eggs are not at least 95% triploid is less than 0.05).

[4] For the purposes of this FONSI, "food" refers to food for humans and animals, including animal feed.

[5] The previously approved Panama grow-out facility is no longer operational and FDA-registered, so it is no longer included in the NADA.

[6] See, e.g., *Natural Resources Defense Council, Inc. v. Nuclear Regulatory Com*., 647 F.2d 1345, 1366 (D.C. Cir. 1981); *Consejo de Desarrollo Economico de Mexicali v. United States*, 438 F. Supp. 2d 1207, 1234 (D. Nev. 2006), vacated and remanded on other grounds, 482 F.3d 1157 (9th Cir. 2007). CEQ has issued guidance on NEPA analyses for actions taking place within the U.S. that may have transboundary effects extending across the border and affecting another country's environment. This does not apply here because would be no effects that cross the border from the United States into other countries from the action. https://ceq.doe.gov/nepa/regs/transguide.html. Canada exercises regulatory authority over ABT facilities in that country.

in order to determine whether there would be significant effects on the environment of the United States due to the origination of exposure pathways from the egg production facility (Rollo Bay Hatchery Unit) in Canada.[7]

In addition, social, economic, and cultural effects of the proposed action on the United States have not been analyzed and evaluated because the analysis in the EA indicates that the proposed action will not significantly affect the physical environment of the United States. Under NEPA, social and economic effects must be considered only once it is determined that the proposed agency action significantly affects the physical environment. 40 CFR 1508.14; see Olmstead Citizens for a Better Community v. U.S., 793 F.2d 201 (8th Cir. 1986) ("an impact statement generally should be necessary only when the federal action poses a threat to the physical resources of the area…"). See also Metro. Edison Co. v. People Against Nuclear Energy. 460 U.S. 766, 774 (U.S. 1983).

ABT's approach to analysis in the EA is closely based on that previously used in the FDA-prepared 2015 EA for the original NADA (2015 EA). This approach was based on a characterization of hazards, an evaluation of potential exposure pathways, and a consideration of the likelihood of any resulting risk. The environmental analysis of consequences in the EA incorporates the principles described by the National Research Council as well as the United States Environmental Protection Agency's (EPA) approach to ecological risk assessment. The potential hazards and harms addressed in ABT's 2019 EA center on the likelihood and consequences of triploid AquAdvantage Salmon or diploid AquAdvantage Broodstock (collectively ABT Salmon)[8] escaping, surviving, reproducing, and/or becoming established in the environment near the Rollo Bay facilities, and subsequently causing an adverse outcome (the risk) to the environment. These hazards are addressed within the framework of a conceptual risk assessment model, and the following series of risk-related questions:

1. What is the likelihood that AquAdvantage Salmon or AquAdvantage Broodstock will escape the conditions of confinement?
2. What is the likelihood that AquAdvantage Salmon or AquAdvantage Broodstock will survive and disperse if they escape the conditions of confinement?
3. What is the likelihood that AquAdvantage Salmon or AquAdvantage Broodstock will reproduce and establish if they escape the conditions of confinement?
4. What are the likely consequences to, or effects on, the environment of the United States should AquAdvantage Salmon or AquAdvantage Broodstock escape the conditions of confinement?

With respect to risk assessment, the EA addresses risks associated with all life stages (i.e., gametes through adults), and all of the zygosities and ploidies associated genotypes and phenotypes (i.e., diploids, triploids, hemizygotes, homozygotes females and masculinized females) of GE salmon that will be present in the Hatchery Unit and used for the production of the triploid, all-female AquAdvantage salmon eyed-eggs (See Section 5.3 of the 2015 EA for details on the production of AquAdvantage Salmon and AquAdvantage Broodstock). In general, when it is important for the purposes of assessing a specific environmental risk, the EA specifies whether an animal is assumed to be reproductively competent and uses a term such as "diploid ABT salmon", diploid GH Atlantic salmon", or "diploid AquAdvantage Broodstock".

[7] Under Executive Order 12114, FDA considered whether the proposed action would have significant impacts on the environment of the global commons or of foreign nations not participating or otherwise involved in the action and, has determined that there would be no significant impacts.

[8] ABT salmon are any GE Atlantic salmon from the E0-1α lineage irrespective of ploidy, zygosity, or gender (i.e., the set of Atlantic salmon that includes diploid GE salmon that may be used as broodstock, as well as triploid AquAdvantage Salmon).

Based on the analysis in the EA, FDA considers the likelihood that AquAdvantage Salmon and/or AquAdvantage Broodstock (including all diploid ABT salmon) could escape from containment, survive, reproduce, and become established in the freshwater or marine environments near the Rollo Bay Hatchery to be very low. This is consistent with the conclusions of Canadian authorities, specifically Environment and Climate Change Canada (ECCC) and Health Canada (HC), in the Joint Assessment Report issued in April 2019 for a New Substance Notification (NSN) submission made by ABT in July 2018 for the Rollo Bay facility[9]. In this report, the Canadian regulatory authorities determined that with the containment measures in place at Rollo Bay, EO-1α salmon[10] were "not toxic" under the Canadian Environmental Protection Act (CEPA) due to the low potential for exposure. An environmental and indirect human health risk assessment report issued by Fisheries and Oceans Canada (DFO) was used to inform the CEPA risk assessment by ECCC and HC (Science Advisory Report 2019/014; April 2019)[11]. This risk assessment report summarized the results of a peer-review meeting held in December 2018 that included over 25 experts from DFO and other Canadian agencies and universities. For the environmental risk assessment, this report concluded that depending on the production scenario (i.e., whether or not non-transgenic salmon were produced along-side of AquAdvantage Salmon), there would be a negligible to moderate risk of adverse environmental effects at the exposure and hazard levels predicted for the Canadian environment from the use of EO-1α Salmon at the Rollo Bay facility. As a result of these analyses, ABT was subsequently authorized by Canadian Authorities to operate at the Rollo Bay facility and hatchery operations are currently underway there.

Information presented in ABT's 2019 EA, which was confirmed during an FDA inspection of the Rollo Bay Hatchery Unit in late June 2019, indicates a high level of physical containment is present throughout the Hatchery Unit. Physical containment is augmented by operational containment (standard operating procedures and operational plans), security measures and ongoing surveillance (e.g., cameras and recording devices). As described in ABT's EA (Section 5.6.4), physical containment refers to measures or barriers implemented on-site to prevent the movement or escape of fish from the Hatchery Unit. Containment measures can include the use of mechanical devices, either stationary or moving (e.g., tanks, screens, filters, covers, nets, etc.), or in some cases, the use of chemicals (e.g., chlorine) to prevent uncontrolled escape or release.

All systems in the Early-Rearing Area of the Hatchery Unit (e.g., Heath Stacks, A Tanks) have a minimum of eight independent levels of physical containment (i.e., barriers) preventing the escape or accidental release of eggs or young fish via effluent flow paths to the outside environment (i.e., polishing pond and Rollo Bay Brook). All tanks in the Advanced-Rearing Area where larger (>10 g) fish are reared have four or more barriers in place for all effluent flow paths. This number of containment levels is more than adequate and greater than the number at most fish production facilities, particularly for fish early life stages (eggs, fry), which present the greatest potential risk for escape. For comparison, the ABRAC Performance

[9] The Joint Assessment Report and related materials are available through this website: https://www.canada.ca/en/environment-climate-change/services/managing-pollution/evaluating-new-substances/voluntary-public-engagement-initiative/aquadvantage-salmon.html

[10] Per the report, EO-1α salmon is an Atlantic Salmon (*Salmo salar*) containing a single insert of the opAFP-GHc2 transgene at the EO-1α locus. EO-1α salmon includes AquAdvantage Salmon, which is a triploid (≥98.5%), all-female subset of the EO-1α lineage.

[11] Fisheries and Oceans Canada. 2019. Environmental and Indirect Human Health Risk Assessment for the Manufacture and Grow-out of EO-1α Salmon, including the AquAdvantage® Salmon, at a Land-based and Contained Facility near Rollo Bay, PEI. Canadian Science Advisory Secretariat, Science Advisory Report 2019/014, April 2019. Report available via this webpage: http://www.dfo-mpo.gc.ca/csas-sccs/Publications/SAR-AS/2019/2019_014-eng.html

Standards[12] developed by the United States Department of Agriculture for facilities conducting research on genetically modified fish and shellfish call for three to five levels of containment. In addition, as substantiated during the FDA facility inspection, the majority of containment equipment (screens, filters) are either new or recently refurbished, and manufactured from heavy gauge stainless steel or other appropriate materials, so they should be reliable, durable and require minimal maintenance and repair.

Should unintentional release of eggs or fish occur, the environmental conditions in the geographic settings of the Rollo Bay facility (e.g., Rollo Bay Brook) and farther afield (e.g., Northumberland Strait) would afford some additional means of containment. The local environmental conditions are not necessarily hostile to survival as evidenced by the current presence of brook trout in the Rollo Bay Brook, but they are not expected to be favorable for reproduction and establishment as evidenced by the current lack of Atlantic salmon in the watersheds nearest to the Rollo Bay facility (i.e., Fortune and Souris Rivers) even though these fish were once native to this area and they have been intentionally stocked there in the past in an attempt to reestablish populations.

As discussed previously in the 2015 EA (Section 5.3.2), the production process for AquAdvantage Salmon ensures that populations produced will be triploid[13] and functionally sterile, all-female animals. Thus, the possibility of their reproducing in the wild is likewise extremely remote. Further, the nearest stream with an Atlantic salmon population is approximately 50 km away, which limits the potential for interactions and spawning with native or stocked Atlantic salmon.

In addition to these "sterile" AquAdvantage Salmon, several types of diploid Atlantic salmon will be present in the Hatchery during normal operations: 1) wildtype (non-GE) Atlantic salmon used for mating and producing AquAdvantage Salmon, and 2) AquAdvantage Broodstock, which will include a) up to 20 reproductively competent, diploid GE females that are homozygous for the EO-1α rDNA construct, and b) up to 30 GE neomales (phenotypic males that are sex-reversed genetic females) that are also diploid and homozygous for the EO-1α rDNA construct, but not capable of reproducing on their own[14].

The greatest potential risk to the environment of the United States would occur in the event of the escape of diploid female AquAdvantage Broodstock from the Rollo Bay Hatchery Unit. These fish are reproductively competent and homozygous for the *opAFP-GHc2* gene; however, there will be only 20 or fewer of these GE females present in the Hatchery Unit at any one time. This small number effectively precludes the possibility of a mass escape of reproductively competent GE females and thus greatly limits the possibility for an escape of sufficient numbers of female fish to establish a reproducing population in the local environment.

Given that growth enhanced Atlantic salmon in general do not have a reproductive advantage compared to non-GE Atlantic salmon, and sometimes are disadvantaged (Moreau and Fleming, 2011; Moreau et al. 2011a), the lack of existing Atlantic salmon populations in the

[12] ABRAC [Agricultural Biotechnology Research Advisory Committee] (1995). Performance standards for safely conducting research with genetically modified fish and shellfish. Document No. 95-04, Office of Agricultural Biotechnology, U.S. Department of Agriculture, 156 pp.

[13] Eggs batches cannot be shipped and must be destroyed if testing indicates that triploidy is below 95%. To date, based on testing, the average diploid rate is 0.08% in batches of AquAdvantage Salmon eggs, although most batches are ≥99.5% triploid, see Table 5-2 in the 2019 EA.

[14] These GE neomales lack a sperm duct and cannot spawn naturally. To produce AquAdvantage Salmon, they must be sacrificed, and their milt collected to fertilize wildtype Atlantic salmon.

surrounding waters with which to breed, and, most importantly, the stringent physical containment at that site, the probability of these diploid ABT female broodstock escaping, reproducing, and establishing is very low.

In the highly unlikely event of an escape, reproduction amongst just AquAdvantage Salmon would not be possible because this population is entirely female, and also effectively sterile. Reproduction of AquAdvantage Salmon with AquAdvantage Broodstock would also be impossible because these broodstock are all females with the exception of the GE neomales, which are sex-reversed genetic females with a male phenotype. However, these GE neomales lack a sperm duct and cannot spawn on their own. Therefore, they cannot reproduce successfully with the female AquAdvantage Salmon or the female AquAdvantage Broodstock.

The only "true" genotypic Atlantic salmon males expected to be held at the Rollo Bay facility[15] would be non-GE wildtype males used to maintain the wildtype population there. These wildtype males are needed to maintain the population of wildtype Atlantic salmon and the production process for AquAdvantage Salmon eggs (see Section 5.3 of the 2015 EA). The number of wildtype non-GE males present in the Hatchery Unit will be limited (<300), and these fish will be housed separately (i.e., in different tanks) from the AquAdvantage Broodstock, thus the possibility for them to escape and spawn with reproductively competent (diploid) AquAdvantage females is extremely remote. This would require a mass escape under some type of disaster scenario (e.g., tornado or tsunami) in which the survival of any released fish would likely be precluded anyway.

Even in the highly unlikely event that AquAdvantage Salmon and/or AquAdvantage Broodstock were able to able to escape the Hatchery Unit and migrate to Canadian marine waters, there is not expected to be a complete exposure pathway to the environment of the United States (i.e., Gulf of Maine and coastal waters further south), which is several hundred miles away by sea. There is no reason to expect any of these escaped/released salmon to undertake a migration to waters of the U.S. given that these fish are produced from domesticated hatchery stocks, as are ocean farmed Atlantic salmon. In general, as they mature, escaped farmed Atlantic salmon of hatchery origin show a strong tendency to migrate into rivers in the vicinity of the site of escape. AquAdvantage salmon and/or AquAdvantage Broodstock would be expected to behave similarly in the event of an escape or release.

Even if AquAdvantage Salmon or AquAdvantage Broodstock were to undertake such a migration to the United States, it is unlikely that any significant numbers would survive the journey. Based on recent return rate data for United States and Canadian Atlantic salmon stocks, marine survival rates for wild origin Atlantic salmon are very low (0.16 to 6.1%) and those for hatchery origin Atlantic salmon are even lower, 0.04 to 0.5%. Triploidy has been shown to further reduce survival/recapture rates of salmon in the field. Mortality rates for AquAdvantage Salmon and AquAdvantage Broodstock would be expected to be at least as high and perhaps higher (>99%) because of their higher metabolism and food requirements, susceptibility to predation, and adaptation to feeding on synthetic aquaculture diets. Thus, even if a migration of escaped or released salmon were to occur, few if any of these fish would likely survive the long migration to waters of the United States.

Because risk is the product of two probabilities, the probability of exposure, and the conditional probability of harm given that exposure has occurred, if exposure is negligible, then even if the probability of harm is larger, the overall risk is negligible. The analysis in the EA indicates that there is a very low likelihood of escape or accidental release from the Rollo Bay Hatchery Unit for all life stages and types of salmon to be held or reared there. Given the

[15] Non-GE wildtype males are not currently being held at Rollo Bay Hatchery Unit, they are brought in as necessary for spawning from the nearby Bay Fortune facility. However, in the future ABT anticipates that up to 300 wildtype males may be held there as egg production is increased on a year-round basis.

additional redundant containment measures in place (e.g., biological, geographical, and geophysical) and the long migration necessary, the combination of these factors results in an extremely low likelihood that AquAdvantage Salmon and/or AquAdvantage Broodstock could escape into the wild, then migrate to and cause effects on the environment of the United States. FDA therefore concludes that the production of AquAdvantage Salmon eyed-eggs in the Rollo Bay Hatchery Unit, under the conditions specified in the application and as described in the accompanying EA, would not result in significant effects on the quality of the human environment in the United States, including populations of endangered Atlantic salmon.

Evaluation of Non-GE Atlantic Salmon Egg Production Scenario

It should be noted that it is possible for business reasons that ABT may occasionally undertake production of non-GE Atlantic salmon eggs, for sale to external parties, along-side of AquAdvantage Salmon production in the Rollo Bay Hatchery. Risks associated with production of non-GE Atlantic salmon eggs has been addressed in Section 7.7 of ABT's October 2019 EA, and FDA has given consideration to the potential impacts of this production scenario. This type of production could theoretically present risks to the environment of the United States, particularly if GE salmon eggs (i.e., AquAdvantage Salmon or AquAdvantage Broodstock eggs) and non-GE salmon eggs were to be comingled or either group of eggs were to be mislabeled prior to shipment. Three potential exposure pathways to the environment of the United States have been identified in association with this production scenario. The first potential exposure pathway is the escape or unintentional release of the non-GE eggs from the Rollo Bay Hatchery Unit. The second pathway is the shipment of these non-GE eggs to Canadian Atlantic salmon aquaculture facilities for smolt production and subsequent grow out[16]. This pathway represents a potential risk if there were to be comingling or mislabeling of AquAdvantage Salmon and non-GE Atlantic salmon eggs, and after shipment of the mislabeled GE salmon eggs or the comingled non-GE and GE salmon eggs there was an inadvertent escape/release of AquAdvantage Salmon eggs, smolts, or posts-molts. The third pathway is the shipment of these non-GE eggs to ABT's Indiana Grow Out facility for rearing to market size. Based on the analysis of these pathways presented in the 2019 EA, in conjunction with the operational procedures (including testing of non-GE egg batches) that have been put into place by ABT (see further discussion below), no significant impacts to the environment of the United States are expected as a result of production of non-GE Atlantic salmon eggs along-side of production of AquAdvantage Salmon eyed-eggs at the Rollo Bay Hatchery Unit.

This production scenario has also been considered and evaluated by DFO in its Science Advisory Report 2019/014 and by ECCC and HC in their April 2019 Joint Assessment Report. In the latter report, several operational procedures were recommended that have since been implemented by ABT to prevent the accidental mixing of transgenic (GE) and non-transgenic (non-GE) egg batches, should the company decide to produce non-transgenic eggs for sale. These operational procedures include:

a. temporal separation of egg production for GE and Non-GE eggs;
b. physical separation of the two types of eggs;
c. highly sensitive genetic testing procedures to validate egg genotypes; and
d. clear labeling protocols.

Based on this and other information, the Joint Assessment Report characterized environmental risks associated with AquAdvantage Salmon for use in commercial, contained, land-based aquaculture to be low because "there is low potential for exposure, especially in light of additional measures for maintaining separation between transgenic and non-transgenic eggs".

[16] Once smolts are produced, which is expected to occur in freshwater land-based facilities, these smolts could be grown out to market size at the same facility or subsequently moved to net pen farms in the marine environment.

ABT has already developed and implemented all of the operational procedures identified by ECCC and HC for risk mitigation during production of non-GE Atlantic salmon eggs. This includes testing of all batches of non-GE eggs to insure they are of the proper genotype prior to any shipments of these eggs. Under these conditions, FDA concludes that production of non-GE Atlantic salmon eggs at the Rollo Bay Hatchery Unit, for sale to external parties, and along-side of production of AquAdvantage Salmon eyed-eggs there, will not result in significant impacts to the environment of the United States.

Consideration of Alternatives

For major Federal actions, including an action to approve a supplemental NADA for eyed-egg production or grow-out of AquAdvantage Salmon at an additional facility that was not approved as part of NADA 141-454, NEPA and its implementing regulations require that environmental documents include a brief discussion of the alternatives to the proposed action, as well as the environmental impacts of these alternatives. Section 4 of the EA describes the reasonable alternatives, which include the proposed action and "no action" alternatives.

The alternatives are the approval of the supplemental NADA under the conditions of use described in the EA and that would be set forth in the approval, if the supplemental NADA is approved, and the "no action" alternative, which considers the environmental impacts of not approving the supplemental NADA. The action evaluated in the EA is the approval of the supplemental NADA, which would permit production of AquAdvantage Salmon eyed-eggs in ABT's Rollo Bay Hatchery Unit. The only other conditions of production and use of AquAdvantage Salmon would be those that are permitted under NADA 141-454, and which only allow commercial production of eyed-eggs for AquAdvantage Salmon at ABT's Bay Fortune facility and grow-out at ABT's Indiana facility. No other conditions of production and use of AquAdvantage Salmon would be within the scope of the NADA or supplemental NADA approvals. The approval of the supplemental NADA is therefore described as the preferred alternative. As described above, any changes and/or additions to the conditions of production and use for AquAdvantage Salmon that constitute a major or moderate change would require a supplemental NADA approval prior to implementation. Any supplemental approval would constitute a new agency action triggering additional environmental analysis under NEPA (see 21 CFR 25.20(m)) to address the potential and cumulative impacts of any proposed changes and/or additions.

FDA has considered the no action alternative for this action, that is, a decision not to approve the supplemental NADA for AquAdvantage Salmon. Should FDA decide not to approve the supplemental NADA to allow production of AquAdvantage Salmon eyed-eggs in the Rollo Bay Hatchery Unit, ABT could either continue to produce them at only the Bay Fortune facility or it could seek approval to produce them at one or more alternative hatchery facilities. The first of these outcomes would maintain the status quo and would result in no environmental impacts other than those that were evaluated in the 2015 EA, which resulted in an FDA FONSI. Because this outcome would not result in a significant impact on the environment, the EA did not address it. The second of these outcomes would require submission of one or more additional supplemental NADAs that would require separate analysis under NEPA. Moreover, because production of AquAdvantage Salmon would be possible at any number of locations worldwide, under different containment conditions and levels of regulatory oversight, and potentially within areas where native Atlantic salmon or other salmonid species are present, there are far too many variables and unknowns to define specific scenarios and perform a comprehensive risk assessment for them at this time.

It is also noted that regardless of the outcome of the proposed action, and even if FDA adopted the no action alternative, the ABT facilities at Rollo Bay would continue to operate (but with no shipment of AquAdvantage Salmon eggs or food products to the United States)

because of prior Canadian regulatory decisions. As mentioned previously, in July 2018, ABT submitted a New Substance Notification to Environment and Climate Change Canada requesting authorization to produce AquAdvantage Salmon eyed-eggs and to grow AquAdvantage Salmon for sale as food at the Rollo Bay site, i.e., the same requests being made in this supplement to the NADA. Subsequent to the NSN review, ABT was authorized by Canadian Authorities to operate at the Rollo Bay site and hatchery operations are currently underway there.

Evaluation of Cumulative Impacts

The Council for Environmental Quality's NEPA regulations define cumulative impact as "the impact on the environment which results from the incremental impact of the present action when added to other past, present and reasonably foreseeable future actions . . . ." 40 CFR 1508.7. The 2019 EA presents evidence to support a finding that collectively production of eyed-eggs and grow-out of AquAdvantage Salmon in the Hatchery and Grow Out Units at the ABT Rollo Bay facility will not result in significant impacts on the environment of the United States. Therefore, the cumulative environment impact of only adding the Rollo Bay Hatchery Unit to the existing NADA is considered negligible.

The conditions of production and use for AquAdvantage Salmon, whether in Canada or the United States, will not change if the supplemental NADA for the Rollo Bay Hatchery Unit is approved (e.g., there will be multiple levels of physical containment at all facilities). Therefore, because each of the agency actions (i.e., original NADA and all supplemental NADA approvals) individually would not have a significant impact on the environment of the United States, and the accessible environments for the facilities are widely separated (PEI and Indiana), no cumulative impacts on the environment of the United States are anticipated should there be production and grow-out of AquAdvantage Salmon at the Rollo Bay facility in Canada. Each individual action has no significant impact and the facilities are sufficiently physically distant from each other, so that even if the impacts from all actions were added together, they would still not rise to the level of being "significant". Therefore, it is concluded there would be no cumulative impacts on the environment of the United States for the action to approve this supplemental NADA for AquAdvantage Salmon.

Determination under the Endangered Species Act

Section 7(a) of the Endangered Species Act (ESA) requires federal agencies to "insure that any action authorized, funded, or carried out by the agency" (the agency action) "is not likely to jeopardize" the continued existence (or result in the destruction or adverse modification of a designated critical habitat) of any species of fish, wildlife, or plants that have been determined to be threatened or endangered under Section 4 of the ESA (i.e., officially listed). In this case, the action is approval of the supplemental NADA that would allow production AquAdvantage Salmon eyed-eggs at the Rollo Bay Hatchery Unit.

Effects on threatened and endangered species in the United States are not reasonably foreseeable given the weight of evidence that AquAdvantage Salmon are unlikely to escape from the Rollo Bay facility, and even if they somehow were able to escape, as discussed in the EA, they are unlikely to reproduce and/or establish in the local aquatic environments, and even more unlikely to undertake and survive a migration to the waters of the United States, which are several hundred miles away or more. Thus, there is no exposure pathway for AquAdvantage Salmon from the Rollo Bay Hatchery Unit to interact with, or adversely affect, any threatened or endangered species in the United States[17]. It is therefore reasonable to

[17] The endangered species listing for Atlantic salmon in the United States includes the Gulf of Maine distinct population segment (FWS, 2009). No complete exposure pathway exists from the Rollo Bay

conclude that approval of the supplemental NADA to allow production of AquAdvantage Salmon at the Rollo Bay Hatchery Unit will have no effect on threatened or endangered species in Maine or other parts of the United States including the endangered Gulf of Maine distinct population segment of Atlantic salmon.

As a result of the review of the materials submitted in support of a supplemental NADA approval for AquAdvantage Salmon, FDA has made a "no effect" determination under the Endangered Species Act (ESA), 16 USC §1531 et seq., i.e., when produced and reared under the conditions in the application and the additional conditions that may be approved in a supplemental NADA, and as described within the 2015 and 2019 EA documents, AquAdvantage Salmon would not jeopardize the continued existence populations of threatened or endangered Atlantic salmon in the United States, or result in the destruction or adverse modification of their critical habitat.

Finding under NASCO Guidelines

The North Atlantic Salmon Conservation Organization's (NASCO) Williamsburg Declaration is a non-binding resolution adopted by its members, which include the United States. In June 2003, NASCO adopted the so-called Williamsburg Resolution, Article 7 of which states that the parties should apply the Guidelines for Action on Transgenic Salmon to protect against potential impacts from transgenic or GE salmonids on wild salmon stocks. The portion of these Guidelines that is relevant to this FONSI (Williamsburg Resolution, Annex 5) states, "while there may be benefits from the introduction of such salmonids if, for example, they could not interbreed with wild stocks...," specific steps should be taken to ensure protection of the wild stocks, including utilization of "all possible actions to ensure that the use of transgenic salmonids, in any part of the NASCO Convention area, is confined to secure, self- contained, land-based facilities." FDA has determined that the Rollo Bay Hatchery Unit for production of AquAdvantage Salmon eyed-eggs follows this recommendation in the NASCO guidelines in that there are no wild salmon stocks in the vicinity of the facility and it is a secure, self-contained, land-based facility.

NEPA Decision and Findings

We have carefully considered the potential environmental impacts of both the proposed agency action to approve the supplemental NADA for the Rollo Bay Hatchery Unit and the No Action Alternative, as described and evaluated in the EA. Based on our evaluation and analysis, and taking into consideration the specific conditions that were established in the original NADA, as modified by the subsequent supplemental NADAs, we have made the finding that the action to approve the supplemental NADA to allow production of AquAdvantage Salmon eyed-eggs in the Rollo Bay Hatchery Unit would not individually or cumulatively have a significant effect on the quality of the human environment in the United States. Based on that finding, FDA has decided not to prepare an environmental impact statement for this proposed action.

Matthew Lucia, DVM
Director, Office of New Animal Drug Evaluation
Center for Veterinary Medicine
U.S. Food and Drug Administration

Attachment:
Environmental Assessment for AquAdvantage Salmon dated October 29, 2019

facility to marine waters in the United States where populations of Atlantic salmon live. This includes the Gulf of Maine distinct population segment of Atlantic salmon.

Electronic Signature
Addendum for Submission ID

Signing Authority (Role)	Letter Date
Matthew Lucia (Office Director)	11/2/2019

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