

Written Testimony to the *Advisory Panel To Better Understand and Make Recommendations Regarding the Implications of Genome-editing Technology for the Citizens of the State* from the Maine Aquaculture Innovation Center.

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MAINE’S AQUACULTURE SECTOR



POTENTIAL RISKS AND CONCERNS FOR MAINE’S AQUACULTURE SECTOR

Concerns currently outweigh enthusiasm for genome-editing technology in Maine’s aquaculture sector (no matter whether that is cisgenic - DNA only from the same species - or transgenic - DNA from other species - genome-editing). It is currently illegal to commercially culture any transgenic aquatic animals in Maine.

Perceived, or potential risks may include:

- Unintended, off-target effects (pleiotropic effects),
- Non-clarification of trait-related genes,
- Negative public perception,
- The negative impact genome-editing technology could have on the reputation of Maine’s seafood acceptance.

POTENTIAL OPPORTUNITIES FOR MAINE'S AQUACULTURE SECTOR

Important research tool: Even if never deployed into commercial practice, genome-editing technology has a very important role to play in aquaculture research. The technology will be revolutionary for advancing knowledge of the biology of our farmed aquaculture species, diseases and pests, impacts of climate change, and much more.

An alternative to selective breeding: Classical, selective breeding is a key component of domestication of farmed species. The selection for improved growth rates, disease resistance and increased quality have been important for Maine's aquaculture sector. Selective breeding has been successful in Maine for responding to disease challenges (oysters and salmon) selecting strains that grow well in cold-water (oysters and salmon), and selecting strains that are of high value (ornamental fish).

In certain cases there may be limitations to what selective breeding can achieve; for example it is limited by the heritability of the trait we are attempting to select for, the generation interval of the species and the genetic variation which exists within farmed stocks. However, genome editing does offer the potential to expedite the selective breeding process and select for traits beyond yield and disease resistance. Genome-editing could accelerate our ability to select for traits that allow farmers to :

- Increase aquaculture productivity to meet increasing demands for high quality protein,
- combating pest and disease pressures,
- improving animal welfare,
- adapting to climate change, and
- Reduce potential environmental impact.

Sterility: Genome-editing technology has the potential for producing sterile plants and animals.

WHAT SHOULD THE STATE OF MAINE DO REGARDING GENOME-EDITING WITHIN AQUACULTURE IN ORDER TO BEST BENEFIT MAINERS IN THE NEXT 5 YEARS?

Commission a study to fully understand the current state of the science around the use of genome editing in aquatic animal and plant species. This study should include a review of the techniques, their benefits and potential risks, and the policies and regulations other jurisdictions are currently using to manage these benefits and potential risks.

SUGGESTED REFERENCES FOR FURTHER INFORMATION

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