INTEGRATED PEST MANAGEMENT PLAN

Mannin Salmon Limited

Drinagh, Errislannan, Clifden, Co. Galway

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Sites covered:
Curhownagh, Mannin Bay

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Introduction to the Integrated Pest Management Plan

What is Integrated Pest Management (IPM)?

Integrated Pest Management (IPM) is a common approach used to control pests in the agriculture sector and has also been widely adopted in marine aquaculture for the control of parasitic infestations.

The IPM approach can provide direct benefits to farmers through regular monitoring of their stocks, enabling them to make decisions based on observations, leading to an optimal use of control methods considering the current health and welfare status of the stocks, economic considerations, and potential environmental impacts. Sea lice (*Lepeophtheirus salmonis* and *Caligus elongatus*) have historically posed the biggest practical pest management challenge in Irish marine aquaculture sites.

An Integrated Pest Management Plan (IPMP) is required for an aquaculture operation in the Republic of Ireland (Aquaculture - licensing under Fisheries Act, 1997 as amended and foreshore act, 1933 as amended.).

Aims of the Integrated Pest Management Plan on sites operated by Mannin Bay Salmon Company Ltd.:

- Effective control of pests (most notably sea lice) to guarantee a continuously high standard of fish health and welfare.
- Effective coordination of all available preventative and mitigative options in a holistic approach to pest management with focus on efficacy, fish welfare and the lowest possible environmental impact.
- Reduction of chemotherapeutic treatments through best management practice and a high standard of biosecurity, prioritization of sustainable biological, physical or other non-medicinal control options.
- Effective use of chemotherapeutic treatments if indicated.
- Reliance on only on one treatment method is typically only successful on the short-term as resistances can develop to chemotherapeutants.
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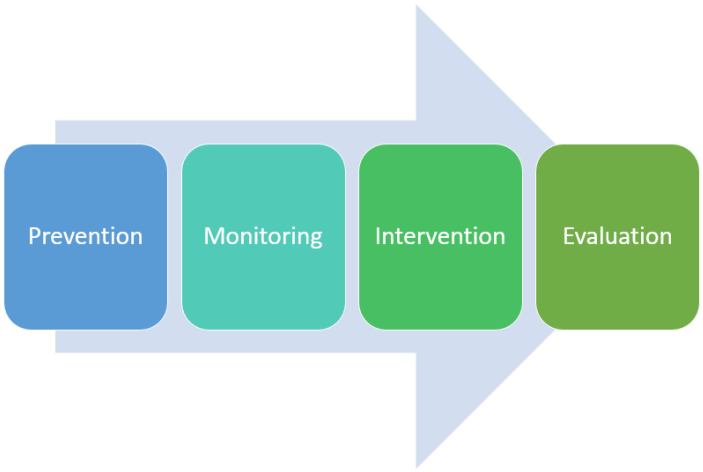
- Compliance with regulations and accreditation.

Implementation
There are several key steps for the implementation of IPM in a fish farm.



1. Prevention

This combination of approaches will contribute to reducing the risk of parasite infestation and associated consequences. Elements of pest prevention include good management practices as outlined in the single bay management plan, best practice biosecurity measures, use of cleaner fish and mechanical options. Available options and potential application on each of the fish farm sites will be assessed continuously and the efficacy of selected options will be reviewed at least annually.

Implementation:

- Annual Stocking Plan as detailed in Single Bay Management Plan and Veterinary Health Plan
- Cleaner fish (lumpfish and/or wrasse). A cleaner fish stocking plan with numbers, species and estimated dates will be in place prior to the stocking of young salmon, taking into account the availability and the seasonal efficacy of the species.

2. Monitoring

All stocks will be monitored regularly and population structure of pests analysed if applicable, to understand the development of infestations and to inform suitable mitigation measures. Company internal data will be collected in addition to monitoring carried out by the Marine Institute.

Implementation:

- Regular pest monitoring (e.g. sea lice counting and gill examination) to be performed on a subsample of the stock (significant representation) in each cage on a weekly basis. Further assessments will be carried out by the Marine Institute.

- *L. salmonis* will be recorded in categories by life cycle stage (Gravid females, adult females, adult males, preadults, chalimus), *Caligus* will be recorded as total number. All counts to be recorded and evaluated by the fish health manager.
- Increasing levels of lice will trigger mitigation measures as appropriate.

3. Intervention

If indicated by monitoring results, fish will be treated. The strategy will be one of zero ovigerous lice at all times in so far as is possible. The decisions on the most suitable mitigation approach will be determined on a case-by-case basis and in discussion with the responsible veterinarian. Biological, physical and non-medicinal options will be prioritized.

Implementation:

- The appropriate response will be decided on a case-by-case basis and in discussion with the responsible veterinarian.
- Non-chemical methods to achieve lice control will be prioritized in preference to the use of chemical methods.
- Freshwater (desalinated) will be used as the primary treatment in conjunction with cleaner fish. Administration will be in accordance with company protocol utilizing the customized desalination plant. The use of cleaner fish will be in accordance with the fish health management and cleaner fish stocking plan.
- In the case of the use of a licensed therapeutant as may be prescribed by the company veterinarian, then the protocol adopted is as follows.
- Records all therapeutic treatments and maintain along with the veterinary prescriptions log.
- In-feed treatment using SLICE (emametctin benzoate) will be used only in the first summer after salmon have been stocked.
- Mechanical, thermal treatments or the use of desalinated water baths will be used throughout the Summer- period. Such treatments will be administered through the charter of a dedicated well boat or thru the deployment of the companies' own desalination plant.
- Such treatments have proven to be of great benefit in the control of sea lice during the 'critical period' (as defined in the Department Protocol on sea lice control)
- The responsible veterinarian will be consulted in advance.

4. Evaluation

Prevention, monitoring and intervention data will be evaluated continuously, and results considered for future mitigation strategy. New options as they become available will be considered and discussed with the responsible veterinarian.