

- 2) The fish farms are the subject of a very vigorous inspection/monitoring regime which is second to none internationally
- 3) The fish farmers have not been shown to be in breach of protocols in respect of sea lice
- 4) Any additional monitoring/inspection proposed will place another burden of bureaucracy on top of the industry without any tangible benefit envisaged
- 5) Any sanctions proposed on fish farmers even by way of interventions currently permitted by existing legislation will be subject to a test of reasonableness

In relation to (4) above, it is published Government policy via the Cawley Report to actively support the planned development of aquaculture and specifically, to streamline licencing procedures. Imposing an additional administrative and cost burden on the industry flies in the face of this policy and would need strong justification not least when set against the backdrop of last week's announcement of redundancies by one company in Donegal. In relation to (5) above the situation could be even more serious. Although the legislation permits the Minister to intervene in the licencing procedure in the interest of good public policy it is legally incumbent on the Minister to act reasonably in relation to any such intervention. Given that the fish farmers are the victims of the sea lice just as much as if not more than the angling community, and that they are not in breach of any protocols, applying sanctions exclusively to them could be construed as acting unreasonably and amounts to invidious discrimination. To go down this route could merely invite legal challenge which, given all the circumstances, we would be unlikely to win. Knowing this likelihood (or even suspecting it), proceeding without full legal advice and then ending up with a loss in the Courts could give rise to claims of maladministration.

In all the circumstances , I would propose we proceed with the original set of recommendations , adjusted to include the Cawley recommendation on breakout space as discussed at last week's meeting. If, on the other hand, the Department is determined for whatever reason to proceed with increased monitoring, increased administrative burdens on the industry and especially any form of sanction exclusively on the fish farmers, my strong recommendation is to seek full legal advice on all the implications. It is certain that the industry will react very strongly to any extra administration, costs or sanctions and we should not proceed without being able to fully defend such measures. Based on all the arguments heard to date CZMD would find it very difficult if not impossible to justify such action. It might therefore be appropriate to postpone Wednesday's meeting pending further consideration of all the issues.

John

Record No 20

-----Original Message-----

From: Dave Jackson [mailto:dave.jackson@marine.ie]
Sent: Friday, May 18, 2007 5:33 PM
To: John Quinlan
Cc: Carmel Daly
Subject: draft executive summary of sea lice wg report

Dear John,

I have reviewed the proposed changes to the executive summary as forwarded to me yesterday by Carmel.

A number of the proposed edits to the recommendations are somewhat unclear as to their meaning and purpose. It may be the case that further editing will help to clarify these.

There are however two of the proposed recommendations which I believe need to be urgently reassessed:

1. "Adjustment of the critical period for monitoring (change the critical period for wild salmonid smolt migration to sea as defined by the monitoring programme to include February)".

There is no sound scientific or technical basis for changing this critical period. Sea trout smolts migrate to sea from mid March (at the earliest) though April. The lice infestations recorded on post smolts prematurely returning in May have been clearly and consistently demonstrated as juvenile lice acquired in the preceding days. The infective stages giving rise to these infestations arise from lice eggs hatched some two to three days previously. From a wild-farmed interaction point of view the key period to minimise ovigerous lice levels on farmed fish is March to May inclusive. Similarly the key period for sea lice control on farmed fish is the spring period (March - May) with the interruption of the breeding cycle as water temperatures rise.

The lengthening of the critical period will have a number of implications which will in no way aid in the improved control of sea lice.

It will place an additional burden on the state to carry out additional monitoring in February under winter sea conditions. This will have cost and resource implications. It will also reduce the availability of weather windows for work to be carried out by farm operators and result in state personnel having to work under marginal weather conditions with the added increased safety risks. The current monitoring regime has been in place for over a decade, is recognised as being robust and effective by all sides, and will not in any way be improved by this additional burden.

The reduction in the trigger level from 2.0 ovigerous females to 0.5 ovigerous females for the month of February is not justified in terms of potential for wild - farmed interactions. The wild smolts are simply not there to be affected by potential infective lice larvae. It will place an additional burden on the farmers to carry out additional lice treatments on two sea winter fish due for harvest in advance of the critical period for smolt migration (March to May). It may also lead to extra treatments or increased use treatments at an inappropriate time. Given the cost of these treatments (it can cost €40- 70,000 to treat a site) and the need to conserve their use in the interests of both minimising resistance issues and meeting standards of best environmental practice this is not wise.

It will reduce the focus on targeted control of lice numbers during the critical period for smolt migration and is likely to be viewed very sceptically by the fish farming industry, which to date has been very supportive of this approach to targeted treatments in the spring as being beneficial both in terms of farm husbandry and any potential wild - farmed interactions.

In the absence of a scientific basis for this change it will be important to be able to demonstrate a reasoned administrative basis for the extra burdens imposed both on the State and on the fish farmers. In particular it will be very important to be able to identify tangible benefits in terms of lice control. Such benefits would then need to be assessed against the negative financial and other burdens such a change will impose both on the State and on industry.

There is a clear need to improve...

that the agreed standards and targets set out in the sea lice monitoring protocol (Monitoring Protocol No 3 for Offshore Finfish Farms- Sea Lice monitoring & Control) are met. However during the course of our deliberations in the Working Group no evidence has been advanced to support the need to revise these standards. It is therefore difficult to identify what tangible benefits will be gained by altering them.

2. " ...emergency availability of novel lice treatment has not succeeded in arresting infestation..."

The availability of Alphamax under special license has been pivotal in the ability to control sea lice in certain bays. In particular where in-feed preparations are not appropriate due to the presence of PD in the stocks the availability of this and other bath treatments is vital to maintaining control of infestations. The statement in recommendation 2 is therefore both inaccurate and misleading. I would recommend it be deleted.

I hope you will find my comments on the proposed changes helpful.

Kind Regards,

Dave

Dr David Jackson
Section Manager/Inspector of Fisheries
Aquaculture & Catchment Mgt Services
Marine Institute

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1. Executive Summary

Finfish production in Ireland grew steadily throughout the 1990s; production in 2001 was as high as 24,000 tonnes but declined to 13,000 tonnes by 2005. The Minimum Import Price introduced across the European Union in 2005 has stabilised fish prices which suffered from below cost selling by some producers and provides the Irish industry with an opportunity to bounce back from poor returns in recent years.

Sea lice are regarded as having the most commercially damaging effect on cultured salmon in the world with major economic losses to the fish farming community resulting each year. Sea lice monitoring has been ongoing in Ireland since 1991. The Sea Lice Monitoring and Control Working Group was established in 2005 to examine/review the systems and processes for controlling sea lice levels at marine finfish farms, in light of experience, and to make recommendations as to any necessary changes or improvements.

During the intervening period despite efforts on control, recorded lice levels have continued to be problematic as evidenced by published monitoring reports; mandatory reporting under the Habitats Directive begins this year in respect of Salmon SACs with the threat of sanctions if the Commission is not satisfied with measures in place to maintain stocks at favourable status; Ireland averted infringement proceedings on compliance of its management of the fishery with the Habitats Directive; in recognition of declining wild stocks, Government has committed to management of the wild salmon fishery for conservation rather than catch; there is a €30m investment in cessation of the fishery and €1.5m pa investment in habitat and stock improvement contributed to by anglers; The European Union introduced Minimum Import Prices in 2005 and farmed salmon prices have recovered significantly since then.

Caution on explanation of sea lice

The Working Group has identified the most significant challenges to effective sea lice control, including: limited availability of space for new sites; access to existing licensed areas for fallowing purposes; environmental and other licensing constraints; and potential objections from a variety of interested parties.

To tackle these challenges, the Group propose the following main strategies to deal with lice infestation at commercial fish farms, namely adjustment of the critical period for monitoring change the critical period for wild salmonid smolt migration to sea as defined by the monitoring program to include February. Among the causes of the pervading problem is water temperature which is the ground put forward for this adjustment; measures to tackle treatment-resistant lice [emergency availability of novel lice treatment has not succeeded in arresting infestation], more efficient management of fish farms sites and strategic bay management approaches. Likewise, the Group outlines a series of recommendations to ensure that the threat posed by lice is as limited as possible. The recommendations are intended to ensure that sea lice come under effective control and that finfish farming becomes more sustainable to take advantage of the recent encouraging economic climate.

Deleted: 3

Recommendations:

1. Adjustment of the critical period for monitoring [change the critical period for wild salmonid smolt migration to sea as defined by the monitoring program to include February. Among the causes of the pervading problem is water temperature which is the ground put forward for this adjustment];
2. Effective and appropriate use of chemical intervention to be reviewed to take ongoing account of changing environmental conditions, developing farming practices, sensitivity of lice to treatments and fish health issues. [emergency availability of novel lice treatment has not succeeded in arresting infestation and approach needs to be ramped up].
3. Intensive consultation with the fish farming industry, both with individual fish farmers and representative organisations, to maintain ongoing optimisation of management practices.
4. Address instances of poor farm management in carrying a lice control measures, husbandry problems, poor inclusion rates far in feed treatments, PD related issues by way of interventions by BIM and the Marine Institute [sponsored under NDP, see 7 below].
5. Critically examine participation by operators and compliance with terms of license and if necessary review of license conditions [sanctions].
6. Intensify efforts, with the industry, to identify "break out" site options, including the possibility of using redundant sites, to optimise fallowing and separation of generations. The fisheries boards to lend support to the application of new approach to use of currently licensed sites, including the species to be cultivated at those sites.
7. Explore with BIM and others options in relation to finance.
8. Include under the national development plan appropriate measure to facilitate investment in addressing all aspects all sea lice monitoring and control.
9. Implementation group to be established comprising: Coastal Zone Management Division and Seafood Policy Division of Department of Communications, Marine and Natural Resources; Bord Iascaigh Mhara; the Marine Institute, Central and Regional Fisheries Boards and Industry representatives.

IPN veterinary } Jackson

Formatted: Bullets and Numbering

Carley

2.

Review of quarantine licensing (protocols)
Regulatory regime

encourage collaboration

10. State generate annual inspection of dormant sites, classify as such, where dormant for 2 years State will activate license where recovered, State will give priority to existing operators for break out sites

STRATEGY TO ACHIEVE EFFECTIVE SEA LICE CONTROL ON MARINE SALMON FARMS

1. BACKGROUND

Salmon farming began in Ireland in the mid 1980s. Production grew steadily throughout the 1990s with production in 2001 as high as 24,000 tonnes but declined to 13,000 tonnes by 2005. The Minimum Import Price introduced across the European Union in 2005 has stabilised fish prices which suffered from below cost selling by some producers and provides the Irish industry with an opportunity to bounce back from poor returns in recent years.

Sea trout fisheries in the west of Ireland suffered a collapse in stocks in 1989/1990 and this collapse has been associated with sea lice infestation from marine salmon farms. Many stocks in the west and north-west are at much reduced levels compared to pre-collapse levels and concerns have been raised by the wild fisheries sector and the Fisheries Boards regarding inadequate control of sea lice on salmon farms. The Fisheries Boards are, inter alia, charged with advising the Minister on policy relating to the conservation, protection, management, development and improvement of inland fisheries including salmon and sea trout fisheries.

Studies in Ireland and other European countries have shown that sea lice from marine salmon farms can pose a serious threat to wild salmonid stocks if not adequately controlled. Sea lice are also regarded as having the most commercially damaging effect on cultured salmon in the world with major economic losses to the fish farming community resulting each year. Sea lice monitoring on marine salmon farms has been ongoing in Ireland since 1991. During the intervening period, despite efforts on

In undertaking this work Group is to;

- Be guided by the need to ensure that lice levels are reduced to, and kept at the lowest possible levels, to the mutual benefit of fish farmers and wild fisheries interests;
- Take account of international best practice in the field of sea lice monitoring and control, and emerging scientific or technological initiatives in this field; and
- Consult with interested parties.

3. THE WORKING GROUP

The Working Group is made up of the following;

Brendan Tuohy - Secretary General, DCMNR, (Chairman)

Martin Brennan and Cecil Beamish - Assistant Secretaries General, DCMNR

Frank Sheridan and Larry Cassidy - Inland Fisheries Division, DCMNR

John Quinlan and Carmel Daly - Coastal Zone Management Division, DCMNR

Donal Maguire and Lucy Watson - Bord Iascaigh Mhara

John O'Connor, Paddy Gargan, Greg Forde, Harry Lloyd and Fiona Grant – Central and Regional Fisheries Boards

Ken Whelan and David Jackson – Marine Institute

The Working Group held a number of meetings. The more recent meetings were chaired by the Secretary General of the Department of Communications Marine & Natural Resources, Brendan Tuohy. Members of the Group met with representatives of the salmon farming industry and also with wild fisheries representatives to get their views and recommendations.

- to report at regular intervals and as considered necessary to the Minister on progress and/or on necessary changes to the plan in the light of experience gained.

It is recommended that the group comprise of representatives of the DCMNR (Inland Fisheries Division, Coastal Zone Management Division and Seafood Policy Division), Bord Iascaigh Mhara, the Marine Institute, Central and Regional Fisheries Boards and industry representatives.

= Cap on Production

5. STRATEGY TO CONTROL SEA LICE ON MARINE SALMON FARMS

1. There will be separation of generations at all sites at one tidal excursion apart.
2. Each site will be fallowed annually, or at end of a production cycle, for a minimum of one month (30 days) before re-stocking. All sites within one tidal excursion will be fallowed synchronously.
3. There will be an annual synchronous "winter" lice treatment for all adjacent sites (one tidal excursion) ^{*where required*}.
4. A planned rotation of sea lice treatments will take place over the production cycle & adjacent sites will use the same product rotation.
5. The current lice treatment triggers for the spring period of 0.3-0.5 egg bearing females per fish, and for the rest of the year of 2.0 egg bearing lice, will be reviewed on a bay by bay basis with reference to impacts on wild fish.
6. These strategies will be included in a formal signed Single Bay Management Agreement.
7. Compliance with the terms of aquaculture licenses will be reviewed and, if necessary, there will be a review of license conditions. Where there is a

generation sites will be examined. Assessment of compliance with target lice levels will be undertaken to ensure that the objective of achieving zero/ near zero egg bearing female lice in spring is achieved. New legislation will take account of compliant and non-compliant operators and an incremental approach to penalties will be introduced.

Considered offenders will have trouble getting licence renewed.

14. There will be a review of all existing licensed areas, and an intensification of efforts to identify "break out" site options, including the possibility of using redundant sites, to optimise fallowing and separation of generations. In accordance with the report, STEERING A NEW COURSE: Strategy for a Restructured, Sustainable and Profitable Irish Seafood Industry 2007-2013 (Cawley N, Murrin J and O'Bric R, 2006), DCMNR will support and facilitate the acquisition of fallowing sites for the salmon farming sector to assist with more effective sea lice and disease control. Provision of these sites will not necessarily involve an increase in the permitted output of the industry, but will be designed to facilitate improved spatial and temporal stock management and reduced incidence of disease.

15. In assessing site suitability and break out space, the requirements of protecting SAC salmon rivers under the Habitats Directive [and the Williamsburg Resolution of NASCO] will be taken into account. Wild salmon and sea trout sanctuary areas in the sea will be established where considered necessary.

inhibited

These will be located primarily in bays where salmon SAC rivers enter *and industry* *supported by cooperation with this.*

16. As the presence of 2-sea winter fish (including S½ fish in their second winter) poses serious potential threat of lice infestation for wild salmonids, all two sea winter fish will be harvested before the end of February each year at all sites. However, if a potential lice problem is developing, accelerated harvesting will

Record No 23**Des Lawlor**

From: Frank Sheridan
Sent: 16 May 2007 14:51
To: Des Lawlor
Subject: FW: Sea lice report
Attachments: DRAFT REPORT TO MINISTER v3.doc

Regards

Frank Sheridan

Inland Fisheries and Marine Research Division
 Department of Communications, Marine and Natural Resources,
 Leeson Lane
 Dublin 2
 (t) +35316782270
 (f) +35316782539
 (m) +353872236459
 (e) frank.sheridan@dcmnr.ie

From: John Quinlan
Sent: 11 May 2007 13:40
To: Martin Brennan
Cc: Frank Sheridan; Larry Cassidy; Brendan Tuohy; Cecil Beamish; Carmel Daly; Roni Hawe; Des Hackett
Subject: RE: Sea lice report

Martin,

I have just seen this now. The draft you have contains some typos and other infelicities normal in a work-in-progress. The cleaned up draft is now available and has gone to the SG (copy attached). The earlier draft was given to IF to let all concerned have early sight of where we were going and this was fully explained at the time . The content issues covered by you below are probably a matter for next Wednesday.

John

-----Original Message-----

From: Martin Brennan
Sent: Friday, May 11, 2007 1:28 PM
To: John Quinlan
Cc: Frank Sheridan; Larry Cassidy; Brendan Tuohy; Cecil Beamish; Carmel Daly; Roni Hawe; Des Hackett
Subject: Sea lice report

John

I have read the draft, which I received last evening. I appreciate what you say about it representing the views of the CZMD, but I am not sure, given that we all sat through the recent meetings, that this is a viable approach. A lot of the material is continued from the earlier documents and not amended in any way in the light of the presentations/evidence. I am assuming that we all want to get to a final robust and forward looking reporting in, say, the next two weeks; that would certainly be my ambition. This is the context in which my comments, which follow, are put forward. I will be direct in the interest of brevity and impact and with a view to progress; controversy or offence not intended.

- There are a few critical unfinished sentences, where I cannot take a view without knowing what

is intended

- Could focus a bit more on the problem and the future and less on defending the industry and the status quo; the executive summary is even more one-sided than the rest of the report
- Could be a shade more radical
- There is a trailer about more funding for the sector which in the context of the current draft would, in my view, strain our credibility as a Group; if such an idea was to be floated, it could only be in the context of the industry being subjected to significant and expensive new demands. The economic argument in a later bullet would question whether State investment is justified at all
- Paras. 5-7 are the substance and should, in any event, be placed nearer to the beginning
- If there is to be an Implementation Group, the leisure/angling/sea trout sector would have to be strongly represented if we are ever to make real progress; the current proposal in that regard is derisory
- Given the discussion, para.1.4 is particularly unbalanced too
- I think we are gone past the "might be implicated" stage
- Para. 3.1 is plainly wrong in its second sentence; the evidence in the SOS submission is damning
- I am not content on sanctions; what is in place is very weak and I wonder should loss of licence/lease be contemplated?
- If we were being radical in relation to location, either by concentrating activity in particular bays, pushing them further out to sea or reusing long-dormant sites, we would have to lock in a cooperative attitude by the RFBs etc.
- I would challenge the "minimum price" approach being presented as a positive; rather I would tend to see it as a protection of a sub-economic or marginally economic activity, which would die of natural causes in its absence or where only the best in every respect would survive
- When it comes to treatments, the well-boat solution mentioned by the producers warrants mention/conclusion

In conclusion, I think much of the foregoing needs to be factored in before the Department engages with the external members. It would not suffice to add a section setting out the views of the IF Division to the existing draft; more radical surgery is needed. Unless that is done, we will never get to a consensus in the Group and would risk another walk-out, as I believe happened in late 2005 or early 2006. I would urge urgent attention to amending the report with a view to very early finalisation.

Martin Brennan

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Deimhnítear leis seo freisin nár aimsíodh víreas sa phost seo tar éis a scanadh.

Frank Sheridan

Record No 234

From: Frank Sheridan
Sent: 16 May 2007 08:26
To: 'frank.sheridan@dublin.ie'
Subject: Fw: Sea lice report

Add to this.

----- Original Message -----

From: Martin Brennan
To: John Quinlan
Cc: Frank Sheridan; Larry Cassidy; Brendan Tuohy; Cecil Beamish; Carmel Daly; Roni Hawe; Des Hackett
Sent: Fri May 11 13:28:02 2007
Subject: Sea lice report

John

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- *

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Martin Brennan

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Deimhnítear leis seo freisin nár aimsíodh víreas sa phost seo tar éis a scanadh.

5

Record No 25



SEA LICE MONITORING AND CONTROL WORKING GROUP

INTERIM REPORT TO THE MINISTER

DRAFT

May 2007

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1. Executive Summary

Finfish production in Ireland grew steadily throughout the 1990s; production in 2001 was as high as 24,000 tonnes but declined to 13,000 tonnes by 2005. The Minimum Import Price introduced across the European Union in 2005 has stabilised fish prices which suffered from below cost selling by some producers and provides the Irish industry with an opportunity to bounce back from poor returns in recent years.

Sea lice are regarded as having the most commercially damaging effect on cultured salmon in the world with major economic losses to the fish farming community resulting each year. Sea lice monitoring has been ongoing in Ireland since 1991. The Sea Lice Monitoring and Control Working Group was established in 2005 to examine/review the systems and processes for controlling sea lice levels at marine finfish farms, in light of experience, and to make recommendations as to any necessary changes or improvements.

The Working Group has identified the most significant challenges to effective sea lice control, including: limited availability of space for new sites; access to existing licensed areas for fallowing purposes; environmental and other licensing constraints; and potential objections from a variety of interested parties.

To tackle these challenges, the Group propose 3 main strategies to deal with lice infestation at commercial fish farms, namely measures to tackle treatment-resistant lice, more efficient management of fish farms sites and strategic bay management approaches. Likewise, the Group outlines a series of recommendations to ensure that the threat posed by lice is as limited as possible. The recommendations are intended to ensure that sea lice come under effective control and that finfish farming becomes more sustainable to take advantage of the recent encouraging economic climate.

Recommendations:

1. Effective and appropriate use of chemical intervention to be reviewed to take ongoing account of changing environmental conditions, developing farming practices, sensitivity of lice to treatments and fish health issues.
2. Intensive consultation with the fish farming industry, both with individual fish farmers and representative organisations, to maintain ongoing optimisation of management practices.
3. Intensify efforts, with the industry, to identify "break out" site options, including the possibility of using redundant sites, to optimise fallowing and separation of generations.
4. Explore with BIM and others options in relation to finance.
5. Implementation group to be established comprising: Coastal Zone Management Division and Seafood Policy Division of Department of Communications, Marine and Natural Resources; Bord Iascaigh Mhara; the Marine Institute and Industry representatives.

2. Background

2.1. Aquaculture in Ireland

In the global context, aquaculture has grown significantly over recent decades, with annual growth of the order of 10% since 1990. It is the fastest growing area of food production. The industry is also characterised by ongoing diversification and innovation, including the cultivation of new species.

Salmon farming started in Ireland commercially in or around 1978 and the first significant company was Curraun Fisheries (at the time a wholly owned subsidiary of Guinnesss Ireland Plc). There was a debate for a few years as to which species (Atlantic salmon or Rainbow trout) would be the more suitable for cultivation, salmon winning out as their survival at sea was better and they fetched a higher price. Roughly 350 tonnes of farmed salmon were produced in 1980 at a value of about €2.6million (prices were very high at that time as the fish were a rarity).

Since its initial development in the early 1970s, the Irish industry has grown to become a significant contributor to local economies. The Irish aquaculture industry provides fulltime and part time employment for some 1,936 people and had a production in 2005 of over 60,000 tonnes valued at €998m, 90 % of which was exported. Finfish production accounted for 13,000 tonnes with a value of €55m, while shellfish production was 50,000 tonnes, valued at €45m. BIM estimated that 410 people were employed in finfish farming during 2005, of which 247 were full-time.

Irish output, however, is small by international standards. By way of comparison the two main European producers of salmon, Norway and Scotland, accounted for production of 602,000 tonnes and 137,000 tonnes, worth €1,806m and €411m respectively, in 2004.

There are three distinct regions in Ireland where salmonid farming is carried out, the West (Counties Mayo and Galway), the Northwest (Co. Donegal) and the Southwest (Counties Cork and Kerry). Maps indicating the locations of the farms are provided in Appendix 2.

Finfish production in Ireland grew steadily throughout the 1990s; production in 2001 was as high as 24,000 tonnes but declined to 13,000 tonnes by 2005. The Cawley Report (*Steering a New Course – Strategy for a Restructured, Sustainable and Profitable Irish Seafood Industry 2007-2013*) identified market factors (salmon prices earlier this decade plummeted due to below cost selling by countries such as Norway and Chile) as the dominant cause for decline. The European Union introduced Minimum Import Prices in 2005 and farmed salmon prices have recovered significantly since then.

The Calwey Report also noted that sub-optimal stock performance due to disease had also impacted the Irish industry. The report cites recent industry improvements in husbandry, stock breeding and feeding practices as the basis on which this issue is being addressed.

Significantly, the report acknowledges that in recent years the Irish industry has been "hostile to investment" owing to the foregoing difficulties but also to the regulatory framework involved.

2.2. Challenges to the industry

There are many challenges facing the sustainable development of Irish Aquaculture including:

- o Issues such as Coastal Zone Management, environmental designations including SAC (Special Areas of Conservation) and NHA (Natural Heritage Area);
- o Infrastructure;
- o Research & Development;
- o public image.

These issues need to be addressed on an ongoing basis. This is being done at a local level in many areas through CLAMS (Co-ordinated Local Aquaculture Management System) and Single Bay Management Schemes.

Fishfarms are also perceived to be problematic because of their proximity to rivers and the concerns over possible impact on wild fisheries. The aquaculture industry has, for some time, expressed the need for more sites and location of sites further offshore. However, new applications have been slow to come forward possibly due to the complex nature of the licensing process (e.g. the need for Environmental Impact Assessment and the appeals process etc).

2.3. What are Sea Lice?

Sea lice are a group of parasitic copepods found on fish world wide. There are two species of sea lice commonly found on cultured salmonids in Ireland, *Caligus elongatus* Nordmann, which infests over eighty different species of marine fish, and *Lepeophtheirus salmonis* Krøyer (the salmon louse), which infests only salmon, trout and closely related salmonid species. *L. salmonis*, the salmon louse, is the more serious parasite on salmon, both in terms of its prevalence and effects. It has been found to occur most frequently on farmed salmon and returning wild salmon have been found to carry an average of 10 or more adult egg bearing females on their return to the Irish coastline from their feeding grounds in the Atlantic.

2.4. What effect do sea lice have?

Sea lice are regarded as having the most commercially damaging effect on cultured salmon in the world with major economic losses to the fish farming community resulting each year. They inflict damage to their hosts through their feeding activity on the host's body. Sea lice affect salmon in a variety of ways; mainly by reducing fish growth; loss of scales which leaves the fish open to secondary infections; and damaging of fish which reduces marketability.

3. Sea Lice Monitoring

Monitoring of lice infestation levels on salmonid farms in Ireland was initiated in April/May 1991. This was in response to concerns that lice emanating from farmed salmonids might be implicated in the phenomenon of large numbers of sea trout returning to rivers in early summer in an emaciated state and with elevated lice numbers. Since April 1994, monitoring has been carried out in accordance with the recommendations of the Sea Trout Task Force and its successor body, the Sea Trout Management and Advisory Group. This involves the inspection and sampling of each year class of fish at all fish farm sites 14 times per annum - twice per month during March, April and May and monthly for the remainder of the year except December-January. Only 1 inspection is carried out during this period.

This monitoring regime has effectively been adopted as one of a number of Monitoring Protocols to which all salmon farmers are required to adhere as part of the licensing regime. The inspections are carried out directly by the Marine Institute. This programme is applied at all marine finfish farms regardless of whether the licensee is subject to the terms of the Protocol or not.

Lice levels are determined from the sampling process and measured against target levels set out in the protocol or in licences. The Spring period (March to May) targets are now set at very rigorous levels of 0.3 to 0.5 egg bearing lice per fish. Outside of this a level of 2.0 egg bearing lice acts as the trigger for treatment. Where measurements at a farm exceed these target levels the M.I. issues a "Notice to Treat" to the licensee.

Results are reported to farms by the M.I. within five working days of the inspection together with appropriate advice. Monthly reports are compiled for each site of mean numbers of egg bearing lice and total mobile lice of each species. These reports are circulated to the farms, the Department of Communications, Marine & Natural Resources, the Marine Institute, the Central Fisheries Board, the Regional Fisheries Boards and the Irish Salmon Growers Association. This ensures that real time information on the levels pertaining on farms is available to all interested parties. These reports are designed to give a clear, unambiguous measure of the infestation level at each site and to act as a basis for management decisions.

3.1. Purpose of Monitoring

The initial purpose of the monitoring in 1991 and 1992 was to obtain an objective assessment of infestation levels on farms and to investigate the nature of these infestations. The results of these investigations, first published in 1993, were used to develop a management strategy for effective sea lice control and subsequently to refine and further enhance the management strategy. The purpose of the national sea lice-monitoring plan since 1994 has been:

- To provide an objective measurement of infestation levels on farms
- To investigate the nature of the infestations

- o To provide management information to drive implementation of the control and management strategies
- o To facilitate further development and refinement of the control and management strategies.

3.2. Management Strategy

As a result of the experience gained over a number of years an integrated approach to sea lice control has been developed in Ireland. This management strategy was endorsed by the Sea Trout Task Force and subsequently, by the Sea Trout Management and Advisory Group. This management strategy, which formed the basis for Single Bay Management (SBM) Agreements, relies on five principal components:

- o Separation of generations
- o Annual fallowing of sites
- o Early harvest of two sea-winter fish
- o Targeted treatment regimes
- o Agreed husbandry practices

Together, these components work to reduce the development of infestations and to ensure the most effective treatment of developing infestations. They minimise lice levels whilst controlling reliance on, and reducing use of, veterinary medicines. The separation of generations and annual fallowing prevent the vertical transmission of infestations from one generation to the next, thus retarding the development of infestations. The early harvest of two sea winter fish removes a potential reservoir of lice infestation and the agreed practices and targeted treatments enhance the efficacy of treatment regimes. One important aspect of targeted treatments is the carrying out of autumn / winter treatments to reduce lice burdens to as close to zero as practicable on all fish, which are to be over-wintered. This ensures zero / near zero egg bearing lice in spring. The agreed husbandry practices cover a range of related fish health, quality and environmental issues in addition to those specifically related to lice control.

3.3. Trigger Levels for Treatment

The setting of appropriate treatment triggers is an integral part of implementing a targeted treatment regime. Treatment triggers during the spring period are set close to zero in the range of from 0.3 to 0.5 egg bearing females per fish and are also informed by the numbers of mobile lice on the fish. Where numbers of mobile lice are high, treatments are triggered even in the absence of egg bearing females.

Outside of the critical spring period, a level of 2.0 egg bearing lice acts as a trigger for treatments. This is only relaxed where fish are under harvest. Over the period since the initiation of SBM (Single Bay Management), treatment triggers have been progressively reduced from a starting point of 2.0 per fish during the spring period to the current levels

which are the optimal sustainable at present. Triggered treatments are underpinned by follow up inspections and, where necessary, by sanctions. Sanctions employed include, peer review under the SBM process, conditional fish movement orders and accelerated harvests.

In late winter and early spring sea water temperatures are at a minimum and development rates of lice are reduced. This has the effect of tending to synchronise the development of lice larvae. A strategic treatment at this time can break the cycle of infection.

Ovigerous female lice are those which produce the infective larvae and treatments are timed to remove adult females before they can release larvae. Setting the treatment trigger at 0.5 ovigerous lice per fish ensures that treatments are carried out when a maximum of half of the fish examined have any ovigerous lice. This is the optimum time to interrupt lice development. Later in the year generations of lice are not as synchronised and intervention, at a lice level of 0.5 ovigerous lice per fish, by way of treatment is generally not justified. A level of 2.0 ovigerous lice per fish has been shown to be a pragmatic level at which intervention by way of treatment is advisable. Levels of total mobile lice or juvenile lice are important in advising fish health professionals in developing a lice control strategy. However, they are not of themselves appropriate measures upon which to trigger mandatory treatments.

3.4. Sampling Strategy

The Irish sampling strategy, which underpins the current monitoring programme, was developed through a consultation process with national and international experts in the field. It has been refined and modified as a result of the recommendations of the Sea Trout Working Group, the Sea Trout Task Force and the Sea Trout Management and Advisory Group. The resulting programme meets both the exacting scientific requirements of a national monitoring programme and the diverse concerns of sectoral interests, as expressed through the various Ministerial committees and through direct representations. The rationale of the current sampling strategy is to:

- Provide a robust and reliable objective measure of lice numbers on farmed fish
- Operate within a framework which is cost effective and capable of being carried out over the range of installations which are in use in offshore farming
- Take account of weather conditions, fish health issues, environmental effects and animal welfare considerations.

4. Co-ordinated Local Aquaculture Management Systems - CLAMS

4.1. Single Bay Management- the forerunner of CLAMS

On the basis of information gathered in surveys of lice infestation on salmon farms in 1991 and 1992, the Department of Marine put in place a new initiative in salmon farm management. This initiative, termed Single Bay Management, has been progressively introduced since then and has resulted in significant and sustained improvements in lice control on farmed fish. Crucial elements in the success of this plan are identified as:

- separation of generations;
- annual fallowing of sites;
- strategic application of chemotheraputants;
- good fish health management; and
- close co-operation between farms.

The process of integrating the elements of Single Bay Management into a co-ordinated local aquaculture management system is outlined below.

4.2. CLAMS

In 1998 the Minister of State for Marine announced the setting up of a Co-ordinated Local Aquaculture Management System group (CLAMS). This concept of management is designed to facilitate the development of plans for individual bays incorporating and extending the concept of Single Bay Management. It will also be integrated with Coastal Zone Management policy and County Development Plans. Though CLAMS is integrated with these plans and the viewpoints of all interest groups are documented, the process is driven by the aquaculture producers working within the framework of national policy. BIM and the Marine Institute have been charged with the responsibility for developing the CLAMS framework at local level.

The CLAMS process is a non-statutory management system, which is anchored in the national marine policy and development programmes. It is envisaged that CLAMS will highlight issues in a bay and co-ordinate the industry and relevant bodies to deal with them. It is separate to licensing issues and is not going to solve or take responsibility for all issues. The concept focuses at local bay level while still taking on board relevant national policies. The object of this process is to formulate a management plan for the bay, which incorporates and extends the concepts of Single Bay Management to all farmed species.

CLAMS provides a concise description of the bay in terms of physical characteristics, history, aquaculture operations, future potential, problems, etc. It also allows various Codes of Practice to be customised and integrated to the aquaculture industry operating in the bay. In addition, it provides the framework from which a management and development plan for

aquaculture in the bay can be drawn. Another important aspect is that this process acts as a focus group for the community. This will then provide an information channel from local to national level and vice versa. It is envisaged that this will provide a framework for addressing issues that affect or are affected by aquaculture activities and streamline the resolution of these situations.

5. National Survey of Sea Lice on Fish Farms in Ireland – 2005

As part of its role in the monitoring and control of sea lice on fish farms, the Marine Institute publishes an annual report covering its findings during that year.

The 2005 report found that sea lice in farmed salmon in Ireland increased to levels which are the highest since 1998. These findings led to concerns by the Department and the industry as well as by wild fishery interests, and resulted in increased public criticism of aquaculture.

On a general level the results, taken with the results in the reports for recent years shows that levels of sea lice rose steadily through 2002, 2003 and 2004. 2005 showed levels that are at their highest since 1998. The worst hit areas are the Northwest and West where poor lice control persisted throughout the year. Farms in the Southwest region appeared to have kept within acceptable levels.

The reasons for the poor results are not straightforward and may include the following:

- increased winter sea temperatures;
- possible reduced efficacy of treatment;
- impact of fish health on treatment efficacy;
- lack of flexibility of licensees to move fish between sites;
- starving of fish prior to harvest;
- changes in management practices (including the desire for 'organic fish').

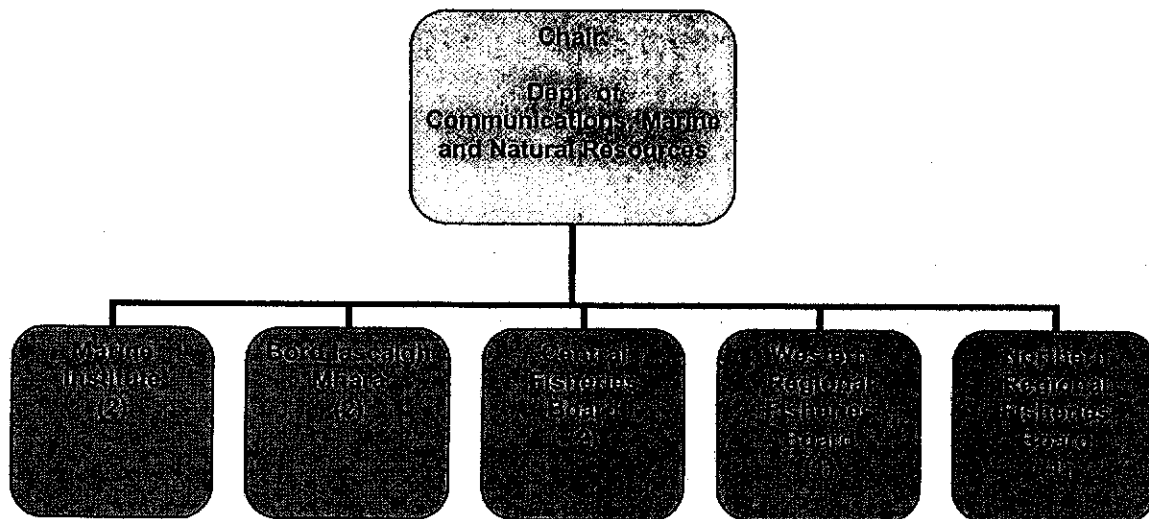
Pancreas Disease (PD) at some farms was a complicating factor, affecting the efficacy of lice treatments. In-feed treatments have a long period of protection (6 -10 weeks) whereas bath treatments confer no protection against re-infestation. PD fish feed badly resulting in poor efficacy or no efficacy of in-feed treatments. Fishfarms with PD must therefore rely on bath treatments which can have immediate re-infestation.

A review of Single Bay Management Plans at the end of 2005 indicated that a sufficient fallowing period was not undertaken at a number of sites and that the concept of separation of generation, which is a strategy to limit transfer of parasites (and disease organisms) from older to younger fish, is not taken on board at some fishfarms. The Department has recently written to all licence holders reminding them of the importance of a good fallowing strategy and instructing them to comply fully with the Department's Protocol on fallowing.

6. Sea Lice Monitoring and Control Working Group

Against a background of heavy lice levels at a number of farms in Conemara and Donegal in 2005, it was decided to establish a working group where the Department and relevant agencies would work together to address concerns. "The Sea Lice Monitoring and Control Working Group" was established.

The group comprises:



The aim of the working group is to examine/review the systems and processes for controlling sea lice levels at marine finfish farms, in light of experience, and to make recommendations as to any necessary changes or improvements. Membership details of the Group are provided at Appendix 1.

The group's terms of reference are "to review, in light of experience, the operation of systems and processes for controlling sea lice levels at marine finfish farms, to identify any necessary changes and set out an action plan with specific timeframes for implementation of such changes".

In undertaking this work the Group is to:

- be guided by the need to ensure that lice levels are reduced to, and kept at the lowest possible levels, to the mutual benefit of fish farmers and wild fisheries interests;
- take account of International best practice in the field of sea lice monitoring and control, and emerging scientific or technological initiatives in this field; and
- consult with interested parties.

The group met on 6 occasions through late 2005, 2006 and 2007.

6.1. "7 Golden Rules"

Seven principles of best practice were drawn up and agreed by the group as a good basis for achieving good farm management in terms of fish health, productivity and sea lice control.

1. Complete separation of Generations (sites to be one tidal excursion apart)
2. Each site to be fallowed annually, or at end of a production cycle, for one month (30 days) before re-stocking. All sites within one tidal excursion to be fallowed synchronously.
3. Annual synchronous "winter" lice treatment for all adjacent sites (one tidal excursion).
4. Planned rotation of sea lice treatments over the production cycle & adjacent sites to use the same product rotation.
5. Treatment triggers Spring Period 0.5 egg bearing females per fish, rest of year 2.0 egg bearing lice.
6. All above to be set out as part of formal signed SBM Agreement.
7. Where there is a persistent problem with sea lice control there is a need for an incremental series of actions up to and including mandatory treatments and sanctions.

6.2. Issues addressed

During the course of the Working Group the Fisheries Boards raised a number of issues which they felt needed to be addressed in the context of improving sealice management and control. While agreement has been reached on a number of areas, consensus has not been reached on a number of matters. Among the issues raised were:

- o Trigger levels
- o Critical period
- o Sanctions/legal issues
- o Broodstock
- o Two sea winter fish
- o Total bay cap
- o Frequency of lice inspections
- o All life stages of lice to be counted

6.2.1 **Trigger Levels**

It is the Department's view that the trigger levels set out in the Protocol, which are the most stringent in any salmon producing country, are appropriate and represent a sound balance between protection of the environment, including wild fish stocks, animal welfare issues and proper use of animal medicines. Accordingly there are no proposals at present for alteration of these levels.

6.2.2 Critical Period

The critical period for sea trout smolt migration is, as indicated in the report of the Sea Trout Task Force and re-iterated in subsequent reports of the Sea Trout Working Group, from February to the middle of May. Peak runs occur in mid-March, with smaller numbers of smolts migrating to sea both before and after that time. The timing of these runs is consistent from year to year. In these circumstances, and as the monitoring and control programme already takes account of the key period (March to May inclusive) both by way of bi-monthly monitoring and the setting of lower treatment trigger levels (0.5 ovigerous lice per fish), it is not proposed to alter the critical period.

6.2.3 Sanctions/Legal Issues

One of the issues which was raised consistently through the working group process was the use of sanctions in cases where there were breaches of the protocol trigger levels of sea lice infestation.

The protocol states that triggered treatments are underpinned by follow-up inspections and, where it is considered necessary, by sanctions. Sanctions employed include peer review under the SBM process, conditional fish movement orders and accelerated harvests.

There is provision in the Act for prosecution to be initiated by the DCMNR where continuing high levels of sea lice can be attributed to failure on the part of the farmer to respond appropriately to notices to treat or to address appropriately ongoing sea lice problems. Persistent failure on the part of the farmer in this regard should ultimately lead to a revocation of a licence under Section 68 of the 1997 Act. However, evidence has shown that, in general, fishfarmers are compliant with the requirements of the protocol and that factors outside of their control contribute to the failure of treatments in some cases.

The Fishery Boards were consistent in their demand that action must be taken by the Department in circumstances where there are persistent high lice levels on farms. While it was pointed out that no criminal liability could attach to a farmer who, despite best endeavours and compliance with instructions, experiences high levels, the Fishery Boards representatives expressed the view that there should be sanctions available in such circumstance.

6.2.4 Broodstock

It was agreed that lice on broodstock should be counted. In future salmon broodstock will be subject to sea lice inspections.

6.2.5 Two sea winter fish (fish remaining in the sea over two winters)

There was also agreement that that it was desirable to have two sea winter fish, other than broodstock, harvested before February.

6.2.6 Total bay cap

The Fishery Boards suggested that, in addition to the current practice of reporting lice numbers per fish, total lice load in a particular bay should also be recorded. Marine Institute advised that best international practice when evaluating the impact of parasite infestations and describing them, is that it should be done in terms of the host-parasite relationship. Infestation levels are normally described in terms of intensity (number of parasite per infected host), prevalence (number of hosts infected with parasites as a proportion of the total population) and abundance (number of parasites per potential host). Total bay figures are misleading and do not give a true picture of the extent or nature of the infestation.

6.2.7 Frequency of sea lice inspections

It was suggested that the number of inspections per year be increased from 14 to 16, with 1 extra in both December and February (before the critical period). Marine Institute has advised that the current monitoring regime provides sufficient data for appropriate assessment of the situation. MI noted that the current regime had detected the deterioration in infestation levels in 2005.

6.2.8 All lice life stages to be counted

The Fishery Boards also asked that all lice should be counted at all life stages. Currently adult females and all mobile stages are counted and reported on. This gives an accurate picture of both the current infestation level and likely trends in infestation in the coming weeks. The level of accuracy possible in counting the microscopic larval stages of the lice renders the carrying out of the procedure in the field of little additional benefit.

6.3. Meeting with ISGA

In addition to the meeting of the Working Group, the Department, under the chairmanship of the Secretary General, met with Industry representatives on 31 January 2007 where a presentation was made to the Department officials on the working group in relation to the issues of concern to their members regarding the ongoing sea lice problem.

ISGA made it clear that an improved sea lice regime will be of great benefit to the industry also in terms of better fish health, improved growth and more marketable fish, and they will welcome any initiative which will improve the situation. It was recognised however, that the main problem was the availability of sites to allow for proper fallowing and, to this end, they were willing to investigate fully the prospect of using breakout sites if these were available to them.

6.4. Meeting with Save Our Seatrout (SOS)

On 16 April 2007 a similar opportunity was given to those representing the angling community and the Department met with members of "Save Our Seatrout" on that date. SOS was given the opportunity to discuss fully all areas of concern to them and, in conclusion, they pointed to

what they see as a solution, namely, the phased relocation of farms away from SAC river estuaries or to closed containers.

Immediate actions are also suggested i.e.

- o a freeze of development or expansions in or near SAC river estuaries;
- o a block on further grant aid to farms in or near to SAC river estuaries;
- o effective application of meaningful and deterrent penalties against all offending farms (see section 6.2.3);
- o a major revision of the lice limits and control regime, viewed on a whole-bay basis (see sections 6.2.4 to 6.2.8).

SACs are Special Areas of Conservation, designated having regard to the European importance of a species or habitat. The Habitats Directive (92/43/EEC) outlines the European legal framework to protect these sites. The main aim of this Directive is to promote the maintenance of biodiversity, taking account of economic, social, cultural and regional requirements and with the general objective of sustainable development. Under the terms of the Directive, any project which has implications for the designated area must be subject to appropriate assessment and, if negative impacts are anticipated, appropriate compensatory measures to ensure the integrity of the area must be put in place.

Sea trout are not a protected species under the Habitats Directive and therefore do not feature in the list of species protected in SACs. Salmon are listed in Annex 2 to the Directive but there is no evidence of sea lice levels causing difficulties in wild Irish salmon populations.

Taking account of the above in relation to the Habitats Directive, an outright ban on marine fin fish farms would be far more severe than the terms or purpose of the Directive. Marine fin fish farms are now generally required to undergo the stringent criteria of Environmental Impact Assessment prior to licensing. This process provides the means to identify, quantify and mitigate any potential impacts arising from the farms on the host environment, including SACs. Licence conditions take account of recommendations made during EIA and many of the conditions under which licences operate limit the potential for negative impacts on the receiving waters. The Department considers that the appropriate assessment measures are already in place to protect SACs.

7. The Problem in Context

Over the last three seasons there has been a problem with lice control at a number of diverse locations. A significant proportion of the problem falls into categories discussed above. The *possible* causes/contributory factors are outlined and discussed below:

1. Poor farm management in carrying out lice control measures.
2. Husbandry problems in administering lice treatments/poor inclusion rates for in-feed treatments.
3. PD related issues (poor appetite and/or poor uptake of active from diet
4. Reduced sensitivity in sea lice populations to available treatments.
5. Incomplete separation of generations leading to vertical transmission of lice.
6. Additional lice treatments required by low trigger levels in protocols.

In particular all farms co-operated with the DCMNR/MI initiative to carry out strategic winter treatments during December 2004 & January/February 2005. All relevant stocks were treated and written confirmation was provided to the Marine Institute.

There has certainly been an issue with inclusion rates for in-feed treatments. The effects of Pancreas Disease on appetite are well known (& this has a direct effect on the up-take of in feed treatments) but there are other less well studied effects of the disease which may also impair the efficacy of in feed treatments. Taken together the above has undoubtedly had a significant impact on the efficacy of in feed lice treatments.

There is growing evidence, including a formal adverse reaction report, that some populations of lice may be exhibiting reduced sensitivity to lice treatments.

Health professionals have expressed concerns from time to time about additional treatments required to reduce lice levels, which were not having an adverse impact on the stock, to comply with trigger levels. This is especially a factor where fish health is already compromised due to other factors (e.g. PD, high temperatures etc). The need to carry out extra treatments is exacerbated where there is mixing of generations on the same or adjacent sites and/or integrated or strategic lice management is not the norm.

7.1. Review of lice control methods**Treatments Licensed in Ireland**

Treatment	Purpose	Usage
SLICE	Enamectin Benzoate (in feed)	widely used
EXCIS	Cypermethrin (bath)	widely used
CALICIDE	insect growth regulator	no longer available
ALPHAMAX		available under special licence for use where other treatments are not effective or have limited efficacy.

Treatments Licensed or available elsewhere

Treatment	Purpose	Usage
Deltamethrin (<i>Alphamax</i>)	Bath	effective & widely used in Norway
Hi-cis Cypermethrin (<i>Betamax</i>)	Bath	as above
Salmosan (organophosphate)	Bath	licensed in UK no longer available
Ivermectin	in-feed	licensed for other food animals in EU/Ireland

Other (alternative) lice "control" methods

Treatment	Usage
Wrasse	Used as a "cleaner fish" in several countries, including Ireland. Still used in Norway. Serious limitations to efficacy. Also issues with supply of wrasse, effects on wild populations and possible disease risks. May have limited application especially on post smolts in their first summer at sea.
Immuno-stimulants	Ecoboost (blend of aromatic herbs) feed additive, said to enhance ability of fish to withstand lice infection. May have part to play in integrated lice management plan. It is not of itself an effective way of controlling existing lice infestations.
Hydrogen Peroxide	Bath treatment. Issues with safety & practicality.

7.2. Solutions / Response Options

In seeking to address the current problems a number of approaches are required. In the short term it will be necessary to tackle the problem of severe infestations at certain sites, some of which may be experiencing reduced sensitivity to currently available medicines. In the short to medium term it will be necessary to review management practices to optimise lice control and to integrate it with overall health management.

Three strategies are listed below which need to be addressed to ensure effective sea lice management on Irish salmon farms. Each of the strategies presents its own particular challenges, however as a suite of responses they provide the best way forward in the current circumstances.

A. Emergency availability of a novel lice treatment

- For use on those sites where remedial action is urgently required.
- For use on sites where reduced sensitivity has been demonstrated or is suspected.

(addressed by way of special licence for Alphamax)

B. Site Management /Bay Management

- Fallowing between generations
- Single Generation sites
- All in all out bay by bay strategies in specific cases
- Flexible and/or novel approach to use of currently licensed sites, including the species to be cultured at those sites.

C. Integration of sea lice and health management protocols to include a bay management approach which is:

- Defined by specific targets and goals.
- Goal led.
- Flexible and enforceable.

8. Conclusions

The solution most likely to have the best medium and long term results is option B – i.e. concentration on site/bay management issues. A flexible, inclusive approach can be achieved by continuing to adapt management practices at site and bay level to emerging trends in sea lice control.

In an effort to optimise management practices with regard to sea lice control at fish farms, a small working group comprising Irish Salmon Growers Association and the Marine Institute has now been set up. The group will meet regularly to ensure proper co-ordination of efforts to achieve optimum benefit from the fish farmers control efforts. The first meeting is imminent.

There appears to be an emerging consensus that “break-out” space is necessary to facilitate fallowing and separation of generations. This gives rise to a number of challenges including:

- o limited availability of space for new sites;
- o access to existing licensed areas for fallowing purposes;
- o environmental and other licensing constraints;
- o potential objections from a variety of interested parties.

8.1. Recommendations

1. Effective and appropriate use of chemical intervention to be reviewed to take ongoing account of changing environmental conditions, developing farming practices, sensitivity of lice to treatments and fish health issues.
2. Intensive consultation with the fish farming industry, both with individual fish farmers and representative organisations, to maintain ongoing optimisation of management practices.
3. Intensify efforts, with the industry, to identify “break out” site options, including the possibility of using redundant sites, to optimise fallowing and separation of generations.
4. Explore with BIM and others options in relation to finance.
5. Implementation group to be established comprising
 - o Coastal Zone Management Division and Seafood Policy Division of Department of Communications, Marine and Natural Resources,
 - o Bord Iascaigh Mhara,
 - o Marine Institute,
 - o Industry representatives

9. Appendices

Appendix 1 - Sea Lice Monitoring and Control Working Group

Members

Secretary General of Dept of Communications, Marine and Natural Resources (Chaired later meetings)

Cecil Beamish, Asst Secretary General

Martin Brennan, Asst Secretary General

Frank Sheridan, Inland Fisheries & Marine Leisure and Research

Larry Cassidy, “

John Quinlan, Coastal Zone management Division

Dave O'Donoghue,

Carmel Daly, Coastal Zone Management Division, Secretary

Donal Maguire, Bord Iascaigh Mhara

Lucy Watson, Bord Iascaigh Mhara

Dave Jackson, Marine Institute

Ken Whelan, Marine Institute

John O'Connor, CEO Central Fisheries Board

Paddy Gargan, Central Fisheries Board

Greg Forde, CEO, Western Regional Fisheries Board

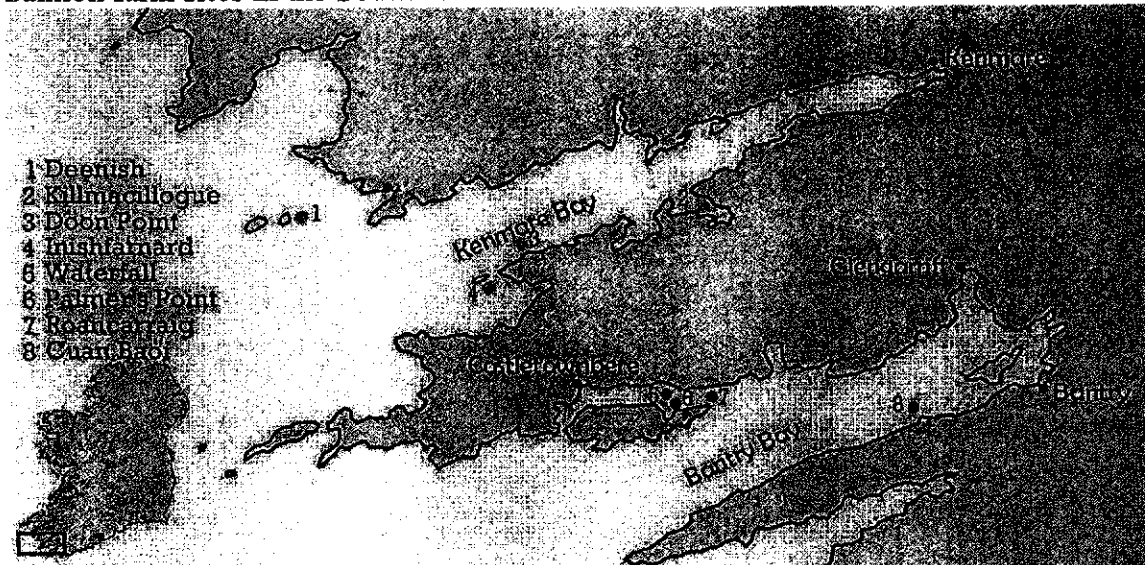
Harry Lloyd, CEO, Northern Regional Fisheries Board

Appendix 2 - Location of Salmon Farms

Salmon farm sites in south Connemara



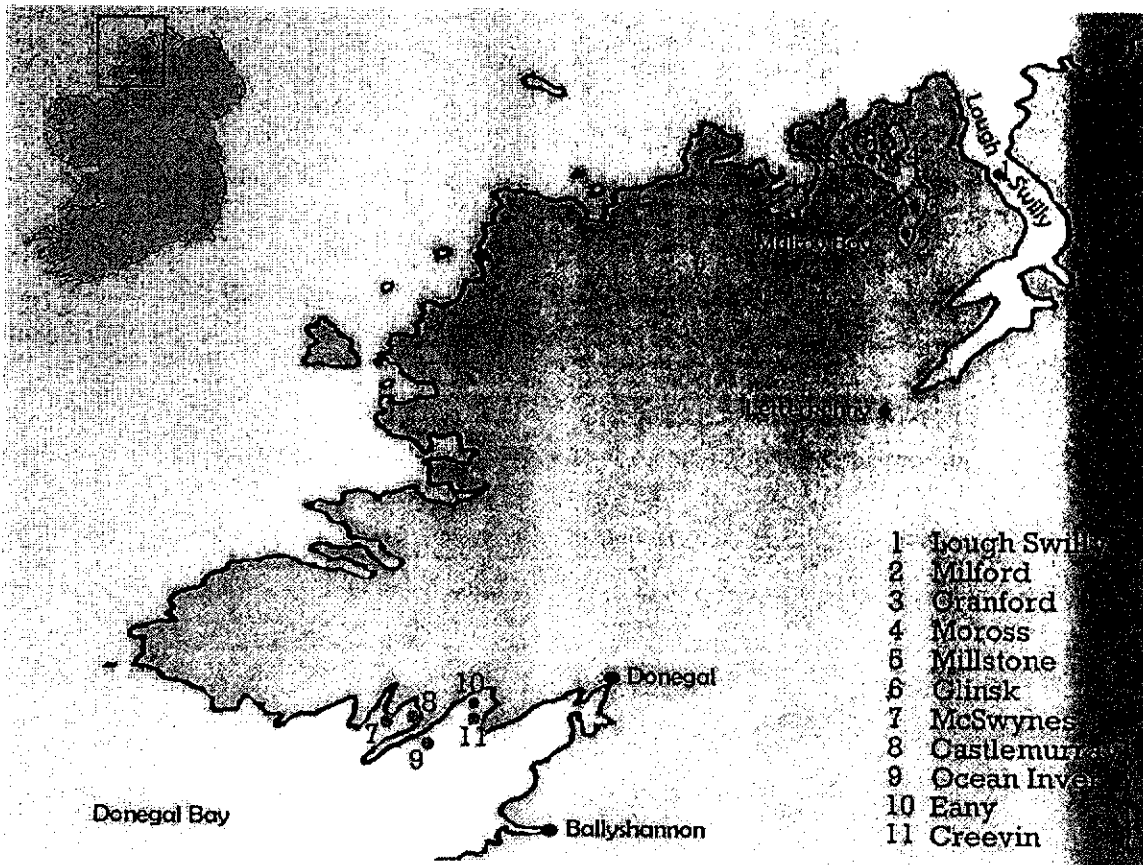
Salmon farm sites in the Southwest



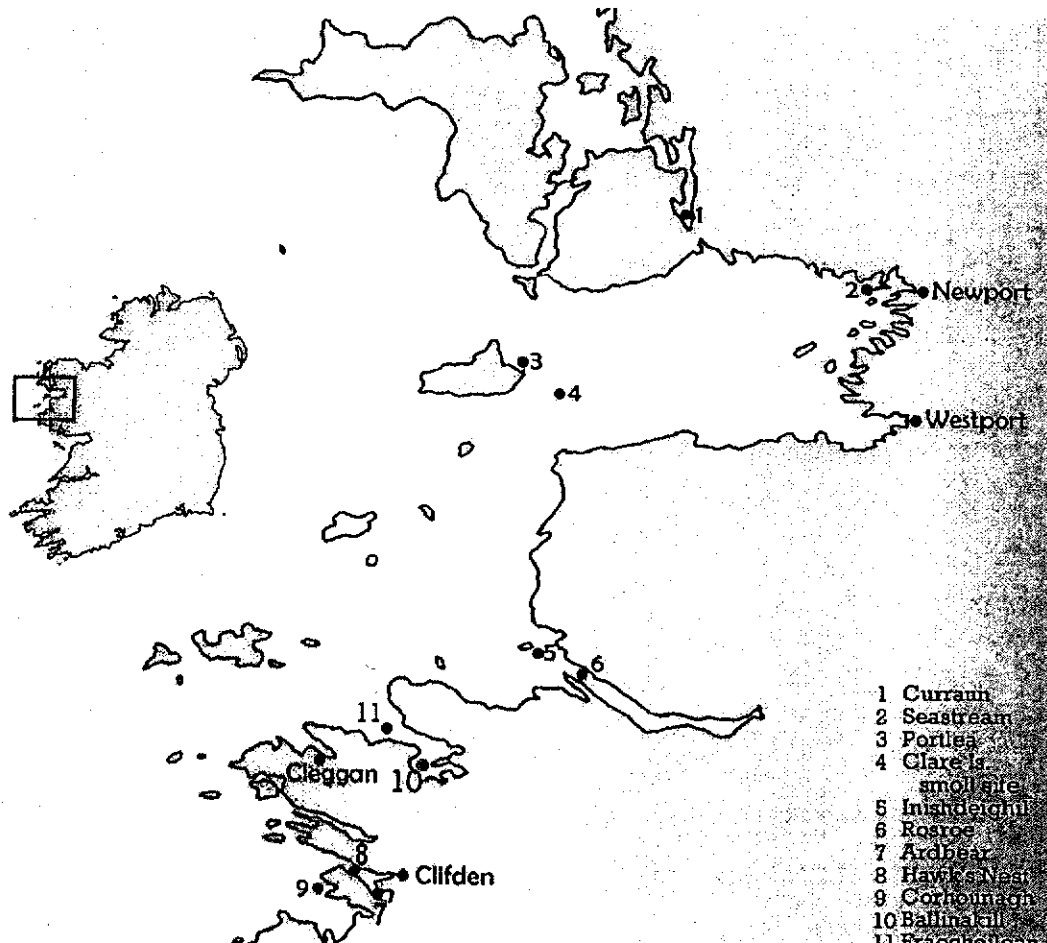
Sites used in 2006= ● red

Sites not used in 2006= ● orange

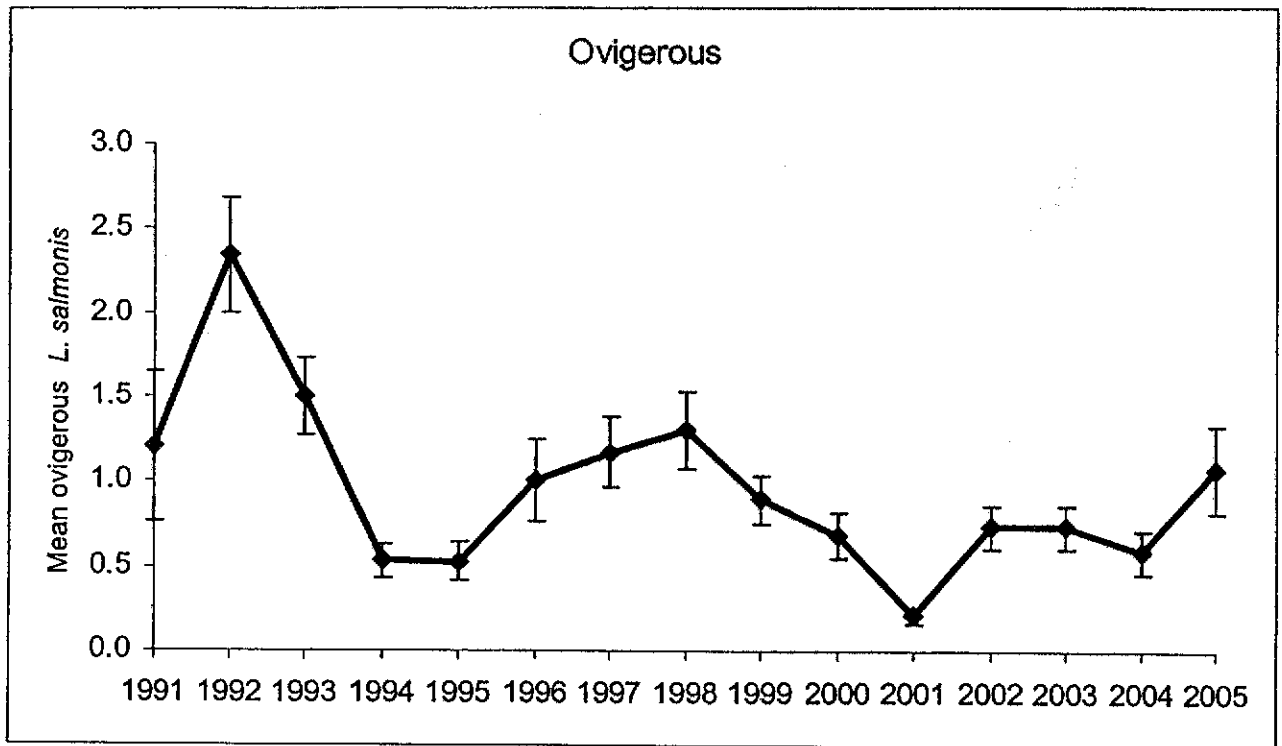
Salmon farm sites in North West



Salmon farm sites in Mayo and north Connemara

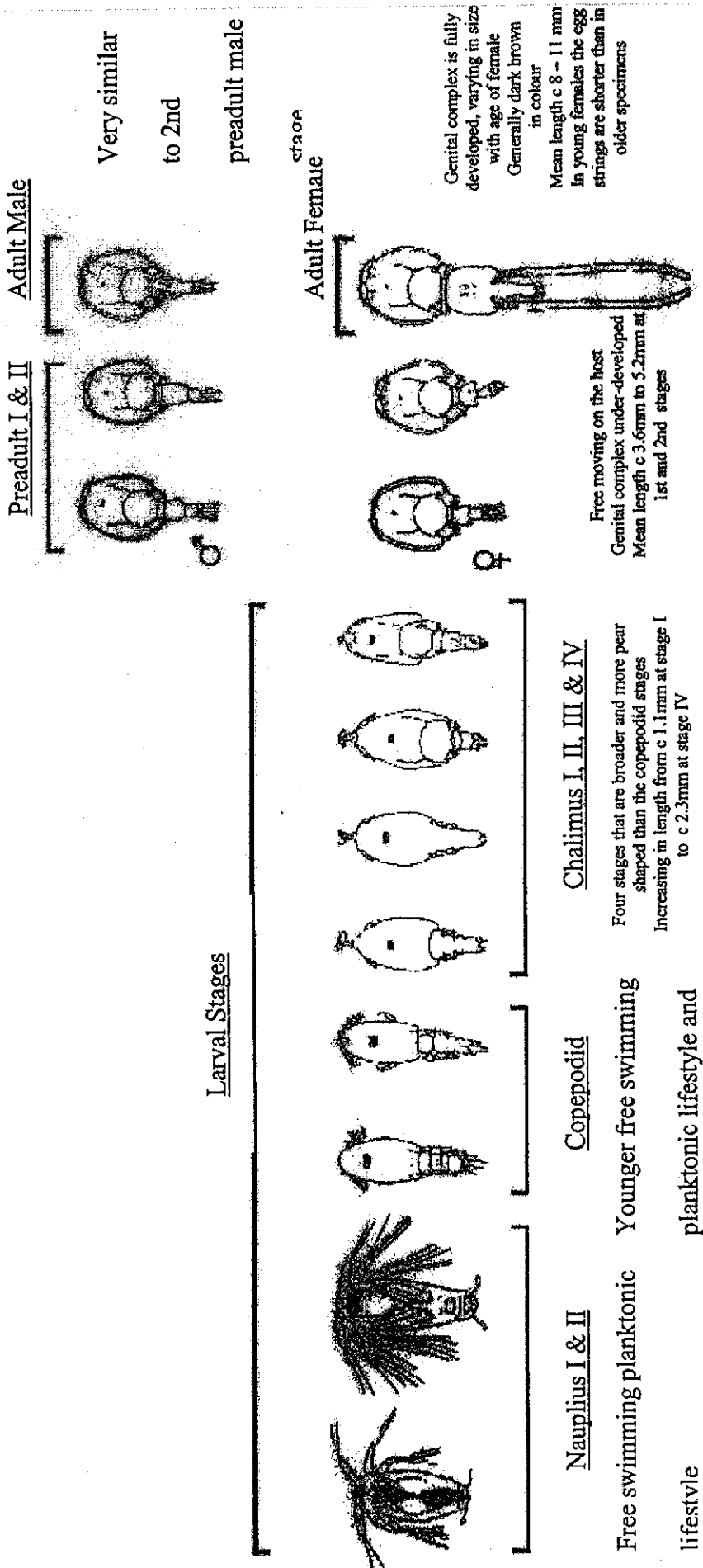


Appendix 3 - Annual Sea Lice Trend 1991-2005

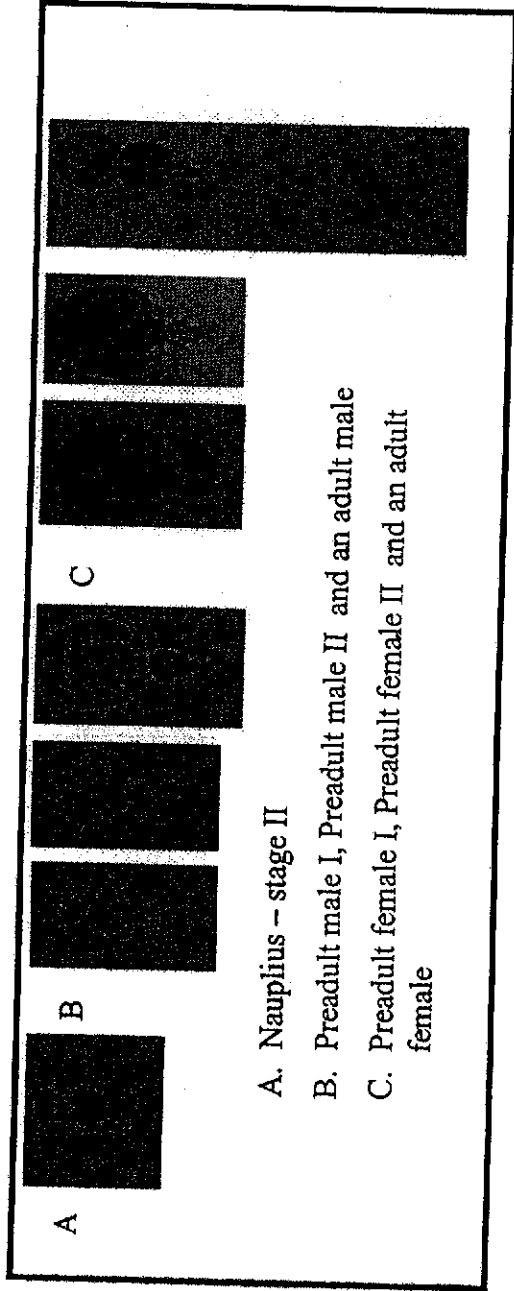


Annual trend (May mean) (SE) ovigerous *L. salmonis* on one-sea-winter salmon.

Appendix 4 - Life cycle of a sea louse



Life cycle of *Lepeophtheirus salmonis* (after Schram, 1993)



Diagrams and photos not to scale.

Frank Sheridan

Record No 25

From: John Quinlan
Sent: 11 May 2007 13:40
To: Martin Brennan
Cc: Frank Sheridan; Larry Cassidy; Brendan Tuohy; Cecil Beamish; Carmel Daly; Roni Hawe; Des Hackett
Subject: RE: Sea lice report
Attachments: DRAFT REPORT TO MINISTER v3.doc

Martin,

I have just seen this now. The draft you have contains some typos and other infelicities normal in a work-in-progress. The cleaned up draft is now available and has gone to the SG (copy attached). The earlier draft was given to IF to let all concerned have early sight of where we were going and this was fully explained at the time. The content issues covered by you below are probably a matter for next Wednesday.

John

—Original Message—

From: Martin Brennan
Sent: Friday, May 11, 2007 1:28 PM
To: John Quinlan
Cc: Frank Sheridan; Larry Cassidy; Brendan Tuohy; Cecil Beamish; Carmel Daly; Roni Hawe; Des Hackett
Subject: Sea lice report

John

I have read the draft, which I received last evening. I appreciate what you say about it representing the views of the CZMD, but I am not sure, given that we all sat through the recent meetings, that this is a viable approach. A lot of the material is continued from the earlier documents and not amended in any way in the light of the presentations/evidence. I am assuming that we all want to get to a final robust and forward looking reporting in, say, the next two weeks; that would certainly be my ambition. This is the context in which my comments, which follow, are put forward. I will be direct in the interest of brevity and impact and with a view to progress; controversy or offence not intended.

- There are a few critical unfinished sentences, where I cannot take a view without knowing what is intended
- Could focus a bit more on the problem and the future and less on defending the industry and the status quo; the executive summary is even more one-sided than the rest of the report
- Could be a shade more radical
- There is a trailer about more funding for the sector which in the context of the current draft would, in my view, strain our credibility as a Group; if such an idea was to be floated, it could only be in the context of the industry being subjected to significant and expensive new demands. The economic argument in a later bullet would question whether State investment is justified at all
- Paras. 5-7 are the substance and should, in any event, be placed nearer to the beginning
- If there is to be an Implementation Group, the leisure/angling/sea trout sector would have to be strongly represented if we are ever to make real progress; the current proposal in that regard is derisory
- Given the discussion, para. 1.4 is particularly unbalanced too
- I think we are gone past the "might be implicated" stage
- Para. 3.1 is plainly wrong in its second sentence; the evidence in the SOS submission is damning
- I am not content on sanctions; what is in place is very weak and I wonder should I

licence/lease be contemplated?

- If we were being radical in relation to location, either by concentrating activity in particular bays, pushing them further out to sea or reusing long-dormant sites, we would have to lock in a cooperative attitude by the RFBs etc.
- I would challenge the "minimum price" approach being presented as a positive; rather I would tend to see it as a protection of a sub-economic or marginally economic activity, which would die of natural causes in its absence or where only the best in every respect would survive
- When it comes to treatments, the well-boat solution mentioned by the producers warrants mention/conclusion

In conclusion, I think much of the foregoing needs to be factored in before the Department engages with the external members. It would not suffice to add a section setting out the views of the IF Division to the existing draft; more radical surgery is needed. Unless that is done, we will never get to a consensus in the Group and would risk another walk-out, as I believe happened in late 2005 or early 2006. I would urge urgent attention to amending the report with a view to very early finalisation.

Martin Brennan

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This is also to certify that this mail has been scanned for viruses.

Tá eolas sa teachtaireacht leictreonach seo (agus b'fhéidir sa chomhaid ceangailte leis) a d'fhéadfadh bheith príobháideach nó faoi rún. Is le h-aghaidh an duine/na ndaoine nó le h-aghaidh an aonáin atá ainmnithe thuas agus le h-aghaidh an duine/na ndaoine sin amháin atá an t-eolas. Murab ionann tusa agus an té a bhfuil an teachtaireacht ceaptha dó bíodh a fhios agat nach gceadaítear nochtadh, cóipeáil, scaipeadh nó úsáid an eolais agus/nó an chomhaid seo. Más trí earráid a fuair tú an teachtaireacht leictreonach seo cuir, más é do thoil é, an té ar sheol an teachtaireacht ar an eolas láithreach.

Deimhnítear leis seo freisin nár aimsíodh víreas sa phost seo tar éis a scanadh.

Record No 27

COASTAL ZONE MANAGEMENT DIVISION

SEA LICE MOINTORING AND CONTROL WORKING GROUP

DRAFT MEETING PAPER

November 2006

Purpose

The purpose of this paper is to provide an overview of issues associated with sea lice control from a CZMD perspective. It also contains, in the final section, a proposal for progressing the matter. Much of the material in the following paragraphs has been supplied by the Marine Institute.

Background

Monitoring of lice infestation levels on salmonid farms in Ireland was initiated in April/May 1991. This was in response to concerns that lice emanating from farmed salmonids might be implicated in the phenomenon of large numbers of sea trout returning to rivers in early summer in an emaciated state and with elevated lice numbers. Since April 1994, monitoring has been carried out in accordance with the recommendations of the Sea Trout Task Force and its successor body, the Sea Trout Management and Advisory Group. This involves the inspection and sampling of each year class of fish at all fish farm sites fourteen times per annum - twice per month during March, April and May and monthly for the remainder of the year except December-January. Only one inspection is carried out during this period.

This monitoring regime has effectively been adopted as one of a number of Monitoring Protocols to which all salmon farmers are required to adhere as part of the licensing regime. The inspections are carried out directly by the Marine Institute. This programme is applied at all marine finfish farms regardless of whether the licensee is subject to the terms of the Protocol or not.

Lice levels are determined from the sampling process and measured against target levels set out in the protocol or in licences. The Spring period (March to May) targets are now set at very rigorous levels of 0.3 to 0.5 egg bearing lice per fish. Outside of this a level of 2.0 egg bearing lice acts as the trigger for treatment. Where measurements at a farm exceed these target levels the M.I. issues a "Notice to Treat" to the licensee. Results are reported to farms by the M.I. within five working days of the inspection together with appropriate advice. Monthly reports are compiled for each site of mean numbers of egg bearing lice and total mobile lice of each species. These reports are circulated to the farms, the Department of Communications, Marine & Natural Resources, the Marine Institute, the Central Fisheries Board, the Regional Fisheries Boards and the Irish Salmon Growers Association. This ensures that real time information on the levels pertaining on farms is available to all interested parties. These reports are designed to give a clear, unambiguous measure of the infestation level at each site and to act as a basis for management decisions.

Purpose of Monitoring

The initial purpose of the monitoring in 1991 and 1992 was to obtain an objective assessment of infestation levels on farms and to investigate the nature of these infestations. The results of these investigations, first published in 1993, were used to develop a management strategy for effective sea lice control and subsequently to refine and further enhance the management strategy. The purpose of the national sea lice-monitoring plan since 1994 has been:

- To provide an objective measurement of infestation levels on farms
- To investigate the nature of the infestations
- To provide management information to drive implementation of the control and management strategies
- To facilitate further development and refinement of the control and management strategies.

Management Strategy

As a result of the experience gained over a number of years an integrated approach to sea lice control has been developed in Ireland. This management strategy was endorsed by the Sea Trout Task Force and subsequently, by the Sea Trout Management and Advisory Group. This management strategy, which formed the basis for Single Bay Management (SBM) Agreements, relies on five principal components:

- Separation of generations
- Annual fallowing of sites
- Early harvest of two sea-winter fish
- Targeted treatment regimes
- Agreed husbandry practices

Together, these components work to reduce the development of infestations and to ensure the most effective treatment of developing infestations. They minimise lice levels whilst controlling reliance on, and reducing use of, veterinary medicines. The separation of generations and annual fallowing prevent the vertical transmission of infestations from one generation to the next, thus retarding the development of infestations. The early harvest of two sea winter fish removes a potential reservoir of lice infestation and the agreed practices and targeted treatments enhance the efficacy of treatment regimes. One important aspect of targeted treatments is the carrying out of autumn / winter treatments to reduce lice burdens to as close to zero as practicable on all fish, which are to be over-wintered. This ensures zero / near zero egg bearing lice in spring. The agreed husbandry practices cover a range of related fish health, quality and environmental issues in addition to those specifically related to lice control.

Trigger Levels for Treatment

The setting of appropriate treatment triggers is an integral part of implementing a targeted treatment regime. Treatment triggers during the spring period are set close to zero in the range of from 0.3 to 0.5 egg bearing females per fish and are also informed by the numbers of mobile lice on the fish. Where numbers of mobile lice are high, treatments are triggered even in the absence of egg bearing females. Outside of the critical spring period, a level of 2.0 egg bearing lice acts as a trigger for treatments. This is only relaxed where fish are under harvest. Over the period since the initiation of SBM, treatment triggers have been progressively reduced from a starting point of 2.0 per fish during the spring period to the current levels which are the optimal sustainable at present. Triggered treatments are underpinned by follow up inspections

and, where necessary, by sanctions. Sanctions employed include, peer review under the SBM process, conditional fish movement orders and accelerated harvests.

In late winter and early spring sea water temperatures are at a minimum and development rates of lice are reduced. This has the effect of tending to synchronise the development of lice larvae. A strategic treatment at this time can break the cycle of infection.

Ovigerous female lice are those which produce the infective larvae and treatments are timed to remove adult females before they can release larvae. Setting the treatment trigger at 0.5 ovigerous lice per fish ensures that treatments are carried out when a maximum of half of the fish examined have any ovigerous lice. This is the optimum time to interrupt lice development. Later in the year generations of lice are not as synchronised and intervention, at a lice level of 0.5 ovigerous lice per fish, by way of treatment is generally not justified. A level of 2.0 ovigerous lice per fish has been shown to be a pragmatic level at which intervention by way of treatment is advisable. Levels of total mobile lice or juvenile lice are important in advising fish health professionals in developing a lice control strategy. However, they are not of themselves appropriate measures upon which to trigger mandatory treatments.

Co-ordinated Local Aquaculture Management Systems

The Single Bay Management approach has subsequently been developed further into Co-ordinated Local Aquaculture Management Systems or CLAMS. This initiative was launched by the Minister for the Marine and Natural Resources in November 1998 and expands the concept of SBM into a management plan for both finfish and shellfish aquaculture on a regional basis. It recognizes the importance of a stratified approach to lice control, and other aquaculture management issues, with appropriate plans and performance indicators being developed on a bay by bay basis.

Sampling Strategy

The Irish sampling strategy, which underpins the current monitoring programme, was developed through a consultation process with national and international experts in the field. It has been refined and modified as a result of the recommendations of the Sea Trout Working Group, the Sea Trout Task Force and the Sea Trout Management and Advisory Group. The resulting programme meets both the exacting scientific requirements of a national monitoring programme and the diverse concerns of sectoral interests, as expressed through the various Ministerial committees and through direct representations. The rationale of the current sampling strategy is to:

- Provide a robust and reliable objective measure of lice numbers on farmed fish
- Operate within a framework which is cost effective and capable of being carried out over the range of installations which are in use in offshore farming
- Take account of weather conditions, fish health issues, environmental effects and animal welfare considerations.

The Current Problem

Over the last three seasons there has been a problem with lice control at a number of diverse locations. A significant proportion of the problem falls into the category outlined above. The possible causes/contributory factors are outlined below and some suggestions for action are offered:

1. Lack of action by farm management
2. Poor farm management in carrying out lice control measures.
3. Husbandry problems in administering lice treatments.
4. Poor inclusion rates for in-feed treatments.
5. PD related issues (poor appetite and/or poor uptake of active from diet)
6. Reduced sensitivity in sea lice populations to available treatments.
7. Incomplete separation of generations leading to vertical transmission of lice.
8. Additional lice treatments required by low trigger levels in protocols.

While on-farm management issues cannot be ruled out in all cases, they do not constitute an adequate or reasonable explanation for the difficulties in achieving control of lice infestations experienced on many sites, which in the past have had very good records of lice control. In general there has been very good co-operation from farms in carrying out lice control measures. In particular all farms co-operated with the DCMNR/MI initiative to carry out strategic winter treatments during December 2004 & January/February 2005. All relevant stocks were treated and written confirmation was provided to the Marine Institute.

There has certainly been an issue with inclusion rates for in-feed treatments. The effects of Pancreas Disease on appetite are well known (& this has a direct effect on the up-take of in feed treatments) but there are other less well studied effects of the disease which may also impair the efficacy of in feed treatments. Taken together the above has undoubtedly had a significant impact on the efficacy of in feed lice treatments.

There is growing evidence, including a formal adverse reaction report, that some populations of lice may be exhibiting reduced sensitivity to lice treatments.

Health professionals have expressed concerns from time to time about additional treatments required to reduce lice levels, which were not having an adverse impact on the stock, to comply with trigger levels. This is especially a factor where fish health is already compromised due to other factors (e.g. PD, high temperatures etc). The need to carry out extra treatments is exacerbated where there is mixing of generations on the same or adjacent sites and/or integrated or strategic lice management is not the norm.

Solutions / Response Options

In seeking to address the current problems a number of approaches are required. In the short term it will be necessary to tackle the problem of severe infestations at certain sites, some of which may be experiencing reduced sensitivity to currently available medicines. In the short to medium term it will be necessary to review management practices to optimise lice control and to integrate it with overall health management. Three strategies are listed below which need to be addressed to ensure effective sea lice management on Irish salmon farms. Each of the strategies presents it's own particular challenges, however as a suite of responses they provide the best way forward in the current circumstances.

A. Emergency availability of a novel lice treatment

- For use on those sites where remedial action is urgently required.
- For use on sites where reduced sensitivity has been demonstrated or is suspected.

(addressed by way of special license for Alphamax)

B. Site management /Bay Management.

- Fallowing between generations
- Single Generation sites
- All in/all out bay by bay strategies in specific cases
- Flexible and/or novel approach to use of currently licensed sites, including the species to be cultured at those sites.

C. Integration of sea lice and health management protocols to include a bay management approach which is:-

- Defined by specific targets and goals.
- Goal led.
- Flexible and enforceable.

part also

Recommendations

The above suite of responses/solutions represents the best possibility of making progress on this issue. The response likely to yield the best medium and long term results is B above – i.e. concentration on site/bay management issues.

There appears to be an emerging consensus that “break-out” space is necessary to facilitate fallowing and separation of generations. This gives rise to a number of challenges including the following:

- limited availability of space for new sites;
- access to existing licensed areas for fallowing purposes;
- environmental and other licensing constraints; and
- potential objections from a variety of interested parties.