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Variation in sea lice infestation on farmed salmonids in  
Ireland.

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#### Abstract

There is considerable inter and intra specific variation in lice infestation of farmed salmonids on the west coast of Ireland. The prevalence of *L. salmonis* on Atlantic salmon (*Salmo salar*) is significantly higher than on rainbow trout (*Oncorhynchus mykiss*). The prevalence of *Caligus elongatus* is similar on both salmonid species. Healthy salmon were found to have significantly lower numbers of *L. salmonis* than sick fish or runts from the same cage. The implications of the reported variations in infestation are discussed.

#### Introduction

Salmonid cultivation commenced in Ireland in 1972. Salmon and rainbow trout farms are now located along the west coast of Ireland from Lough Swilly in the north of County Donegal to Bantry Bay in County Cork. Infestations with the salmon louse, *Lepeophtheirus salmonis* (Kroyer) are a problem for salmon farming throughout Europe. *L. salmonis* feeds on the mucus, skin and blood of salmonids (Kabata 1974, Brandal et al 1976). It is seldom found on other species (Kabata 1979) though it has been recorded on saithe associated with salmon farms in Scotland (Bruno and Stone 1990) and Ireland, where ovigerous females have also been recorded (pers. obs.). Infestations on Irish farms have led to dermal erosion with the associated problems of osmotic stress and secondary infection (Jackson and Minchin 1993).

This paper examines the variation in infestation of farmed salmonids, held at the same or adjacent sites, with *L. salmonis*.

## Methods

Samples of thirty fish were examined. The fish were removed from the cage by net and placed directly into a bin of anaesthetic (Benzocaine). No more than four fish were anaesthetised at one time. The fish were then examined for all free moving stages of sea lice. These were removed using forceps and placed in tubes containing 70% ethanol, one tube per fish. salmon were returned to their cages following sampling. Once sampling was complete, the bin of anaesthetic was emptied through a sieve and all lice remaining in it were removed and preserved in 70% ethanol. The numbers of lice remaining in the bin were used to allow calculation of the gross mean number of lice per fish.

The gross mean was calculated by treating the lice from the bin as a sample from an extra fish and dividing the resulting totals by the actual number of fish as follows:

$$\text{Gross Mean} = \frac{\text{sum of lice on 30 fish} + \text{lice in bin}}{30}$$

Samples of sick fish/runts were selected by net on the basis of poor swimming, dark colour, size and slim body.

Data was analysed using the t-test (paired two-sample for means).

## Results

During 1992 and 1993 sampling was carried out at a number of locations on adjacent farms rearing Atlantic salmon (*Salmo salar*) and rainbow trout (*Oncorhynchus mykiss*) respectively. It was found that in all cases the rainbow trout had a much lower prevalence of *L. salmonis* (Table 1.). These differences were found to be highly significant ( $p=0.01$ ).

The prevalence of *Caligus elongatus* Nordmann on salmon and rainbow trout in south connemara was found to be similar on both species in April (Table 2.) and higher on rainbow trout in May and June. There was no clear difference between prevalence of *C. elongatus* on salmon and rainbow trout.

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Date	Ovigerous females	Total No.
April '93	1.16 (0.06)	9.16 (2.36)
May '93	2.77 (0.06)	15.0 (1.56)
June '93	1.93 (0.03)	11.63 (0.76)
<b>a. South Connemara</b>		
May '92	4.07 (0.0)	9.33 (1.26)
April '93	1.23 (0.0)	14.5 (1.8)
May '93	4.13 (0.03)	12.13 (0.56)
June '93	1.36 (0.1)	4.66 (0.5)
<b>b. Clew Bay</b>		
Sept '92	5.67 (0.53)	22.4 (9.4)
<b>c. Inver Bay</b>		

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Table 1. Comparison of *L. salmonis* prevalence on one sea-winter salmon and rainbow trout (in brackets).

The prevalence of *L. salmonis* on healthy salmon was found to be significantly lower ( $p=0.01$ ) than on sick fish or runts (Table 3.). This position could occasionally be reversed however immediately after a treatment with dichlorvos. This appeared to occur where a treatment was only partially successful.

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Date	Ovigerous Females	Total No.
April '93	0.53 (0.3)	0.96 (0.7)
May '93	0.0 (0.56)	0.1 (0.66)
June '93	0.0 (0.25)	0.0 (0.53)

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Table 2. Gross Means of *C. elongatus* on salmon and rainbow trout in South Connemara.

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	Ovigerous Females	Total No.
Healthy Salmon	5.67	22.4
Sick/Runts	18.8	43.6

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Table 3. Prevalence of *L. salmonis* on healthy salmon and sick individuals/runts.

### Discussion

The highly significant difference in the prevalence of *L. salmonis* on cage reared Atlantic salmon and rainbow trout has major practical implications for the fish farmer. Rainbow trout do not require expensive and stressful lice treatments. This in turn means that they are not open to the negative side effects of lice treatments under summer conditions, such as outbreaks of stress related diseases.

The underlying reasons for the low prevalence of *L. salmonis* on rainbow trout are not clear. It is possible that the strong shoaling of rainbow trout and their extremely vigorous feeding may dislodge the adult lice. Rainbow trout have a much thicker mucus layer than Atlantic salmon and this may also assist in the physical

dislodging of the lice. It is also possible that rainbow trout are able to mount an efficient host response to infestation by *L. salmonis* copepodids. Such a response has been demonstrated in coho salmon (*Oncorhynchus kisutch*) by Johnson and Albright (1993).

The much higher prevalence of *L. salmonis* on runts and sick fish poses certain problems for the successful management of lice levels in farmed salmon. These fish can act as reservoirs of ovigerous females, from which infestation of the healthy fish on the farm can occur. It is therefore essential that any lice management plan should seek to either, effectively treat these fish or, involve their removal by culling.

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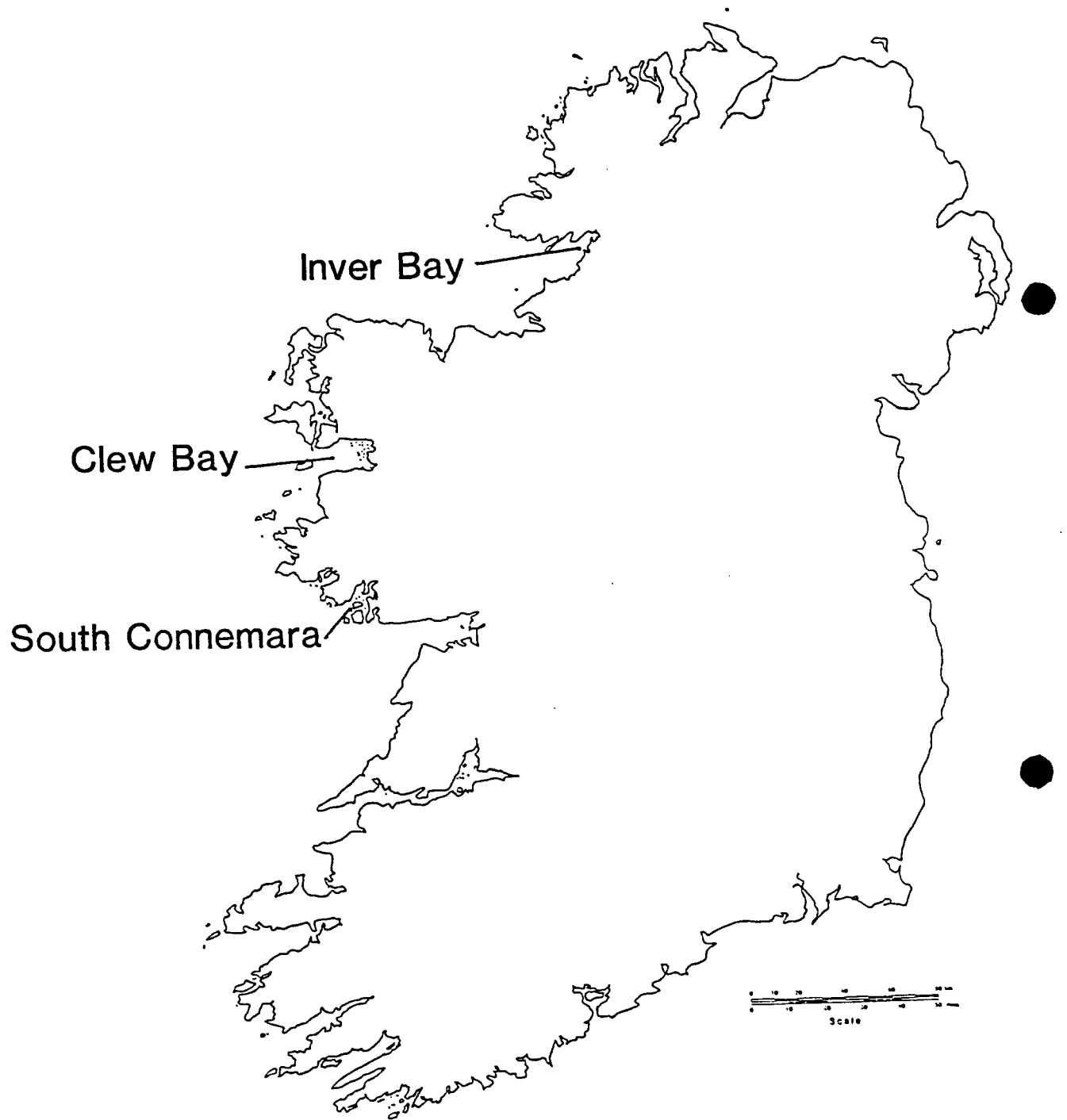


Figure 1. Study Areas.