ParaFishControl

Economic modelling of parasite control in Mediterranean cage farming

ParaFishControl Workshop

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Challenge and Impact

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➢ Challenge

- *S. chrysophrii*, *E. leei* and *C. oestroides* infections reduce production in Mediterranean cage farming.
- Information on effectiveness of control strategies incomplete and fragmented.
- Very little reliable information on economics of controlling these parasites.

➢ Impact

- Farmers need to adopt trial and error approach to controlling parasites.
- Difficult to assess effectiveness of multiple control measures in combination.
- Uncertainty about economic effectiveness of control measures applied.

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Our approach and our team

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Brief description of the proposed solution

- Develop online tool that allows farmers to assess the most economically appropriate control strategy for their own farm.
- *Must be freely available, easily accessible and simple to use.*

Team involved in the development

- Data used in model calculations derived from Parafish expert consultations and Epidemiological studies (ANDRO, AQUARK, CSIC, IOR, SKRET, UNIBO, UNIUD, CEFAS)
- Model developed by CEFAS (Nicola McPherson).

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Economic model user interface 1

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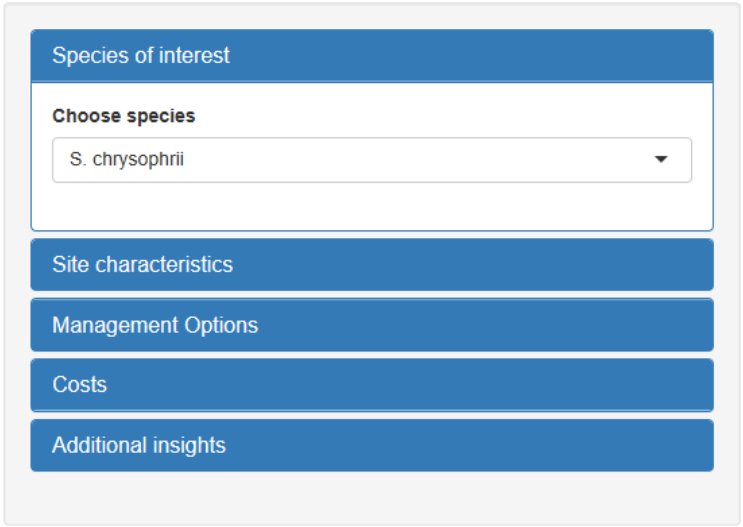
ParaFishControl farm level tool



You have selected *S. chrysophrii*

S. chrysophrii ia a monogenean which causes mortality of Gilthead sea bream (Sparus aurata).

The values selected in this section will be used to estimate the mortalities and delays that could result from a *S. chrysophrii* disease outbreak.

Click on link to open web version of model (https://openscience.cefas.co.uk/parafish_economic/)

Select parasite of interest from *Enteromyxum leei, Sparicotyle chrysophrii* or *Ceratothoa oestroides*

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Economic model user interface 2

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Species of interest

Site characteristics

Infected wild fish population within 2km

- (•) Low density
- ( ) High density

Number of hatcheries supplying the farm

- (•) Less than 3
- ( ) 3 or more

Nearest infected net cage (metres)

- ( ) 5
- ( ) 200
- ( ) 500
- (•) 2000

Number of farms in area

- ( ) 1
- ( ) 2-3
- ( ) 4-5
- (•) 5+

Number of companies farming in area

- (•) 1
- ( ) 2-3
- ( ) 4-5
- ( ) 5+

Management Options

Costs

Additional insights

Site Characteristics

This section provides information on site level factors which may influence the presence or intensity of an infection on your farm. The data from this section has been derived from an expert consultation, and a survey of 39 sites conducted as part of the ParaFishControl project.

The coloured headings below indicate the risk status for the factors selected. Expand for more information.

Density of infected wild fish

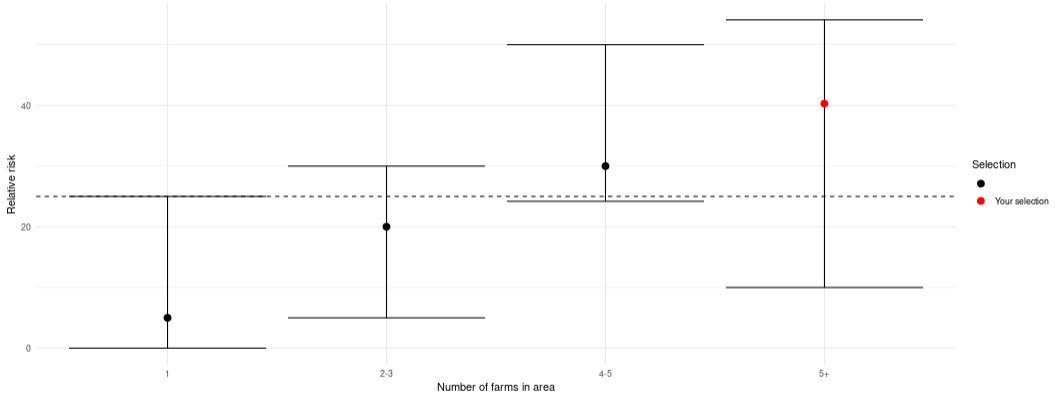
Number of hatcheries

Nearest infected net cage

Number of farms in area

The intensity of infection increases with the number of farms in the area. A green rating for this factor indicates that the perceived risk to your farm is lower than average.

Your farm has a red rating.



Number of companies farming in area

Enter details about the farm. Information about the associated risk is presented for each field.

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Economic model user interface 3

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Species of interest

Site characteristics

Management Options

Please enter the closest match for your current on site practices then click the button below

How frequently are mortalities removed?

Every 5+ days

Is Year Class Separation used?

No

Is fallowing used?

Yes

How frequently are nets changed?

Quarterly

How frequently are nets cleaned?

More than every 2 months

Calculate disease risk

Costs

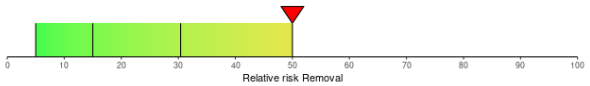
Additional insights

Risk factors associated with E. leei disease

The risks associated with the management factors you have selected are shown below. The risk values were obtained during an expert consultation (cite) and provide information on the relative likelihood that your site would develop clinical disease, if an infection occurred. Compare your selections with the other options available to consider how you might reduce the risk of a disease outbreak on your farm.

2 of your choices are rated Red, click for details

Removal



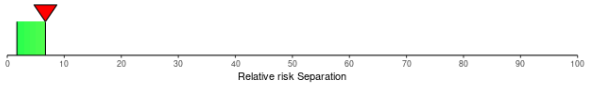
Sites which answer "Every 5+ days" have the highest risk of developing clinical disease, they are 45% more likely to experience clinical disease than farms which answer "Daily".

Upgrade?

If you choose an alternative you will be able to assess cost of the change in the Costs section

- (•) No change
- ( ) Daily
- ( ) Every 2 days
- ( ) Every 3-5 days

Separation



Sites which answer "No" have the highest risk of developing clinical disease, they are 5% more likely to experience clinical disease than farms which answer "Yes".

Upgrade?

If you choose an alternative you will be able to assess cost of the change in the Costs section

- (•) No change
- ( ) Yes

1 of your choices are rated Amber, click for details

2 of your choices are rated Green, click for details

Enter current management practices. Information about risk is presented for each choice, and choices can be changed

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Economic model user interface 4

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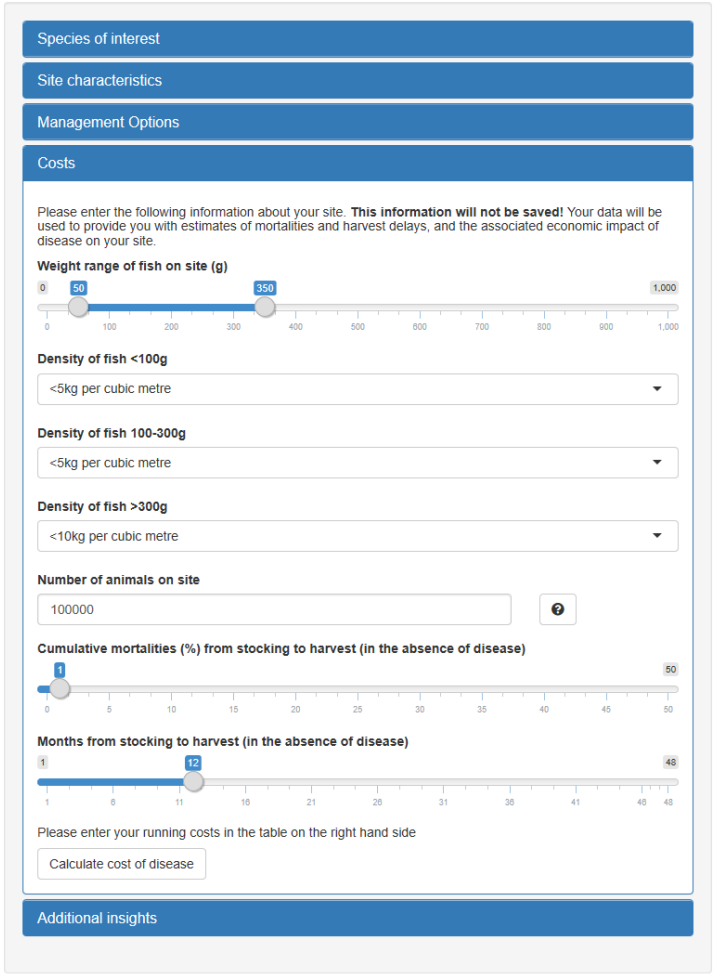

Impact of *S. chrysophrii* clinical disease

Mortalities and harvest delays

Based on the weights and stocking densities of animals on your site, the estimated delay that would result from S. chrysophrii clinical disease would be 0.5 months. Cumulative mortalities from stocking to harvest would be 5%.

Economic impact

Enter your running costs

Please estimate the current costs of running your farm in the `Current` column.

Cost	Current	With_upgrades
Variable costs per month	500	700
Fixed costs per month	1000	1000
Animal purchase per 1000 animals	200	200
Animal value at harvest	2	2

Calculate cost of disease

Current and projected cost results

The table shows your current running costs, the predicted costs if disease were present, and the projected costs of applying the management upgrades above.

Name	Current	With S. chrysophrii disease	With upgrades (no disease)
Production time (Months)	12.00	12.50	12.00
Fixed costs	12000.00	12500.00	12000.00
Variable costs	6000.00	6250.00	8400.00
Animal purchase	20000.00	20000.00	20000.00
Mortalities (Count)	1000.00	5950.00	1000.00
Total revenue	198000.00	188100.00	198000.00
Total costs	38000.00	38750.00	40400.00
Profit/loss (+/-)	160000.00	149350.00	157600.00

Enter site specific information on costs. Model will then calculate profit/loss for the farm with and without management upgrades.

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Expected benefits for the industry

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- Gives farmers the opportunity to assess economics of different pest control approaches and takes account of the characteristics of the individual farm.
- In some cases the model outputs identify economically effective control measures which could make the farm more profitable.
- Actual benefits to industry difficult to assess and will depend largely on uptake by farmers, so to encourage its use;
    - It is quick and easy to use (15-30 minutes per parasite species)
    - Completely confidential (none of the data entered by farmers is recorded or stored)

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Current status and next steps

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- Final version of the model has been released and is available at https://openscience.cefas.co.uk/parafish_economic/
- Supporting information available at http://data.cefas.co.uk/#/View/20141
- Will be hosted on CEFAS servers for at least 5 years.
- Should not require any maintenance.
- Ongoing promotion and dissemination via Parafish knowledge transfer team.

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Conclusions

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- These online economic models are a new approach
- Underlying calculation based largely on Parafish project outputs (epidemiological studies, expert consultations).
- It is hoped they will be widely used, giving farmers a quick and easy way to assess the economics of management strategies for three important parasites of Mediterranean cage aquaculture.
- Will be made freely available online, both the user interface and the underlying code.
- In the future, this approach could potentially be used for a range of aquatic diseases in different culture situations (subject to robust data to underpin model calculations)

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Thank You

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For any enquiries about this model please contact:

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