Azamethiphos Dispersion Modelling
Greshornish, Loch Snizort
CAR/L/1002890

Mowi Scotland Limited

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EXECUTIVE SUMMARY

Dispersion model simulations have been performed to assess whether bath treatments at Greshornish salmon farm will comply with pertinent environmental quality standards. A realistic treatment regime, with 2 pen treatments per day, 3 hours apart, was simulated. Each pen required 297 g of azamethiphos (the active ingredient in Salmosan, Salmosan Vet and Azure) for treatment, resulting in a daily release of 594 g and a total discharge over 6 days of 3.56 kg. Simulations were performed separately for modelled neap and spring tides, and the sensitivity of the results to key model parameters was tested.

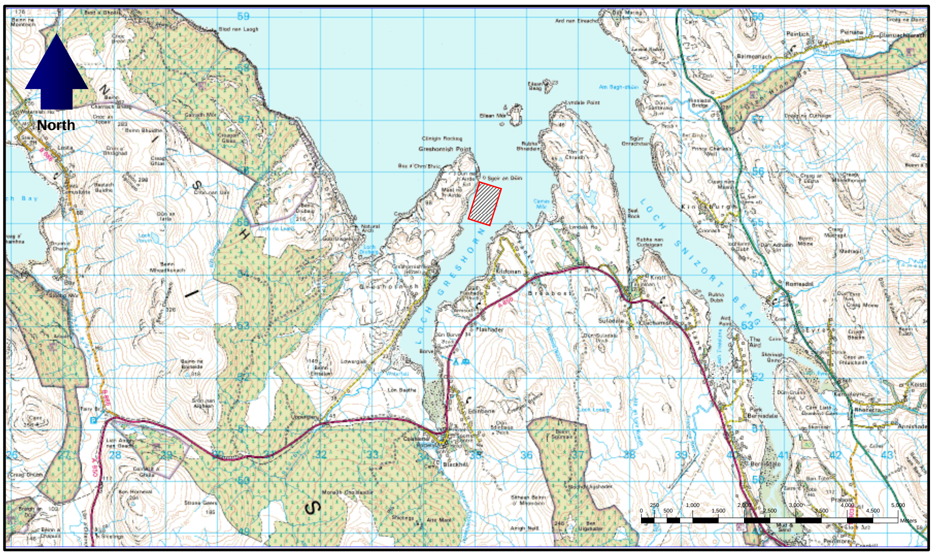
The model results (Table 1) confirmed that the treatment scenario proposed, with a daily release of no more than 594 g of azamethiphos should comfortably comply with the EQS. The peak concentration during the baseline simulation 72 hours after the final treatment was less than 0.1 µg/L, the maximum allowable concentration, and the area where concentrations exceeded the EQS of 0.04 µg/L was substantially less than the allowable 0.5 km^2. The baseline simulation presented here was designed to be relatively conservative.

Table 1. Summary of Results

Site details	
Site Name:	Greshornish
Site Location:	Isle of Skye
Peak Biomass (T):	2,195
Pen details	
Number of Pens:	12
Pen Circumference (m):	100
Working Depth (m):	9.3
Pen Group Configuration:	2 x 6
Azamethiphos consent to be applied for	
Recommended 3-hour (kg):	0.297
Recommended 24-hour (kg):	0.594

1 INTRODUCTION

This report has been prepared by Mowi Scotland Ltd. to meet the requirements of the Scottish Environment Protection Agency (SEPA) for an application to increase the current consent of topical sealice veterinary medicines at the marine salmon farm Greshornish, Isle of Skye (Figure 1). The current Azamethiphos consent for Greshornish is 208.4 g (3 hours) and 285.5 g (24 hours). The report presents results from coupled hydrodynamic and particle tracking modelling to describe the dispersion of bath treatments to determine EQS-compliant quantities for the current site biomass and equipment. The modelling procedure follows as far as possible guidance presented by SEPA in December 2023 (SEPA, 2023).



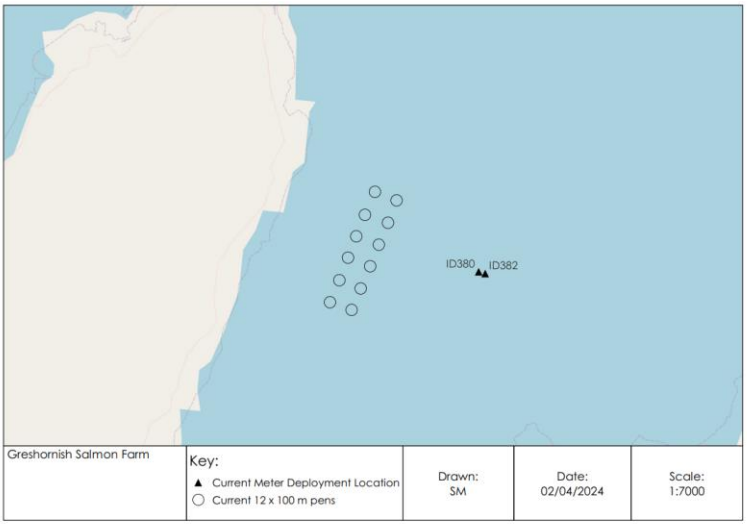


*Figure 1. Location of the salmon farm at Greshornish on Skye (top), and the locations of the ADCP deployments (▲) relative to the pen (**o**) positions (bottom).*

1.1 Site Details

The site is situated in Loch Greshornish, in the North-West of Skye (Figure 1). Details of the hydrographic data are provided in Table 2. The receiving water is defined as Loch Snizort.

Table 2. Hydrographic Information

Hydrographic Data	ID380	ID382
Site:	Greshornish	Greshornish
Current Meter Position:	135571, 855450	135589, 855445
Depth of Deployment Position (m):	25.43	25.52
Surface Bin Centre Height Above Bed (m):	19.71	20.72
Middle Bin Centre Height Above Bed (m):	6.71	6.72
Bottom Bin Centre Height Above Bed (m):	3.71	3.72
Duration of Record (days):	87	45
Start of Record:	25/05/2021	27/08/2021
End of Record:	20/08/2021	12/10/2021
Current Meter Averaging Interval (min):	20	20
Magnetic Correction to Grid North:	0.44506	0.4848

2. MODEL DETAILS

2.1 Model Domain and Boundary Conditions

The unstructured mesh used in the model was adapted from the East Coast of Lewis and Harris (ECLH) sub-model mesh of the Scottish Shelf Model (SSM; Marine Scotland, 2016) (Figure 2). Model resolution was enhanced in the Loch Snizort region particularly around the Mowi site at Greshornish (Figure 3). The spatial resolution of the model varied from 20 m in some inshore waters and round the farm pens to 5 km along the open boundary. The model consists of 93,211 nodes and 178,897 triangular elements. Model bathymetry (Figure 4) was also taken from the ECLH sub-model (SSM; Marine Scotland, 2016).

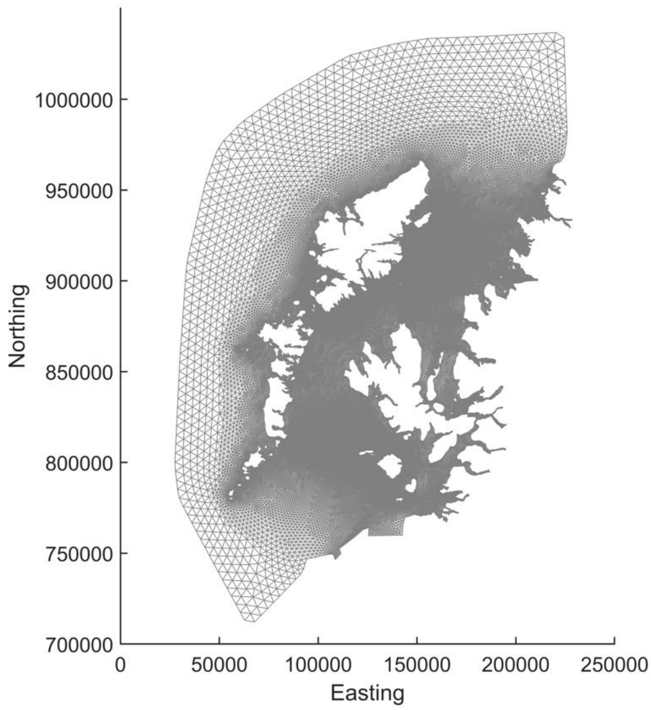


Figure 2. The mesh and domain of the modelling study, adapted from the ECLH sub-model.

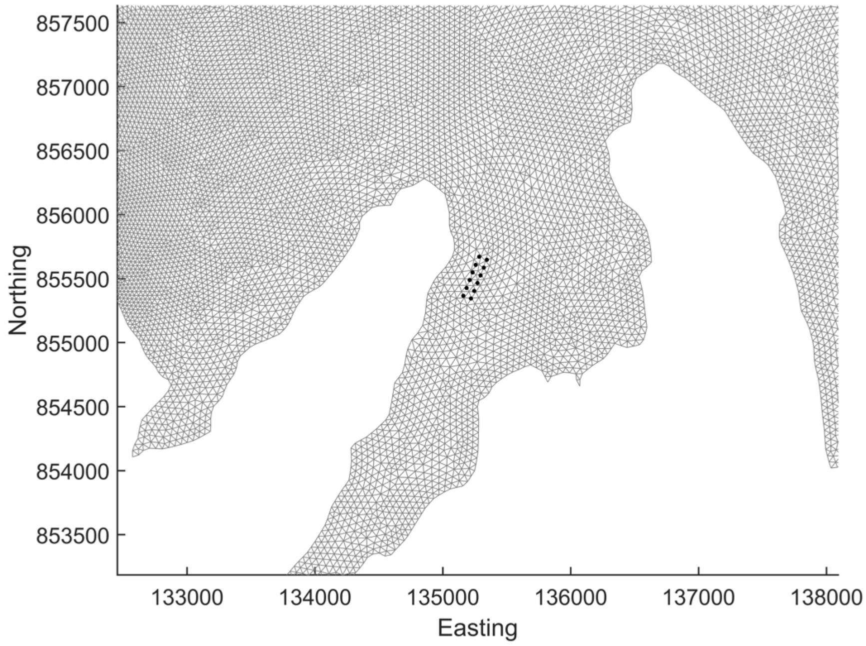


Figure 3. The unstructured mesh around the Greshornish site in the modified model grid, with the pen locations indicated (○).

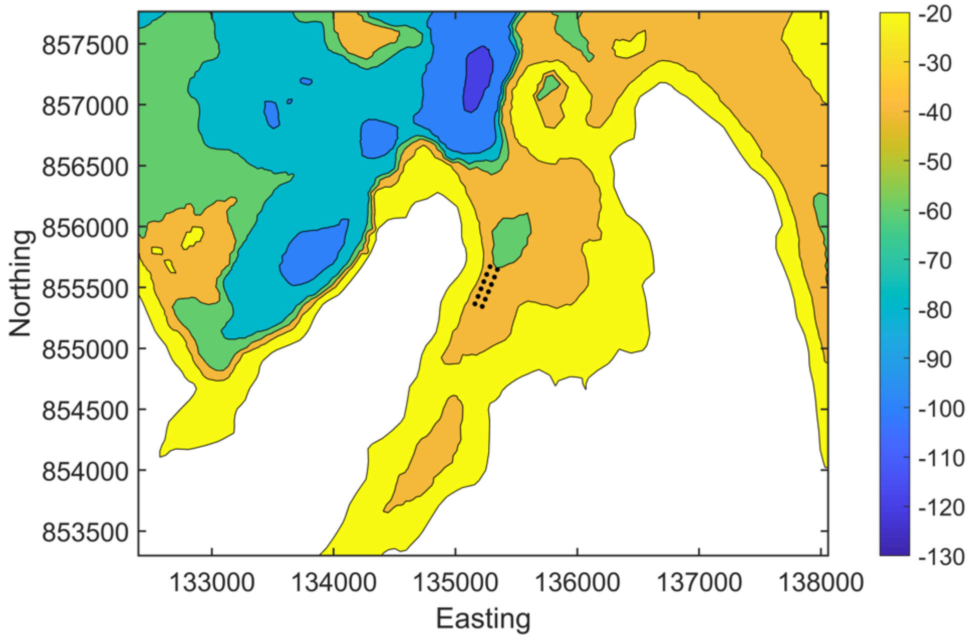


Figure 4. Model water depths (m) around the Greshornish salmon farm from the modified model. The pen locations indicated (●).

The model was forced at the outer boundaries by 8 tidal constituents (M_2, S_2, N_2, K_2, O_1, K_1, P_1, Q_1) which were derived from tidal analysis (Pawlowicz et al., 2002) of the sea surface elevations at the closest nodes from the Scottish Shelf Model climatology (Marine Scotland, 2016). Spatially- and temporally-varying wind speed and direction data were taken from the

ERA5 global reanalysis dataset (ECMWF, 2021) for the required simulation periods. Details of the hydrodynamic modelling that underpins the dispersion model are given in Mowi (2024).

2.2 Medicine Dispersion Modelling

The medicine dispersion modelling, performed using the UnPTRACK model (Gillibrand, 2022), simulates the dispersion of patches of medicine discharged from pens following treatment using tarpaulins. The UnPTRACK model uses the same unstructured mesh as the hydrodynamic model, and reads the flow fields directly from the hydrodynamic model output files. Therefore, no spatial or temporal interpolation of the current fields is required, although current velocities are interpolated to particle locations within UnPTRACK. The treatment scenario assumed 2 pens can be treated per day.

To simulate the worst-case scenario, the dispersion modelling was initially conducted using flow fields over a period of 10 days, centred on a small neap tidal range taken from the hydrodynamic model simulations. This is assumed to be the least dispersive set of ambient conditions, when medicine dispersion is least likely to meet the required EQS. Later simulations tested dispersion during spring tides.

A treatment depth of 3.1 m was chosen as a realistic net depth during application of the medicine for the 100 m pens. The initial mass released per pen was calculated from the reduced pen volume and a treatment concentration of ~120 µg L^{-1}, with a total mass of 3.56 kg of azamethiphos released during treatment (12 pens). Numerical particles were released from random positions within a pen radius of the centre and within the 0 – 3.1 m depth range. The simulations used *~1M* numerical particles in total, each particle representing 10 mg of azamethiphos.

Each simulation ran for a total of 220 hours (9.2 days). This covered the treatment period (123 hours), a dispersion period to the EQS assessment 72 hours after the final treatment, and an extra 25 hours to check for chance concentration peaks. At every hour of the simulation, particle locations and properties (including the decaying mass) were stored and subsequently concentrations calculated. Concentrations were calculated on a grid of 50m x 50m squares using a depth range of 0 – 5 m. Using a regular grid for calculating concentrations means that a known, constant, accuracy and precision of the calculated values applies across the grid.

From the calculated concentration fields, time series of two metrics were constructed for the whole simulation:

(i) The maximum concentration (µg/L) anywhere on the regular grid; and
(ii) The area (km^2) where the EQS was exceeded.

These results were used to assess whether the EQS or MAC was breached after the allotted period (72 hours after the final treatment).

Sensitivity analyses were conducted to assess the effects of:

(i) Horizontal diffusion coefficient, K_H
(ii) Vertical diffusion coefficient, K_V
(iii) Time of release

The dispersion simulations were performed separately over two separate neap tides to confirm the dispersion during the weakest tides, and a spring tide (Figure 5 and Figure 6).

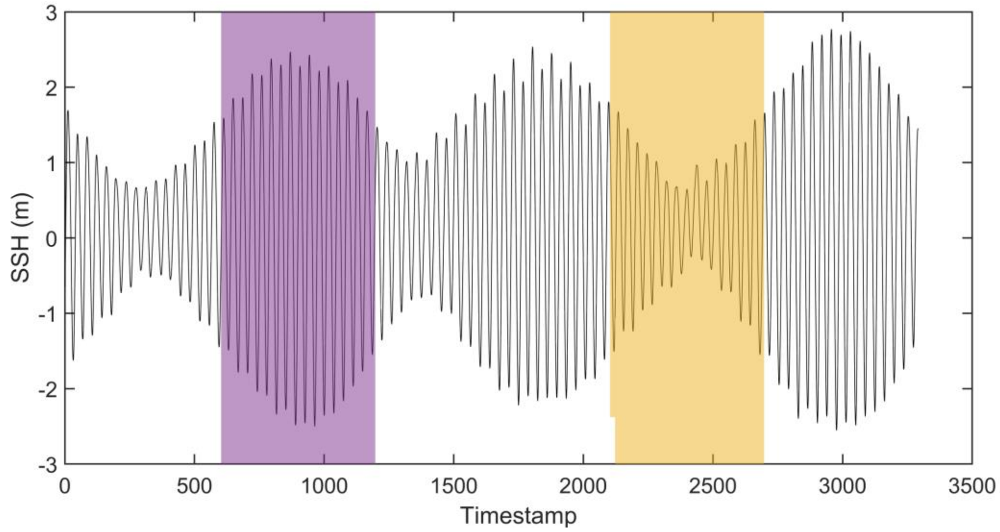


Figure 5. Sea surface height (SSH) at Greshornish from 27th August –12th October 2021 (ID382). Dispersion simulations were performed over neap tides (yellow, start day 25th September 2021) and spring tides (purple, start day 4th September 2021)

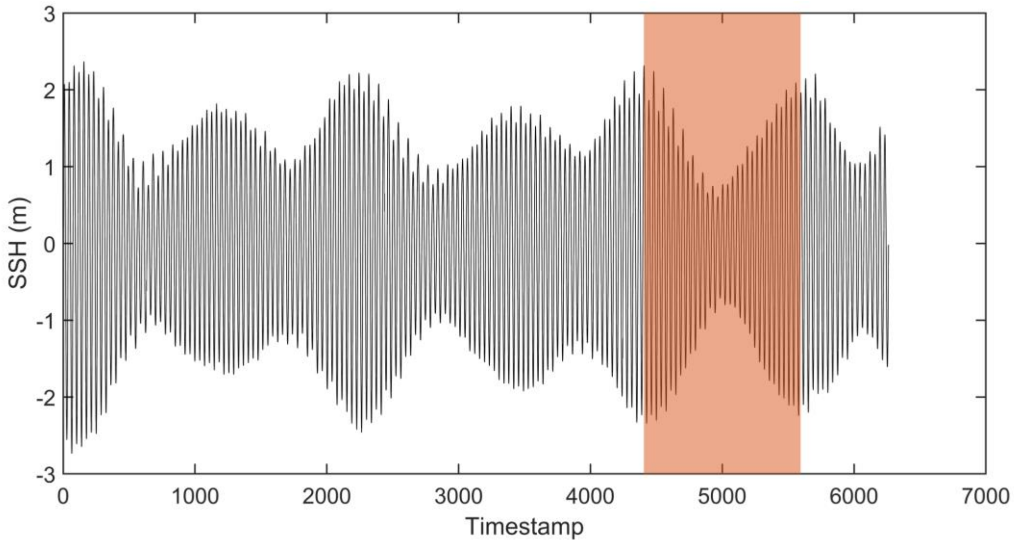


Figure 6. Sea surface height (SSH) at Greshornish from 25th May to 20th August 2021 (ID380). Dispersion simulations were performed over neap tides (orange, start day 28th July 2021)

2.3 Medicine Dispersion Simulations

The pen locations and details of the medicine source are listed in Table 3. The time of release is relative to the start of the neap or spring period highlighted in Figure 5 and Figure 6.

All simulations used the release schedule and quantities outlined in Table 3. In Runs 2 – 7 (Table 4), the release schedule was set back or forward by a number of hours to investigate the effect of tidal state at the time of release on the results. Results for these simulations are still presented in terms of time relative to the first release.

Table 3. Details of the treatment release simulated by the dispersion model. The release time is relative to the start of the neap or spring period highlighted in Figure 5.

Pen	Easting	Northing	Net Depth (m)	Treatment Mass (kg)	Release Time (hours)
1	135284	855670	3.1	0.297	0
2	135344	855646	3.1	0.297	3
3	135257	855606	3.1	0.297	24
4	135320	855585	3.1	0.297	27
5	135233	855547	3.1	0.297	48
6	135295	855524	3.1	0.297	51
7	135210	855488	3.1	0.297	72
8	135271	855464	3.1	0.297	75
9	135245	855403	3.1	0.297	96
10	135160	855365	3.1	0.297	99
11	135220	855344	3.1	0.297	120
12	135186	855426	3.1	0.297	123

Table 4. Dispersion model simulation details for the treatment of the 12 pens at Greshornish.

Set	Run No.	T 1/2 (h)	Kh	Kv	Start Time
Neap Tides, Start day = 29 (25th September 2021, ID382)					
Baseline	1	134.4	0.1	0.001	00:00
1	2	134.4	0.1	0.001	00:00 -6h
	3	134.4	0.1	0.001	00:00 -4h
	4	134.4	0.1	0.001	00:00 -2h
	5	134.4	0.1	0.001	00:00 +2h
	6	134.4	0.1	0.001	00:00 +4h
	7	134.4	0.1	0.001	00:00 +6h
2	8	134.4	0.2	0.001	00:00
	9	134.4	0.05	0.001	00:00
3	10	134.4	0.1	0.0025	00:00
	11	134.4	0.1	0.005	00:00
Spring Tides, Start day = 8 (1st September 2021, ID382)					
4	12	134.4	0.1	0.001	00:00
5	13	134.4	0.2	0.001	00:00
	14	134.4	0.05	0.001	00:00
6	15	134.4	0.1	0.0025	00:00
	16	134.4	0.1	0.005	00:00
Neap Tides, Start day = 63 (28th January 2021, ID380)					
7	17	134.4	0.1	0.001	00:00
8	18	134.4	0.2	0.001	00:00
	19	134.4	0.05	0.001	00:00
9	20	134.4	0.1	0.0025	00:00
	21	134.4	0.1	0.005	00:00

2.4 3-hour EQS

In addition to the main simulations described above to assess compliance with the 72-hour EQS, simulations were also performed to assess compliance with the 3-hour EQS (SEPA, 2023). The 3-hour EQS is applied as a mixing zone EQS, whereby the area where concentrations exceed the EQS of 250 ng L^{-1} after 3 hours must be less than the 3-hour mixing zone. The 3-hour mixing zone is primarily a function of mean near-surface current speed at the site, and has traditionally been calculated by the BathAuto Excel spreadsheet. For calculation of the mixing zone, a mean surface current speed of 4.3 cm s^{-1} was used from ID380 (Table 5).

For the 3-hour EQS assessment, the baseline runs for neap and spring tides (Runs 1 and 14 in Table 4) were repeated, but with results output every 20 minutes and the runs were truncated, lasting only until 3 hours after the final treatment. The area of the medicine patch for each individual treatment was then calculated over the 3-hour period following its release, and the area exceeding 0.25 μg $L^{-}1$ determined. Concentrations from these simulations were calculated on a 10m x 10m grid (rather than a 50m x 50m grid) in order to more accurately calculate the smaller areas of medicine over the initial 3-hour period.

Table 5. Parameter values used in the calculation of the 3-hour mixing zone ellipse area and the resulting area

Parameter	Value
Mean current speed (ms^{-1})	0.043
Area of 100m pen (km^2)	0.0073863
Distance from shore (km)	0.65
Mean water depth (m)	25.43
Treatment Depth (m)	5
Mixing zone ellipse area (km^2)	**0.0682792**

2.5 Interactions with Special Features

Two types of near-by PMF features of interest have been identified (SEPA, 2024) which are thought to be at potential risk from medicine influence and hence must be considered when modelling the treatment releases from Greshornish. Table 6 shows details of the features of interest, and the locations are indicated in Figure 7.

Predicted concentrations of azamethiphos at the PMF locations during the simulation periods were extracted from the model results. These calculations were made using a 5 m thick layer immediately above the seabed, since both types of the special features are benthic habitats.

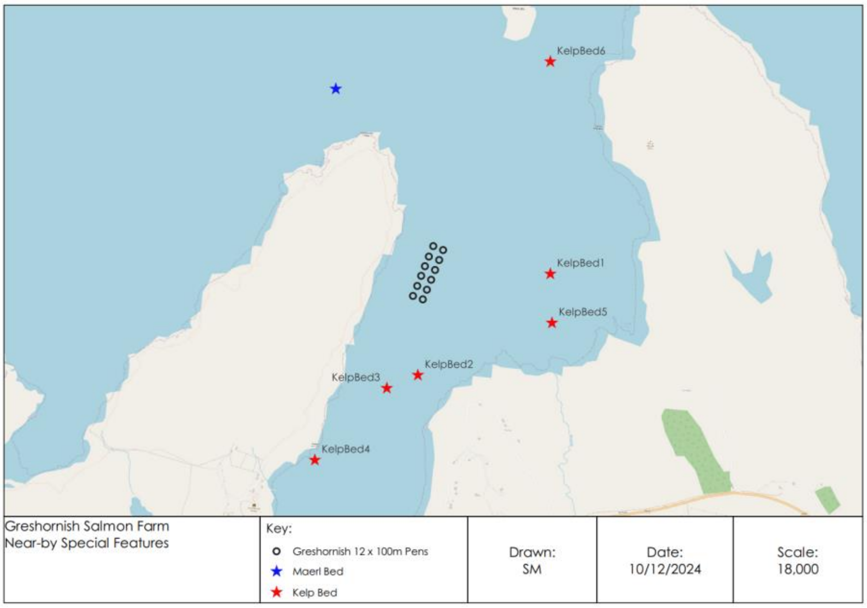


Figure 7. Identified special features near the Greshornish salmon farm.

Table 6. Details of identified special features

Feature Name	Feature Type	Reason for Identification
Maerl beds	PMF	At risk from bath influence
Kelp beds	PMF	At risk from bath influence

3 RESULTS

3.1 Dispersion During Neap Tides, September 2021 (ID382)

A standard treatment of twelve 100 m pens, with a reduced net depth of 3.1 m and assuming 2 pens can be treated per day at a treatment concentration of ~120 µg/L, resulted in a treatment mass per pen of azamethiphos of 297 g, a daily (24-h) release of 594 g and a total treatment release of 3.57 kg over 123 hours. The dispersion of the medicine during and following treatment from Run001 (Table 4) is illustrated in Figure 8. After 24 hours, as the third treatment on day 2 was discharged, discrete patches of medicine are evident from the first two treatment releases from the first day. The maximum concentration at this time is roughly 120 µg/L, due to the release of the third treatment. After 72 hours, as the seventh treatment is discharged, discrete patches of medicine from the previous treatment releases are still evident, but the patches of medicine have rapidly dispersed and are already down to concentrations of the same order as the EQS (0.04 µg/L). The maximum concentration at this time was again around 120 µg/L, due to the release of the seventh treatment.

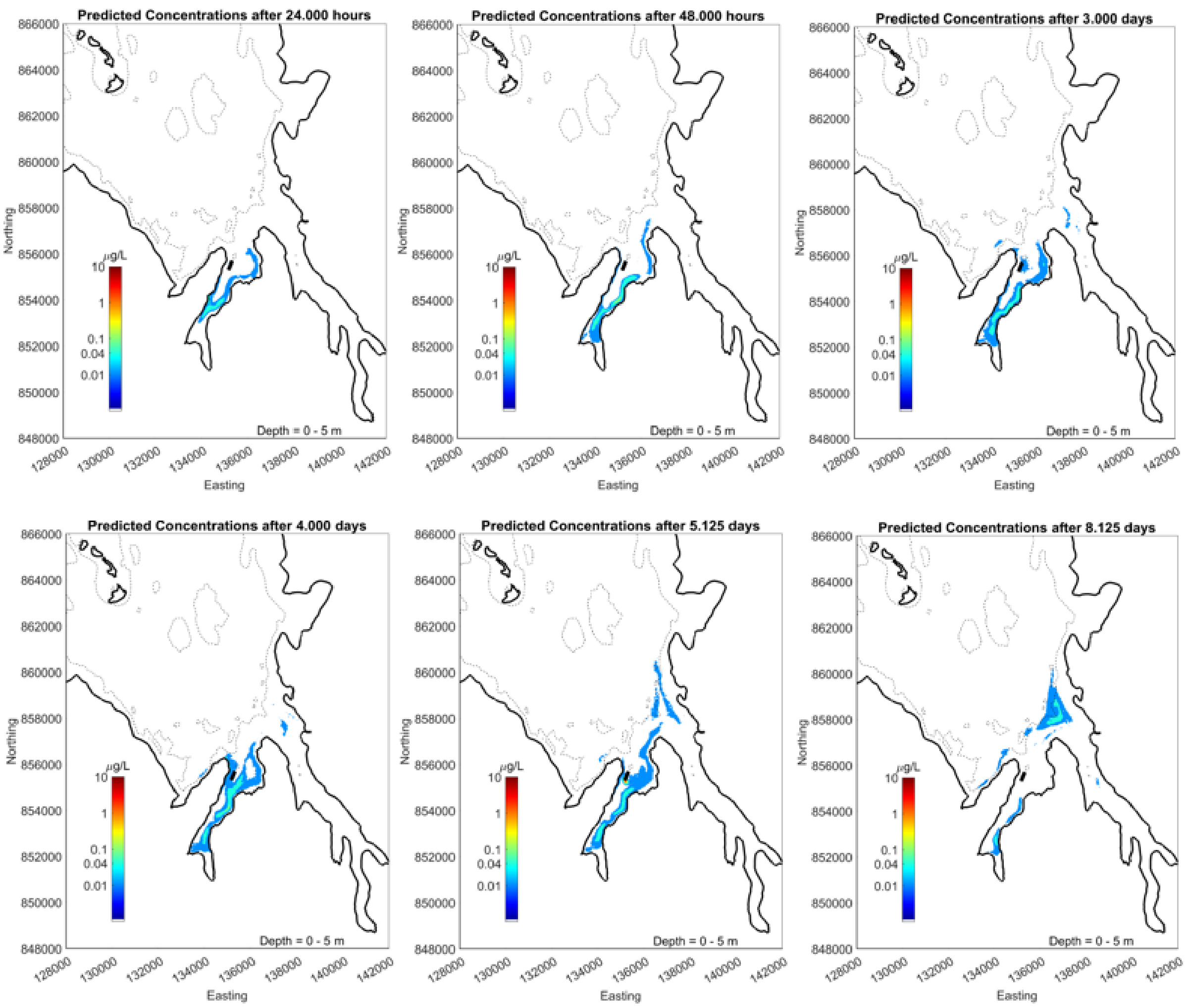


Figure 8. Predicted concentration fields for a dispersion simulation at neap tides after 24 hours (top left), 48 hours (top middle), 72 hours (top right), 96 hours (bottom left), 123 hours (bottom middle) and 195 hours (bottom right).

The treatment schedule completed after 123 hours (5.125 days). At this stage, the medicine released on earlier days has already dispersed to Loch Snizort main basin. It is noticeable that dispersion of the medicine does not happen in a gradual “diffusive” manner, but is largely driven by eddies and horizontal shear in the spatially-varying velocity field, which stretches and distorts the medicine patches and enhances dispersion. Following the final treatment at 123 hours, the treatment patches were rapidly dispersed and concentrations rapidly fell away below the EQS. Remnants of medicine are seen but at concentrations below the MAC.

The time series of maximum concentration from this simulation is shown in Figure 9 (blue). The 12 peaks in concentration of ~120 µg/L following each treatment event over the first 5 days are evident. Following the final treatment after 123 hours, the maximum concentration fell steadily away (Figure 9). A default half-life of 134.4 hours (5.5 days) was used. The maximum concentration seventy-two hours after the final treatment (time = 195 hours) was well below 0.1 µg/L, the maximum allowable concentration (MAC).

The area where the EQS of 0.04 µg/L was exceeded peaked at about 0.6 km^2 following the final treatment, but had fallen well below the 0.5 km^2 threshold immediately after; by 72 hours after the final treatment, the exceeded area was close to zero (Figure 8 and Figure 9).

These results indicate that, with a horizontal diffusion coefficient of 0.1 $m^2\ s^{-1}$, and a medicine half-life of 134.4 hours, the environmental quality standards are comfortably achieved. In the following sections, the sensitivity of the model results to the medicine half-life, diffusion coefficients and tidal state are examined.

3.2 Sensitivity to Diffusion Coefficients

The model results were tested for sensitivity to the horizontal and vertical diffusion coefficients used. The horizontal diffusion coefficient used for the standard runs was K_H = 0.1 $m^2\ s^{-1}$. Simulations were also performed with higher and lower values of K_H, specifically K_H = 0.2 $m^2\ s^{-1}$ and K_H = 0.05 $m^2\ s^{-1}$ (Table 4). The time series of maximum concentration and area exceeding the EQS are shown in Figure 9. The time series shows that K_H values of 0.1 and 0.2 do not exceed the MAC after 195 hours (72 hours after the final treatment). The sensitivity run with K_H = 0.05 shows a slight breech of the MAC after 195 hours, but this value is known to be highly conservative. The area limit of 0.5 km^2 was also comfortably met in all cases.

Similarly, sensitivity to the vertical diffusion coefficient, K_V, was tested (Figure 10). The model results are not particularly sensitive to the vertical diffusion rate, but increased vertical diffusion, likely in the presence of wind and/or waves, led to slightly smaller areas where the EQS was exceeded.

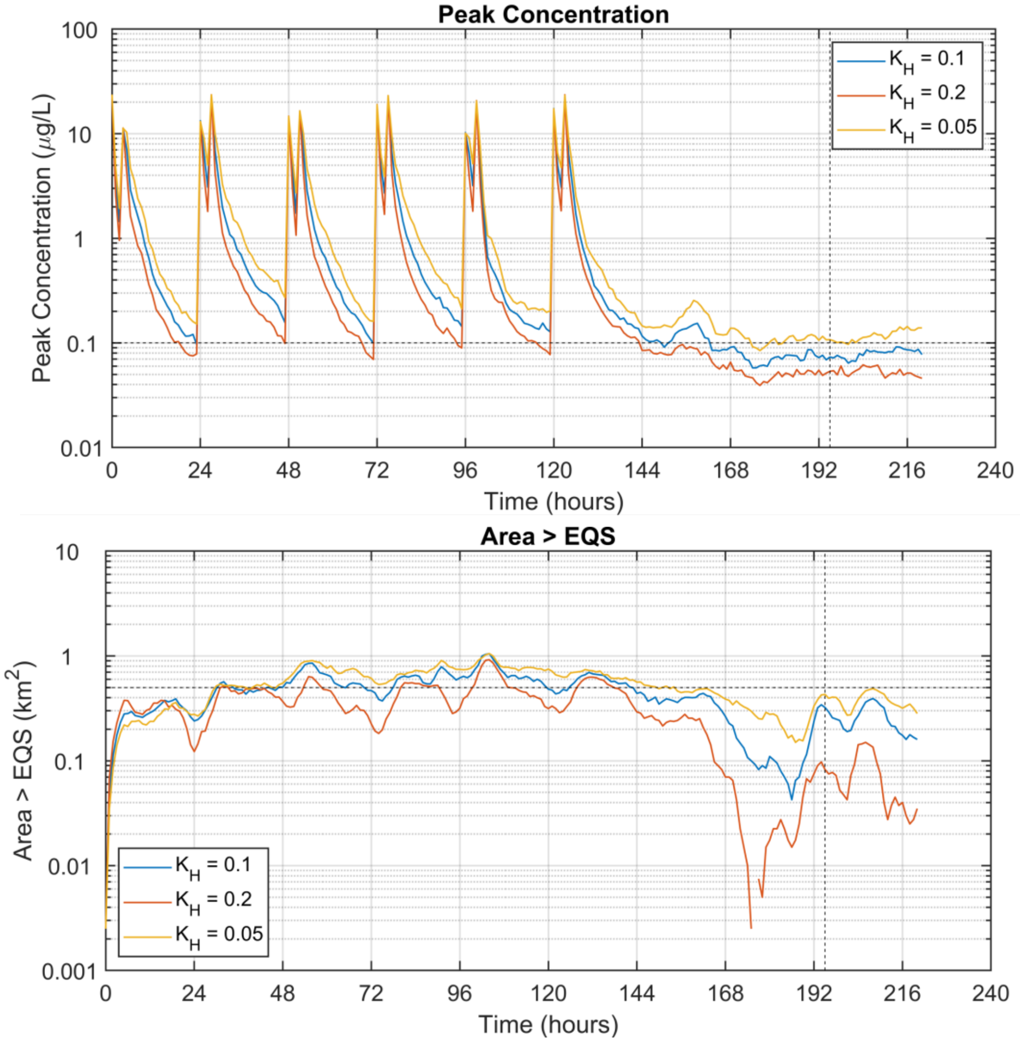


Figure 9. Time series of maximum concentration (top) and area exceeding the EQS (bottom) from the second set of model runs (Table 4). The model was run during neap tide with varying horizontal diffusion coefficient K_H (m^2 s^{-1}). The MAC and area limit 72 hours after the final treatment (Time = 195 h) of 0.1 µg/L and 0.5 km^2 are indicated by the horizontal dashed lines.

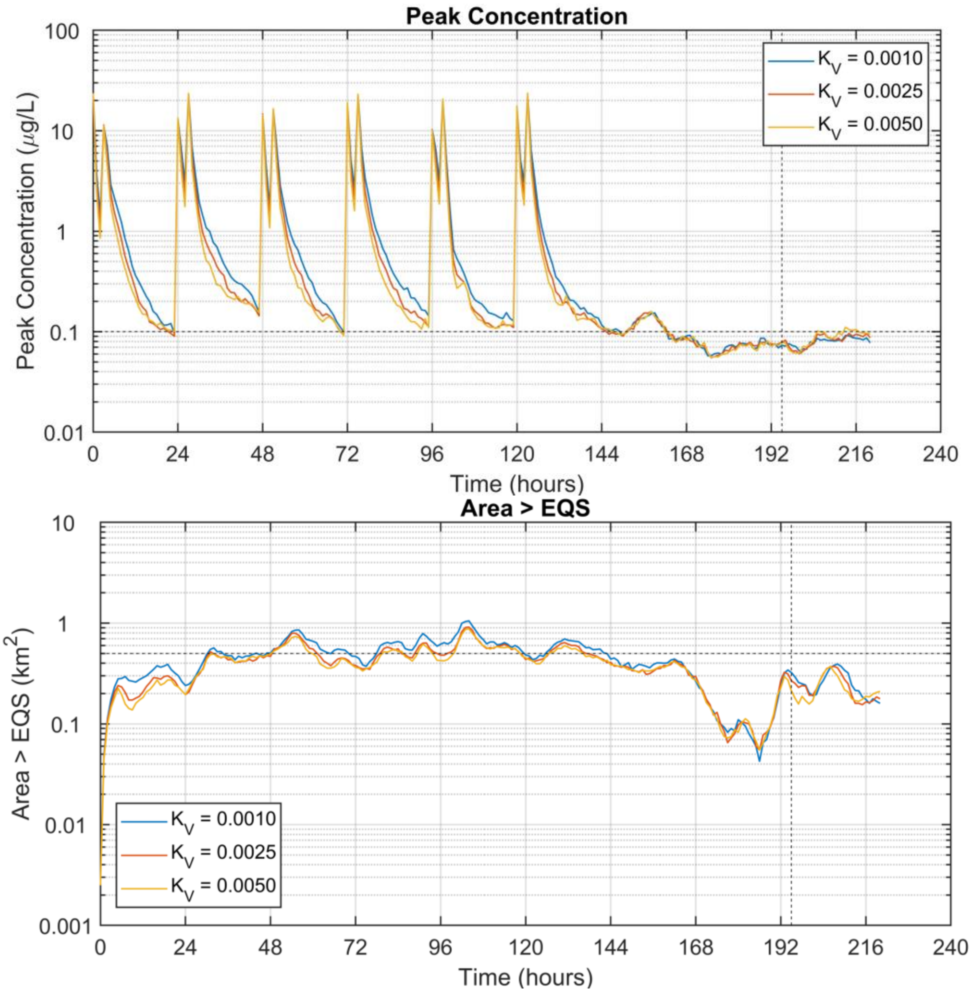


Figure 10. Time series of maximum concentration (top) and area exceeding the EQS (bottom) from the third set of model runs (Table 4). The model was run during neap tides with varying vertical diffusion coefficient K_V ($m^2 s^{-1}$). The MAC and area limit 72 hours after the final treatment (Time = 195 h) of 0.1 µg/L and 0.5 km^2 are indicated by the horizontal dashed lines.

3.3 Sensitivity to Release Time

The baseline simulation was repeated with the time of the releases varied by up to ±6 hours, the purpose being to assess the influence, if any, of the state of the tide on subsequent dispersion. A half-life of 134.4 hours was used in these runs which is thought to still be conservative.

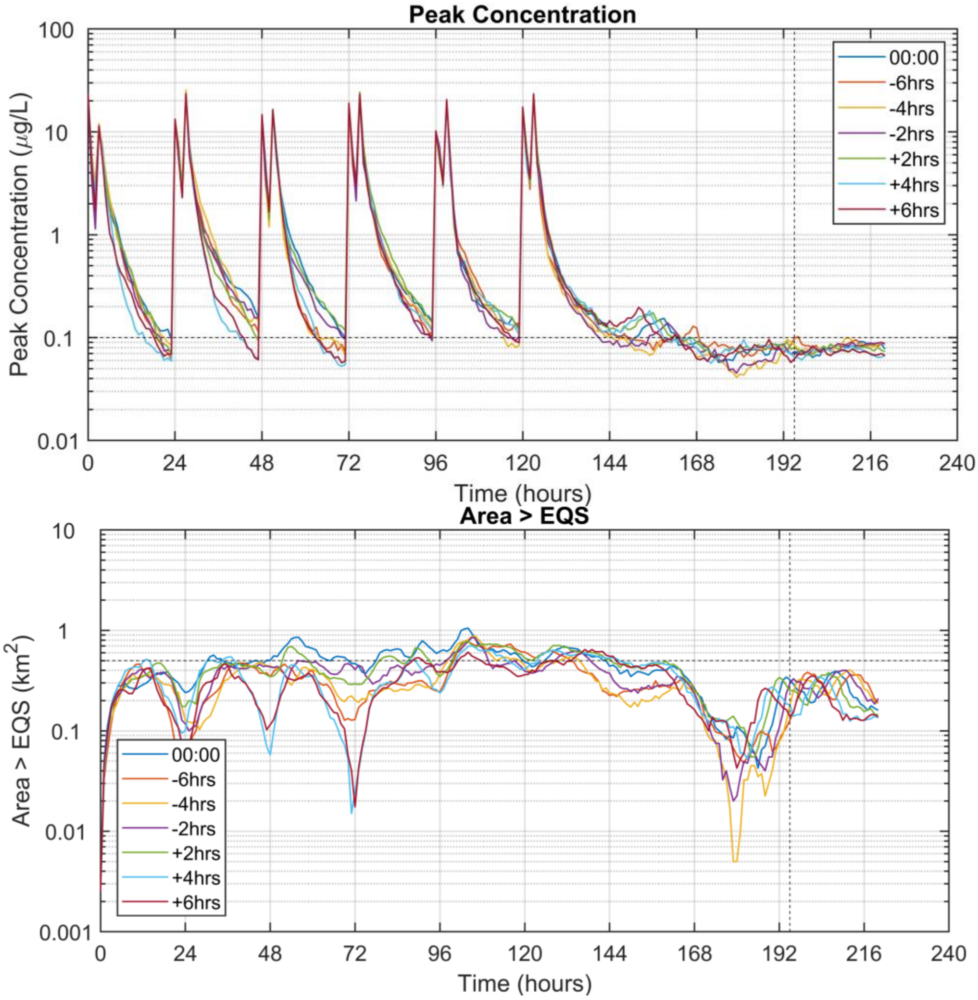


Figure 11. Time series of maximum concentration (top) and area exceeding the EQS (bottom) from the first set of model runs (Table 4). The model was run during neap tides with varying release times, relative to the baseline (Start = 0 h). The MAC and area limit 72 hours after the final treatment (Time = 195 h) of 0.1 µg/L and 0.5 km² are indicated by the horizontal dashed lines.

3.4 Dispersion during Spring Tides, September 2021 (ID382)

Dispersion simulations were carried out during modelled spring tides in September 2021 (Figure 5), repeating the main set carried out for neap tides (Table 4). The same treatment scenario of 2 treatments per day was simulated, with each treatment using 297 g of Azamethiphos. For all horizontal and vertical diffusion coefficients simulated, both the MAC and area EQS were achieved (Figure 12).

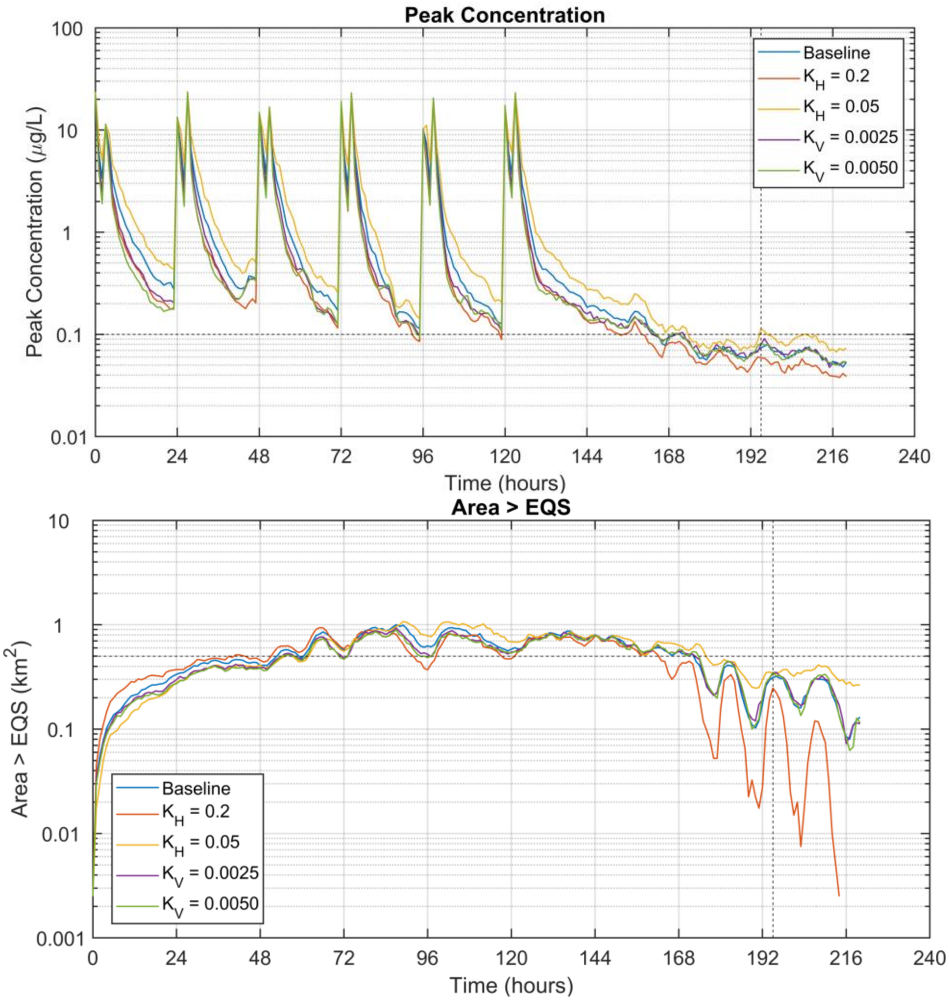


Figure 12. Time series of maximum concentration (top) and the area where concentrations exceeded the EQS (bottom) from the fourth, fifth and sixth set of model runs (Table 4). The model was run at spring tides with varying horizontal diffusion coefficient K_H ($m^2 s^{-2}$) and vertical diffusion coefficient K_V ($m^2 s^{-2}$). The MAC and area limit 72 hours after the final treatment (Time = 195 h) of 0.1 µg/L and 0.5 km^2 are indicated by the horizontal dashed lines.

3.5 Dispersion During Neap Tides, July 2021 (ID382)

A further set of dispersion simulations during modelled neap tides in July 2021 were carried out (Figure 5), repeating the main set carried out for neap tides in September 2021 (Table 4). The same treatment scenario of 2 treatments per day was simulated, with each treatment using 297 g of Azamethiphos. For all horizontal and vertical diffusion coefficients simulated, both the MAC and area EQS were comfortably achieved. These simulations demonstrate again that the modelled treatment regime will comfortably meet the EQS criteria.

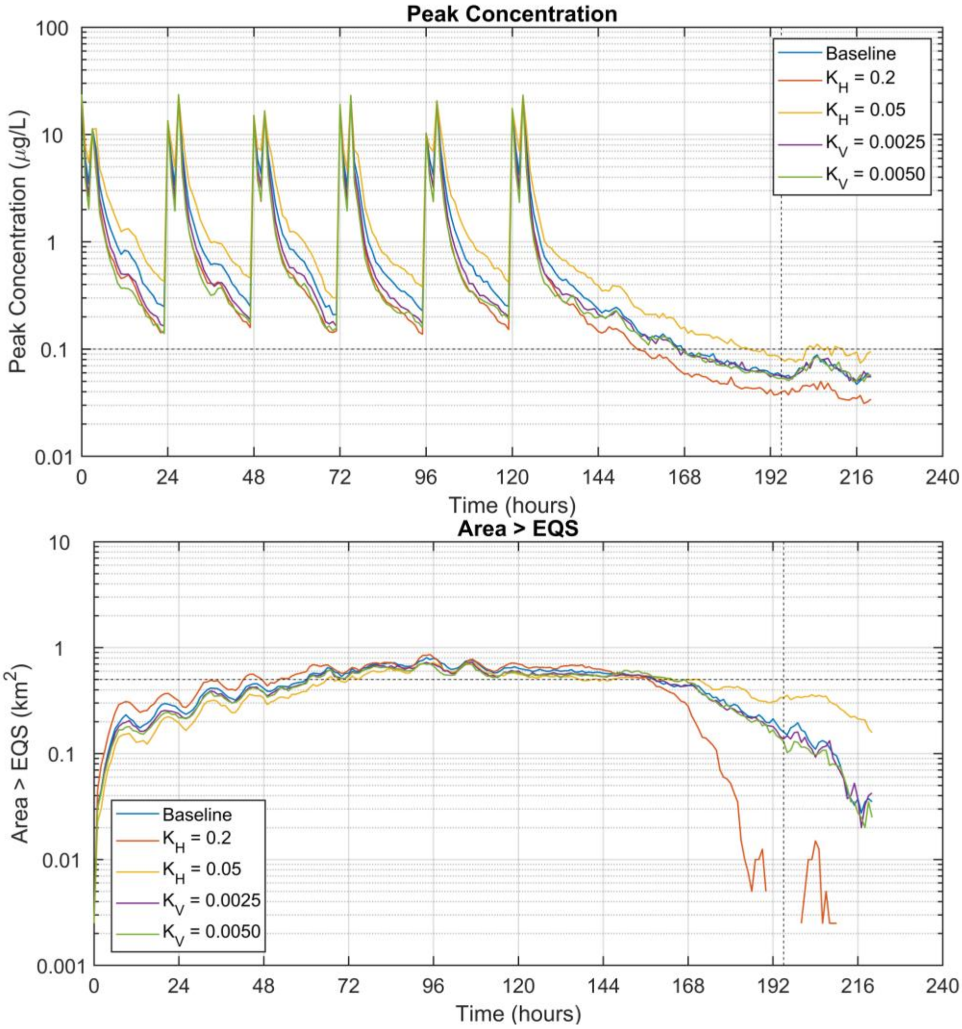


Figure 13. Time series of maximum concentration (top) and the area where concentrations exceeded the EQS (bottom) from the seventh, eighth and nineth set of model runs (Table 4). The model was run at neap tides from July 2021 with varying horizontal diffusion coefficient K_H ($m^2 s^{-2}$) and vertical diffusion coefficient K_V ($m^2 s^{-2}$). The MAC and area limit 72 hours after the final treatment (Time = 195 h) of 0.1 g/L and 0.5 km^2 are indicated by the horizontal dashed lines.

3.6 3-Hour EQS

The 3-hour mixing zone is primarily a function of mean near-surface current speed at the site, and has traditionally been calculated by the BathAuto Excel spreadsheet. For calculation of the mixing zone, a mean surface current speed of 4.33 cm s^{-1} was used from ID380 (Table 1) which was thought to be a representative value for the surface 0 – 5 m layer at Greshornish. The parameter values used in the calculation of the 3-hour mixing zone ellipse area are shown in Table 5.

The time series of the areas where the 3-hour EQS of 250 µg/L is exceeded for a single selected pen treatment at neap tide (first release on 25th September 2021) are shown in Figure 14. The single pen treatment selected was the 6th release which is closest to the centre of the neap tide and hence is discharged during what is thought to be the least dispersive conditions.

The area exceeding the EQS was less than the allowable mixing zone (0.0682792 km^2) after 3 hours.

For spring tide releases (first release on 4th September 2021), the area where concentrations exceeded the 3-hour EQS also complied with the allowable area (Figure 14). This demonstrates that the discharge quantity of 297 g of Azamethiphos from each of the twelve 100 m pens at Greshornish should not breach the 3-hour Environmental Quality Standard.

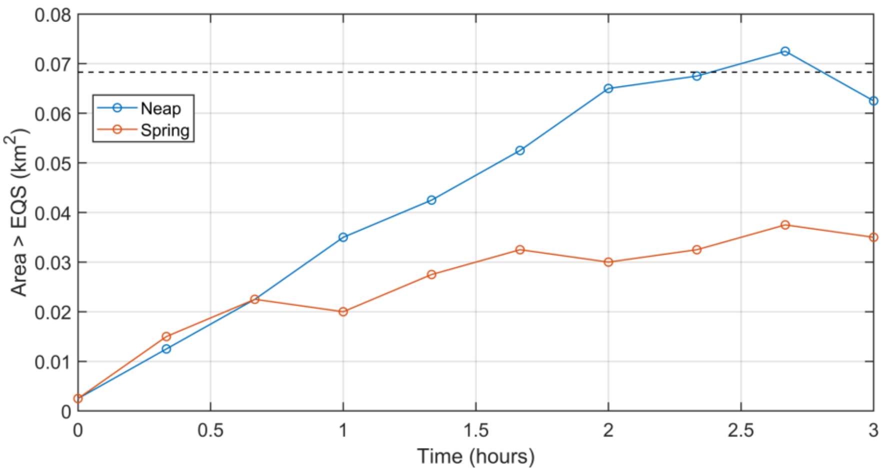


Figure 14. Time series of the area exceeding the 3-hour EQS for the sixth (middle) pen treatment during the 3 hours following release at neap and spring tide. The 3-hour mixing zone area is indicated (---).

3.7 Interactions with Special Features

Figure 15 shows the hourly peak concentrations at each of the six identified Kelp Bed locations (SEPA, 2024) for a 5 m thick layer above the seabed. The concentrations are minimal throughout at both neap and spring tide and, at the peak, are still well below the MAC (0.25 µg/L).

Figure 16 shows the hourly peak concentrations at an identified near-by Maerl Bed location (SEPA, 2024). Over neap tides, the concentrations are very minimal with a maximum peak concentration of 0.031 µg/L. During the spring tide, there is a similar story, with concentrations well below the MAC, a peak concentration of 0.0455 is shown at 59 hours.

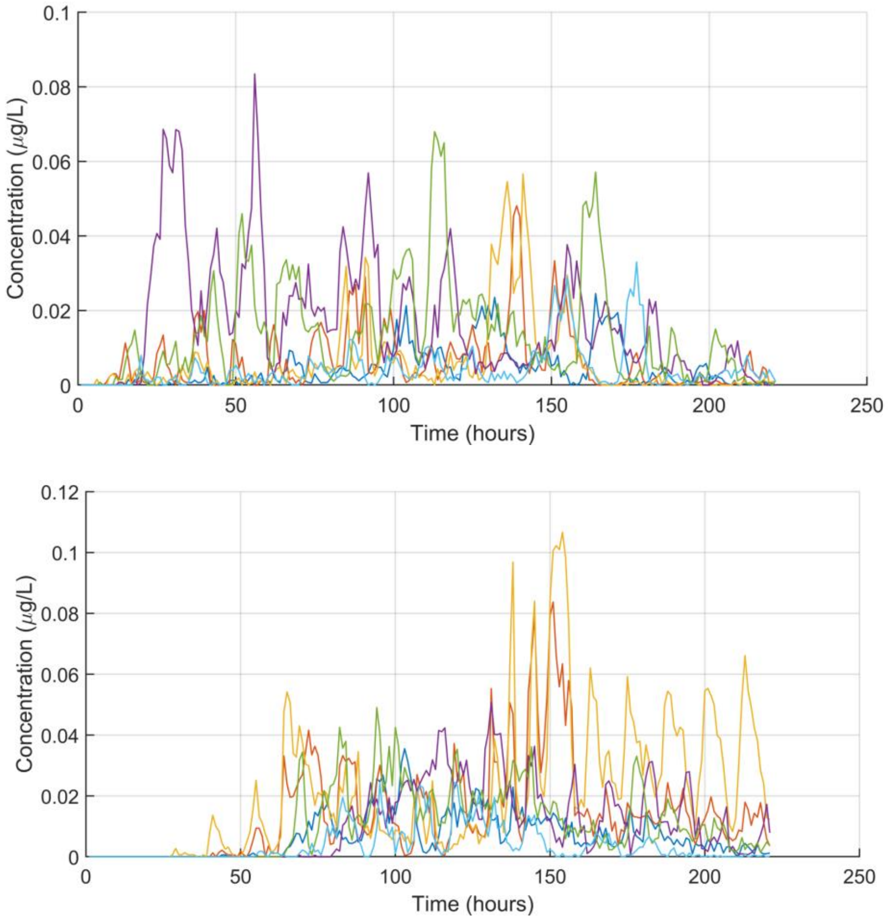


Figure 15. Peak concentrations at six Kelp Bed PMF locations over neap (top) and spring (bottom) tides

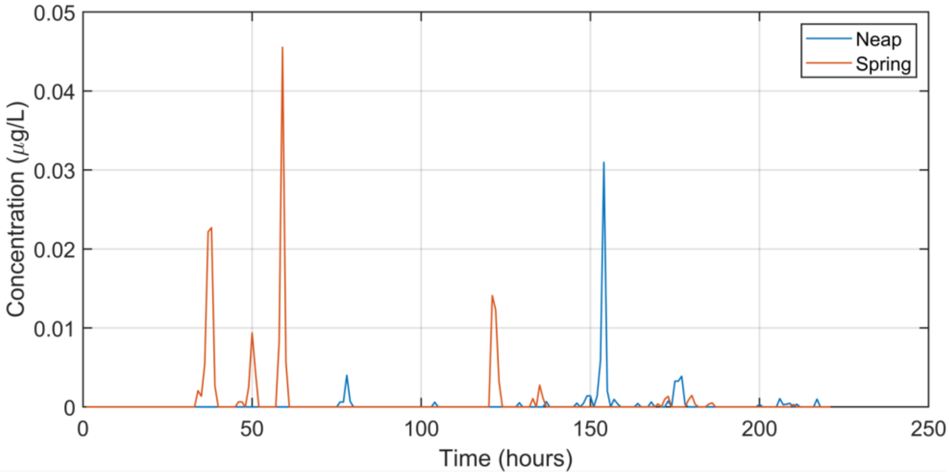


Figure 16. Peak concentrations at an identified Maerl Bed PMF location over neap (blue) and spring (red) tides

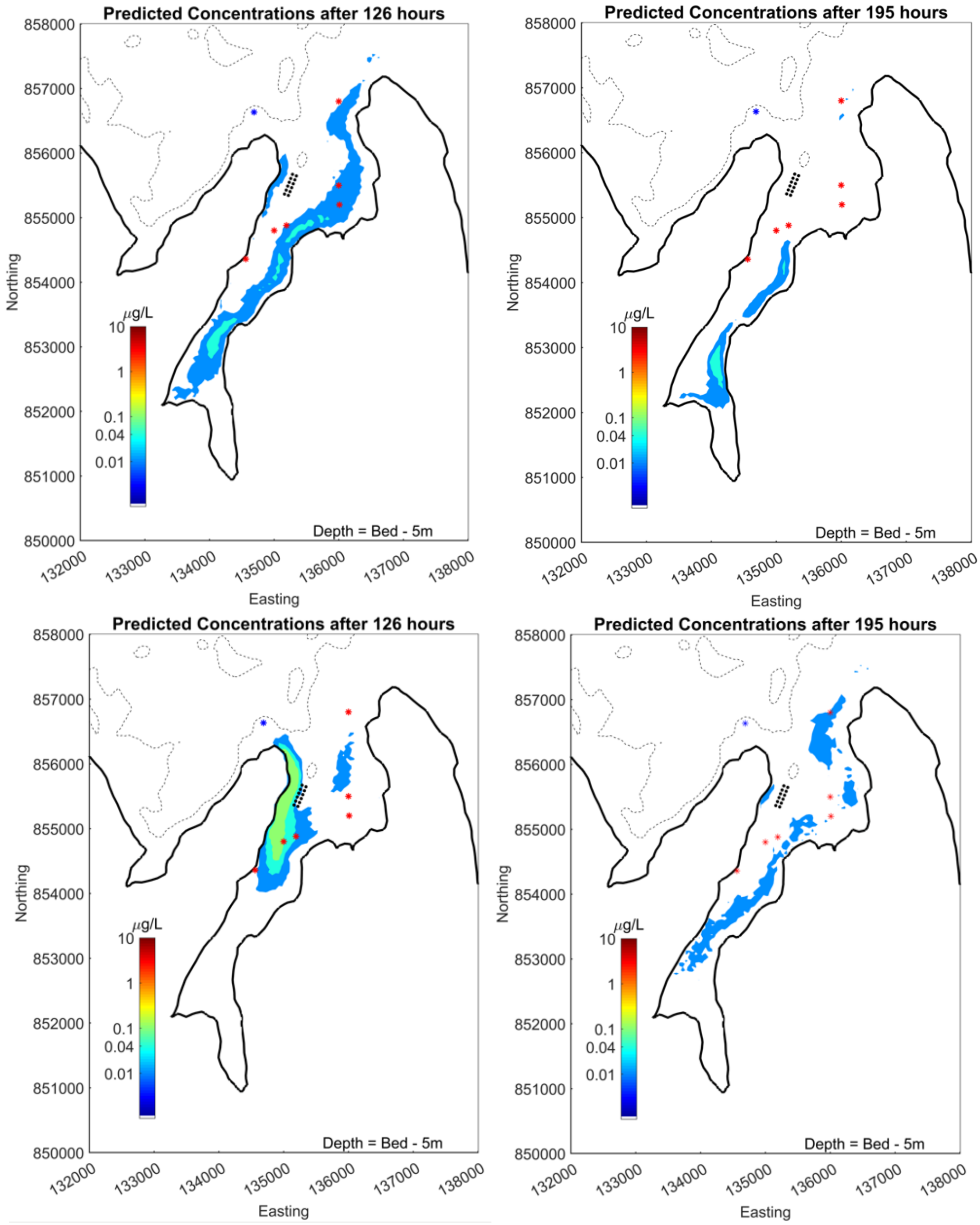


Figure 17. Predicted concentration fields for a baseline neap (top) and spring (bottom) tide dispersion simulation at 3 (left) and 72 (right) hours after the final treatment at Greshornish. Specified special features are shown, kelp beds (red) and mearl bed (blue).

Figure 17 shows the concentrations around the site and specified special features for the 5 meter layer above the seabed. Concentrations 3 hours after the final treatment do not exceed 0.04 ug/L and are well below the 3 hr MAC. 72 hours after the final treatment, concentrations are either equal to or below the 72 hour MAC, but not in the areas where the special features are found.

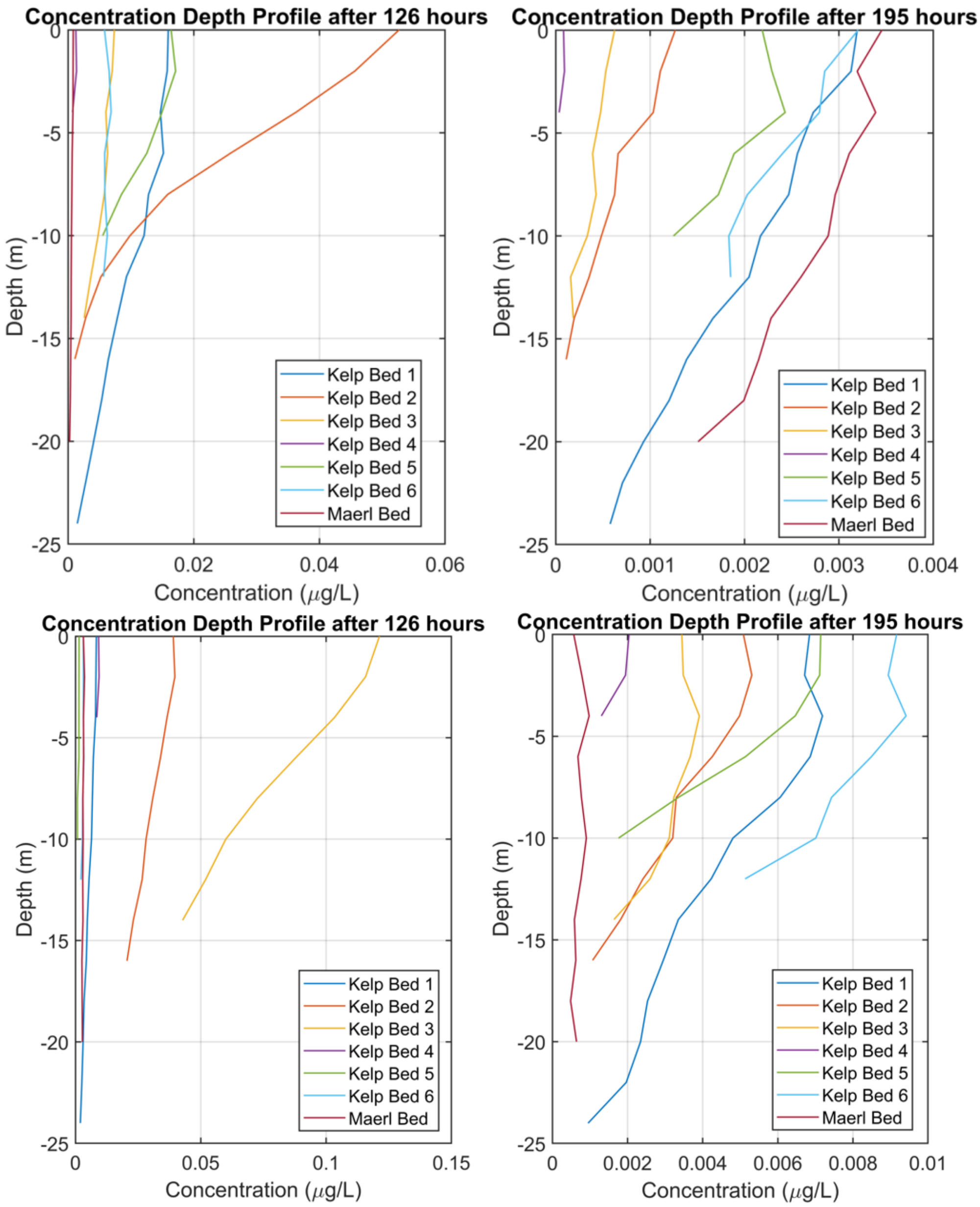


Figure 18. Concentration depth profiles for the seven special features at 3 and 72 hours after final treatment over neap tides (top) and spring tides (bottom).

Figure 18 shows concentration depth profiles, calculated using a 250 m radius area around each of the specified special features, at 3 and 72 hours after the final treatment release at both spring and neap tides. Concentrations at most special features are well below both the 3 hour and 72 hour EQS (MACs of 0.25 and 0.1 µg/L) throughout the water column. Kelp Bed 3 shows a slightly higher concentration than the rest of the special features at 126 hours during spring tides. This is due to the close proximity to the pens, with the timeframe representing peak concentration in the treatment schedule. The higher concentrations are seen nearer the surface and decrease towards the seabed, where the special feature is located. This is followed by a significant decline in concentration, shown in the 195 hours depth profile. It is clear that the concentrations decrease at depth, highlighting that all of the benthic habitats are less exposed to the medicine releases. These results indicate that the medicine releases from Greshornish fish farm will not have a detrimental effect on the near-by special features and that medicine levels are well below environmental quality standards.

4 SUMMARY AND CONCLUSIONS

A total of 23 dispersion simulations have been performed to assess whether bath treatments at Greshornish salmon farm will comply with pertinent environmental quality standards. A realistic treatment regime, with 2 pen treatments a day was simulated. Each pen required 297 g of Azamethiphos for treatment, resulting in a total discharge over 6 days of 3.57 kg. Simulations were performed separately for modelled neap and spring tides, and the sensitivity of the results to key model parameters was tested. Results are summarised in Table 7.

The model results confirmed that the treatment scenario proposed, with a daily release of no more than 594 g, should consistently comply with the EQS. The peak concentration during the baseline simulation after 195 hours (72 hours after the final treatment) was less than 0.1 µg/L, the maximum allowable concentration, and the area where concentrations exceeded the EQS of 0.04 µg/L was substantially less than the allowable 0.5 km^2. In all simulations performed, including sensitivity testing, the EQS and MAC criteria were met. Further simulations over a second neap tide demonstrated that the modelled treatment regime consistently complied with the relevant EQS and MAC. For the simulation during spring tides, greater dispersion meant that the MAC and EQS were met very comfortably. Peak concentrations near the seabed at the identified special features (SEPA, 2023) were found to be consistently less than both the 3-hour and 72-hour MAC over the full treatment simulation. Therefore, it is believed that the requested daily quantity of 594 g of azamethiphos can be safely discharged at Greshornish without breaching the MAC or EQS.

Table 7. Summary of Results

Site details	
Site Name:	Greshornish
Site Location:	Isle of Skye
Peak Biomass (T):	2,195
Pen details	
Number of Pens:	12
Pen Circumference (m):	100
Working Depth (m):	9.3
Pen Group Configuration:	2 x 6
Azamethiphos consent to be applied for	
Recommended 3-hour (kg):	0.297
Recommended 24-hour (kg):	0.594

5 REFERENCES

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