

To Christin Atchinson, Waikato Regional Council
From Dr Hilke Giles, Pisces Consulting
Date 16 August 2023
Subject Technical review of the seabird effects assessment provided with an application by North Western Mussels Limited for a mussel spat/nursery marine farm off the Waikato Region West Coast
WRC Reference APP145770

1 Background and structure of this review

This memo provides a review of an application by North Western Mussels Ltd (**NWML** or **applicant**), for a mussel spat/nursery marine farm, focusing on the aspects related to effects on seabirds.

You specifically asked me to answer the following questions:

- Has a robust baseline survey in accordance with Appendix 1A of the Coastal Plan been undertaken? If not, what are the differences. Do you consider the deviation from Appendix 1A appropriate and if so, why?
- Is the seabird assessment scientifically robust and can WRC rely on the conclusions? Please provide reasoning.
- Do you consider that any other effects require further consideration?
- Is further information required to ensure a robust assessment in respect to effect on seabirds? If so, please detail the information required and provide reasoning.
- Have mitigation measures been proposed and do you consider them appropriate to minimise and/or mitigate effects/risks?
- Has monitoring been proposed? If so, do you consider the proposed monitoring appropriate? Please provide reasoning.
- Do you have any further comments?

To inform my review, I have reviewed the following documents:

1. AEE by Aquaculture Direct (**AEE**)
2. Seabird Assessment by Wildlands, Schedule E (**seabird assessment**)

My review is structured as follows:

- Overview of the proposal (section 2)
- Seabirds (section 3)

Section 3 commences with a summary of the effects assessment provided, followed by responses to your questions. Throughout this memo I identify information and action requirements and make recommendations. I suggest you provide the applicant with my full memo so that they can review the relevant context of each requirement and recommendation.

2 Overview of the proposal

The application is for a 700 ha spat catching and holding farm in four blocks (sites) north and south of Raglan/Whāingaroa on the Waikato west coast in 20-40 m deep water (Figure 1). The minimum distance between the farm sites and the coastline is 3.1-4.0 km. The application is to catch and seed



Figure 1. Locations of proposed marine farm sites A to D.

Greenshell mussel spat (*Perna canaliculus*), and to grow and harvest Greenshell mussel seed (maximum size of 90 mm). The operational stages are described as follows:

1. Spat Catching/Collection Operations - Microscopic spat will attach themselves to the dropper lines during the free-swimming larval stage (which lasts approx. 3-5 weeks each cycle). There are three spat settlements per year namely autumn, winter and spring.
2. Spat Nursery Operations - Depending on a range of factors, operational options are:
 - Remove the dropper lines from the farm when the spat is still at 'spat stage' then relocate those dropper lines to existing mussel growing areas, including in the Coromandel/Hauraki Gulf;
 - Let the spat grow to a juvenile 'seed' stage prior to transfer; or
 - Introduce spat from an alternative source, such as a hatchery, in accordance with the proposed Biosecurity Management Plan, by introducing it onto mussel spat 'stocking' hung from the lines, then allow it to grow to juvenile 'seed' stage prior to transfer.

Spat nursery options enable spat to be grown to 'seed' to an average of 70 mm. This mussel seed will then be transferred to the Hauraki Gulf for on growing to harvest size

3. Harvesting and Maintenance - The spat catching/nursery activity will be carried out year round.

The applicant also seeks consent to install and maintain structures (and replace them as required), to seed, grow and harvest marine farming product from the marine farm (including the discharging of coastal seawater and discharge of biodegradable and organic waste matter), and all other activities that are ancillary to the operation of the farm.

Table 1. Proposed development stages. Source: AEE.

	Site A	Site B	Site C	Site D	Total
Stage 1	90ha	90ha	90ha	N/A	270ha
Stage 2	180ha	180ha	180ha	60ha	600ha
Stage 3	180ha	180ha	180ha	160ha	700ha

The applicant proposes developing the farm sites in three stages to ensure that actual effects on marine mammals and surf breaks are no greater than predicted, i.e., no greater than 'no more than minor'. Staged development generally comprises 50% development of each row in the first stage with farm site D being developed last with 27% development in Stage 2 (Table 1). The applicant proposes providing a staging development plan (SDP) for certification at a later stage. The SDP will include methods for appropriate monitoring of development stages to inform development of further stages.

The applicant describes that the activity will be operated in accordance with management plans, which will be developed in consultation with relevant experts and Iwi as appropriate and submitted to the Waikato Regional Council (WRC) for certification. Management plans will include the following:

- Staging Development Plan
- Operational Management Plan
- Marine Mammal Management Plan
- Biosecurity Management Plan

Furthermore, the marine farms will operate in accordance with all industry best management practices, including the A+ Sustainable Management Framework for Greenshell Mussels.

3 Seabirds

3.1 Summary of effects assessment by the applicant

The assessment of effects on seabirds by Wildlands Consultants (*Wildlands*) is based on a desktop assessment. Wildlands used a range of information sources, including scientific papers, relevant New Zealand databases of seabird sightings, unpublished data, and previous assessments and reviews of mussel farming and spat-catching/nursery operations. Wildlands collated information on seabird and shorebird observations between Karioitahi Beach and Waikawau Tunnel beach (covering approximately 160 km of coastline) and up to approximately 55 kilometres offshore over a three-year period from January 2019 to December 2021 (Figure 2). Effects on seabirds were assessed using a range of approaches, including by utilising the Ecological Impact Assessment Guidelines prepared by the Environment Institute of Australia and New Zealand (Roper-Lindsay et al. 2018, **EIANZ guidelines**), evaluating NZCPS Policy 11, risk assessment, and describing effects in RMA terminology.

Wildlands identified the following potential effects of the proposed farm:

- Entanglement in structures
- Habitat exclusion
- Benthic habitat changes
- Ingestion of foreign debris

- Lights causing attraction or disorientation
- Disturbance
- Noise
- Prey abundance changes

All effects, except for prey abundance changes, are described by Wildlands as posing “a very low risk to seabirds” and “likely to have a less than minor or negligible effect on all species”.¹ Changes in prey abundance are assessed as a positive effect.

While describing the risk of disturbance as very low and the associated effect within the range of negligible to less than minor, Wildlands express concerns about disturbance of breeding birds, for example, through boats approaching breeding colonies of shags, terns, and gulls.² I comment on this inconsistency in the assessment in my response to your questions below.

Wildlands describe that some species may benefit from biota growing on farm structures, from roosting opportunities in between bouts of foraging, and potential increased fish abundances.

Overall, Wildlands conclude that the proposed spat-catching/nursery farm is likely to have a neutral effect on seabirds.

Mitigation measures and monitoring recommended by Wildlands and proposed by the applicant are listed below along with my responses to your respective questions.

3.2 Response to your questions

In this section I provide responses to your questions relevant to effects on seabirds.

3.2.1 *Has a robust baseline survey in accordance with Appendix 1A of the Coastal Plan been undertaken? If not, what are the differences. Do you consider the deviation from Appendix 1A appropriate and if so, why?*

Appendix 1A does not provide specific requirements for baseline surveys for the seabird assessments. I therefore provide general comments on the information provided on seabirds.

General methods

In general, the method chosen by Wildlands to present information on seabirds, i.e., reviewing available databases and publications, is appropriate and the method generally used for effects assessment of this type and scale of marine farm resource consent applications. Considering the large number of seabird sightings available and presented Tables 2 and 3 of the Wildlands report, in my opinion, a field survey was not necessary. However, see my comments on the size of the study site and relevance of seabirds species included in the baseline dataset below.

Size of study site and relevance of seabirds species included in the baseline dataset

Wildlands collated records of seabird sightings for a large area (referred to by Wildlands as ‘study site’), covering approximately 160 km of coastline and extending up to 55 km offshore (Figure 2). For comparison, the maximum extent between the proposed farming sites is approximately 35 km and the maximum distance to shore is approximately 7 km.

¹ Seabird assessment, p.24.

² Seabird assessment, p.20.

Due to the large range of most seabirds and the commonly patchy nature of seabird observation datasets, it is appropriate to survey or review a large spatial area. However, it is important that information collated is representative and relevant to the proposed farming sites. The applicant has not provided an explanation why the 160 km by 55 km study site was chosen. Wildlands have not provided a map of seabird sightings listed in Tables 2 and 3 of their report, which makes it impossible to determine whether birds are evenly distributed within the study site or whether species have been included in the effects assessment that have not been observed in the area surrounding the proposed farming sites or comparable distances from shore. This means that it is possible that the effects assessment included seabird species that are unlikely to utilise the area of the proposed farming sites.

Wildlands describe that “the study area was split into three zones for the analysis; the coastal zone within four kilometres of the coast, Gannet Island, and the sea zone – a zone with subjective boundaries set to include the pelagic bird surveys”³. These zones are shown in Figure 2. As for the study site, no explanation is provided how the zones were chosen. The 4 km coastal zone boundary appears to not be particularly well aligned with the application because all farming sites cross or touch the zone boundary. Therefore, whether a bird species has been observed in the coastal zone or the sea zone does not assist with determining its relevance for the application or effects assessment as parts of both zones are relevant.

Some descriptions in sections 4 and 5 of the Wildlands report refer to species observed in the proposed farming areas or describe species as likely to utilise these areas. Other descriptors refer to species not usually present in a coastal environment, and it is not clear how those descriptions relate to Tables 2 and 3 of the Wildlands report. Overall, it is difficult to ascertain which of the seabird species included in the baseline dataset are of relevance to the effects assessment.

Information requirement 1:

It is unclear which bird species listed in Tables 2 and 3 of the Wildlands seabird assessment are of direct relevance to the proposed farming sites and potentially vulnerable because of their conservation status and behaviour. This information is important to inform the effects assessment, particularly in regard to the required level of protection for threatened species and the identification of appropriate mitigation measures. The information could be provided in different ways, including:

- By providing a map showing seabird sightings listed in Tables 2 and 3 in relation to the proposed farming sites;
- By changing the spatial zones of the assessment to better reflect the relevance of zones to the proposed farming sites;
- By providing a summary description of seabird species directly relevant to the assessment; and/or
- By grouping seabird species by behaviours that influence their vulnerability to marine farming.

Independent of the specific approach taken, Wildlands should provide a clear summary description of seabird species, if any, that have been identified as potentially vulnerable to the proposed farming activity and the reasons why.

³ Seabird assessment, p.9.

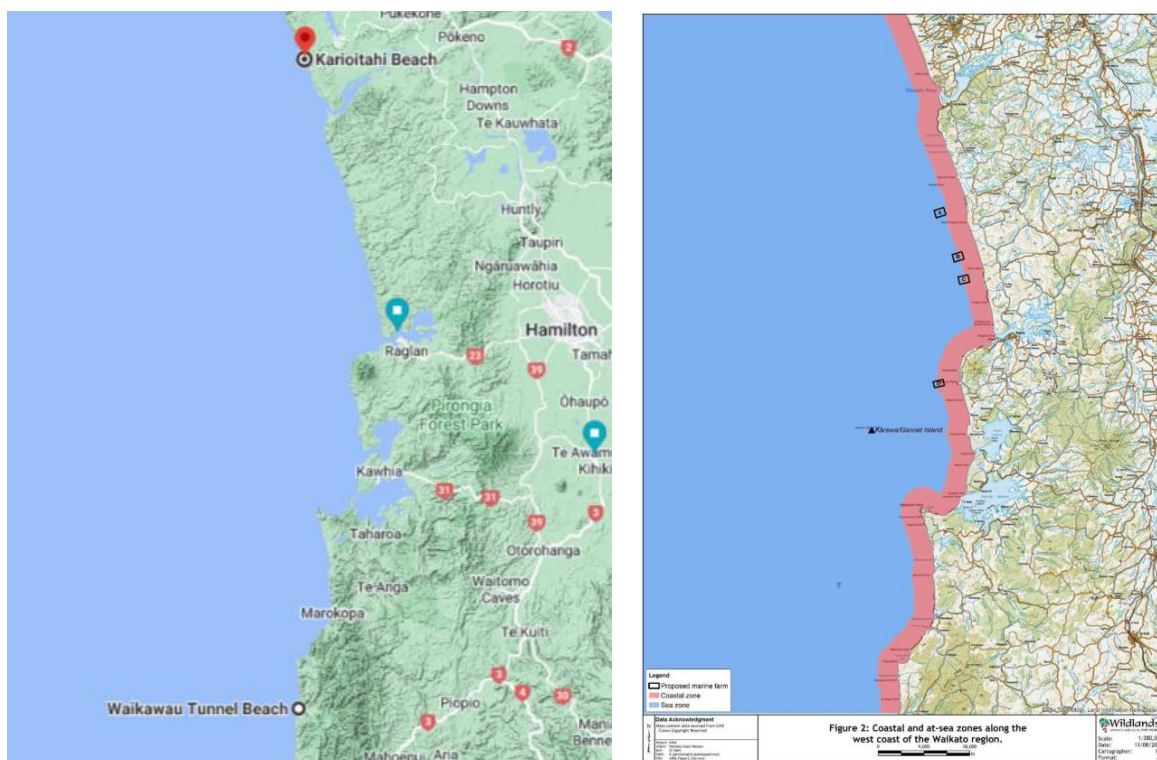


Figure 2. Northern and southern extent of the 'study site' (approximately 160 km of coastline) from which records of seabird sightings were collated (left). Coastal and sea zones created by Wildlands for the purpose of the effects assessment (right). Note the different scales of the two maps. Source: Figure 2 of seabird assessment.

3.2.2 Is the seabird assessment scientifically robust and can WRC rely on the conclusions? Please provide reasoning.

In this section I present several comments on the seabird effects assessment. Most of my comments focus on the assessment approach, specifically the, in my opinion, in parts unsystematic application of assessment methods and resulting inconsistencies among and missing evidential basis for assessment conclusions. I would like to emphasise that I have no specific ecological concerns about effects on seabirds; however, there are considerable uncertainties in the assessment. As indicated by the length of this section, in my opinion, the assessment needs improvement to meet the required level of scientific robustness. I provide several recommendations for how this could be achieved; however, the applicant may choose alternative options to achieve the required improvements.

Inconsistencies in effects assessment method used and assessment outcome descriptions

The seabird assessment concludes that "The potential effects of entanglement, habitat exclusion, benthic habitat changes, foreign debris, navigational lights, disturbance, and noise, all pose a very low risk to seabirds and are likely to have a less than minor or negligible effect on all species".⁴

It is unclear which parts of the assessment this conclusion is based on as the assessment used a range of assessment approaches:

- Table 4 of the seabird assessment describes effects in terms of the EIANZ guidelines (e.g., low, moderate); and

⁴ Seabird assessment, p.24.

- Descriptors in sections 5.1 to 5.9 of the seabird assessment describe effects in RMA terminology (e.g., less than minor), and, in some cases, also describe the likelihood and/or risk of some effects or interactions taking place.

The conclusion statement classifies the risk of all assessed effects to seabirds as 'very low' and, in terms of RMA terminology, describes effects as 'less than minor' or 'negligible'. Both are inconsistent with the assessment because:

- The RMA terms used to assess adverse effects in sections 5.1 to 5.9 range from negligible to minor, with two effects assessed as minor (benthic habitat change and ingestion of foreign debris). The conclusion that all effects have a less than minor or negligible effect is therefore not supported by the assessment; and
- Risk for seabirds is not assessed systematically and instead only described for some species and some effects (or interactions) in sections 5.1 to 5.9. My best attempt of extracting the range of risks identified is very low to low, noting that the risk arising from most effects has not been assessed. Therefore, the conclusion that all effects pose a very low risk to seabirds is not supported by the assessment.

As stated above, I have no particular concern about the outcomes of the seabird assessment and, in principle, agree that effects of the proposed farming activity on seabirds will likely be small. However, in my opinion the outcomes (or findings) are not sufficiently supported by the assessment for the reasons outlined above. Considering several threatened seabird species have been identified as utilising the area, in my opinion, the robustness of the effects assessment needs to be strengthened.

To achieve the required level of robustness, a summary table could be added to the report, systematically summarising the effects assessments using a consistent assessment method. Assessment outcomes could then be revised to align with the assessment.

If an effect is identified as being of potential ecological concern, the summary should identify the seabird species this outcome applies to and what, if any, effects mitigation and/or monitoring are required or recommended. Providing a specific rationale for all recommended mitigation measures is important to ensure that their likely effectiveness can be evaluated and that they can be implemented appropriately.

Information requirement 2:

The Wildlands report contains inconsistencies in effects assessment method used and assessment outcome descriptions. For this reason, in my opinion the outcomes of the seabird assessment are not sufficiently well supported by the assessment and, considering several threatened seabird species have been identified, the robustness of the effects assessment needs to be strengthened.

Information required:

- A systematic assessment summary, for example a table, of the effects assessment and assessment outcomes using a consistent assessment method.
- A revised assessment outcome/conclusion that is consistent with the assessment.
- For any effects identified as being of potential ecological concern, a clear description of the seabird species this applies to and what, if any, effects mitigation and/or monitoring are required or recommended.

Comments on the use of the EIANZ guidelines

Wildlands use the effects assessment approach described in the EIANZ guidelines for some of their assessment. As I explain in this section, it is not clear how some assessment outcomes were reached. Furthermore, the level of discussion provided with the assessment does not meet the requirements of the guidelines (shown below). Providing appropriate explanations for the applications of the guidelines is particularly important for marine systems because the guidelines were developed for terrestrial and freshwater ecosystems.⁵

Effects assessment under the EIANZ guidelines involves:

- Assigning ecological value to the assessed ecological features (in this application seabird species);
- Determining the magnitude of effects (a measure of the extent or scale of the impact and the degree of change that it will cause); and
- Using a matrix approach to determine the level of effect from the magnitude of effect and the ecological value.

While providing matrices for the assessment, the guidelines specify that scales used to populate the matrix should be explained for each assessment context. The EIANZ guidelines state that:⁶

“Matrices alone are insufficient, and must always be used in conjunction with thorough discussion to show how the scores have been allocated to the matrix cells and how evaluations have been made. This is especially important when evaluation is not clear-cut and may fall ‘between the cells’ of a matrix.

The matrices are intended to assist informed and robust assessment. The results cannot simply be taken on face value; they must be grounded in good data and the outputs must be interrogated and justified.

The words which result from each table – very high, high, medium, low, and negligible – are short-hand for the ecological implications, which should be discussed and justified within the assessment text. Similarly, there is often a level of risk or uncertainty associated with every assessment that must be acknowledged appropriately”.

Wildlands assigned an ecological value to each seabird species listed in Tables 2 and 3 based on the species’ threat status. This is consistent with the EIANZ guidelines.

Wildlands list magnitudes of effects ratings for each potential effect in Table 4 of their report (partially reproduced as Table 2) but do not explain how they derived these values, i.e., how they applied the criteria in Table 8 of the EIANZ guidelines to the potential effects. This is inconsistent with the EIANZ guidelines.

Wildlands also list the level of effect in Table 4 of their report (partially reproduced as Table 2) but it is unclear how some effects levels were determined. For example:

- Several seabird species in the study area assigned ecological value ‘very high’. The magnitude of effect for potential effect ‘entanglement’ is listed as ‘low’ in Table 4 of the Wildland report.

⁵ The EIANZ guidelines can be successfully used to assess effects in marine environments, but their focus on terrestrial and freshwater ecosystems makes appropriate documentation especially important for marine applications.

⁶ EIANZ guidelines, p.76.

According to the criteria for describing level of effect (matrix shown in Table 10 of the EIANZ guidelines, reproduced as Table 3), the level of effect should be 'moderate', but Table 4 of the Wildlands report lists the overall level of effect as 'low-moderate'.

- Wildlands do not explain how the inherent 'averaging' or 'balancing' of the EIANZ guidelines approach⁷ affects effects assessments of threatened species that meet NZCPS Policy 11(a) descriptors and therefore trigger an 'avoid effect' protection status. In my opinion, when applying the guidelines to threatened species, care needs to be taken and supporting discussion provided to ensure their status is appropriately reflected in the assessment.

The EIANZ guidelines don't appear to consider the likelihood of effect occurrence. Especially for threatened species (i.e., high ecological value) and effects with potentially fatal outcomes (i.e., high magnitude), the likelihood of the effect occurring is an important consideration. It is unclear if/how this is considered when applying the EIANZ guidelines.

The descriptions in Wildlands report sections 5.1 to 5.9 are very valuable and generally comprehensive. I would support the reasoning that the EIANZ guidelines are not necessary for the effects assessment and that Wildlands could instead rely on the more descriptive (but ecologically much better supported) approach taken in sections 5.1 to 5.9 with an improved consistency in effects descriptors and an improved summary section as requested in my comments above. In my opinion, as it currently stands, the EIANZ approach, including Table 4 of the Wildlands report, adds considerable uncertainty to the assessment, especially for threatened species.

Table 2. Examples of some potential effects of mussel farming on seabirds, magnitude of effect and level of adverse effect shown in Table 4 of the seabird assessment. Shown here to illustrate inconsistencies with EIANZ guidelines explained in this memo.

Potential Effects	Description	Magnitude of Effects	Level of Adverse Effects
Entanglement	Diving birds may become entangled in underwater ropes and other structures, leading to mortality.	Low	Low-Negligible
Habitat exclusion	Structures may deter birds from feeding on farms or inhibit movement within a farm.	Low	Negligible
Benthic habitat changes	The deposition of mussel shells and pseudofaeces changes the benthic fauna beneath a farm, which may include benthic and demersal fish.	Low	Low

Table 3. Criteria for describing level of effects under the EIANZ guidelines. Source: Table 10 of EIANZ guidelines.

Ecological Value ► Magnitude ▼	Very high	High	Moderate	Low	Negligible
Very high	Very high	Very high	High	Moderate	Low
High	Very high	Very high	Moderate	Low	Very low
Moderate	High	High	Moderate	Low	Very low
Low	Moderate	Low	Low	Very low	Very low
Negligible	Low	Very Low	Very low	Very low	Very low
Positive	Net gain	Net gain	Net gain	Net gain	Net gain

⁷ By this I mean the method of applying Table 10 of the guidelines (shown in Table 3), which does not provide for any 'bottom lines' because, no matter how high the ecological value of the assessed feature is, a moderate or lower magnitude of effects results in a level of effect that is less than very high.

Information requirement 3:

Wildlands use the effects assessment approach described in the EIANZ guidelines for some of their assessment. It is unclear how some assessment outcomes were reached and how the likelihood of effects occurrence has been considered, especially for threatened species. Furthermore, the level of discussion provided with the assessment does not meet the requirements of the guidelines. In my opinion, as it currently stands, the EIANZ approach, including Table 4 of the Wildlands report, adds considerable uncertainty to the assessment, especially for threatened species.

To address this information gap, I recommend that:

- Wildlands review the assessments made under the EIANZ guidelines and provide appropriate documentation, including a description of how the likelihood of an effect occurring is considered under the guidelines; or
- Remove reference to the EIANZ guidelines and rely on other assessment methods already used.

Conclusion of effects assessment

As noted above, it is difficult to ascertain from the seabird assessment which seabird species are of direct relevance to the effects assessment. Sections 5.1 to 5.9 of the seabird assessment provide generally good descriptions of potential effects and refer to some species with specific reference to the proposed farm sites. However, the seabird assessment does not present a systematic overview/conclusion of seabird species, if any, that may be of notable risk, for example because of their conservation status, utilisation of the proposed farming sites and/or behaviour that may make them potentially vulnerable to the proposed farming activities. Having this information is important to determine whether the proposal provides the required level of protection for threatened species and whether proposed mitigation measures are appropriate.

Information requirement 4:

It is unclear which seabird species, if any, may be of notable risk, for example because of their conservation status, utilisation of the proposed farming sites and/or behaviour that may make them potentially vulnerable to the proposed farming activities.

Information required:

- A systematic summary table or description of seabird species, if any, that have been identified as potentially vulnerable to the proposed farming activity, the reason for that assessment conclusion, and the implications of that assessment, for example, whether mitigation measures are required or recommended.

Section 5.1. Entanglement

The seabird assessment states that “no injuries or entanglements have been reported from New Zealand or overseas mussel farms”⁸ (emphasis added) without providing a reference for this statement.

⁸ Seabird assessment, p.18.

I am aware of scientific publications supporting that there have been no reports of seabird deaths as a result of entanglement in fixed lines of the type found in mussel farms or spat catching areas (e.g., Sagar, 2013; Lloyd, 2003; Butler, 2003) but I am not aware of any reports demonstrating no injuries and no entanglements.

Information requirement 5:

No supporting reference is provided by Wildlands for the statement that “no injuries or entanglements have been reported from New Zealand or overseas mussel farms”.

Information required:

- Please provide a supporting reference for the statement. Alternatively, if necessary, re-phrase the statement to be consistent with available scientific literature.

Section 5.8: Lights causing attraction or disorientation

The seabird assessment contains the following statement:⁹

“The coastline is within 3.1 kilometres, and illumination from the special markers will be visible to coastal nesting species. However, seabirds are most at risk of disorientation when weather conditions and visibility is poor. Consequently, this is when the reach of the special lights would be significantly reduced”.

The report does not describe whether the lights may have any adverse effects on coastal nesting species. Considering Wildlands identify that they may, clarification is needed.

Information requirement 6:

Wildlands describe that special markers will be visible to coastal nesting species but do not describe whether the lights may have any adverse effects on coastal nesting species.

Information required:

- Please clarify whether illumination from special markers is expected to have adverse effects on coastal nesting species.

Effects assessment outcome for threatened species

In the conclusion section, the seabird assessment states that:¹⁰

“many of the bird species present are Nationally Threatened or At Risk and trigger Policy 11 (a)(i) and 11 (a)(ii) in the New Zealand Coastal Policy Statement 2010”.

This highlights the need to use care and be specific when assessing effects on seabirds. I also note that, while Wildlands identify that many bird species trigger Policy 11(a), the assessment does not draw a conclusion on whether the proposal is consistent with the level of protection required under Policy 11(a). Clarification is required on this aspect.

⁹ Seabird assessment, p.22.

¹⁰ Seabird assessment, p.23.

Information requirement 7:

The seabird assessment describes that many of the bird species present trigger Policy 11 (a)(i) and 11 (a)(ii) of the NZCPS but does not present a conclusion on whether the proposal is consistent with the level of protection required under Policy 11(a).

Information required:

- A statement by Wildlands whether, in their expert opinion, the application is consistent with NZCPS Policy 11(a) in regard to bird species meeting the descriptors of Policy 11(a)(i) and (ii).

Comments on lack of alignment with assessments of other effects

There is little (if any) alignment between the seabird assessment and the assessments of effects on the benthic environment and wild fish, even though those effects are described by Wildlands and underpin parts of their assessment of effects on seabirds. Instead of referring to the respective assessments provided by the applicant, Wildlands refer to benthic and wild fish effects assessments carried out elsewhere and national reviews. I have no concerns about the effects descriptions and thus the assumptions Wildlands created for their assessment. However, it would have been more appropriate had Wildlands utilised the specific benthic and wild fish effects assessments conducted for this application.

Comments on interpretation of NZCPS Policy 11

The seabird assessment report states that:¹¹

"The west coast of the North Island is part of an IBA for seabirds (NZ M003 West Coast Eastern North Island). This 'at sea' IBA covers an area of 14,993 km² and has been identified based on two seabird species (tākapu/Australasian gannet *Morus serrator*, Not Threatened and tara iti/New Zealand fairy tern *Sternula nereis davisae*, Threatened-Nationally Critical). The IBA criteria is A4ii. A map and details of the IBA are provided in Appendix 2. The application site falls within this large IBA. This IBA triggers Policy 11 (a)(vi) in the New Zealand Coastal Policy Statement 2010" (emphasis added).

Based on my understanding, this is an incorrect interpretation of the NZCPS. The IBA does not trigger NZCPS Policy 11(a) as it is not protected under legislation.

However, if the statement were true, the 'avoid effects' protection level would be triggered for the proposed application areas. In that case, based on the findings of the seabird assessment, the effects of the proposed marine farms would likely not meet the required protection level.

3.2.3 *Do you consider that any other effects require further consideration?*

No

3.2.4 *Is further information required to ensure a robust assessment in respect to effect on seabirds? If so, please detail the information required and provide reasoning.*

I have identified several information requirements in my response to your question related to seabirds above and below. It is important that the applicant has the necessary context for the identified information requirements. I therefore recommend you forward my full responses to your questions in this section to the applicant instead of creating a separate list of information gaps.

¹¹ Seabird assessment, p.23.

3.2.5 *Have mitigation measures been proposed and do you consider them appropriate to minimise and/or mitigate effects/risks?*

The seabird assessment contains the following statements related to mitigation:¹²

- While noting that vessels are required to keep speeds below five knots within 200 metres of shore, reducing the risk of bird disturbance, Wildlands state that the potential for disturbance of surface-breeding seabirds should be addressed by examining proposed vessel routes and maintaining distances from known breeding colonies (mainland or at sea) of 100 metres or more.
- The potential for seabirds or migratory shorebirds being attracted to lights on vessels will be avoided if work is only carried out only during daylight hours.
- Management of waste and debris should be addressed through a number of conditions, setting out best practices for maintenance and operation of the farm.

The AEE describes the following activities aimed at implementing the mitigation measures recommended by Wildlands (I refer to this list as the **proposed mitigation measures**):¹³

- Active participation in the A+ Sustainable Management Framework for Greenshell Mussels, which includes practices to control release of plastic into the marine environment and to manage interactions with seabirds.
- Active uptake of new methodologies and technologies developed in partnership with the aquaculture industry as part of its collective approach to plastic waste.
- Operating in accordance with an operational management plan which includes practices to ensure ongoing security and integrity of structures.
- Maintaining a log of seabird observations and interactions and appropriate training of farm staff regarding foraging and roosting behaviours and contingencies if seabirds are observed in distress.
- Restricting all harvesting and maintenance operations to daylight hours unless operational or safety requirements prevail.

My comments on mitigation measures proposed in the AEE (proposed mitigation measures) are as follows:

1. The list of proposed mitigation measures does not include the specific requirement identified by Wildlands that, if a bird is entangled, all incidents, regardless of outcome (e.g., injury or mortality), must be reported to the Department of Conservation as outlined in the Waikato Regional Coastal Plan.

Action required 1:

To ensure all mitigation measures recommended by Wildlands are implemented, the applicant should include in their list of proposed mitigation measures the requirement that any bird entanglements, regardless of outcome (e.g., injury or mortality), are reported to the Department of Conservation.

¹² Sections 6 and 7 of the seabird assessment.

¹³ AEE, p.56.

2. The list of proposed mitigation measures does not reflect the recommended mitigation measure that “vessels that service the farm should use routes that avoid rock stacks, islets and islands used by shags, terns, and gulls for nesting by at least 100 metres”.¹⁴ Wildlands’ conclusion that effects from disturbance are less than minor is based on the stated assumption that “boats remain 100 metres offshore when transiting, and [...] boat speeds are less than five knots if approaching the shore or the spat-catching/nursery farm”.

Action required 2:

To ensure all mitigation measures recommended by Wildlands are implemented, the applicant should include in their list of proposed mitigation measures the requirement that vessels that service the farm should use routes that avoid rock stacks, islets and islands used by shags, terns, and gulls for nesting by at least 100 metres.

Action required 3:

To support effective implementation of this mitigation measure, rock stacks, islets and islands used by shags, terns, and gulls for nesting should be identified before the commencement of farming so that vessel operators know in which locations the 100 metre distance applies.

3. It is not clear whether the proposed mitigation measures aimed at minimising the release of plastics, include the specific requirements described by Wildlands that “During maintenance and harvesting, all cordage, plastics, and general waste must be collected on-board and disposed of ashore. Any debris that does accidentally fall overboard must be retrieved as soon as possible”¹⁵. As above, the conclusion of the effects assessment by Wildlands is conditional on this mitigation measure being implemented.

Information requirement 8:

Please confirm whether mitigation measures include the requirement that during maintenance and harvesting, all cordage, plastics, and general waste must be collected on-board and disposed of ashore and that any debris that does accidentally fall overboard must be retrieved as soon as possible.

4. The list of proposed mitigation measures does not confirm whether Wildland’s recommendation to use flashing or rotating lights rather than constant lights to reduce the potential for disorientation of seabirds will be implemented.

Information requirement 9:

Please confirm whether mitigation measures include the requirement to use flashing or rotating lights rather than constant lights to reduce the potential for disorientation of seabirds.

5. The proposed mitigation measures include “Operating in accordance with an operational management plan which includes practices to ensure ongoing security and integrity of

¹⁴ Seabird assessment, p.20.

¹⁵ Seabird assessment, p.21.

structures"¹⁶ (emphasis added). It is unclear what aspects of security and integrity of structures are considered important for seabirds and therefore what the specific objectives of these mitigation practices are in the context of managing effects on seabirds. Specific operating objectives for the mitigation of adverse effects on seabirds from inadequate security and integrity of structures should be specified. I understand the applicant plans to seek certification of an operational management plan after consent has been obtained and specific objectives will be necessary to inform the certification process.

Information requirement 10:

Please clarify what aspects of security and integrity of structures are considered important for seabirds and the specific objectives of the proposed mitigation practices in the context of managing effects on seabirds.

6. I agree with the proposed training of farm staff regarding foraging and roosting behaviours and actions to take if seabirds are observed in distress.
7. The proposed mitigation measures include two activities focussing on plastic waste but no measures focussing on general waste. Mitigation should apply to all inorganic farm waste. Furthermore, Wildlands state in their report that management of waste and debris should be addressed through a number of conditions, setting out best practices for maintenance and operation of the farm. However, it is unclear what these best practices are and whether the proposed mitigation measures reflect best practice.

Action required 4:

Mitigation measures aimed at minimising the release of farm waste should apply to all inorganic farm waste, not just plastics.

Action required 5:

Current best practices for maintenance and operation of spat catching and mussel farming in regard to minimising adverse effects on seabirds should be identified and incorporated in proposed mitigation measures.

3.2.6 Has monitoring been proposed? If so, do you consider the proposed monitoring appropriate? Please provide reasoning.

The seabird assessment contains the following statements on monitoring:¹⁷

- Monitoring should be undertaken to assess seabird interactions with the spat catching farm. Maintenance and harvesting team members should record seabird observations to monitor seabird behaviour while approaching (within 100 metres of the proposed farm site) and during spat farm catching activities. Observations should include if a bird is foraging, roosting on buoys or the water surface, and whether any birds have been found entangled.

¹⁶ AEE, p.56.

¹⁷ Sections 6 and 7 of the seabird assessment.

- Monitoring should be undertaken to ground truth that the mussel spat catching/nursery operation has less than minor adverse effects.

The AEE describes the following monitoring and information gathering activities (I refer to this list as the **proposed monitoring**):¹⁸

- Maintaining a log of seabird observations and interactions and appropriate training of farm staff regarding foraging and roosting behaviours and contingencies if seabirds are observed in distress.

My comments on recommended and proposed monitoring are as follows:

1. The proposed requirement to maintain 'a log of seabird observations and interactions' (emphasis added) appears highly ambitious, and I question whether it is feasible or necessary. As indicated in the seabird assessment, many seabirds and seabird species utilise the coastal area in which that farms will be located. I consider it highly unlikely that the nature of farm operations will provide time for all seabird observations and interactions to be recorded (as would be required to maintain a log as currently required). Furthermore, it is not clear from the seabird assessment whether this is necessary, especially if the refined seabird assessment confirms that predicted effects are of no or low ecological concern for some species and/or effects. Proposed monitoring should be operationally feasible and ecologically meaningful. I therefore recommend reconsidering the proposed approach and seeking clarification from Wildlands whether the permanent maintenance of a log of all seabird species and all observations and interactions is necessary. It may be appropriate to limit monitoring to specific time periods or to restrict the requirement to maintain a log of entanglements and other incidents only, as required by the Department of Conservation and in accordance with other relevant requirements that may apply.

Recommendation 1:

I recommend the applicant seek clarification from Wildlands on monitoring requirements aimed at assessing seabird interactions with the proposed marine farms and, if appropriate, reconsiders the proposed requirement to maintain a log of seabird observations and interactions to ensure the activity is ecologically meaningful and operationally feasible.

2. Wildlands state in their report that monitoring should be undertaken to ground truth that the mussel spat catching/nursery operation has less than minor adverse effects. No such monitoring is proposed by the applicant. Furthermore, it is unclear why monitoring is deemed necessary if effects are assessed as less than minor as no specific areas of uncertainty have been identified in the assessment. Considering the low level of effects identified in the seabird assessment (noting that this needs to be confirmed as per my comments on the robustness of the assessment above), it is not clear to me what specific effects Wildlands identified as requiring monitoring. In my opinion, unless the effects assessment identifies specific effects and/or species or concern or areas of uncertainty that may lead to actual effects being greater than currently predicted, monitoring is generally not required. Should monitoring be carried out, it is important that specific monitoring objectives are stipulated that enable an effective implementation and review of monitoring requirements over time.

¹⁸ AEE, p.56.

Information requirement 11:

The monitoring recommendations by Wildlands should be clarified. If appropriate, the applicant should provide specific monitoring objectives and describe the process to be taken to develop monitoring methods.

3.2.7 Do you have any further comments?

No

4 References

Butler, D., 2003. Possible impacts of marine farming of mussels (*Perna canaliculus*) on king shag (*Leucocarbo carunculatus*). Department of Conservation Internal Series 111. Department of Conservation, Wellington, New Zealand

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Sagar, P., 2013. Literature review of ecological effects of Aquaculture: Seabird interactions (Report prepared for the Ministry for Primary Industries).