

**BEFORE THE ENVIRONMENT COURT  
AT AUCKLAND  
I MUA I TE KŌTI TAIAO O AOTEAROA  
TĀMAKI MAKĀURAU ROHE**

**UNDER** the Resource Management Act 1991  
**IN THE MATTER** of appeals under Clause 14 of Schedule 1 of the Act

**BETWEEN** **BAY OF ISLANDS MARITIME PARK  
INCORPORATED**  
(ENV-2019-AKL-000117)  
**ROYAL FOREST AND BIRD PROTECTION  
SOCIETY OF NEW ZEALAND  
INCORPORATED**  
(ENV-2019-AKL-000127)  
**Appellants**

**AND** **NORTHLAND REGIONAL COUNCIL**  
**Respondent**

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**STATEMENT OF EVIDENCE IN REPLY OF DR REBECCA LIV  
STIRNEMANN FOR NGĀTI KUTA KI TE RAWHITI HAPŪ, BAY OF  
ISLANDS MARITIME PARK INC AND ROYAL FOREST AND BIRD  
PROTECTION SOCIETY OF NEW ZEALAND INC (MARINE  
ECOLOGY)**

**TOPIC 14 – MARINE PROTECTED AREAS**

**22 JUNE 2021**

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Royal Forest and Bird Protection  
Society of NZ Inc  
Solicitor acting: PD Anderson  
PO Box 2516  
Christchurch 8140  
[p.anderson@forestandbird.org.nz](mailto:p.anderson@forestandbird.org.nz)

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Bay of Islands Maritime Park / Ngāti Kuta  
ki te Rāwhiti hapu  
Counsel: Sally Gepp  
Level 1, 189 Hardy Street  
Nelson 7010  
[sally@sallygepp.co.nz](mailto:sally@sallygepp.co.nz)

**MAY IT PLEASE THE COURT**

1. My name is Rebecca Liv Stirnemann
2. My qualifications and experience are set out in my primary statement of evidence dated 19 March 2021. I confirm that in preparing this evidence I have complied with the Expert Witness Code of Conduct.
3. This evidence is given in reply to the Statements of Evidence of the following expert witnesses:
  - a. Simon West
  - b. Enrique Manuel Pardo Diaz
  - c. Thomas Clark
  - d. Vince Kerr
  - e. Phil Ross
  - f. John Holdsworth
  - g. Alicia McKinnon
 and the fisheries Joint Witness Statement.

**Evidence of Simon West**

4. In paragraph 16 of Simon West's evidence, the following point is made:
 

*“Dr Stirnemann uses the north eastern New Zealand important bird area (IBA) to justify the importance of the Bay of Islands, Cape Brett and Mimiwhangata areas to seabirds. This IBA cover the coastal area from Three Kings Island in the north to East Cape and does not provide any specific information to the Bay of Islands to Mimiwhangata areas, and is therefore misleading to apply this wider area to the relatively small area of interest in this case.”*
5. I disagree with that statement. IBAs have been developed to guide the implementation of national conservation strategies. IBAs are recognised globally as internationally important for bird conservation and known to support key bird species. New Zealand holds a large proportion of the world's seabirds many of which are threatened and in decline. This entire IBA area is critical to various seabird species triggering the criteria as outlined in my evidence. In paragraph 3 in the evidence of Enrique Manuel Prado Diaz, the total protected MPA area in Northland of 3,981.51 hectares is calculated as being equivalent to 0.2% of Northland's territorial sea (1,756,860 hectares). Very little of this Northland IBA is therefore currently protected in a way that ensures ecosystem function, supports threatened and at-risk seabird taxa and reduces bycatch impacts.
6. In paragraph 17 of Simon West's evidence, the following point is made:
 

*“There are threatened species of seabirds found in the areas proposed for protection, however these species are pelagic in nature and range well beyond the areas under appeal and well beyond the extent of the IBA. Other species may regularly be seen feeding within the areas but range widely with in the IBA.”*

7. I partly agree: some seabirds do range widely in search of food. However, this is not true for all species. A number of the “At risk” species breeding within area C are heavily reliant on local food resources as they need to return to eggs and hungry chicks. For example, little blue penguins (“At risk”) are an inshore forager with a feeding range limited by the position of breeding sites during the nesting period. Fish resources close to the breeding sites are important for this species.
8. As outlined in my evidence both threatened and “at risk” species are dependent on shoaling fish (workups) to drive prey to the sea surface, making them accessible as a food source and range widely to access this declining resource. They are attached to the Cape Brett region with its rich upwelling waters which drives the occurrence of these workups. Workups are particularly important during breeding for species such as “At risk” red billed gulls and “At risk” white fronted tern. These workups are targeted by purse seining activity in North eastern New Zealand (see map of purse seining activity in fisheries evidence). The number and size of workups have declined in the area under consideration. Diet-related breeding failure in seabirds has been attributed to declines in key prey abundance, the quality of prey and overall prey availability (Kowalczyk et al. 2014). Work ups are also important foraging sources for the Nationally Vulnerable Flesh-footed Shearwater and Nationally Vulnerable Black Petrel which travel to the North to feed.
9. In paragraph 23 of Simon West’s evidence, the following point is made in reference to the marine environment:
 

*“To prevent further changes, contributing factors will need to be defined, and meaningful controls imposed on all contributing factors.”*
10. I partly agree. Other factors other than fisheries also need to be addressed such as sedimentation and climate change factors. However, some of these will be difficult to address directly at a regional scale. For example, even with decreases in greenhouse emissions changes are expected and additional steps are needed to boost the resilience of ecosystems against factors such as climate change, marine acidification, sea level rise, shifts in species distributions and oxygen availability. Marine protection can mitigate and promote adaptation to climate change by promoting carbon sequestration and storage, by buffering against uncertainty in management, environmental fluctuations, directional change and extreme events (Roberts et al. 2017). Marine protection can thus be a cost-effective adaptation strategy with both local and global scale benefits (Roberts et al. 2017).
11. In paragraph 33 of Simon West’s evidence, the following point is made:
 

*“the deep reef habitat is likely to contain species such as black coral protected under the Wildlife Act and classed as natural, rare and at risk, thus they require protection under NZCPS policy 11a(i).”*
12. I partly agree. Areas with black coral should be protected. However, it is important to note that as well as being found on reefs, black corals are often found as solitary colonies on isolated outcrops and are not limited to deep reef habitat (Tracey & Hjørvarsdóttir, 2019). Furthermore, though New Zealand coral are often referred to as ‘Deep-sea coral’, and the New Zealand ‘Deep-sea’

region is defined as 200 m or more, several corals have a shallow minimum depth distribution, and some habitat suitability modelling studies use a 50 m cut-off in the depth data for this group (Tracey & Hjørvarsdottir, 2019). Further, the evidence of E Prado (Paragraph 64) indicates Gorgonians (*Perissogorgia vitrea*, order Alcyonacea) coral were found by DOC in several locations from 20 to 70m in the inner and outer Bay of Islands.

13. In paragraph 35 of Simon West's evidence, the following point is made:

*“The soft sediment habitats, including and beyond the reef edge 1 km buffer of the SEA zone, appear to be of apparently “featureless” mud, sand and or shell hash, where the biodiversity tends to be located mainly within the substrate. These areas are not known to contain taxa or ecosystems that are rare or threatened, but some of the area may be used as migration pathways for lobster.”*

14. I disagree. This paragraph suggests that this area is without ecological value and is therefore not impacted by fishing. However, a 2017 study (Tuck et al. 2017) outlines changes in ecosystem processes by fishing on soft sediment areas through reductions in: habitat complexity; bioturbation (surface sediment reworking and destabilisation); suspension feeding; and, because increased density of habitat structure protects the seafloor from disturbance by waves and currents and sediment stabilisation. Results by Tuck et al. 2017 also found fishing in soft bottomed areas is associated with reductions in the number of taxa and diversity of both epifaunal and infaunal biomass and productivity with 10-40% of changes being accounted for by trawling activity. Rare species likely to exist in the soft sediment have not been sufficiently sampled e.g. helmet shells and Tonna cask shells. Others such as stony cup corals such as *Flabellum* spp. and *Stephanocyathus platypus*, as well as most sea pen species, are located in soft sediment (Tracey & Hjørvarsdottir, 2019).

15. In paragraph 35 of his evidence Simon West states:

*“Some seabed habitats are more susceptible to damage than others, reef biota tends to be more exposed as it grows above the substrate, damage to reef areas is generally seen as longer lasting as biota present in these habitats tend to be slower growing.”*

16. I partly agree. Many deep-sea corals are exceptionally long-lived and grow extremely slowly meaning they have low resilience and lowered recoverability. However, the results of Tuck et al. 2017 suggest damage to soft sediment areas can also be substantial and likely to affect ecosystem function over time. Similarly, the effects on small rocky outcrops can also be substantial. Furthermore, though direct physical disturbance by bottom trawl gear is the most obvious source of impact secondary effects can be substantial through the formation of sediment plumes from fishing operations.
17. Trawl gear mobilises sediments creating plumes of particles in their wake, these are on average 2–4 m high, and 120-150 m in width depending on the size of trawl gear (Tracey & Hjørvarsdottir, 2019). In low-current, deep environments, these can disperse very slowly over large distances, and potentially affect areas well beyond, and deeper than the area of the fishery. Indeed, a field study in a trawled Norwegian fjord showed that a single 1.8 km long trawl pass created a 3–5 million m<sup>3</sup> sediment plume equivalent to c. 10% of the annual gross sedimentation rate (Bradshaw et al. 2012). These secondary

effects can bury taxa, effect recruitment, smother corals or clog polyps and affect feeding success. It is therefore not unlikely that reef biota where threatened species have been identified are affected by trawling activity in the surrounding area even if the activity is not directly on the area of habitat. Based on the evidence of Semmens I consider these effects would currently be occurring in the Area Cs and have broad scale impacts outside of the direct areas impacted along the trawl lines.

18. In paragraph 64 of Simon West's evidence, the following point is made:

*“Mr Clark describes variability in the design of trawl nets for different target species, this may lead to variability in the effects of disturbance from the fishing gear from relatively minor and short-lived in some habitats and in others, severe and long-lasting, especially in habitats formed by living organisms. Recovery rates after trawling depend on recruitment of new individuals, growth of surviving biota, and active immigration from adjacent habitat.”*

19. I agree that variability in interaction with trawl gear will depend on the type of trawl used, and the different components of the trawl rig. The gear type influences the degree of seabed penetration, or amount of continual contact with the seabed (Clark and Koslow 2007). Eigaard et al. (2016) reviewed global trawl data and on coarse substrate (mixed sediments) trawl doors could penetrate 5-10 cm, ground gear (bobbins etc) 1-8 cm, with variable sweep-bridge-chain penetration. I do not support the statement that by Mr West the effects of bottom trawling are likely to be a minor short lived adverse effect.

20. In paragraph 65 of Simon West's evidence, the following point is made:

*“The values described of the soft bottom habitats described above are not ecologically significant and thus the fishery has taken control and does not fish the areas most ecologically sensitive and the proposed protection areas will not provide any greater protection from bottom trawling than is currently happening.”*

21. I disagree. The soft sediment is an ecologically important area for fish species and though it has been understudied it has ecological significance. Tuck et al. (2017) assessed the effects of fishing on soft sediment habitat, fauna and ecological processes in the New Zealand context, concluding that surface-living species, long-lived species, structurally fragile species, and biogenic habitat-forming species are all particularly vulnerable. An additional effect which is under considered is trawl induced sediment plume damage (See Paragraph 13 in evidence above) which is likely to have a significant effect on sensitive habitats. I also disagree with the statement that further protection will not provide any greater protection than what is currently occurring. Soft sediment areas (outside reef systems) need protection from trawling to ensure threatened and at-risk species and their habitat are protected and that the ecosystem services they require are functioning. What happens at the bottom of the sea and the removal of fish species affects species on the surface.

22. In paragraph 68 and 69 of Simon West's evidence, the following point is made:

*“Unlike bottom trawling and danish seining, purse seining has no contact with the seabed so does not directly cause damage to the seabed ecosystem. Mr Clark has stated captures of seabirds, marine mammals or chondrichthyans (sharks and rays) do occur with this method however they are minimal and can readily be released alive by leaving them in the net until*

*the required species are removed.” “As stated by Mr Clark seabird captures are minimal. Purse seining along with longlining were responsible for only six recorded capture events between 2002 and 2018 within the proposed marine protection areas (Figure 5), all birds were released alive.”*

23. I agree that purse seining has no contact with the seabed and therefore does not directly damage the seabed ecosystem. However, the effect of purse seining is twofold through: (1) bycatch effects and (2) through the loss of workups and thus their function in providing a food source for both threatened and at-risk seabird species. I disagree with the statement that the effect of bycatch capture of threatened species can be considered minimal. Bycatch threatens seabirds, marine mammals and chondrichthyans globally. Bycatch is recognised by the CMS and other organisations as being the key threat to survival of a number of species. Negative bycatch impacts are notably problematic for taxonomic groups with conservative life history such as manta rays, spiny devil rays and black petrels which reproduce slowly and have a small annual number of offspring. The loss of small numbers of these species to fisheries bycatch has a larger effect on the probability of these species going extinct (being viable) especially if they are already threatened and population sizes are small. Post release survival should also not be assumed especially as the cryptic mortality rates (birds which later die from injuries) are not known. For instance, survival of live caught wandering albatross was less than 40% (Phillips & Wood, 2020).
24. I agree with paragraph 91 of Simon West’s evidence which says:
- “Each of the proposed marine protection areas have taxa or benthic communities that warrant their protection under the NZCPS policy 11.”*
25. In paragraph 92 of Simon West’s evidence, the following point is made:
- “However these taxa and communities are not uniform across each area and in some cases areas within the proposed marine protection areas do not warrant their protection under the NZCPS policy 11.”*
26. I disagree. Though taxa and communities are not uniform across the marine area they have critical functions. One critical function is enhancing workups and their ecological function for threatened and at-risk seabirds.
27. In paragraph 93 of Simon West’s evidence, the following point is made:
- “Bottom contact fishing methods have the potential to damage sensitive seabed communities. However, according to the maps in Mr Clark’s and Mr Hore’s evidence, this fishing activity does not generally overlap with the reef areas that contain taxa or benthic communities of high value.”*
28. I disagree. Commercial bottom trawling may not occur frequently over heavily reefed areas. It can, however, still take place over ‘coral’ and other typically highly biodiverse features on soft bottoms. Trawlers directly produce a reduction in the coral coverage on the swept bottoms (see bycatch evidence provided in my evidence in chief). As well as resulting in direct coral loss abrasions by gear facilitates bacterial infections and epibionts colonization increasing mortality. Trawling also affects recolonization of various taxa. It is also important to note that bottom impacting fishing activity outside reef areas

can also impact reefs through the production of sediment plumes (see paragraph 13).

### **Evidence of Enrique Manuel Pardo Diaz**

29. In paragraph 36 of Enrique Diaz's evidence, the following point is made:

*“A proposed Marine Mammal Sanctuary in the Bay of Islands was announced by the Minister of Conservation for public consultation on 20 April 2021, in response to the dramatic decline of the local bottlenose population. The proposed Sub-Areas A, B and partially C of Te Ha o Tangaroa proposal may have some benefits for the endangered bottlenose dolphin population in the Bay of Islands through improved foraging opportunities in the areas. The management proposal in the consultation paper do not include fisheries management measures.”*

30. I support this statement. Both dolphins and seabirds are good indicator species of ecosystem function and food resource availability. Population declines of both taxa suggest the health of food stocks maybe a concern and that food resource management may be needed to enhance populations.

### **Evidence of Thomas Clark**

31. In paragraph 76 of Mr Clark's evidence, the following point is made:

*“As with bottom trawling, Danish seining does not take place on reefs because that would damage the nets or could result in entanglement with rocks. Activity is focused on soft bottoms.”*

32. I disagree. Commercial bottom trawling may not occur frequently over heavily reefed areas. It can, however, still take place over 'coral' and other typically highly biodiverse features on soft bottoms. The maps presented as part of Mr Clark's evidence appear to be the set points and not the tracks this is therefore not indicative of where trawling activity occurs, only of the start point of the activity.

33. In paragraph 83 of Mr Clark's evidence, the following point is made in regard to purse seining:

*“Captures of non-fish marine species, such as seabirds, marine mammals or chondrichthyans (sharks and rays) are minimal and can readily be released alive by leaving them in the net until the required species are removed.”*

34. I disagree. This statement suggests that purse seine bycatch is: 1) not having an effect on endangered (threatened and at risk) species and 2) when captured they are all released alive and 3) that there is no mortality of species which are released alive. I also disagree with the statement that the effect of bycatch capture of threatened species can be considered minimal.

35. Bycatch threatens seabirds, marine mammals and chondrichthyans globally. Bycatch is recognised by the CMS and other organisations as being the key threat to survival of a number of species. Negative bycatch impacts are notably problematic for taxonomic groups with conservative life history such as manta ray, spiny devil ray and black petrel which reproduce and have a low number of offspring. The loss of small numbers of these species to fisheries bycatch has a larger effect on the probability of these species going extinct (being

viable) especially if they are already threatened and population sizes are small. For instance there are estimated to be only approximately 1059 breeding pairs of black petrel remaining. Risk analysis in New Zealand suggests this species is most at risk from commercial fisheries. Bycatch of this or similarly endangered species should not be considered minimal and should not be considered in isolation in one small area. As species become increasingly rare the probability of capture is decreased however the impact of capture on the population is increased as is the risk of population extinction. Furthermore, fisheries bycatch post release survival should not be assumed especially as the cryptic mortality rates (e.g. birds and other species which later die from injuries) are not known. For instance, survival of live caught wandering albatross during fishing activity was determined to be less than 40% (Phillips & Wood, 2020).

36. In paragraph 97 and 107 of Mr Clark's evidence, the following point is made:

*"As can be seen from the map below, bottom trawling activity takes place almost exclusively outside the reef structures identified by the Northland regional Council as the Significant Ecological Areas for the area. That is entirely consistent with the practices discussed earlier. Bottom trawling does not constitute a risk to the benthic environment for which protection is sought by the appellants. This appeal, if successful, would only result in a loss of activity for no greater conservation benefit."*

37. I disagree. The map provided by Mr Clark contains the setting points and not the trawl lines of trawl activity within the area of interest. It is therefore impossible to determine from this information where trawl activity has taken place in relation to the reef structures. Furthermore, as outlined above the effects of trawl induced sediment plumes have not been considered. I have outlined in evidence above additional effects on soft sediment bottoms.

38. In paragraph 98 of Mr Clark's evidence, the following point is made:

*"The map below contains the setting points where bottom trawling and Danish seining has occurred since 2009. The sets are clustered and represent the 518 events in the area. The darkness of the points indicates multiple events depicted by the points."*

39. I disagree. As outlined above the map does not depict the trawl lines of the fishing activity.

40. In paragraph 115 of Mr Clark's evidence, the following point is made:

*"The following map from the Dragonfly website (<https://psc.dragonfly.co.nz/2019v1/released/explore/>) indicates that there has been some observer monitoring of trawl activity in the area. Similar maps for the bottom and surface longline sectors show lower levels of observer activity. The low level of observer activity signifies that FNZ do not consider that the area constitutes a high-risk area for protected species."*

41. I disagree. There are a number of reasons why there may be low observer coverage in this area. Several alternative reasons for boats not to have observers are outlined in Mr West's evidence e.g., cost of observers, the ability to get observers on some of the boats and boat size. I have not seen any



evidence that lack of observer coverage means FNZ does not consider the area to be a high risk for “protected species”.

42. In paragraph 117 of Mr Clark’s evidence, the following point is made:

*“While the information is limited, there is no reason to consider that commercial fishing in the area under the current level of regulated mitigation constitutes a threat to protected species.”*

43. I disagree. I have outlined in my evidence and above a number of effects by which the current level of regulated mitigation is a threat to both threatened and at-risk species. Furthermore, this statement is in contrast to those made by the Fisheries New Zealand Commissions

44. In paragraph 150 of Mr Clark’s evidence, the following point is made:

*“The maps provided earlier clearly indicate that no bottom contacting fishing takes place on the rocky reefs in the areas, which are identified as Significant Ecological Areas (SEAs). Bottom trawling and danish seining occur on the soft sandy and muddy habitats, not on hard reef or foul ground where there is a risk of loss of gear. Because of the spatial separation, there is no risk of damage to the SEAs and the reef structures that remain in them. Purse seining has no bottom contact.”*

45. I disagree. As outlined above the map provided by Mr Clark does not depict the trawl lines of the fishing activity only the setting points. It is therefore not possible to reach a conclusion on the specific areas directly affected by trawling and Danish seining.

46. In paragraph 152 of Mr Clark’s evidence, the following point is made:

*“I have reviewed the information available on protected species captures by commercial fishing. While observer activity levels in the area are low, observed interactions in the area are low and no seabird mortalities have been recorded. In the wider context, Fisheries New Zealand commissions an assessment of the risk to seabird populations from commercial fishing on a frequent basis. The most recent risk assessment identified only one species – black petrel – to be at confirmed risk from fishing.”*

47. I disagree. Mr Clark has drawn incorrect conclusions from this report which clearly states that a number of species are considered to be at risk from commercial fisheries:

*“The present analysis provides an updated assessment of the risk of commercial fisheries in New Zealand for 71 seabird taxa breeding in the New Zealand region, including data to the 2016–17 fishing year.” (Richard et al. 2020). “Black petrel remained at “very high risk” from commercial fisheries; it was the only species at the highest risk ranking. There were five taxa in the second-highest category, with Salvin’s albatross, Westland petrel, flesh-footed shearwater, southern Buller’s albatross and Gibson’s albatross assessed to be at “high risk” from fisheries. While the species-level risk score for black petrel was relatively unchanged from previous risk assessments, the current assessment estimated that the greatest fisheries risk to black petrel is from inshore trawl fisheries; previously, bottom-longline fisheries were estimated to pose the greatest risk to this species” (Richard et al. 2020).*

48. In paragraph 153 of Mr Clark’s evidence, the following point is made:

*“In the light of the information presented on fishing effort and the existing suite of FA96 measures, the marine biodiversity identified by the appellants appears to be protected under the existing FA96 regulatory framework. Duplicating those safeguards with regional council provisions would appear to be both inappropriate and unnecessary when the FA96 has the capability to achieve the same desired outcomes.”*

49. I disagree. As set out in my primary evidence, ecologically important habitats and rare, declining and threatened species are presently unprotected from the effects of fishing methods. It is my opinion that the proposed fishing controls will significantly improve the protection of marine and terrestrial biodiversity and have significant ecological benefits.

#### **Evidence of Vince Kerr**

50. In paragraph 32-33 of Vince Kerr’s evidence, the following point is made:

*“Fishing is a risk to soft bottom communities of which we know very little.”*

51. I agree. This is a biodiverse system which is threatened by bottom trawling.

#### **Evidence of Phil Ross**

52. I agree with paragraph 32-33 of Phil Ross’s evidence, including the statement that:

*“Fishing methods that involve dragging gear across the seafloor (trawling and dredging) will modify the structure of the seafloor and can alter the biodiversity that occurs there. In the Bay of Islands, Cape Brett and Mimiwhangata areas, ecologically important habitats and rare and threatened species that are presently unprotected from these fishing methods include seagrass meadows, shellfish beds and deep reefs communities consisting of fragile, long-lived and slow growing invertebrate species (including protected corals).”*

53. In paragraphs 42-68 Phil Ross has summarised the vulnerability of deeper seafloor habitats to trawling and dredging. I agree with this evidence.

#### **Evidence of McKinnon**

54. In paragraph 46 of McKinnon’s evidence, the following point is made:

*“Seabird mitigation devices are also already required for commercial surface and bottom longlining under the Fisheries Act, including weighting of longlines and streamer line specifications. Therefore, the proposed measures directly duplicate fisheries regulation. It is also uncertain whether the intention is for the proposed mitigation measures to apply to recreational longlines (i.e. any line to which more than 7 hooks (whether baited or not) are attached). Seabird mitigation measures for recreational fishing are not regulated under the Fisheries Act, but recreational fishers are encouraged to use responsible seabird handling and mitigation techniques when fishing.”*

55. I agree that seabird measures for recreation fishers are not regulated under the Fisheries Act and I support provision for this as provided in the appellants proposed rules.

**Fisheries JWS**

56. In paragraph 7e of the fisheries JWS the following question is asked:

*“What are the effects of different fishing methods on the marine environment in the areas proposed for protection (including the relevance of different fishing methods used in different locations)?”*

57. And the following statement is made

*“(e) While acknowledging the importance of small pelagics being accessible on the sea surface, Mr Drummond and Mr Clark have reservations about attributing the decline in fish work ups to fishing alone.”*

58. I disagree with this statement. As set out in my evidence in chief, workups are not only made up of small pelagic species and it is not only their presence at the surface of the water which is critical but their function as a system which drive other key organisms to the surface such as zooplankton and larval fish which are ecologically important for supporting various seabird species. Though other factors (e.g. disease) may have a small effect on a small number of fish in an area, there is to my knowledge no evidence of this being the case in the area of interest, and the main contributing factor to the decline of the number and size of workups is the removal of fish which make up the workups from the system (expressed in tonnes in the fisheries evidence). These workups are targeted by purse seining activity.

**Dr Rebecca Liv Stirnemann**

**22 June 2021**

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