

EXPERT CONFERENCE —WATER QUALITY AND ECOLOGY (RIVERS and LAKES)

ENV-2018-CHC — 026, 29, 37, 38, 39, 40, 41, 47, 50 and Various s274 parties

Topic: Proposed Southland Water and Land Plan - Southland Regional Council

Date of conference: 3 and 4 September 2019

Venue: Kelvin Hotel, 20 Kelvin Street, Invercargill

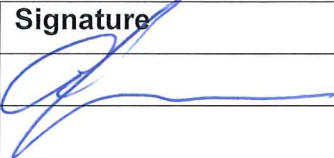
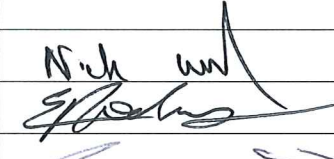

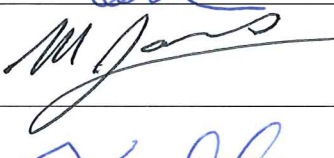

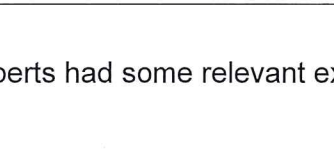
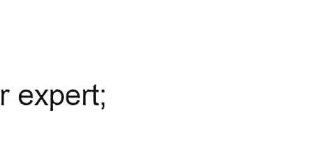
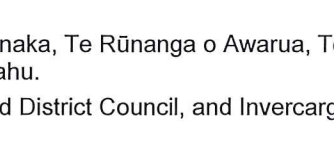

Facilitator: Jim Hodges, Environment Commissioner

Recorder: Sue Bennett and Ewen Rodway



Attendees

- 1 Witnesses who participated and agreed to the content of this Joint Witness Statement (**JWS**) on 4 September:

Name	Employed or engaged by	Signature
Dr Ton Snelder	Southland Regional Council	
Dr Elaine Moriarty	Southland Regional Council	
Nick Ward	Southland Regional Council	
Ewen Rodway	Southland Regional Council	
Dr Adam Canning	Southland Fish and Game Council	
Kathryn McArthur	Royal Forest and Bird Protection Society of New Zealand and Department of Conservation	
Dr Jane Kitson	Ngā Rūnanga ¹	
Ailsa Cain	Ngā Rūnanga	
Dr Mark James	Meridian Energy Limited and Alliance Group Ltd	
Justin Kitto	DairyNZ Limited and Fonterra Co-operative Group	
Susan Bennett	Territorial Authorities ²	
Bill Chisholm	Waiiau Rivercare Group	

For ease of reference throughout this JWS, all experts had some relevant expertise in rivers, lakes, and estuaries except the following:

- (a) Ms Cain, who is a cultural policy expert;
- (b) Mr Rodway, who is primarily a groundwater expert;



¹ Comprising Waihopai Rūnaka, Hokonui Rūnaka, Te Rūnanga o Awarua, Te Rūnanga o Oraka Aparima, and Te Rūnanga o Ngāi Tahu.

² Comprising Gore District Council, Southland District Council, and Invercargill City Council.

- (c) Mr Ward does not consider himself an expert in rivers.
- 2 For clarity Mr Chisholm and Dr Snelder were present for the development of the whole JWS but had to leave after final review of paragraph 15. Dr Moriarty left the conference at lunchtime and was not present to sign the final document.

Environment Court Practice Note

- 3 All participants confirm that they have read the Environment Court Consolidated Practice Note 2014 and in particular Section 7 (Code of Conduct, Duty to the Court and Evidence of an expert witness) and Appendix 3 - Protocol for Expert Witness Conferences and agree to abide by it.

Introduction

- 4 In a minute dated 8 August 2019, the Court recorded at paragraph [3] that “A key objective in the proposed plan states that water quality in degraded waterbodies will be improved (Objective 6). This begs the question what is meant by degraded?” The Court then referred to work undertaken by scientists describing “degraded” in relation to waterbodies, noting that the work was incomplete. The Court then set out a process for completing the work and directed that a facilitated meeting be convened on 3 and 4 September to start this process.
- 5 A facilitated meeting of parties was held on 3 September in Invercargill at which they agreed key tasks for water quality and ecology experts to address at expert conferencing over the period to 29 November 2019. The list of attendees at the facilitated workshop is included in Attachment 1 of this Joint Witness Statement (JWS) and the list of key tasks is included in Attachment 2 of the JWS.
- 6 Following the facilitated meeting, the experts proceeded to conference in accordance with the broad direction set out in the list of tasks. The experts participating were primarily water quality and ecology experts. In addition, Ms Cain participated as a cultural expert and Mr Rodway participated as a groundwater expert.



- 7 The rivers and wetlands experts spent considerable time at the conferences in May 2019 discussing what methods should be used to assess degradation and noted that many different factors need to be considered. At the conference, they were made aware of additional information that had become available as a result of on-going work by the Regional Council. They also noted that Dr Death had undertaken considerable work in relation to nitrogen, phosphorus and MCI values, which the other experts considered would provide a very helpful base for further consideration. This information will be taken into consideration in this and subsequent JWSs.
- 8 For clarity, Dr Canning noted that Dr Death's information was not new, but will be presented in a different spatial framework to allow comparison with the work of other experts on a like for like basis.
- 9 The estuaries and lakes experts note that they had only limited time for conferencing and will provide further information as part of the ongoing work.
- 10 The experts note that all information in this JWS is preliminary only and will require review and additional input through the rest of the conferencing process. The experts also note that the interim thresholds that will be recommended at the end of the process will have been developed using currently available information.

Conference outcomes

To what extent did the experts consider Ki Uta Ki Tai and Te Mana o te Wai?

- 11 The experts started by recognising that the concepts of Ki Uta Ki Tai and Te Mana o te Wai are embedded in the proposed Southland Water and Land Plan (pSWLP) and in the National Policy Statement for Freshwater Management. As such they provide key starting points for any consideration of what is meant by degradation in the context of water quality and ecology. The experts acknowledged this in the Rivers and Wetlands JWS, when they stated³:

³ Paragraph 26



... there is a requirement to recognise the national significance of Te Mana o te Wai, as provided for in the plan. There is a need to consider mauri, the health of the people, the health of the environment, and the health of the waterbody.

- 12 Ms Cain provided the following introduction to the meaning of these concepts in the Southland context:

The pSWLP seeks to manage water and land resources in a way that encompasses the Ngāi Tahu philosophy of Ki Uta Ki Tai. This approach recognises that water is important in a variety of ways and that Environment Southland is committed to managing the connections between land and all water, particularly the effects of water quality and quantity changes on the health and function of estuaries and coastal lagoons.⁴

Ki Uta Ki Tai is commonly referred to as 'mountains to the sea' and is about standing on the land and knowing the effects, both positive and negative, in every direction. This ethos reflects the mātauranga (knowledge) that all environmental elements are interconnected and must be managed as such. At a framework level, Ki Uta Ki Tai is similar to the RMA term 'integrated management'.

The pSWLP also recognises that Te Mana o te Wai is fundamental to the integrated framework for freshwater management in Southland.⁵ Te Mana o te Wai was formally introduced to Freshwater Management in 2014 through the NPSFM, which states that it is nationally significant. Upholding Te Mana o te Wai acknowledges and protects the mauri of the water.⁶ Another way of saying this is that the needs of the waterbody are put first. Te Mana o te Wai puts a korowai (cloak) over water to recognise its significance in its own right and provides an overarching principle of protection in freshwater management.

Te Mana o te Wai then moves to providing for Te Hauora o te Taiao (the health of the environment), Te Hauora o te Wai (the health of the waterbody) and Te Hauora o te Tangata (the health of the people). Hauora is not just a reference to one's health but to a state of health. Hauora is defined in English as meaning 'fit, well, healthy, vigorous, robust.' A human analogy for hauora is that you can take a knock, such as have a cold, and have the resilience to bounce back to a healthy and vigorous state.



⁴ pSWLP Appeals Version, p. 5

⁵ pSWLP Appeals Version, p. 6

⁶ NPSFM, p. 7

Therefore, at a principle level, Te Mana o te Wai puts the needs of the waterbody first and provides for healthy and robust waterbodies, people and environment – not one over the other but the hauora of all three elements. Te Mana o te Wai is encompassed in the pSWLP by Ki Uta Ki Tai that holistically integrates the application of Te Mana o te Wai from the estuaries to the headwaters and everything in-between.

- 13 The experts agree that the concepts are consistent with the statement made in the Rivers and Wetlands JWS that⁷:

... water quality and ecology must be considered using an holistic, whole of catchment approach as well as site specific considerations. This requires consideration of historic and current land use, the quality and quantity of groundwater, rivers and streams, lakes, wetlands, estuaries and the sea on an integrated basis.

- 14 While the experts consider that they may be able to set thresholds where ecosystem health and human health values are considered to be degraded in terms of Objective 6, this may not be consistent with the provisions of Objective 3 relating to hauora.

What is meant by “degraded”?

- 15 For the purposes of this expert conferencing process, the experts are relying on the NPSFM 2017. This includes the following description of ecosystem health value (from Appendix 1 of the NPSFM, 2017):

The freshwater management unit supports a healthy ecosystem appropriate to that freshwater body type (river, lake, wetland or aquifer).

In a healthy freshwater ecosystem ecological processes are maintained, there is a range and diversity of indigenous flora and fauna, and there is resilience to change.

Matters to take into account for a healthy freshwater ecosystem include the management of adverse effects on flora and fauna of contaminants, changes in freshwater chemistry, excessive nutrients, algal blooms, high sediment levels, high temperatures, low oxygen, invasive species, and changes in flow regime. Other matters



⁷ Paragraph 25

to take into account include the essential habitat needs of flora and fauna and the connections between water bodies.

- 16 The experts understand that the definition of “degraded” will be used under Objective 6 to determine where improvement of a water body is required. The experts have adopted the concept of the “national bottom line” (NBL) or “minimum acceptable state” from the NPSFM as indicative of “degraded” state. Where there is not a defined NBL for an attribute, the experts have interpreted degraded to mean where a significant and persistent⁸ change in any one or more of the following occurs:
- (a) natural ecological processes
 - (b) the expected spatial range and diversity of indigenous species
 - (c) resilience
- 17 The experts will further explain this interpretation when discussing the specific attributes in later stages of the conference. The experts note that this interpretation of degraded is not the same as the hauora of the waterbodies as described in paragraph 12 above.
- 18 When assessing attribute state, the experts will consider indigenous biodiversity and threatened species, as part of paragraph 16(b). The majority of experts note that they will use the latest DOC National Threat Classification to determine which species are threatened. Mr Chisholm is opposed to the use of this classification system because he considers it to be arbitrary, unscientific and biased. He anticipates that he will provide evidence in support of this statement in the Topic B hearings.

What is the most appropriate spatial framework to consider the concepts of Ki Uta Ki Tai and Te Mana o te Wai and integrated management to enable degraded water bodies to be identified?

- 19 The experts have considered Te Mana o te Wai and Ki Uta Ki Tai in principle but acknowledge that they are limited by the interim nature of this process and

⁸ As used in the NPSFM Appendix 2 to define Band D or equivalent of each attribute state below National Bottom Line.



can only apply the thresholds at a broad regional scale. In addressing the question, they have considered whether the rivers and lakes classification system in Appendix E is fit for this purpose. The experts note that there is no current classification for estuaries in Appendix E.

20 The experts note that the pSWLP uses Surface Water Quality Management Units (SWQMU) to classify rivers and lakes in Appendix E. The experts consider that the SWQMU have the following limitations for use in the definition of degradation on an interim basis:

- (a) they are too detailed for the time constraints of expert conferencing; and
- (b) they are not purely a bio-physical based classification and incorporate some Water Conservation Order and planning requirements.

21 The experts consider an alternative classification system is required for the definition of degradation on an interim basis for this JWS. On a preliminary basis, the classification system recommended by the experts are as follows:

- (a) Rivers⁹:
 - (i) Upland
 - (ii) Lowland
- (b) Lakes¹⁰:
 - (i) Shallow
 - (ii) Deep
 - (iii) Intermittently closed and open lagoons (ICOLL)
- (c) Estuaries¹¹:

⁹ The experts will determine the definition of these areas based on the work included in Hodson's evidence and develop a map of the region for these classes.

¹⁰ Using the classification in the first Lakes JWS, which is based on that used in the NPSFM and is specifically linked to the NPSFM classes in Appendix 2 of the Lakes JWS. The Lakes experts believed that it better represents the natural lake characteristics that influence Southland lake quality.

¹¹ This classification will be further developed through this process. Whilst not stated explicitly, the first Lakes JWS used this system.



- (i) Tidal lagoon
- (ii) Tidal river
- (iii) Fiords and Bays

What are the appropriate ecological indicators of health to be used on an interim basis and what is the numeric attribute state for each attribute for which sufficient data is available?

- 22 The experts note that Objective 6 refers only to water quality. Directions provided by the Court refer to ecological indicators of health, which the experts have interpreted to be wider than physico-chemical water quality. For the purposes of this JWS they have interpreted ecological health to include water quality, habitat quality, aquatic life and ecosystem processes. The river experts note that these are four of the criteria included in Clapcott et al 2018 report¹². They have not considered the fifth criteria, water quantity.
- 23 The experts agree that the following attributes in Tables 1 – 3 are appropriate for the definition of degradation taking into account the matters raised in paragraphs 41 to 45 in the first Rivers and Wetlands JWS. The river experts note that in the first JWS in paragraph 37, they identified a number of other attributes which impact on ecosystem health and need to be considered in addition to those in Tables 1.
- 24 The experts note that they will provide guidance on the level of confidence that is associated with specific attribute thresholds. This will be recorded in the “Certainty” column in the following tables.



¹² Clapcott et al, 2018. Freshwater biophysical ecosystem health framework. Prepared for MfE. Cawthron Report No 3194.

Table 1: Preliminary attributes and associated spatial scale to identify degraded rivers.

Attribute	Spatial Area	Metric	Numeric Threshold	Compliance Statistic	Data Used in JWS	Certainty	Explanation/Reference
Dissolved inorganic nitrogen (DIN) (nutrient) ¹³	upland	DIN					
	Lowland	DIN					
Dissolved Reactive Phosphorus (DRP) (nutrient)	Upland	DRP					
	lowland	DRP					
Ammonia-N (toxicity)	Region	Amm-N					
Nitrate-N (toxicity)	Region	Nitrate-N					
Macroinvertebrates	Upland	MCI					
	Lowland	MCI					
Periphyton	Upland	Chlorophyll-a					
		% weighted composited cover (Peri WCC)					

¹³ In the first JWS, ammonia and nitrate were assessed separately for nutrient effect. On further consideration, the experts consider that these should be combined as DIN for this JWS.



Table 1: Preliminary attributes and associated spatial scale to identify degraded rivers.

Attribute	Spatial Area	Metric	Numeric Threshold	Compliance Statistic	Data Used in JWS	Certainty	Explanation/Reference
	Lowland	Chlorophyll-a					
		% weighted composited cover (Peri WCC)					
Macrophytes	Region	% cover (method to be confirmed)					
Deposited fine sediment	Upland	% cover <2mm					
	Lowland	% cover <2mm					
Stream and riparian habitat	To be determined	Requires further consideration			Rapid Habitat Assessment (RHA) at SOE sites		Includes shade



Table 1: Preliminary attributes and associated spatial scale to identify degraded rivers.

Attribute	Spatial Area	Metric	Numeric Threshold	Compliance Statistic	Data Used in JWS	Certainty	Explanation/Reference
Temperature	Region	°C		Maximum			Davies-Colley et al 2013 ¹⁴
Fish	Region	Index of Biotic Integrity (IBI)			None		Joy and Death 2004 and updated in 2010 ¹⁵ .
Disolved oxygen	Region	mg/L					
Clarity / Turbidity	TBC	m / NTU (FNU - continuous)					MfE guideline ¹⁶ New NPSFM
Ecosystem metabolism	Upland	Gross primary production (GPP) and Ecosystem Respiration					
	lowland						

¹⁴ Reference for Davies Colley¹⁵ Reference for Joy and Death¹⁶ Reference for MfE guideline

Table 1: Preliminary attributes and associated spatial scale to identify degraded rivers.

Attribute	Spatial Area	Metric	Numeric Threshold	Compliance Statistic	Data Used in JWS	Certainty	Explanation/Reference
		(ER) (to be confirmed)					
Metals and other contaminants							
<i>E. coli</i> (human health)	Region	cfu/100mL	Bands D and E or Median >130				
Benthic Cyanobacteria (human health)	Region	% cover					



Table 2: Preliminary attributes and associated spatial scale to identify degraded Lakes and ICOLLS

Attribute	Spatial Area	Metric	Numeric Threshold	Compliance Statistic	Data Used in JWS	Certainty	Explanation/Reference
Sedimentation Rate							
Sediment muddiness							
Total Nitrogen in water							
Total Phosphorus in water							
Ammonia-N (toxicity)							
Phytoplankton							
Cyanobacteria planktonic							
Clarity							
Trophic Level Index (TLI)							
Macrophytes / Lake submerged plant indicators (SPI)							
Dissolved oxygen							



Table 2: Preliminary attributes and associated spatial scale to identify degraded Lakes and ICOLLS

Attribute	Spatial Area	Metric	Numeric Threshold	Compliance Statistic	Data Used in JWS	Certainty	Explanation/Reference
Pest fish							
Marginal Habitat							
Open/close regime							
Temperature							



Table 3: Preliminary attributes and associated spatial scale to identify degraded estuaries.

Attribute	Spatial Area	Metric	Numeric Threshold	Compliance Statistic	Data Used in JWS	Certainty	Explanation/Reference
Sedimentation Rate							
Sediment muddiness							
Area of soft mud							
Coverage of seagrass							
Total Nitrogen in water							
Total Phosphorus in water							
Ammonia-N (toxicity)							
Phytoplankton		Chlorophyll-a					
Cyanobacteria planktonic							
Clarity							
Macroalgae cover							
Sediment oxygen							
Sediment nutrients							



Table 3: Preliminary attributes and associated spatial scale to identify degraded estuaries.

Attribute	Spatial Area	Metric	Numeric Threshold	Compliance Statistic	Data Used in JWS	Certainty	Explanation/Reference
Pest fish							
Marginal Habitat							
Open/close regime							
Temperature							
Gross Eutrophic Zone							
Estuary Invertebrates							
Metal (toxicity)							

Which existing waterbodies that are degraded and by which attribute?

25 This will be addressed through the remainder of the conferencing.

How is groundwater taken into account in this JWS?

26 All experts relied on the evidence of Mr Rodway with respect to groundwater matters as set out in paragraph 35 of the first JWS. The experts note that further consideration of the connection between groundwater and surface water is likely to be required as part of the development of methods for the pSWLP.

27 The experts are unclear as to whether groundwater needs to be considered as part of water quality in accordance with Objective 6. It would assist the experts in completing the conferencing if clarification of this issue can be provided.

What programme of work is to be followed?

28 The experts agreed the outline programme of work set out in Table 4 below.

Table 4: Outline programme of work.

Workstream	Task	Output from work required	By whom	Reporting date and distribution
All	Combined Expert Conference	JWS	All	By 4 September 2019
All	Create sharing location for sharing of data, information and references	Sharing location	Dr Moriarty	By 6 September 2019
All	Place references in sharing location	Compiled references	All	By 11 September 2019



Table 4: Outline programme of work.

Workstream	Task	Output from work required	By whom	Reporting date and distribution
All	Definition of data request to ES for relevant data for attributes Tables 1, 2 and 3.	List of data currently available and that is to be requested	Mr Ward / Dr Snelder to prepare draft request and circulate to all for comment	Circulate list by 9 September 2019 Comments by 11 September 2019 Request to ES by 12 September 2019 – to be provided by 30 September 2019.
All	Organise data into a format that is easily interrogated	Formatted data	Dr Snelder (River and lake) Mr Ward (Estuaries)	By 11 October 2019
Lakes and Estuaries	Produce table and map for lakes and estuaries. Produce justification for proposed typologies.	Map, table and narrative	Mr Ward and Dr Snelder	Typologies by 9 October 2019, remainder by the 14 October 2019



Table 4: Outline programme of work.

Workstream	Task	Output from work required	By whom	Reporting date and distribution
Rivers	Map defining upland and lowland areas Lookup table of SOE sites and classification by SWQMU, proposed class, and FMU.	GIS layer and pdf of map showing SOE sites and FMU boundaries Table of sites	Dr Snelder/ES	By 13 September 2019
All	Review information to gain preliminary agreement on the classification system for discussion at the conference (14 – 16 October 2019)	Agreement of classes	All	14 October 2019
All	Combined expert conference (2 -3 days 14 – 16 October 2019)	JWS covering - Possible linkages with cultural indicators and linkages back to Ki Uta Ki Tai / Te Mana o Te Wai. - Attribute thresholds set - Spatial framework confirmed - Compliance statistics defined for attributes - Discuss the linkage between river attributes and estuaries	All	By 16 October 2019



Table 4: Outline programme of work.

Workstream	Task	Output from work required	By whom	Reporting date and distribution
All	Assessment of state data against the attribute thresholds to identify degraded waterbodies	Production of assessment tables	Dr Snelder/ES	By 30 October 2019
All	Other workstreams to be defined by the final conference			
All	Combined expert conference (2 -3 days TBC between the 11 and 22 November 2019)	Final JWS	All	By 22 November 2019



Appendix 1**List of attendees at the facilitated meeting on 3 September 2019**

Alyssa Langford – Counsel (Southland Regional Council)
Philip Maw – Counsel (SRC)
Ton Snelder – SRC
Nick Ward – SRC
Ewen Rodway – SRC
Lucy Hicks – SRC
Matthew McCallum-Clark – Planner (SRC)
Elaine Moriarty – Science Manager (SRC)
Michael Garbett – Counsel (TA's) and agent for ICC Water Manager
Janan Dunning – Planner (TA's)
Sue Bennett – Scientist (TA's)
Bill Chisholm – Consultant - Certified environmental consultant - (Waiiau Rivercare Group)
Rikki Donnelly – Counsel (Waiiau Rivercare Group)
Linda Kirk – Planner (DOC)
Pene Williams – Counsel (D-GoC)
Ben Farrell – Planner (F&B/F&G)
Sally Gepp – Counsel (F&B/F&G)
Kate McArthur – (F&B/DOC)
Adam Canning – (F&B/F&G)
Lauren Phillips – (Beef & Lamb)
Karina Jordan – Planner (Beef & Lamb)
Jane Whyte – Planner (Meridian)
Mark James – Ecologist (Meridian / Alliance)
Stephen Christensen – Counsel (Meridian / Alliance)
Andrew Feierabend – (Meridian)
Humphrey Tapper – Inhouse counsel (Meridian)
Carmen Taylor – Planner (Ravensdown)
Anna Wilks – (Ravensdown)
Mark Christensen – (Ravensdown)
Darryl Sycamore – Planner (Feds)
Claire Lenihan (Feds and agent for HortNZ)
Sue Ruston – Planner (Balance)
Gerrard Willis (Fonterra / DairyNZ)



Bal Matheson (Fonterra / DairyNZ)
Justin Kitto – Freshwater ecologist (DairyNZ)
Ailsa Cain – Cultural policy (Nga Runanga)
Jane Kitson – Technical (Nga Runanga)
Treena Davidson – Planner (Nga Runanga)
James Winchester – Counsel (Nga Runanga)
Andrew Gysberts – Environment Court
Jim Hodges – Environment Court



Appendix 2

List of key tasks for experts agreed at facilitated workshop on 3 September 2019

1. Describe what is meant by “degraded”.
2. Identify the spatial framework (taking into account ki uta ki tai, te mana o te wai, and the interconnectedness of waterbodies) at which numeric attributes can be applied to determine whether a water body is degraded. Consider whether the river classification system in Appendix E is correct for this purpose.
3. In respect of ecological indicators of health, confirm whether the previously identified indicators or health/attributes (as per previous JWS’s) are the appropriate ecological indicators of health/attributes in the light of the further information provided by the Southland Regional Council.
4. Identify the numeric attribute state for each parameter for which sufficient data is available, at the appropriate spatial scale, and explain why that attribute state has been used.
5. Identify existing waterbodies that are degraded and by which attribute.
6. Liaise with experts identifying the cultural indicators of health.

Proposed Programme of Works

4 September	<p>is to confirm timetable to achieve the key tasks outlined above.</p> <p>arate workstream may be required for cultural indicators of , Rivers, Estuaries, and Lakes/ICOLS.</p> <p>S confirming the timetable and tasks will be produced and ted to the parties.</p>
16 October	is to provide an update as to progress as against the work programme identified above.
29 November	is to file final JWS.



Out of scope issues

1. A separate process is being undertaken by the Regional Council and its expert witnesses to identify the cause of continuing reduction in the aerial extent of wetlands.
2. The contents of Appendix E.
3. The land use management response to the indicators of health.
4. The planning response to the indicators of health.

