2019
Strategic Environmental Assessment for Marine and Freshwater Aquaculture Development in South Africa

APPENDIX C-2

Screening Report








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PHASE 2 OUTPUT REPORT: *IDENTIFICATION OF STRATEGIC AQUACULTURE AREAS*

Strategic Environmental Assessment for Aquaculture Development in South Africa

PHASE 2 OUTPUT REPORT:

IDENTIFICATION OF STRATEGIC AQUACULTURE AREAS

Strategic Environmental Assessment for Aquaculture Development in South Africa	
Phase 2 Output Report: Identification of Strategic Aquaculture Areas	
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Version	Final (Version 3)
Date	07 July 2017

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ABBREVIATIONS & ACRONYMS

CSIR	Council for Scientific and Industrial Research
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DSF	Decision Support Framework
ERG	Expert Reference Group
GIS	Geographic Information Systems
PES	Present Ecological State
PSC	Project Steering Committee
RAS	Recirculating aquaculture system
SAPAD	South African Protected Areas Database
SEA	Strategic Environmental Assessment

SUMMARY

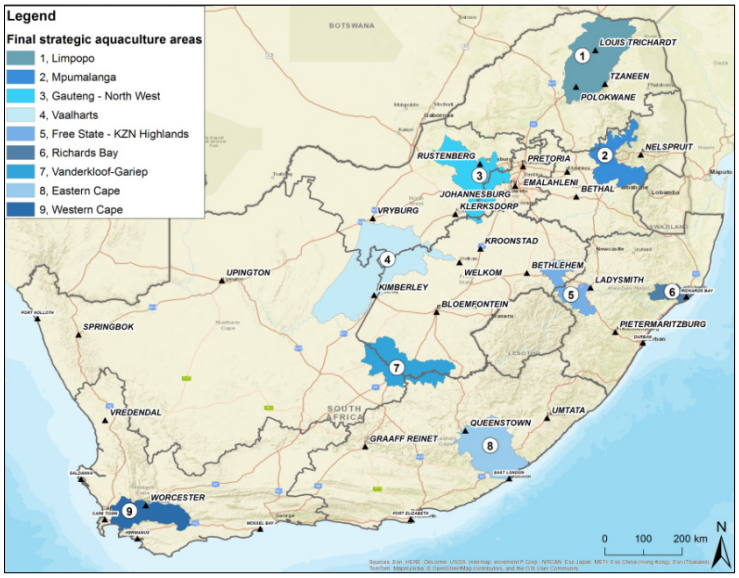
The Department of Environmental Affairs and the Department of Agriculture, Forestry and Fisheries commissioned the Council for Scientific and Industrial Research to conduct a Strategic Environmental Assessment (SEA) for Aquaculture Development in South Africa. The SEA seeks to ultimately produce a Decision Support Framework (DSF) that will provide guidance for site- and activity specific assessment processes, and supply Government with the necessary tools it needs to enable responsible, integrated and streamlined decision-making on aquaculture development.

This report provides the approach and results of a strategic areas identification process (Phase 2 of the SEA). The strategic aquaculture areas serve as study areas for specialist investigation and assessment during the Assessment Phase (Phase 3) of the SEA which creates an evidentiary basis for the DSF.

The identification of the strategic aquaculture areas for the purposes of the SEA constituted three main stages: 1) variable and threshold identification; 2) a multi-criteria analysis using Geographic Information Systems; and 3) area selection and refinement. Iterative stakeholder engagement formed an integral part of identifying the strategic aquaculture areas.

Nine final strategic areas were identified and selected for freshwater aquaculture, whilst eight strategic areas were identified and selected for marine aquaculture (or mariculture). The areas are representative of all the South African provinces.

a)



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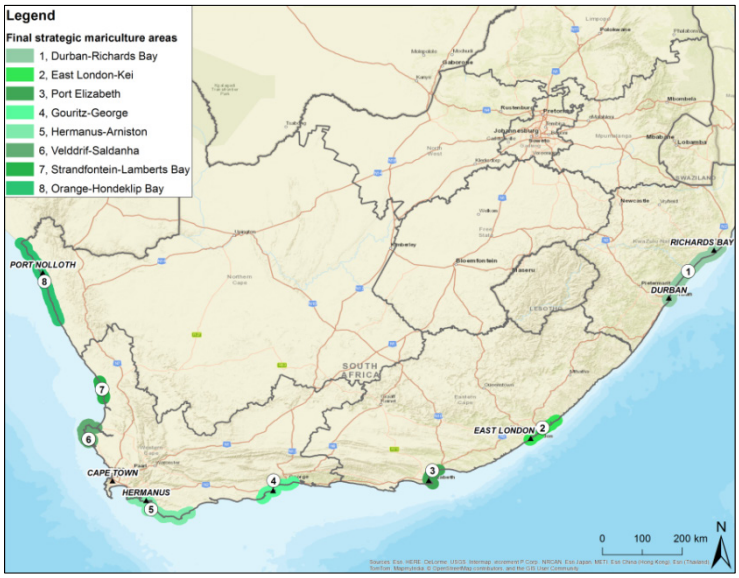
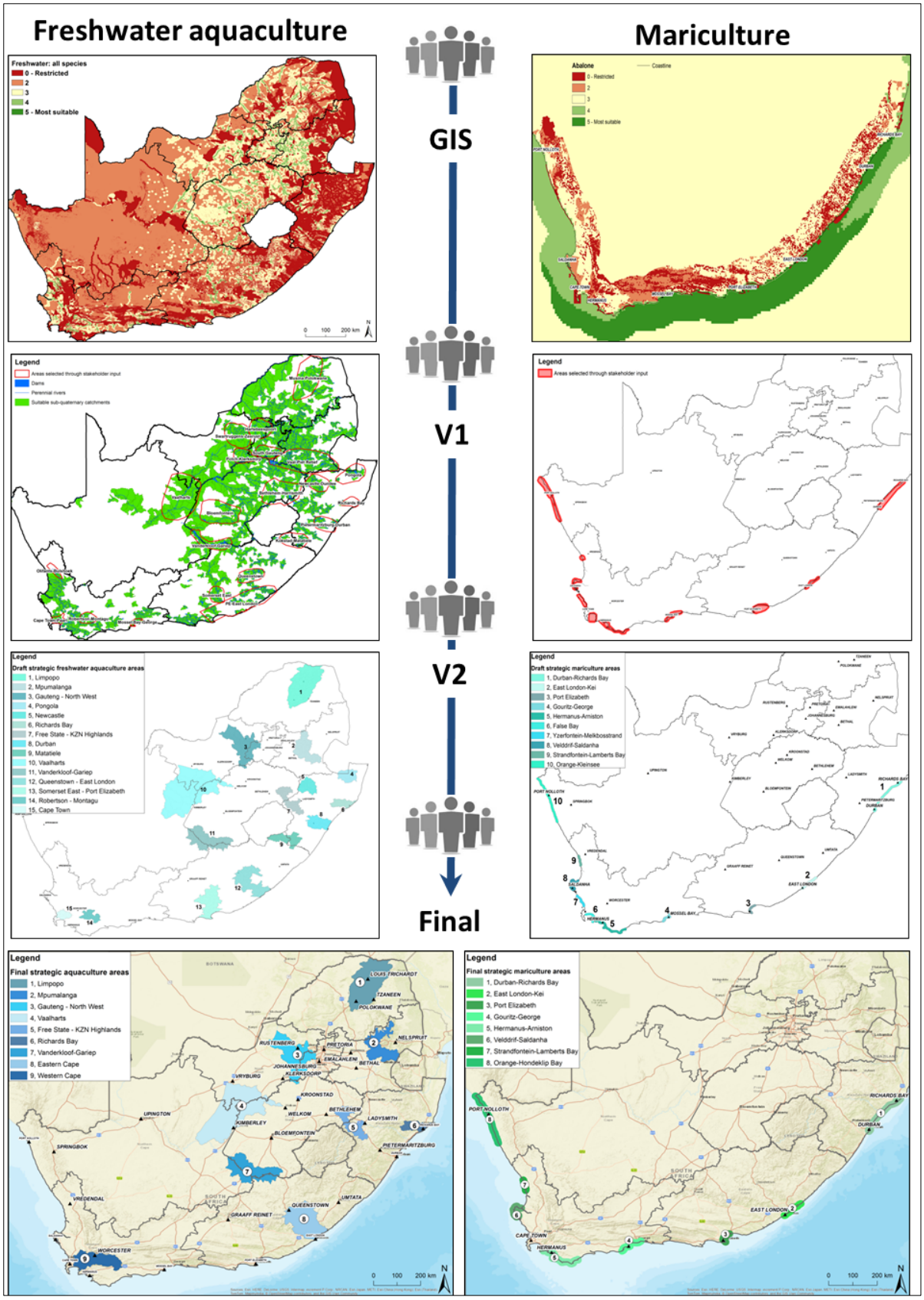


Final strategic aquaculture areas for a) freshwater aquaculture and b) mariculture



Process summary for the identification of strategic freshwater- and marine aquaculture areas, produced through a process of GIS analysis and iterative stakeholder engagement.

1 INTRODUCTION

This report is an output of the Strategic Environmental Assessment (SEA) for Aquaculture Development in South Africa, conducted by the Council for Scientific and Industrial Research (CSIR) on behalf of the Department of Environmental Affairs (DEA) and the Department of Agriculture, Forestry and Fisheries (DAFF).

A key objective of the SEA process constituted a Screening Phase (Phase 2) for which the main outcome was the "identification of draft aquaculture development zones" (hereafter referred to as strategic aquaculture areas) for marine- and freshwater aquaculture. The purpose of this document is to provide the approach and results of the strategic areas identification process. The strategic aquaculture areas serve as study areas for specialist investigation and assessment during the Assessment Phase (Phase 3) of the SEA.

In order to identify strategic freshwater and marine aquaculture areas, a multi-criteria analysis using Geographical Information Systems (GIS) was undertaken using variables that considered existing conditions, uses- and users of the environment, as well as high-level requirements of aquaculture facilities employing specific operational systems for farming different species. GIS analysis have increasingly become a crucial tool for planning and managing natural resources, and have been implemented around the world for identifying suitable, sustainable and optimal areas for aquaculture development using a range of environmental, economic, and social parameters (Nath et al., 2000; Nayak et al., 2014; Longdill et al., 2008; Stelzenmüller et al., 2017).

The identification and investigation of strategic aquaculture areas aims to i) facilitate the development of aquaculture in an environmentally responsible manner; ii) assist potential aquaculture developers by acting as a high-level development siting tool; iii) maximise the sustainability of new aquaculture development; and to iv) stimulate the industry by reducing regulatory complexity and incentivising development within the identified strategic aquaculture areas.

2 APPROACH AND OUTCOMES

The identification of the strategic aquaculture areas for the purposes of the SEA constituted three main stages (Figure 1). Key components of this process included iterative consultation with key stakeholders and a spatial analysis using Geographic Information Systems (GIS) techniques.

2.1 Stakeholder engagement

Stakeholders were engaged at key points throughout the strategic aquaculture area identification process (Table 1), and mainly consisted of (but not limited to) members of the Aquaculture SEA Project Steering Committee (PSC) and Expert Reference Group (ERG) which includes relevant national and provincial authorities, conservation agencies, research institutions, and industry representatives.

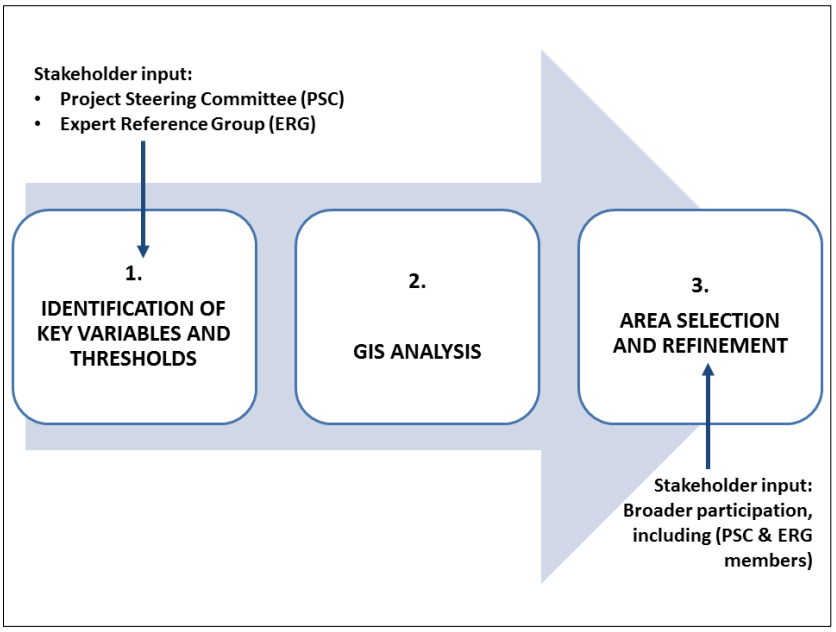


Figure 1: The three main stages in the process of identifying strategic areas for aquaculture development, with key points of stakeholder involvement.

Table 1: Summary of stakeholder interaction and associated outputs during the SEA process of identifying the strategic aquaculture areas.

FORMAT	PURPOSE	DATE	OUTPUT
Stakeholder workshop 1:	ERG Key Siting Criteria and Species Specific Thresholds workshop.	24 January 2017	• Identification and ranking of siting variables (Section 2.2) • Meeting notes (Appendix A)
Stakeholder workshop 2:	Focused internal workshop for identification of draft strategic freshwater aquaculture areas.	28 February 2017	• Version 1 draft strategic freshwater aquaculture areas (Section 2.4.1) • Meeting notes (Appendix B)
Stakeholder workshop 3:	Focused internal workshop for identification of draft strategic mariculture areas.	02 March 2017	• Version 1 draft strategic mariculture areas (Section 2.4.2) • Meeting notes (Appendix C)
Stakeholder workshop 4:	PSC feedback and workshop to refine draft suitable freshwater and marine aquaculture.	08 March 2017	• Version 2 draft strategic aquaculture areas (Sections 2.4.1 and 2.4.2) • Meeting notes (Appendix D)
Offline Review:	Broader stakeholder commenting period to refine and finalise strategic areas.	17 March – 18 April 2017	• Final strategic aquaculture areas (Section 3); • Comments and responses (Appendix E)

2.2 Stage 1: Variables and thresholds

2.2.1 Key siting variables

First, spatially explicit key siting variables, which would act as the input for the GIS analysis, were identified and selected in a workshop setting with stakeholders. The variables constituted push- and pull-factors which broadly represented environmental conditions and sensitivities; uses and users of the environment; as well as requirements of aquaculture facilities employing specific operational systems for breeding different species.

An initial list of key variables was compiled and workshopped with key stakeholders to determine key siting criteria for identifying suitable strategic aquaculture areas, per species. Workshop participants were also asked to rank the variables from one ("1" - most important / non-negotiable) to five ("5" - least important) (**Appendix F: List of key variables**).

Final selection of variables (Figure 2) depended on the importance of the variable (as ranked by stakeholders) and the availability of adequate spatial data.

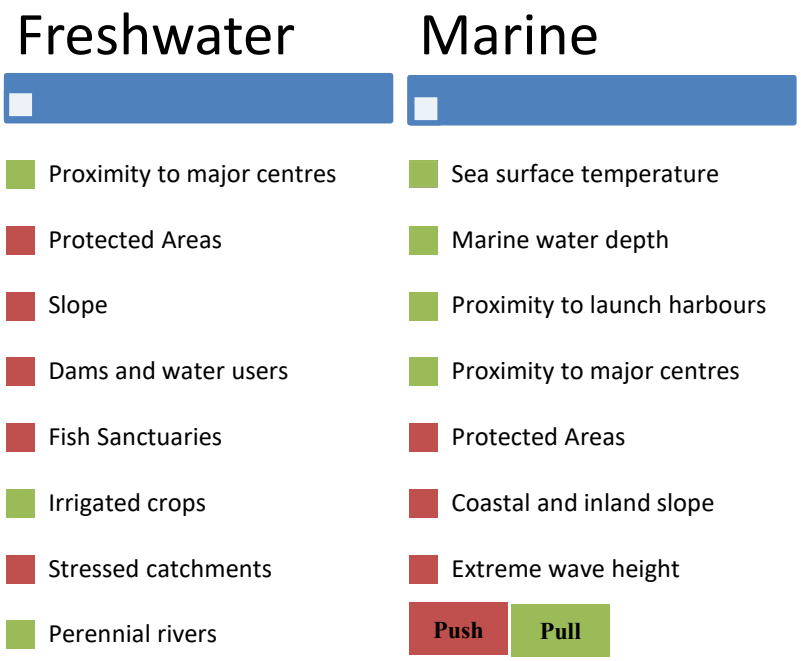


Figure 2: Selected key variables identified and ranked by stakeholders, and subsequently used as input for a GIS analysis to identify the strategic aquaculture areas. Pull factors are indicated with a green block and push factors are indicated with a red block.

2.2.2 Species-specific thresholds

Spatial data for sea surface temperature and marine water depth were available; therefore species-specific thresholds with regards to these two variables were identified for mariculture species. Optimal and tolerable ranges for these thresholds were established with stakeholder input (Table 2).

Table 2: Optimal and tolerable marine water depth and sea surface temperature ranges for mariculture species considered in the SEA.

			MARINE WATER DEPTH (m)		SEA SURFACE TEMPERATURE (°C)	
			Optimal	Tolerable	Optimal	Tolerable
OFFSHORE	Dusky kob		40	25 – 100	18 – 21	12 – 30
	Atlantic salmon		40	25 – 100	12 – 16	6 – 20
INSHORE	Dusky kob		35	25 – 70	22 – 25	12 – 30
	Atlantic salmon		35	25 – 70	12 – 16	6 – 20
	Bivalves (Mediterranean mussel & Pacific oyster)	Rafts	10	< 10	10 – 20	7 – 30
		Longlines	15 – 20	< 10	10 – 20	7 – 30
ONSHORE	Abalone (incl. micro- macro algae)			1 – 50	14 - 18	< 25

Freshwater temperature was not considered in the GIS analysis as no reliable water temperature data was available for the entire country's freshwater bodies. Furthermore, air temperature was not deemed to be a reliable proxy for water temperature. Suitable temperature ranges for the different freshwater aquaculture candidate species considered in the SEA (i.e. African sharptooth catfish, Marron, Mozambique tilapia, Nile tilapia, Brown trout, Rainbow trout) were derived from general climatic suitability based on stakeholder input in refining the study areas (see Section 2.4; Appendices B and D).

2.3 Stage 2: GIS analysis

The GIS analysis to identify strategic aquaculture areas was executed using ArcMap 10.3 software (ESRI, 2014), and consisted of: a) data preparation; b) reclassification; c) Weighted Overlay Analysis; and d) area extraction (Figure 3). This process was conducted separately for freshwater aquaculture and mariculture.

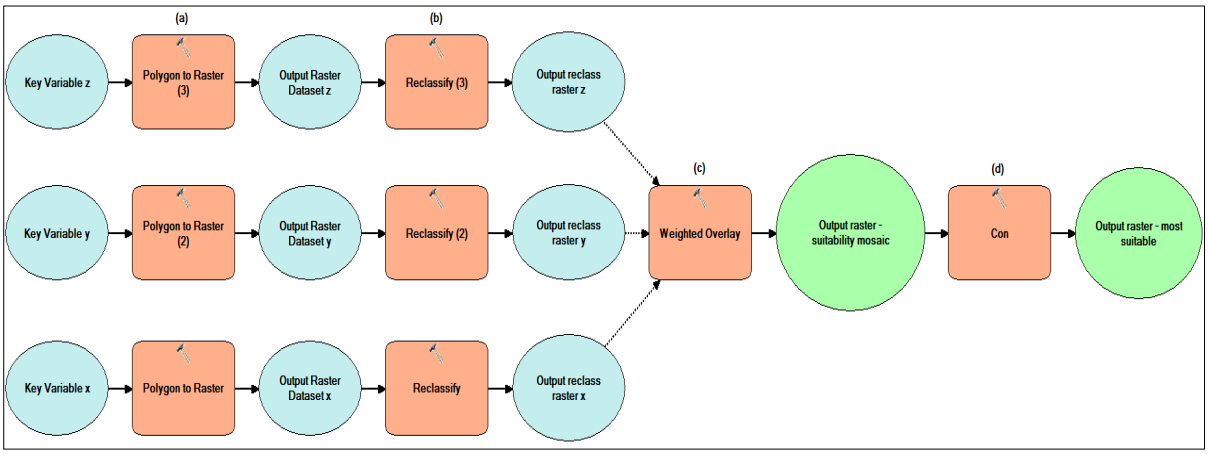


Figure 3: Schematic representation of the GIS process model for identifying strategic aquaculture areas. The process consisted of: a) data preparation; b) reclassification; c) Weighted Overlay Analysis; and d) area extraction.

2.3.1 Data preparation and reclassification

Most recent and available spatial data for the selected key variables (Table 3 and Table 4) were collated and vector data was converted to raster format. Raster data enables for the quick analysis of large and complex datasets (ESRI, 2016a).

Each raster dataset was reclassified into a gradient of classes, from 'Restricted' (0) to 'Most Suitable' (5) (see "Scale" in Table 3 and Table 4). For example: In the South African Protected Areas Database (SAPAD)

spatial dataset, a formal protected area was scaled as 'Restricted' as it is assumed no regulatory streamlining may be proposed for areas that are formally protected by law, whilst an area that is not a protected environment was scaled as 'Most Suitable' as it is assumed that, at a strategic level, there would be a smaller risk of aquaculture activities being in conflict with priority conservation areas.

2.3.2 Weighted Overlay Analysis

Weighted Overlay Analysis is a GIS spatial analysis tool that enables the analysis of multiple criteria to solve problems like site selection and suitability models (ESRI, 2016b) using intra-variable scaling and inter-variable influence. Scale and influence were broadly derived from the variable ranking input from stakeholders. The Weighted Overlay Analysis settings are presented in Table 3 (freshwater aquaculture) and Table 4 (mariculture). Metadata, including data sources, for the key variables are provided in Appendix G.

Table 3: Weighted Overlay Analysis settings for strategic freshwater aquaculture areas.

FRESHWATER AQUACULTURE			
VARIABLE	**CLASS / VALUE**	**SCALE**	**INFLUENCE**
Proximity to major Centres	20 km	4	5%
	No data	1	
Protected Areas	Botanical Garden/Mountain Catchment Area/Marine Protected Area/Protected Environment/Special Nature Reserve/Ramsar /National Park	Restricted	15%
	Biosphere Reserve	2	
	National Protected Area Expansion Strategy/Nature Reserve/Forest Nature Reserve/Forest Wilderness Area	3	
	No data	5	
Steep slope	> 10%	Restricted	10%
	No data	5	
Dams and dam users	Biological Control	2	25%
	Divert Water	3	
	Domestic	Restricted	
	Electricity	5	
	Erosion Control	2	
	Fish Barrier	Restricted	
	Flood Control	2	
	Flow Measurement	3	
	Industrial	4	
	Irrigation	5	
	Limited Agricultural Use	5	
	Mining	2	
	Municipal	Restricted	
	Recreation	3	
	River Diversion	3	
	Stock Watering	2	
	Storage	2	
	No data	1	
Fish Sanctuaries	Fish sanctuaries	Restricted	2%
	No data	5	
Irrigated crops	Optimal	4	20%
	Tolerable	3	
	No data	1	
Stressed catchments	Over-exploited / stressed catchments	1	3%

FRESHWATER AQUACULTURE			
VARIABLE	**CLASS / VALUE**	**SCALE**	**INFLUENCE**
	No data	5	
Perennial rivers and Present Ecological State (PES)	PES A / PES B / Flagship free-flowing	Restricted	20%
	PES C / PES D	5	
	PES > E	3	
	No data	1	

Table 4: Weighted Overlay Analysis settings for strategic mariculture areas.

MARICULTURE			
VARIABLE	**CLASS / VALUE**	**SCALE**	**INFLUENCE**
Sea surface temperature	Optimal	5	30%
	Tolerance	4	
	No data	1	
Marine water depth	Optimal	5	20%
	Tolerance	4	
	No data	1	
Proximity to launch Harbours	10 km	5	5%
	No data	2	
Proximity to major Centres	20 km	4	5%
	No data	1	
Protected Areas	Botanical Garden/Mountain Catchment Area/Marine Protected Area/Protected Environment/Special Nature Reserve/Ramsar /National Park	Restricted	15%
	Biosphere Reserve	3	
	National Protected Area Expansion Strategy/Nature Reserve/Forest Nature Reserve/Forest Wilderness Area	4	
	No data	5	
Steep slope	> 10%	Restricted	15%
	No data	5	
Extreme wave height (1:1yr at 15 m depth)	Extreme waves < 3.5 - 3.65	5	10%
	Extreme waves < 3.65 - 4.05	4	
	Extreme waves < 4.05 - 4.35	3	
	Extreme waves < 4.35 - 4.65	2	
	Extreme waves < 4.65 - 5.75	Restricted	
	No data	4	

Results

The output of the Weighted Overlay Analysis consisted of a mosaic of 'suitability' classes ranging from least suitable/restricted to most suitable. A single output was generated for freshwater aquaculture (Figure 4).

Mariculture species were distinguishable based on data availability for sea surface temperature and marine water depth (refer to Section 2.2.2), therefore an output for each focus species considered in the SEA (i.e. Abalone, Atlantic salmon, Dusky kob, Mediterranean mussel, Pacific oyster) was generated (Figure 5 - Figure 9).

Freshwater Weighted Overlay Analysis

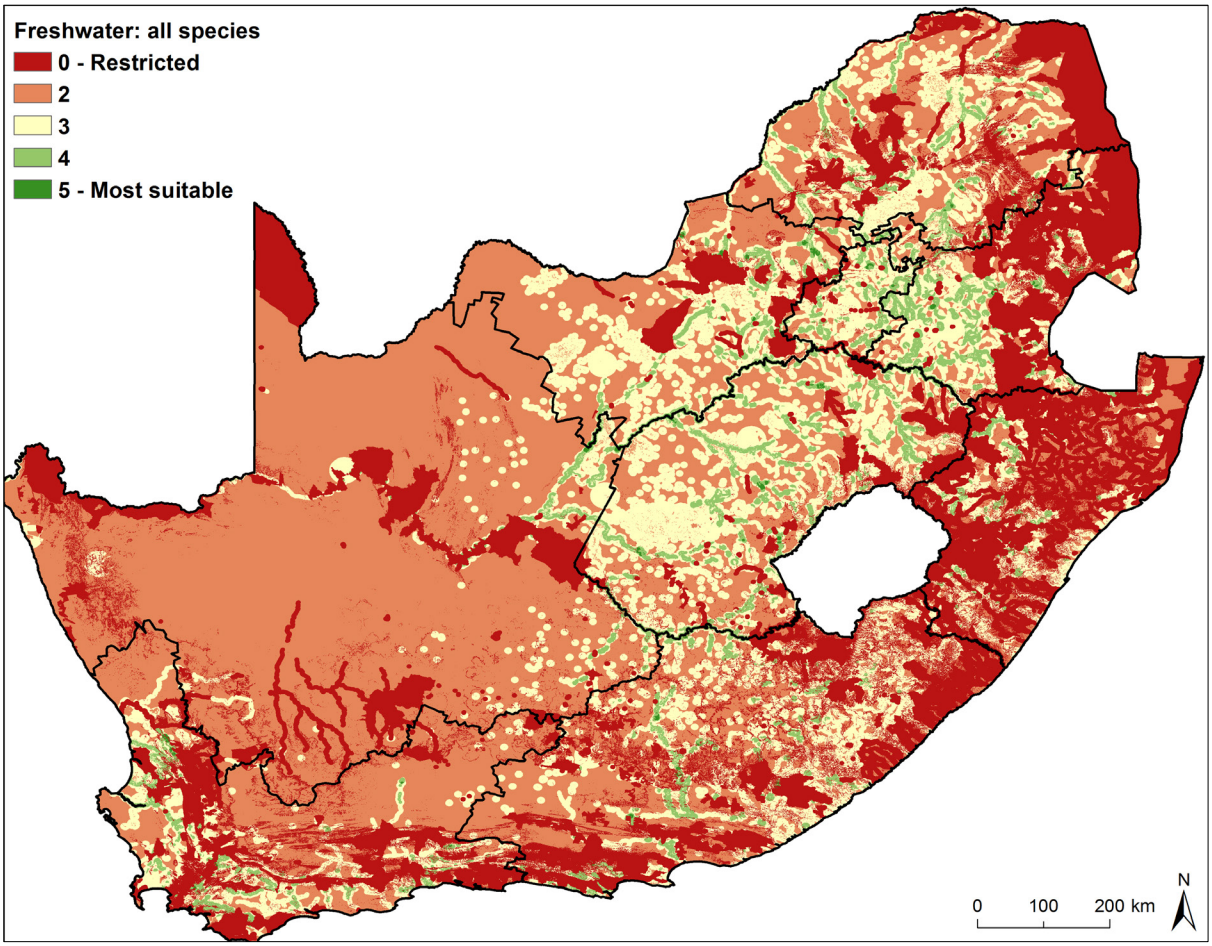


Figure 4: Weighted Overlay Analysis result for freshwater aquaculture (all species).

Marine Weighted Overlay Analysis

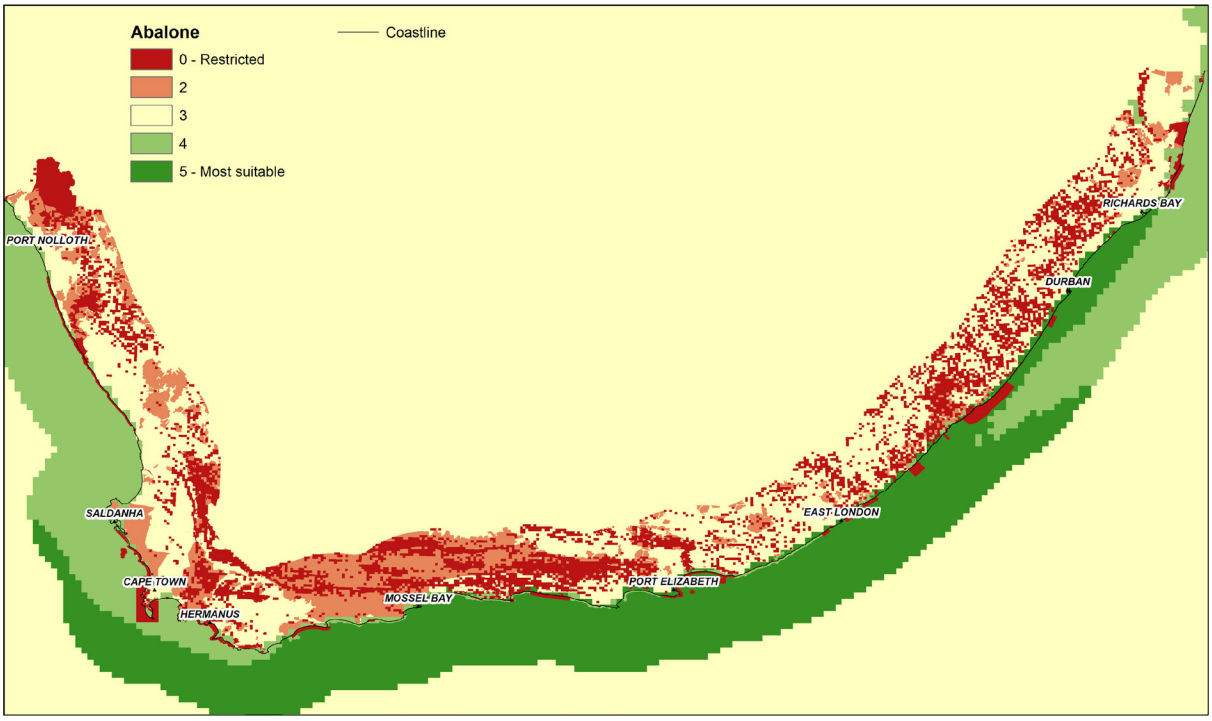


Figure 5: Weighted Overlay Analysis result for Abalone.

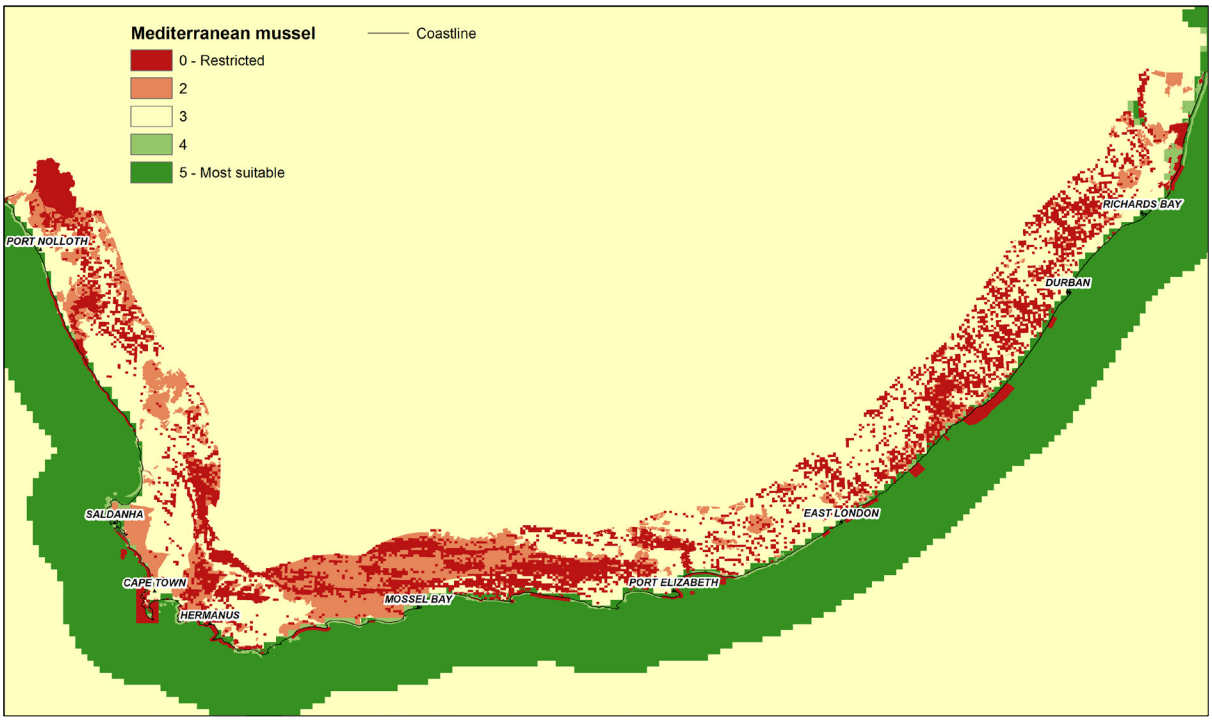


Figure 6: Weighted Overlay Analysis result for Mediterranean mussel.

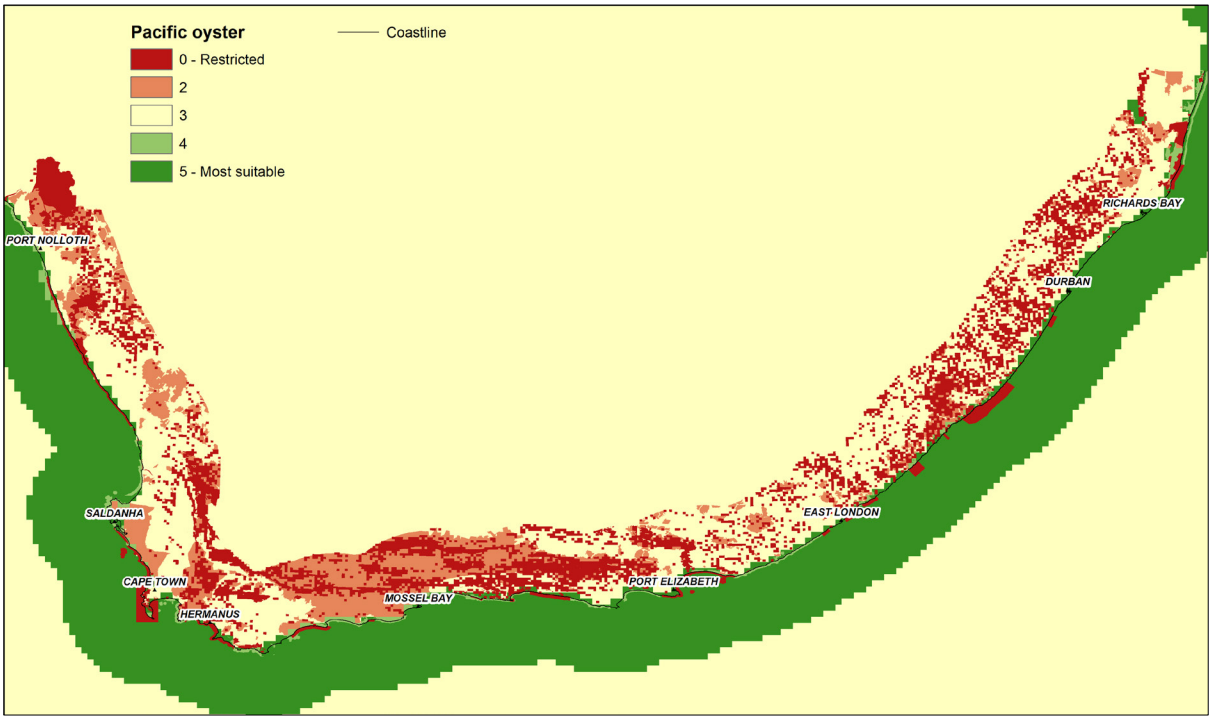


Figure 7: Weighted Overlay Analysis result for Pacific oyster.

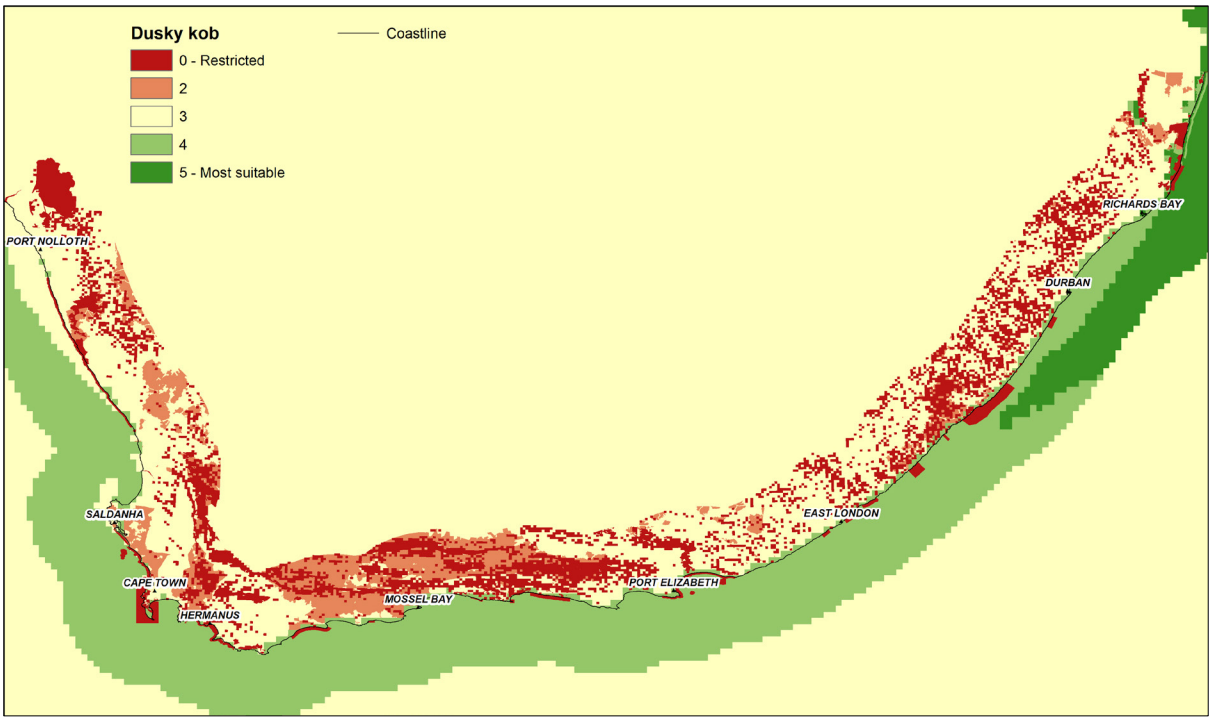


Figure 8: Weighted Overlay Analysis result for Dusky kob.

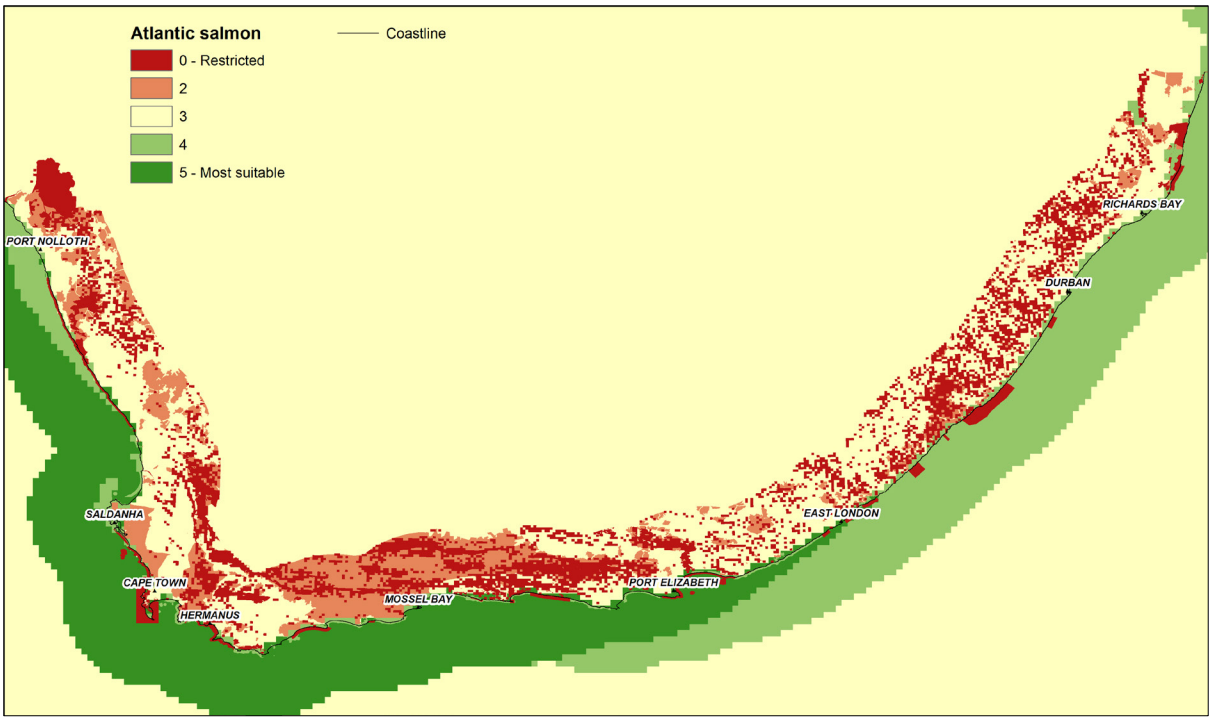


Figure 9: Weighted Overlay Analysis result for Atlantic salmon.

2.3.3 Extraction of 'suitable' sub-quaternary catchments

Most suitable areas (i.e. classes 4 and 5 in the Weighted Overlay Analysis) were extracted (Figure 10 and Figure 11). For strategic freshwater aquaculture areas, sub-quaternary catchments coinciding with most suitable classes were selected for easier identification of broader areas by stakeholders (Figure 10). The "most suitable" areas from the GIS analysis served as the point of departure for the strategic area selection and refinement by stakeholders.

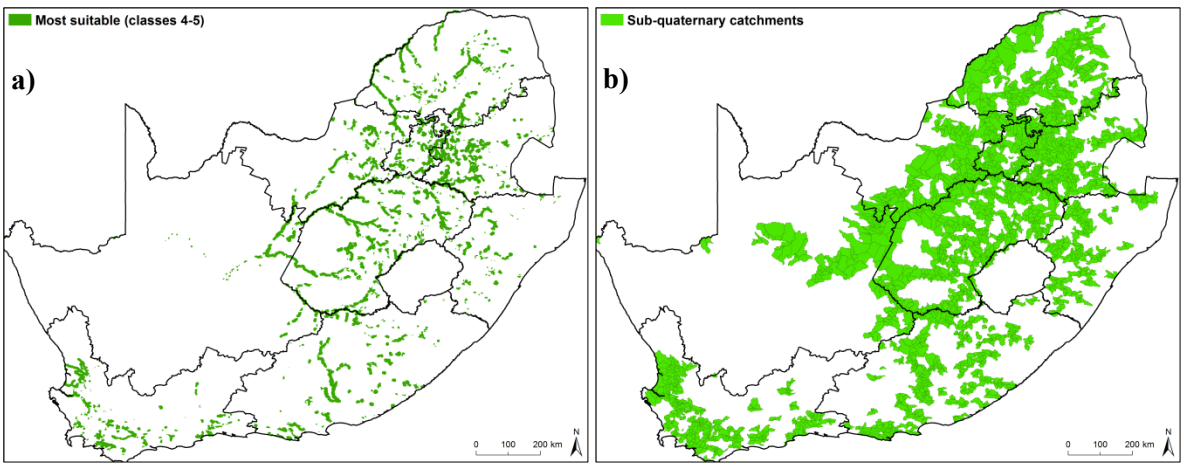


Figure 10: a) Most suitable freshwater aquaculture areas (i.e. classes 4 and 5) extracted from the Weighted Overlay Analysis output and b) corresponding sub-quaternary catchments coinciding with suitable areas served as the point of departure for strategic area identification and refinement.

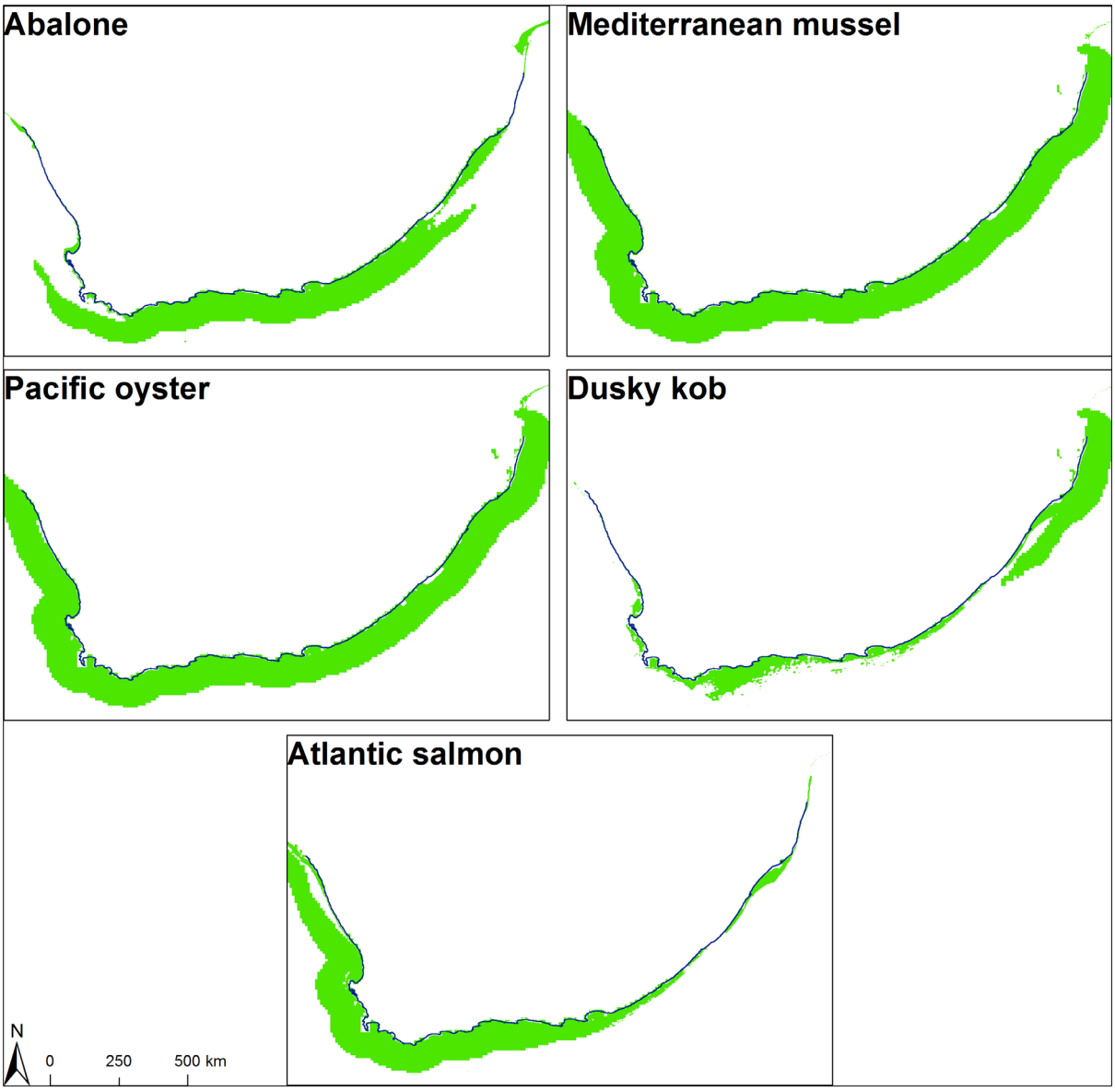


Figure 11: Most suitable mariculture areas (i.e. classes 4 and 5) extracted from the Weighted Overlay Analysis served as the point of departure for strategic area identification and refinement.

2.4 Stage 3: Area selection and refinement

2.4.1 Freshwater aquaculture

From the suitable sub-quaternary catchments in Figure 10, multiple broader areas for potential freshwater aquaculture were identified by stakeholders in a workshop on 28 February 2017 using Google Earth software (Google Earth Inc., 2015). Initially, 22 potential areas were identified (Figure 12) – each supported by a rationale for selection, as well as an indication of the species and systems that would be suitable for each area (see Appendix B).

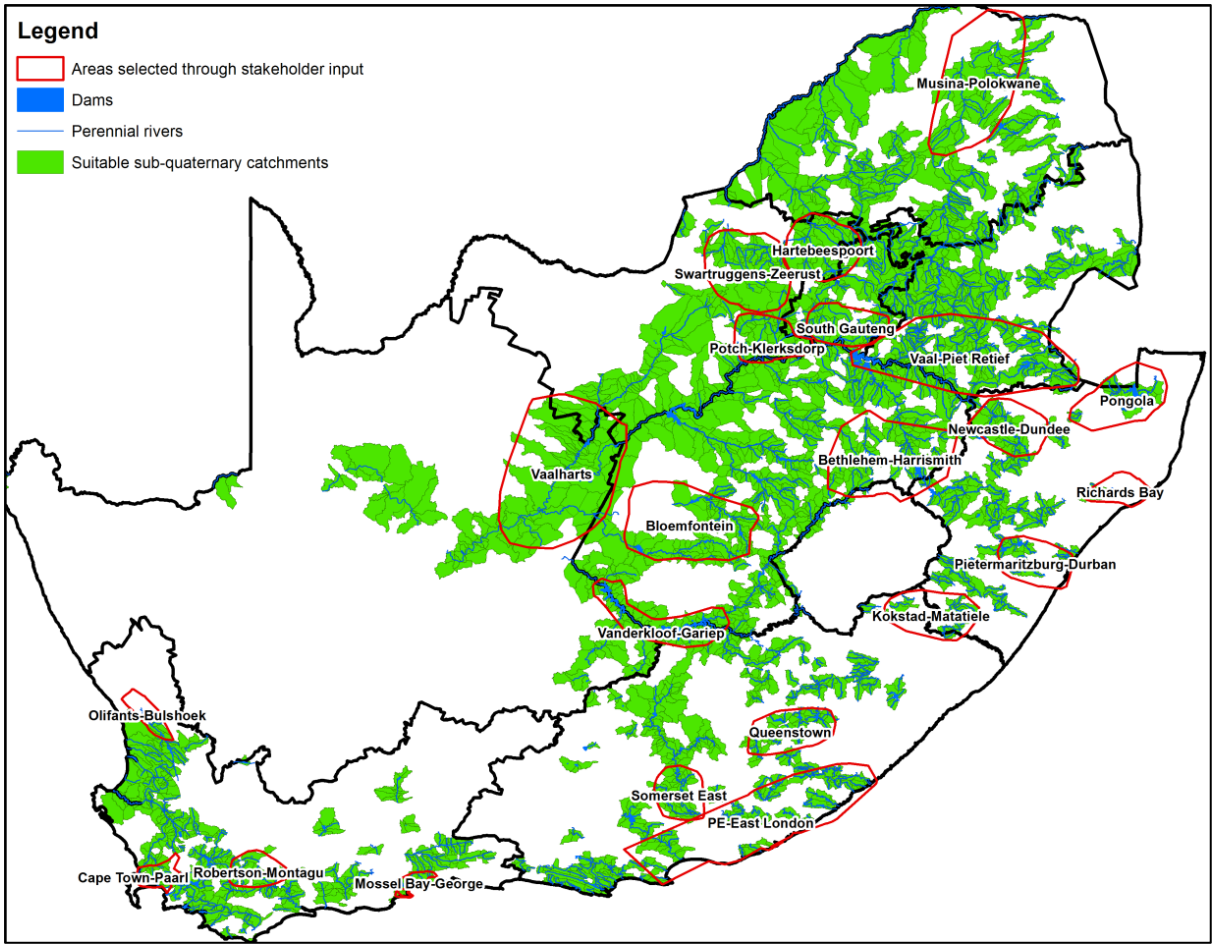


Figure 12: Draft Version 1 strategic freshwater aquaculture areas identified with stakeholder input (28 February, 2017).

The identified Version 1 draft freshwater aquaculture areas (Figure 12) were further refined with stakeholder input in a workshop on 08 March 2017. Rationales for inclusion, exclusion or changes to areas were provided (Appendix D). Areas were finally extracted as clusters of catchments (Figure 13).

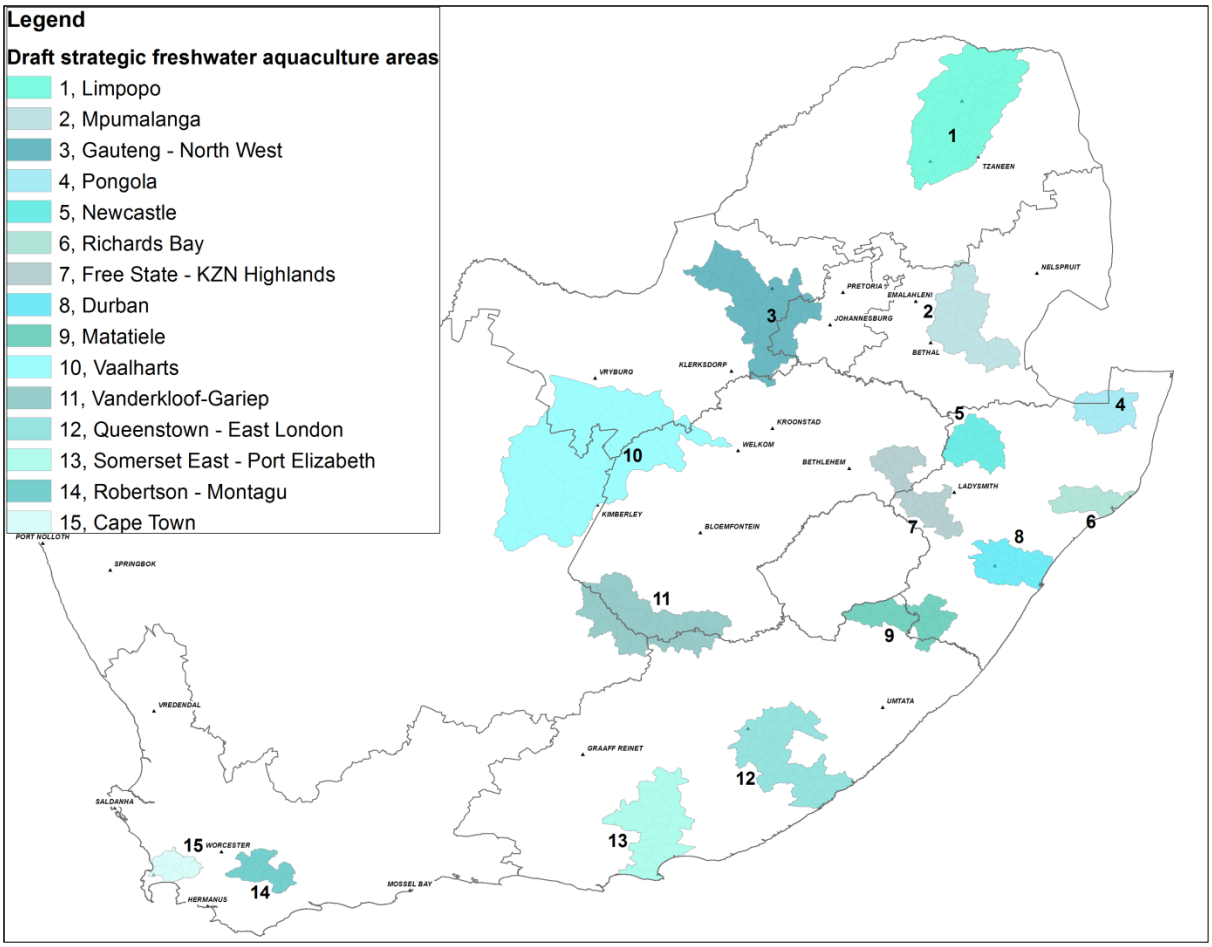


Figure 13: Draft Version 2 strategic freshwater aquaculture areas refined with stakeholder input (08 March, 2017) and extracted as clusters of catchments.

Maps of the draft Version 2 freshwater aquaculture areas (Figure 13) – including lists of dams and rivers that occur within the areas, and the species and systems proposed for each area – were circulated to a broader stakeholder group. Stakeholders included, amongst others, provincial authorities and aquaculture industry associations. Stakeholders were given instruction to provide clear rationales for inclusion, exclusion or changes to the draft areas. All comments were considered and responded to accordingly (see Appendix E), and shaped the final strategic freshwater aquaculture areas (see Section 3) that serve as study areas for specialist investigation in Phase 3 (Assessment Phase) of the SEA.

2.4.2 Mariculture

Multiple broader areas for potential mariculture were identified by stakeholders in a workshop on 02 March 2017 using Google Earth software (Google Earth Inc., 2015). Initially, 10 potential areas were identified (Figure 14) – each supported by a rationale for selection, as well as an indication of the species and systems that would be suitable for each area (see Appendix C).

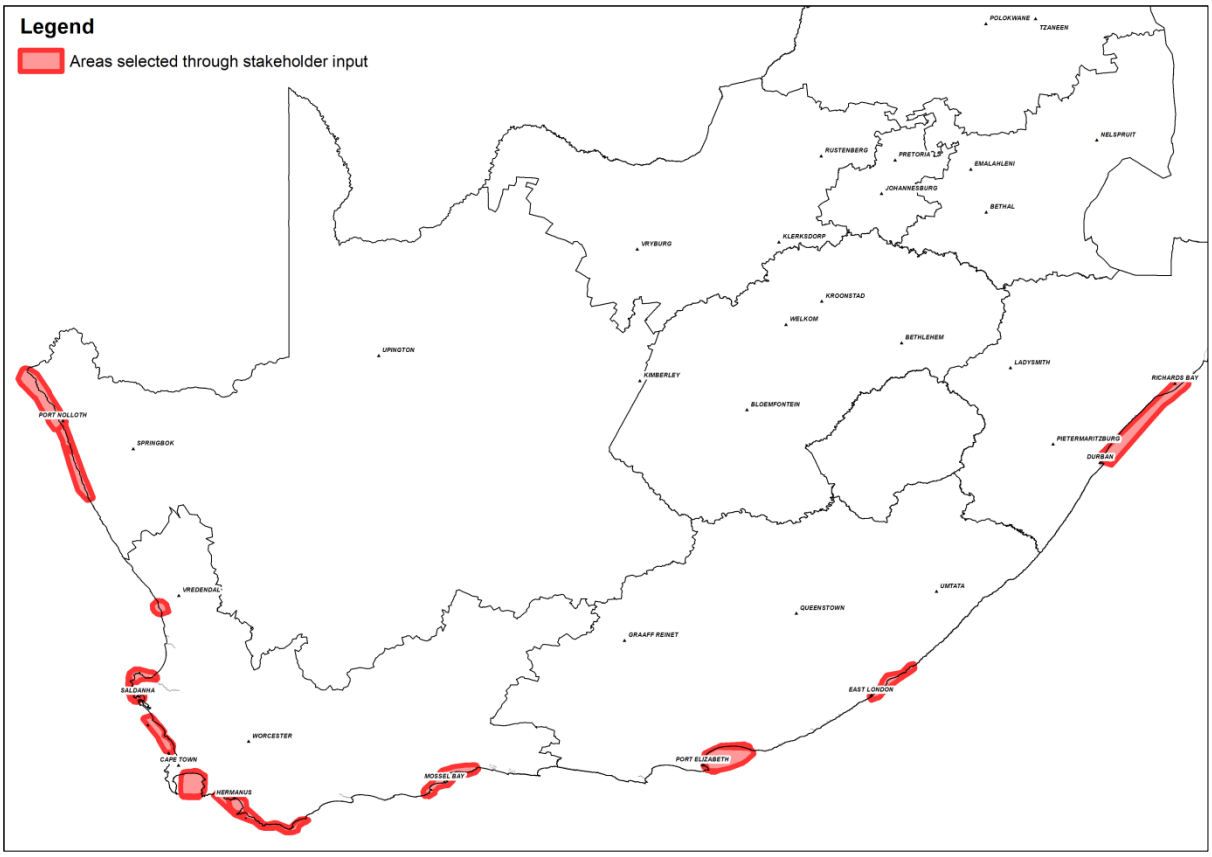


Figure 14: Draft Version 1 strategic mariculture areas identified with stakeholder input (02 March, 2017).

The identified Version 1 draft mariculture areas (Figure 14) were further refined with stakeholder input in a workshop on 08 March 2017. Rationales for inclusion, exclusion or changes to areas were provided (Appendix D). Areas were finally extracted as sections along the South African coast (Figure 15).

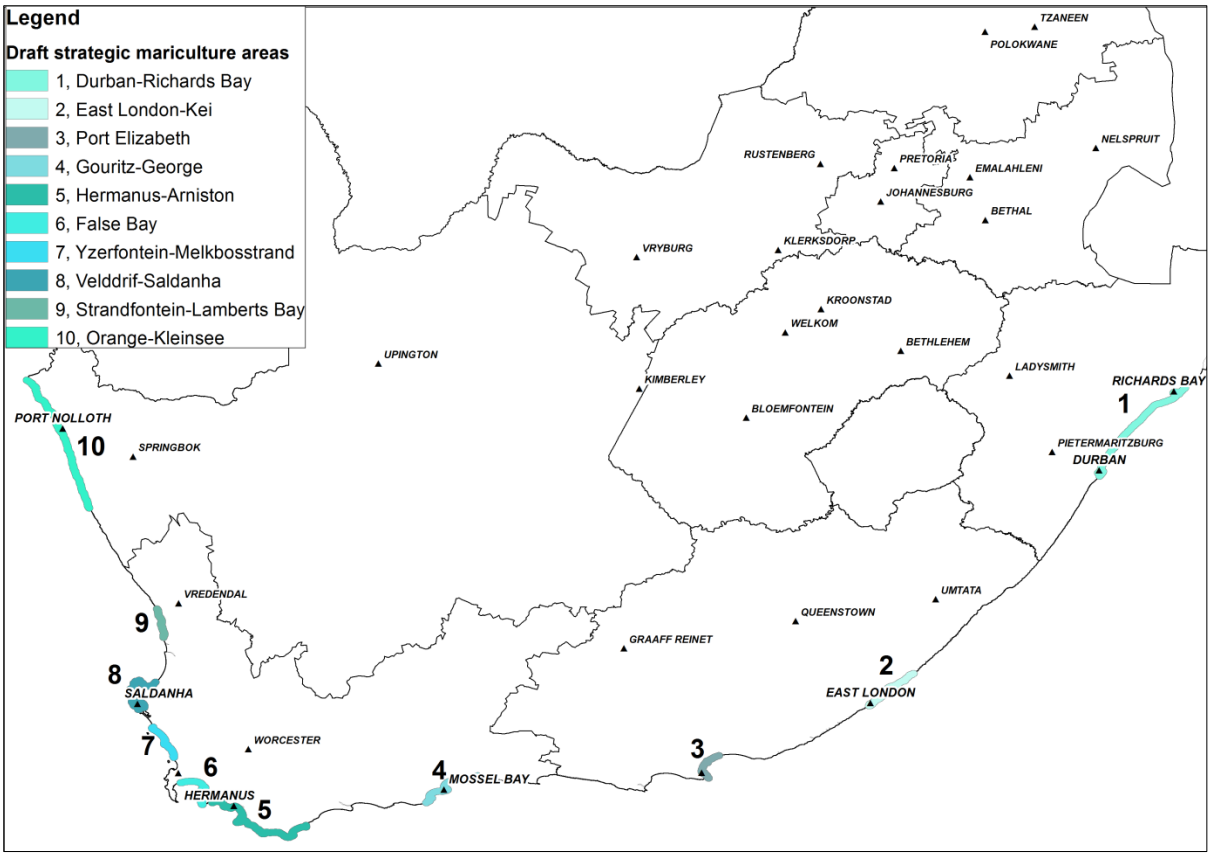


Figure 15: Draft Version 2 strategic mariculture areas refined with stakeholder input (08 March, 2017) and extracted as clusters of catchments.

Maps of the draft Version 2 mariculture areas – including the species and systems proposed for each area – were circulated to a broader stakeholder group. Stakeholders included, amongst others, provincial authorities and aquaculture industry associations. Stakeholders were given instruction to provide clear rationales for inclusion, exclusion or changes to the draft areas. All comments were considered and responded to accordingly (see Appendix E), and shaped the final strategic mariculture areas – see Section 3 – that serve as study areas for specialist investigation in Phase 3 (Assessment Phase) of the SEA.

3 FINAL STRATEGIC AQUACULTURE AREAS

A combination of GIS analysis and iterative stakeholder engagement processes (as described in Section 2 above) produced final strategic aquaculture areas (Figure 16 and Figure 17) which serve as study areas for specialist investigation in the Assessment Phase (Phase 3) of the SEA.

Figure 18 presents the final strategic aquaculture areas in relation to existing facilities (based on the Existing Facilities Database dated July 2017 (work-in-progress)). The Existing Facilities Database is a separate output from the SEA and is based on information from received from multiple stakeholders, including national and provincial authorities, conservation agencies, and industry associations.

3.1 Strategic freshwater aquaculture areas

A total of nine final strategic areas were identified and selected for freshwater aquaculture (Table 5 and Figure 16). These areas are representative of all nine South African provinces.

Table 5: Final strategic freshwater aquaculture areas, as well as the species and production systems proposed in each.

Strategic area		Species	Production system	Province
1	Limpopo	African sharptooth catfish	• Dam cage-culture • Ponds • Recirculating aquaculture system (RAS)	Limpopo
		Mozambique tilapia	• RAS • Ponds	
		Nile tilapia	• RAS	
2	Mpumalanga	Mozambique tilapia	• RAS • Ponds	Mpumalanga
		Nile tilapia	• RAS	
		Rainbow and Brown trout	• Dam cage-culture • Ponds • Flow-through (raceways & tanks) • RAS	
3	Gauteng - North West	African sharptooth catfish	• Dam cage-culture • Ponds • Flow-through (tanks) • RAS	Gauteng North West
		Mozambique tilapia	• RAS • Ponds	
		Nile tilapia	• RAS	
4	Vaalharts	African sharptooth catfish	• Dam cage-culture • Ponds • RAS	Free State North West Northern Cape
5	Free State - KZN Highlands	Rainbow and Brown trout	• Flow-through (raceways & tanks) • Dam cage-culture • Ponds • RAS	Free State KwaZulu-Natal
6	Richards Bay	African sharptooth catfish	• Dam cage-culture • Ponds • RAS	KwaZulu-Natal
		Mozambique tilapia	• RAS • Ponds	
		Nile tilapia	• RAS	
7	Vanderkloof-Gariep	African sharptooth catfish	• Dam cage-culture • Ponds • RAS	Eastern Cape Free State Northern Cape
		Rainbow and Brown trout	• Flow-through • Dam cage-culture • Ponds • RAS	
8	Eastern Cape	Marron	• RAS	Eastern Cape
		Mozambique tilapia	• RAS • Ponds	
		Nile tilapia	• RAS	
		Rainbow and Brown trout	• Flow-through (tanks)	

Strategic area		Species	Production system	Province
			• Dam cage-culture • Ponds • RAS	
9	Western Cape	Rainbow and Brown trout	• Flow-through (tanks) • Dam cage-culture • Ponds • RAS	Western Cape

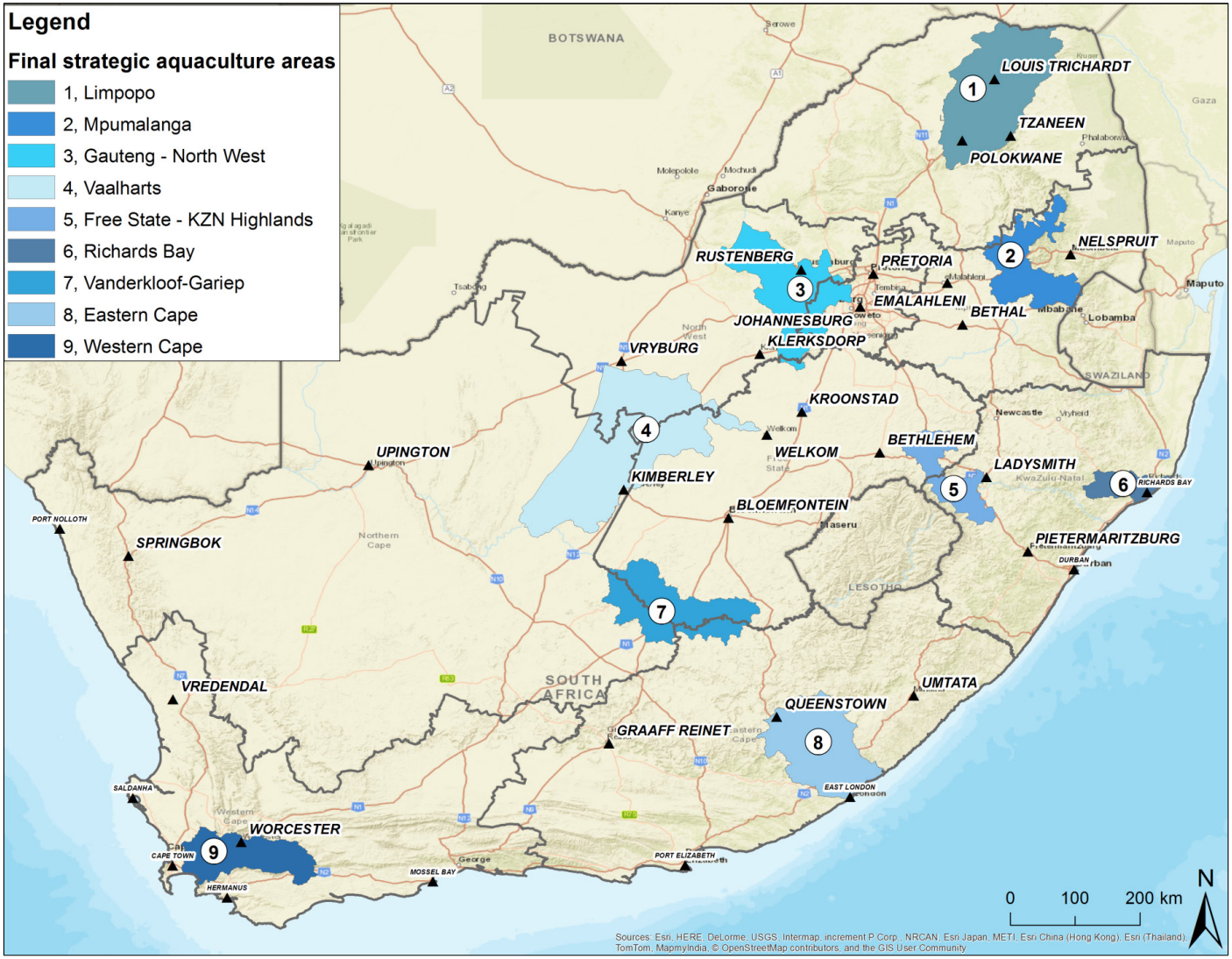


Figure 16: Final strategic freshwater aquaculture areas to be investigated in Phase 3 of the SEA.

3.2 Strategic mariculture areas

A total of eight strategic areas were identified and selected for mariculture (Table 6 and Figure 17). These areas are representative of all coastal South African provinces

Table 6: Final strategic mariculture areas, as well as the species and production systems proposed in each.

Strategic area		Species	Production system	Province
1	Durban-Richards Bay	Dusky kob	• Cage-culture • Land-based RAS • Land-based ponds	KwaZulu-Natal
2	East London-Kei	Dusky kob	• Cage-culture • Land-based RAS • Land-based ponds	Eastern Cape
		Abalone*	• Land-based flow-through tanks	
3	Port Elizabeth	Dusky kob	• Cage-culture • Land-based RAS • Land-based ponds	Eastern Cape
		Abalone*	• Land-based low-through tanks	
		Mediterranean mussel	• Longlines/rafts	
		Pacific oyster	• Longlines/rafts	
4	Gouritz-George	Abalone*	• Land-based flow-through tanks	Western Cape
		Mediterranean mussel	• Longlines	
		Pacific oyster	• Longlines	
5	Hermanus-Arniston	Abalone*	• Land-based flow-through tanks	Western Cape
		Atlantic salmon	• Cage-culture • Land-based RAS	
		Mediterranean mussel	• Long-lines	
		Pacific oyster	• Long-lines	
6	Velddrif-Saldanha	Abalone*	• Land-based flow-through tanks	Western Cape
		Atlantic salmon	• Cage-culture • Land-based RAS	
		Mediterranean mussel	• Longlines/rafts	
		Pacific oyster	• Longlines/rafts • Land-based nurseries	
7	Strandfontein-Lamberts Bay	Abalone*	• Land-based flow-through tanks	Western Cape
		Atlantic salmon	• Land-based RAS	
		Mediterranean mussel	• Longlines/rafts	
		Pacific oyster	• Longlines • Land-based nurseries	
8	Orange-Hondeklip Bay	Abalone*	• Land-based flow-through tanks	Northern Cape

Strategic area		Species	Production system	Province
		Atlantic salmon	• Land-based RAS	
		Pacific oyster	• Land-based nurseries	

*Abalone includes micro- and macro algae often associated with Abalone farms.

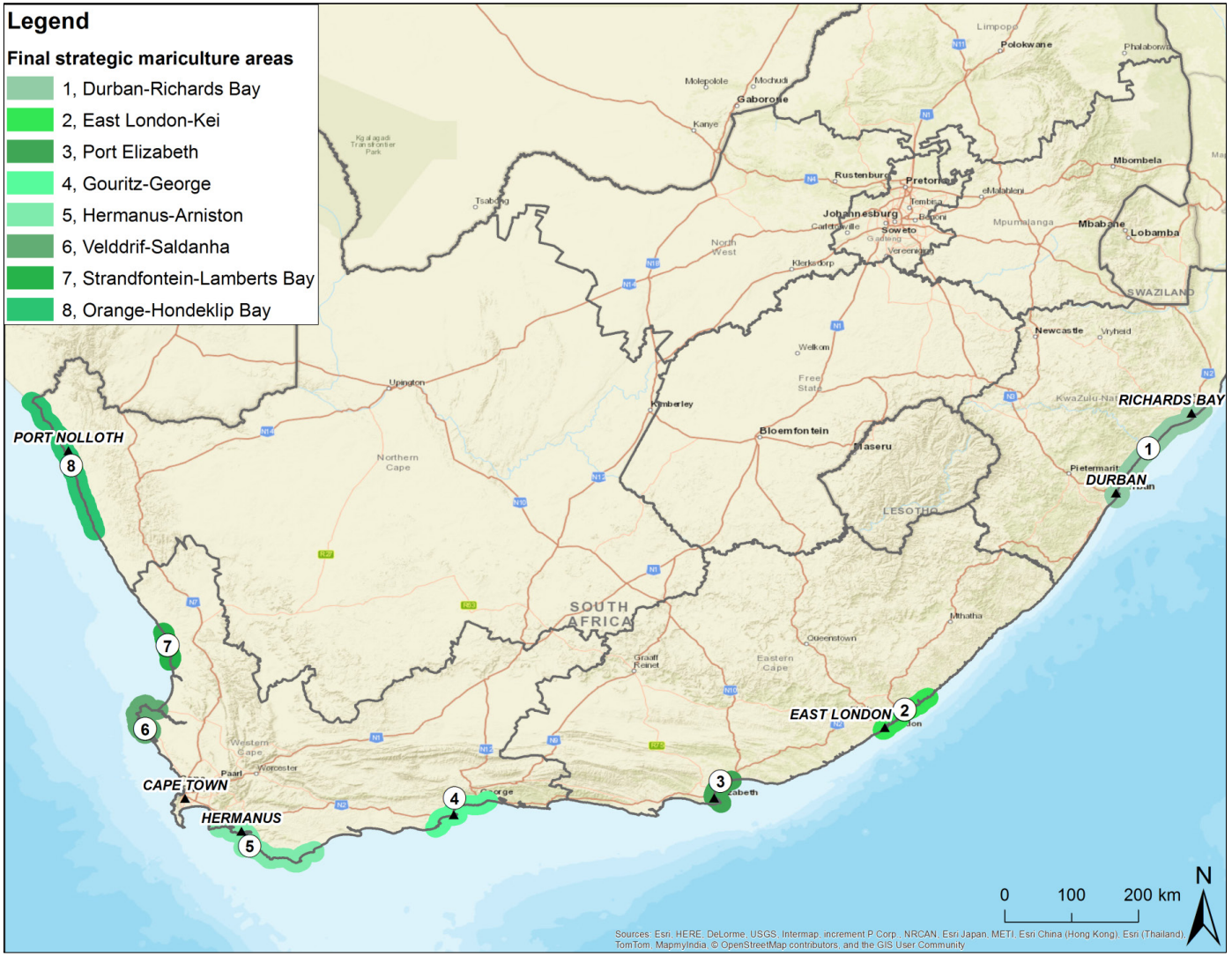


Figure 17: Final strategic mariculture areas to be investigated in Phase 3 of the SEA.

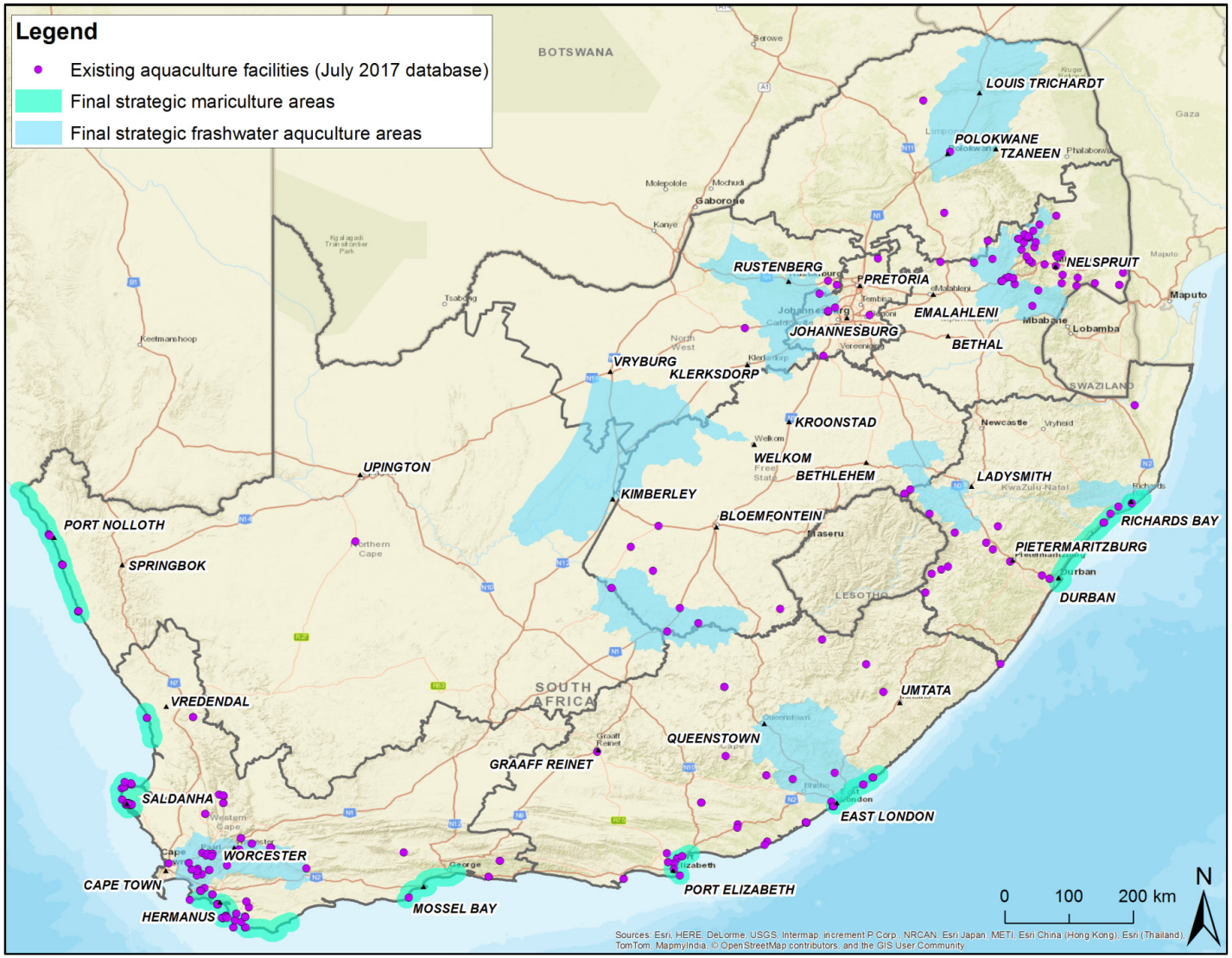


Figure 18: Final strategic aquaculture areas in relation to existing aquaculture facilities (based on the Existing Facilities Database dated July 2017).

4 ASSUMPTIONS

- The SEA is a desktop-based strategic assessment that aims, at a high level, to identify strategic areas and investigate the potential for streamlining regulatory requirements for aquaculture in those areas. However, it has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner, and will seek to exclude areas (from regulatory streamlining) within the strategic areas where the environmental impacts of aquaculture may be found to be unacceptable, and to prescribe appropriate environmental assessment and management actions in areas where aquaculture could be acceptable.
- The SEA assumes the use of natural waterbodies as water sources. Groundwater is not considered as a potential water source for this study.
- The SEA assumes no regulatory streamlining for instream freshwater aquaculture in rivers or stream, but does consider dam cage-culture of certain species.
- The SEA assumes no regulatory streamlining for mariculture development in estuaries.
- Although it is recognised that fully artificial RAS systems may be employed successfully virtually anywhere in the country, the SEA assumes minimum technology/engineering input (e.g. artificial heating or cooling). Therefore, 'natural' unsuitability from a climate perspective (e.g. too cool or hot) for a species was mainly taken into account during the strategic area identification process.
- Freshwater temperature was not considered in the GIS analysis as no reliable water temperature data could be found for the country and air temperature was not deemed to be a reliable proxy for water temperature. Temperature was considered based on stakeholder input in refining the study areas.
- Aquaculture will not in any way be restricted or prohibited outside of the strategic aquaculture areas. Any person has the right to propose aquaculture development anywhere and follow the existing regulatory requirements and processes to obtain any required authorisations and licenses.
- Consideration of the 'business case' in terms of development- and operating costs and technical - and financial feasibility is not within the scope of the SEA, but should be considered on a project-by-project basis, and is the responsibility of the developer/farmer proposing a specific aquaculture project.
- The identified strategic areas serve as study areas for the Assessment Phase (Phase 3) of the SEA, during which a specialist assessment of environmental sensitivities and an analysis of the risks and opportunities of aquaculture development will be conducted.

5 WAY FORWARD

The identified strategic areas are subject to specialist investigation in the Assessment Phase (Phase 3) of the SEA.

Proposed strategic issues/topics that will be investigated:

- Biodiversity and ecology (including aspects of water quality, quantity, and waste);
- Heritage;
- Visual and scenic resources;
- Socio-economics; and

Key components of the specialist investigations, per topic, include:

- A description of key environmental attributes and sensitivities within each area;
- Identification of key impacts of aquaculture development and their mitigation;
- A risk (and opportunity) assessment, before- and after mitigation, where risk is the collective consideration of the consequence of an impact and the likelihood of its occurrence;
- An indication of limits of acceptable change;
- Best practice guidelines; and
- Gaps in knowledge.

The specialist findings will serve as the evidentiary basis for a Decision Support Framework (DSF) that aims to provide guidance on site- and activity specific assessment processes and supply Government with the necessary tools it needs to enable responsible, integrated and streamlined decision-making on aquaculture development. This includes guidance on regulations, decision-making and assessment protocols, and monitoring requirements.

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Appendix A: Meeting notes - ERG Key Siting Criteria and Species Specific Thresholds workshop.

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National SEA for Aquaculture in South Africa
Workshop Notes

EXPERT REFERENCE GROUP (ERG) WORKSHOP:
Key Siting Criteria And Species Specific Thresholds - Level 1 and 2 Screening/Mapping

Date and Time:
24 January 2017 from 10h00-15h00

Location:
CSIR Stellenbosch, Mountain View Seminar Room

Attendees

Name	Organisation	Email
Mary-Jane Thaela-Chimuka	ARC	Thaelamj@arc.agric.za
Roger Krohn	ASSA	roger@hik.co.za
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Rainier Stephanie	WWF	srainier@wwf.org.za

Apologies

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Johan Kooij	Catfish Supreme	johankooij@yahoo.com

Appendix A: Meeting notes - ERG Key Siting Criteria and Species Specific Thresholds workshop.

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Greg Stubbs	Three Streams	Greg@threestreams.co.za

Note: In pursuit of efficiency, these notes are intended to capture the key outcomes from the discussion that influence the approach to the SEA and not as detailed minutes of the entire workshop as some aspects/issues are captured in the siting criteria matrix.

Notes

- Presentation by Lizande Kellerman, CSIR
- Comments and inputs from attending participants on each of the key variables discussed were electronically captured by CSIR on the PowerPoint presentation during the workshop. The updated PowerPoint presentation is attached to these notes.

The notes below supplement the information in the presentation:

Level 1 National-scale screening

Ferdie Endemann: The production system using racks for oysters in estuaries is being phased out; however there is one small project in Hamburg, Eastern Cape that still use racks.

Roger Krohn: The production of prawns e.g. white-leg shrimp is not a viable species in natural inshore environments off the South African coast. And prawn producers are often outcompeted by imported product available at half the price of local production. Chris Fouché and others agreed that prawns should not be included as a priority species in the SEA.

Ferdie Endemann: Seaweed can be grown using longlines like oysters. He recommended that the SEA also look at the Operation Phakisa project in Saldanha Bay where seaweed (*Gracilaria* sp.) is grown on longlines along with abalone.

Appendix A: Meeting notes - ERG Key Siting Criteria and Species Specific Thresholds workshop.

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Stewart Bernard: In terms of Harmful Algal Blooms (HABs) and extreme conditions (wave dynamics) it would be useful to consider the frequency and persistence of these undesirable events, as well as the location of occurrence, but given limited available time and budget this might not be feasible. He also added that for algae/cyanobacteria it is important to know whether a particular species is toxic, since different fin- and shellfish species at different stages of their life cycles have different sensitivities to HABs.

Mary-Jane Thaela-Chimuka: A possible workaround the complexity of the HAB variables is to perhaps consider where devastating HABs have occurred in the past 10 years and regard those as potential exclusion or 'push' areas. Ferdie Endemann supported Mary-Jane's comment adding that inshore abalone farms should ideally be located away from potential freshwater influences.

Brett Macey: Harmful cyanobacteria concentrations will probably not be an issue in big dams.

Ferdie Endemann: The definition of "offshore" could be redefined to "all areas outside of sheltered bays". Mary-Jane Thaela-Chimuka added that steep slope is a constraint for development in terms of facility construction costs onshore; however, the functioning of land-based flow-through systems is assisted by slight slope.

Dee Fischer: In other SEAs such as the Wind and Solar SEA, "no-go" areas (where development is restricted in terms of environmental legislation) were masked. This could assist in the mapping exercise to identify those areas where aquaculture development is not recommended due to unsuitability of the receiving terrain. With regards to exclusion of such areas, national parks, Marine Protected Areas (MPAs) and National Key Points e.g. coastal power stations such as Koeberg should be considered "no-go" areas.

Mary-Jane Thaela-Chimuka: There are about 117 irrigation schemes in Limpopo where the Limpopo Department of Agriculture and Rural Development (LDARD) has initiated the integrated farming of freshwater aquaculture species using irrigation water as intermediate water source. The CSIR is to contact Mr Khoza at the LDARD for more information.

Ferdie Endemann: Excluding dams currently used for domestic water use may exclude rural communities that could potentially benefit from the transformation that aquaculture may bring in that area. He further commented that data on ammonia concentrations would be the most useful indicator of freshwater quality. Pat Morant added that ammonia is very volatile and would not form dangerous concentrations in open waters e.g. dams; however, it could be a problem in tank-based systems. Stewart Bernard commented that the SEA will have to apply sensitivity mapping for each of the identified suitable dams.

Mary-Jane Thaela-Chimuka: There is a need to also look at former protected areas as some now fall under the custodianship of provincial agriculture departments. Mellisa Naiker added that there are also some forested areas in the Western Cape that have been awarded to agricultural departments.

<u>Level 2 National-scale screening</u>

Roger Krohn: Waste outfalls may provide an indication of marine water quality; however, discharges from storm water outfalls have a greater influence over water quality (e.g. in Saldanha Bay). He further added

that access to electricity is an important factor for establishing an aquaculture facility, and that an aquaculture facility generally uses approximately 2 MW of electricity per day. Effectively it is not the proximity to electricity infrastructure that is important, but rather where there is capacity for sufficient electricity supply. Luanita Snyman-van der Walt commented that current spatial data used for the purposes of the SEA include physical areas where electricity infrastructure is present; future expansion plans may be considered, where applicable, to account for potential capacity. Ferdie Endemann, Roger Krohn and Mary-Jane Thaela-Chimuka suggested that proximity to electricity could be a Level 1 screening variable.

Roger Krohn: The SEA should also consider mines that have spare electricity capacity and may also be a potential water source.

Actions:

1) CSIR to source FAO data available on ammonia standards for aquaculture.
2) Ferdie Endemann to provide CSIR with a copy of the draft Western Cape aquaculture market analysis and development programme/strategy dated 2012.
3) Ferdie Endemann to provide CSIR with extra data, including a spreadsheet model to assist in determining water needs per ton of fish production.
4) CSIR to contact Prof John Bolton and Dr Anderson at University of Cape Town (UCT) with regards to seaweed culture.
5) CSIR to contact Catherine Greengrass about marron culture, as well as to obtain a copy of the ARC's PhD study done on marron from Mary-Jane Thaela-Chimuka.
6) CSIR to contact Dr Gerhard Backeberg at the Water Research Commission (WRC), and Dr Khalid Salie at the Stellenbosch University about information on studies done regarding wave height on dams.
7) Other variables to consider: existing Operation Phakisa projects as well as existing aquaculture projects can be added by CSIR as pull factors.

Presentation on consolidated project description and approach to specialist inputs

Lizande Kellerman gave an overview of the consolidated project description and Terms of Reference for the specialist inputs.

Actions:

1) CSIR to obtain study from Ferdi Endemann on aquaculture value chains, including diagrams, to include in Project Description.

Appendix B: Meeting notes - Focused internal workshop for identification of draft strategic freshwater aquaculture areas.

Appendix B: Meeting notes - Focused internal workshop for identification of draft strategic freshwater aquaculture areas.

National SEA for Aquaculture in South Africa
Workshop Notes

INTERNAL WORKSHOP:
Refinement of draft suitable freshwater aquaculture identified through national-scale GIS screening

Date and Time:
28 February 2017 from 9h00-16h00

Location:
CSIR Stellenbosch, Mountain View Seminar Room

Attendees

Name	Organisation	Email
Paul Lochner (PL)	CSIR	PLochner@csir.co.za
Pat Morant (PM)	CSIR	pmorant@csir.co.za
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Thabo Sefike (TS)	WC DoA	thabos@elsenburg.com
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Henk Stander (HS)	University of Stellenbosch	hbs@sun.ac.za

Note: In pursuit of efficiency, these notes are intended to capture the key outcomes from the discussion that influence the approach to the SEA and the actions to be taken forth and not as detailed minutes of the entire workshop as some are captured in the GIS format. Points of discussion where captured as annotations in the mapping during the workshop.

Purpose of this meeting was to discuss and refine the draft suitable freshwater aquaculture areas, identified through GIS analysis at a national-scale (Level 1 screening), per province.

Key actions from the workshop:

1. LSvdW to overlay latest map from DEA on where trout occur onto our green areas (proposed trout areas), to check for consistency. LSvdW to check with DEA/DAFF that we have the latest available version of the trout mapping by DEA as at 28/02/2017 (confirm by 07 March).
2. LK to contact Gerrie van der Merwe (aka “oom Gerrie”) to find out more about the Mpumalanga seven suitable dams (input needed by 07 March).
3. LSvdW to overlay Nile Tilapia distribution, if available. LK to send the latest maps to Stanley Rogers at Limpopo DEDET to check (by 07 March), and possibly also Ben van der Waals and Nick James, for their comment.
4. LSvdW to split the suitability maps into cold water species (i.e. trout) and warm water species (i.e. tilapia). And also indicate which of these areas are also suitable for catfish and marron.

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5. Look for clusters of suitable dams and add suitable dam info, using inputs from (2) and "top dams for aquaculture" listed below.
6. LK to send revised mapping and green areas to key government experts in the provinces (first) and then to leading fish farm developers, for comment.
7. LK to check that we have identified the top dams for aquaculture in SA, and then source more details on these dams from DWS (e.g. phosphorus levels, volume and turnover of water).

As a high-level check, we identified the following as the top dams for cage culture or for use of water below the exit in raceway:

1. Nandoni Dam in Venda, Limpopo (part of Luvuvhu River, formerly known as Mutoti dam).
2. Sterkfontein Dam near Harrismith, Free State (part of Tugela-Vaal water project).
3. Roodeplaat Dam near Pretoria, Gauteng
4. Hartbeestpoort Dam near Brits, North West
5. Vanderkloof Dam near Petrusville, Northern Cape
6. Seven to nine dams in Mpumalanga (LK to obtain details from Gerrie Van der Merwe)
7. Bergriver Dam near Franschoek, Western Cape
8. Kloof Dam near Clarens, Free State (downstream of Mohale dam)
9. Midmar Dam near Howick, KwaZulu Natal
10. Vaal Dam (may not be suitable as this the major water supply for Gauteng Province)
11. Grootdraai Dam near Standerton, Mpumalanga.

Experts that need to be contacted:

1. Frans Swanepoel: Tilapia Aquaculture Association of South Africa
2. Len Coetzer: Mpumalanga DARDLEA
3. Patricia Ledwaba: Mpumalanga DARDLEA
4. Mary Jane Thaela-Chimuka: Agricultural Research Council
5. Johan Kooij: Catfish Supreme
6. Nick James: Tilapia Growers Association
7. Stanley Rogers: Limpopo DEDET
8. Gerrie Van der Merwe: Mpumalanga Trout Forum / Trout South Africa
9. Ian Rushworth: Ezemvelo KZN Wildlife
10. Catherine Greengrass: ARC (she is working with Mary-Jane)
11. Roger Krohn: Aquaculture Association of South Africa
12. Gerhard Backeberg: Water Research Commission
13. Khalid Salie: Stellenbosch University

Appendix B: Meeting notes - Focused internal workshop for identification of draft strategic freshwater aquaculture areas.

National SEA for Aquaculture in South Africa
Workshop Notes

WORKSHOP OUTCOMES

	AREA	SPECIES	PROVINCE	WATERCOURSE	RATIONALE AND COMMENTS
1	**Musina-Polokwane**	**Catfish; Tilapia**	Limpopo	Rivers flowing to and from the Limpopo River; Nandoni dam	- Rivers flowing from/to Limpopo river. Expert input indicated that Nile tilapia may already be present in these watercourses. - Still to determine - for tilapia, would ponds and dam cage-culture be acceptable?
2	**Vaal-Piet Retief**	**Trout**	Mpumalanga	Various rivers; Vaaldam; Grootdraai dam	- WRC inland fisheries study also considers Heyshope and Grootdraai for inland fisheries; therefore could also be suitable for dam cage culture and/or water source for off-stream. - SANBI trout mapping (Dec, 2016) shows trout is **not currently extensively present** in this area. - May be expected that DWS will have an issue with Vaaldam as it is a key drinking water dam. Cages not feasible as dam levels variable - e.g. recent drought and floods, but potential as water source for off-stream. - The variability of climate of the Highveld (extreme min & max temperatures) may pose a risk.
3	**South Gauteng**	**Trout**	Gauteng	Various rivers	- Potential for off-stream aquaculture with various rivers as water sources. - SANBI trout mapping (Dec, 2016) shows trout is **not currently extensively present** in this area. - The variability of climate of the Highveld (extreme min & max temperatures) may pose a risk.
4	**Hartebeespoort**	**Catfish; Tilapia;**	North West; Gauteng	Various rivers; Hartebeespoort dam;	- SANBI trout mapping (Dec, 2016) shows trout is **not currently extensively present** in this area.

Appendix B: Meeting notes - Focused internal workshop for identification of draft strategic freshwater aquaculture areas.

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	AREA	SPECIES	PROVINCE	WATERCOURSE	RATIONALE AND COMMENTS
		Trout		Roodeplaat dam	- The variability of climate of the Highveld (extreme min & max temperatures) may pose a risk.
5	**Potch-Klerksdorp**	**Catfish;** **Trout**	North West	Various rivers; Boskop dam; Potchefstroom dam; Modder dam; Rietspruit dam; Klipdrift dam	- SANBI trout mapping (Dec, 2016) shows trout **is currently present** in some sub-quaternary catchments in this area (around Potchefstroom). - The variability of climate of the Highveld (extreme min & max temperatures) may pose a risk.
6	**Swartruggens-Zeerust**	**Catfish;** **Tilapia;** **Trout**	North West	Various rivers	- SANBI trout mapping (Dec, 2016) shows trout **is currently present** in some sub-quaternary catchments in this area. - The variability of climate of the Highveld (extreme min & max temperatures) may pose a risk.
7	**Bethlehem-Harrismith**	**Trout**	Free State	Various rivers; Sterkfontein dam;	- Highlands area with cooler climate which is good for trout. - SANBI trout mapping (Sept, 2016) shows trout **is currently present** in some sub-quaternary catchments in this area.
8	**Bloemfontein**	**Trout**	Free State	Krugersdrift dam; Rustfontein dam; Kalkfontein dam; Masels poort;	- SANBI trout mapping (Sept, 2016) shows trout is **not currently extensively present** in this area.
9	**Vanderkloof-Gariep**	**Trout**	Free State; Northern	Vanderkloof dam; Gariep dam	- Operation Phakisa initiatives in Vanderkloof dam. SANBI trout mapping (Dec, 2016) shows trout is **not currently extensively present** in this area.

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	AREA	SPECIES	PROVINCE	WATERCOURSE	RATIONALE AND COMMENTS
			Cape; Eastern Cape		- Government trout hatchery at Gariep dam. - SANBI trout mapping (Dec, 2016) shows trout **is currently present** in sub-quaternary catchments in associated with Gariep dam. - Gariep dam water quality not great – very turbid, sediment trap.
10	**Vaalharts**	**Catfish**	Northern Cape	Spitskop dam; Vaalharts dam	- Vaalharts irrigation scheme. - Water management will be crucial here due to the method of irrigation; dams get drained on a daily basis. Water sustainability issues.
11	**Newcastle-Dundee**	**Trout**	KwaZulu Natal	Various rivers; Ntshingwayo (Chelmsford) dam	- SANBI trout mapping (Dec, 2016) shows trout **is currently present** in some sub-quaternary catchments in this area
12	**Pongola**	**Catfish; Tilapia**	KwaZulu Natal	Various rivers; Pongolaspoort dam	- Good area for subsistence aquaculture of tilapia and catfish.
13	**Richards Bay**	**Catfish; Tilapia**	KwaZulu Natal	Mhlatuze river; Goedertrou dam	- Good for Tilapia and catfish (pond culture – Mozambique tilapia & catfish)
14	**Pietermaritzburg-Durban**	**Catfish; Tilapia**	KwaZulu Natal	Various rivers; Midmar dam	- Close to Durban markets.
15	**Kokstad-Matatiele**	**Trout**	KwaZulu Natal; Eastern	Various rivers	- SANBI trout mapping (Dec, 2016) shows trout **is currently extensively present** in this area. - Close to Durban markets.

Appendix B: Meeting notes - Focused internal workshop for identification of draft strategic freshwater aquaculture areas.

National SEA for Aquaculture in South Africa
Workshop Notes

	AREA	SPECIES	PROVINCE	WATERCOURSE	RATIONALE AND COMMENTS
			Cape		- No large dam infrastructure, therefore no opportunity for cage-culture.
16	**PE-East London**	**Tilapia; Marron**	Eastern Cape	Various rivers	- Close to markets. - Perhaps too cold for Tilapia in ponds, but opportunity for RAS. - Marron in colder areas around Stutterheim.
17	**Somerset East**	**Trout**	Eastern Cape	Groot-vis river; Elandsdrift dam	- Climatic variability. - Perhaps potential for seasonal trout aquaculture. - SANBI trout mapping (Dec, 2016) shows trout **is currently present** in some sub-quaternary catchments in this area.
18	**Queenstown**	**Trout; Marron**	Eastern Cape	Various rivers; Xonxa dam; Lubisi dam	- SANBI trout mapping (Dec, 2016) shows trout **is currently extensively present** in this area. - Marron in escape-proof RAS; no flow-through ponds.
19	**Mossel Bay-George**	**Catfish; Trout**	Western Cape	Various rivers; Klipheiwe dam; Hartebeeskuil dam	- Seasonal using RAS only. - CapeNature has serious reservations about this area. - SANBI trout mapping (Dec, 2016) shows trout **is currently present** in some sub-quaternary catchments in this area around George. - CapeNature are sensitive about African sharptooth catfish. Invasive, and stocked illegally. Only RAS in areas where it was legally established (Cape Flats & Eersteriver basin). - Will allow RAS of Nile tilapia where there is Mozambique tilapia Tilapia only where legally established already.
20	**Robertson-Montagu**	**Trout**	Western Cape	Various rivers	- SANBI trout mapping (Dec, 2016) shows trout **is currently present** in some sub-quaternary catchments in this area.
21	**Cape Town-Paarl**	**Tilapia;**	Western	Urban aquaculture;	- Good area to promote aquaculture in urban areas and industrial zones using RAS systems.

Appendix B: Meeting notes - Focused internal workshop for identification of draft strategic freshwater aquaculture areas.

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Workshop Notes

	AREA	SPECIES	PROVINCE	WATERCOURSE	RATIONALE AND COMMENTS
		Marron (Urban Aquaculture) **Trout**	Cape	Bergriver dam	- Bergriver dam - race-way below the dam based on intake position. SANBI trout mapping (Dec, 2016) shows trout **is currently extensively present** in this area. - CapeNature Sensitive about African sharptooth catfish. Invasive, and stocked illegally. Only RAS in areas where it was legally established (cape flats & eersteriver basin). - Will allow RAS for Nile tilapia where there is Mozambique tilapia Tilapia only where legally established already.
22	**Olifants-Bulshoek**	**Catfish;** **Tilapia**	Western Cape	Olifants river, upstream of Bulshoek dam	- Seasonal, climatic variability. - Potential to utilise canals as raceways. - CapeNature are sensitive about African sharptooth catfish. Invasive, and stocked illegally. Only RAS in areas where it was legally established (Cape Flats & Eersteriver basin). - Will allow RAS for Nile tilapia where there is Mozambique tilapia Tilapia only where legally established already.

Appendix C: Meeting notes - Focused internal workshop for identification of draft strategic mariculture areas.

Appendix C: Meeting notes - Focused internal workshop for identification of draft strategic mariculture areas.

National SEA for Aquaculture in South Africa
Workshop Notes

INTERNAL WORKSHOP:
Refinement of draft suitable marine aquaculture identified through national-scale GIS screening

Date and Time:
02 March 2017 from 09:00-16:00

Location:
CSIR Stellenbosch, Mountain View Seminar Room

Attendees

Name	Organisation	Email
Andrea Bernatzeder (AB)	DAFF	AndreaB@daff.gov.za
Paul Lochner (PL)	CSIR	PLochner@csir.co.za
Pat Morant (PM)	CSIR	pmorant@csir.co.za
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Luanita Snyman-van der Walt (LSvdW)	CSIR	LvdWalt1@csir.co.za
Karabo Mashabela (KM)	CSIR	KMashabela1@csir.co.za
Ferdie Endemann (FE)	WC DoA	ferdiee@elsenburg.com
Thabo Sefike (TS)	WC DoA	thabos@elsenburg.com
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Apologies:

Name	Organisation	Email
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Note: In pursuit of efficiency, these notes are intended to capture the key outcomes from the discussion that influence the approach to the SEA and the actions to be taken forth and not as detailed minutes of the entire workshop as some are captured in the GIS format. Points of discussion where captured as annotations in the mapping during the workshop.

Purpose of this meeting was to discuss and refine the draft suitable Marine aquaculture areas, identified through national-scale Level 1 screening per province.

Key actions from the workshop:

1. LSvdW to adapt the water temperature profile for Dusky kob to between 20˚C and 30˚C.

2. LSvdW to adapt the weighting of the water temperature and water depth variables so that water temperature has higher weighting (e.g. 35%) than water depth (e.g. 15%).
3. LSvdW to adapt the optimal water temperature profile for Abalone to between 14˚C and 18˚C, with the "tolerable" upper limit reduced from 25°C to 22°C.
4. LK to source Saldanha ADZ EIA as a valuable input for finer scale mapping and specialist investigations, especially re planned exclusion zones. Saldanha has been identified through Level 1 screening as a potential study area for the SEA going forward.
5. LSvdW to consider the usefulness of overlaying the natural distribution range of indigenous brown seaweeds (kelp) such as *Ecklonia maxima* and *Laminaria pallida* with suitable sites for abalone farming as kelp is a natural food source for abalone.
6. Abalone suitable areas: The Silverstroom coast (west coast, north of Cape Town) was identified as technically suitable for abalone. However, conservation planning and thus constrained available land could rule out the area. LSvdW to check terrestrial biodiversity constraints and conservation planning to confirm.
7. LSvdW to capture points raised in the workshop as annotations to the mapping exercise.

<u>Additional information to consider</u>:

1. LSvdW to consider previous studies e.g. Shiran, 2003; Anchor, 2011; and Advance Africa, 2016 and cross-check recommended suitable aquaculture areas for candidate species from those studies with our current mapping. LK has sourced copies of all aforementioned studies and spatial data from Shiran, 2003 study was obtained from FE.
2. LSvdW to consider usefulness of overlaying the location of Blue Flag Beaches, which relates to visual impacts, water quality and recreational beach use, with identified suitable marine areas to further refine the areas for assessment.
3. LK to check the EIAs done for Mossel Bay and Port Elizabeth for potential marine finfish cage culture (by Jeremy Blood, CCA Environmental) – which species were considered for open water cage culture (e.g. Silver kob and Yellowtail?).
4. LK to cross-check ADZs planned by DAFF i.e. Saldanha, Algoa, Coega, Qologa and East London from information provided by AB.

Appendix C: Meeting notes - Focused internal workshop for identification of draft strategic mariculture areas.

National SEA for Aquaculture in South Africa
Workshop Notes

WORKSHOP OUTCOMES

	AREA	PROVINCE	SPECIES	RATIONALE AND COMMENTS
1	**Orange-Port Nolloth**	Western Cape	**Atlantic salmon**	- Potential for land-based Atlantic salmon - Risks: plume from Orange River (increased sediments and turbidity / low salinity), potential conflicts with mining applications and activities; harmful algal blooms (HABs).
2	**Orange-Hondeklip Bay**	Western Cape	**Abalone**	- Clear of 50 km Orange River mouth plume buffer to minimise freshwater influences - Potential for land-based and ranching - Risks: Orange River plume, mining applications and activities - Degraded mining land for rehabilitation may provide an opportunity
3	**Kleinsee**	Western Cape	**Oysters**	- Potential area for oyster nursery and hatchery - not for grow-out - Cheaper pump technology would make it even more feasible - Also identified in the Advance Africa 2017 study - Risks: HABs
4	**Doring Bay**	Western Cape	**Atlantic salmon**	- Potential for land-based salmon and abalone in conjunction
			Abalone	- Potential for land-based salmon and abalone in conjunction (value-add) - Potential for Abalone - Risks: freshwater influence from Olifants River, HABs - Electricity may be a limiting factor currently - 900 tpa current carrying capacity, (electricity available for pumping currently limits this to 600 tpa).
5	**Velddrif-Paternoster**	Western Cape	**Oysters**	- Potential for nurseries and hatcheries (and even grow-out) which feed into Saldanha for finishing - Use of salt pans at Paternoster and Velddrif. - New bivalve processing facility proposed – Velddrif - Oyster growth proven to be the best on the West Coast. - Also identified in the Advance Africa 2017 study
6	**Saldanha Bay**	Western Cape	**Atlantic salmon**	- Lower HAB risk (though still at risk) - Stripping out nutrients from the shellfish - multifunctional, synergistic.

National SEA for Aquaculture in South Africa
Workshop Notes

	AREA	PROVINCE	SPECIES	RATIONALE AND COMMENTS
				- Risks: Oxygen levels in summer may be low; Land availability restricts land-based Atlantic salmon - nurseries and hatcheries not as feasible in Saldanha, only for grow-out - Potential for land-based salmon and abalone in conjunction (value-add) - Also identified in Anchor 2011 and Advance Africa 2016 studies.
			Mussels	- Established successful facilities here. - Carrying capacity ~48 000 tpa for shellfish (oysters & mussels) (current estimates) - Also identified in the Advance Africa 2017 study. Potential decreases to north and south of Saldanha.
			Oysters	- Established successful facilities here. - Carrying capacity ~48 000 tpa for shellfish (oysters & mussels) (current estimates)
7	**St Helena - Saldanha**	Western Cape	**Abalone**	- Potential area for abalone - Risks: HABs - Opportunities: Fish processing plants outfall in St Helena Bay - Better potential (less limiting factors) towards Saldanha bay
8	**Yzerfontein-Melkbosstrand**	Western Cape	**Abalone**	- Potential for abalone ranching. - Risks: Major issues from land-based perspectives in terms of terrestrial conservation (CoCT BioNet and Saldanha conservation planning); Koeberg exclusion areas
9	**False Bay**	Western Cape	**Atlantic salmon**	- Opportunity for cage-culture - Launch points available - Processing facilities on the Cape Flats -Selecta (Viking groups) Philippi - marine finfish processing - Processing potential in Hout Bay (land product in Hout Bay / Gordons Bay) - (potential for sea-run trout)
			Mussels	- Potential for oysters on submerged long-lines - Risks: Waves may be a limiting factor - submerged long-lines could work, challenges to get vessels out to service; biodiversity risks; waste water outfalls, plumes, urban runoff
			Oysters	- Potential for oysters on submerged long-lines - Risks: Waves may be a limiting factor - submerged long-lines could work, challenges to get

Appendix C: Meeting notes - Focused internal workshop for identification of draft strategic mariculture areas.

National SEA for Aquaculture in South Africa
Workshop Notes

	AREA	PROVINCE	SPECIES	RATIONALE AND COMMENTS
				vessels out to service; biodiversity risks; waste water outfalls, plumes, urban runoff
10	**Hermanus-Gans Bay**	Western Cape	**Atlantic salmon**	- Potential for land-based - Wave climate not suitable for cage-culture - Also identified in Anchor 2011 and Advance Africa 2016 studies.
11	**Kleinmond-Arniston**	Western Cape	**Abalone**	- Land availability limiting factor for abalone in Hermanus - Temperature may not be suitable along parts of this area - Existing Abalone farms near Oubaai - Potential for Abalone decreases towards Arniston due to water temperature issues - warm water accumulates close to a reef in Arniston area.
12	**Gourits-George**	Western Cape	**Abalone**	- Constraints: Limiting factors for Abalone here are steep cliffs and slope along the coast and limited availability of kelp as feed. - Opportunities: land availability for land-based facilities - Mossel Bay Municipality has shown interest in abalone farming.
13	**Vlees Bay – George**	Western Cape	**Mussels**	- Potential for long-line oysters and mussels - Risks: temperature profile needs to be verified; primary production may not be sufficient.
			Oysters	- Potential for long-line oysters and mussels - Risks: temperature profile needs to be verified; primary production may not be sufficient.
14	**Port Elizabeth**	Eastern Cape	**Dusky kob**	- Potential (sub-optimal) for cage-culture, however, Yellow tail may do better here. - Also identified in Anchor 2011 and Advance Africa 2016 studies.
			Mussels	- Potential area, but lower chlorophyll levels compared to west coast means less food available and lower growth rates. - Food requirements for mussels are higher than oysters
			Oysters	- Potential area, but lower chlorophyll levels compared to west coast means less food available and lower growth rates. - Food requirements for mussels are higher than oysters
			Abalone	- Localised warming in the bay

National SEA for Aquaculture in South Africa
Workshop Notes

	AREA	PROVINCE	SPECIES	RATIONALE AND COMMENTS
				- Risk: temperature variation may be a limiting factor.
15	**East London**	Eastern Cape	**Dusky kob**	- Potential to have land-based dusky kob facilities. - South of East London the potential for dusky kob becomes marginal due to colder water temperature.
16	**East London-Kei**	Eastern Cape	**Abalone**	- Temperature becomes marginal – better growth in winter. - Modify management for warmer water farming. - Risks: Abalone farmers often look for rocky outcrops to anchor their pipelines, issues exist when crossing expansive sandy beaches in terms of servicing the pipe and keeping it anchored. Short pipeline distances are most optimal; also effluent from the facility may get stuck in the surf zone; freshwater influences from many estuaries.
17	**Durban-Richards Bay**	KwaZulu Natal	**Dusky kob**	- Cage culture concentrated around Richards Bay and Durban - Potential to have land-based dusky kob facilities with water intake from the sea. - Risks: river plumes, seasonal floods, urban runoff from Durban and Richards Bay - Promising results from Stellenbosch University Dusky Kob trial, but discontinued due to lease not renewed. - Richards Bay also identified in Advance Africa 2016 study.

Appendix D: Meeting notes - Project Steering Committee feedback and workshop to refine draft suitable freshwater and marine aquaculture.

Appendix D: Meeting notes - PSC feedback and workshop to refine draft suitable freshwater and marine aquaculture.

National SEA for Aquaculture in South Africa
Workshop Notes

DAFF WORKSHOP:
Refinement of draft suitable marine and freshwater aquaculture areas identified through national-scale GIS screening

Date and Time:
08 March 2017 from 09:30-14:00

Location:
DAFF Marine Research Aquarium, Sea Point

Attendees

Name	Organisation	Email
Michelle Pretorius (MP)	DAFF	MichellePR@daff.gov.za
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Note: In pursuit of efficiency, these notes are intended to capture the key outcomes from the discussion that influence the approach to the SEA and the actions to be taken forth and not as detailed minutes of the entire workshop as some are captured in the GIS format. Points of discussion where captured as annotations in the mapping and tabled notes during the workshop.

Purpose of this workshop:
To discuss and refine the draft suitable Marine and Freshwater aquaculture areas, identified through national-scale Level 1 screening per province.

Appendix D: Meeting notes - PSC feedback and workshop to refine draft suitable freshwater and marine aquaculture.

National SEA for Aquaculture in South Africa
Workshop Notes

WORKSHOP OUTCOMES

1.1Summary of draft freshwater study areas, rationales and inputs from screening workshops

	AREA	SPECIES	PROVINCE	WATERCOURSE	RATIONALE AND COMMENTS (INPUT FROM 28 FEBRUARY WORKSHOP)	RATIONALE AND COMMENTS (INPUT FROM 08 MARCH WORKSHOP)
1	**Musina-Polokwane**	**Catfish; Tilapia**	Limpopo	Rivers flowing to and from the Limpopo River; Nandoni dam	- Rivers flowing from/to Limpopo River. Expert input indicated that Nile tilapia may already be present in these watercourses. - Still to determine - for tilapia, would ponds and dam cage-culture be acceptable?	- Nandoni dam water temperature might be too cold for tilapia - This area must be confirmed with Limpopo authorities
2	**Vaal-Piet Retief**	**Trout**	Mpumalanga	Various rivers; Vaaldam; Grootdraai dam	- WRC inland fisheries study also considers Heyshope and Grootdraai for inland fisheries; therefore could also be suitable for dam cage culture and/or water source for off-stream. - SANBI trout mapping (Dec, 2016) shows trout is **not currently extensively present** in this area. - May be expected that DWS will have an issue with Vaaldam as it is a key drinking water dam. Cages not feasible as dam levels variable - e.g. recent drought and floods, but potential as water source for off-stream. - The variability of climate of the Highveld (extreme min & max temperatures) may pose a risk.	- This area must be cross-checked with suitable dams provided by Trout South Africa.
3	**South Gauteng**	**Trout**	Gauteng	Various rivers	- Potential for off-stream aquaculture with various rivers as water sources. - SANBI trout mapping (Dec, 2016) shows trout is **not currently extensively present** in this area. - The variability of climate of the Highveld (extreme min & max temperatures) may pose a risk.	- The cluster of areas identified around the Gauteng and North West provinces could be merged into a single study area.

Appendix D: Meeting notes - PSC feedback and workshop to refine draft suitable freshwater and marine aquaculture.

National SEA for Aquaculture in South Africa
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	AREA	SPECIES	PROVINCE	WATERCOURSE	RATIONALE AND COMMENTS (INPUT FROM 28 FEBRUARY WORKSHOP)	RATIONALE AND COMMENTS (INPUT FROM 08 MARCH WORKSHOP)
4	**Hartebeestpoort**	**Catfish; Tilapia; Trout**	North West; Gauteng	Various rivers; Hartebeestpoort dam; Roodeplaat dam	- SANBI trout mapping (Dec, 2016) shows trout is **not currently extensively present** in this area. - The variability of climate of the Highveld (extreme min & max temperatures) may pose a risk.	- The cluster of areas identified around the Gauteng and North West provinces could be merged into a single study area. - Hartebeestpoort dam has a serious water quality issue, and is probably too hot for trout. - Roodeplaat dam may have a zoning issue, and conflict with recreational users.
5	**Potch-Klerksdorp**	**Catfish; Trout**	North West	Various rivers; Boskop dam; Potchefstroom dam; Modder dam; Rietspruit dam; Klipdrift dam	- SANBI trout mapping (Dec, 2016) shows trout **is currently present** in some sub-quaternary catchments in this area (around Potchefstroom). - The variability of climate of the Highveld (extreme min & max temperatures) may pose a risk.	- The cluster of areas identified around the Gauteng and North West provinces could be merged into a single study area. - Too warm for trout. Growth would be marginal here.
6	**Swartruggens-Zeerust**	**Catfish; Tilapia; Trout**	North West	Various rivers	- SANBI trout mapping (Dec, 2016) shows trout **is currently present** in some sub-quaternary catchments in this area. - The variability of climate of the Highveld (extreme min & max temperatures) may pose a risk.	- The cluster of areas identified around the Gauteng and North West provinces could be merged into a single study area.
7	**Bethlehem-Harrismith**	**Trout**	Free State	Various rivers; Sterkfontein dam;	- Highlands area with cooler climate which is good for trout. - SANBI trout mapping (Sept, 2016) shows trout **is currently present** in some sub-quaternary catchments in this area.	- Opportunity to employ raceways at the tunnel coming into South Africa from the Katse dam. - Sterkfontein has been earmarked for trout (along with Vanderkloof) as an Operation Phakisa initiative.
8	**Bloemfontein**	**Trout**	Free State	Krugersdrift dam;	- SANBI trout mapping (Sept, 2016) shows trout	- This area is not as optimal as the

Appendix D: Meeting notes - PSC feedback and workshop to refine draft suitable freshwater and marine aquaculture.

National SEA for Aquaculture in South Africa
Workshop Notes

	AREA	SPECIES	PROVINCE	WATERCOURSE	RATIONALE AND COMMENTS (INPUT FROM 28 FEBRUARY WORKSHOP)	RATIONALE AND COMMENTS (INPUT FROM 08 MARCH WORKSHOP)
				Rustfontein dam; Kalkfontein dam; Masels poort;	is **not currently extensively present** in this area. - Prox. to Bloemfontein & access to markets.	Bethlehem-Harrismith area. Therefore exclude this area, as Bethlehem-Harrismith sufficiently represents the Free State province.
9	**Vanderkloof-Gariep**	**Trout; Catfish**	Free State; Northern Cape; Eastern Cape	Vanderkloof dam; Gariep dam	- Operation Phakisa initiatives in Vanderkloof dam. SANBI trout mapping (Dec, 2016) shows trout is **not currently extensively present** in this area. - Government hatchery (trout, tilapia & catfish) at Gariep dam. - SANBI trout mapping (Dec, 2016) shows trout **is currently present** in sub-quaternary catchments in associated with Gariep dam. - Gariep dam water quality not great – very turbid, sediment trap.	- Vanderkloof Dam is an Operation Phakisa initiative for trout cage culture. - It must still be determined whether trout can survive the warm summer months. - The Gariep dam is very turbid – Vanderkloof not as turbid. - Also investigate the Gariep dam for Catfish and Tilapia.
10	**Vaalharts**	**Catfish**	Northern Cape	Spitskop dam; Vaalharts dam	- Vaalharts irrigation scheme. - Water management will be crucial here due to the method of irrigation; dams get drained on a daily basis. Water sustainability issues.	- Extend this area slightly to include the Bloemhof dam (potential for cage-culture). - Risks: pesticides and herbicides in water from agricultural activities.
11	**Newcastle-Dundee**	**Trout**	KwaZulu Natal	Various rivers; Ntshingwayo (Chelmsford) dam	- SANBI trout mapping (Dec, 2016) shows trout **is currently present** in some sub-quaternary catchments in this area	- No comments
12	**Pongola**	**Catfish; Tilapia**	KwaZulu Natal	Various rivers; Pongolaspoort dam	- Good area for subsistence aquaculture of tilapia and catfish.	- Pongolaspoort dam could have potential for cage-culture - Rhodes project at Pongolaspoort (?) - The climatic variability (extreme min & max temperatures) may pose a risk.

Appendix D: Meeting notes - PSC feedback and workshop to refine draft suitable freshwater and marine aquaculture.

National SEA for Aquaculture in South Africa
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	AREA	SPECIES	PROVINCE	WATERCOURSE	RATIONALE AND COMMENTS (INPUT FROM 28 FEBRUARY WORKSHOP)	RATIONALE AND COMMENTS (INPUT FROM 08 MARCH WORKSHOP)
13	**Richards Bay**	**Catfish; Tilapia**	KwaZulu Natal	Mhlatuze river; Goedertrou dam	- Good for Tilapia and catfish (pond culture – Mozambique tilapia & catfish)	- Confirmed better temperature profile for warm water species
14	**Pietermaritzburg-Durban**	**Catfish; Tilapia; Trout**	KwaZulu Natal	Various rivers; Midmar dam	- Close to Durban markets.	- This area may be too cold for Tilapia, rather also consider Trout here.
15	**Kokstad-Matatiele**	**Trout**	KwaZulu Natal; Eastern Cape	Various rivers	- SANBI trout mapping (Dec, 2016) shows trout **is currently extensively present** in this area. - Close to Durban markets. - No large dam infrastructure, therefore no opportunity for cage-culture.	- No comments
16	**PE-East London**	**Tilapia; Marron**	Eastern Cape	Various rivers	- Close to markets. - Perhaps too cold for Tilapia in ponds, but opportunity for RAS. - Potential for marron in colder areas around Stutterheim.	- The cluster of areas identified in the Eastern Cape province could be merged into one or two study areas: 1) from Somerset East down to PE; and 2) From Queenstown down to East London.
17	**Somerset East**	**Trout**	Eastern Cape	Groot-vis river; Elandsdrift dam	- Climatic variability. - Perhaps potential for seasonal trout aquaculture. - SANBI trout mapping (Dec, 2016) shows trout **is currently present** in some sub-quaternary catchments in this area.	- The cluster of areas identified in the Eastern Cape province could be merged into one or two study areas: 1) from Somerset East down to PE; and 2) From Queenstown down to East London.
18	**Queenstown**	**Trout; Marron**	Eastern Cape	Various rivers; Xonxa dam; Lubisi dam	- SANBI trout mapping (Dec, 2016) shows trout **is currently extensively present** in this area. - Marron in escape-proof RAS; no flow-through ponds.	- The cluster of areas identified in the Eastern Cape province could be merged into one or two study areas: 1) from Somerset East down to PE; and 2) From Queenstown down to East London.
19	**Mossel Bay-**	**Catfish;**	Western Cape	Various rivers;	- Seasonal using RAS only.	- It is proposed that this area be

Appendix D: Meeting notes - PSC feedback and workshop to refine draft suitable freshwater and marine aquaculture.

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	AREA	SPECIES	PROVINCE	WATERCOURSE	RATIONALE AND COMMENTS (INPUT FROM 28 FEBRUARY WORKSHOP)	RATIONALE AND COMMENTS (INPUT FROM 08 MARCH WORKSHOP)
	George	Trout		Klipheiwe dam; Hartebeeskuil dam	- CapeNature has serious reservations about this area. - SANBI trout mapping (Dec, 2016) shows trout **is currently present** in some sub-quaternary catchments in this area around George. - CapeNature is sensitive about African sharptooth catfish. Invasive, and stocked illegally. Only RAS in areas where it was legally established (Cape Flats & Eerste River basin). - Will allow RAS of Nile tilapia where there is Mozambique tilapia. Tilapia only where legally established already.	excluded - considering the environmental concerns around this area (raised by CapeNature), it would be irresponsible to allow relaxed legislation for aquaculture here. Rather look to less sensitive areas in the Western Cape.
20	Robertson-Montagu	Trout	Western Cape	Various rivers	- SANBI trout mapping (Dec, 2016) shows trout **is currently present** in some sub-quaternary catchments in this area.	- No comments
21	Cape Town-Paarl	Tilapia (Urban Aquaculture); Marron (Urban Aquaculture) Trout	Western Cape	Urban aquaculture; Bergriver dam	- Good area to promote aquaculture in urban areas and industrial zones using RAS systems. - Bergriver dam - race-way below the dam based on intake position. SANBI trout mapping (Dec, 2016) shows trout **is currently extensively present** in this area. - CapeNature is sensitive about African sharptooth catfish. Invasive, and stocked illegally. Only RAS in areas where it was legally established (Cape Flats & Eerste River basin). - Will allow RAS for Nile tilapia where there is Mozambique tilapia. Tilapia only where legally established already.	- The Western Cape is too cold for tilapia. - Rather only promote Trout in this area. - Production out of City of Cape Town wouldn't be expected to be high and the economic viability of freshwater / inland aquaculture may not be great here.

Appendix D: Meeting notes - PSC feedback and workshop to refine draft suitable freshwater and marine aquaculture.

National SEA for Aquaculture in South Africa
Workshop Notes

	AREA	SPECIES	PROVINCE	WATERCOURSE	RATIONALE AND COMMENTS (INPUT FROM 28 FEBRUARY WORKSHOP)	RATIONALE AND COMMENTS (INPUT FROM 08 MARCH WORKSHOP)
22	**Olifants-Bulshoek**	**Catfish; Tilapia**	Western Cape	Olifants river, upstream of Bulshoek dam	- Seasonal, climatic variability. - Potential to utilise canals as raceways. - CapeNature are sensitive about African sharptooth catfish. Invasive, and stocked illegally. Only RAS in areas where it was legally established (Cape Flats & Eerste River basin). - Will allow RAS for Nile tilapia where there is Mozambique tilapia. Tilapia only where legally established already.	- It is proposed that this area be excluded as there is currently no trout present and the area is too cold for catfish and tilapia.

WORKSHOP OUTCOMES

1.2Summary of draft marine study areas, rationales and inputs from screening workshops

	AREA	PROVINCE	SPECIES	RATIONALE AND COMMENTS	INPUT (08 March 2017)
1	**Orange-Port Nolloth**	Western Cape	**Atlantic salmon (land-based)**	- Potential for land-based Atlantic salmon - Risks: plume from Orange River (increased sediments and turbidity / low salinity), potential conflicts with mining applications and activities; harmful algal blooms (HABs).	- Merge Orange-Port Nolloth, Orange-Hondeklip Bay and Kleinsee into a single larger study area for land-based Atlantic salmon, Oyster nurseries (to feed into Saldanha for finishing), and land-based abalone.
2	**Orange-Hondeklip Bay**	Western Cape	**Abalone (land-based)**	- Clear of 50 km Orange River mouth plume buffer to minimise freshwater influences - Potential for land-based and ranching - Risks: Orange River plume, mining applications and activities - Degraded mining land for rehabilitation may provide an opportunity	- Merge Orange-Port Nolloth, Orange-Hondeklip Bay and Kleinsee into a single larger study area for land-based Atlantic salmon, Oyster nurseries (to feed into Saldanha for finishing), and land-based abalone. - Currently no mariculture at Hondeklip Bay due to conflict with mining in terms of water access and security.
3	**Kleinsee**	Western Cape	**Oysters (land-based)**	- Potential area for oyster nursery and hatchery - not for grow-out	- Merge Orange-Port Nolloth, Orange-Hondeklip Bay and Kleinsee into a single larger study area for land-

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	AREA	PROVINCE	SPECIES	RATIONALE AND COMMENTS	INPUT (08 March 2017)
				- Cheaper pump technology would make it even more feasible - Also identified in the Advance Africa 2017 study - Risks: HABs	based Atlantic salmon, Oyster nurseries (to feed into Saldanha for finishing), and land-based abalone. - Nursery areas will be strategically important for expansion of the area.
4	**Doring Bay**	Western Cape	**Atlantic salmon (land-based)**	- Potential for land-based Atlantic salmon and abalone in conjunction	- Extend Doring Bay study area from Strandfontein to Lamberts Bay. - Info to consider: Doringbaai Abalone EIA done by SRK. - Mining activities north of Strandfontein may become an issue – limited land space availability.
			Abalone (land-based)	- Potential for land-based Atlantic salmon and abalone in conjunction (value-add) - Potential for Abalone ranching - Risks: freshwater influence from Olifants River, HABs - Electricity may be a limiting factor currently - 900 tpa current carrying capacity, (electricity available for pumping currently limits this to 600 tpa).	- Extend Doring Bay study area from Strandfontein to Lamberts Bay. - Info to consider: Doringbaai Abalone EIA done by SRK. - Mining activities north of Strandfontein may become an issue – limited land space availability.
5	**Velddrif-Paternoster**	Western Cape	**Oysters (land-based)**	- Potential for nurseries and hatcheries (and even grow-out) which feed into Saldanha for finishing - Use of salt pans at Paternoster and Velddrif. - New bivalve processing facility proposed – Velddrif - Oyster growth proven to be the best on the West Coast. - Also identified in the Advance Africa 2017 study	- This area also has potential for land-based Atlantic salmon.
6	**Saldanha Bay**	Western Cape	**Atlantic salmon (cage-culture)**	- Lower HAB risk (though still at risk) - Stripping out nutrients from the shellfish - multifunctional, synergistic. - Risks: Oxygen levels in summer may be low; Land availability restricts land-based Atlantic salmon - nurseries and hatcheries not as feasible in Saldanha, only for grow-out - Potential for land-based Atlantic salmon and abalone in	- This area also has potential for sea-run trout. - Check the following EIA studies for info: (i) DAFF Saldanha ADZ, (ii) Molapong Aquaculture, and (iii) Southern Cross Salmon Farming Pty Ltd. - Risk: Low oxygen events may occur close to Noordbaai. - It was confirmed during the workshop that it is not necessary to conduct specialist assessments for the

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	AREA	PROVINCE	SPECIES	RATIONALE AND COMMENTS	INPUT (08 March 2017)
				conjunction (value-add) - Also identified in Anchor 2011 and Advance Africa 2016 studies.	Saldanha study area as there is a lot of information available (including a bay-wide EIA). Include Saldanha as a study area in the SEA, but focus on the available information.
			Mussels (rafts & longlines)	- Established successful facilities here. - Carrying capacity ~48 000 tpa for shellfish (oysters & mussels) (current estimates) - Also identified in the Advance Africa 2017 study. Potential decreases to north and south of Saldanha.	- It was confirmed during the workshop that it is not necessary to conduct specialist assessments for the Saldanha study area as there is a lot of information available (including a bay-wide EIA). Include Saldanha as a study area in the SEA, but focus on the available information. - Check the following EIA studies for info: (i) DAFF Saldanha ADZ, (ii) Molapong Aquaculture, and (iii) Southern Cross Salmon Farming Pty Ltd.
			Oysters (rafts & longlines)	- Established successful facilities here. - Carrying capacity ~48 000 tpa for shellfish (oysters & mussels) (current estimates)	- It was confirmed during the workshop that it is not necessary to conduct specialist assessments for the Saldanha study area as there is a lot of information available (including a bay-wide EIA). Include Saldanha as a study area in the SEA, but focus on the available information. - Check the following EIA studies for info: (i) DAFF Saldanha ADZ, (ii) Molapong Aquaculture, and (iii) Southern Cross Salmon Farming Pty Ltd.
7	**St Helena - Saldanha**	Western Cape	**Abalone (land-based)**	- Potential area for abalone - Risks: HABs - Opportunities: Fish processing plant's outfall in St Helena Bay - Better potential (less limiting factors) towards Saldanha Bay	- No comments

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	AREA	PROVINCE	SPECIES	RATIONALE AND COMMENTS	INPUT (08 March 2017)
8	**Yzerfontein-Melkbosstrand**	Western Cape	**Abalone (ranching(?))**	- Potential for abalone ranching. - Risks: Major issues from land-based perspectives in terms of terrestrial conservation (CoCT BioNet and Saldanha conservation planning); Koeberg exclusion areas	- If the DAFF ranching sites overlay with this area, it could be considered as a study area. To determine – is abalone ranching within the scope of the SEA? - However, due to of terrestrial conservation (CoCT BioNet and Saldanha conservation planning) (confirm with Dean Impson) and Koeberg exclusion areas this area may well not be included.
9	**False Bay (sea-based only)**	Western Cape	**Atlantic salmon (cage-culture)**	- Opportunity for cage-culture - Launch points available - Processing facilities on the Cape Flats -Selecta (Viking groups) Philippi - marine finfish processing - Processing potential in Hout Bay (land product in Hout Bay / Gordons Bay) - (potential for sea-run trout)	- The conditions in False Bay are suitable for mariculture, but the area is very built-up. Furthermore, interested and affected parties will probably oppose mariculture development here. - Other risks include coastal dynamics and waves.
			Mussels (long-lines)	- Potential for oysters on submerged long-lines - Risks: Waves may be a limiting factor - submerged long-lines could work, challenges to get vessels out to service; biodiversity risks; waste water outfalls, plumes, urban runoff	- The conditions in False Bay are suitable for mariculture, but the area is very built-up. Furthermore, interested and affected parties will probably oppose mariculture development here. - Other risks include coastal dynamics and waves.
			Oysters (long-lines)	- Potential for oysters on submerged long-lines - Risks: Waves may be a limiting factor - submerged long-lines could work, challenges to get vessels out to service; biodiversity risks; waste water outfalls, plumes, urban runoff	- The conditions in False Bay are suitable for mariculture, but the area is very built-up. Furthermore, interested and affected parties will probably oppose mariculture development here. - Other risks include coastal dynamics and waves.
10	**Hermanus-Gans Bay**	Western Cape	**Atlantic salmon (land-based and cage-culture)**	- Potential for land-based - Wave climate not suitable for cage-culture - Also identified in Anchor 2011 and Advance Africa 2016 studies.	- This area also has potential for cage-culture of Atlantic salmon.
11	**Kleinmond-Arniston**	Western Cape	**Abalone (land-based)**	- Land availability limiting factor for abalone in Hermanus - Temperature may not be suitable along parts of this area	- Warm water intrusions do occur here, but the area up to Arniston should be suitable for Abalone. - Good abalone growth has been recorded in this area.

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	AREA	PROVINCE	SPECIES	RATIONALE AND COMMENTS	INPUT (08 March 2017)
				- Existing Abalone farms near Oubaai - Potential for Abalone decreases towards Arniston due to water temperature issues - warm water accumulates close to a reef in Arniston area.	
12	**Gourits-George**	Western Cape	**Abalone (land-based)**	- Constraints: Limiting factors for Abalone here are steep cliffs and slope along the coast and limited availability of kelp as feed. - Opportunities: land availability for land-based facilities - Mossel Bay Municipality has shown interest in abalone farming.	- It was expressed that this is definitely a targeted expansion area for Abalone farming.
13	**Vlees Bay – George**	Western Cape	**Mussels (long-line)**	- Potential for long-line oysters and mussels - Risks: temperature profile needs to be verified; primary production may not be sufficient.	- Even if this area is assessed in the SEA and protocols developed, a biodiversity risk assessment will still have to be conducted for areas outside of existing Mediterranean mussel populations. To be determined - what is the present distribution of Mediterranean mussels? This may be cross-checked along the coast to confirm / substantiate identified study areas for mussels.
			Oysters (long-line)	- Potential for long-line oysters and mussels - Risks: temperature profile needs to be verified; primary production may not be sufficient.	- This area could still consider this area for oysters. - This are is not a very high ranking suitable area, there are some constraints (consider as expansion area for when Saldanha reaches its limits). - Are there current wild oyster concessions in the Mossel Bay area?
14	**Port Elizabeth**	Eastern Cape	**Dusky kob (land-based and cage-culture)**	- Potential (sub-optimal) for cage-culture, however, Yellow tail may do better here. - Also identified in Anchor 2011 and Advance Africa 2016 studies.	- Coega IDZ has mariculture proposed within its limits, but no operational developments yet. - What are the current plans in terms of mariculture in the PE area?
			Mussels (rafts and long-lines)	- Potential area, but lower chlorophyll levels compared to west coast means less food available and lower growth rates.	- Sea-based

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	AREA	PROVINCE	SPECIES	RATIONALE AND COMMENTS	INPUT (08 March 2017)
				- Food requirements for mussels are higher than oysters	
			Oysters (rafts and long-lines)	- Potential area, but lower chlorophyll levels compared to west coast means less food available and lower growth rates. - Food requirements for mussels are higher than oysters	- Sea-based
			Abalone (land-based)	- Localised warming in the bay - Risk: temperature variation may be a limiting factor.	- Abalone farm in PE closed down due to conflicts with Coega expansion. - Land-based
15	**East London-Kei**	Eastern Cape	**Dusky kob (land-based)**	- Potential to have land-based dusky kob facilities. - South of East London the potential for dusky kob becomes marginal due to colder water temperature.	- Dusky kob cultivation in land-based re-circulation systems is proving to not be that feasible.
16	**East London-Kei**	Eastern Cape	**Abalone (land-based)**	- Temperature becomes marginal – better growth in winter. - Modify management for warmer water farming. - Risks: Abalone farmers often look for rocky outcrops to anchor their pipelines; issues exist when crossing expansive sandy beaches in terms of servicing the pipe and keeping it anchored. Short pipeline distances are most optimal; also effluent from the facility may get stuck in the surf zone; freshwater influences from many estuaries.	- Suitable area for Abalone - confirmed that this is the most eastern boundary for Abalone. - This area includes the Qolora ADZ.
17	**Durban-Richards Bay**	KwaZulu Natal	**Dusky kob (cage-culture) land-based)**	- Cage culture concentrated around Richards Bay and Durban - Potential to have land-based dusky kob facilities with water intake from the sea. - Risks: river plumes, seasonal floods, urban runoff from Durban and Richards Bay - Promising results from Stellenbosch University Dusky Kob trial, but discontinued due to lease not renewed. - Richards Bay also identified in Advance Africa 2016 study.	- This area includes the Amatikulu ADZ.

Appendix D: Meeting notes - PSC feedback and workshop to refine draft suitable freshwater and marine aquaculture.

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Key actions from the workshop:

1. LK to cross-check all DAFF ADZ information received from AB and provide location data to LSvdW. LSvdW to overlay current and planned DAFF ADZs, as well as KZN Ezemvelo suitable areas identified for aquaculture data sets onto the mapping of the green areas by 14 March 2017.
2. LK to follow up with Heather Terrapon at SANBI to obtain the latest version (*viz* Feb 2017) of the trout mapping data by 14 March 2017. LSvdW to overlay latest trout mapping before sending draft suitable freshwater areas to provincial authorities for further input and comment.
3. LK to ask provincial authorities to also comment on species specific water temperature ranges for the proposed freshwater areas. LSvdW to incorporate these into the final refinement of the study areas.
4. LK has obtained list of dams, from Oom Gerrie van der Merwe (Trout SA), with potential for trout aquaculture on 8 March 2017. LSvdW to cross-reference these dams with current suitable freshwater areas identified.
5. LK to obtain inputs received from Cape Nature re the EIA done for Silverstroom Strand area from MP by 14 March 2017
6. LK has requested spatial data of DAFF abalone ranching areas from MP. LSvdW to cross-check gazette abalone ranching zones with current identified marine areas suitable for land-based abalone mariculture
7. LK has requested spatial data on current Mediterranean mussel distribution along the SA coast from MP. TP has mentioned studies done by Tammy Robinson at Stellenbosch University on mussel distribution. LSvdW to consider usefulness of overlaying and cross-check the current mussel distribution with areas identified suitable for mussel production
8. LK to verify information with MP re current concession areas for Pacific oyster in the Mossel Bay area.
9. LK has requested and obtained the following EIA related information from MP:
    a. Doringbaai Abalone EIA study undertaken by SRK Consulting
    b. DAFF Basic Assessment study for the Saldanha Bay ADZ undertaken by SRK consulting
    c. Molapong Aquaculture EIA study for Saldanha Bay undertaken by Ecosence cc
    d. Southern Cross Salmon Farming Pty Ltd EIA study for Saldanha Bay undertaken by Alastair Sempill Consulting.
10. LK to check the aforementioned EIA studies and cross-check which species and associated production systems are planned for the Saldanha Bay area. LSvdW to cross-check the areas (zoning) identified for aquaculture development in the Saldanha Bay area with the current green area mapped.

Appendix E: Comments and responses report - Broader stakeholder commenting period to refine and finalise strategic areas.

Appendix E: Comments and responses report - Broader stakeholder commenting period to refine and finalise strategic areas.

A key objective of the Strategic Environmental Assessment (SEA) process constituted a Screening Phase (Phase 2) for which the main outcome was the "identification of draft aquaculture development zones" (hereafter referred to as strategic aquaculture areas) for marine- and freshwater aquaculture. The purpose of this document is to provide the approach and results of the strategic areas identification process. The strategic aquaculture areas serve as study areas for specialist investigation and assessment during the Assessment Phase (Phase 3) of the SEA.

Maps of the draft Version 2 freshwater aquaculture and mariculture strategic areas – including the species and systems proposed for each area – were circulated to a broader stakeholder group. Stakeholders included, amongst others, provincial authorities and aquaculture industry associations. Stakeholders were given instruction to provide clear rationales for inclusion, exclusion or changes to the draft areas. All comments were considered and responded to accordingly, and shaped the final strategic mariculture areas that serve as study areas for specialist investigation in Phase 3 (Assessment Phase) of the SEA.

Comments and responses report - Broader stakeholder commenting period to refine and finalise strategic areas

Commenter	Comment	Response
HIK **Roger Krohn** **23/03/2017**	FRESHWATER AQUACULTURE SITES Check with the Trout guys about where DEA and Trout SA have agreed that trout can be grown – I think there are areas in Limpopo where trout grow.	The SANBI trout mapping was considered when developing the proposed study areas. It shows limited trout presence around Polokwane.
	The only species I have a problem with is Tilapia in ponds and dams in any Western Cape areas – temperatures are too low for them to survive without artificial heating. They may survive in RAS systems, but that is all.	The SEA assumes minimum technology/engineering input (e.g. artificial heating or cooling). Therefore, 'natural' unsuitability from a climate perspective (e.g. too cool or hot) for a species was also taken into account. Temperature was not considered in the GIS analysis as no reliable water temperature data could be found for the country and air temperature was not deemed to be a legitimate proxy for water temperature. Temperature was considered based on specialist input in refining the study areas. The northern part of South Africa in the Limpopo province is considered too hot for optimal trout production. The Cape Town study area was identified for urban aquaculture of Tilapia and Marron, which assumes highly regulated artificial systems. It has been contemplated that this is not in line with the objectives of the SEA, which assumes minimum technology/engineering input (e.g. artificial heating or cooling). Based on this, and concerns that climatic conditions are unsuitable for warmer water aquaculture species, the Cape Town area is not taken forward for further investigation in the current SEA as a separate study area. The Robertson-Montagu and Cape Town areas were merged to create a single study area in the Western Cape that will be investigated for trout.
	MARINE AQUACULTURE SITES: Map Zone 1: KZN Area 1: Durban - Richard's bay: Might as well include Cobia (Prodigal son) in cages	Cobia is not included in the scope of the SEA. However, the SEA will seek to make recommendations on other species, with similar requirements to the template species included in the SEA that have the potential for cultivation or further investigation.
	Map Zone 2 and 3: E. Cape Area 1: Port Elizabeth: Yellowtail has been shown to do better than cob here in cages. Area 2: East London: Add Yellowtail for recirc	Yellowtail is not included in the scope of the SEA. However, the SEA will seek to make recommendations on other species, with similar requirements to the template species included in the SEA that have the potential for cultivation or further investigation.
	Map Zone 4 - 8: W. Cape Area 1: Strandfontein – Lambert's Bay OK	Noted.
	Area 2: Velddrif – Saldanha Bay Add Rainbow Trout Area 3: False Bay Add Rainbow Trout Area 4: Hermanus – Arniston Add Rainbow Trout	These areas are not being proposed as study areas for freshwater aquaculture. The study area in the Western Cape province being taken forward for further investigation in Phase 3 of the SEA is the Robertson-Montagu area for freshwater aquaculture (trout).
	Area 5: Gouritz – George Add Yellowtail in cages in Mossel Bay	Yellowtail is not included in the scope of the SEA. However, the SEA will seek to make recommendations on other species, with similar requirements to the template species include in the SEA that have the potential for cultivation or further investigation.
	Map Zone 9: N. Cape Area 1: Orange – Kleinzee OK	Noted.

Appendix E: Comments and responses report - Broader stakeholder commenting period to refine and finalise strategic areas.

Commenter	Comment	Response
Mpumalanga - Department of Agriculture, Rural Development, Land and Environmental Affairs **Stephen Goetze** **24/03/2017**	Just had a quick look at the maps and study or identified areas for Mpumalanga and have noted that none of the Tilapia or crocodile areas/farmers have been included in your study. All this data was sent to you by our GIS section (Francois Koeglenberg) after we had mapped each project/farmer in the province. Have these farmers been excluded for a reason or have you possibly not received those maps and info on the warm water fish species and crocodile farmers?	Crocodile is not included in the scope of the SEA. Existing facilities were not considered as a pull factor for identifying the study areas. The reason is twofold: firstly, the SEA team has not received significant response with information and locations of existing facilities from all Provinces and stakeholders, therefore the existing facilities database is currently porous and would skew the analysis towards areas for which we have received more information. Secondly, and most importantly, the SEA seeks to investigate areas in which to potentially unlock "new' aquaculture development, and not necessarily to increase development in areas where aquaculture development is already established or dense.
Northern Cape - Department of Agriculture, Land Reform & Rural Development **Thinus Jonker** **24/03/2017**	The following is a few comments from my side: Fresh water: (NORTHERN CAPE) Can add overnight dams to ponds for catfish as most people will understand it better	Noted.
	The area is very wide on the western side and I would suggest that we exclude the areas west of the Harts and Vaal rivers	The extent of the area is a function of the extent of the catchments in this area. The catchments in which the Vaal- and Harts rivers are situated extend far west. The area will be reduced for final investigation.
	Trout in off-stream RAS, ponds, flow through systems will be a problem ito water temperature - my opinion with little knowledge of trout farming!	Vanderkloof Dam is an Operation Phakisa initiative for trout cage culture. However, it is widely recognised that it must still be determined whether trout can survive the warm summer months. Trout in off-stream RAS, ponds and flow through systems would only be possible with significant technology/engineering input (e.g. artificial heating or cooling).
	Marine: (NORTHERN CAPE) I would suggest we describe the area as Hondeklip Bay to Alexander Bay - there are already activities at Hondeklip Bay	This area extends from the Orange river mouth (Alexander Bay) to Hondeklip Bay - not Kleinzee as incorrectly indicated on the version 1 study area maps. This has been corrected.
	For abalone we should include the ranching opportunities	Abalone ranching is not included in the scope of the SEA. Ranching does not require an EIA, however, future abalone activities will develop around the ranching zones so these were taken into consideration, especially in Northern Cape.
	We can perhaps add seaweed (Ulva spp) as option for land based systems - perhaps linked to abalone/oyster farms	The SEA assumes the cultivation of algae (seaweed) in association with abalone and oysters, but will not investigate it as a separate focus species.
	I agree on the rest of the assumptions and areas for Phase 3	Noted.
Free State - Department of Economic, Small Business Development, Tourism and Environmental Affairs **Leon Barkhuizen** **30/03/2017**	1. Only certain areas in the Free State have been identified or deemed to be suitable for aquaculture. However, closed recirculating aquaculture systems where especially water temperature and quality can be managed and controlled will make it possible to farm with fish nearly anywhere. I am not sure how you have considered this in identifying suitable areas for aquaculture in the Free State (or South Africa).	The SEA recognises that artificial aquaculture systems make aquaculture possible virtually anywhere in South Africa. However, the study assumes minimum technology/engineering input (e.g. artificial heating or cooling), which entails that areas located within the vicinity of a suitable water source (dams and rivers) and within areas of climatic suitability have been identified for investigation.
	2. Vaalharts Area Mention is made of possible cage culture in dams (Bloemhof Dam included). However, I must caution you that the water quality in Bloemhof Dam is during certain periods of the year of an extremely low quality and highly polluted with hyper-eutrophic conditions leading to major toxic blue-green algae blooms. Fish surveys I did in Bloemhof Dam the past years indicated a high prevalence of fish parasites and diseases. Personally I will not opt for any cage culture within Bloemhof Dam or use the water from Bloemhof Dam and the Vaal River for any off-stream aquaculture projects.	The potential constraints for aquaculture in the Bloemhom dam are noted. However, the dam and the Vaal River will still be investigated in the Phase 3 of the SEA in order to confirm the constraints and / or identify the opportunities for responsible aquaculture in this area.
	3. Vanderkloof-Gariep Area I do not support or recommend the use of rainbow and brown trout for cage-culture in the Vanderkloof-Gariep area. As trout is a cold water species which requires high quality clean and cool water with a high oxygen content, I do not think it will survive at all in cages in Gariep or Vanderkloof Dams. The water in Gariep Dam is certain periods of the year very muddy with a very high silt load and the water temperature very high, especially during mid-summer. This will definitely lead to major mortalities amongst trout in cages that will not be able to escape the unfavourable conditions within drifting cages in the dam. I understand that the Department of Agriculture, Forestry and Fisheries is looking at possible trout cage culture in conjunction with the Northern Cape Department of Agriculture, Land Reform and Rural Development in Vanderkloof Dam, but I have my doubts if it will be sustainable and economically viable as the water temperature is quite high during certain periods of the year.	The high sedimentation load in the Gariep Dam is recognised; therefore African Sharptooth catfish would be the greater focus in the Gariep Dam. Vanderkloof Dam is an Operation Phakisa initiative for trout cage culture. However, it is widely recognised that it must still be determined whether trout can survive the warm summer months, or whether seasonal production would be the best option.

Appendix E: Comments and responses report - Broader stakeholder commenting period to refine and finalise strategic areas.

Commenter	Comment	Response
	I therefore do not agree or support rainbow and brown trout aquaculture projects in the Vanderkloof-Gariep area. However, the area ought to be suitable for sharptooth catfish.	
	4. Free State – KZN Highlands Area I presume you are aware of the mapping process on the occurrence of trout, and where trout will be allowed or not, currently been finalised by the National Department of Environmental Affairs (headed by Dr. Guy Preston and his team) and SANBI as part of the listing of trout as an alien and invasive species. In general I support the area on the map you have provided, but please note that a much larger area where trout already occur have been drafted during the mapping process for trout in the Free State that were done last year. I do not have a copy of the map, but you may get it from Heather from SANBI – I presume you know her?	The SANBI trout mapping was considered when developing the proposed study areas and shows trout presence here.
	5. Gauteng-North West Area For sharptooth catfish I do not have a problem.	Noted.
(Mpumalanga - Department of Agriculture, Rural Development, Land and Environmental Affairs **Patricia Ledwaba** **30/03/2017**	I agree with your statements "the opportunity for streamline regulatory requirements for the establishment of new aquaculture facilities"; "Secondly, and most importantly, the SEA seeks to investigate areas in which to potentially unlock "new' aquaculture development, and not necessarily to increase development in areas where aquaculture development is already established or dense". Hence, only trout is included in the map for Mpumalanga, which already the industry has established and dense as you mentioned. Tilapia is then included in the coastal areas but not in inland Provinces. Is the SEA study only meant for the species and provinces that has already developed which is not what you meant in your statement? Is it species focus in the inland provinces. Actually is only Mpumalanga were tilapia has been excluded and dams and rivers in the Lowveld Region were warm water species is suitable. Is fresh warm water species (tilapia and catfish) Mpumalanga excluded because we did attend previous reference group meetings? Your mapping area actually looks skewed because of exclusion of indigenous fresh warm water species. If you say your analysis will be skewed, how so because I see in the map that Limpopo, Gauteng, North West are included? We understand about crocodiles not being part of the study. But please do include the other species identified for the province. If you need more information let us know. Mpumalanga has potential for fresh warm water species, especially in the Nkomazi and Bushbuckridge municipalities.	Tilapia has been identified in areas which are climatically more suitable. Mpumalanga was considered more suitable for cooler climate species (i.e. Trout) on the basis of suitable climate, not on the basis of Trout farming already being established there. The SEA assumes minimum technology/engineering input (e.g. artificial heating or cooling). Therefore, 'natural' unsuitability from a climate perspective (e.g. too cool or hot) for a species was also taken into account. This is the reason why cooler climate species, like Trout, were not identified for provinces like Limpopo, North-West and Gauteng. Temperature was not considered in the GIS analysis as no reliable water temperature data could be found for the country and air temperature was not deemed to be a legitimate proxy for water temperature. Temperature was considered based on specialist input in refining the study areas. Warmer parts of Mpumalanga (e.g. the north-east sharing a border with Mozambique and Limpopo which includes the Nkomazi and Bushbuckridge municipalities) was considered less suitable based on land-use conflicts, especially with regards to protected environments (e.g. the Kruger National Park) and indigenous fish sanctuaries.
	We did put an effort into making sure SEA receives this info even through our GIS specialist. Therefore, exclusion cannot be an option and accepted. If there's a need for SEA to send "their specialists" to Mpumalanga for the study and verification, so be it. Aquaculture (tilapia & catfish & ornamentals) for Mpumalanga cannot be developed or established if it's excluded in this study. Mpumalanga does not only have potential for trout.	The SEA is a desktop-based *strategic* assessment that aims, at a high level, to identify areas and investigate the potential for streamlining regulatory requirements for aquaculture in those areas. However, it has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner, and will seek to exclude areas (from regulatory streamlining) within the study areas where the environmental impacts of aquaculture may be found to be unacceptable, and prescribe appropriate environmental assessment and management actions in areas where aquaculture could be acceptable. It is extremely important to recognise that aquaculture will not in any way be restricted or prohibited outside of the SEA study areas. Any person has the right to propose development in any area and with any species, and follow the existing regulatory requirements and processes to obtain any required authorisations and licenses. Based on comments received the Mpumalanga study area has been expanded to the East (along the Komati river) and will also be investigated for Tilapia culture.

Appendix E: Comments and responses report - Broader stakeholder commenting period to refine and finalise strategic areas.

Commenter	Comment	Response
	We request SEA review the study area.	Noted.
Nick James (Rivendell Hatchery) **via Neville Futter (Envirofin Aquaculture)** **30/03/2017**	The constitution gives every citizen the right to farm. It is not prescriptive as to what form this may entail. As fish farming is livestock farming, one assumes that these same rights still apply. Nor does the constitution prescribe where one may… or may not farm.	It is extremely important to recognise that aquaculture will not in any way be restricted or prohibited outside of the SEA study areas. Any person has the right to propose development in any area and with any species, and follow the existing regulatory requirements and processes to obtain any required authorisations and licenses.
	2. GIS is assumed to be a modern technology with hitherto unseen powers. As someone with a Geography Honours degree, I am however aware that GIS is little more than a layered form of spatial cartographic mapping utilising various, selected inputs (land use, conservation status, human usage etc). The resulting map is as selective as the chosen inputs.	GIS is used in the SEA as a useful and effective tool that enables the scope of the SEA, specifically study areas, to be defined. The results of the process which led to the identified study areas are dependent on the input layers, but also based on human input (this opportunity for multiple stakeholders to review and comment) which selects and verifies the input layers. The identification, selection, and ranking of variables, as well as the final selection and refinement of the study areas were carried out with stakeholder engagement and therefore does not only reflect the computer generated outcome and the "discretion of the designer", but includes a multiplicity of stakeholder inputs and views.
	3. For the maps to have any relevance, we need to know what criteria were used to define the demarcated areas for aquaculture, and correspondingly why other areas are excluded. There are immediate glaring anomalies such as:	The GIS analysis was conducted used the following key variables for freshwater aquaculture: Major centres, protected areas, slope, dams and dam users, fish sanctuaries, irrigated crops, stressed catchments, and Present Ecological State of perennial rivers. The analysis was conducted for the entire country with available spatial data. The results of the process which led to the identified study areas are dependent on the input layers, but also based on human input (this opportunity for multiple stakeholders to review and comment) which selects and verifies the input layers. The identification, selection, and ranking of variables, as well as the final selection and refinement of the study areas were carried out with stakeholder engagement and therefore does not only reflect the computer generated outcome and the "discretion of the designer", but includes a multiplicity of stakeholder inputs and views.
	· The Incomati corridor, a prime low altitude agricultural area where the Incomati river catchment is invaded by Nile tilapia from Mozambique is excluded. Why, it is ideal for tilapia culture and several high investment projects have been proposed here?	Existing facilities were not considered as a pull factor for identifying the study areas. The reason is twofold: firstly, the SEA team has not received significant response with information and locations of existing facilities from all Provinces and stakeholders, therefore the existing facilitates database is currently porous and would skew the analysis towards areas for which we have received more information. Secondly, and most importantly, the SEA seeks to investigate areas in which to potentially unlock "new' aquaculture development, and not necessarily to increase development in areas where aquaculture development is already established. However, based on the comments received the Mpumalanga study area has been expanded to the East (along the Komati river) and will also be investigated for Tilapia culture.
	· The entire northern and NE part of Limpopo from the border with NW Province to the KNP and southwards to Pretoria is climatically ideal for tilapia culture. The Limpopo catchment has been invaded by Nile tilapia from Zimbabwe since 2000. What is the justification for demarcating only a small restricted area in what appears to be primarily Venda?	Pull factors that resulted in this area being identified: Irrigated crops between Polokwane and Louis Trichardt provides an opportunity for water use synergies. Proximity to larger urban centres (Polokwane, Louis Trichardt & Tzaneen) for access to market and support services. It is extremely important to recognise that aquaculture will not in any way be restricted or prohibited outside of the SEA study areas. Any person has the right to propose development in any area and with any species, and follow the existing regulatory requirements and processes to obtain any required authorisations and licenses.
	· The two regions 7 and 8 in the E Cape run from cool areas that are too cold for tilapia to warm areas too warm for trout. Yet these areas include the district East and SE of Queenstown (Xonxa, Lubisi and Ncora dams) which are climatically unsuitable for both tilapia and trout. These areas have been documented to be unsuitable for aquaculture by various reputable organisations such as SAIAB and Enviro Fish Africa (Pty) (Ltd). Why they should be included as suitable areas begs the question as to whether other criteria such as human poverty, environmental degradation, and lack of agricultural infrastructure have taken precedence over suitability for aquaculture? The Lower Albany frost-free area is however excluded. Why, this is an agricultural area of low conservation status and potential agricultural diversification?	It is assumed that the Eastern Cape study areas would be considered for both warmer climate species (such as Marron and Tilapia) in the warmer areas towards the coast, as well as for colder climate species (trout) in the cooler parts of the proposed study areas (i.e. towards the north). The SEA has a strong environmental focus, thus promoting aquaculture that is developed in an environmentally responsible manner, and will seek to exclude areas (from regulatory streamlining) within the study areas where the environmental impacts of aquaculture may be found to be unacceptable, and prescribe appropriate environmental assessment and management actions in areas where aquaculture could be acceptable.
	· There are several other anomalies which bring into question the criteria used in the mapping process.	The GIS analysis was conducted used the following key variables for freshwater aquaculture: Major centres, protected areas, slope, dams and dam users, fish sanctuaries, irrigated crops, stressed catchments, and Present Ecological State of perennial rivers. The analysis was conducted for the entire country with available spatial data. The results of the process which led to the identified study areas are dependent on the input layers, but also based on human input (this opportunity for multiple stakeholders to review and comment) which selects and verifies the input layers.
	4. No mention is made of demarcating *Conservation areas* for threatened indigenous fish	Indigenous Fish Sanctuaries from the National Freshwater Ecosystem Priority Areas (NFEPA) study was taken into

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	species to balance the prescriptive and restrictive nature of the exercise. For example: The Wild Coast estuaries form an ideal sanctuary area for *Oreochromis mossambicus*, protected from Nile tilapia invasion by high salinity and low winter temperature, and in an area where commercial aquaculture is unlikely. The elevated coastal platform from Port St Johns to the KZN border, with its isolated short and cool rivers is climatically unsuitable for tilapia culture yet offers the perfect sanctuary option in this part of their natural range. Surely, as this is a DEAT initiative, the mapping exercise would gain more credibility if *positive* such proposals were included?	account and used as a "push factor"/"less suitable area" for aquaculture development.
	5. Aquaculture Development Zones (ADZ) do not exist in any other country where commercial aquaculture is successful. Globally, in almost all cases successful aquaculture is SITE SPECIFIC, and projects form either large diversification investments by farms, mines, specific projects based on a natural resource (land or water), and are not confined to a specific geographic areas EXCEPT by geographic factors such as climate, water availability, land suitability for ponds, infrastructure in terms of energy and access etc. Like the poultry broiler industry demonstrates, fish farms concentrated into restricted defined areas end up as Aquaculture Dead Zones (ADZ) when disease strikes, and the ADZ concept is fundamentally flawed for intensive livestock production.	The aim of the SEA has been amended slightly. It no longer seeks to identify ADZs or areas legally zoned for aquaculture development. The SEA is a desktop-based <u>strategic</u> assessment that aims, at a high level, to identify areas of suitability and investigate the potential for streamlining regulatory requirements for aquaculture in those areas. However, it has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner, and will seek to exclude areas (from regulatory streamlining) within the study areas where the environmental impacts of aquaculture may be found to be unacceptable, and prescribe appropriate environmental assessment and management actions in areas where aquaculture could be acceptable.
	6. There is no legal justification why a potential fish farmer situated in NW Limpopo or the Albany area of the E Cape should be prejudiced over one situated in Venda by an imposed mapping exercise. That is the sort of discrimination I thought this country was trying to get away from. The technology now available to farmers to prevent any form of fish escapes or pollution to natural water bodies exists. The Zambian authorities who are much more enlightened regarding aquaculture than those in SA have realised this by permitting (for example) a large commercial fish farm above the Victoria Falls near Livingstone which is no threat to the local conservation, and is now producing 17.5 tons from every 1ha pond harvested. If the Zambian authorities can do this, why cannot South Africa?	The SEA is a desktop-based strategic assessment that aims, at a high level, to identify areas and investigate the potential for streamlining regulatory requirements for aquaculture in those areas. However, it has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner, and will seek to exclude areas (from regulatory streamlining) within the study areas where the environmental impacts of aquaculture may be found to be unacceptable, and prescribe appropriate environmental assessment and management actions in areas where aquaculture could be acceptable. It does not seek to prejudice any person in any way, but is a first pass at identifying areas where aquaculture can be incentivised and best managed with minimal environmental consequences. It is extremely important to recognise that aquaculture will not in any way be restricted or prohibited outside of the SEA study areas. Any person has the right to propose development in any area and with any species, and follow the existing regulatory requirements and processes to obtain any required authorisations and licenses.
	7. It would be interesting to know who the 'stakeholders and experts' were who advised on areas suitable for tilapia culture? As far as I know not a single tilapia culture expert was included in this process. Kindly let us have a list if their names and credentials. As an aquaculture expert specialising in tilapia culture and farm design throughout Southern Africa, my answer to the Question "*Do you agree with the study areas and species identified per province?*" has to be therefore a categorical No.	In drafting and reviewing the suitable aquaculture areas identified for potential new development of Tilapia culture in South Africa, the SEA team consulted with experts from the following entities representative on our Expert Reference Group: 1. Aquaculture South Africa 2. Aquaculture Association of South Africa 3. Tilapia Aquaculture Association of South Africa 4. Agricultural Research Council: Aquaculture division 5. University of Stellenbosch: Aquaculture division 6. CapeNature: Freshwater scientific services 7. Western Cape Dept of Agriculture: Aquaculture at Elsenburg 8. eZemvelo KZN Wildlife: Biodiversity & Permitting 9. KwaZulu-Natal Dept of Economic Development, Tourism and Environmental Affairs: Impact Management 10. Eastern Cape Dept of Economic Development, Environmental Affairs and Tourism: Biodiversity & Conservation 11. Free State Dept of Agriculture and Rural Development: Aquaculture Development 12. Free State Dept of Economic, Small Business Development, Tourism and Environment: Biodiversity & Permitting 13. Gauteng Dept of Agriculture and Rural Development: Animal Health and Veterinary Services 14. Limpopo Dept of Economic Development, Environment and Tourism: Alien Invasive Species 15. Mpumalanga Dept of Agriculture, Rural Development, Land and Environmental Affairs: Aquaculture 16. Mpumalanga Tourism and Parks Agency: Biodiversity Planning & Permitting 17. Northern Cape Dept of Agriculture, Land Reform & Rural Development: Animal Production 18. Northern Cape Dept of Environment and Nature Conservation: Coastal management & Freshwater systems

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		19. North West Dept of Rural, Environment and Agricultural Development: Fisheries and Aquaculture 20. Western Cape Dept of Environmental Affairs and Development Planning: Biodiversity and Coastal Management 21. Agricultural Research Council: Aquaculture Unit 22. Dept of Agriculture, Forestry and Fisheries: Sustainable Aquaculture Management 23. South African National Biodiversity Institute: Biodiversity Assessment and Monitoring 24. World Wide Fund for Nature – South Africa: Sustainable Fisheries
	8. My overall comment is that if DEAT would put as much effort into protecting endangered species by POSITIVE actions rather than negative restriction of a potentially large food-producing industry, then South Africa might catch up with its neighbouring countries which are at least 25 years ahead. Perpetuating the cycle of poverty by elaborate and unnecessary restrictive legislation achieves nothing. The comment that farmers falling outside the prescribed areas *would not be prohibited* is sinister, and does not bode well in terms of permitting and legalising of justified projects…a severe existing hindrance to aquacultural development in South Africa that also does not exist in neighbouring countries.	The aim of the SEA is to create an enabling area within areas that have been pre- assessed in terms of potential environmental (biophysical, social, economic) risks and opportunities. It does not seek to recommend penalisation of activities outside of the identified strategic areas. However, there may be some areas that are identified as not suitable for aquaculture based on current knowledge (e.g. in highly sensitive environments).
MFFASA / Zini Fish Farms **via Neil Stallard** **31/03/2017**	Durban-Richards Bay Area· There need to be more species added to this area: o Spotted Grunter (*Pomadasys commersoni*) o Cobia (*Rachycentron canadum*)	Cobia and Grunter are not included in the scope of the SEA. However, the SEA will seek to make recommendations on other species, with similar requirements to the template species included in the SEA that have the potential for cultivation or further investigation.
	· The area could be extended north of Richards Bay to the Mapelane point.	Noted, the area has been extended to Mapelane point.
	· The systems must also include open pond culture.	Based on comments received during this Screening Phase, open pond culture of Dusky kob has been included in the SEA.
	Port Elizabeth & East London · Additional species: o Yellowtail (*Seriola lalandi*)	Yellowtail is not included in the scope of the SEA. However, the SEA will seek to make recommendations on other species, with similar requirements to the template species included in the SEA that have the potential for cultivation or further investigation.
	· In considering areas one needs to look at the costs of operating in some areas. The costs of farming in IDZ's have so far proved to be inhibitive.	The SEA is a desktop-based strategic assessment that aims, at a high level, to identify areas and investigate the potential for streamlining regulatory requirements for aquaculture in those areas. However, it has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner. The 'business case' in terms of development- and operating costs and technical -and financial feasibility is not within the scope of the SEA, but should be considered on a project-by-project basis, and would still be the responsibility of the developer/farmer proposing a specific aquaculture project.
	· What about the rural areas between East London and Port Elizabeth for RAS?	It is assumed that the Eastern Cape study areas would be considered for both warmer climate species (such as Marron and Tilapia) in the warmer areas towards the coast, as well as for colder climate species (trout) in the cooler parts of the proposed study areas (i.e. towards the north). Therefore, the reason for the proposed study areas extending from the coast towards the inland, and not just along the coast.
	· Open pond systems not suitable due to cool temperatures.	Noted.
	Orange-Kleinsee Area · What about oyster and mussel grow-out? In Namibia they do these off the coast and they have been listed in the Western Cape Province Information Pack in areas that are not in Saldanha Bay.	Western Cape Department of Agriculture and DAFF have indicated this area as being strategically important for land-based mussel and oyster nurseries supplying Saldanha Bay for sea-based grow-out. Frequent Harmful Algal Blooms (HABS) and a high-energy coastline discouraged the potential for sea-based grow-out of mussels and oysters in this area. Also, MFFASA members have confirmed the unsuitability of the Northern Cape coastline in this area for any sea-based Mariculture.
	I suggest not prioritising one area above the other at this stage, when there are multiple areas in one province. Rather investigate all areas as we need to develop the sector.	The SEA is a desktop-based strategic assessment that aims, at a high level, to identify areas and investigate the potential for streamlining regulatory requirements for aquaculture in those areas. The study has to have a defined scope which is tied to available time and resources to carry out further investigations within the identified study areas. To ensure a thorough, fair and timely assessment, defined study areas that represent all provinces is proposed in this 'first-pass' SEA.
MFFASA / Viking Aquaculture **Pieter Marais**	I am not sure if this only applies to future full commercial farms, but what about finfish hatchery RAS in Western Cape for Kob and Yellowtail. Possibly also flat fish species like sole.	Yellowtail, Sole and sea-run Trout, and pond culture of oysters are not included in the scope of the SEA. However, the SEA will seek to make recommendations on other species and systems, with similar requirements to the template species included in the SEA that have the potential for cultivation or further investigation.

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01/04/2017	Also, oysters in ponds. Trout also need to be added to cage culture systems.	The SEA assumes minimum technology/engineering input (e.g. artificial heating or cooling). Therefore, 'natural' unsuitability from a climate perspective (e.g. too cool or hot) for a species was also taken into account. The water temperature in the Western Cape was considered too cold for optimal Dusky kob culture, therefore a study area focusing on Duksy kob (as template warm water species) is proposed in KwaZulu-Natal, whereas the cooler water temperature along the West Coast was considered most suitable for optimal Atlantic salmon culture (as template cold water species). A study area in the Robertson-Montagu region for trout has been proposed for further investigation in Phase 3 of the SEA.
MFFASA **Guy Musson** **22/03/2017**	All reference to abalone and land based finfish is RAS – they need to define RAS very clearly (i.e. – 25%; 50%; 95%);	Noted. RAS is defined for the purposes of the SEA in the Project Description Chapter being compiled by the project team.
	1) All reference to indigenous marine finfish is only dusky kob – I would think that this needs to be broadened as well to include the likes of soles, kingklip, white stumpnose, etc.;	Other species like Sole, Kingklip and Stumpnose are not included in the scope of the SEA. However, the SEA will seek to make recommendations on other species, with similar requirements to the template species included in the SEA that have the potential for cultivation or further investigation.
	2) The only salmonid mentioned is Atlantic salmon – my feeling is that this reference MUST be broadened as well to include other salmonids such as the steelhead trout, etc., and cannot just refer to Atlantic salmon given the restraints around salmon hatcheries in South Africa;	Steelhead trout is not included in the scope of the SEA. However, the SEA will seek to make recommendations on other species, with similar requirements to the template species included in the SEA that have the potential for cultivation or further investigation.
	3) No reference to pond culture of marine finfish at all. This production system HAS to be included as I feel that the Mtunzini Fish Farms (Zini Fish Farms) is critical to the future of dusky kob and that future sole farms on the West Coast will more than likely be in ponds in abalone effluent and integrated into some form of algae culture;	Based on comments received during this Screening Phase, open pond culture of Dusky kob has been included in the SEA. Sole is not included in the scope of the SEA. However, the SEA will seek to make recommendations on other species and systems, with similar requirements to the template species included in the SEA that have the potential for cultivation or further investigation The SEA assumes minimum technology/engineering input (e.g. artificial heating or cooling). Therefore, 'natural' unsuitability from a climate perspective (e.g. too cool or hot) for a species was also taken into account. The water temperature in the Western Cape was considered too cold for optimal Kob culture, therefore a study area focusing on Kob is proposed in KwaZulu-Natal, whereas the cooler water temperature along the West Coast was considered most suitable for optimal Atlantic salmon culture.
	4) In my opinion, the reference to cage farming of finfish is unrealistic except in Richards Bay and in Saldanha Bay.	Noted.
CapeNature **Dean Impson** **31/03/2017**	<u>1) Do you agree with the aquaculture study areas as identified for your province?</u> The study areas seem sensible, especially the one near Cape Town which is close to markets, technology partners and water. The proposed aquaculture nodes have some potential for conflict because the area includes some Freshwater Ecosystem Priority Areas, including FEPA "fish sanctuaries" (e.g. above Berg River dam, above Wemmershoek Dam). It would be best if some of the most sensitive areas were excluded from the proposed zones. It is also doubtful that DWS and the City of Cape Town would support any cage culture on the Berg River and Wemmershoek Dams as these dams provide Cape Town and environs with excellent quality water, a precious asset for an expanding city.	The Cape Town study area was identified for urban aquaculture of Tilapia and Marron, which assumes highly regulated artificial systems. It has been contemplated that this is not in line with the objectives of the SEA, which assumes minimum technology/engineering input (e.g. artificial heating or cooling). Based on this, and concerns that climatic conditions are unsuitable for warmer water aquaculture species, the Cape Town area is not taken forward for further investigation in the current SEA as a separate study area. The Robertson-Montagu and Cape Town areas were merged to create a single study area in the Western Cape that will be investigated for trout.
	It is noted that you were not given the latest NEMBA trout maps that SANBI has prepared because they have not been approved for general distribution. This is a pity as trout are the biggest freshwater aquaculture species in the province. Hence your aquaculture zones may change slightly once you have access to the maps.	Noted.
	DAFF and the Department of Agriculture W Cape, as well as this study, should identify a list of dams considered most suitable for aquaculture production, providing reasons why. A study on the dams could be considered separately from the bigger aquaculture zones. The results of this analysis could then form the basis of discussions with DWS and other agencies that manage large dams in RSA.	The study areas were identified, selected and refined with dams (as a water source and as key for cage-culture) in mind. Dams will be considered 'separately' in terms of the main system that may be employed for aquaculture (e.g. cages), as well as in terms of carrying capacity. The study areas have been presented at a quaternary catchment scale, but further investigation in Phase 3 of the SEA will focus on water bodies (e.g. rivers and dams).
	In terms of species the proposals seems sensible, but note that Brown trout is not grown	Noted.

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	commercially for human consumption. It is produced sporadically for stocking dams for flyfishing purposes.	
	2) Can these areas be investigated further in the SEA? Yes, see comments above. The areas need to be refined further. We are happy to assist with this	Noted.
	3) In terms of potential impact, which of the two areas is more appropriate? The proposed zone near Cape Town seems more sensible for reasons given in 1) above.	The Cape Town study area was identified for urban aquaculture of Tilapia and Marron, which assumes highly regulated artificial systems. It has been contemplated that this is not in line with the objectives of the SEA, which assumes minimum technology/engineering input (e.g. artificial heating or cooling). Based on this, and concerns that climatic conditions are unsuitable for warmer water aquaculture species, the Cape Town area is not taken forward for further investigation in the current SEA as a separate study area. The Robertson-Montagu and Cape Town areas were merged to create a single study area in the Western Cape that will be investigated for trout.
ARC **Mary-Jane Thaela -Chimuka** **31/03/2017**	My suggestion is to look into the different dams water levels if you have not done that already, from the Water and Sanitation website for water level http://niwis.dwa.gov.za/niwis2/	Noted.
	I have also requested Mr. Eric Watkinson from DST to send you information of our indigenous tilapia and catfish distribution, Water resources and minimum temperature, that he is preparing for our selective breeding project.	Noted.
Northern Cape Department of Environment and Nature Conservation **Louise Geldenhuys** **06/04/2017**	Oysters in land-based nurseries: In principle there is no objection to oyster aquaculture in land-based nurseries in this zone. However, oysters have been farmed in the province before, and have been associated with the introduction of alien species. In 2007 a survey was done of alien species at oyster farms at Alexander Bay, Saldanha Bay and Knysna Estuary (Houpt et al., 2010). They found three newly introduced alien species that were specifically introduced through Oyster aquaculture activities, two of which occurred at Alexander Bay (Black sea urchin and the European flat oyster). They also describe an invasive Mediterranean crab found at Kleinsee (Haupt et al., 2010). While the ecological implications of invasions such as these, and especially of the Black Sea urchin, which can cause kelp-bed communities to collapse, is potentially severe, it seems that the invasion did not spread out of the Alexander Bay oyster dams. In order to prevent possible alien species in oyster dams to reach the ocean, in addition to other preventative measures, oyster farms should not be allowed in areas in the proposed zone where there is any risk of freshwater or seawater flooding during extreme storm events or sea level rise.	The SEA has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner, and will seek to exclude areas (from regulatory streamlining) within the study areas where the environmental impacts of aquaculture may be found to be unacceptable, and prescribe appropriate environmental assessment and management actions in areas where aquaculture could be acceptable. Identification of environmental sensitivities within the study areas (e.g. biodiversity and ecology), the potential impact/risk of aquaculture in those areas, and best practice mitigation and management will be investigated in Phase 3 (assessment phase) of the SEA. Furthermore, the SEA also includes a review and update of a Biodiversity Risk and Benefit Assessment conducted for the Pacific oyster, *Crassostrea gigas,* according to Section 14 of Chapter 6 of the Alien and Invasive Species Regulations of 2014 i.e. Risk Assessment Framework, in terms of the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEMBA). This risk assessment addresses issues including but not limited to restricted activities; hybridization; persistence and invasiveness; impacts on biodiversity, ecosystem balance, natural resources and probability of naturalisation; key ecological, economic and social impacts, risk control measures and mitigation, and recommendation for required permitting procedures.
	Abalone in land-based re-circulation systems: In principle there is no objection to abalone farming in land-based re-circulation systems in this zone.	Noted.
	Atlantic salmon in land-based re-circulation systems: This species need more careful consideration. It is not clear that this is a suitable aquaculture species for this zone. Concerns with farming with this species in this zone is: - It is not native to this area, and there is always a risk of invasion when introducing a non-native species to an area. - There have been reports of the effluents from farming with this species can have especially high nutrient concentrations and cause algae blooms. - There is a concern with the possibility of spreading fish parasites. - This species does not seem like a sustainable option since it was reported that 2-5 kg wild caught fish is required to produce 1 kg of farmed Atlantic salmon (Tacon, 1996). More recent studies found that some of the fish meal feed can be replaced by plant proteins (Carter & Hauler, 2000), and that fish oil can be replaced by rapeseed oil (Bell et al., 2001). However, the use of wild-caught fish feeds could only be prevented if the use of alternatives is enforced.	The SEA has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner, and will seek to exclude areas (from regulatory streamlining) within the study areas where the environmental impacts of aquaculture may be found to be unacceptable, and prescribe appropriate environmental assessment and management actions in areas where aquaculture could be acceptable. Identification of environmental sensitivities within the study areas, the potential impact/risk of aquaculture with specific species in those areas (e.g. invasion, effluent causing algae blooms, parasites), and best practice mitigation and management will be investigated in Phase 3 (assessment phase) of the SEA.

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	Although it is indicated that land-based re-circulation systems are proposed, more information is needed on how the above-mentioned potential negative impacts will be prevented. The case for including the farming of this species in the Northern Cape coastal zone would need more detailed motivation, and a decision on allowing/not allowing this species should be made on a higher policy-making level.	
	Other options: Other options that could be considered is abalone ranching and feed algae or seaweed production. Feed algae or seaweed production may be viable in the nutrient-rich upwelling system of the west coast. Production of kelp as a food source for abalone farms may further grow the abalone farming industry.	Abalone ranching is not included in the scope of the SEA. Abalone ranching does not trigger the need for an EIA. Land-based activities (e.g. hatchery and grow-out) of abalone are being assessed. The SEA assumes the cultivation of algae (seaweed) in association with abalone and oysters, but will not investigate it as a separate focus species.
	Name of zone: The name of the zone given "Orange-Kleinsee Area" is confusing, since it gives the impression that it is the area between the Orange River Mouth and Kleinsee, while the map indicates that the southern border of the zone is much further south around Hondeklip bay.	This area extends from the Orange River mouth (Alexander Bay) to Hondeklip Bay - not Kleinsee as incorrectly indicated on the version 1 study area maps. This has been corrected.
	Northern border of zone: The northern border of the zone is currently in Namibia, and the zone include the Orange River Estuary. This highly important and sensitive area should be excluded from the zone, and I suggest making the northern border of the zone a south of the Orange River Mouth Wetland Ramsar site, including an appropriate buffer area (boundary of the Ramsar site can be found in the Protected Areas shapefile available on https://egis.environment.gov.za/?q=protected_areas_database).	The SEA is a desktop-based strategic assessment that aims, at a high level, to identify areas and investigate the potential for streamlining regulatory requirements for aquaculture in those areas. However, it has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner, and will seek to exclude areas (from regulatory streamlining) within the study areas where the environmental impacts of aquaculture may be found to be unacceptable, and prescribe appropriate environmental assessment and management actions in areas where aquaculture could be acceptable. The SEA assumes no regulatory streamlining for aquaculture development in estuaries (as they are dynamic and sensitive features of the environment) or Ramsar sites. The final study areas will reflect the exclusion of the Orange River Mouth.
	Mining areas: It should be noted that several large portions of the proposed zone consists of restricted-access mining areas owned by mining companies. While this should not be a cause of exclusion (since mines does not last forever, and other economic activities should be encouraged in these areas), it should be kept in mind, since these mines can prevent any aquaculture activities taking place on their land.	The SEA is cognisant of land-use constraints and potential synergies between mining and aquaculture. However, the SEA is a desktop-based strategic assessment that aims, at a high level, to identify areas and investigate the potential for streamlining regulatory requirements for aquaculture in those areas. However, some questions, e.g. can I farm with abalone on this specific piece of land/erf/farm, and the required negotiations with relevant stakeholder (land-owners, permit holders) are very site-specific and needs to be answered at the project level, and hence falls outside of the scope of this SEA.
	Protected Areas Expansion Priority Areas: Priority areas for protected area expansion for the Namakwa district has recently been identified, and it is suggested that these areas (the primary focus areas in attached shapefile) should be extracted from the proposed aquaculture zone.	Broad areas were identified as study areas (Phase 2 - screening) for further investigation in the SEA (Phase 3 - assessment). Phase 2 considered Formal National Protected Areas to inform the broader study areas and Phase 3 will consider finer scale conservation planning, such as Protected Areas Expansion Priority Areas.
	4. Additional information for further refinement of zone (sensitive areas that should be excluded from the final aquaculture zone): Further refinement of the zone should prohibit aquaculture development in the following sensitive areas: - Terrestrial critical biodiversity areas (available from enricoosthuysen@gmail.com) - Threatened coastal and benthic marine ecosystems (can be found at http://bgis.sanbi.org/SpatialDataset/Detail/407) - Estuaries (can be found at http://bgis.sanbi.org/Projects/Detail/62) - Seal colonies (shapefile attached) - It is recommended that a buffer zone should be developed in order to prevent land-based aquaculture facilities to be too close to the high-water mark. This buffer zone should be of sufficient size to protect aquaculture facilities from being at risk of coastal erosion, extreme storm events (that is becoming more frequent along our coastline), and sea-level rise.	It is extremely important to recognise that the SEA process cannot and does not seek to restrict or prohibit aquaculture development outside of the SEA study areas. However, it has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner, and will seek to exclude areas (from regulatory streamlining) within the study areas where the environmental impacts of aquaculture may be found to be unacceptable, and prescribe appropriate environmental assessment and management actions in areas where aquaculture could be acceptable. Identification of environmental sensitivities within the study areas (e.g. threatened ecosystems, conservation planning, seal colonies, coastal erosion) the potential impact/risk of aquaculture in those areas, and best practice mitigation and management will be investigated in Phase 3 (assessment phase) of the SEA. The SEA assumes no regulatory streamlining for aquaculture development in estuaries as they are dynamic and sensitive features of the environment.

Appendix E: Comments and responses report - Broader stakeholder commenting period to refine and finalise strategic areas.

Commenter	Comment	Response
Western Cape Department of Environmental Affairs & Development Planning **Liza Petersen** **07/04/2017**	The Department is of the opinion that the variables and thresholds used in the level one screening to identify suitable marine and freshwater aquaculture, should not include variables related to economic viability (e.g. ports and airports, major harbours, major roads, research support services, cities or major towns, aquaculture feed suppliers and irrigated land). In other words, an area should not be excluded because at this point, it does not make “economic sense”. These variables may change over time and may prove to be a needless limiting factor in future.	These variables relate to access to services and support and were captured as proximity to major centres (e.g. Cape Town or Polokwane) and proximity to harbours from which vessels can be launched (e.g. Hermanus). These factors represent basic technical pull factors and not necessarily economic viability and were identified by stakeholders to be important to consider. However, as the SEA has a strong environmental focus these variables were provided less weight in the GIS analysis than, for example, National Protected Areas (5 % vs 15 %).
	The Department agrees with the ecological and social constraints. In addition, CapeNature and the Department have produced a Western Cape Biodiversity Spatial Plan (2016). This plan, together with the NFEPA should guide and inform further investigation with the focus areas. The plan is available from CapeNature, Scientific Services.	NFEPA Fish Sanctuaries were considered in the GIS analysis for identifying the study areas (push factor). Conservation- and biodiversity plans will be considered in the assessment phase of the SEA (Phase 3) focusing on the final study areas identified and selected.
	There is thus the need to focus on the ecological and social variables and thresholds rather than the variables and thresholds that are limiting factors from an economic viability perspective. This may (or may not) unlock potential for aquaculture in more areas in future, should these variable change.	The SEA is a desktop-based strategic assessment that aims, at a high level, to identify areas and investigate the potential for streamlining regulatory requirements for aquaculture in those areas. However, it has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner. The 'business case' in terms of development- and operating costs and detailed technical -and financial feasibility is not within the scope of the SEA, but should be considered on a project-by-project basis, and would still be the responsibility of the developer/farmer proposing a specific aquaculture project.
	Some clarity regarding what information sources were used in determining the screening tool should be mentioned. Were spatial planning documents such as Environmental Management Frameworks and Spatial Development Frameworks also included in the information sources? It is important that these strategic spatial documents are included as information sources in the development of the SEA.	Spatial planning documents such as Environmental Management Frameworks and Spatial Development Frameworks will be considered in the assessment phase of the SEA (Phase 3) focusing on the final study areas identified and selected.
	These areas can be investigated further. However, the Department is of the opinion that the study area is very limited in terms of the freshwater aquaculture possibilities. Based on the suggestion above, additional areas (not limited by the “economic viability”) may be included in the study area. These could be described differently or as secondary options for aquaculture development, rather than being excluded from the benefits of this project based on economic factors.	The development of the draft study areas did not take into account "economic viability", but focused on key environmental constraints, such as protected areas and fish sanctuaries, and available resource (e.g. rivers and dams, with cognisance of Present Ecological State and water users). Therefore, the study areas do not seek to include or exclude potential areas based on economic factors, but has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner, and will seek to exclude areas (from regulatory streamlining) within the study areas where the environmental impacts of aquaculture may be found to be unacceptable, and prescribe appropriate environmental assessment and management actions in areas where aquaculture could be acceptable. The 'business case' in terms of development- and operating costs and technical -and financial feasibility is not within the scope of the SEA, but should be considered on a project-by-project basis, and would still be the responsibility of the developer/farmer proposing a specific aquaculture project.
	The Department applies equal importance to the areas currently identified. The areas that are limited based on economic viability may however be included as “secondary options”.	The SEA is a desktop-based strategic assessment that aims, at a high level, to identify areas and investigate the potential for streamlining regulatory requirements for aquaculture in those areas. The study has to have a defined scope which is tied to available time and resource to carry out further investigations within the identified study areas. To ensure a thorough and fair assessment, one study area (one freshwater {and one marine, where applicable}) per province is proposed in this 'first-pass' SEA.
	3. The Department would also like to understand the role of standards in terms of the development of the aquaculture SEA. 3.1. Two national aquaculture standards were developed, including marine (i.e. abalone) and freshwater (i.e. trout) species. The “draft national standard for land-based abalone” was gazetted for public comment but has not yet been finalised and gazetted for implementation. The “draft national standard for land-based trout aquaculture” never went out for public comment as agreement between government and industry was pending. 3.2. Lots of work has however gone into the development of these standards and will be particularly useful in implementation of the SEA. It is the view of the Department that the SEA should not aim to “delist” activities but rather allow for exclusion from the requirement to obtain environmental authorisation based on the use of a standard, consistent with Section 24(2)(d) of the National Environmental Management Act, 1998 (Act No. 107 of 1998).	The meeting between the CSIR SEA Team and the Department (WC DEADP) on 9th May 2017 refers. The following key actions resulted from the discussion: • Both the draft national aquaculture standards developed for marine (i.e. abalone) and freshwater (i.e. trout) species will be considered during the assessment phase of the SEA. • Specialists will investigate and test the applicability of the draft standards in each of the strategic aquaculture areas identified for abalone and trout, respectively. • Recommendations to potentially amend or add specific activities to the current draft standards, and/or the potential development of new standards for the remaining candidate species as per the SEA scope, where relevant, will be made in accordance with the Expert Reference Group in support of drafting a decision-support framework i.e. possible streamlined and integrated authorisation processes based on the outcome of the specialist assessment.

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Commenter	Comment	Response
	3.3. The Department is aware that amendment to the standards or additional standards will be required as there are more species covered by the SEA. However, given the current involvement and knowledge base in the reference group, this could be possible. 3.4. The suggestion is therefore that the standards are used in conjunction with the SEA for the purposes of aquaculture development. The Department would also like to discuss this recommendation with the project team.	
	<u>Abalone Aquaculture</u> Abalone aquaculture requires significant amounts of nutrients of which most is derived from seaweed or kelp. Do the areas where these activities are planned have sufficient seaweed for harvesting during the entire growing period (4 years); or will it be brought in from elsewhere? Suggestion: The maximum sustainable yield for seaweed (kelp) must be assessed for the areas in which these activities are planned as part of the SEA studies. The study areas may need to be rationed should the studies indicate that some areas have reached its capacity.	Noted. The SEA assumes the cultivation of algae (seaweed) and kelp in association with abalone, but will not investigate it as a separate focus species. Wild harvesting of seaweed or kelp specifically is also excluded from the scope of this SEA. The natural distribution of seaweed / kelp forests associated with strategic areas identified for potential Abalone culture will be investigated in Phase 3 (assessment phase) of the SEA.
	<u>Abalone Aquaculture</u> Seaweed is often grown in tanks and is enriched by adding significant amounts of fertilizer and synthetic nutrients that are later discharged into the ocean as part of return wastewater. This could release new contaminants into an area and clarity in terms of how the existing ecological systems will cope with these potential pollutants. Furthermore, the release of particulate matter from the process needs to be controlled as this results in turbidity at discharge points and creates plumes that can affect the light penetration of areas close to the discharge points. These nutrients should ideally be discharged outside the surf zone to ensure proper dilution through dispersal. Suggestion: Synthetic feed alternatives must be assessed for their impact on the specific areas of where they plan to be located.	Noted. These types of issues will be assessed and addressed in Phase 3 (Assessment) and Phase 4 (Decision Making Framework) of the SEA.
	<u>Abalone Aquaculture</u> For areas where these farms are to be located in dune systems or on beaches the impact of the required infrastructure must be assessed. For most of the Western Cape Provincial Coastline a coastal management line has been scientifically determined. This line is not completed for the Eden District area yet but will be done by the end of 2017. Although the Coastal management line is not adopted by the provincial minister as yet it is in process and thus should be considered where possible in terms of placement of infrastructure in the coastal zone.	Noted. These types of issues will be assessed and addressed in Phase 3 (Assessment) and Phase 4 (Decision Making Framework) of the SEA.
	<u>Abalone Aquaculture</u> The pre-treatment of abstracted seawater and the addition of associated chemicals or additives must be explored especially if the water is to be discharged back into the ocean. Issues relating to wave action and sea currents must be explored with regard to its potential to cause beach or dune erosion, as well as erosion (including siltation) of the ocean floor once it has been discharged.	Noted. These types of issues will be assessed and addressed in Phase 3 (Assessment) and Phase 4 (Decision Making Framework) of the SEA.
	<u>Abalone Aquaculture</u> The re-circulation of water often occurs to increase the temperature in colder environments, however this could result in the concentration of toxic by-products. There is the risk of concentrating dissolved solids and particulate matter in a re-circulation system, as well as bacteria and parasites. The discharge of these contaminants must be considered in the individual assessments.	Noted. These types of issues will be assessed and addressed in Phase 3 (Assessment) and Phase 4 (Decision Making Framework) of the SEA.
	<u>Air quality</u> The SEA Report should determine if any activities related to the aquaculture industry impacts on air quality and propose measures to manage possible air quality impacts from	Noted. These types of issues will be assessed and addressed in Phase 3 (Assessment) and Phase 4 (Decision Making Framework) of the SEA.

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Commenter	Comment	Response
	these activities. The following must also be considered in the SEA study: • Noise generation must conform to the Western Cape Noise Control Regulations, 2013; • Dust generation must conform to the National Dust Control Regulations (GN No. R. 827) of 1 November 2013 as per the NEM: AQA; and • Odour control in terms of Section 35 (2) of the NEM: AQA. Suggestion: The SEA should consider that potential impacts of these potential issues of nuisance to surrounding communities.	
	<u>Saldanha</u> Aquaculture species are sensitive to several environmental pressures, including ocean acidification and sea warming due to climate change, as well as air quality impacts (metal-based dust). A general concern is therefore raised in terms of the location of the proposed aquaculture areas, given the current and future land-based industrial development taking place in and around Saldanha Bay. A delicate balance is required between the aquaculture industry and the land-based industrial development. Suggestion: The aquaculture SEA must also consider the increase in industrial activity, especially as it related to the Industrial Development Zone proposed from the Saldanha Bay area.	Noted. These types of issues will be assessed and addressed in Phase 3 (Assessment) and Phase 4 (Decision Making Framework) of the SEA. It is important to note that the SEA seeks to assess the potential risks and opportunities of aquaculture to the environment, and not environmental impacts to aquaculture.
	<u>Climate change</u> Please note that "Global warming is a major impact of climate change. Increased temperature brings about associated changes in the hydrology and hydrography of water bodies, exacerbates the occurrence of algal blooms and red tides etc., all factors that could have important impacts on aquaculture" (De Silva & Soto, 2009). Suggestion: The effect of climate change on the proposed areas and how it will influence the aquaculture industry should be further investigated and taken into consideration in the development of the SEA.	Noted. These types of issues will be assessed and addressed in Phase 3 (Assessment) and Phase 4 (Decision Making Framework) of the SEA. It is important to note that the SEA seeks to assess the potential risks and opportunities of aquaculture to the environment, and not environmental impacts to aquaculture.
	<u>Areas excluded from the National Standard for land-based abalone aquaculture (this standard was gazette for public comment but not yet adopted)</u> The following extract is from the National Standard for land-based abalone aquaculture and deals with areas that should be excluded from the scope of the standard: "The provisions of this standard are not applicable to land-based abalone aquaculture facilities, infrastructure or structures with a production output exceeding 50 000 kg per annum (wet weight) where any portion of such facility, infrastructure or structures occurs within — (a) fish sanctuaries for critically endangered and endangered fish species; (b) river FEPAs; (c) terrestrial critical biodiversity areas; (d) wetlands and associated buffer zones extending 500 metres from the edge of a wetland; (e) subterranean water control areas as specified in the General Authorisations in terms of section 39 of the National Water Act, 1998 (Act No. 36 of 1998); (f) estuaries, including a buffer of 500 metres from the edge of the estuary; (g) world heritage sites; (h) heritage sites; (i) protected areas; and (j) coastal access land."	Many of these area types have been incorporated in the GIS analysis to identify the study areas, and will be considered within the study areas at a finer scale to ensure that the areas identified in this Standard is appropriately taken into account.

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Commenter	Comment	Response
	Suggestion: It is suggested that the consistency between the areas that form part of the SEA and the areas that are excluded from the scope of the standard must be kept as far as possible, for ease of implementation.	
	<u>Areas excluded from the National Standard for land-based trout aquaculture (only draft developed – never went out for public consultation)</u> The national standard for land-based trout aquaculture exclude the following areas from its scope: (aa) "fish sanctuaries for critically endangered and endangered fish species; (bb) river FEPAs; (cc) terrestrial critical biodiversity areas; (dd) wetlands and associated buffer zones extending 500 metres from the edge of a wetland; (ee) subterranean water control areas as specified in the General Authorisations in terms of section 39 of the National Water Act, 1998 (Act No. 36 of 1998); (ff) estuaries including a buffer of 500 metres from the edge of the estuary; (gg) world heritage sites; (hh) heritage sites; (ii) protected areas; (jj) coastal access land; and (kk) within 250m from scenic routes;" Suggestion: Similarly, it is suggested that the consistency between the areas that form part of the SEA and the areas that are excluded from the scope of the standard must be kept as far as possible, for ease of implementation.	Many of these area types have been incorporated in the GIS analysis to identify the study areas, and will be considered within the study areas at a finer scale to ensure that the areas identified in this Standard is appropriately taken into account.
Limpopo Department of Economic Development, Environment and Tourism **Stanley Rogers** **10/04/2017**	This Department does not support the farming of Nile Tilapia, *Oreochromis niloticus*, in this province (Limpopo). We already have escapees of this species in the north eastern section of the Limpopo River and even though the original source has dried up and the fish have died out, there are still fish of this species in some off stream dams down stream of Pontrift. These were moved illegally for 'aquaculture' or for fun. The original stocking was also illegal.	Noted.
	We are currently collecting DNA samples to determine the distribution of *Oreochromis niloticus* or its hybrids in the province and will make a decision on the desirability of allowing aquaculture with this species in these areas. Currently unscrupulous operators are spreading these fish with the hope of forcing us to allow aquaculture.	Part of the SEA is to conduct a first-pass mapping of Nile tilapia distribution in South Africa. If you have any data it would be very valuable for this process if you are willing/able to share it with the project team.
	The department has no serious concern regarding the using of indigenous species for aquaculture if the fish are sourced from a reliable supplier. These fish should be farmed in off-stream dams or RAS facilities and all movement of live fish must be covered by a permit to transport live fish in terms of the provincial law (Article 57 (1.1(b)and (c)of LEMA, Act of 2003). The aquaculture facilities must also be registered with the department in terms of the same legislation (Article 57 (1) (a) of LEMA, Act 7 of 2OO3).	Noted.
	This department does not support cage culture in instream dams and impoundments. Our major concern is regarding the presence of hippos and/or crocodiles in most of our waters. There are also concerns relating to health issues and pollution as well as escapees from these types of facilities.	Noted. The SEA is a desktop-based strategic assessment that aims, at a high level, to identify areas and investigate the potential for streamlining regulatory requirements for aquaculture in those areas. However, it has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner, and will seek to exclude areas (from regulatory streamlining) within the study areas where the environmental impacts of aquaculture may be found to be unacceptable, and prescribe appropriate environmental assessment and management actions in areas where aquaculture could be acceptable.
	DAM COMMENTS:	Noted.
	Albasini: Crocodiles, hippos and illegal netting	
	Chuniespoort (Ga-Tshwene): Crocodiles and area is prone to theft problems	

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Commenter	Comment	Response
	Dap Naude: Is managed as a trout fishery by Haenertsburg Trout Association (HTA)	
	Dr. Neethling: Wall seems to be broken and no longer exists (Google Earth)	
	Ebenezer: Is utilised for trout, bass and carp angling. HTA hatchery is on this dam	
	Fundudzi: Is a holy site for the Venda and any commercial activities will probably be opposed	
	Hans Merensky: ?	
	Hout river: Theft and muggings a serious problem	
	Lorna Dawn: ?	
	Magoebaskloof:Hippos occur and area is closed to fishing.	
	Middle Letaba: Illegal netting, and theft and muggings are a problem.	
	Mutshedzi: Theft will probably be a problem. In the middle of a rural community.	
	Nkumpi: Is usually dry. Is used as a desilting area for Nkumpi 2	
	Nkumpi2 ?	
	Nwanedi (Nwanedzi and Luphephe) In a provincial reserve. Crocodiles. No commercial activities allowed.	
	Nzhelele: In a provincial reserve. Crocodiles. No commercial activities allowed.	
	Turfloop: In a provincial reserve. No commercial activities allowed. An Agriculture fisheries station already exists on this reserve.	
	Tzaneen: In a provincial reserve. Crocodiles and hippos. No commercial activities allowed.	
	Vondo: Crocodiles	
	The crocodile population in the Limpopo is stable and is not threatened at this stage. The hippo population in this system is stable but not big enough to be complacent about it. The crocodile and hippo populations in the tributaries are under pressure.	The SEA is a desktop-based strategic assessment that aims, at a high level, to identify areas and investigate the potential for streamlining regulatory requirements for aquaculture in those areas. However, it has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner, and will seek to exclude areas (from regulatory streamlining) within the study areas where the environmental impacts of aquaculture may be found to be unacceptable, and prescribe appropriate environmental assessment and management actions in areas where aquaculture could be acceptable. The issue around sensitive hippo and crocodile populations in Limpopo are noted and will be addressed in the specialist investigation (Phase 3) of the SEA.
	The crocodile and hippo populations in the Letaba are crashing and are seriously threatened. The crocodile and hippo populations in the Olifants system are stable but there is also pressure on them due to increasing agricultural impacts and poaching.	
	Due to the pressures on these populations we do not want to add more stressors by adding to the impacts on these systems.	
CapeNature **Pierre de Villiers** **10/04/2017**	Site selection - many of these, e.g. Gouritz, will be in the coastal zone including CBAs and corridors so the placement and design needs to be sensitive to these aspects.	The SEA is a desktop-based strategic assessment that aims, at a high level, to identify areas and investigate the potential for streamlining regulatory requirements for aquaculture in those areas. However, it has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner, and will seek to exclude areas (from regulatory streamlining) within the study areas where the environmental impacts of aquaculture may be found to be unacceptable, and prescribe appropriate environmental assessment and management actions in areas where aquaculture could be acceptable. Critical Biodiversity Areas will be considered in the assessment phase of the SEA (Phase 3) focusing on the final study areas identified and selected.
	Access roads need to be maintained - increased traffic in rural areas including coastal resort areas	Noted. These are the types of issues that will be considered in Phase 3 (Assessment Phase) of the SEA.
	Sense of place in rural coastal areas needs to be maintained	
	Effluent management is important	
	Escaped animals should not be a threat to the natural populations, e.g. genetics and disease	
	Staff should ideally be sourced locally (if possible as this is really skilled labour)	
Eastern Cape Department of Economic Development, Environmental Affairs & Tourism	DEDEAT is of the opinion that following must be considered:	Noted.
	The recommendations stipulated in Table 7-5 (Page 192) of the Coega IDZ Aquaculture EIA Report.	
	Dusky Kob: OK / RAS. No cage culture in open water (Algoa Bay). Our comments on the	

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Commenter	Comment	Response
Dayalan Govender **10/04/2017**	Algoa Bay ADZ support this opinion.	
	Abalone: Good / FTS	
	Oysters: Good / FTS. Not in open water because (Algoa Bay) Pacific Oysters have become established in estuaries.	
	Mediterranean Mussels: Poor. AIS. Do not use.	
Abalone Farmers Association of South Africa **Nigel Dorward** **11/04/2017**	The identified zones are fair, and most suitable for aquaculture development. However, there are localised areas within the study areas which already hold high volumes of aquaculture product (such as Walker Bay between Hermanus and Gansbaai). It is strongly advisable that a localised area such as this require fully fledged environmental authorisation, as there may well be a synergistic effect of multiple impacts and the risks to existing companies is large.	Noted.
	Why does the study area for Natal start at Durban and end at Richards Bay? Generally speaking, are the areas south of Durban towards the Transkei not be better suited from a land availability/affordability perspective. Also, why is dusky kob the only species identified? Could a case for smaller experimental species not be made (eg marine ornamentals, sea cucumbers, sea urchins etc). Is it possible to have an amalgamated "warm water species" area?	Dusky kob is the only warm water marine species included as template species in the Scope of this SEA. Other species like ornamentals, sea cucumbers and sea urchins are not included in the scope of the SEA. However, the SEA will seek to make recommendations on other species, with similar requirements to the template species included in the SEA, that have the potential for cultivation or further investigation. Topography and proximity to major centres (for support services) may be seen as key constraints along the Eastern Cape Coast. Furthermore, many estuaries exist along this coast, that may pose challenges from a water quality perspective in terms of freshwater influences in the marine environment (thus fluctuating salinity levels), as well as higher sediment loads.
	Why is the Transkei study area so limited? Is it topographical? There is so much potential in this area closer to Umtata, where there is an airport and thus access to markets.	Topography and proximity to major centres (for support services) may be seen as key constraints along the Eastern Cape Coast. Furthermore, many estuaries exist along this coast, that may pose challenges from a water quality perspective in terms of freshwater influences in the marine environment (thus fluctuating salinity levels), as well as higher sediment loads.
Department of Agriculture Western Cape Government **Ferdie Endemann** **18/04/2017**	1. STRANDFONTEIN-LAMBERTS BAY AREA - Abalone-Land-based re-circulation systems (RAS) - Land-based pump ashore - Land-based semi re-circulation - Oysters – Add longlines - Mussels-Add comment on high energy areas might not be suitable for raft installation	Noted.
	2. VELDDRIF-SALDANHA AREA - Abalone-Land-based re-circulation systems (RAS) - Land-based pump ashore - Land-based semi re-circulation	Noted.
	3. FALSE BAY AREA Interact with DEA to ascertain if portions of the Western Side of the bay (that are in the Table Bay National Park) may be used for especially Marine Cage Culture Agree with submerged oyster and mussel longlines.	Conservation planning will be taken into account, however, the study area comprises the Eastern side of the bay outside of the National Park.
	4. HERMANUS-ARNISTON AREA - Abalone-Land-based re-circulation systems (RAS) - Land-based pump ashore - Land-based semi re-circulation - Oysters/Mussels-Add comment on high energy areas might not be suitable for raft installation	Noted.
	5. GOURITZ-GEORGE AREA - Abalone-Land-based re-circulation systems (RAS) - Landbased pump ashore - Landbased semi re-circulation	Noted.
	1. ROBERTSON-MONTAGU AREA Agree in full	Noted.

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Commenter	Comment	Response
	2. CAPE TOWN AREA - Add catfish with Tilapias for urban aquaculture - Marron – add secured ponds as production system	The Cape Town study area was identified for urban aquaculture of Tilapia and Marron, which assumes highly regulated artificial systems. It has been contemplated that this is not in line with the objectives of the SEA, which assumes minimum technology/engineering input (e.g. artificial heating or cooling). Based on this, and concerns that climatic conditions are unsuitable for warmer water aquaculture species, the Cape Town area is not taken forward for further investigation in the current SEA as a separate study area. The Robertson-Montagu and Cape Town areas were merged to create a single study area in the Western Cape that will be investigated for trout.
	Do you agree with the study areas and species identified for your province? What excluded the following sites: Worcester De Doorns Area (Stetyns Kloof Dam), Bulshoek Dam, Olifants River System and the dams in the Grabouw area (Steenbras Dam-Upper and Rock View? Dam)?	Based on stakeholder and expert interaction these areas were pre-emptively excluded: Worcester area was excluded due to the presence of indigenous Berg-Breede White Fish. Bulshoek area was excluded as there is currently no trout present and the area is too cold for catfish and tilapia. Dams in the Grabouw area was excluded due to potential use conflict with other water users - specifically domestic water / drinking water.
	Can these areas be investigated further in the SEA? Agree with areas being investigated	Noted.
	Of the two areas identified for your province, which area would you consider being of higher importance/significance for potential aquaculture development? Greatest potential is in the broader Cape Town Area in the Bergriver and Wemmershoek dam (cage culture and possibly flow through race ways if constant water flow could be guaranteed). Klein Plaas already has fish in (cage Rainbow Trout) but the production might be higher than currently achieved. It is important to calculate the carrying capacity as per the following uses: human, livestock and irrigation. Model was already forwarded. I suspect there will be significant resistance from DWS on dams earmarked for human consumption. Remember we can set the allocation on the amount of feed and not necessary the tonnage of fish produced. The urban aquaculture potential is medium in the Metropol. Agree with the production systems proposed for the Metropol area.	The Cape Town study area was identified for urban aquaculture of Tilapia and Marron, which assumes highly regulated artificial systems. It has been contemplated that this is not in line with the objectives of the SEA, which assumes minimum technology/engineering input (e.g. artificial heating or cooling). Based on this, and concerns that climatic conditions are unsuitable for warmer water aquaculture species, the Cape Town area is not taken forward for further investigation in the current SEA as a separate study area. The Robertson-Montagu and Cape Town areas were merged to create a single study area in the Western Cape that will be investigated for trout.
Gauteng Department of Agriculture and Rural Development **Dietana Nemudzivhadi** **18/04/2017** **(submitted with supplementary material: EMF and C-plan maps)**	According to the Gauteng Provincial Environmental Management Framework (EMF) 2014, the study area falls within all five zones (zones 1; 2; 3; 4 and 5, Map attached), dominated by zones 4 (normal control zone) and 3 (high control zone). EMF zone 4 is characterized by or is earmarked for agricultural uses outside the urban development zone while EMF zone 3 is characterized by or is earmarked for sensitive and protected areas (Tourism and Recreation activities I purposes) outside the urban development zone. According to the EMF, Aquaculture is conditionally compatible with activities intended for EMF zone 4, and is undesirable or is not compatible with activities intended for EMF Zone 3.	Noted. Conservation- and biodiversity plans (like EMFs and C-plans) will be considered in the assessment phase of the SEA (Phase 3) focusing on the final study areas identified and selected.
	Zone 3 has specific values that need to be protected such as protected areas, CBAs and ESAs, Rivers , undeveloped ridges that must be conserved and area that are sensitive (map attached). Other supported activities in this zone are those with potential for conservation, tourism and recreation.	
	Should aquaculture take place in the proposed zones, generic conditions for SEA should take into consideration the sensitivities of zones 3 and 2.	
	The Directorate EPPC cannot conclude whether it agrees or disagrees with the study area and species identified for the Province. Further comments for an informative and expert decision can be sourced from Biodiversity Management section regarding the impact of aquaculture on ecology (C-plan) and Agriculture section on GAPA.	Noted.
	Please find attached two maps depicting the Gauteng Conservation Areas and Gauteng Provincial EMF Zones applicable in the SEA study area for your use.	
Mpumalanga Tourism & Parks Agency **Mervyn Lotter**	I attach here a shapefile of the proposed trout waters that DEA will soon be gazetting for comment as part of the Alien and Invasive Species Regulations. There is only a small amount of overlap between your SEA Aquaculture layer and our NEMBA layer. Our layer in based on current trout activities and where land owners have been allowed to stock	The DEA/SANBI trout mapping was considered when developing the proposed draft study areas. We have updated the study areas to align with these trout presence layers.

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18/04/2017 **(surbmitted with supplemetary material: shapefiles: DEA trout waters)**	trout over the last 20 or so years. Our proposed trout waters do avoid species of conservation concern and we have used subcatchments as our planning units (not the larger Quaternary catchment as you have). We have even subdivided a few subcatchments in an effort to allow the stocking of trout in some areas while avoiding sensitive rivers elsewhere within the same subcatchments. You may incorporate these areas (the attached shapefile) within your proposed SEA but be aware of our planning units and that we cannot allow trout to be stocked outside of these areas (except as indicated in below bullet). Problems may arise when only parts of a subcatchment occur within a quarternary catchment)	
	As you have avoided the fish sanctuary areas (from NFEPA), we do not have a lot of biodiversity concerns relating to the proposed SEA area outside of our DEA demarcated area. However we do consider the "W" Primary catchment as sensitive and ask that these are removed from the SEA. This would include W53A-W54B quarternary catchments.	Due to these concerns we have amended the Mpumalanga study areas to better align with the SANBI trout presence maps. Catchment W is no longer included for further investigation in Phase 3 of the SEA.
	We do however note that much of your proposed trout areas are in areas that we consider or believe to be environmentally unsuitable for trout (too warm) and therefor unable to sustain trout throughout the 4 seasons. If they were suitable for trout, then they would already have been stocked with trout and we do not receive permits to stock these areas. We suggest you take a closer look the environmental parameters used to identify areas suitable for trout.	Noted.
	We do not support the production of trout in streams or rivers and only in off-stream structures (such as ponds). You mentioned "*off-stream flow-through systems (raceways and tanks)*" as implementation systems and these would be supported provided they are disconnected from river systems.	Noted. The SEA is a desktop-based strategic assessment that aims, at a high level, to identify areas and investigate the potential for streamlining regulatory requirements for aquaculture in those areas. However, it has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner, and will seek to exclude areas (from regulatory streamlining) within the study areas where the environmental impacts of aquaculture may be found to be unacceptable, and prescribe appropriate environmental assessment and management actions in areas where aquaculture could be acceptable. The SEA assumes no in-stream aquaculture in rivers and streams, but considers the following production systems dam cage culture, stream flow-through system i.e. raceways (Danish ponds and concrete) and tanks with water intakes from water sources such as streams, rivers and dams.
	We are particularly concerned about trout production near the following rivers (from the list you provided) -Seganagana -Thole -Ngwempisi	Due to these concerns we have amended the Mpumalanga study areas to better align with the SANBI trout presence maps. These rivers are associated with Catchment W and are no longer included as a study area for further investigation in Phase 3 of the SEA.
	Of the list of large waterbodies provided, we do not think any of these may be suitable dams for trout as they are too warm. Belfast Dam and Dullstroom Dam may be suitable but we have a general concern wrt cage-culture and that is the resultant nutrient build-up and hence these smaller dams may not be suitable?	Noted. Noted. These are the types of issues that will be considered in Phase 3 (Assessment Phase) of the SEA. It is anticipated that the potential carrying capacity of dams and the option of seasonal culture will also be assessed.
	We would also like to note that nature reserves should be avoided and Nooitgedacht Dam occurs within a gazetted nature reserve.	Noted. The SEA strongly focuses on promoting aquaculture that is developed in an environmentally responsible manner, and will seek to exclude areas (from regulatory streamlining) within the study areas where the environmental impacts of aquaculture may be found to be unacceptable, and prescribe appropriate environmental assessment and management actions in areas where aquaculture could be acceptable.
Bivalve Shellfish Farmer's Association of South Africa (BSASA) **Vos Pienaar**	BSASA supports this initiative, which is a valuable exercise that will help address challenges and provide an overview of the opportunities for marine aquaculture in South Africa. We restrict our comments to the bivalve sector – oyster and mussel culture. None of the comments below is intended to rule out culture species and methods as they have currently been mapped – we rather wish to highlight possible challenges, make additions,	Noted.

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24/04/2017 **(submitted with additional comments from BSASA members)**	and make cautionary notes based on our experience.	
	Throughout the mapping, more precision is required when referring to "oysters" and "mussels". Currently, the only mussel species farmed in South Africa is the Mediterranean mussel (*Mytilus galloprovincialis*) and the only oyster is the Pacific oyster (*Crassostrea gigas*). However, this might change in future, which has implications for both the choice of areas, and for the techniques suitable for each area. For example:	The scope of the SEA currently includes Mediterranean mussel (*Mytilus galloprovincialis*) and Pacific oyster (*Crassostrea gigas*) as confirmed by DAFF. However, the SEA will seek to make recommendations on other species, with similar requirements to the template species included in the SEA that have the potential for cultivation or further investigation.
	a. Mussel culture was attempted in Algoa Bay in the 1980s using the indigenous *Perna perna* and has now been discontinued, with the entire sector now located in Saldanha Bay and based on the Mediterranean mussel. This suggests that recruitment was then not high enough to sustain commercial mussel production there: is this so and has this changed?	
	b. Culture of at least two indigenous oyster species (*Striostrea margaritacea* and *Saccostrea cucullata*) is a possibility in the foreseeable future, particularly in Algoa Bay, where mortality of the temperate Pacific oyster can be extremely high in summer due to combined high sea temperatures and low phytoplankton concentrations (Pieterse *et al.* 2012; Nel *et al.* 2014).	
	Generally, awareness of two challenges is required when planning mussel and oyster culture along the East and South coasts of South Africa:	
	c. Food (plankton) availability along much of South Africa's East Coast is relatively low, and temperatures high enough to stress bivalves (Pieterse *et al.* 2012; Nel *et al.* 2014).	The Port Elizabeth study area was determined as the eastern-most area where bivalves might still be feasible. The SEA is a desktop-based strategic assessment that aims, at a high level, to identify areas and investigate the potential for streamlining regulatory requirements for aquaculture in those areas. The areas were broadly selected based on available GIS information and expert knowledge. However, given the strategic and desktop-based level of the SEA there are some considerations that will still need to happen at a project- and site-specific level (i.e. "is the food availability as this specific site where I propose a bivalve culture project sufficient" or "will this specific site where I propose a mussel culture project provide sufficient natural recruitment for the project to be feasible?"
	d. Mussel culture relies on wild spatfall. Will there be sufficient natural recruitment of mussels to drive intensive mussel farming? This would need to be investigated before attempting commercial operations here.	
	Are rafts for mussels and long-lines for oysters commercially feasible in off-shore waters at any of the sites? SA offshore waters are among the most inhospitable in the world – the exposed and high-energy nature of our coastline was specifically identified in the BID to this SEA released in September 2016. We are concerned that there is insufficient awareness of the profound difference between operating in a sheltered marine environment such as Small Bay of Saldanha, and in exposed shelf waters such as Algoa Bay (for rafts), or the famously dangerous environments of Mossel Bay and the East London coast (both rafts and longlines). Particularly the rafts but also many of the longline systems currently in use in Saldanha and Algoa Bays would not withstand these higher-energy environments. Substantial modifications and far greater capital expenditure would be required to make these systems suitable for the new bivalve sites proposed. The cost of the high-tech subsurface suspended culture systems currently being pioneered for offshore bivalve culture in New Zealand, North America and Europe (suggested for use in False Bay), would be prohibitive for sectors with small profit margins such as mussel and oyster culture.	Noted.
	Pump ashore systems are expensive for bivalves relative to profits and will become more so.	Noted. The SEA is a desktop-based strategic assessment that aims, at a high level, to identify areas and investigate the potential for streamlining regulatory requirements for aquaculture in those areas. However, it has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner. The 'business case' in terms of development- and operating costs and technical -and financial feasibility is not within the scope of the SEA, but should be considered on a project-by-project basis, and would still be the responsibility of the developer/farmer proposing a specific aquaculture project.
	<u>Specific area additions/comments:</u>	
	<u>East London-Kei Area 2</u>: It is very important that estuaries such as the Keiskamma, currently excluded, be included. There is currently a DAFF-funded experimental oyster and kabeljou farm at Hamburg, in the Keiskamma estuary. Strategically, this region needs	This study area has been extended southwards to include the Keiskamma estuary and Pacific oyster nurseries. However, the SEA assumes no regulatory streamlining for aquaculture development in estuaries as they are dynamic

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	to be expanded southwards to include this estuary for oyster culture (finfish farmers can comment on the kabeljou possibility there). The Pacific oyster listing should be for a nursery operation only, using intertidal racks.	and sensitive features of the environment.
	False Bay Area 6: Reference to submerged long lines – is this realistic?	Based on stakeholder input and comments received during this review process, the False Bay area will not be taken forward for further investigation in Phase 3 of the SEA.
	Areas of greatest significance where multiple locations for one species have been identified within a province:	
	Western Cape: Saldanha Bay – it is no accident that the entire bivalve industry in the Western Cape is located here. Mossel Bay and False Bay are unproven locations for bivalve culture, and are far more exposed (see comments below).	Noted.
	Eastern Cape: both the Kei-East London-Keiskamma area and the Port Elizabeth area (Algoa Bay) are equally important, for different reasons.	Noted. Both these areas will be taken forward for further investigation in Phase 3 of the SEA.
	Comments on culture systems suggested for species within each area:	
	False Bay: Oyster & Mussels: Working in the exposed waters of, for example, False Bay would mean very few working days per year, particularly in summer when this bay is exposed to strong south-easterly winds. This in turn would necessitate greater capital expenditure on larger boats and accompanying equipment for working the lines.	Noted. Based on stakeholder input and comments received during this review process, the False Bay area will not be taken forward for further investigation in Phase 3 of the SEA.
	Robust discussion is needed around the way the SEA seeks to resolve challenges such as the reconciling the current emphasis on high-value species with the need to improve food security. How will mari-culture be profitable in South Africa's harsh marine environment, and how will competition with tourism and conservation be addressed? For mari-culture to increase production to levels that will truly reduce pressure on wild-caught fisheries, annual production will have to increase in the few keys areas to levels that will greatly increase such competition.	Strategic issues such as how the growing Mariculture industry could potentially compete with the tourism industry in future, and how user conflicts arising from increasing Mariculture activities could potentially impact on conservation initiatives will be investigated during the specialist assessment (Phase 3) of this SEA.
BSASA **Andrew Maclachlan**	Offshore culture is the trend in a lot of the of countries and while we were "spoiled" in having access to calm and protected areas in Saldanha for many years we never had to consider that route. Increased commercial activity and residential expansion in our area with associated pollution risk might change the view in terms of expansion of Aquaculture very soon. We are not the only country in the world having to deal with harsh sea conditions (other than the limited amount of protected areas such as Saldanha). Mussel farms 4 - 8 nautical miles offshore is not "new technology any more". The areas proposed in the CSIR document are therefore not so farfetched. It requires substantially higher Capex requirement and is therefore an economical/investor/ return on investment decision more than a "nice to have site". The choice of equipment - longlines versus rafts, sub surface systems etc,etc is to be determined by site, conditions and financial considerations and there is no need for us to try and exclude areas at this stage of the document.	Noted.
	B) BSASA should not get involved in commenting on other types of aquaculture (fin fish and or Multi - trophic culture) provided that these operations do not impact negatively on shellfish farming and is based on sound permit conditions and accepted monitoring programs. At the moment at lot of the views "floating around" on these types of aquaculture is based on pure speculation (possible this and possible that). We should be involved in creating unity in the developing aquaculture sector and not division before we have even more different associations as role players might find themselves "not finding a home" in an organisation with too narrow minded views on certain issues.	Noted.
	BSASA has in the past supported fin fish farming in the case of the Southern Atlantic Sea Farms project. We (existing and new farms) will be forced in the very near future to implement acceptable monitoring of all types of aquaculture operations. We can also not allow BSASA to be "used" for attacks on other types of Aquaculture.	Noted.
	C) Any general framework document like the CSIR one is an attempt to facilitate growth	Noted, thank you.

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	of the aquaculture industry and is subject to financial viability, environmental impact, applying new technology etc and should be supported as such. This document produced by one of the few reputable organisations in South Africa having access to the manpower, funds and technology to support Aquaculture should be supported by BSASA. The regulatory and compliance issues are to be dealt with by the various Government Departments and legislation in place and not BSASA. Southern Atlantic Sea Farms and three other farms soon to join BSASA (I am authorised to comment on their behalf) therefore support the CSIR document.	
BSASA **Guy Musson**	The authors need to be made aware of the difference in costs, both CAPEX and OPEX, associated with operating in the Inner Bay sites and the Outer Bay sites in Saldanha Bay in order to clearly understand the challenges that will be faced in exposed sites such as False Bay and East London. I do not think that long-line or raft culture of bivalves will be feasible in these proposed off-shore sites;	The SEA is a desktop-based strategic assessment that aims, at a high level, to identify areas and investigate the potential for streamlining regulatory requirements for aquaculture in those areas. However, it has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner. The 'business case' in terms of development- and operating costs and technical -and financial feasibility is not within the scope of the SEA, but should be considered on a project-by-project basis, and would still be the responsibility of the developer/farmer proposing a specific aquaculture project.
	Estuarine sites along the Eastern and Southern coasts may become more important in the future as nursery areas, and might become more profitable in the future in terms of phosphate and nitrate trading (similar to Carbon Credit Trading) with upstream polluters, as is being pioneered in America and Europe presently;	SEA assumes no regulatory streamlining for aquaculture development in estuaries as they are dynamic and sensitive features of the environment.
	I feel that the association must be cautious when commenting about finfish production in Saldanha Bay. We should support aquaculture in general, on the proviso that it is undertaken in a responsible way that is compliant with permit and environmental conditions. Multi-trophic aquaculture which includes the farming of macro-algae, bivalves and finfish is a production system that is gaining momentum globally and Saldanha Bay is ideally suited for such systems, if developed within the carrying capacity of the ecosystem and managed responsibly in compliance with permit conditions.	Noted.
BSASA **Quiryn Snethlage**	Regarding species in the NC, we also have ranching of abalone, small oyster hatchery and clams once rights /permit is granted. Will this do away with a lot of red tape to increase Mariculture or create more?	Abalone ranching is not included in the scope of the SEA. Abalone ranching does not trigger the need for an EIA. Land-based activities (e.g. hatchery and grow-out) of abalone are being assessed. Clams are not included in the scope of the SEA. However, the SEA will seek to make recommendations on other species, with similar requirements to the template species included in the SEA that have the potential for cultivation or further investigation. The SEA is a desktop-based strategic assessment that aims, at a high level, to identify areas and investigate the potential for streamlining regulatory requirements to stimulate aquaculture in these areas. However, it has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner and assumes no regulatory streamlining for aquaculture development in sensitive environments.
Tilapia Aquaculture Association of South Africa (TAASA) **21/04/2017** **Valdi Perreira and members**	We do not unequivocally agree with the areas per province, as identified in the maps. In particular we are concerned by the fact that the GIS screening does not reflect the spread *of Oreochromis niloticus* throughout South Africa. Below you will find a screenshot of the Global Biodiversity Information Facility search for the reported presence of Nile tilapia in South Africa (see attached maps in TAASA comments report). You will note that while there is some degree of overlap with the proposed areas and we are concerned that the areas delineated in the study severely limits the proposed scope of tilapia farming.	Thank you for the information. Part of the SEA entails a first-pass Nile tilapia presence mapping process by consolidating existing distribution data as well as collecting new data via a citizen science survey where civil society is able to log the locations and other details about their Nile tilapia (and hybrid) catches via an online platform. This will seek to further refine the study areas where possible.
	We also include a map created by Prof Ben van der Waal based on his personal observations with the respect to the presence of Nile tilapia in river systems he has visited. As this map reflects areas that he has personally visited, it is limited in extent, but reflects similarities to the Global Biodiversity Information Facility search. The areas in pink/red reflect the spread of *Oreochromis niloticus* while the green areas reflect the natural range of the *Oreochromis mossambicus* (see attached maps in TAASA comments report).	Noted, thank you.
	There is also inadequate consideration given to artificial water bodies – while these are	The water bodies that have been included in the study areas are based on existing spatial data that contains dams and

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	often linked to natural water systems, there is an abundance of man-made reservoirs and these are not adequately catered for in the proposed study areas. While these reservoirs do not reflect the natural range of Nile tilapia, we believe it is important to include these water bodies in the study.	dam users in South Africa. As with most spatial data at a national scale, the data cannot be expected to be fully complete or accurate. There may be other "suitable" water bodies that have not been captured in the spatial data or the list of dams and rivers, but is contained within the study areas and thus included in the study.
	A further complication in this regard is the number of permits that have already been issued for the farming of Nile tilapia in recirculating aquaculture systems, many, if not most of the existing farms and these locations have seemingly been ignored when the proposed study areas have been drawn up. TAASA is happy to assist with the identification of RAS and pond systems across the country. We believe this will help form an accurate picture and assist you in the development of proposed zones.	Existing facilities were not considered as a pull factor for identifying the study areas. The reason is twofold: firstly, the SEA team has not received significant response with information and locations of existing facilities from all Provinces and stakeholders, therefore the existing facilitates database is currently porous and would skew the analysis towards areas for which we have received more information. Secondly, and most importantly, the SEA seeks to investigate areas in which to potentially unlock "new' aquaculture development, and not necessarily to increase development in areas where aquaculture development is already established or dense. Mapping and data capture is, however, a separate output of the SEA process and we would greatly appreciate any assistance from stakeholders in this regard.
	It is not clear to the commercial tilapia farming sector whether the proposed Aquaculture Development Zones are going to be specifically created to ensure that previously disadvantaged communities are provided access to water resources or if a balance is going to be struck between commercial farming interests and government's stated intention of creating sustainable livelihoods for rural communities. It is from our perspective, critical that clarity be provided in this regard as this is the departure point which informs much of the development work around these zones.	The SEA is a desktop-based strategic assessment that aims, at a high level, to identify areas and investigate the potential for streamlining regulatory requirements for aquaculture in those areas for any type of applicant who would need to obtain Environmental Authorisation or other permits to practice aquaculture. However, it has a strong focus on promoting aquaculture that is developed in an environmentally (social, economic and biophysical) responsible manner, and will seek to exclude areas (from regulatory streamlining) within the study areas where the environmental impacts of aquaculture may be found to be unacceptable, and prescribe appropriate environmental assessment and management actions in areas where aquaculture could be acceptable. It is extremely important to recognise that aquaculture will not in any way be restricted or prohibited outside of the SEA study areas. Any person has the right to propose development in any area and with any species, and follow the existing regulatory requirements and processes to obtain any required authorisations and licenses.
	In addition to the abovementioned concerns, our members have also noted the following general challenges and observations with respect to the focus areas which need to be resolved: o If there is a cluster of farmers with permits (*niloticus*) who fall immediately outside the designated zone, is there anyway of having the zoning borders extended for them to be included.	These challenges and observations with respect to the identified strategic aquaculture areas are noted. Based on the outcome of the investigation into the potential for streamlining and integrating regulatory requirements in these strategic aquaculture areas, it is envisaged that recommendations following from the assessment could be applicable to areas currently not included in the SEA.
	o Can the department be more specific or elaborate on what potential ramifications exist for farmers who fall outside the proposed zones specifically related to permit renewal, amendment to current permits (i.e. addition of hatchery for example). In addition to permits that currently exist what possible effect may there be on aspects of aquaculture that may still require permits in the future like processing facilities, etcetera. How will this be affected?	
	o Does this have any correlation with ADEP in terms of future claims, etcetera. It would be odd if pay outs were made to farmers who do not fall with-in the zones. What would have been the point of funding for development if it was then curbed by a zoning border?	
	o Aquaculture, whether in RAS, ponds or dams/cages, is farming of livestock and no different to other types of livestock enterprise.	Noted.
	o Citizens have a constitutional right to farm what and where they choose, although this right may not be absolute, regulation must still be rational.	Noted.
	o GIS is cartographic mapping using input criteria which are the sole discretion of the designer. Therefore the resulting map is wholly dependent on the choice of the input criteria, and can be subjective, objective, pre-determined or even biased in order to reflect any desired or predetermined outcome.	GIS is used in the SEA as a useful and effective tool that enables the scope of the SEA, specifically study areas, to be defined. The results of the process which led to the identified study areas are dependent on the input layers, but also based on human input (this opportunity for multiple stakeholders to review and comment) which selects and verifies the input layers. The identification, selection, and ranking of variables, as well as the final selection and refinement of the study areas were carried out with stakeholder engagement and therefore does not only reflect the computer generated outcome and the "discretion of the designer", but includes a multiplicity of stakeholder inputs and views.
	o What were the criteria used in generating the accompanying proposed study areas?	The GIS analysis was conducted used the following key variables for freshwater aquaculture: Major centres, protected

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	Cursory examination of these maps suggests a degree of pre-determination in the areas selected. For example, how can such a large area of Limpopo arise while in provinces Mpumalanga/KZN and Cape the selected areas are small, scattered and located in what can only appear as in a carefully chosen fashion?	areas, slope, dams and dam users, fish sanctuaries, irrigated crops, stressed catchments, and Present Ecological State of perennial rivers. The analysis was conducted for the entire country with available spatial data. The basic spatial unit utilised to define the study areas were sub-quaternary catchments, the sizes of which vary across the country.
	o Who are the 'experts' who advised on areas suitable for Tilapia culture? Do we get to know who they were so that we can, if necessary, challenge them and their recommendations/ decisions, or at least get to hear on what basis they were made?	In drafting and reviewing the suitable aquaculture areas identified for potential new aquaculture development (incl. Tilapia culture) in South Africa, the SEA team consulted with experts from the following entities representative on our Expert Reference Group: 1. Aquaculture South Africa 2. Aquaculture Association of South Africa 3. Tilapia Aquaculture Association of South Africa 4. Agricultural Research Council: Aquaculture division 5. University of Stellenbosch: Aquaculture division 6. CapeNature: Freshwater scientific services 7. Western Cape Dept of Agriculture: Aquaculture at Elsenburg 8. eZemvelo KZN Wildlife: Biodiversity & Permitting 9. KwaZulu-Natal Dept of Economic Development, Tourism and Environmental Affairs: Impact Management 10. Eastern Cape Dept of Economic Development, Environmental Affairs and Tourism: Biodiversity & Conservation 11. Free State Dept of Agriculture and Rural Development: Aquaculture Development 12. Free State Dept of Economic, Small Business Development, Tourism and Environment: Biodiversity & Permitting 13. Gauteng Dept of Agriculture and Rural Development: Animal Health and Veterinary Services 14. Limpopo Dept of Economic Development, Environment and Tourism: Alien Invasive Species 15. Mpumalanga Dept of Agriculture, Rural Development, Land and Environmental Affairs: Aquaculture 16. Mpumalanga Tourism and Parks Agency: Biodiversity Planning & Permitting 17. Northern Cape Dept of Agriculture, Land Reform & Rural Development: Animal Production 18. Northern Cape Dept of Environment and Nature Conservation: Coastal management & Freshwater systems 19. North West Dept of Rural, Environment and Agricultural Development: Fisheries and Aquaculture 20. Western Cape Dept of Environmental Affairs and Development Planning: Biodiversity and Coastal Management 21. Agricultural Research Council: Aquaculture Unit 22. Dept of Agriculture, Forestry and Fisheries: Sustainable Aquaculture Management 23. South African National Biodiversity Institute: Biodiversity Assessment and Monitoring - Spatial Analysis Pr 24. World Wide Fund for Nature – South Africa: Sustainable Fisheries These experts have been invited to ensure a robust assessment process and outputs, further participation and involvement by the various bodies are encouraged.
	o Why have areas where known *O niloticus* invasions have occurred (Limpopo, Sabie, Crocodile and Nkomati rivers to name a few) not been included? Is this not further indication of deliberate and pre-determined area selection? It is imperative that these areas form part of the investigation rather than simply ignore them whilst pretending they don't exist. An Einstein quote is appropriate here: "Everyone has a right to their own opinion but no-one has a right to their own facts"	The Limpopo river (in the Limpopo study area) was specifically identified for Nile tilapia due to know invasion of the species. The Sabie and Crocodile rivers were considered less suitable based on land-use conflicts, especially with regards to protected environments (e.g. the Kruger National Park) and indigenous fish sanctuaries. Based on comments received from stakeholders the Mpumalanga study area has been expanded to the East (along the Komati river) and will also be investigated for Tilapia culture.
	o There is real concern that this may 'morph' into permitted zones and the vast majority of land/farmers could thus be excluded, in spite of the denials to the contrary stated in the letter, where it says that farmers falling outside of the areas would not be prohibited from aquaculture. Could this mean that these farmers become subject to more stringent or even unreasonable permitting conditions, whilst those falling within the chosen areas benefit from preferential treatment? If so would that be constitutional?	The SEA is a desktop-based strategic assessment that aims, at a high level, to identify areas and investigate the potential for streamlining regulatory requirements for aquaculture in those areas. However, it has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner, and will seek to exclude areas (from regulatory streamlining) within the study areas where the environmental impacts of aquaculture may be found to be unacceptable, and prescribe appropriate environmental assessment and management actions in areas where aquaculture could be acceptable. It is extremely important to recognise that aquaculture will not in any way be restricted or prohibited outside of the SEA

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		study areas. Any person has the right to propose development in any area and with any species, and follow the existing regulatory requirements and processes to obtain any required authorisations and licenses.
	o Permits have been issued to farmers in areas outside of those proposed focus areas. Surely the fact that permits have been issued in these areas is an indication of an interest in aquaculture in these areas, that these areas likely are suitable to fish farming, that there likely is a demand for fish in these areas, and that there most certainly is a need for job creation in these areas. This alone should warrant inclusion in the focus areas.	Existing facilities were not considered as a pull factor for identifying the study areas. The reason is twofold: firstly, the SEA team has not received significant response with information and locations of existing facilities from all Provinces and stakeholders, therefore the existing facilitates database is currently porous and would skew the analysis towards areas for which we have received more information. Secondly, and most importantly, the SEA seeks to investigate areas in which to potentially unlock "new' aquaculture development, and not necessarily to increase development in areas where aquaculture development is already established or dense.
	o Not an exhaustive list by any means, but how on earth can areas North of Gauteng and especially the Lowveld (Nelspruit, Barberton, Komati), which are prime locations in the country for warm water fish production be totally excluded from these focus areas? These areas cannot be excluded simply because of these regions fear of involvement in Niloticus. That certainly appears to be the case as this study is supposed to be to the benefit of both Marine and Freshwater species - which should include - Tilapia. These areas being omitted also has me seriously questioning the criteria used in the GIS analysis.	Based on comments received during this review process the Mpumalanga study area has been refined and expanded towards Nelspruit, Barberton and the Komati river and warm water species (Tilapia) was added for investigation. Some areas in this region were considered less suitable based on land-use conflicts, especially with regards to protected environments (e.g. the Kruger National Park) and indigenous fish sanctuaries.
	o Areas not included in the SEA understandably are not automatically prohibited, but areas like these have the potential, and likely will become major players in freshwater aquaculture in years to come so why not streamline regulations for these areas now?	Noted. The SEA is a desktop-based strategic assessment that aims, at a high level, to identify areas and investigate the potential for streamlining regulatory requirements for aquaculture in those areas. The study has to have a defined scope which is tied to available time and resources to carry out further investigations within the identified study areas. To ensure a thorough, fair and timely assessment, defined study areas that represent all provinces is proposed in this 'first-pass' SEA. However, based on the outcome of the investigation into the potential whether to streamline and integrate regulatory requirements in these strategic aquaculture areas, it is envisaged that recommendations following from the assessment could be applicable in areas currently not included in the SEA.
	o It would be for the greater good to study an abundance of areas and then exclude the incompatible to go forward in a manner best for all and allowing fair and equal opportunity to all and streamlining of the processes all round. In essence speeding up aquaculture development, food production and job creation as soon as possible without imparting a death sentence to the industry in other areas simply because it was not on the map at these early stages.	Noted. The SEA is a desktop-based strategic assessment that aims, at a high level, to identify areas and investigate the potential for streamlining regulatory requirements for aquaculture in those areas. The study has to have a defined scope which is tied to available time and resources to carry out further investigations within the identified study areas. To ensure a thorough, fair and timely assessment, defined study areas that represent all provinces is proposed in this 'first-pass' SEA.
Kwazulu-Natal Economic Development, Tourism and Environmental Affairs **05/05/2017** **(comments compiled in consultation withEzemvelo KZN Wildlife, Ocean Research Institute (ORI) and the Department of Economic Development, Tourism and Environmental Affairs: Coastal Management Section)** **(submitted with supporting documentation on protected areas).**	**3.1 Comments from the Oceanic Research Institute (ORI):**	
	a) Selection of areas Overall, the region chosen was considered to be inappropriate for large scale aquaculture, since it encompasses sensitive areas (coastal wetlands, dunes, estuaries. habitats) under pressure from a number of sources related to development, industrialization and agriculture uses. These include mining rights, leases for dune mining from Richards Bay to Fairbreeze in the northern part of the selected area, large housing developments related to urban sprawl arooss the region and large tracts of coastal land under sugarcane and forestry. Moreover, the KwaZulu-Natal coast is experiencing environmental threats to human health and ecological systems alike from a number of waste water treatment works which discharge poorly¬treatedeffluent, through estuaries into the coastal zone.	The SEA has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner, and will seek to exclude areas (from regulatory streamlining) within the study areas where the environmental impacts of aquaculture may be found to be unacceptable, and prescribe appropriate environmental assessment and management actions in areas where aquaculture could be acceptable. Identification of environmental sensitivities (e.g. biodiversity, ecology, marine water quality) and potential land-use conflicts (e.g. other agriculture and mining) within the study areas the potential impact/risk of aquaculture in those areas, and best practice mitigation and management will be investigated in Phase 3 (assessment phase) of the SEA. Potential conflicts, impacts and environmental sensitivities are noted.
	Many of these experience management and maintenance problems, and not all are under the control of the Department of Water and Sanitation (DWS) (mainly under the management of municipalities). The CSIR are aware of the major offshore pipeline outfalls off the metros of eThekwini and uMhlathuze (south and north of the demarcated area), but there are many more discharge points. Further planned coastal development in this area, increasing informal settlements around economy centres where people seek employment and planned desalination plants add to the pressure on the region. These will really conflict with mariculture operations, either in terms of intake water quality, or	

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	constraints on space for development.	
	The influence on the water quality in the coastal zone from the discharge of mariculture waste is an additional major concern. There is evidence that inshore current movement in the central KZN Bight area may lead to water retention within the coastal zone, which influences the dilution effect on discharges (either from mariculture or other sources) within this area. The coastal zone water quality is likely already compromised in several localities, placing quality risks on intake waters that may be used to run proposed mariculture operations.	
	b) Species selected Dusky Kob (*Argyrosomus japonicus*) is considered suitable for the KZN coast aquaculture given the geographic distribution and coastal/inshore habitat preference of the species. However, it is a relatively expensive species to produce, and will not address food security issues amongst poor coastal communities.	Noted. The SEA is a desktop-based strategic assessment that aims, at a high level, to identify areas and investigate the potential for streamlining regulatory requirements for aquaculture in those areas. However, it has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner. The 'business case' in terms of development- and operating costs and technical -and financial feasibility is not within the scope of the SEA, but should be considered on a project-by-project basis, and would still be the responsibility of the developer/farmer proposing a specific aquaculture project.
	c) Cage culture in ports and harbours Cage culture methods have the potential to spread diseases and treatment biocides from the farmed areas to the natural marine environment. There is also the potential for parasite contamination, metabolic waste build up under cages through excreta deposition and uneaten food causing deterioration of water quality. There is also the threat of genetic contamination of wild stocks. Pollutants flowing into the port from city activities and also those generated through in situ port activities may contaminate cultured fish making it unsuitable for human consumption.	The SEA has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner, and will seek to exclude areas (from regulatory streamlining) within the study areas where the environmental impacts of aquaculture may be found to be unacceptable, and prescribe appropriate environmental assessment and management actions in areas where aquaculture could be acceptable. Identification of environmental sensitivities within the study areas the potential impact/risk of aquaculture (e.g. around disease, biocides, parasites) in those areas, and best practice mitigation and management will be investigated in Phase 3 (assessment phase) of the SEA. Potential impacts and environmental sensitivities are noted.
	Elsewhere, the trend is for marine fishes to be cultured in submerged cages in deeper water further offshore. Here our coast has too much shipping and the high energy coast with strong currents and often rough seas deem this to be unsuitable.	Potential challenges and conflicts noted. The SEA is a desktop-based strategic assessment that aims, at a high level, to identify areas and investigate the potential for streamlining regulatory requirements for aquaculture in those areas. However, it has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner. The 'business case' in terms of development- and operating costs and technical -and financial feasibility is not within the scope of the SEA, but should be considered on a project-by-project basis, and would still be the responsibility of the developer/farmer proposing a specific aquaculture project.
	d) Proposed limitations and suggestions i. "No Go" areas No-Go Areas - In estuaries, including Estuarine Functional Zones (EFZ; include the water surface areas and supporting riparian habitats that are part of estuarine functions and processes). The EFZ is the area up until the 5m topographical contour, but even beyond this limit should be considered as “No Go" areas if supporting habits exist there. Suitable areas will have to be sought outside of estuarine areas, but also considering other adjacent sensitive habitats.	The SEA assumes no regulatory streamlining for aquaculture development in estuaries and associated Functional Zones as they are dynamic and sensitive features of the environment.
	ii. Pipelines removing waste Discharges into estuaries or coast water bodies, is not appropriate and is legislated so in some instances. Waste discharge from land-based mariculture facilities has to be removed out of the coastal zone through suitably long discharge pipes, further offshore taking local sea currents, dilution effects and sensitivity of coastal ecosystems into account.	Noted.
	iii. Local species Prudency should be practiced in the selection of other aquaculture species, with local species being chosen over exotics. Even so, culture of species such as mussels and oysters requires sheltered embayment habitats and therefore would be inappropriate in the context of this region selected for KZN. Regarding finfish, species such as tilapia (CIO/idea) and mullet (Mugrhdae) are considered to be more appropriate for addressing concerns of food security.	For mariculture, the scope of the SEA includes the investigation of the Durban-Richards Bay for Dusky kob only. Mussels and oysters are not identified as being suitable options for cultivation in this area. For freshwater aquaculture, the scope of the SEA includes the investigation of an area stretching inland from Richards Bay for Tilapia and Catfish, and an area in the highlands towards the Free State border for trout. Mullet is not included in the scope of the SEA.

Appendix E: Comments and responses report - Broader stakeholder commenting period to refine and finalise strategic areas.

Commenter	Comment	Response
	iv. Stresses The SEA should collectively consider the current major stressors and pressures on the selected region and project this into the future given the likelihood of further population movement to this stretch of KZN coast.	Noted.
	v. Boundaries of the proposed Thukela Marine Protected Area (MPA) Operation Phakisa has earmarked part of this coast and marine environment as part of its national MPA expansion plan. The Thukela MPA, stretching from just north of Tinley Manor to the mouth of the Mlalazi River, has been gazetted for public comment. According to the Protected Areas Act (2004) MPAs (please refer to Annexure I attached herewith) should be considered as exclusion zones for mariculture.	SEA assumes no regulatory streamlining for aquaculture development in formal protected areas.
	vi. Other areas to be considered There may be more appropriate areas for shore-based mariculture activities on the KZN south coast, which should be considered by the SEA.	Noted.
	3.2 Comments received from Ezemvelo KZN Wildlife.	
	a) The proposed uThukela MPA which is part of the Phakisa MPA network (please refer to Annexures 2 and 3 attached herewith) and is soon to be gazetted is in the area identified as the proposed aquaculture development zone. It should be noted that the Protected Areas Ad under which the MPA will be declared is very specific with regards to mariculture/aquaculture. We understand that the aquaculture would be land based and while extraction of water for these facilities would be permitted, input of water into the MPA would need to follow an EIA process, specifically due to the fact that there is an invasive fish species dominating estuaries in this area and is presumed to be from the output of the existing aquaculture facility. There would also be a problem with the collection of brood stock in the MPA as this species is one of the species this MPA is trying to protect and which is under threat, however collection of brood stock outside of the MPA would be permitted. The technical team for the MPA is putting together a technical document for all such activities which would be excluded from the MPA and the scientific justification thereof. Further interaction/discussions must take place with Ezemvelo KZN	SEA assumes no regulatory streamlining for aquaculture development in formal protected areas.
	b) With regards to large cage farming of this species, more details are required and a comparative assessment must be undertaken to show the benefits and risks of each. The locations and the number of facilities should also be provided, and thereafter these aspects can be interrogated.	The SEA is a desktop-based *strategic* assessment that aims, at a high level, to identify areas and investigate the potential for streamlining regulatory requirements for aquaculture in those areas. However, it has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner, and will seek to exclude areas (from regulatory streamlining) within the study areas where the environmental impacts of aquaculture may be found to be unacceptable, and prescribe appropriate environmental assessment and management actions in areas where aquaculture could be acceptable.
	c) The coastal protected areas along the KZN Coast, namely Beachwood, Umhlanga, Amatikulu, Siyaya Coastal Park. Umlalazi and Richards Bay Reserve must be provided with a suitable buffer. There are existing aquaculture operations at Amatikulu. Umlalazi and the Port of Richards Bay, and the SEA needs to assess the success/failures of these operations upfront before proceeding with new projects.	SEA assumes no regulatory streamlining for aquaculture development in formal protected areas. Appropriate buffers, informed by specialist assessment in Phase 3 of the SEA, will be assigned. The SEA does not seek to "proceed with new projects"; it has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner, and will seek to exclude areas (from regulatory streamlining) within the study areas where the environmental impacts of aquaculture may be found to be unacceptable, and prescribe appropriate environmental assessment and management actions in areas where aquaculture could be acceptable.
	d) The coastline itself along KZN is very high energy in terms of tidal heights, wave action, nearshore currents etc. and infrastructure here will be at risk of damage.	Potential challenges and conflicts noted. The SEA is a desktop-based strategic assessment that aims, at a high level, to identify areas and investigate the potential for streamlining regulatory requirements for aquaculture in those areas. However, it has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner. The 'business case' in terms of development- and operating costs and technical -and financial feasibility is not within the scope of the SEA, but should be considered on a project-by-project basis, and would still be the responsibility of the developer/farmer proposing a specific aquaculture project.
	d) The water quality of Durban Bay needs to be taken into account for any aquaculture projects there - the water quality in the Durban Bay is currently very poor, with very high levels of toxic heavy metals in the sand, water and fish. This is monitored by the CSIR and the records are in possession of Transnet Port Authority (TNPA). The risk of	Noted.

Appendix E: Comments and responses report - Broader stakeholder commenting period to refine and finalise strategic areas.

Commenter	Comment	Response
	contamination of aquaculture produce needs to *be* seriously considered.	
	3.3 Comments received from the Department of Economic Development. Tourism and Environmental Affairs:	
	a) The demarcated areas offshore of the Durban and Richards Bay Ports are heavy shipping lanes. Additionally, there are offshore anchorage areas for ships waiting to enter the ports. These areas must be negotiated with TNPA as well as with SAMSA. Transnet and SAMSA must be engaged on implications for vessel movement and port operations.	Noted. The SEA has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner, and will seek to exclude areas (from regulatory streamlining) within the study areas where the environmental impacts of aquaculture may be found to be unacceptable, and prescribe appropriate environmental assessment and management actions in areas where aquaculture could be acceptable. Identification of environmental sensitivities (e.g. biodiversity, ecology, marine water quality) and potential land- and water -use conflicts (e.g. other activities in ports) within the study areas the potential impact/risk of aquaculture in those areas, and best practice mitigation and management will be investigated in Phase 3 (assessment phase) of the SEA.
	b) The KZN Sharks Board should be engaged regarding what impact coastal aquaculture could have in attracting predators, leading to increased netting of sharks and importantly impacts on bather safety.	Noted. Potential sensitivities and potential risk of cage culture on marine mammals are noted. The KZN Sharks Board and Oceanic Research Institute have been added to the SEA stakeholder database.
	c) In addition, careful consideration must be given to 'Blue Flag" status beaches as well as tourists areas that are striving to such or similar certification. It must also be borne in mind that KZN is synonymous for tourism and no project should adversely affect its status. Opportunities surrounding aquaculture could be seen in a positive/tourist light and could be explored.	Noted. The SEA has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner, and will seek to exclude areas (from regulatory streamlining) within the study areas where the environmental impacts of aquaculture may be found to be unacceptable, and prescribe appropriate environmental assessment and management actions in areas where aquaculture could be acceptable. Identification of environmental sensitivities (e.g. biodiversity, ecology, marine water quality) and potential land- and water -use conflicts (e.g. Blue Flag Beaches for recreational use) within the study areas the potential impact/risk of aquaculture in those areas, and best practice mitigation and management will be investigated in Phase 3 (assessment phase) of the SEA.
	d) The Department is concerned about the drought situation that has been devastating in KZN. It is unclear if water is available for Aquaculture projects yet communities are still struggling to obtain basic services. Will aquaculture projects result in an increase of desalination plants proposed? Experience has recently showed that desalination plants were electricity intensive and in general very expensive (start up and management thereof). The bulk service requires/supply availability in the identified areas must be thoroughly investigated.	The SEA has a strong focus on promoting aquaculture that is developed in an environmentally responsible manner, and will seek to exclude areas (from regulatory streamlining) within the study areas where the environmental impacts of aquaculture may be found to be unacceptable, and prescribe appropriate environmental assessment and management actions in areas where aquaculture could be acceptable. Identification of environmental sensitivities (e.g. water stressed areas) within the study areas the potential impact/risk of aquaculture (e.g. community water security) in those areas, and best practice mitigation and management will be investigated in Phase 3 (assessment phase) of the SEA. Desalination as a water source for aquaculture is not in the scope of this first pass SEA.
	e) The KZN Department of Agriculture and Rural Development should be engaged as aquaculture in KZN is coordinated by this Department.	Noted.
	g) In general, coastal aquaculture in KZN does not have a great record with much work undertaken by EDTEA and ORI. This context/background/lessons must not be lost despite the Phakisa drive. New initiatives will have to learn from past ventures and acknowledge the limitations of aquaculture in coastal KZN.	Noted.
	h) If it is found that projects are feasible and would have a less impact, it is essential that such projects should include other value adding components as opposed to just an aquaculture project: EXAMPLE: An aquaculture project, desalination plant, salt refining/manufacturing facility (to reduce waste/effluent/brine), hydroponics (waste can be used as fertilizer in growing vegetables - little to no waste, whilst producing vegetables for food security), and lea garden (tourism component). This is just an example but allows for diversity and sustainability in an operation.	Noted.

Appendix F: List of key variables

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List of key variables considered, identified and ranked by stakeholders. Variables marked with an asterisk were utilised in the GIS analysis to identify strategic aquaculture areas. Final selected of variable depended on the importance of the variable and available of adequate spatial data to conduct the spatial analysis.

VARIABLE	**RATIONALE FOR CONSIDERATION**	**RANK**
Marine Water Depth*	Suitable depths for different species cultivated in different systems. Optimal depths for flushing of wastes and infrastructure costs.	**1**
Mean Water Temperature* *(this was the main variable differentiating between species)*	Optimal Temperatures For Survival And Growth For different Species.	**1**
Water Salinity	Suitable salinity for different species cultivated in different systems.	**1**
Wave Height*	Rough conditions pose a risk to infrastructure.	**2**
Harmful Algal Blooms (HABs) / High Risk Areas	Frequent and intense HABs pose a risk to survival, growth and health of different species.	**1** **1**
Distance From Shoreline	Proximity to shoreline (water intake) increases technical and financial viability of onshore facilities.	**3**
Slope & Pump Head*	Technical suitability and financial viability of onshore and freshwater facilities. Greater height from shoreline (water intake) reduces technical and financial viability of onshore facilities.	**2**
Water Requirements	Suitable water availability for freshwater aquaculture.	**1**
Mean Annual Runoff	Areas with higher runoff per annum may be expected to have more suitable water availability and security.	**2**
Water Resource Users / Allocation Of Dams*	Direct conflict / competition for water resources.	**1**
Biological Control		**1**
Flood Control		**2**
Municipal		**1**
Divert Water		**3**
Flow Measurement		**1**
Recreation		**3**
Domestic		**1**
Industrial		**2**
River Diversion		**3**
Electricity		**1**
Irrigation		**2**
Stock Watering		**1**
Erosion Control		**1**
Limited Agricultural Use		**2**
Storage		**3**
Fish Barrier		**1**
Mining		**1**
Infrastructure and support	Access to market and support services.	
*Ports & Harbour**		**1**
Major Airports		**4**
Major Roads		**2**
Universities		**4**
*Cities / Major Centres**		**2**
Aquaculture Feed Suppliers		**4**

Appendix F: List of key variables

Other land-use conflicts or synergies	Synergy with existing / proposed land use and users.	
*Irrigated Land**	Opportunities for freshwater re-use.	**1**
Military		**1**
Mining		**1**
Water stressed catchments*		**1**
South African National Protected Areas*		**1**
Biosphere Reserve		**1**
Botanical Garden		**1**
Forest Nature Reserve		**3**
Forest Wilderness Area		**3**
Marine Protected Area		**1**
Mountain Catchment Area		**1**
National Park		**1**
National Protected Areas Expansion Strategy		**3**
Nature Reserve		**3**
Protected Environment		**1**
Ramsar Site		**1**
Special Nature Reserve		**1**
World Heritage Site		**1**
National Freshwater Ecosystem Priority Areas	Conflict with existing / proposed land use and users.	**1**
*Present Ecological State Of Rivers**		**1**
*Flagship Free-Flowing Rivers**		**1**
*Fish Sanctuaries**		**1**
Natural Wetlands		**1**
Water Quality		
Total Dissolved Solids Concentration	Optimal water quality for species survival, growth and health	**1**
Waste Outfalls	Optimal water quality for species survival, growth and health. Waste outfalls (stormwater and sewage) carry hydrocarbons, heavy metals, nutrients and *E. coli*.	**1**
Turbidity / Sedimentation	Increased sedimentation and turbidity within proximity of rivers. Suitable water quality and oxygen content for species survival, growth and health	**1**
Planning	Direct conflict / alignment with provincial/district/municipal planning.	
Special Economic Zones		**3**
Integrated Development Plans		**3**
Spatial Development Frameworks		**3**
Conservation Plans		**1**
Dam Resource Management Plans		**3**
Port Plans		**4**
Shipping Lanes		**1**
Electricity Supply	Proximity to available electricity supply increases technical and financial viability of onshore and land-based facilities, especially where electricity intensive systems are employed.	**1**

Appendix G: Key variable metadata

Appendix G: Selected key variable metadata

FEATURE	DESCRIPTION	SPATIAL RESOLUTION	SOURCE	DATE
Dams	Dams of South Africa. DWS dams use/purpose obtained from http://www.dwa.gov.za/Documents/DWS_DAMS%20LIST%20INTERNET.pdf. Dataset contains a total of 473 dams, for which the use/purpose of only 168 is recorded.	1: 250 000	Department of Water and Sanitation (DWS) (Url: http://www.dwaf.gov.za/iwqs/gis_data/river/rivs500k.aspx) and as updated by the National Freshwater Ecosystem Priority Area (NFEPA) study.	2005
Marine water depth	Raster dataset containing marine water depth along the coast of South Africa	30 arc second	The GEBCO_2014 Grid, version 20150318, www.gebco.net	2014
Irrigated lands	Crop field boundaries digitized from satellite imagery. Irrigated land extracted.	1:20 000	Department of Agriculture, Forestry and Fisheries (DAFF)	2013
	Irrigated crop boundaries were augmented with the latest 2013-2014 National Land Cover Data set.	30 m	GEOTERRAIMAGE (DEA Open Access)	2015
Slope	Steep slopes exceeding 10 % derived from Digital Elevation Model.	30 m	United States Geological Survey (USGS)	2015
National Parks	National Parks extracted from the South African Protected Areas Database (SAPAD) as well as National Protected Areas Expansion Strategy Focus Areas.	1: 5 000	Department of Environmental Affairs (DEA) (Url: https://egis.environment.gov.za/data_egis)	2017
Mean annual Sea Surface Temperature	Mean sea surface temperature globally from 2009 to 2013. The dataset was created using remotely-sensed MODIS Aqua data from NASA's (National Aeronautics and Space Administration) Ocean Color database.	0.08333 dd	NASA Ocean Biology (OB.DAAC). (2014). Mean annual sea surface temperature for the period 2009-2013 (composite dataset created by UNEP-WCMC). Data obtained from the Moderate Resolution Imaging Spectro-radiometer (MODIS) Aqua Ocean Colour website (NASA OB.DAAC, Greenbelt, MD, USA). Accessed 28/11/2014. URL: http://oceancolor.gsfc.nasa.gov/cgi/l3. Cambridge (UK): UNEP World Conservation Monitoring Centre. URL: http://data.unep-wcmc.org/datasets/36.	2014
Launch harbours	Important launch harbours identified by stakeholders, digitised as points.	1: 5 000	Council for Scientific and Industrial Research (CSIR)	2017
Major centres	Major centres identified by stakeholders, digitised as points.	1: 5 000	CSIR	2017
Extreme waves	Mean height of 1:1 year extreme waves at 15 m depth contour. Digitised as sections along the coast.	1: 5 000	CSIR coastal vulnerability study	2014
Stressed catchments	Highly stressed / over-exploited catchments	1: 500 000	Water Resources 2005	2002
Perennial rivers	Perennial rivers	1: 500 000	DWS (Url: http://www.dwaf.gov.za/iwqs/gis_data/river/rivs500k.aspx) and as updated by the National Freshwater Ecosystem Priority Area (NFEPA) study.	2004
	Present Ecological State (PES)		DWS (Url: http://www.dwa.gov.za/iwqs/rhp/eco/peseismodel.aspx)	2014
Fish sanctuaries	Sub-quaternary catchments identified as important for protecting threatened or near-threatened indigenous fish species – National Freshwater Ecosystem Priority Areas	1: 500 000	CSIR	2011