

Table 3: The ecological issues discussed in the text for the West Coast rock lobster fishery, and corresponding indicators and research approaches that may be useful in addressing each issue. Issues are those in the category 'Ecological Well-being', identified and prioritised (see methods) by stakeholders attending the Pelagic Fishery Risk Assessment for Sustainable Fishery (see Nel 2005a). Research approaches or monitoring studies currently underway are given, and those proposed for the future are also indicated. For each issue, technical management measures are proposed and, where possible and applicable, ways in which their performance could be evaluated, and South Africa's ability to manage each issue is rated using asterisks

Issues	Indicators	Research approaches and proposed studies	Technical management measures and evaluation	Implementation ¹
Extreme risk category				
Trophic influences (interactions with urchins and abalone) of large-scale movements of West Coast rock lobster (hereafter referred to as lobster) (ECOSYSTEM)	Spawner-biomass estimates for lobster and abalone; indicators of trophic interaction between urchins, abalone and lobster; benthic community structure	Independent assessments and OMPs for both lobster and abalone; benthic community surveys have been initiated; continue annual fishery independent abalone and lobster surveys Future: research processes involved in interactions between lobsters and benthic organisms, particularly urchins, abalone and octopus; model trophic interactions and benthic community dynamic; intensify benthic surveys; investigate the driving forces of the lobster population shift	Manage the lobster resource to retain potential for fisheries of impacted species such as abalone Future: develop joint management procedure for lobster and abalone east of Cape Hangklip; take into account trophic interactions and models in management; maintain or achieve 25% spawner-biomass threshold limit for both lobster and abalone (threshold abalone abundance required to stimulate spawning and ensure reproductive success); curtail poaching of both lobster and abalone	**
High risk category				
Fisheries and management implications of southward and eastward shifts in lobster distribution (caused by long-term climate change) (ECOSYSTEM)	Measures of abundance per area, within accepted statistical threshold (abundance, growth, size-structure, sex structure); cpue	Continue annual offshore and inshore Fishery Independent Monitoring Survey (FIMS); continue monitoring of commercial catches Future: investigate factors and mechanisms causing distributional shift in lobster	MPAs are in place and efficacy has been evaluated; re-evaluate the MPAs and possibly reposition if necessary Assess the feasibility of moving to a spatially disaggregated model for the OMP	**
Detrimental effect on lobster fishery of increased frequency/magnitude of harmful algal blooms, low-oxygen events and corresponding lobster walkouts (ECOSYSTEM)	Frequency of harmful algal blooms	Continue to monitor frequency of low-oxygen events by means of a real-time monitoring buoy at Elands Bay to collect temperature, oxygen and chlorophyll data; diver surveys to check on imminence of walk-out; monitoring by inspectors of lobster concentrations inshore Future: investigate usefulness of acoustic tracking of lobster movements during a walkout	Contingency plans in place to handle logistics of lobster (storage tanks, transport, etc.); revise plans for larger numbers walking out	***
Moderate risk category				
Damage caused to benthic biota (hard corals, bryozoans, sea fans) by lobster fishing gear (ECOSYSTEM)	Benthic community composition; species diversity; visible damage	Future: undertake experiments and monitoring (compare fished and unfished areas) to assess damage by fishing gear to benthic biota; if damage is caused, investigate alternative trap designs	Implement alternative trap designs and closed areas to minimise damage	***

Table 3: cont.

Issues	Indicators	Research approaches and proposed studies	Technical management measures and evaluation	Implementation ¹
Discarding of plastics, or netting during repairs, ingested by seabirds or causing seabird entanglement (ECOSYSTEM)	Mortality rate of seabirds due to entanglement in lobster netting or plastics discarded by lobster fishery	Minimise discarding of fishing gear and plastics; continue current observer programme to monitor incidences of discarding of plastics and netting Future: extend observer coverage Comment: evaluate and control discards of gear and plastics by other fishing industries/sources and address holistically	Permit conditions and Industry Code of Conduct stipulates no discarding; actively enforce appropriate penalties against transgressors; consider using inspectors to monitor return of plastics taken to sea	***
Entanglement of cetaceans (whales and basking sharks) in lobster trap ropes. (This arose as an issue subsequent to the stakeholder workshop) (ECOSYSTEM)	Number of reported entanglements	Proposed study to assess the best means of disentangling whales	Consider possible area/season closures; consider changing from individual traps to long-line traps	**
Bycatch of species in lobster traps (more than 30 species including catsharks, kingklip, octopus, hottentot and other linefish) (ECOSYSTEM)	Abundance indices of bycatch species; bycatch of species in lobster traps	Continue current observer programme (current observer coverage is 8%); collect FIMS data; minimise detrimental bycatch Future: consider bycatch across all fisheries (holistic approach required)	Consider bycatch across all fisheries (holistic approach required)	*

¹ Ease of implementation of management response/ability to manage

* Limited

** Fair

*** Good potential