Summary of Background documents

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MARAM/IWS/DEC14/Hake/BG1 (Regional assessments): illustrates the regional assessment of Minke whales in the North Pacific. The document provides a straw dog on how joint assessment under different stock structure hypotheses for hake off South Africa and Namibia might be structured..

MARAM/IWS/DEC14/Hake/BG2 (Regional assessments): report of the Benguela Current Commission ECOFISH WP1-WP2 hake stock structure workshop held 26-28 March 2014. The aim of the workshop (following on from a recommendation of the International Panel of the December 2013 IWS) was to review all available information pertaining to hake biology and stock dynamics in the Benguela region with the intention of developing plausible hypotheses of hake stock structure in the region. The available information reviewed included results from genetic analyses, data from research surveys and spatial patterns in spawning, age and growth. Based on the data reviewed, 3 alternative hypotheses were recommended for *M. capensis* and two for *M. paradoxus*. Other data sources that could potentially provide useful information were also identified e.g. parasitology, otolith shape analysis, tagging studies, ichthyoplankton surveys in Namibia.

MARAM/IWS/DEC14/Hake/BG3 (Regional assessments): provides background to the assessment results that follow from fitting the model detailed in MARAM/IWS/DEC14/Hake/P2 to the data listed therein. The "Reference Case" of P2 is Operating Model RS1 of the Reference Set of models listed in BG3.

MARAM/IWS/DEC14/Hake/BG4 (South African hake Life history): a collation of biological information about the South African hake resource that was requested by Robin Waples. This provides information on the following biological aspects of South African hake: age structure, length structure, the sex disaggregated growth curves for both species, age specific survival, fecundity, length at maturity, generation length, time and location of spawning, larval biology, length of larval life and recruitment.

MARAM/IWS/DEC14/Hake/BG5 (Regional Assessments): provides catch and abundance estimates per latitudinal degree for both hake species on the west coast of South Africa.

MARAM/IWS/DEC14/Hake/BG6 (Catchability issues): discusses the relative selectivity of two gear types for two vessels using GeoPOP. The relative selectivity is estimated for each size class and relies on paired trawl hauls performed with two types of gear. In the first instance, The *RV Dr. Fridtjof Nansen* and *FV Blue Sea*, using the same gear were compared. Secondly, *RV Africana* "old" and "new" gear was compared with Gisund gear used by *Nansen*.

MARAM/IWS/DEC14/Hake/BG7 (Hake spawning in Namibia): used GSI and maturity staging from both hake species in Namibia to determine spawning patterns. Evidence indicates that *M. paradoxus* do not spawn while *M. capensis* spawns throughout the year in Namibia.

MARAM/IWS/DEC14/Hake/BG8 (Hake spawning in Namibia): presents the results from three Nansen cruises that collected hake and larval samples. The eggs and larvae were not separated by species. The authors however assumed that all eggs were from *M. capensis* as only mature *M. capensis* were found near newly spawned eggs. No mature *M. paradoxus* were found in trawls near newly spawned eggs.

MARAM/IWS/DEC14/Hake/BG9 (Parasites as biotags for Namibian hake): 84 individual *M. capensis* and 60 *M. paradoxus* were investigated for their parasite assemblages. A distinct boundary was established for both species at about 25°30' S based on the presence and absence of several parasite species.

MARAM/IWS/DEC14/Hake/BG10 (Regional Assessments): reports the development of, and results for, an updated Reference Case for the South African hake resource, taking account of the recommendations made by the December 2013 International Fisheries Stock Assessment Review Workshop (Smith *et al.*, 2013) as well as incorporating new species- and gender-disaggregated longline data.

MARAM/IWS/DEC14/Hake/BG11 (Regional Assessments): reports the hake Candidate Management Procedure testing methodology for projections into the future, detailing the equations applied for future begin-year numbers-at-age, catch, catch-at-age by species, gender and fleet, and recruitment. These in turn are used to generate future biomass in the form of species disaggregated CPUE and survey series per coast and species. Performance statistics are also listed as are the data available to the CMPs.

MARAM/IWS/DEC14/Hake/BG12 (Regional Assessments): reports final CMP trial results for the revised SA hake OMP. Results for the Reference Set are reported for four CMPs, distinguished by two different target average TACs for the next decade, and by whether or not the TAC is fixed at 147500 tons for the next two years.

MARAM/IWS/DEC14/Hake/BG13 (Regional Assessments): reports update on the progress made based on the recommendations by panel from the December 2013 IWS.

MARAM/IWS/DEC14/Hake/14 (Adjusting survey indices of M. paradoxus abundance using bottom temperature): describes an attempt to adjust historical survey biomass indices of *M. paradoxus* to account for "missing" biomass in surveys that only extended to 500m depth. The approach uses a "presence-absence" versus bottom temperature relationship to estimate the proportion of the deep-water hake population that was not sampled by the surveys.

MARAM/IWS/DEC14/Hake/15 a and b (Regional Assessments): report and annex from the May 2014 Copenhagen ECOFISH Stock Assessment meeting. Report back on the progress of assessment models likely to be used for joint assessments and future work needed. The following was discussed during the meeting: final updated Reference Case and proposed Reference Set for SA hake OMP revision, Review of pertinent ECOFISH deliverables, including SAM comparison, SAM developments for future work, Hake movement models, and an update from the March Biology ECOFISH meeting.