

NATURAL RESOURCES - FISHERIES

Falkland Islands Government



Scientific Programme 2021 - 2023

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Mission Statements

FISHERIES DEPARTMENT

The Fisheries Department's primary mission is to achieve maximum sustainable yield from fish and squid stocks in Falkland and adjacent waters in order to create long-term wealth for the community. This process is to be underpinned by effective Fisheries Science, Fisheries Protection, and Administration.

FISHERIES SCIENCE

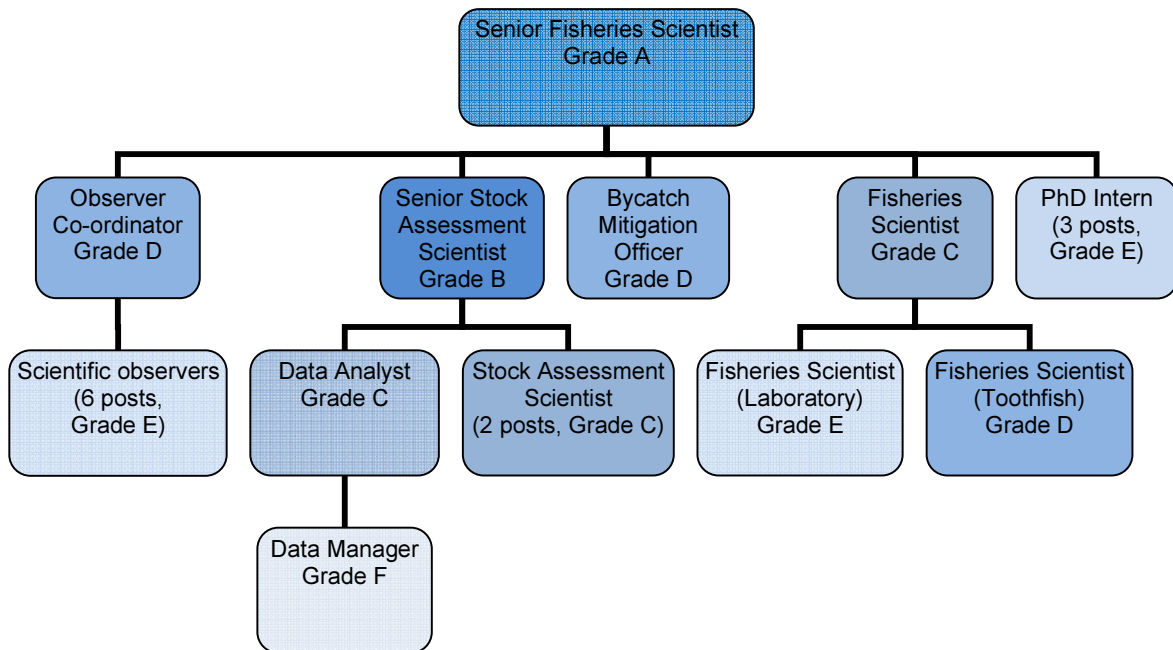
Provision of scientific advice to Fisheries Management to exploit the marine resources around the Falkland Islands in a sustainable manner, achieved by:

- Collection and analysis of all available commercial and biological data
- Stock assessment and biomass estimates of main commercial species of fish and squid using up-to-date methods and modelling
- Studies of the biology, ecology and life cycles of the main commercial marine species inhabiting waters around the Falkland Islands
- Ecosystem approach to study key biological and physical parameters, and dynamics in waters around the Falkland Islands on the Patagonian Shelf, contributing to Ecosystem Based Fisheries Management (EBFM)
- Minimisation of environmental impacts of fishing practices, and promote good environmental stewardship in the Falkland Islands

RESOURCES

SCIENTIFIC SECTION

STAFF



There is a scientific team of 20 people grouped into three subsections (scientific observers, stock assessment and fisheries studies) working on various subjects within the Scientific Fisheries Section, plus Bycatch Mitigation Officer and PhD intern positions.

SCIENTIFIC SECTION

BUDGET

The following funds are budgeted to accomplish the scientific tasks for the financial year 2020-2021. Similar funding is anticipated in future years of the programme.

Main budget votes of the Scientific Budget 0326:

| Item | Budget (FKP) |
|-------------------------------------|---------------------|
| 1. Salaries and wages | 789,364 |
| 2. Research | 53,520 |
| 3. Charter fees for research vessel | 375,440 |
| 4. Charter fuel | 194,150 |
| 5. Fishing equipment | 27,310 |

The detailed breakdown of the research budget is being prepared every year and is subject to tasks allocated for a given year.

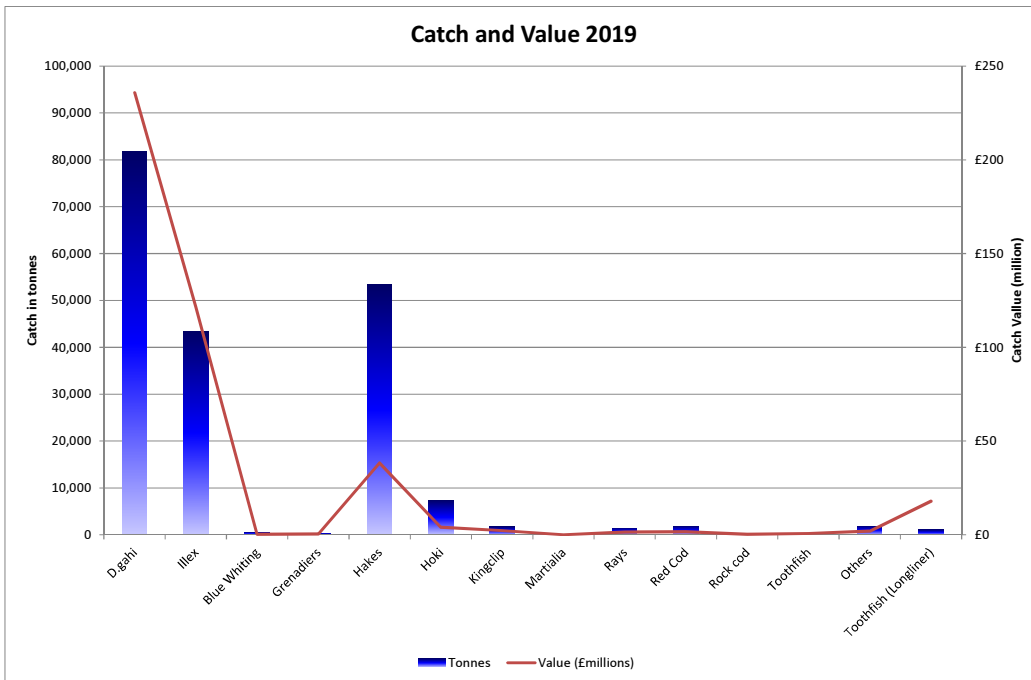
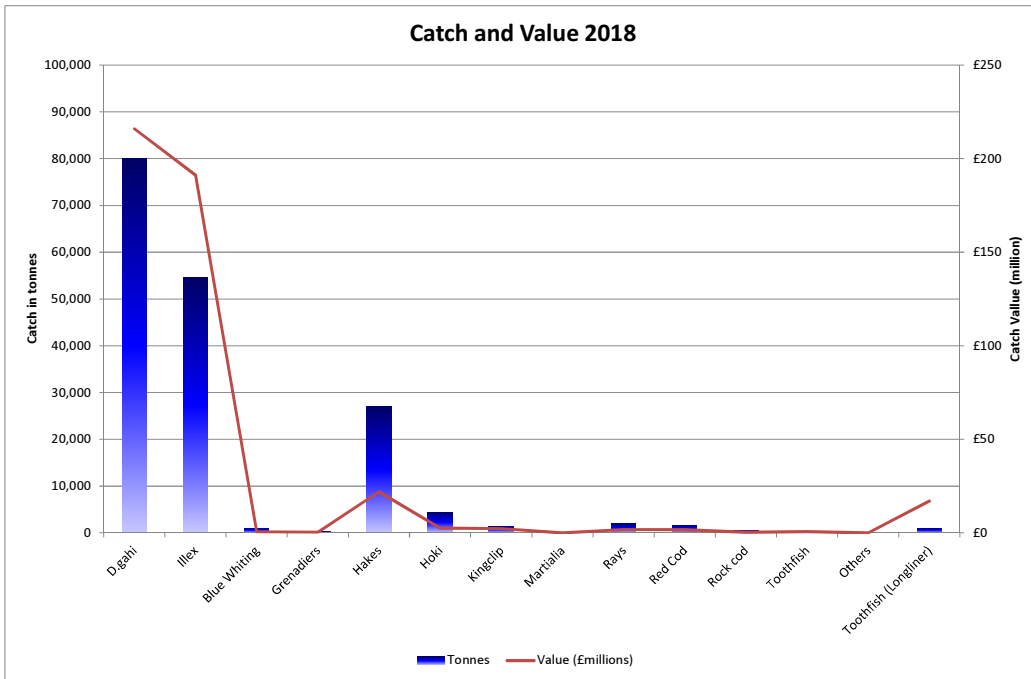
MAIN COMMERCIAL SPECIES WITHIN FICZ/FOCZ

Total catch (metric tonnes) of main commercial species in Falkland waters in every decade between 1987 and 2016 and their average catches in the four years (2017-2020).

| | 1987-1996 | 1997-2006 | 2007-2016 | 2017-2020 |
|---------------------------|-----------|-----------|-----------|-----------|
| <i>D. gahi</i> (calamari) | 74,786 | 43,047 | 46,348 | 71,829 |
| <i>Illex</i> | 140,749 | 105,401 | 125,493 | 57,039 |
| <i>Martialia</i> | 617 | 261 | 1 | 0 |
| Hakes | 11,558 | 3,108 | 13,991 | 34,926 |
| Red Cod | 4,708 | 4,621 | 4,147 | 1,555 |
| Blue Whiting | 42,352 | 24,787 | 7,233 | 972 |
| Grenadiers | 0 | 270 | 872 | 1194 |
| Kingclip | 1,361 | 1,884 | 3,168 | 1,603 |
| Rock cod | 0 | 2,973 | 47,014 | 1,611 |
| Rays | 4,326 | 4,015 | 5,870 | 2,020 |
| Toothfish | 859 | 1,910 | 1,409 | 1,305 |
| Hoki | 11,979 | 20,669 | 15,670 | 5,885 |
| Scallops | 0 | 252 | 6 | 6 |
| Others | 3,341 | 2,610 | 1,043 | 5,036 |
| | 296,636 | 215,808 | 272,265 | 184,981 |

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TOTAL CATCH AND COMMERCIAL VALUE IN 2018 AND 2019



STATUS OF STUDIES AND STOCK ASSESSMENT OF MAIN COMMERCIAL SPECIES OCCURRING IN FALKLAND ISLANDS WATERS

The data on the status of studies of each commercial species and their stock assessment are summarized in the Table below. Traffic light indicators are applied to describe the status.

Green – well studied, needs seasonal or annual monitoring of stock status. **Yellow** – some important points are unknown, needs further studies. **Red** – major points are unknown, needs to be studied.

| Species | Abundance | Commercial value: Total catch (per kilo) | Life cycle studies | Stock structure | Stock assessment models applied | Conservation measures applied |
|---------------|---|--|---|---|---|--|
| <i>Illex</i> | Variable, between very high (catch >100,000 t) and very low (<10,000 t) | High (Medium) | Well studied. Spawning grounds known, feeding grounds known, migrations, trophic relations | Well known, several seasonally spawning cohorts | Depletion model but problematic to use because of straddling nature of South Patagonian Stock of <i>Illex</i> , | 40,000 t spawning biomass threshold. |
| <i>Loligo</i> | High (catch 20,000-60,000 t) | High (High) | Well studied. Spawning grounds known, feeding grounds known, migrations, trophic relations | Well known, two seasonally spawning cohorts | Biomass survey before fishing season, depletion model in-season, biomass projection model post-season | 10,000 t spawning biomass threshold, fishing ban on spawning and nursery grounds |

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| | | | | | | |
|-----------------------|--|--------------------|--|---|---|---|
| Rock cod | Low (catch ~less than 10,000 t) | Low (Low) | Well studied. Spawning grounds known, feeding grounds known, the migration extent is known, trophic relations known | Stock consists of one interbreeding population around the Falkland Islands. Relationship with stocks from the Argentine EEZ is unclear. | Regular annual swept-area surveys of the stock in FICZ | 11,000 t TAC for the 2021 fishing season |
| Southern blue whiting | Static at low level (catch ~2,000 t) | Low (Low) | Well studied. Spawning grounds known, feeding grounds known, migrations known, trophic relations known | Well known, interchangeable stocks with Argentina and Chile. | Straddling stock, some problems in application of stock assessment models without the knowledge of the Argentinean part | TAC of 2,000 t for 2013; fishing ban in spawning grounds since 2010 |
| Hoki, whiptail hake | Medium (catch ~20,000 t, with possibility to increase) | Medium (Low) | Not well studied. Spawning grounds unknown, feeding grounds known, migrations known, trophic relations unknown | Not well-known, needs further studies, same stock as Argentina and possibly Chile. | Straddling stock, problems in application of stock assessment models without the knowledge of the Argentinean part | Finfish effort limitations |
| Hakes | Medium (catch >10,000 t, with possibility to increase) | Medium (Medium) | Well studied. Spawning grounds known, feeding grounds known, migrations known, trophic relations known | Not well-known, needs further studies, , same stock as Argentina and possibly Chile. | Straddling stock, some problems in application of stock assessment models without the knowledge of the Argentinean part | Catch by limited effort in A-licensed fishery and targeted fishery not allowed for other licences (W and G) |

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| | | | | | | |
|-----------|---|--------------------|---|---|--|--|
| Red cod | Low (catch <10,000 t, with possibility to increase) | Medium (High) | Well studied. Spawning grounds known, feeding grounds known, migrations known, trophic relations known | Not well-known, needs further studies, possibly same stock as Argentina and Chile. | Low migratory stock, swept-area method | Fishing ban in spawning grounds since 2010 |
| Kingclip | Low (catch <10,000 t, with possibility to increase) | Low (High) | Not well studied. Spawning grounds unknown, feeding grounds known, migrations unknown, trophic relations known | Not well-known, needs further studies, possibly same stock as Argentina and Chile. | Straddling stock, some problems in application of stock assessment models without the knowledge of the Argentinean part | Finfish effort limitations |
| Toothfish | Low (catch <10,000 t) | Medium (High) | Well studied. Spawning grounds known, feeding grounds known, migrations known, trophic relations known | Not well-known, needs further studies, possibly minor interchange with stocks from Argentina and Chile | Age-based production model with use of CASAL statistical package | 1,040 t TAC, fishing ban in spawning grounds |
| Skates | Low (catch <10,000 t) | Medium (Medium) | Not well studied. Spawning grounds unknown, feeding grounds known, migrations unknown, trophic relations known | Not well-known, needs further studies, possible overlap on stocks of some species with Argentina and Chile. | Skate stocks are assessed annually using a biomass production model. In some years, by swept-area surveys during research cruises | No specialized fishery to the south of 51°S. |

OUTCOMES FROM THE LAST PROGRAMME 2018-2020

Main outcomes of the scientific programme 2018-2020 are listed below.

Traffic light indicators are applied to describe the status.

Green – Fully completed. **Yellow** – partially completed, reasons given. **Red** – nit completed, explanations given

| Objective | Task or Action | Lead Person | Targeted Output | Outcomes |
|--|--|---|--|---|
| Objective #1 On-going | Carry out stock assessment and biomass estimates of main commercial species of fish and squid. | Stock Assessment Scientists, Senior Fisheries Scientist | Review relevant stock assessment models and techniques. Develop new stock assessment models that will include environmental parameters. | Regular stock assessments are conducted of main commercial species <i>D. gahi</i> and toothfish. Initial stock assessments using data-poor methods have been conducted in the past three years for all commercial finfish species, and will be updated and revised according to guidelines from the MEP external review. The first stock assessment of <i>I. argentinus</i> in over a decade was conducted in 2019 using data made available that year through the data exchange of the Scientific Sub-Committee of the South Atlantic Fisheries Commission |
| 2018-2019 | Introduction of TAC in finfish fisheries with allocation of individual TAC to companies | Data Analyst, Stock Assessment Scientists, Senior Fisheries Scientist | TAC of all commercial finfish species for individual companies | An exercise has been made to set TAC based calculation of VUs in finfish fishery and compare that with the current TAE calculation of VU. External reviewer (MEP) was chosen to provide the advice for finfish fisheries studies and management in 2020. Their advice will be considered in the next programme. |

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| Objective | Task or Action | Lead Person | Targeted Output | Outcomes |
|---|---|--|--|--|
| Objective #2 ongoing | To collect and analyse all available commercial data and produce licensing advice and TAC (where available) for every type of Falkland fisheries. | Data Analyst, Stock Assessment Scientists | Address the data quality issue; improve the data base structure and queries. | <p>All data were checked and entered into commercial and biological databases. The data were analysed to produce reports and licensing advice.</p> <p>A standardized program of parallel trawl surveys in February between the <i>D. gahi</i> fishing zone (<i>Loligo</i> Box; to the east) and finfish zone (to the west) has now been implemented in 8 of the past 11 years. For the past two years, survey biomass estimates have been summarized in a comprehensive report to provide time series indices for the major Falkland Islands commercial fishery species.</p> |
| 2018 | Catch reporting by e-logbooks in all Falkland fisheries | Data Analyst, Stock assessment scientists In conjunction with Synergy | Same day acquisition of catch data from finfish fleet Facilitation of data entry and data management in all fisheries | E-logbooks are operational in all fleets apart from jiggers. It has been challenging to introduce them in jiggers as some of these vessels do not have regular email (yet) and have their communication with Fisheries Department via their agents. |

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| Objective | Task or Action | Lead Person | Targeted Output | Outcomes |
|-------------------------------------|---|--|---|--|
| Objective #3 On going | Studies of biology, ecology and life cycles of main commercial marine species inhabiting waters around the Falkland Islands | Senior Fisheries Scientist | Reveal population structure by genetic and fine chemical methods. Identify migration routes and stock dynamics by research surveys. | <p>Reports on biology and life cycles of main commercial species from Falkland Islands waters.</p> <p>The Fisheries Department worked directly, subcontracting external genetic and chemical laboratories when necessary.</p> <p>Genetic studies showed two independent toothfish populations above and below Antractic Polar Front. Trace element analysis of toothfish juveniles revealed two source populations in the Falkland Islands, Diego Ramirez and Burdwood Bank.</p> |
| 2018 | Environmental factors influencing abundance and migrations of <i>Illex</i> squid | Senior Fisheries Scientist, Stock assessment scientist | Possible incorporation of environmental parameters into stock assessment models | Sampling has been collected during 2019-2020 for this project, and analysed fully by PhD Intern I. Chemshirova in 2020. A paper has been submitted. Results could be used in prediction of squid size and maturity relative to SSTs in January-February before the start of the fishing season. |
| 2018-2020 ongoing | Investigation of stock structure and population dynamics of main finfish species (hake, rock cod) and bycatch species (kingclip, red cod) | Fisheries Scientist, Stock assessment scientists | Understanding of spatial and temporal variability in abundance, reproductive, and trophic patterns | In 2018-2020, studies were mainly concentrated on hake which is now the main commercial species in finfish fishery. Sampling has been completed including otoliths, genetic samples and feeding spectrum of hakes in different parts of their species range. It is slated to be analysed in 2020. |
| 2018-2019 | Studies of distribution and migration of juvenile toothfish on the Falkland Shelf | Senior Fisheries Scientists, Fisheries scientist | Data for stock assessment of toothfish | The study has been completed by Toothfish Scientist B. Lee and is being submitted for publication. Reports and presentations have been made. Positive correlation of the ACC eddies passing from easter part of Burdwood Bank onto the Falkland Shelf and recruitment abundance has been identified. |

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| Objective | Task or Action | Lead Person | Targeted Output | Outcomes |
|----------------------------------|---|--|--|--|
| Objective #4 2018-2019 | Decrease of finfish by-catch in skate fisheries | Senior Fisheries Scientist, Stock assessment scientists, Fisheries Scientist | Summary of mesh size experiments to avoid the by-catch of finfish and squid species in skate fisheries | Sea trials using commercial vessels involved into skate fishery has been done in 2018. Recommendations of applicable mesh size to skate trawl fisheries (400 mm mesh in the codend) has been introduced into licence conditions since January 2021. |
| Objective #5 On-going | Study key parameters and dynamics of marine ecosystems in the Falkland Conservation Zones and adjacent waters | Senior Fisheries Scientist, Data Analyst/Stock Assessment | Investigate dynamics in oceanography during research surveys and standard oceanographic transects. | Variability of environment and possible impact of recent climate change is being analysed using monthly oceanographic transects and hydrological surveys during research cruises. In 2020, plankton surveys have been carried out and plankton dynamics is being analysed. |

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| Objective | Task or Action | Lead Person | Targeted Output | Outcomes |
|--|--|--|--|---|
| Objective #6 On going | To produce fisheries reports for Government and fishing industry and publish scientific papers | Senior Fisheries Scientist, Fisheries Scientist, Data Analyst/Stock Assessment Scientists | Summarize all commercial and biological data after each fishery season, encourage personnel to publish results of their research without delays. | Fisheries Statistics report has been produced annually with summaries of every commercial fishery around the Falkland Islands annually. Reports to Fisheries Committee are produced quarterly, and to FFLG – monthly. All other reports have been produced when required, with 22 scientific papers in peer-reviewed journals in 2018-2019. |
| Objective #7 On going | Reduction of incidental mortalities of seabirds, sea mammals and sharks to negligible levels | Senior Fisheries Scientist, Seabird Observer, Observer Co-ordinator | Mitigation measures to reduce contacts of sea birds and marine mammals with fishing gear | |
| 2018-2020 | To reduce seabird mortality in longline and trawl fisheries | Seabird Observer, Observer Co-ordinator | Improved Bird Scaring Devices, or discard management systems installed on the ships | Annual mortality estimates are produced in the annual reports and summarized in Fisheries Statistics Bulletin |
| 2018-2019 | To reduce and avoid seal mortalities in trawl fisheries | Senior Fisheries Scientist, Scientific Observers, Observer Co-ordinator | Optimum seal exclusion devices put within the trawl nets to prevent seals from entering codends and drowning | Licensing regulations to mitigate interactions between seals and trawl gear were introduced in 2018. Approved Seal Exclusion Device has to be fit into the net if seal mortalities exceed the maximum limit. A paper has been produced and published in Fisheries Research. |

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| Objective | Task or Action | Lead Person | Targeted Output | Outcomes |
|---|--|---|--|--|
| <p>Objective #8</p> <p>On going</p> | <p>To meet the MSC standards in the toothfish longline fishery</p> | <p>Stock assessment scientist, Toothfish scientist, Fisheries scientist</p> | <p>Habitat model, with assessment of the longline impact and development of a move-on rule for VME species.</p> <p>Research on adult movement, and juvenile mortality</p> <p>Continued testing of the stock assessment model for robustness in face of uncertainty</p> | <p>MSC recertification was granted in November 2018, for a five year period.</p> <p>Habitat model was used for mapping of VMEs, a scientific paper has been produced by SAERI with FIFD scientists participation.</p> <p>Tagging report summarized the results of tagging and recaptures of toothfish in the last 3 years.</p> |

MAIN GOALS OF THE PROGRAMME 2021-2023

The following main goals will be continued to follow from the previous programme to ensure provisions of stock assessment and recommendations for management of the commercial fishery resources of the Falkland Islands.

1. Abundance and stock dynamics of main commercial species should be estimated both in-season and after-season and used for licensing advice, TAC/TAE allocation and management.
2. Ecology, stock structure and migrations of main commercial species inhabiting waters around the Falkland Islands should be studied in sufficient detail that would create a basis to apply stock assessment models to better effect. Ecosystem structure will be analysed to prepare the background for Ecosystem-Based Fisheries Management (EBFM).
3. Hydrographic/oceanographic factors affecting the variability in stock abundance should be studied to reveal possible environmental predictors to forecast the trends in stock biomass.
4. Work towards MSC Certification of *D. gahi* fishery when required and continue to provide advice for re-certification of toothfish longline fishery.
5. The impacts of various fisheries on the environment and ecosystems should be minimised.

SCIENTIFIC PROGRAMME 2021 – 2023: KEY TASKS (DETAILED PLANS WILL BE PRODUCED EACH YEAR)

| Objective | Task or Action | Lead Person | Targeted Output | Targeted Outcome | Resources | Timescales and Milestones |
|--|--|--|--|---|---|--|
| Main goal #1 On-going | Abundance and stock dynamics of main commercial species should be estimated both in-season and after-season. | Stock Assessment Scientists, Senior Stock Assessment Scientist | Review relevant stock assessment models and techniques including data poor models. | Stock assessments of main commercial species included into licensing advice produced every year | The Fisheries Department will work on stock assessments directly subcontracting statistical modellers for specific advice if necessary. | |
| 2021 | Analysis and evaluation of stock assessment methods including ICES species categories | Data Analyst, Stock Assessment Scientists, Senior Stock Assessment Scientist | TAC of all commercial finfish species for individual companies if recommended and accepted | TAC based calculation of VUs in finfish fishery with alternative TAE calculations based on individual species abundance | Demersal surveys of standing biomass of finfish species in FICZ | Introduction of new form of Licensing advice for finfish fisheries in 2022 |
| 2021-22 | Stock assessment of Illex using depletion model and timing of squid occurrence in Falkland Zones | Stock Assessment Scientists, Senior Stock assessment scientist | Update of depletion model to estimate stock abundance and fisheries mortality rates | Recommendations for fisheries management of Illex including management measures for jigging fleet | Juvenile surveys, catches in observed commercial trawls, data on out of zone catches and whale depredation | Updated stock assessment in 2021-2022 |

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| Objective | Task or Action | Lead Person | Targeted Output | Targeted Outcome | Resources | Timescales and Milestones |
|---------------------------------------|--|---|--|--|--|--|
| Main goal #2 ongoing | Ecology, stock structure and migrations of main commercial species inhabiting waters around the Falkland Islands | Fisheries scientist, Toothfish scientist, Senior Fisheries Scientist | Reveal population structure by genetic and fine chemical methods. Identify migration routes and stock dynamics by research surveys | | The Fisheries Department will work directly, subcontracting external genetic and chemical laboratories | |
| 2021-22 | Demography of migrating stocks of Illex in Falkland waters | PhD Intern, Senior Fisheries Scientist | Population structure of Illex by using chemical and genetic methods with identification of seasonal cohorts by back calculation of their age | Basis for development of management scheme for Illex jigging fishery | The Fisheries Department will work directly, subcontracting external genetic and chemical laboratories | 2021 – ageing of squid by statoliths 2022 – genetic and chemical studies |
| 2021-22 | Stock structure and population dynamics and migrations of main finfish species with hake as a target species | Fisheries Scientist, Stock assessment scientist, Senior Fisheries Scientist | Population structure of hake by using chemical and genetic methods | Seasonal and spatial regulation of hake fishery | Same as above | 2021 – length-frequency analysis 2022 - chemical studies of otoliths 2023 - genetics |

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| Objective | Task or Action | Lead Person | Targeted Output | Targeted Outcome | Resources | Timescales and Milestones |
|-----------|---|---|---|---|--|--|
| 2021-2022 | Life cycle and habitat use by toothfish on the Falkland Shelf | Toothfish Scientist, Fisheries Scientist Senior Fisheries Scientist | Scheme of toothfish life cycle with conservation measures to exploit the stock sustainably | Depending on the outcome, spatial and temporal fishing restrictions to prevent exploitation of 'sink' stocks. | The Fisheries Department will work directly, subcontracting external genetic and chemical laboratories | 2021 – juvenile toothfish habitats 2022 – chemical analysis of otoliths and tagging to analyse migrations of adults |
| 2021-2023 | Studies of trophic chains on the Patagonian Shelf with identification of <i>D. gahi</i> place in it | PhD Intern, Fisheries Scientist, Senior Fisheries Scientist | Trophic relations on the Patagonian Shelf to make a background for EBFM using Ecosym and Ecopath modeling | Possible inclusion of diet component into the model of variability of <i>D. gahi</i> stocks | The Fisheries Department will work directly, subcontracting external genetic and chemical laboratories | 2021 - food spectrum analysis 2022 – stable isotope analysis |
| 2021-2023 | Studies of seasonal and annual dynamics in species composition and abundance of zooplankton | Data Manager, Fisheries Scientist, Senior Fisheries Scientist | Role of various plankton groups in ecosystem of the Patagonian Shelf | Basis of EBFM modelling of the Patagonian Shelf | The Fisheries Department will work directly | 2021-2022 Seasonal dynamics of crustacean and gelatinous plankton |

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| Objective | Task or Action | Lead Person | Targeted Output | Targeted Outcome | Resources | Timescales and Milestones |
|--|--|--|--|--|--|--|
| <p>Main goal #3</p> <p>On-going from previous programme</p> | <p>Study key parameters and dynamics of marine ecosystems in the Falkland Conservation Zones and adjacent waters</p> | <p>Senior Fisheries Scientist, Data Analyst/Stock Assessment</p> | <p>Investigate dynamics in oceanography during research surveys and standard oceanographic transects</p> | <p>Possible inclusion of environmental parameters into stock assessment models</p> | <p>The Fisheries Department will work directly subcontracting external oceanographic institutions when necessary.</p> | <p>Monthly oceanographic transects, hydrological surveys</p> |
| <p>Main goal #4</p> <p>On-going</p> | <p>MSC Certification. Preparation of data and materials for possible certification of <i>D. gahi</i> fishery when required and continue to provide advice for re-certification of toothfish longline fishery</p> | <p>Stock Assessment Scientist (MSC), Senior Stock Assessment Scientist, Senior Fisheries Scientist</p> | <p>Updated toothfish stock assessment and management;</p> <p>Strategy for managing bycatch and bait species in longline fishery;</p> <p>Strategy for managing vulnerable marine ecosystems (VMEs) in longline fishery.</p> | <p>Data for the surveillance /reassessment produced and submitted to the certification body (CAB) on schedule;</p> <p>Successful MSC recertification of the toothfish fishery.</p> | <p>FIFD will lead the work, in collaboration with SAERI (primarily for benthic habitats work) and CFL (for research cruise organization and fishery related issues).</p> | <p>3rd annual surveillance audit: September 2021</p> <p>4th annual surveillance audit and fishery reassessment: September 2022</p> |

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| Objective | Task or Action | Lead Person | Targeted Output | Targeted Outcome | Resources | Timescales and Milestones |
|--|---|--|--|---|---|--|
| Main goal #5 On going | Minimise the impacts of various fisheries on the environment and ecosystems | Bycatch Mitigation Officer Senior Fisheries Scientist, Observer Co-ordinator | Development of new mitigation measures to reduce interactions of megafauna with fishing vessels | | The Fisheries Department will work directly | |
| 2021-2023 | To mitigate seabird interactions in longline and trawl fisheries | Same as above | Improvement of mitigation methods, with research on net entanglement and discard tank mitigation | Decrease of seabird net mortalities to negligible levels | The Fisheries Department will work directly | 2021 - Net-binding trials on commercial vessels 2022-2023 – discard tank effects on seabird interactions with fishing vessels |
| 2021-2023 | To mitigate seal interactions in trawl fisheries | Same as above | Seal Exclusion Device (SED): monitoring of usage and improvements, finfish SED trials | Decrease of seal net mortalities to negligible levels | The Fisheries Department will work directly | 2022-2023 – trials of SEDs in finfish fisheries |
| 2021-2023 | To mitigate shark mortalities in bottom longlining | Bycatch Mitigation Officer Senior Fisheries Scientist, Stock assessment Scientist (MSC) | Measures to minimise shark bycatch by preventing hooking | List of measures to prevent shark bycatch in the longline toothfish fishery | The Fisheries Department will work directly | 2022 - Trials on commercial longliner |

