Appendix 17

Predicted Distributions for Fisheries of the Chatham Rise (Golder 2014b)

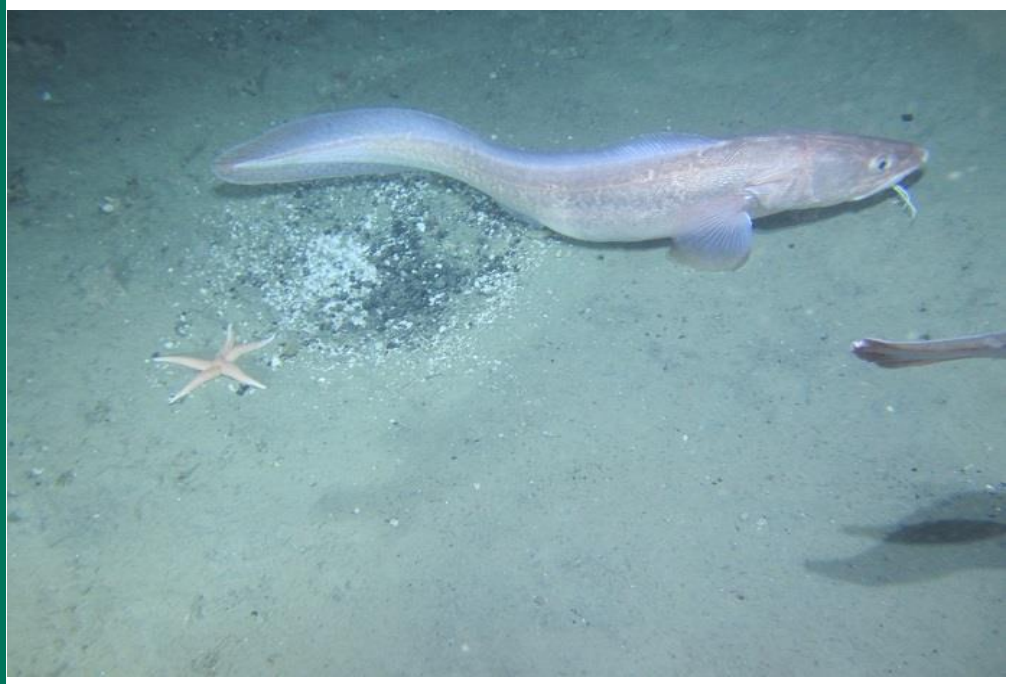
Chatham Rock Phosphate Ltd

April 2014

CHATHAM RISE FISHERIES

Predicted Distributions for Fisheries of the Chatham Rise

Submitted to:
Chatham Rock Phosphate Limited
PO Box 231
Takaka 7142



Report Number. 11178207517/017

REPORT

Golder Associates

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APPENDICES

1.0 INTRODUCTION

The fisheries in the region of the Chatham Rise are well-known for their ecological and commercial importance, which is reflected by the substantial fisheries and environmental research that has been undertaken for the area, as summarised in Beaumont et al. 2013. More than 200 species of fish have been identified from the Chatham Rise (Pinkerton 2013).

Information on the fish species on the Chatham Rise has been collected over a period of decades and includes both pelagic (fish inhabiting the water above the seabed) and demersal (fish that live and feed near the seabed) species. Information on demersal fish species has been obtained through trawling and is the focus of this report.

The Ministry for Primary Industry (MPI), and previously the Ministry of Fisheries, maintains a research trawl database that contains information on fish caught in trawls throughout New Zealand's Exclusive Economic Zone (EEZ). This database is the primary source of information on fish species distribution within the EEZ.

The information in the database was utilised by Leathwick et al. (2006) to predict the distribution of over 100 fish species within the EEZ and to refine a demersal fish community classification for New Zealand waters.

2.0 REPORT SCOPE

This report[1] has been prepared to describe the distribution of demersal fish species on the Chatham Rise in relation to the Chatham Rock Phosphate mining license areas (Figure 1).

This report includes:

- An overview of the data source and methodology used to develop the probability of capture database (after Leatherwick et al. 2006) (Section 3.0).
- Maps of probability of capture for 121 fisheries on the Chatham Rise (Section 4.0).

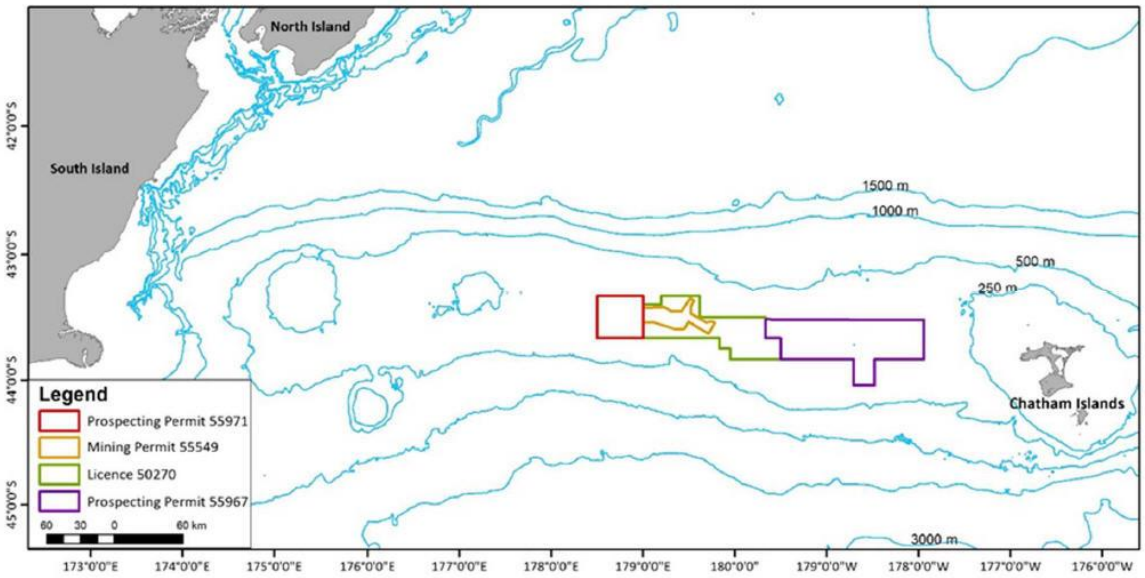

Figure 1: Location of the Chatham Rock Phosphate Limited mining and prospecting permit and license areas.

[1] Your attention is drawn to the document, "Report Limitations", as attached in Appendix A. The statements presented in that document are intended to advise you of what your realistic expectations of this report should be, and to present you with recommendations on how to minimise the risks to which this report relates which are associated with this project. The document is not intended to exclude or otherwise limit the obligations necessarily imposed by law on Golder Associates (NZ) Limited, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in so doing.

This report presents maps that provide a representation of the preferred habitat for fisheries on the Chatham Rise. These maps were prepared by GNS using the dataset provided by MPI from previous work by Leathwick et al. (2006). The methodology for the development of the demersal fish dataset is described fully in Leathwick et al. (2006).

The maps are based on research trawl data and environmental information that was used by Leathwick et al. (2006) to determine the probability of capture for 122 demersal fish species throughout New Zealand's EEZ. It was considered here that this information would provide a useful indication of the preferred habitat for these populations on the Chatham Rise. Information for one species (spineback – *Notacanthus sexspinis*) was not able to be converted to map form for this report due to data file corruption.

3.0 DATA SOURCE

The approach of Leathwick et al. (2006) was to fit statistical models relating to the distribution of fish species to a set of environmental variables chosen for their functional relevance. The statistical models were combined with gridded environmental data at a resolution of 1 km to form environment-based, spatially comprehensive predictions of individual species distributions, including areas where trawl data was lacking. Key points from the methodology described by Leathwick et al. (2006) are described below.

The input data included fish distribution data from the *fish_comm* research bottom trawl database which is a groomed version of the Ministry of Primary Industries *trawl* database collected from bottom trawl tows carried out by research vessels between 1979 and 2005. Data grooming focussed on the accuracy of species identification and the geographic coordinates of trawl tows. This catch data described the weight in kilograms of all species caught in 1 % or more of the trawls.

Trawl parameters and environmental predictors used in predicting the distributions of demersal fish species across the Chatham Rise. Trawl conditions included mesh-size of the trawl cod-end (mm), trawl distance (nm), year of trawling grouped in five-year intervals, and trawl speed (knots). Environmental parameters included average depth (m), estimated temperature at the seafloor (°C), estimated salinity at the seafloor (psu), chlorophyll-a concentration derived from case-2 algorithm (ppm), sea surface temperature spatial gradient (°C/km), depth averaged tidal current (m/s), seafloor slope (°), suspended particulate matter (approximately to g/m^2), wave-induced orbital velocity at the seafloor (m/s), and dissolved organic matter (dimensionless index).

The origins of these data, the model fitting process using Boosted Regression Trees, and the evaluation of model performance are described in Leathwick et al. (2006).

Predictions of fish distribution were formed by combining the statistical models with environmental data covering the area down to the maximum trawl depth of 1,950 m. Predictions were standardised for variation in trawl conditions.

4.0 MAPS OF PROBABILITY OF CAPTURE FOR FISHERIES ON THE CHATHAM RISE

Leathwick et al. (2006) concluded that the occurrence of most species could be predicted with a high degree of reliability based on the outputs from performance statistics. Average depth was the most important variable contributing to the model outcomes, followed by temperature and salinity, then cholorphyll-a. The authors further concluded that, while some of the results could have been produced using research trawl records alone, the results of their assessment showed that spatially comprehensive predictions were possible using available modelling techniques, including for areas not directly sampled by trawling.

It is for that reason that the dataset from the modelled probability of capture was used for mapping of fisheries distributions of the Chatham Rise, rather than only using research trawl records.

Examination of the probability of capture information for the species provides information as to the likelihood of whether a particular species may be affected by proposed activities within the Chatham Rock Phosphate permit and license areas. Table 1 provides a broad overview of the fish species that are:

- Present only in shallow waters that are well-removed from the permit and license areas.
- Present in water depths much deeper than the permit and license areas. These areas are on the slopes of the Chatham Rise typically deeper than 800 m.
- Present on the Chatham Rise and occur in the permit and license areas but the probability of capture is <50 %.
- Present on the Chatham Rise and occur in the permit and license areas but the probability of capture is >50 %.

The following figures (Figures 2 to 122) present the probability of capture for fish species on the Chatham Rise. These maps are presented in alphabetical order based on their MPI fisheries code (e.g., BAR for barracouta, LIN for ling etc.)

5.0 REFERENCES

Beaumont J, Baird S, Hayden B 2013. Biological and fishing data within the Minerals Prospecting Licence 50270 area within the Chatham Rise. NIWA Client Report WLG2011-10. April 2013.

Leathwick J, Francis M, Julian K 2006. Development of a demersal fish community map for New Zealand's Exclusive Economic Zone. NIWA client report HAM2006-062 prepared for Department of Conservation. 21 p.

Pinkerton MH 2013. Ecosystem Modelling of the Chatham Rise. Report prepared by NIWA for Chatham Rock Phosphate Limited. April 2013.

Table 1: Fish species on the Chatham Rise and their likelihood of presence in the CRP marine consent area.

Species occupying shore/shallow waters not in or near the marine consent area	Species occupying deep waters not in or near the marine consent area	Other species with 0 % probability of capture in the marine consent area (but elsewhere on the Chatham Rise)	Species with less than 50 % probability of capture within the marine consent area	Species with greater than 50 % probability of capture within the marine consent area
Ahuru	Basketwork eel	Black oreo	Banded bellowsfish	Alfonsino
Anchovy	Bigscaled brown slickhead	Black slickhead	Banded rattail	Barracouta
Common warehou	Black ghost shark	Humpback rattail	Baxter's dogfish	Bollon's rattail
Blue cod	Black javelinfish	Lighthouse fish	Bluenose	Capro dory
Blue mackerel	Blob fish	Longnosed deepsea skate	Carpet shark	Deepsea flathead
Eagle ray	Brown chimaera	Japanese gurnard	Crested bellowfish	Hairy conger
Elephantfish	Cape scorpionfish	Warty oreo	Cucumber fish	Hake
Filamentous rattail	Common halosaur		Deepsea cardinalfish	Hoki
Golden mackerel	Four-rayed rattail		Frostfish	Javelin fish
John dory	Johnson's cod		Gemfish	Lemon sole
Kahawai	Kaiyomaru rattail		Hapuku	Ling
Kingfish	Longnose velvet dogfish		Greenback jack mackerel	Long-nosed chimaera
Leatherjacket	Mahia rattail		Leafscale gulper shark	Lookdown dory
Whiptail ray	Notable rattail		Mirror dory	Lucifer dogfish
New Zealand sole	Orange roughy		Murphy’s mackerel	Orange perch
Pilchard	Owston's dogfish		Northern spiny dogfish	Pale ghost shark
Porcupine fish	Pacific spookfish		Oblique banded rattail	Red cod
Red gurnard	Ridge scaled rattail		Oliver's rattail	Scaly gurnard
Red mullet	Serrulate rattail		Pale toadfish	Sea perch
Sand flounder	Shovelnose dogfish		Plunket's shark	Silver dory
Short-tailed black ray	Small-headed cod		Prickly dogfish	Silver warehou
Slender smooth-hound	Smallscaled brown slickhead		Ray’s bream	Silverside

Species occupying shore/shallow waters not in or near the marine consent area	Species occupying deep waters not in or near the marine consent area	Other species with 0 % probability of capture in the marine consent area (but elsewhere on the Chatham Rise)	Species with less than 50 % probability of capture within the marine consent area	Species with greater than 50 % probability of capture within the marine consent area
Snapper	Smooth oreo		Redbait	Spiny dogfish
Spotted stargazer	Squashed face rattail		Ribaldo	Swollenhead conger
Spotty	*Tubbia tasmanica*		Rig	White warehou
Trevally	Violet cod		Rudderfish	Witch
Yellow-belly flounder	Viperfish		School shark	
	White rattail		Seal shark	
			Silver roughy	
			Southern blue whiting	
			Spiky oreo	
			Tarakihi	

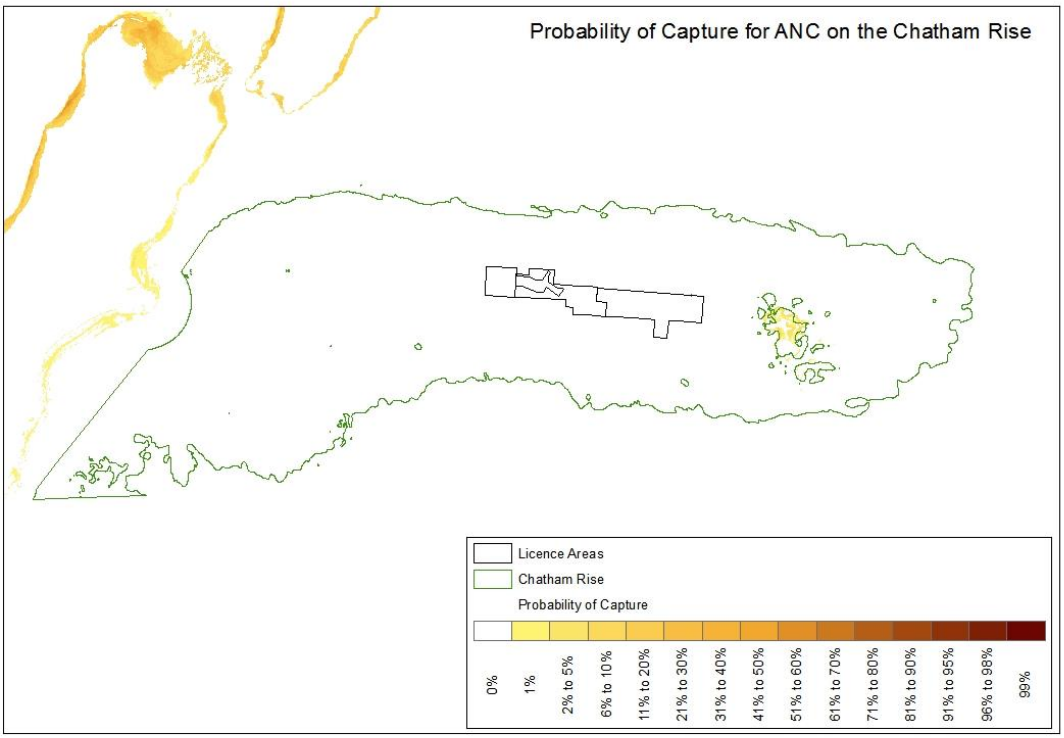

Figure 2: Probability of capture for anchovy (Engraulis australis; ANC) on the Chatham Rise.

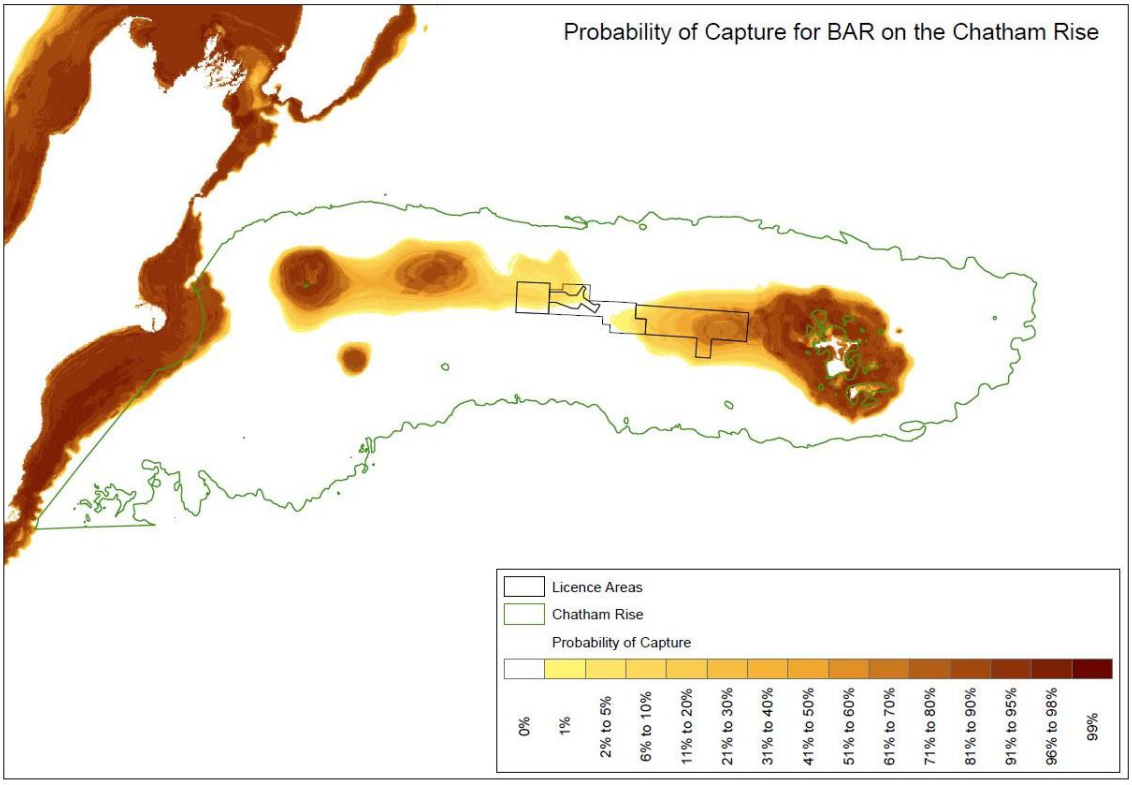

Figure 3: Probability of capture for barracouta (Thyrsites atun; BAR) on the Chatham Rise.

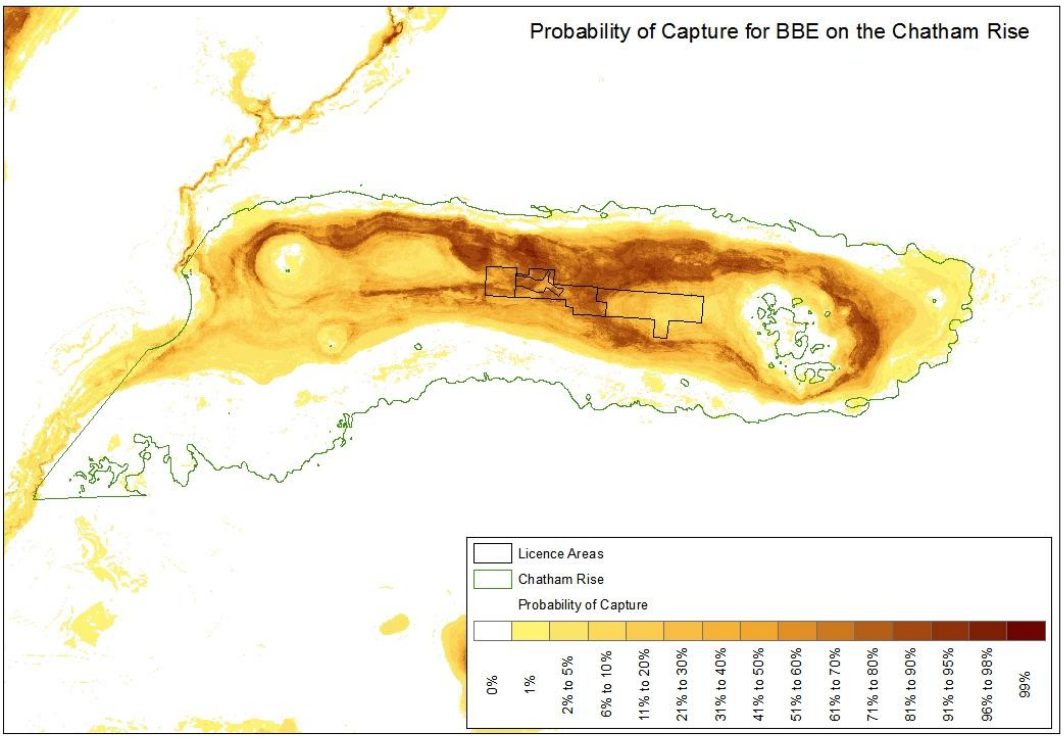

Figure 4: Probability of capture for banded bellowfish (Centriscops humerosus; BBE) on the Chatham Rise.

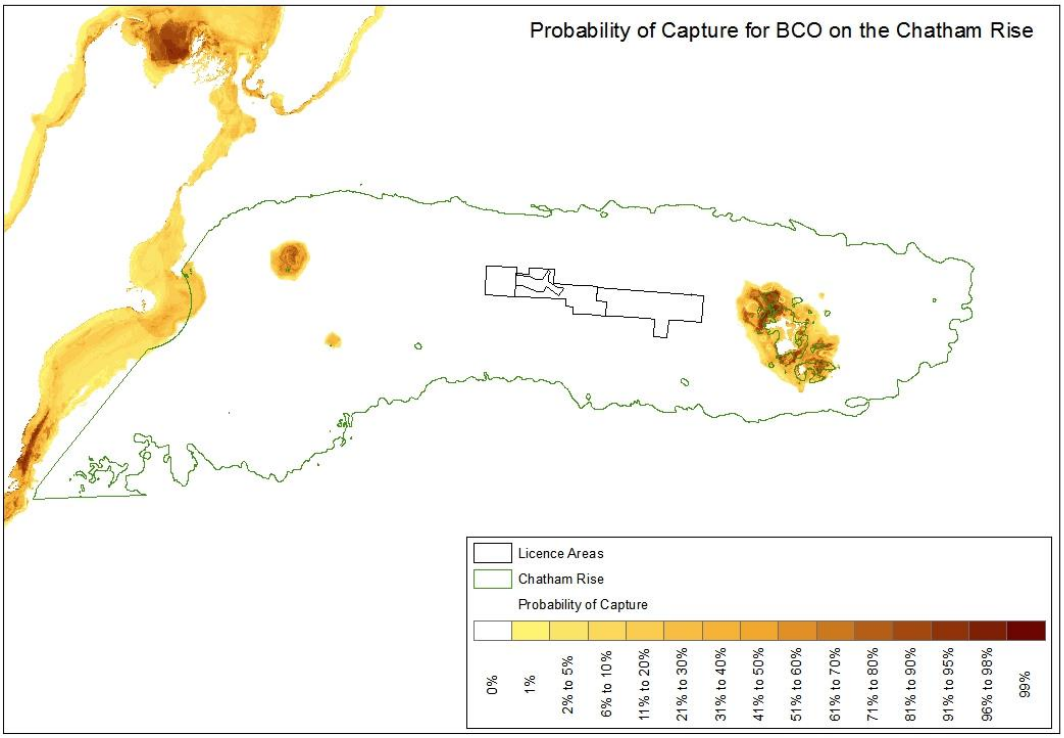

Figure 5: Probability of capture for blue cod (Parapercis colias; BCO) on the Chatham Rise.

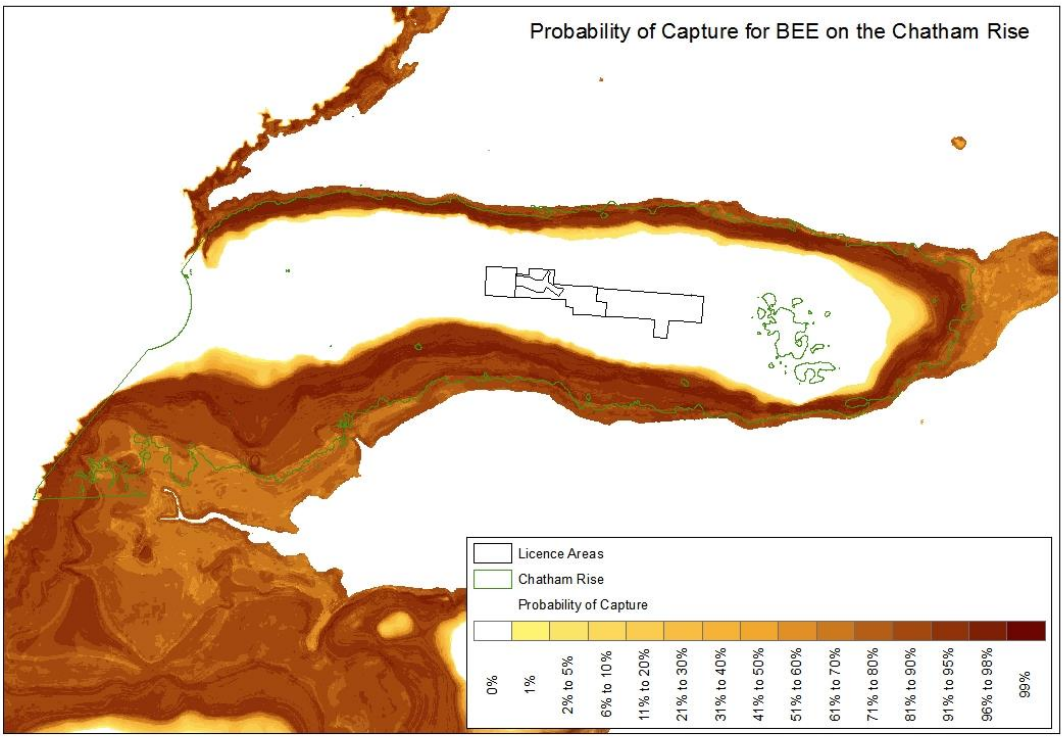

Figure 6: Probability of capture for basketwork eel (Diastobranchus capensis; BEE) on the Chatham Rise.

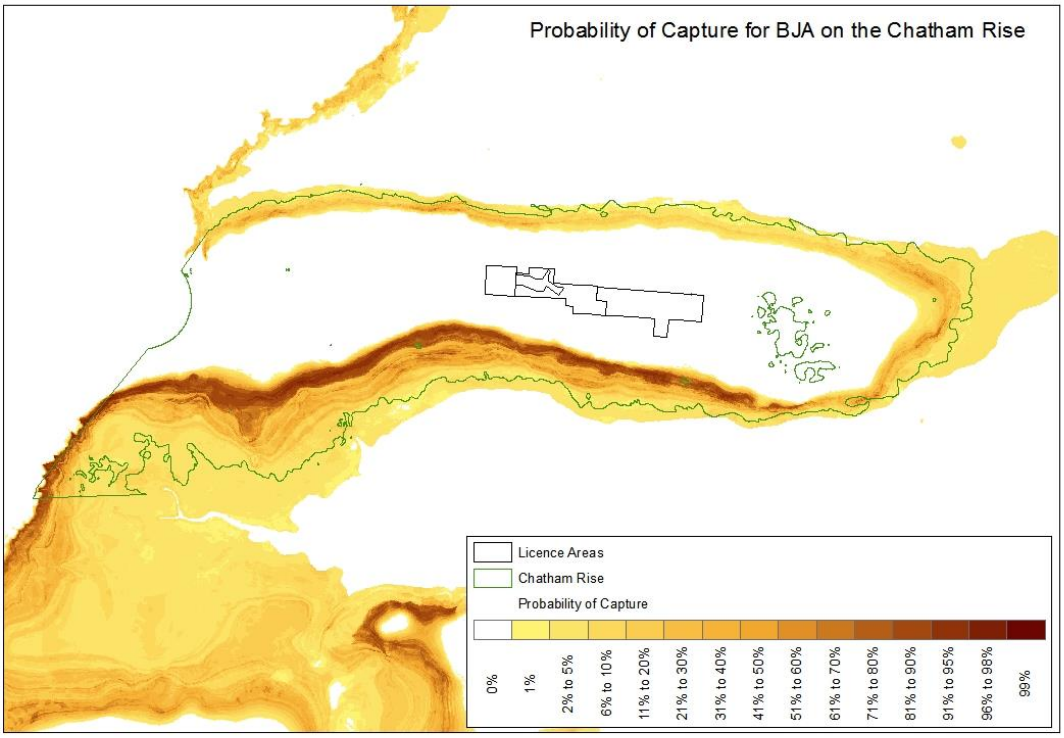

Figure 7: Probability of capture for black javelinfish (Mesobius antipodum; BJA) on the Chatham Rise.

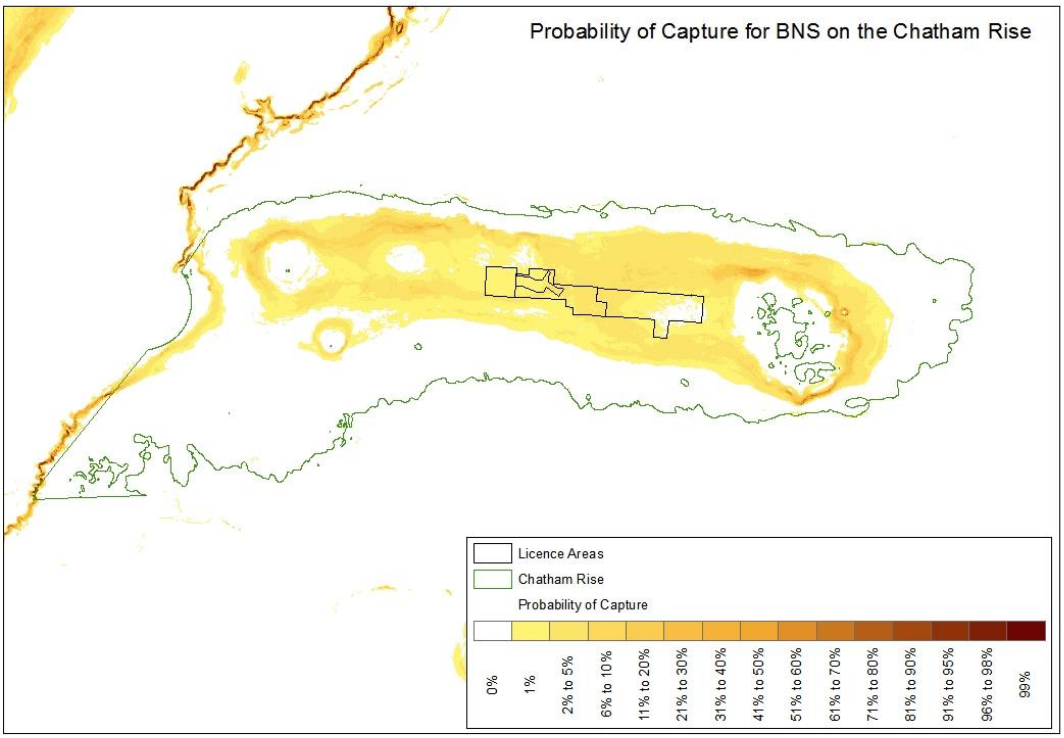

Figure 8: Probability of capture for bluenose (Hyperoglyphe antarctica; BNS) on the Chatham Rise.

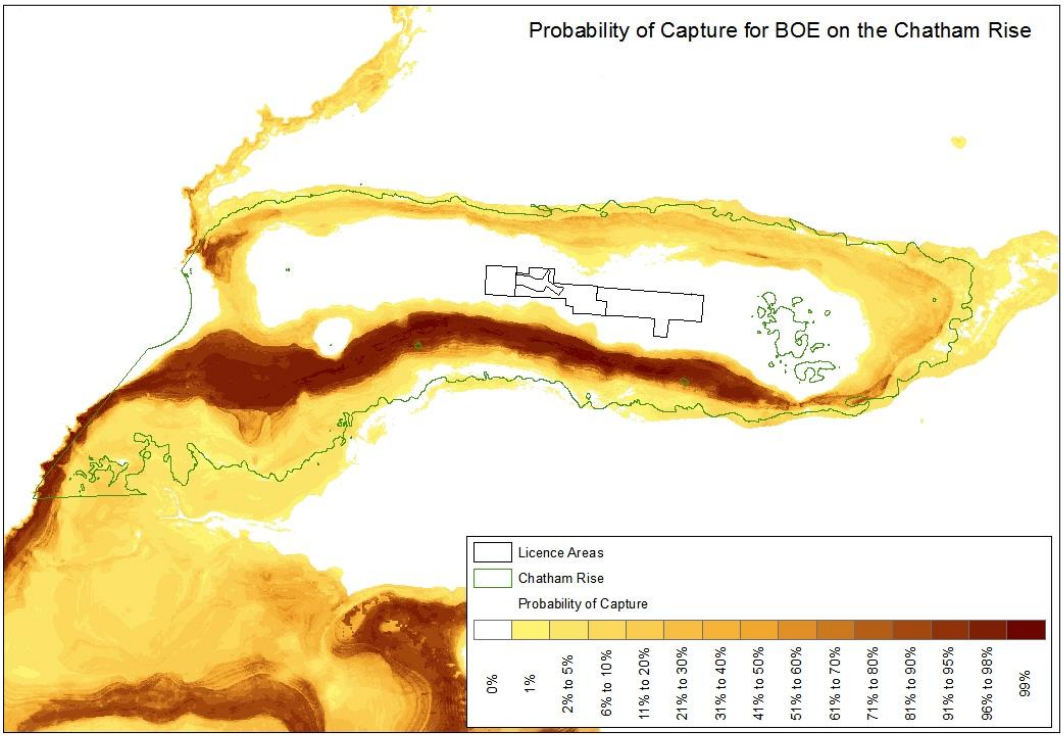

Figure 9: Probability of capture for black oreo (Allocyttus niger; BOE) on the Chatham Rise.

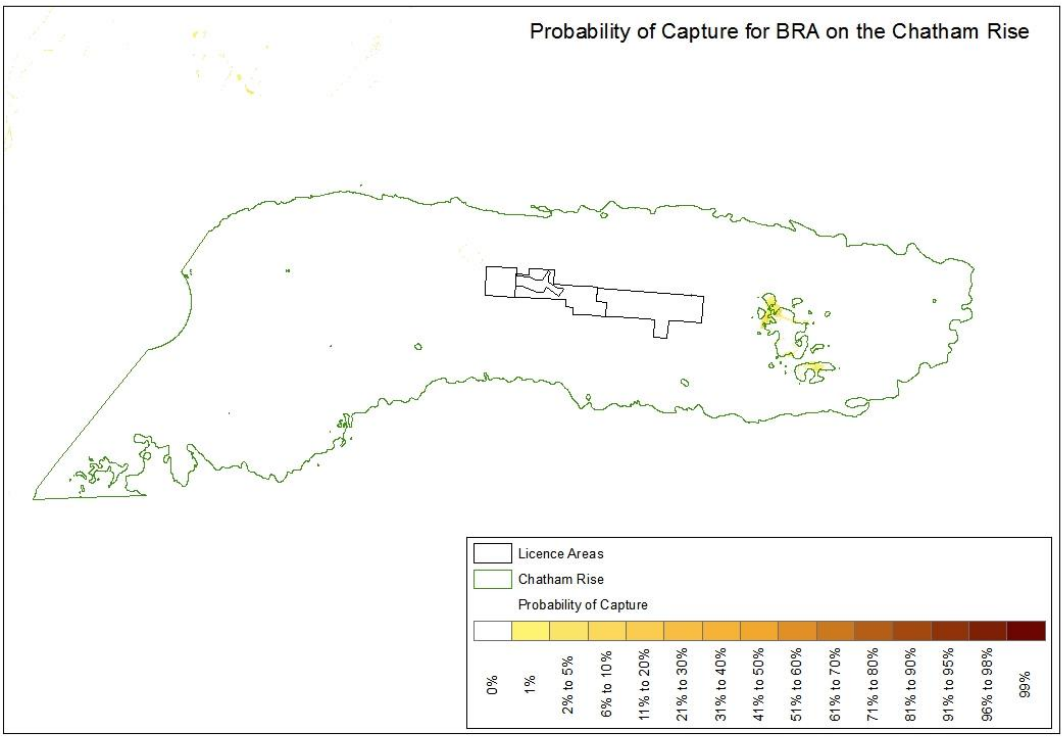

Figure 10: Probability of capture for short-tailed black ray (Dasyatis brevicaudatus; BRA) on the Chatham Rise.

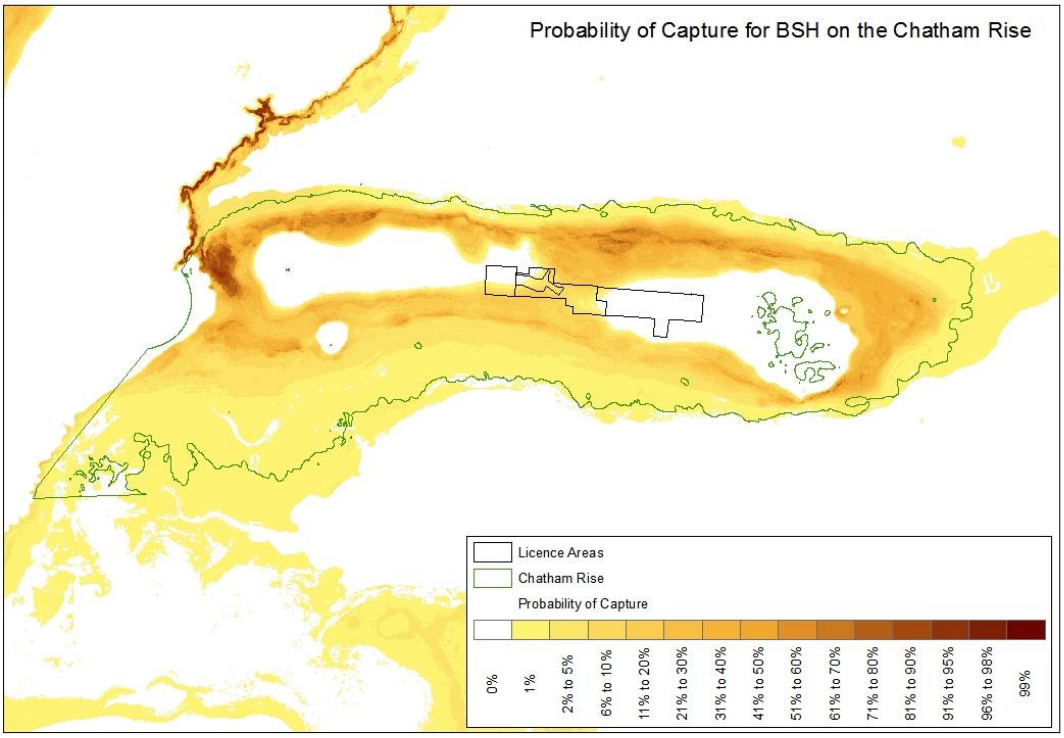

Figure 11: Probability of capture for seal shark (Scymnorhinus licha; BSH) on the Chatham Rise.

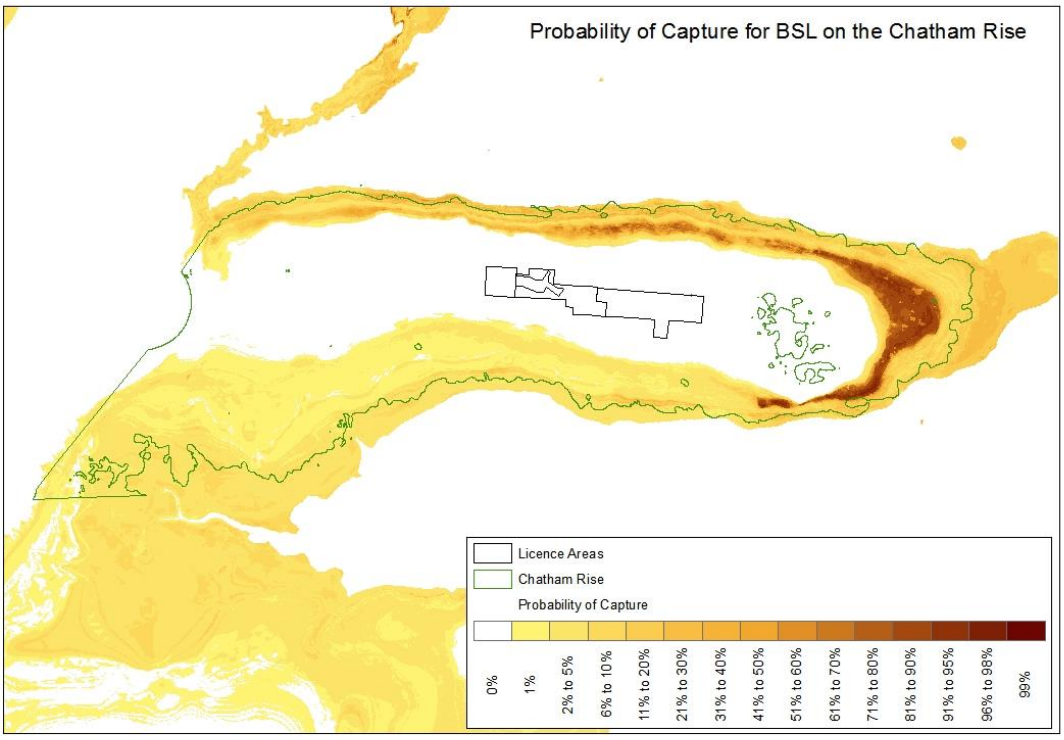

Figure 12: Probability of capture for black slickhead (Xenodermichthys copei; BSL) on the Chatham Rise.

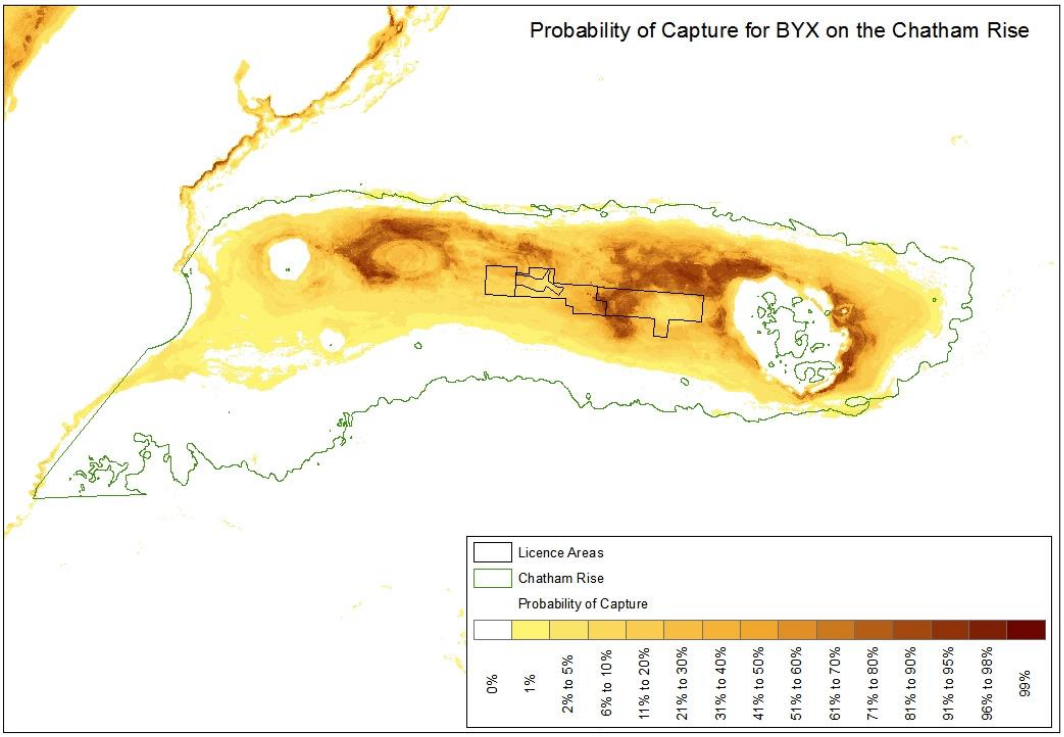

Figure 13: Probability of capture for alfonsino and long-finned Beryx (Beryx splendens and B. decadactylus; BYX) on the Chatham Rise.

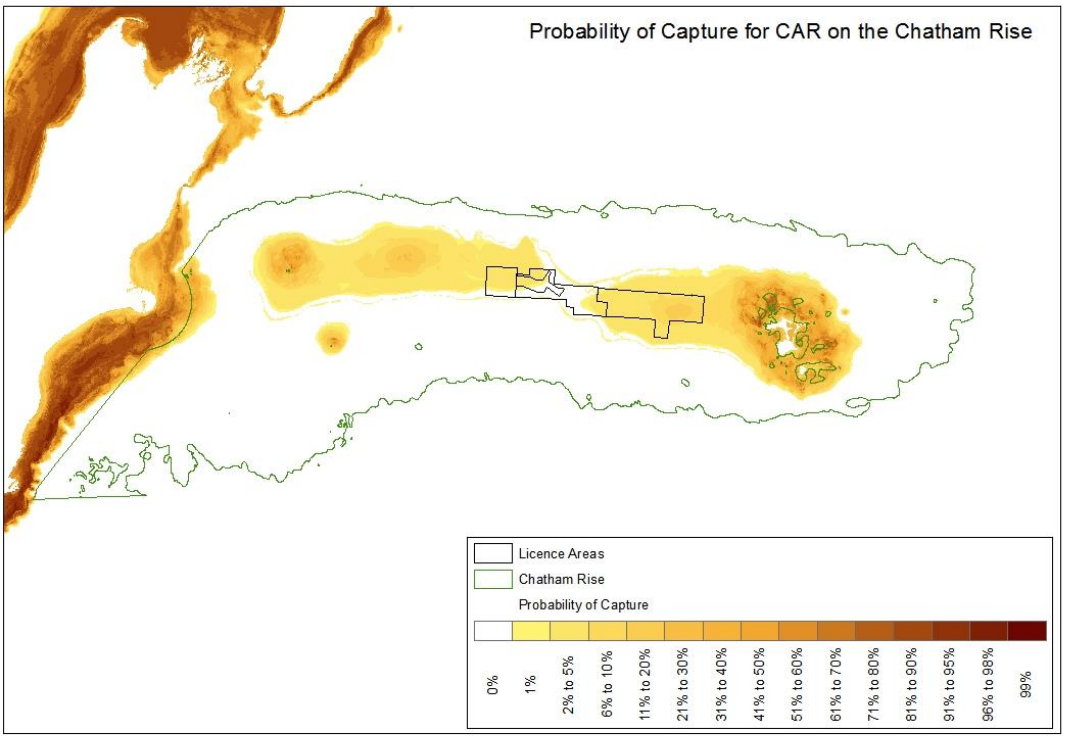

Figure 14: Probability of capture for carpet shark (Cephaloscyllium isabella; CAR) on the Chatham Rise.

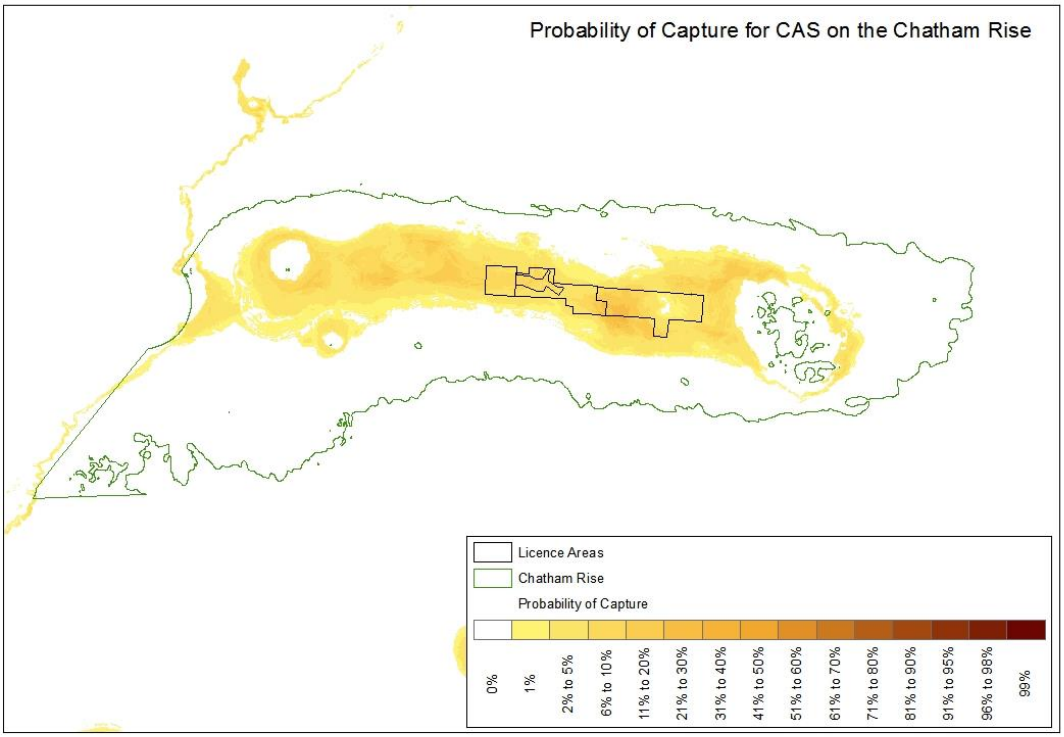

Figure 15: Probability of capture for oblique banded rattail (Caelorinchus aspercephalus; CAS) on the Chatham Rise.

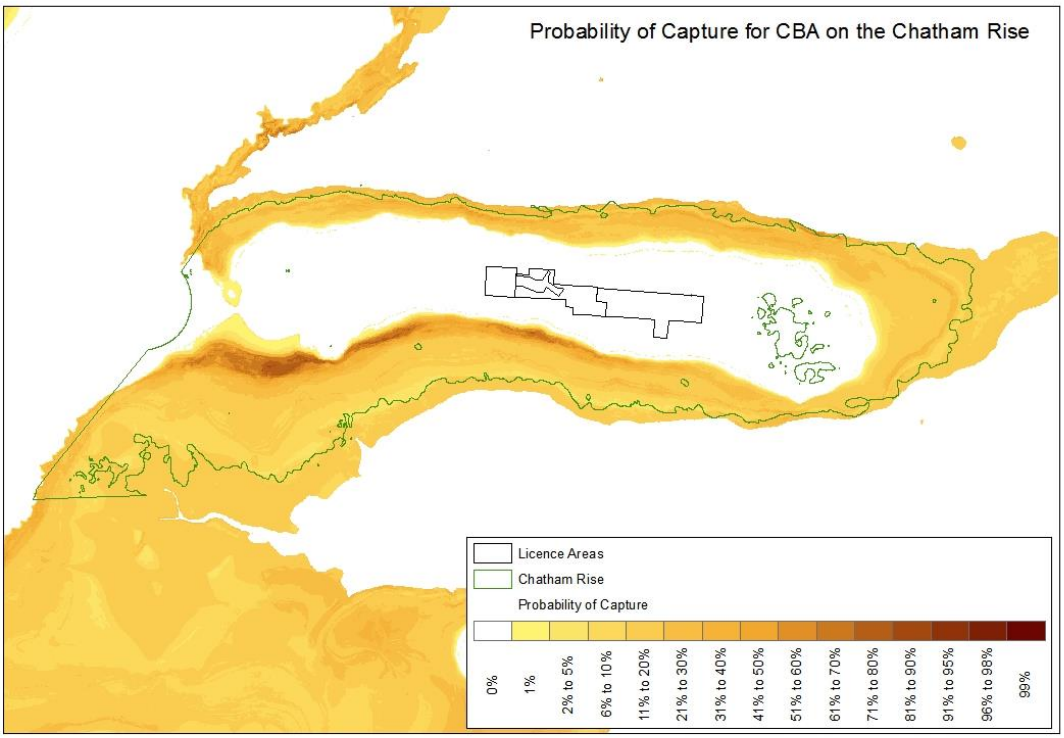

Figure 16: Probability of capture for humpback (slender) rattail (Coryphaenoides dossenus; CBA) on the Chatham Rise.

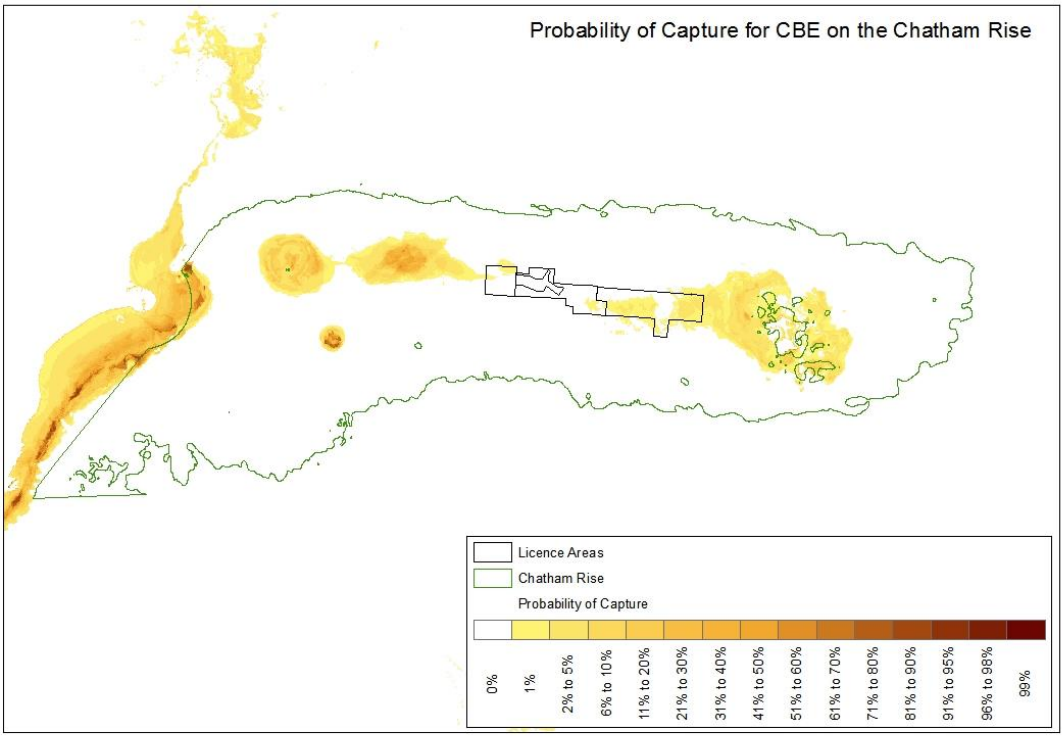

Figure 17: Probability of capture for crested bellowfish (Notopogon lilliei; CBE) on the Chatham Rise.

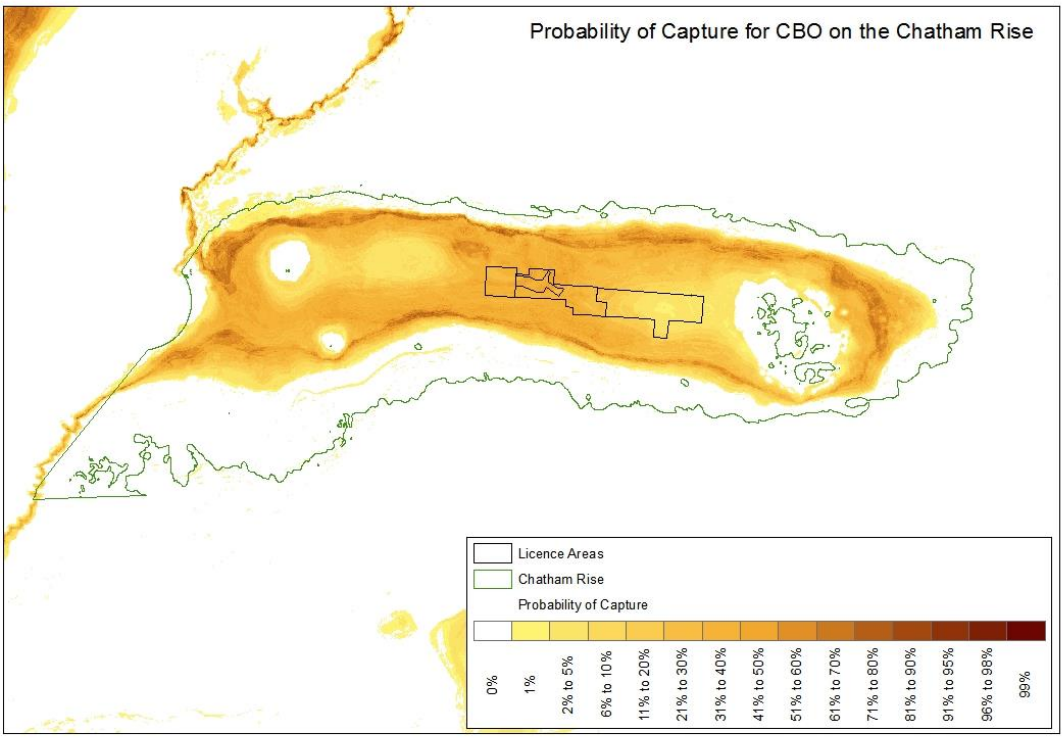

Figure 18: Probability of capture for Bollon's rattail (Caelorinchus bollonsi; CBO) on the Chatham Rise.

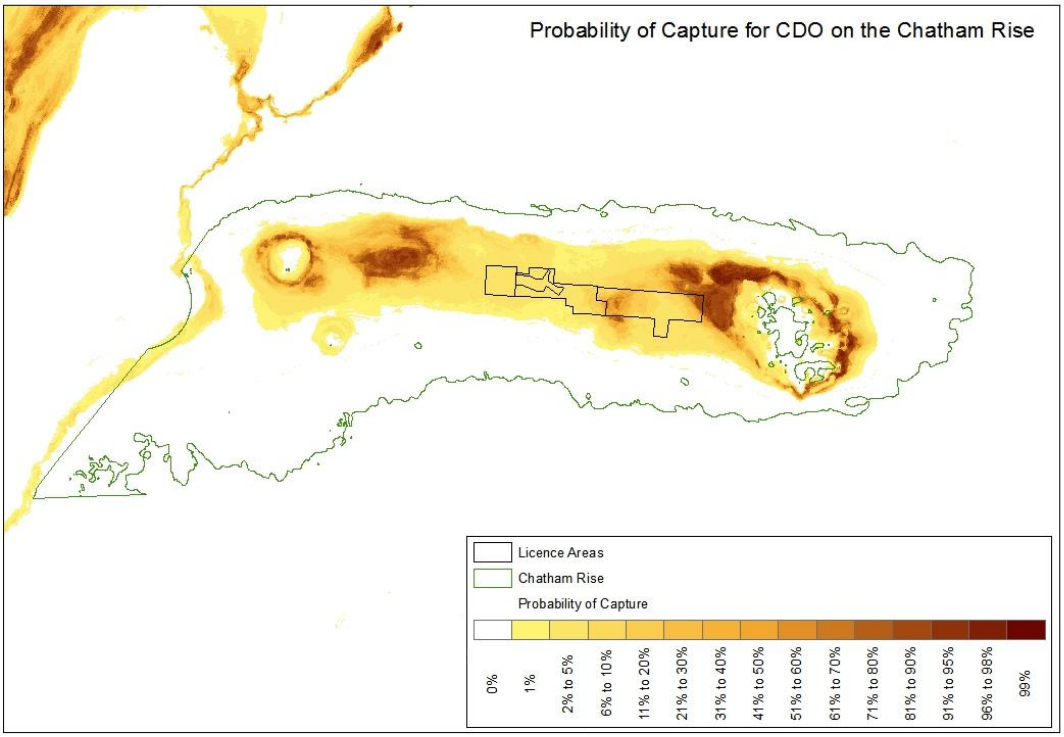

Figure 19: Probability of capture for capro dory (Capromimus abbreviatus; CDO) on the Chatham Rise.

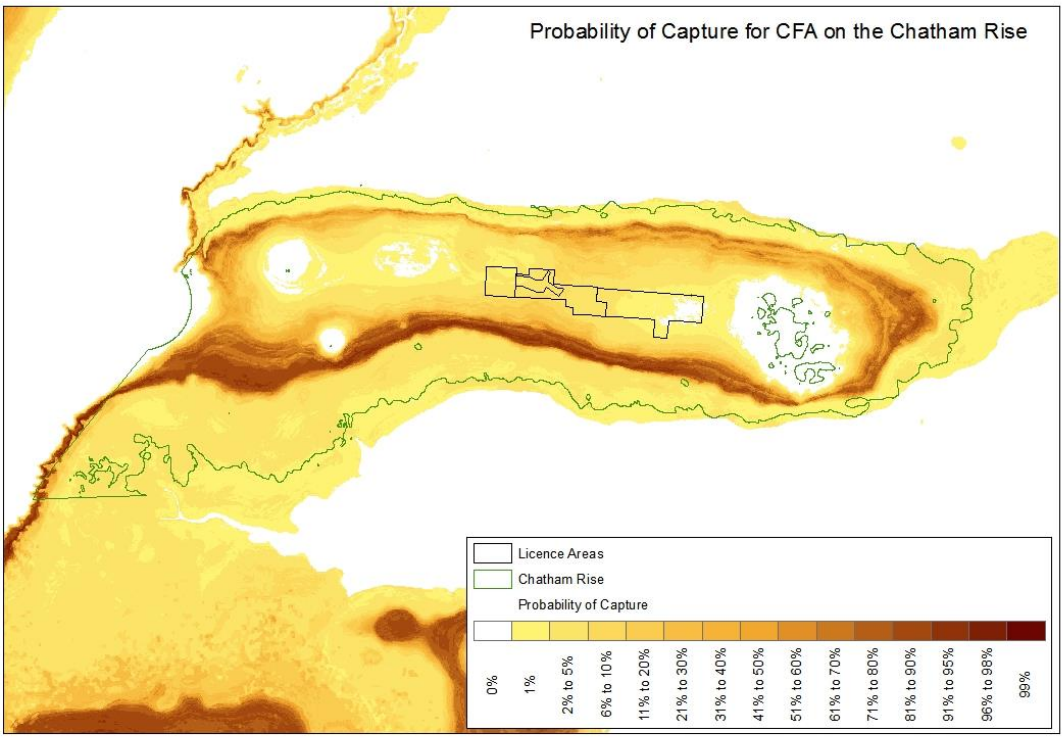

Figure 20: Probability of capture for banded rattail (Caelorinchus fasciatus; CFA) on the Chatham Rise.

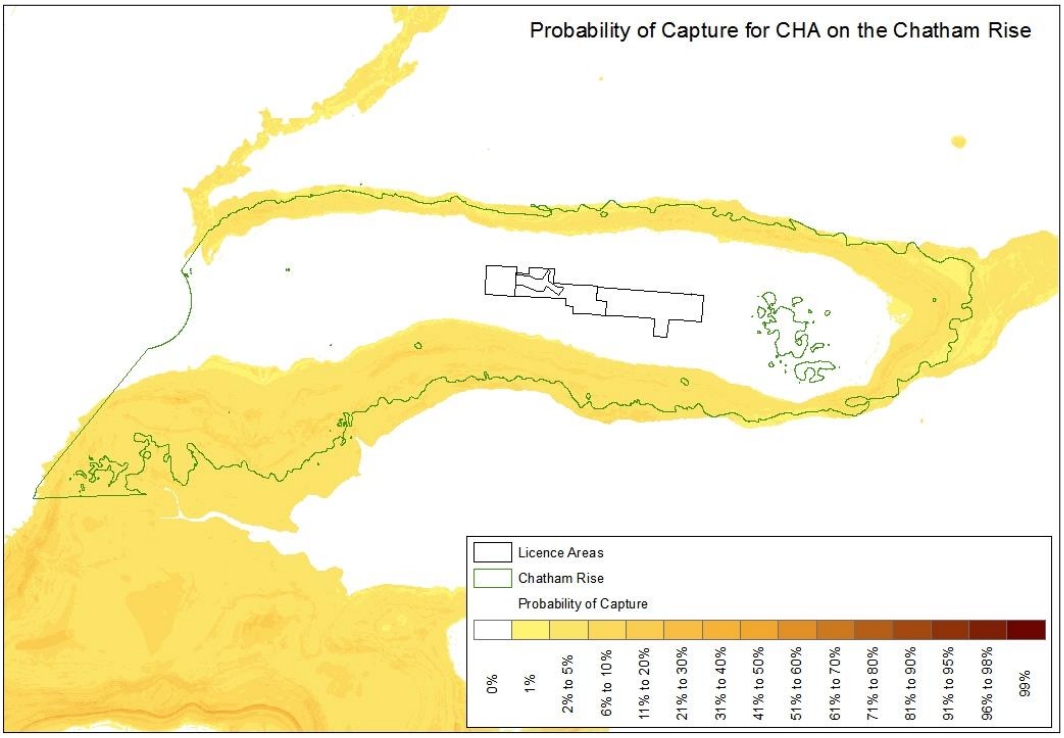

Figure 21: Probability of capture for viperfish (Chauliodus sloani; CHA) on the Chatham Rise.

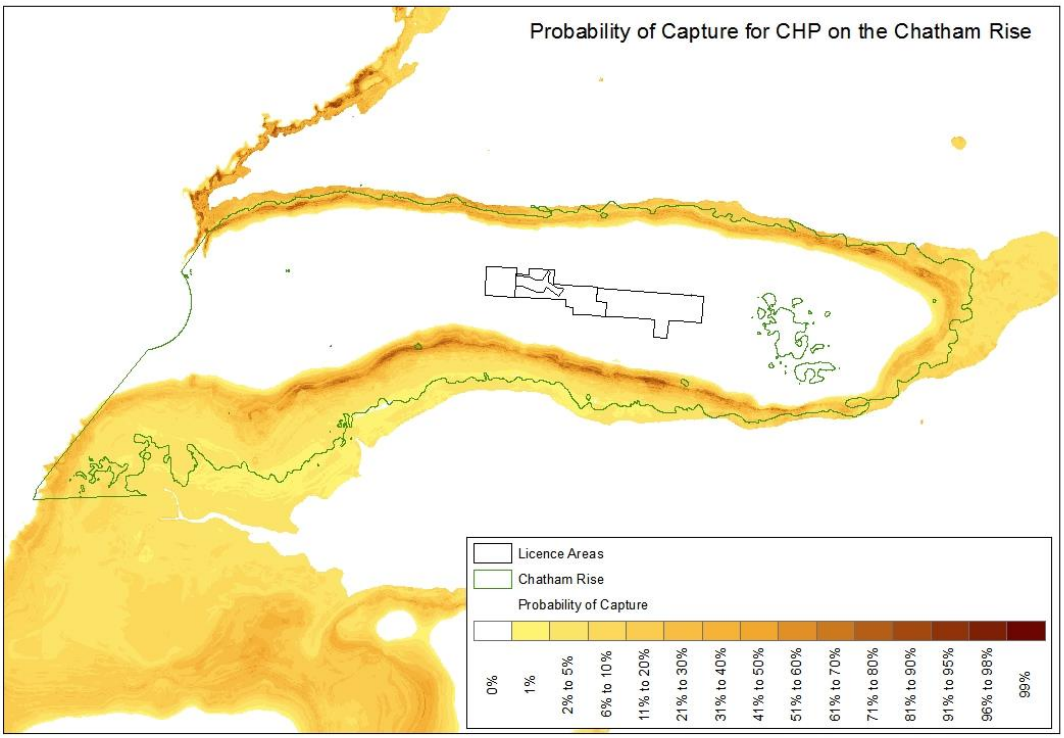

Figure 22: Probability of capture for brown chimaera (Chimaera sp. C; CHP) on the Chatham Rise.

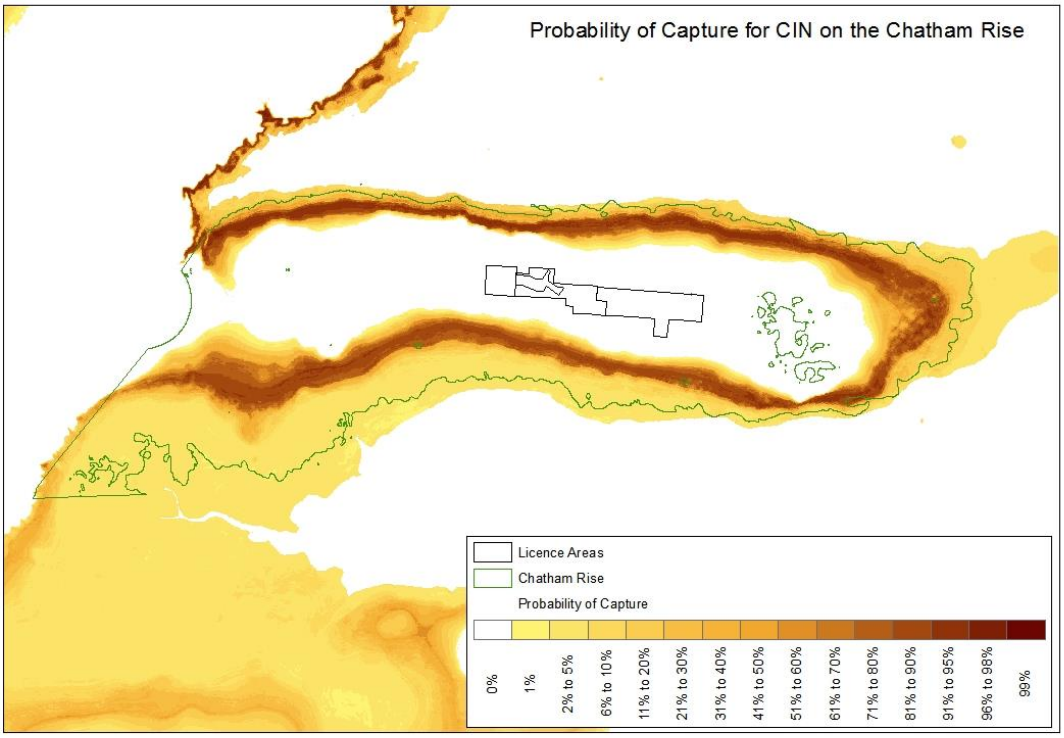

Figure 23: Probability of capture for notable rattail (Caelorinchus innotabilis; CIN) on the Chatham Rise.

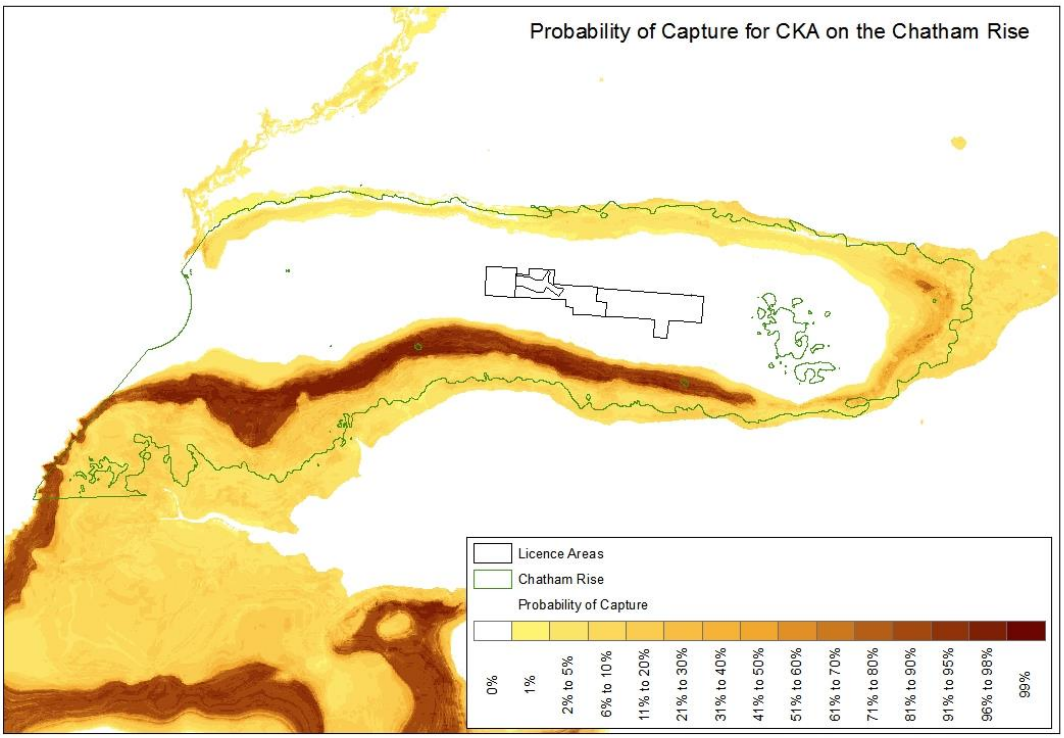

Figure 24: Probability of capture for Kaiyomaru rattail (Caelorinchus kaiyomaru; CKA) on the Chatham Rise.

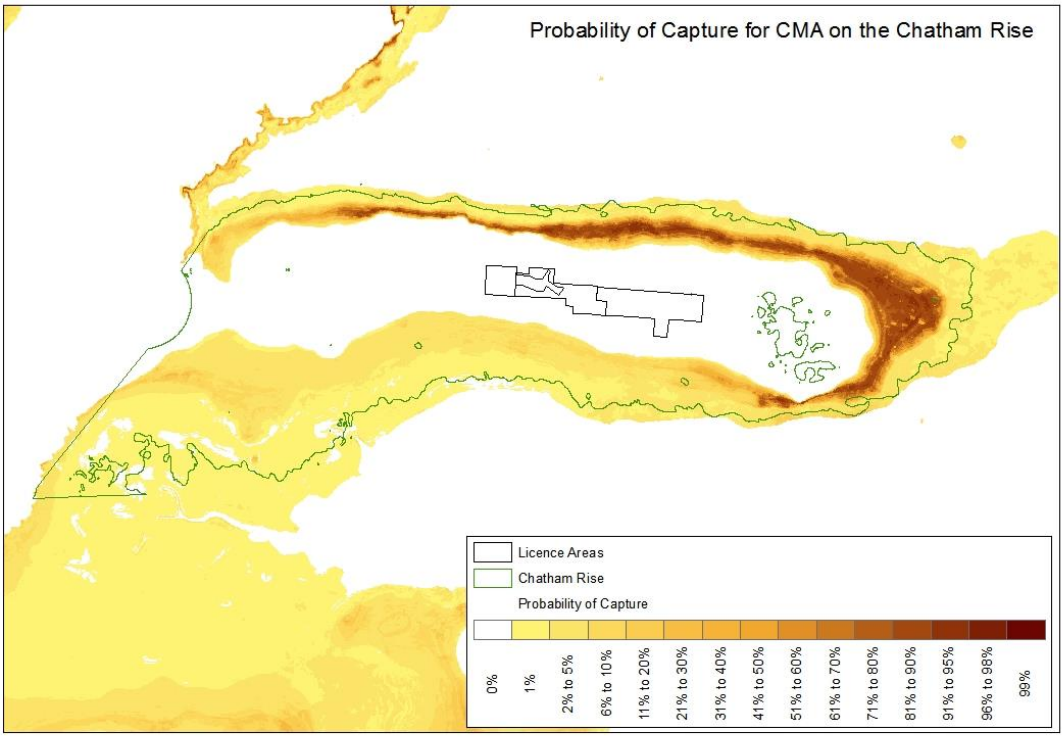

Figure 25: Probability of capture for Mahia rattail (Caelorinchus matamua; CMA) on the Chatham Rise.

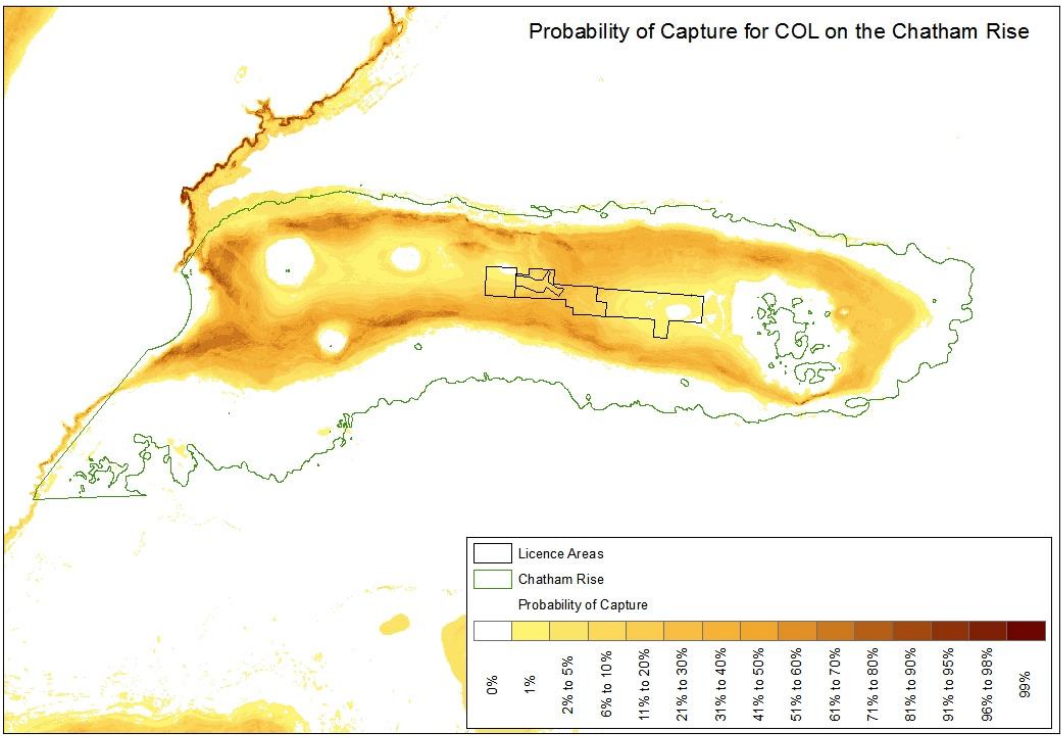

Figure 26: Probability of capture for Oliver's rattail (Caelorinchus oliverianus; COL) on the Chatham Rise.

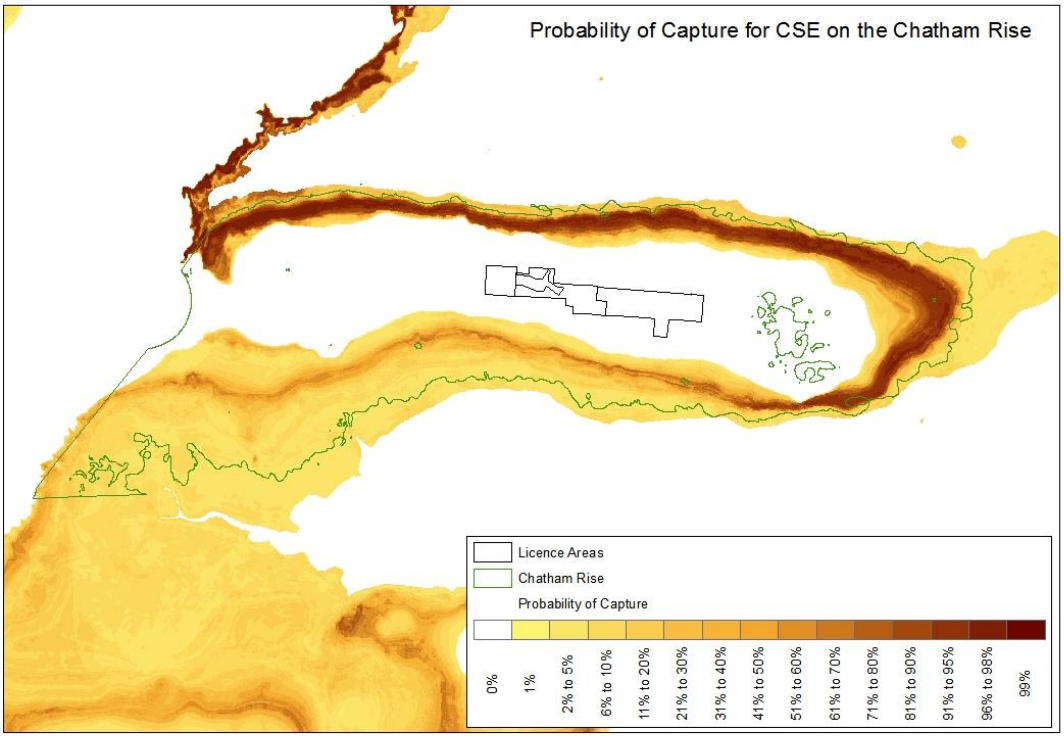

Figure 27: Probability of capture for serrulate rattail (Coryphaenoides serrulatus; CSE) on the Chatham Rise.

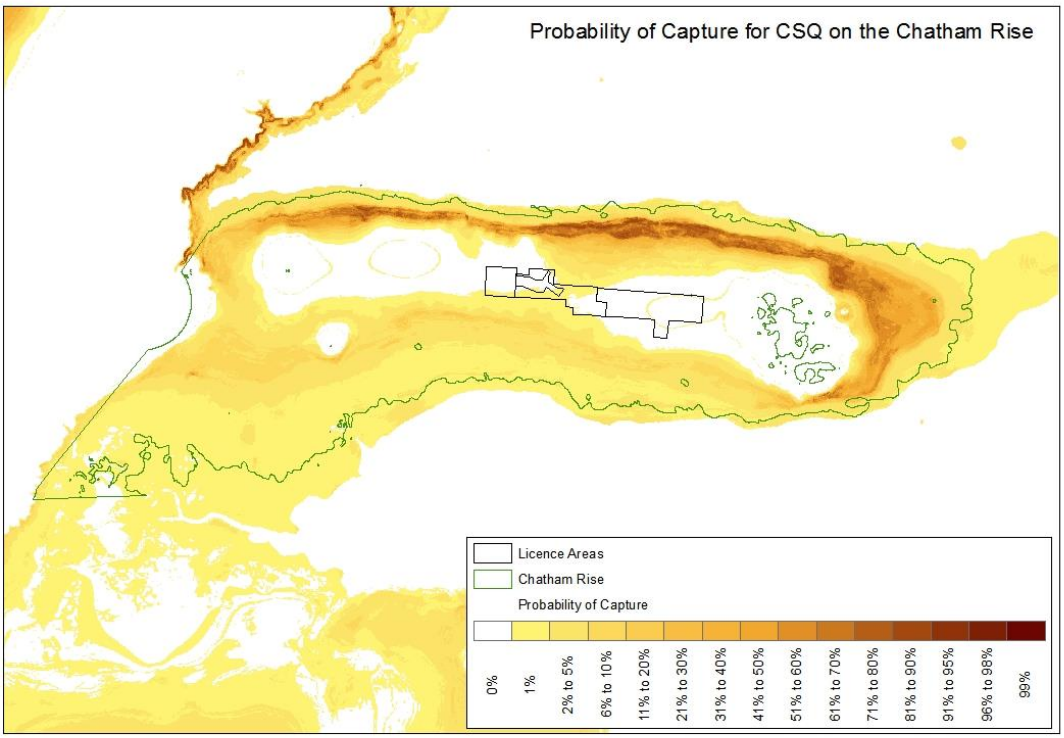

Figure 28: Probability of capture for leafscale gulper shark (Centrophorus squamosus; CSQ) on the Chatham Rise.

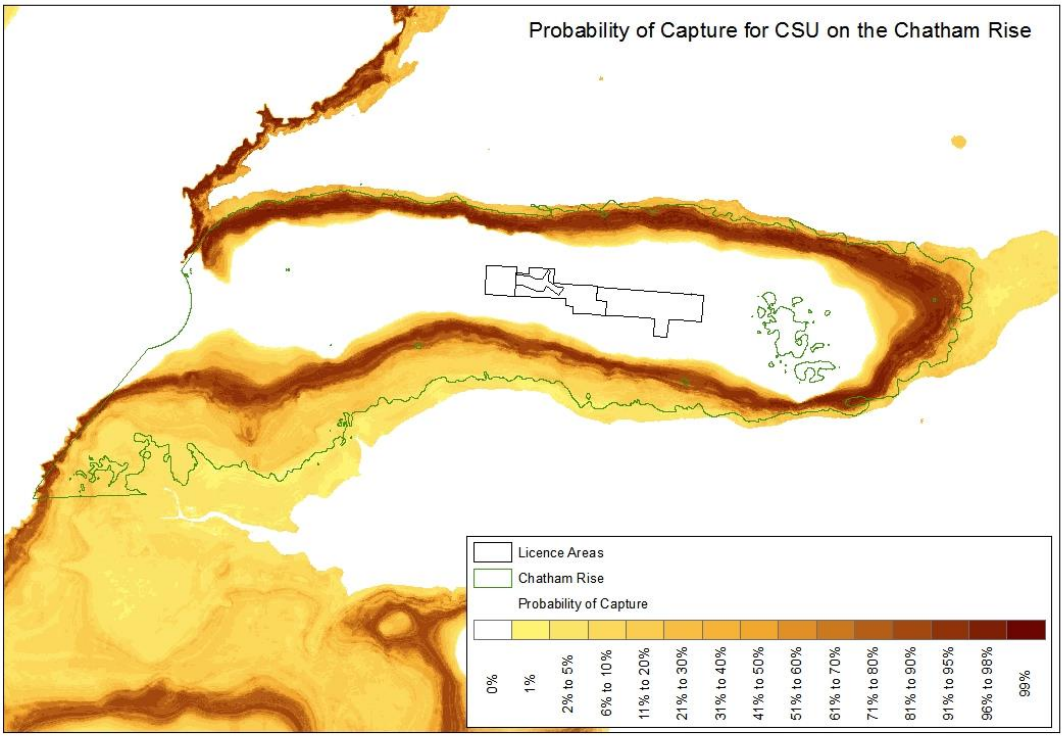

Figure 29: Probability of capture for four-rayed rattail (Coryphaenoides subserrulatus; CSU) on the Chatham Rise.

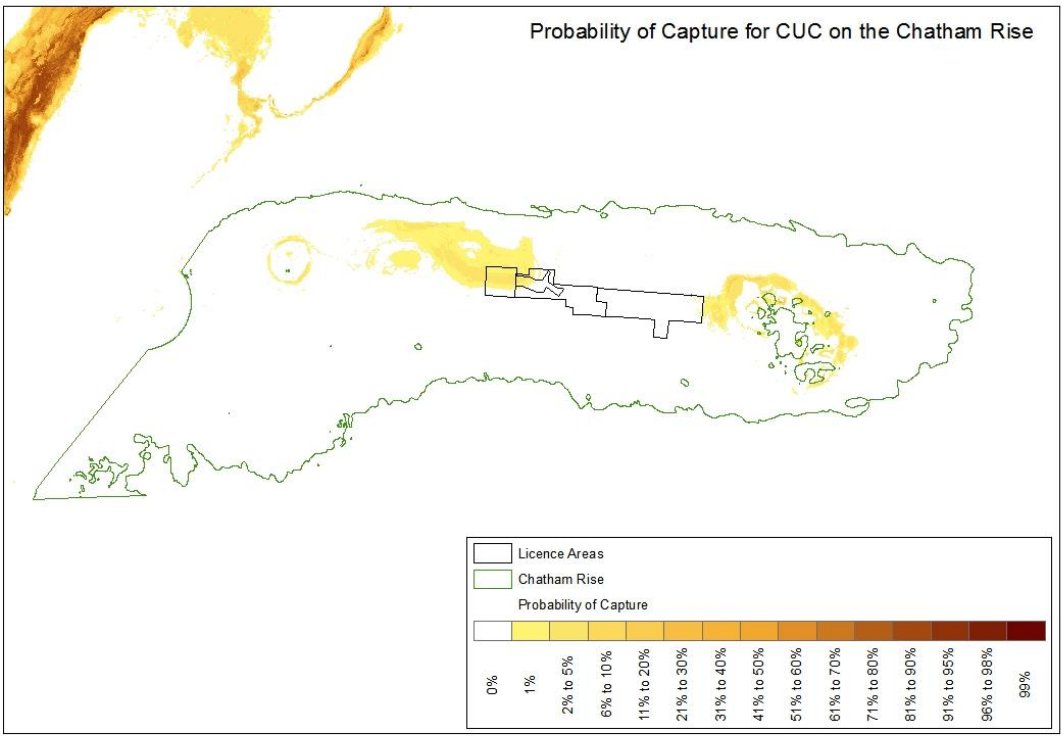

Figure 30: Probability of capture for cucumber fish (Chlorophthalmus nigripinnis; CUC) on the Chatham Rise.

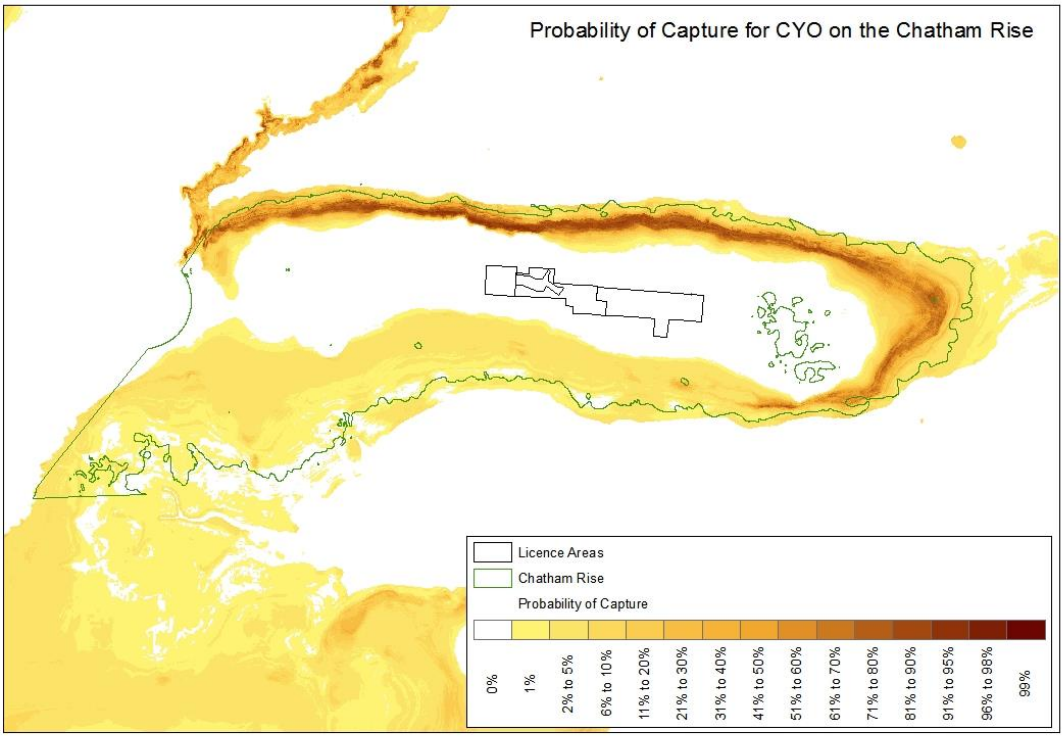

Figure 31: Probability of capture for Owston's (smooth skin) dogfish (Centroscymnus owstoni; CYO) on the Chatham Rise.

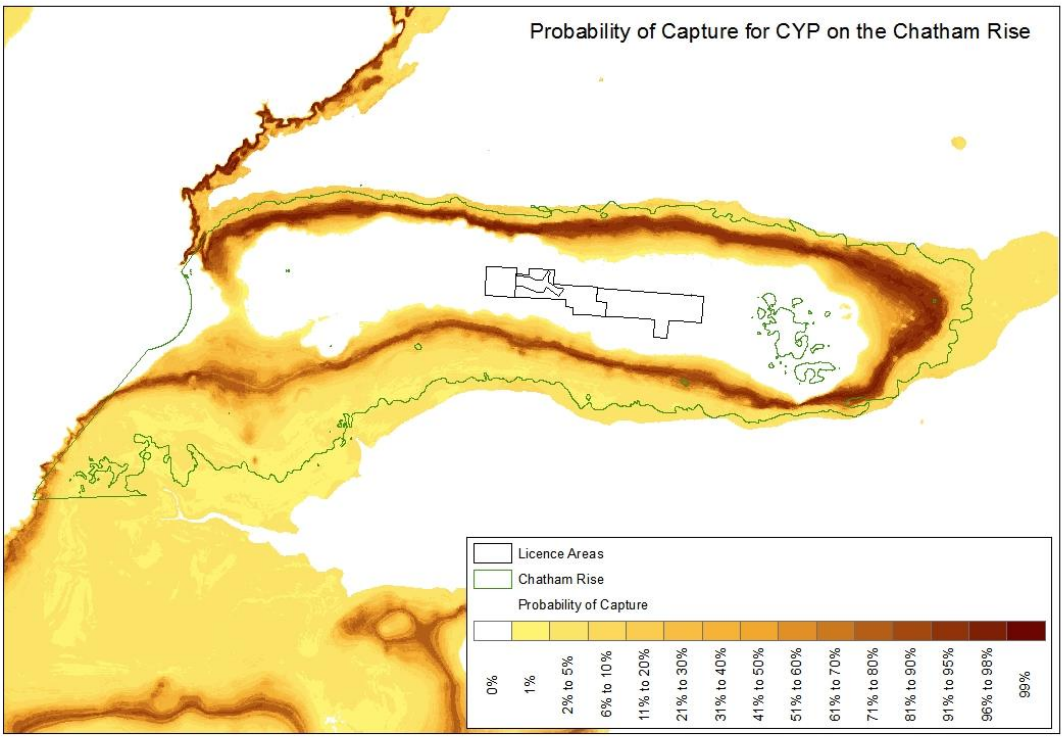

Figure 32: Probability of capture for longnosed velvet dogfish (Centroscymnus crepidater; CYP) on the Chatham Rise.

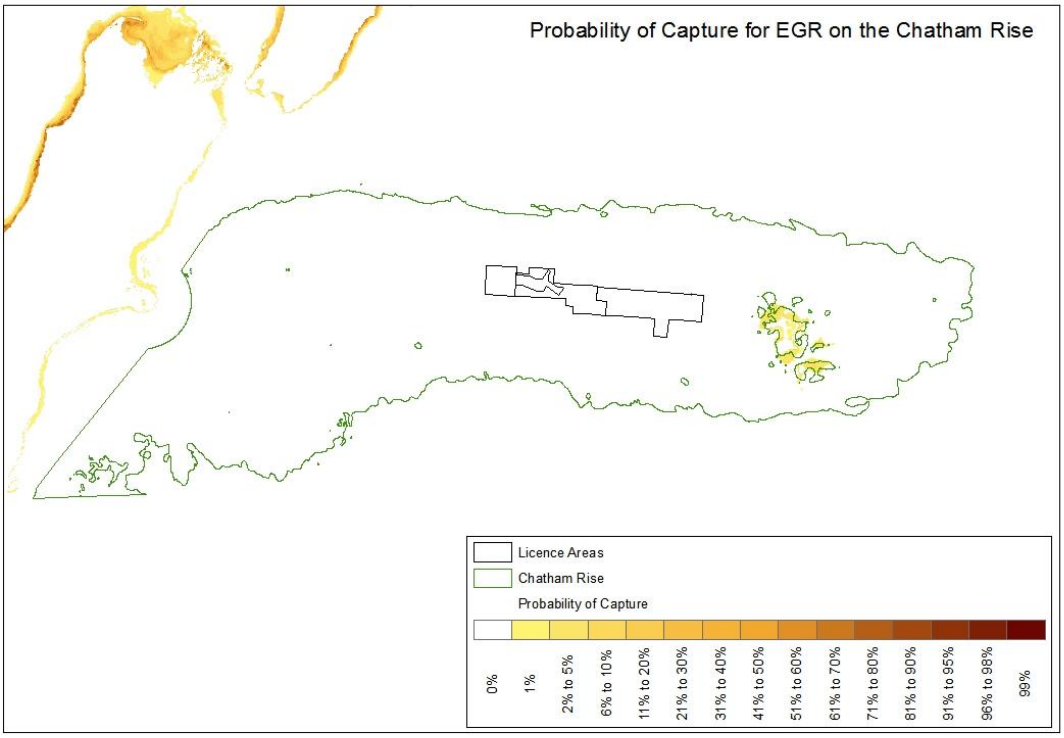

Figure 33: Probability of capture for eagle ray (Myliobatis tenuicaudatus; EGR) on the Chatham Rise.

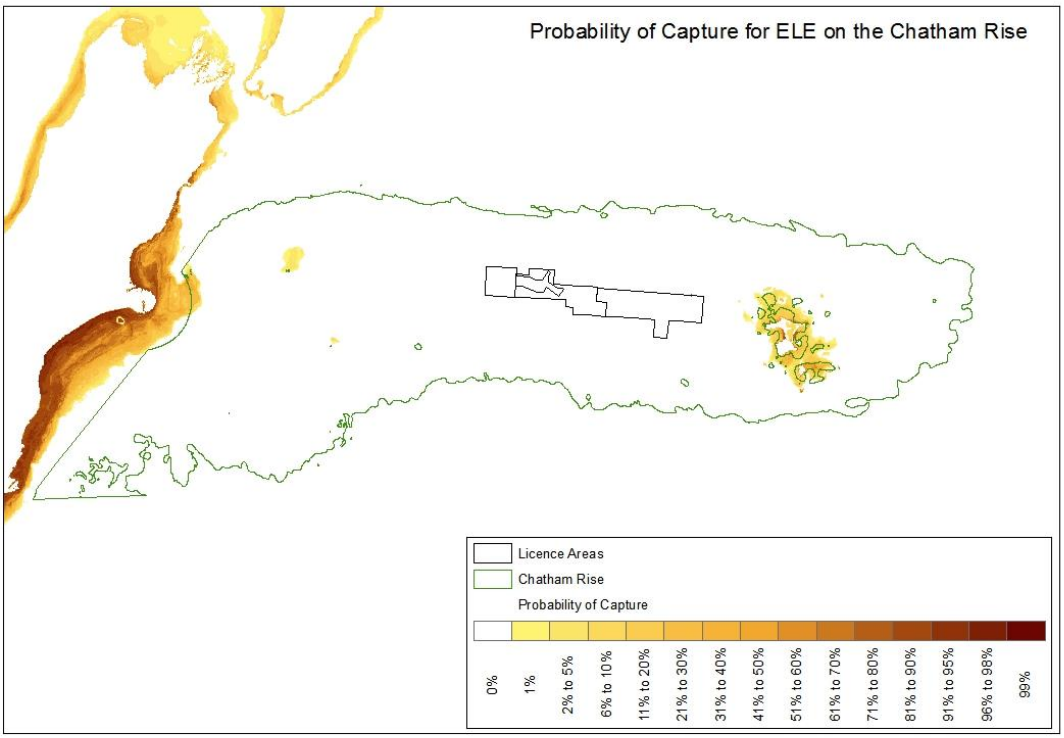

Figure 34: Probability of capture for elephant fish (Callorhinchus milii; ELE) on the Chatham Rise.

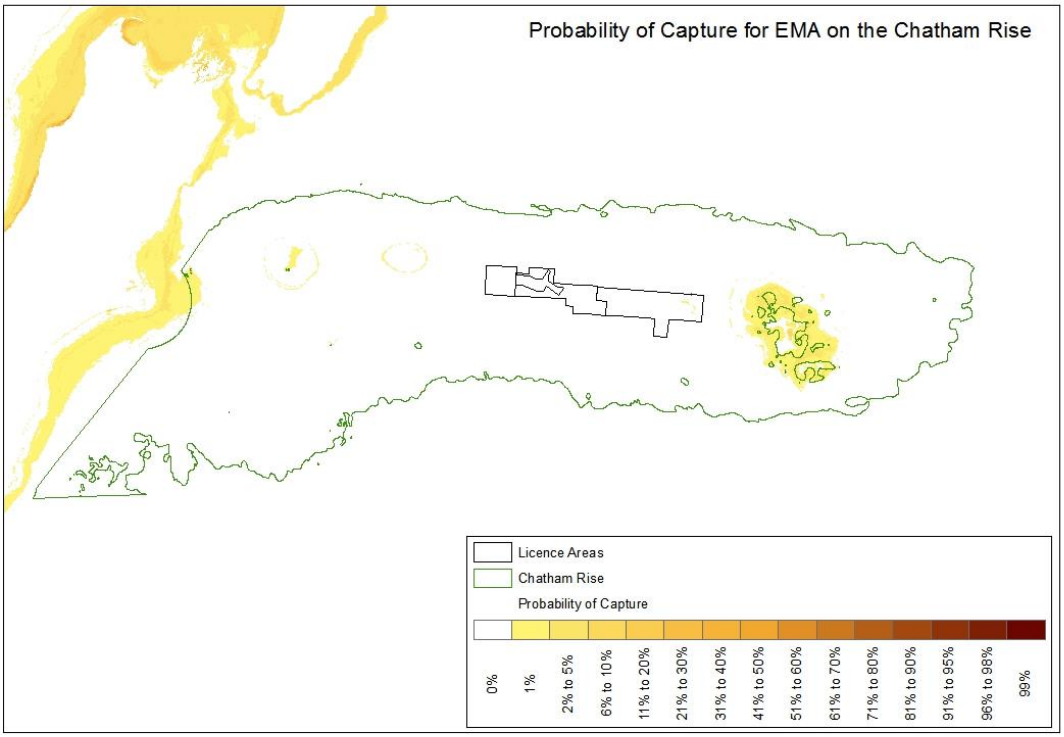

Figure 35: Probability of capture for blue mackerel (Scomber australasicus; EMA) on the Chatham Rise.

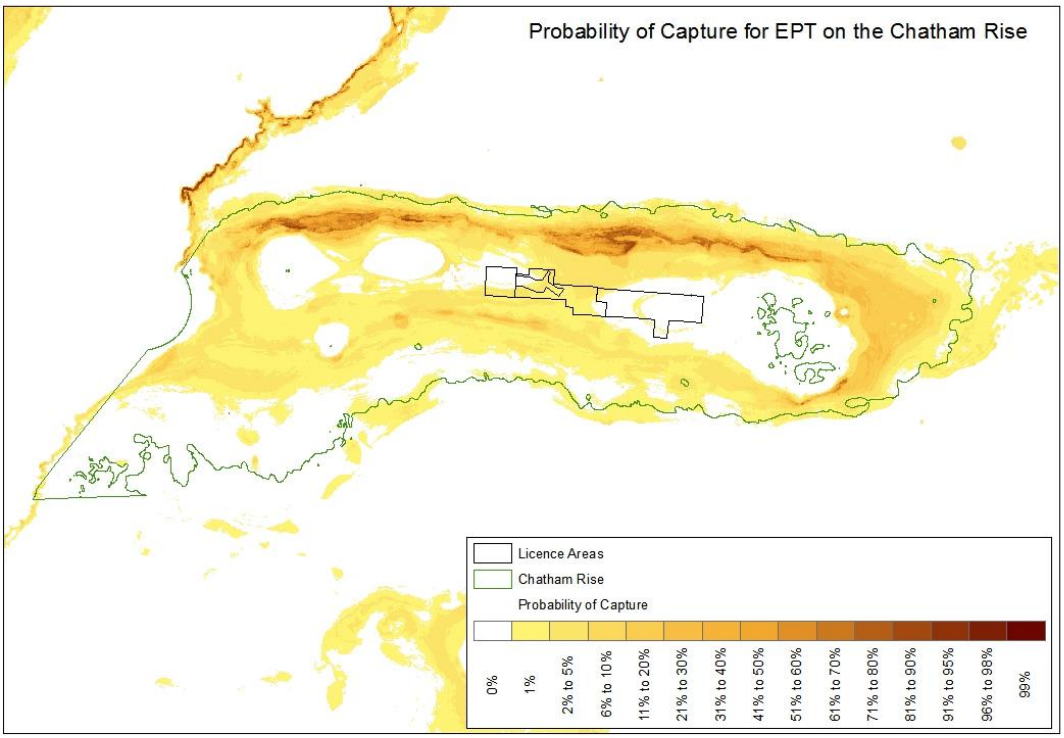

Figure 36: Probability of capture for deepsea cardinalfish (Epigonus telescopus; EPT) on the Chatham Rise.

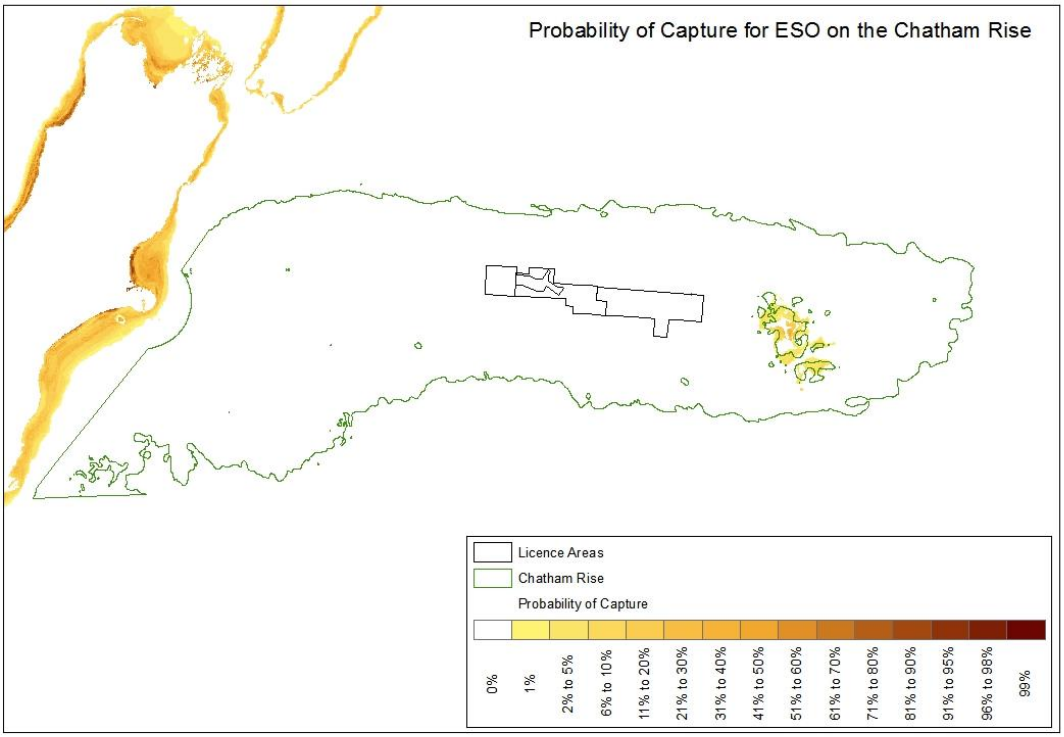

Figure 37: Probability of capture for New Zealand sole (Peltorhamphus novaezelandiae; ESO) on the Chatham Rise.

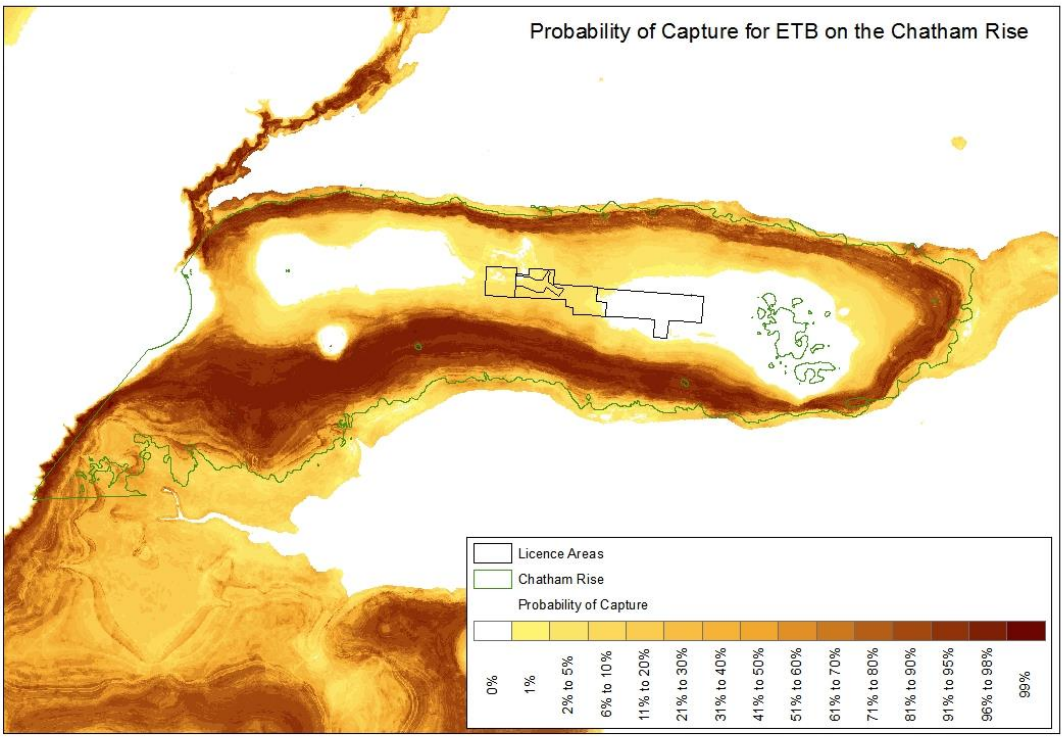

Figure 38: Probability of capture for Baxter's dogfish (Etmopterus baxteri; ETB) on the Chatham Rise.

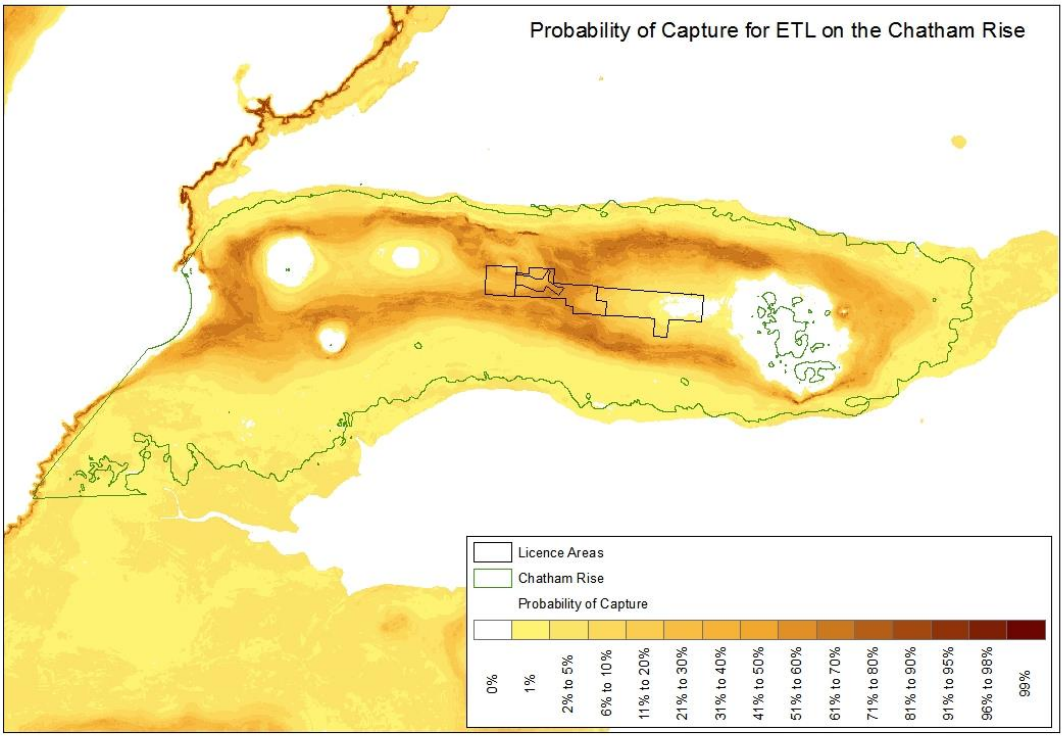

Figure 39: Probability of capture for lucifer dogfish (Etmopterus Lucifer; ETL) on the Chatham Rise.

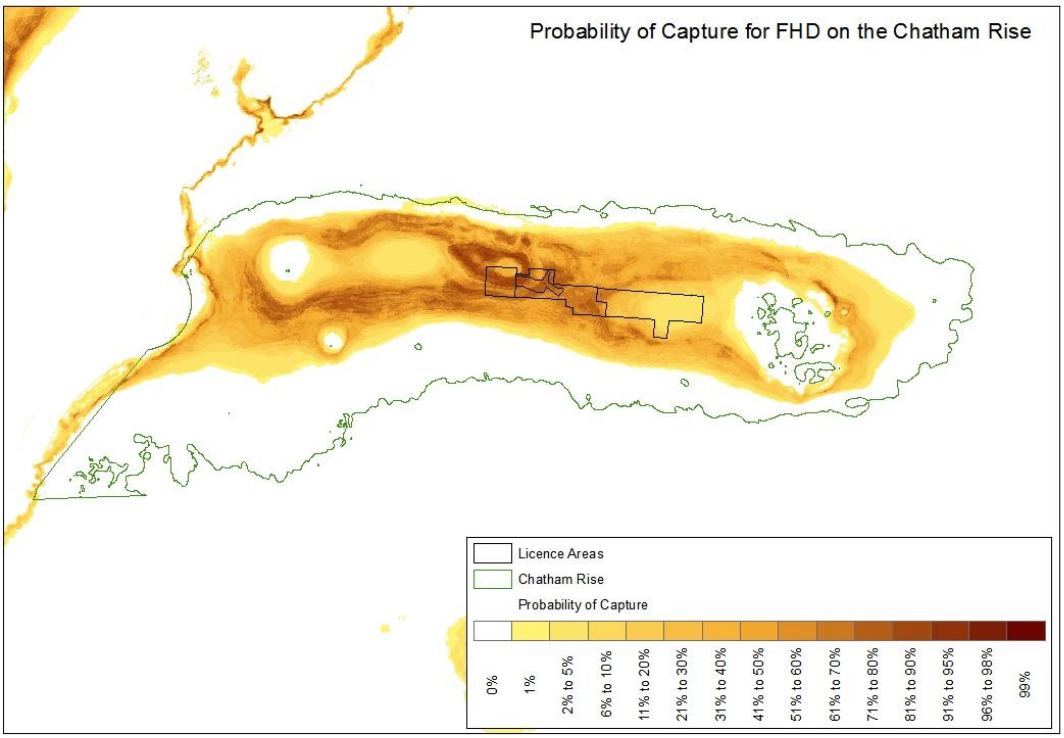

Figure 40: Probability of capture for deepsea flathead (Hoplichthys haswelli; FHD) on the Chatham Rise.

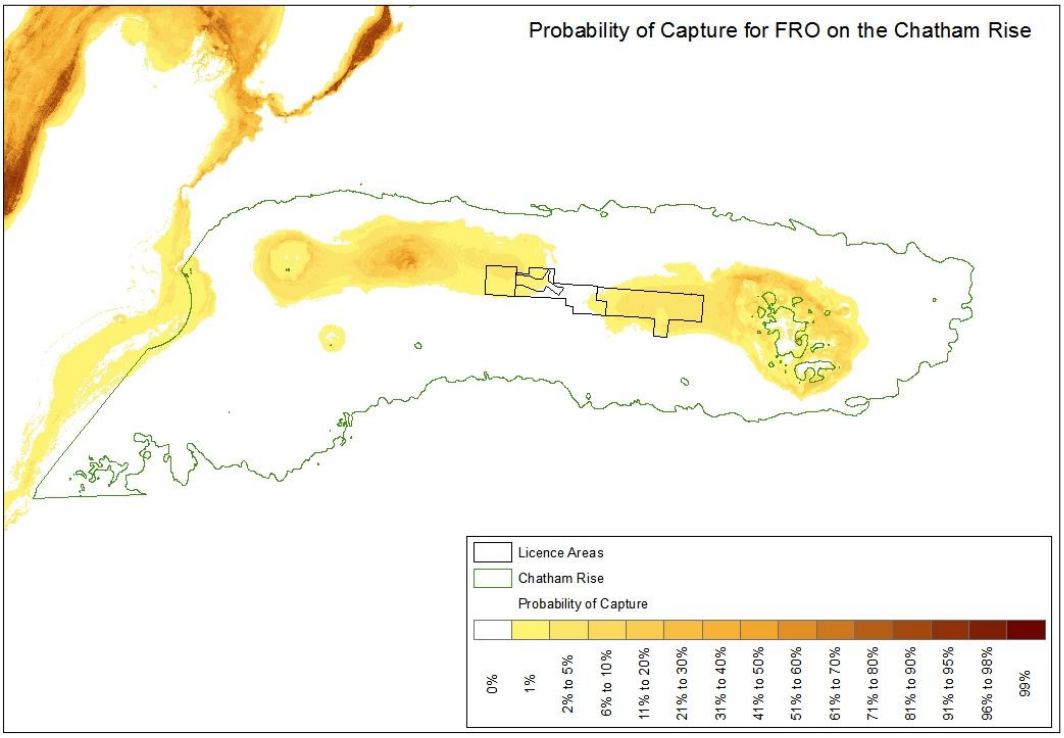

Figure 41: Probability of capture for frostfish (Lepidopus caudatus; FRO) on the Chatham Rise.

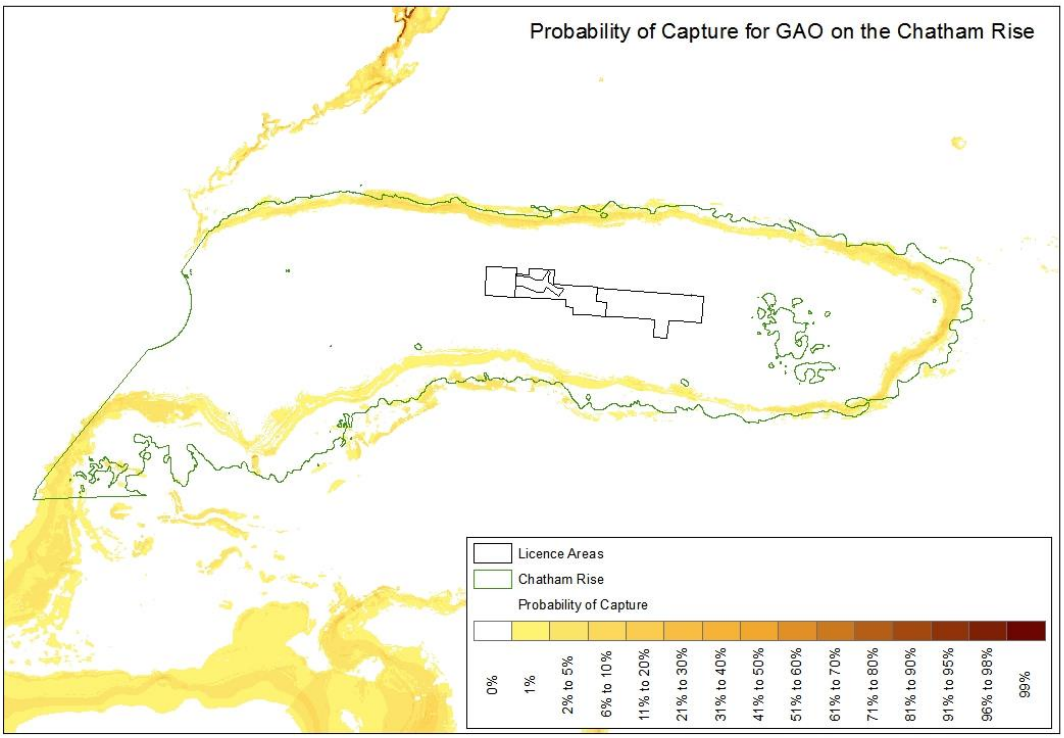

Figure 42: Probability of capture for filamentous rattail (Gadomus aoteanus; GAO) on the Chatham Rise.

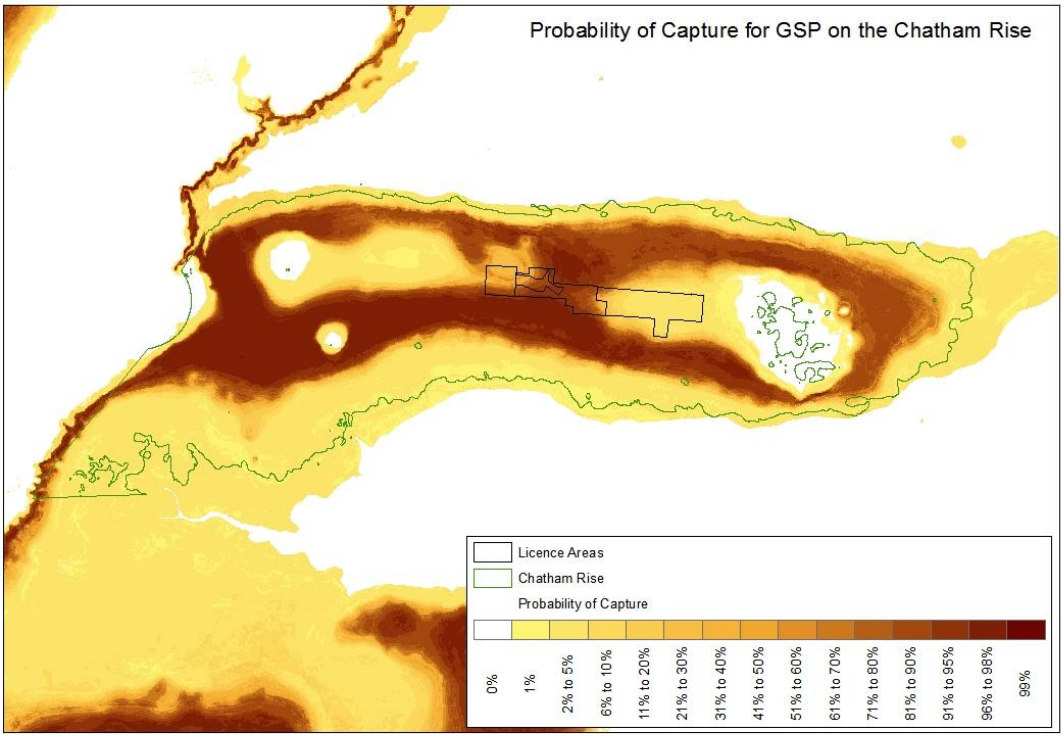

Figure 43: Probability of capture for pale ghost shark (Hydrolagus bemisi; GSP) on the Chatham Rise.

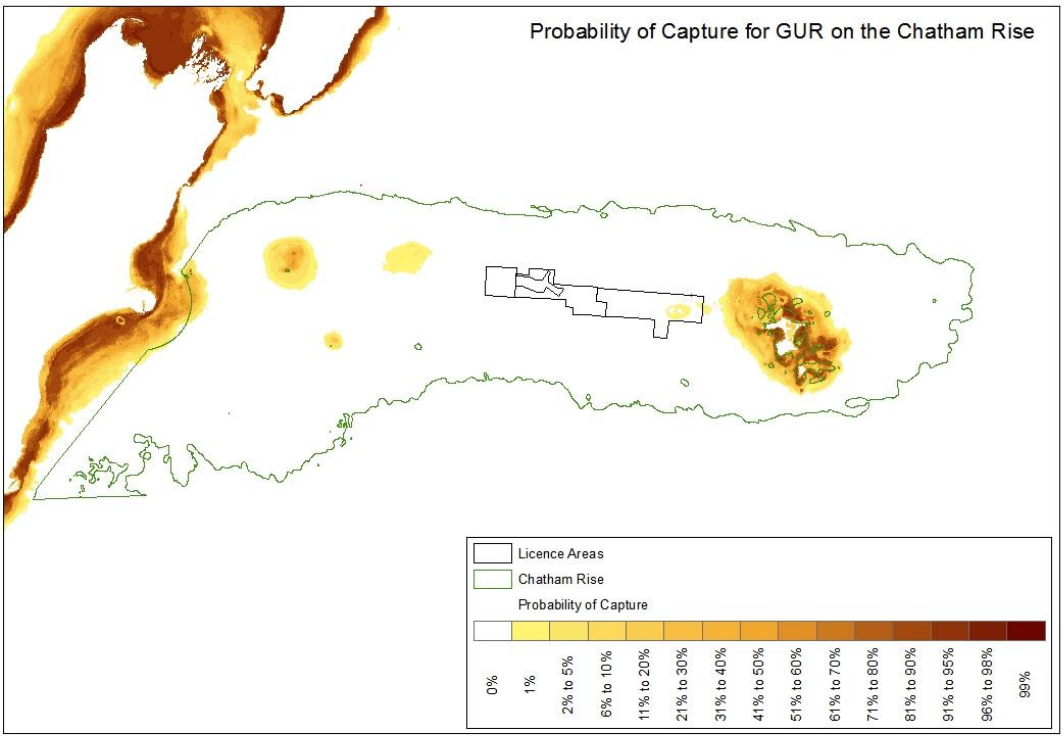

Figure 44: Probability of capture for red gurnard (Chelidonichthys kumu; GUR) on the Chatham Rise.

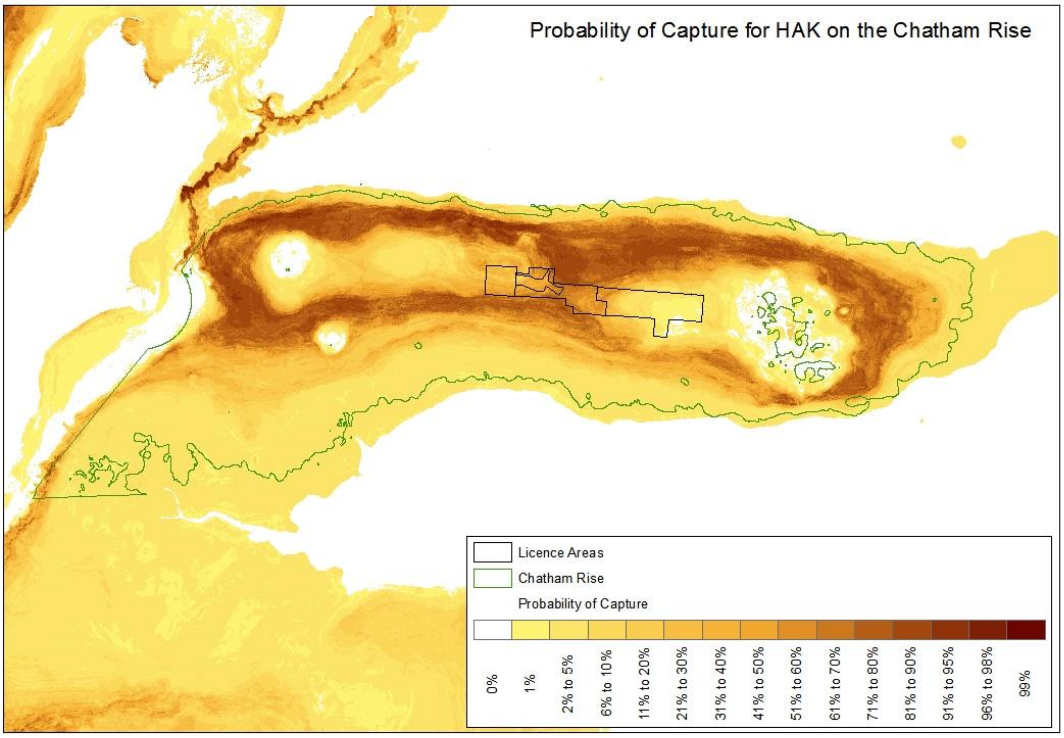

Figure 45: Probability of capture for hake (Merluccius australis; HAK) on the Chatham Rise.

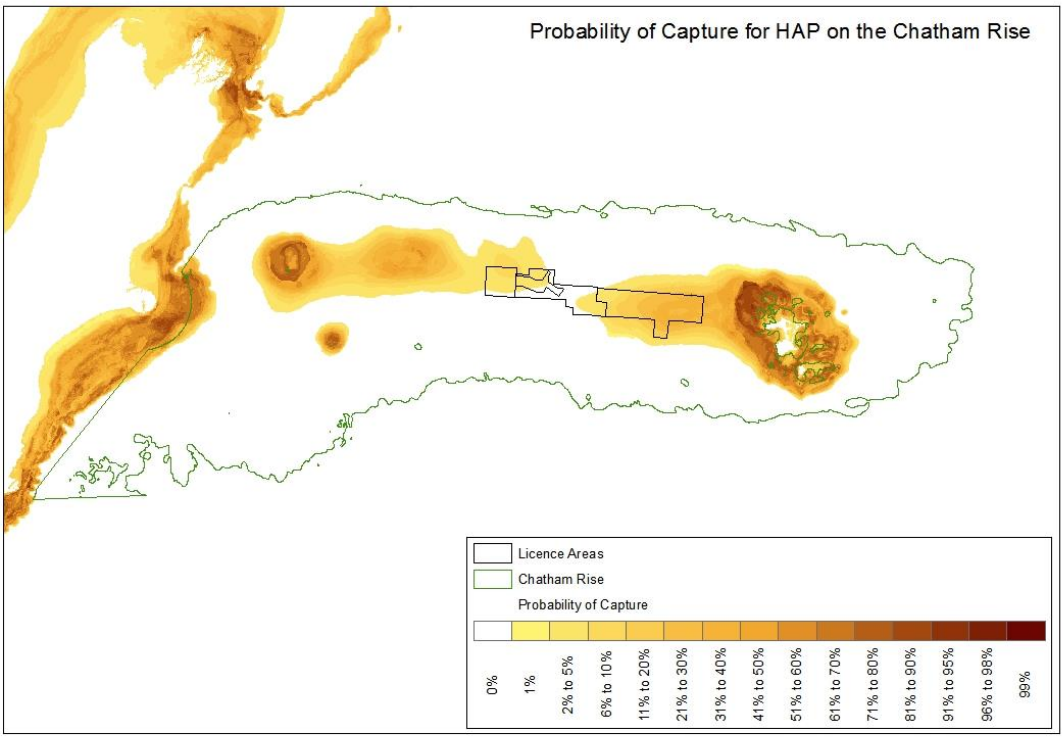

Figure 46: Probability of capture for hapuku (Polyprion oxygeneios; HAP) on the Chatham Rise.

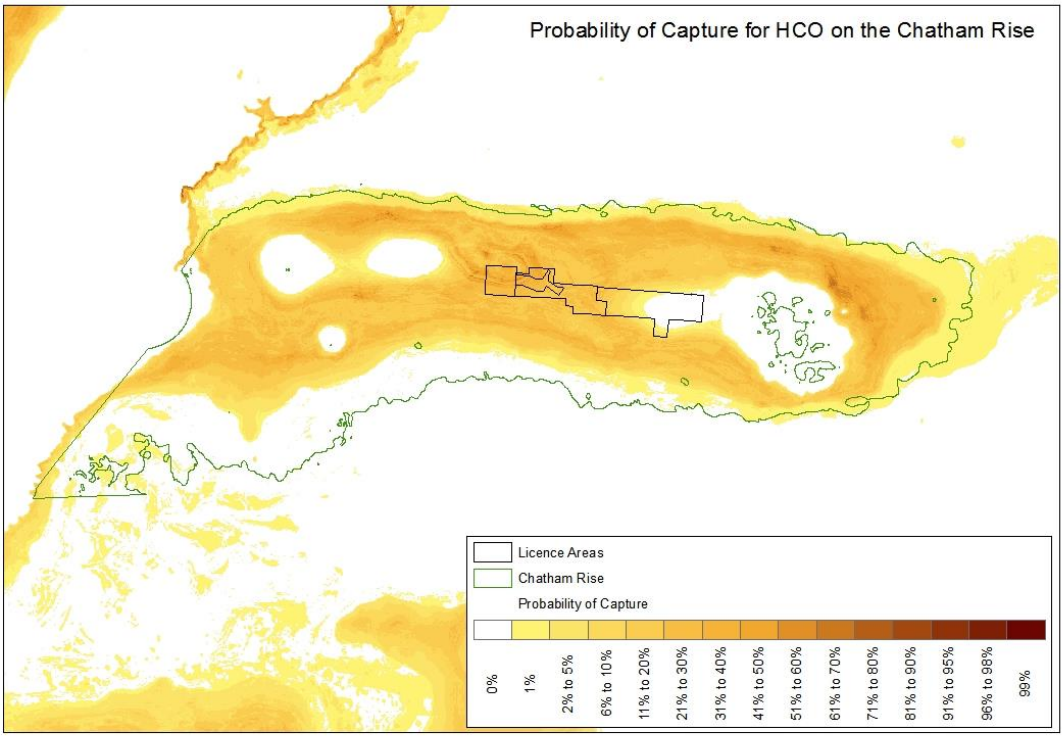

Figure 47: Probability of capture for hairy conger (Bassanago hirsutus; HCO) on the Chatham Rise.

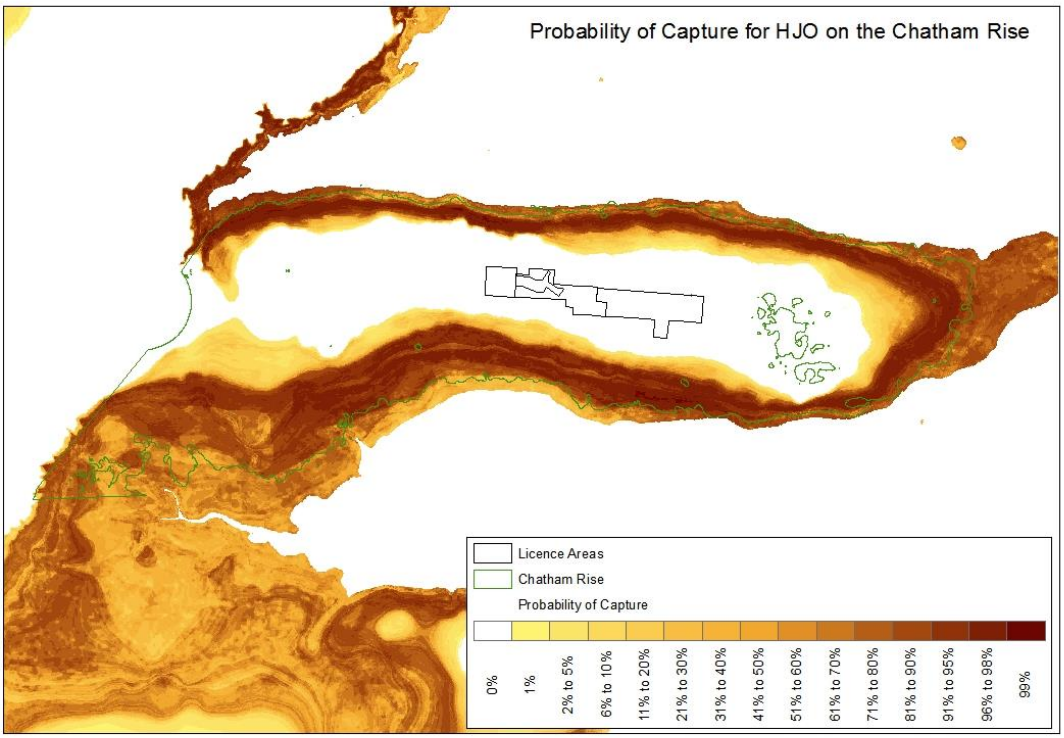

Figure 48: Probability of capture for Johnson's cod (Halargyreus johnsonii; HJO) on the Chatham Rise.

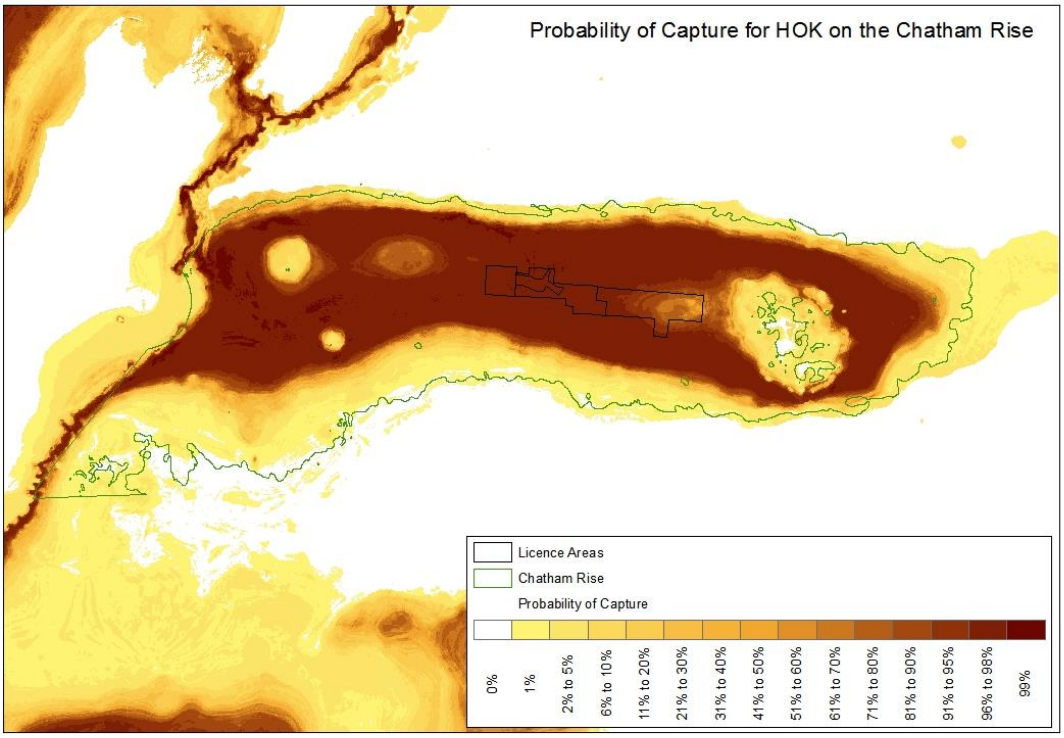

Figure 49: Probability of capture for hoki (Macruronus novaezelandiae; HOK) on the Chatham Rise.

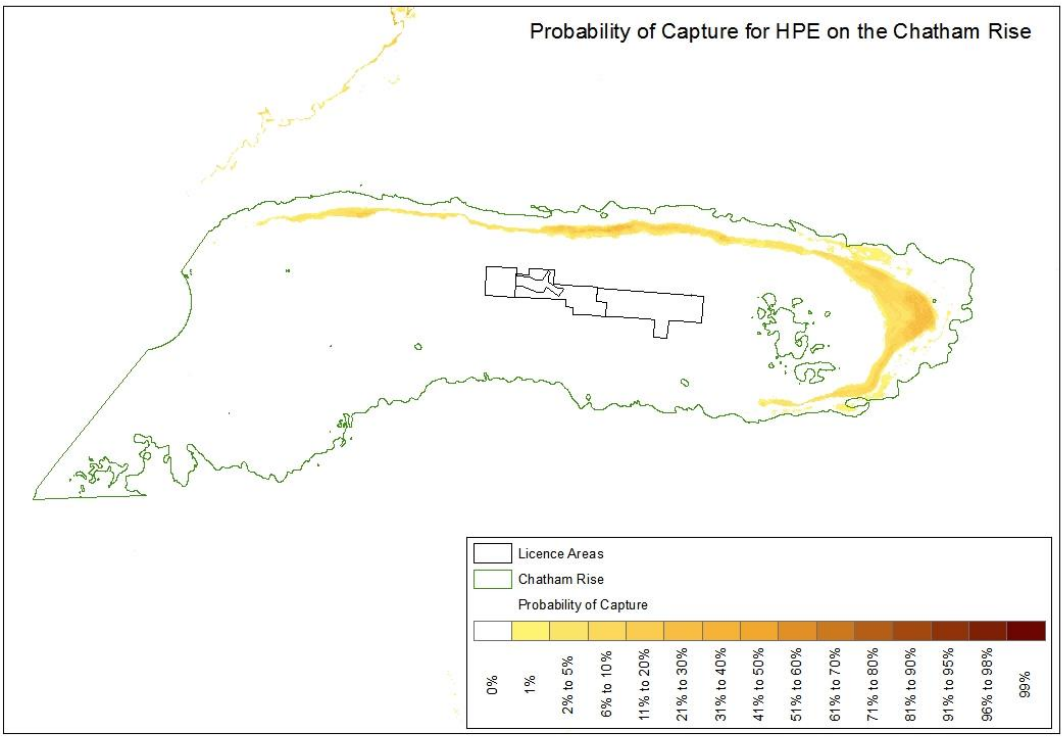

Figure 50: Probability of capture for common halosaur (Halosaurus pectoralis; HPE) on the Chatham Rise.

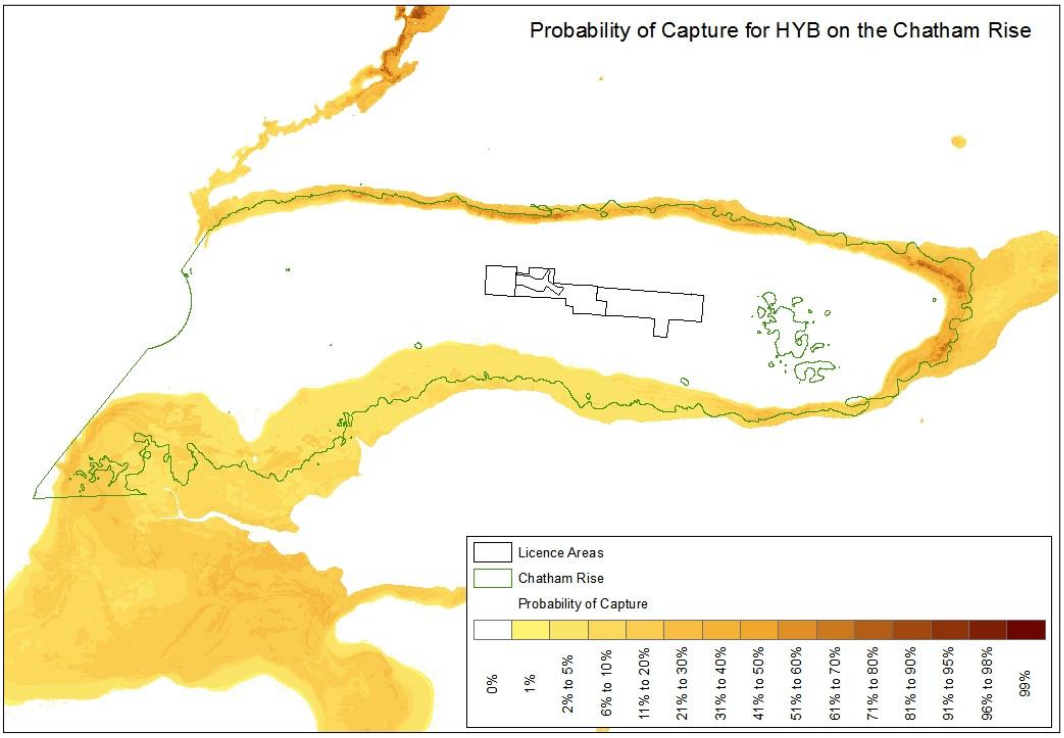

Figure 51: Probability of capture for black ghost shark (Hydrolagus homonycteris; HYB) on the Chatham Rise.

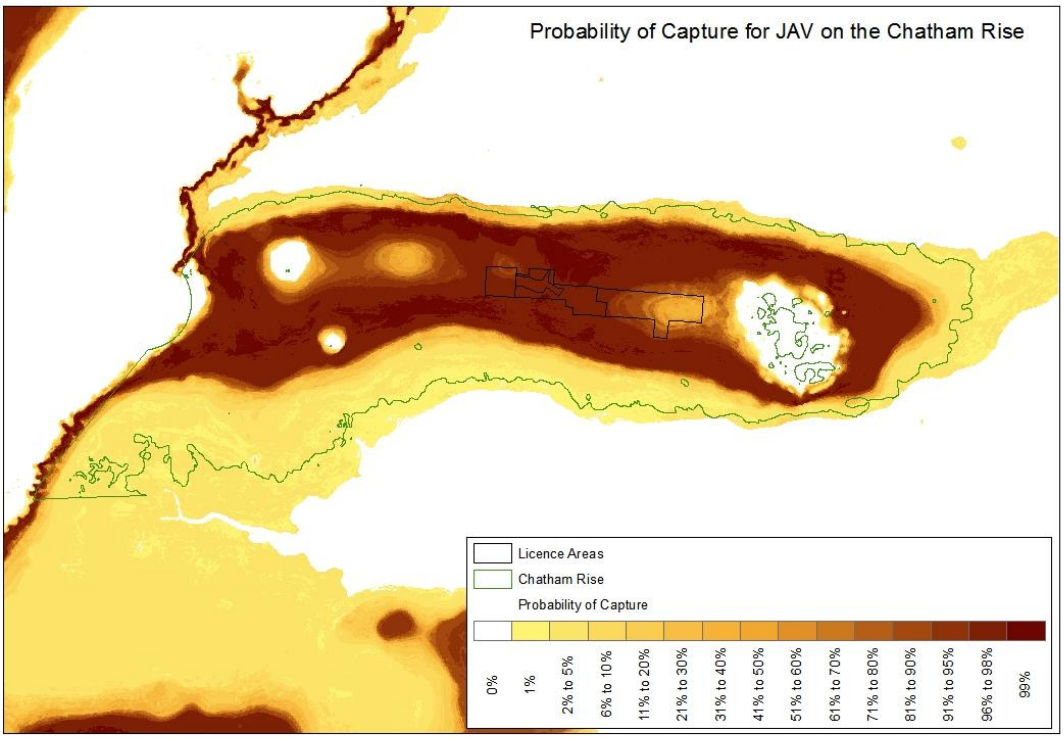

Figure 52: Probability of capture for javelin fish (Lepidorhynchus denticulatus; JAV) on the Chatham Rise.

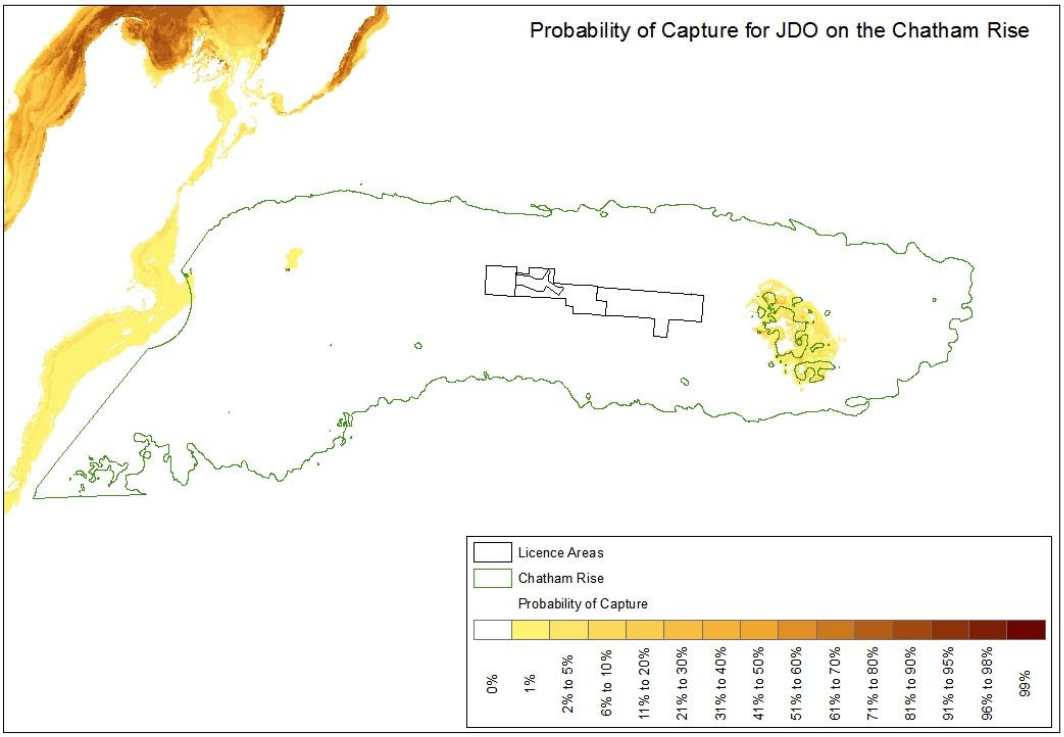

Figure 53: Probability of capture for John dory (Zeus faber; JDO) on the Chatham Rise.

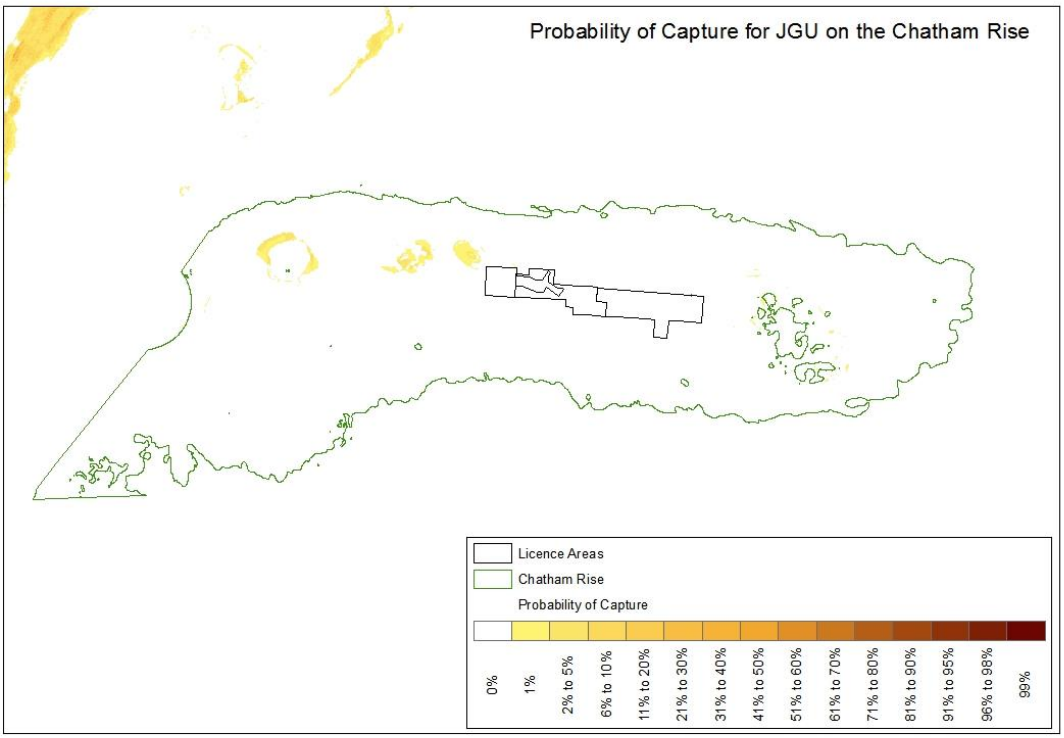

Figure 54: Probability of capture for Japanese (spotted) gurnard (Pterygotrigla picta; JGU) on the Chatham Rise.

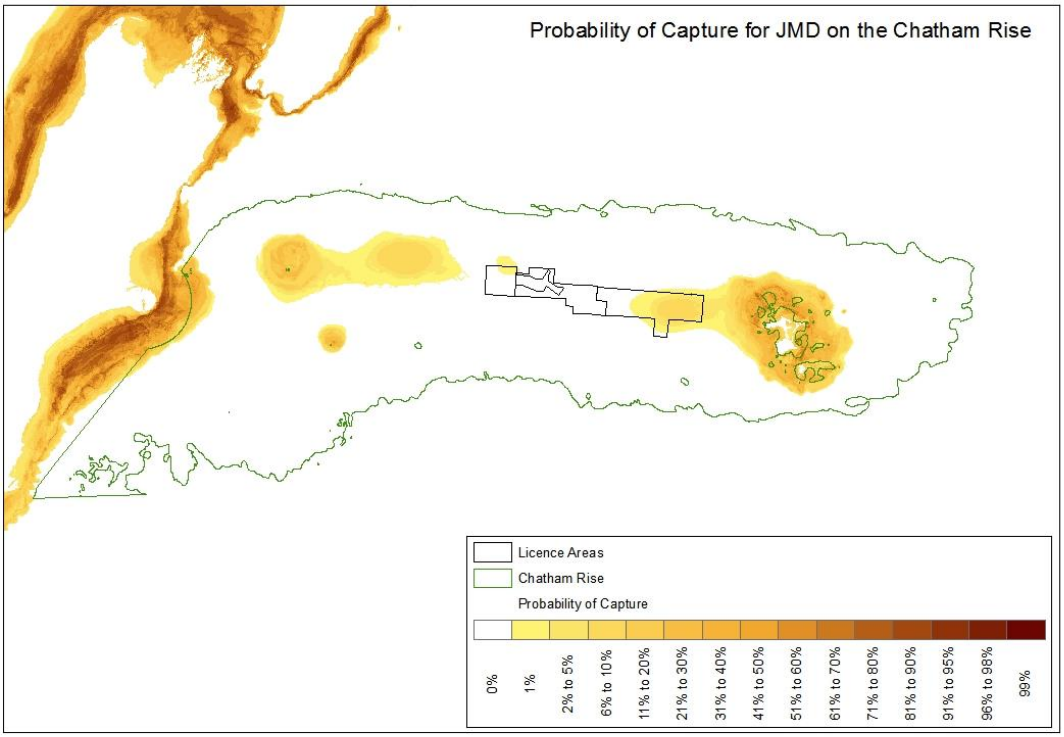

Figure 55: Probability of capture for greenback jack mackerel (Trachurus declivis; JMD) on the Chatham Rise.

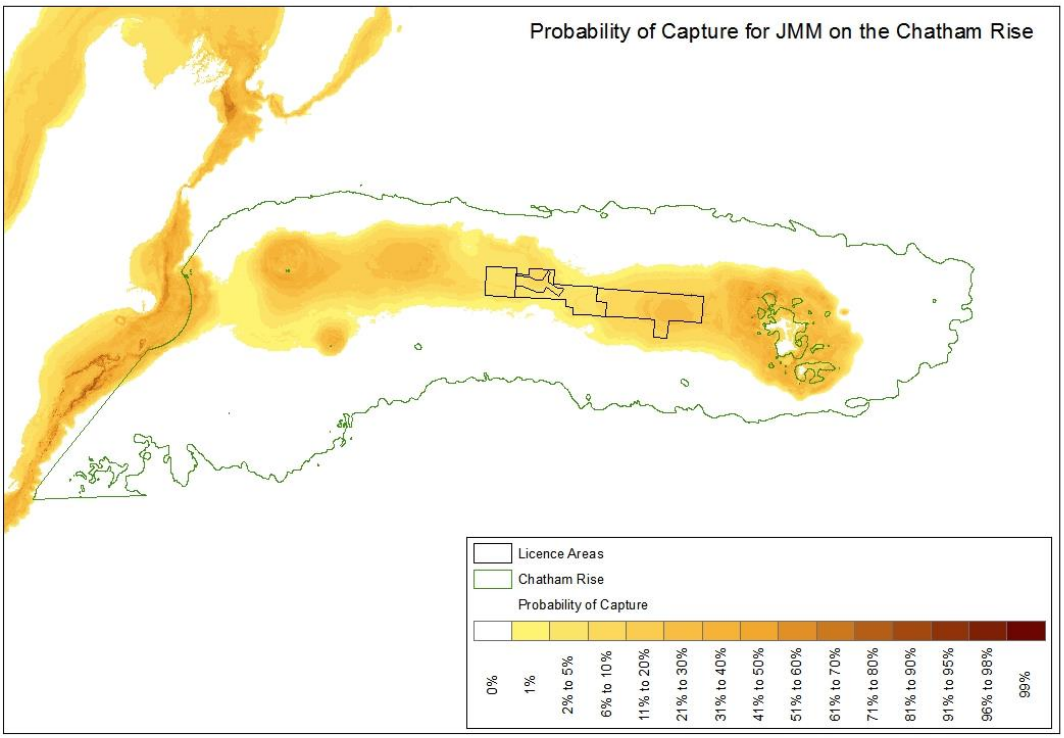

Figure 56: Probability of capture for Murphy's (slender) mackerel (Trachurus murphyi; JMM) on the Chatham Rise.

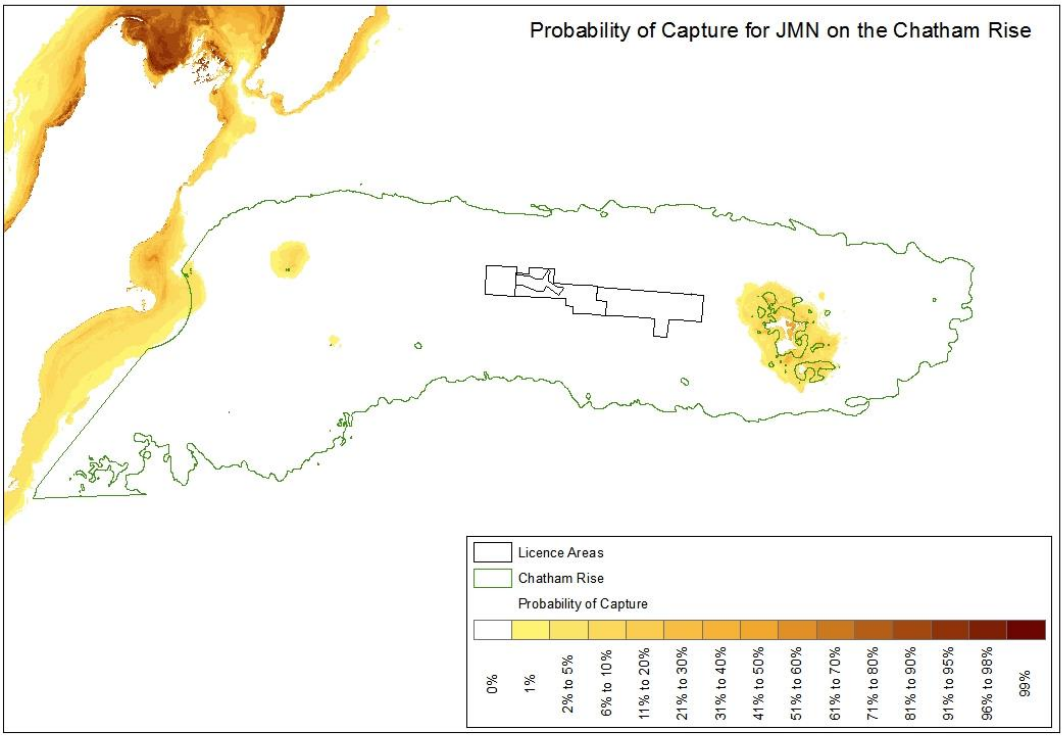

Figure 57: Probability of capture for golden mackerel (Trachurus novaezelandiae; JMN) on the Chatham Rise.

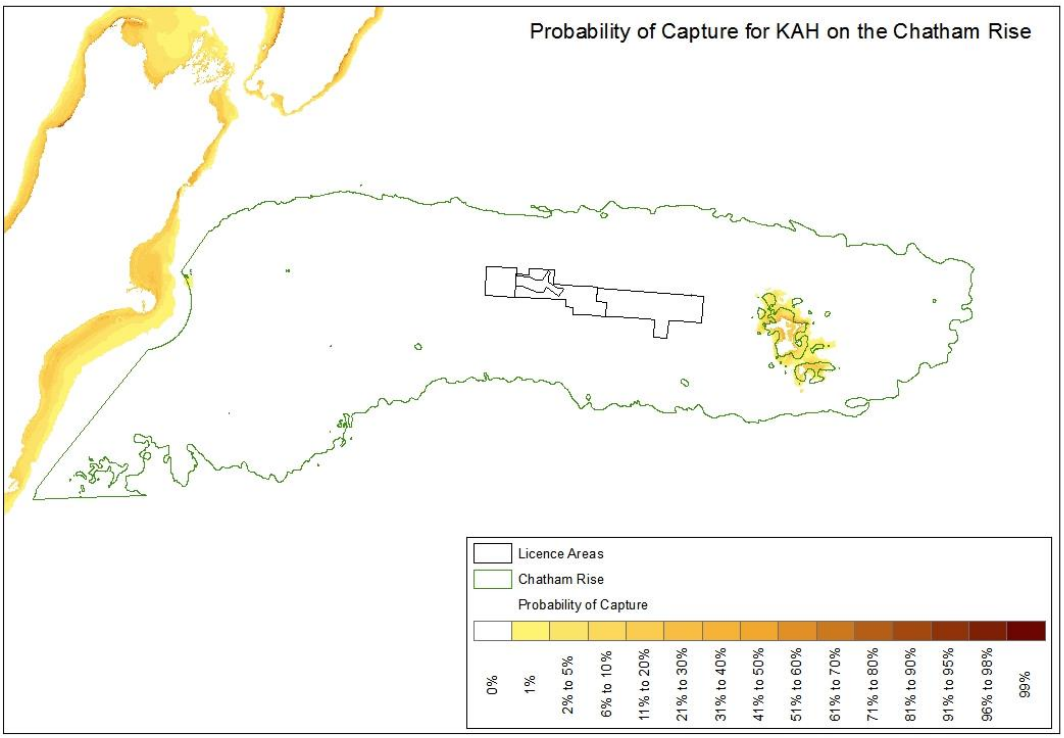

Figure 58: Probability of capture for kahawai (Arripis trutta; KAH) on the Chatham Rise.

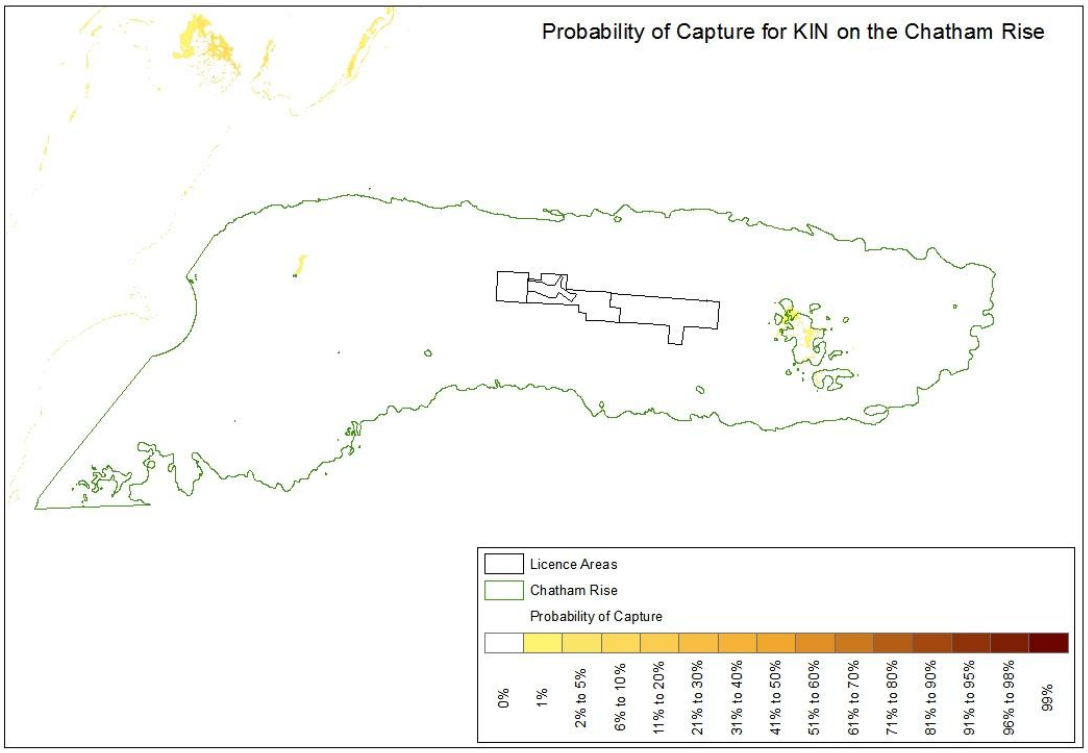

Figure 59: Probability of capture for kingfish (Seriola lalandi; KIN) on the Chatham Rise.

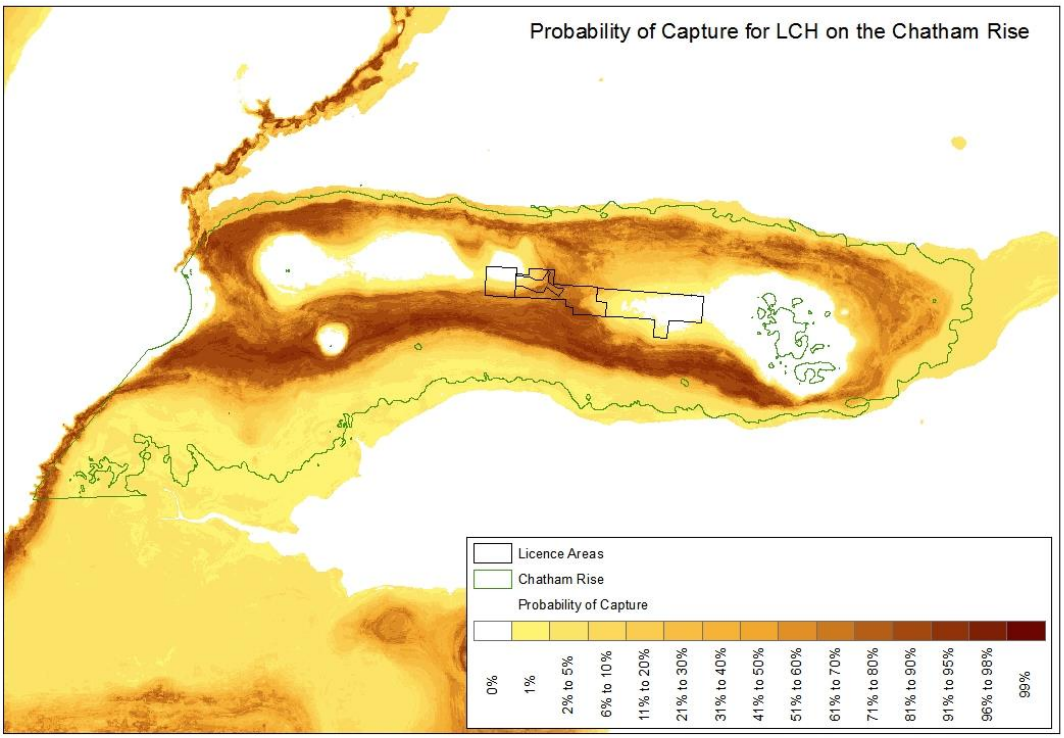

Figure 60: Probability of capture for long-nosed chimaera (Harriotta raleighana; LCH) on the Chatham Rise.

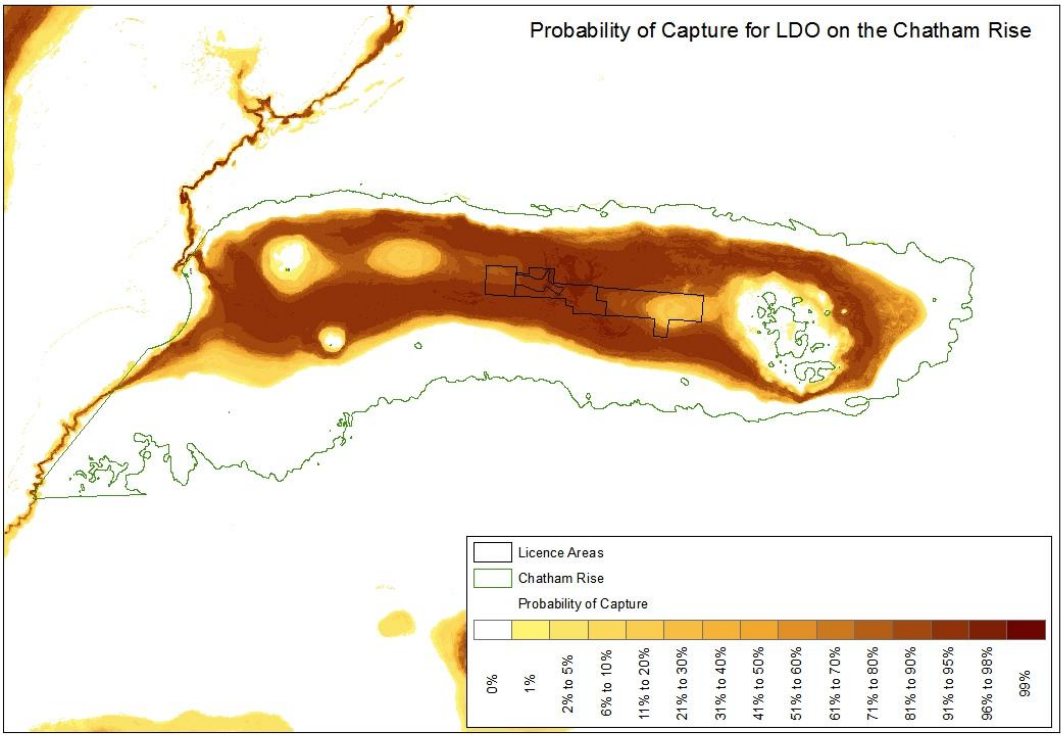

Figure 61: Probability of capture for lookdown dory (Cyttus traverse; LDO) on the Chatham Rise.

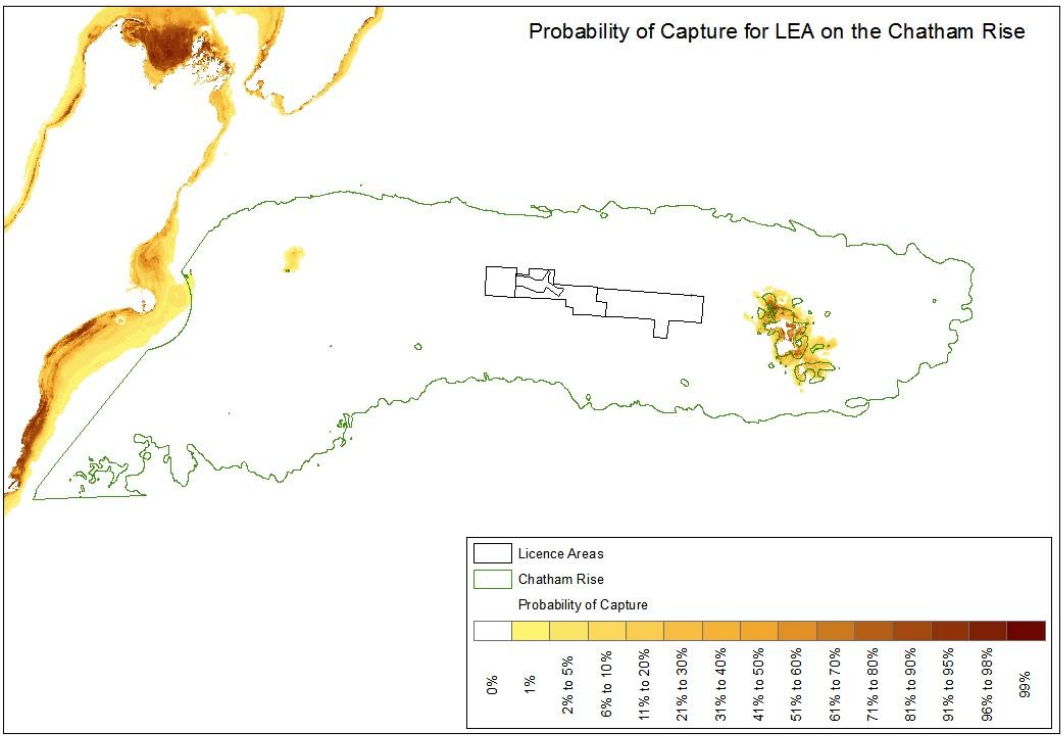

Figure 62: Probability of capture for leatherjacket (Parika scaber; LEA) on the Chatham Rise.

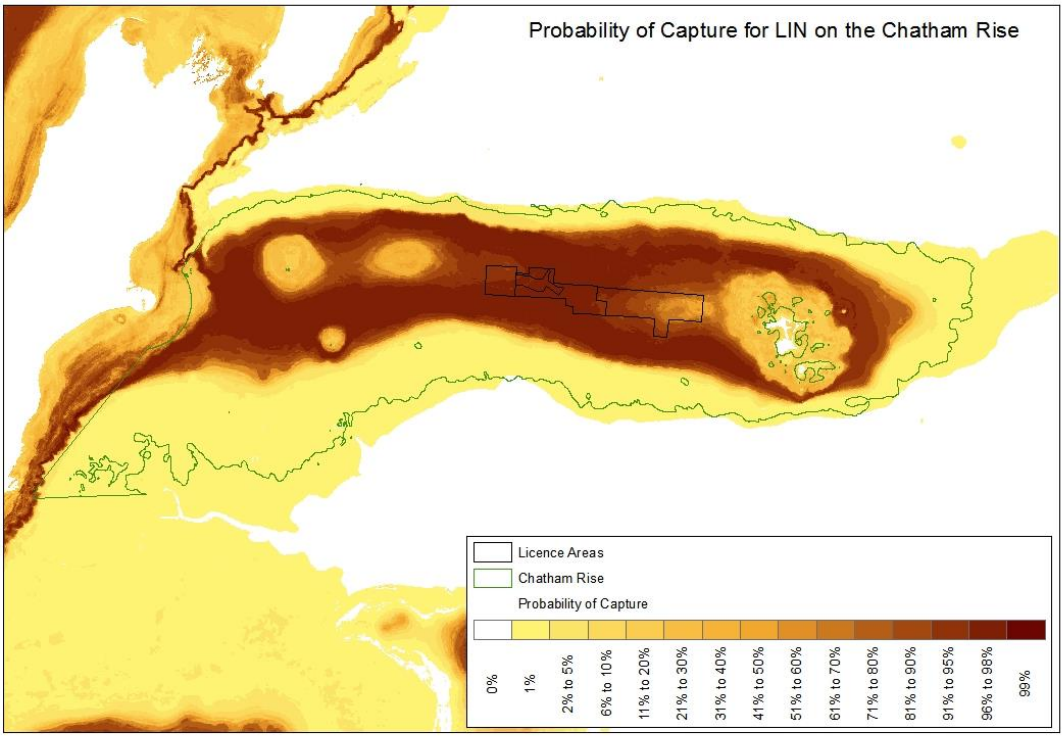

Figure 63: Probability of capture for ling (Genypterus blacodes; LIN) on the Chatham Rise.

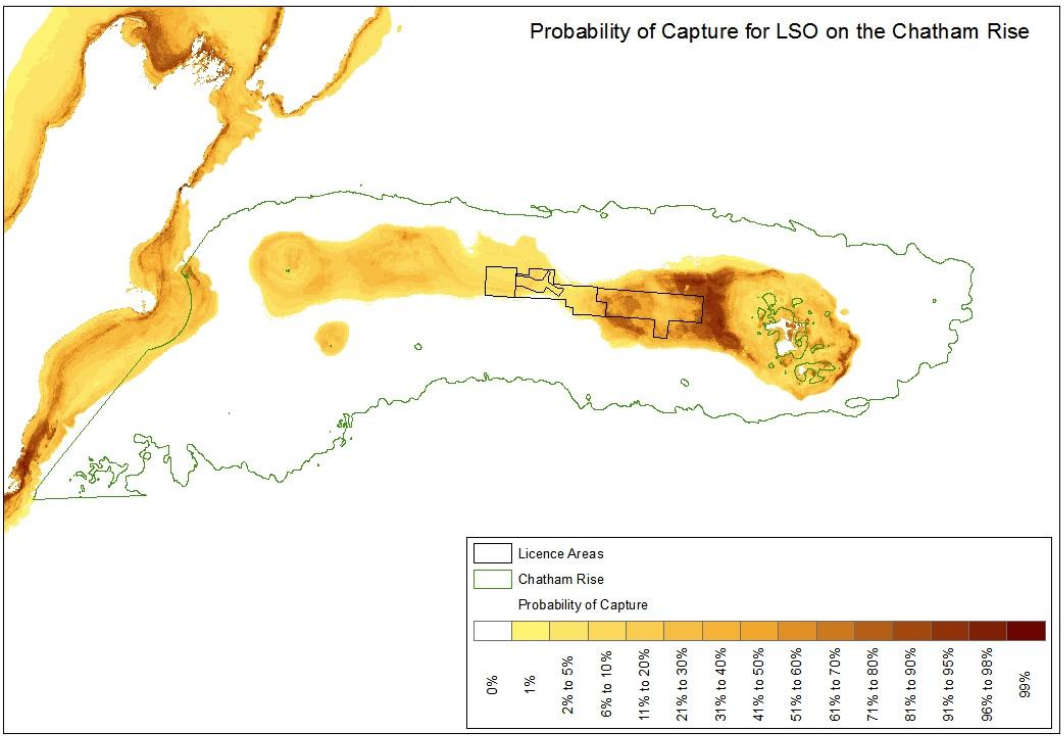

Figure 64: Probability of capture for lemon sole (Pelotretis flavilatus; LSO) on the Chatham Rise.

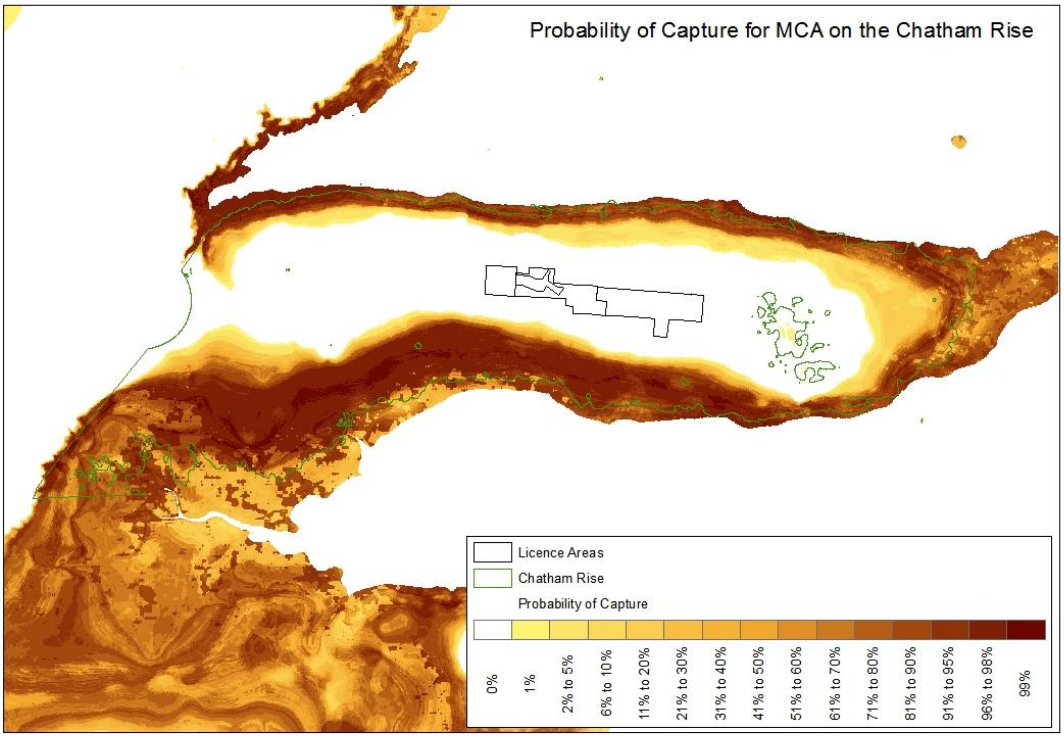

Figure 65: Probability of capture for ridge scaled rattail (Macrourus carinatus; MCA) on the Chatham Rise.

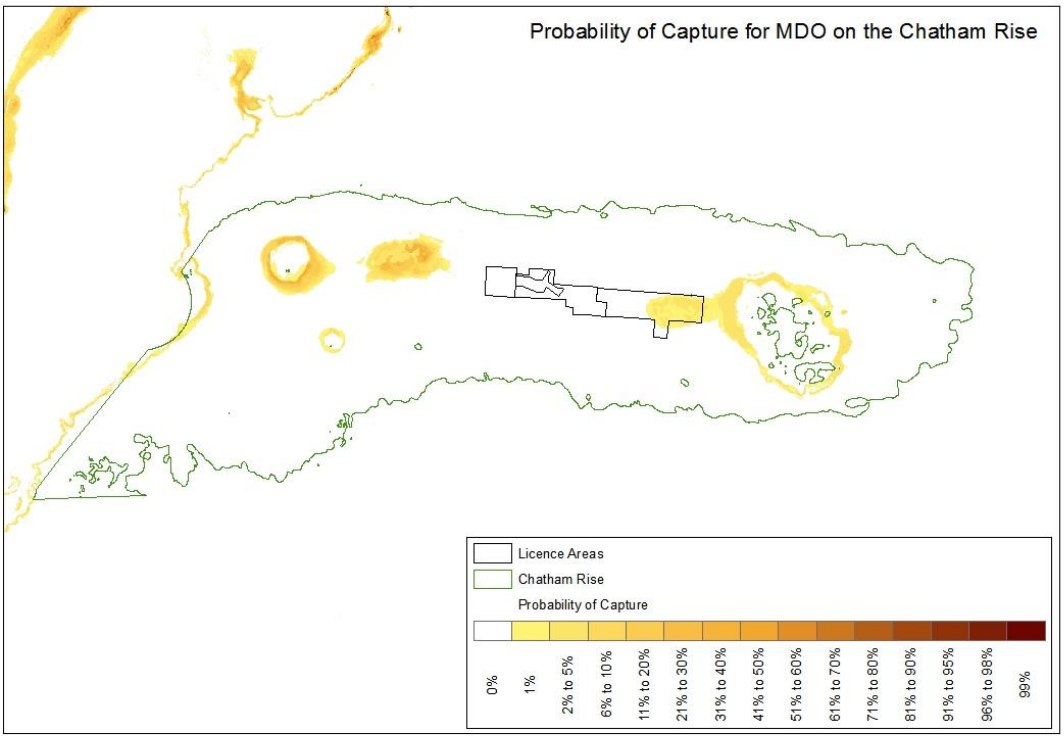

Figure 66: Probability of capture for mirror dory (Zenopsis nebulosus; MDO) on the Chatham Rise.

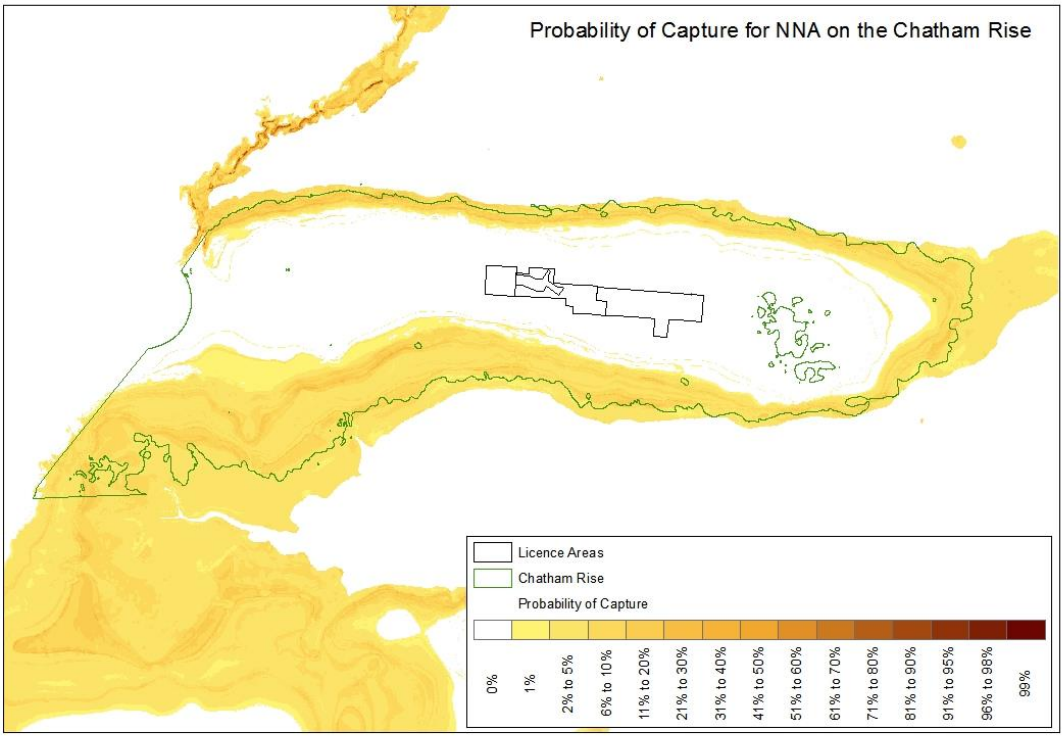

Figure 67: Probability of capture for squashed face rattail (Nezumia namatahi; NNA) on the Chatham Rise.

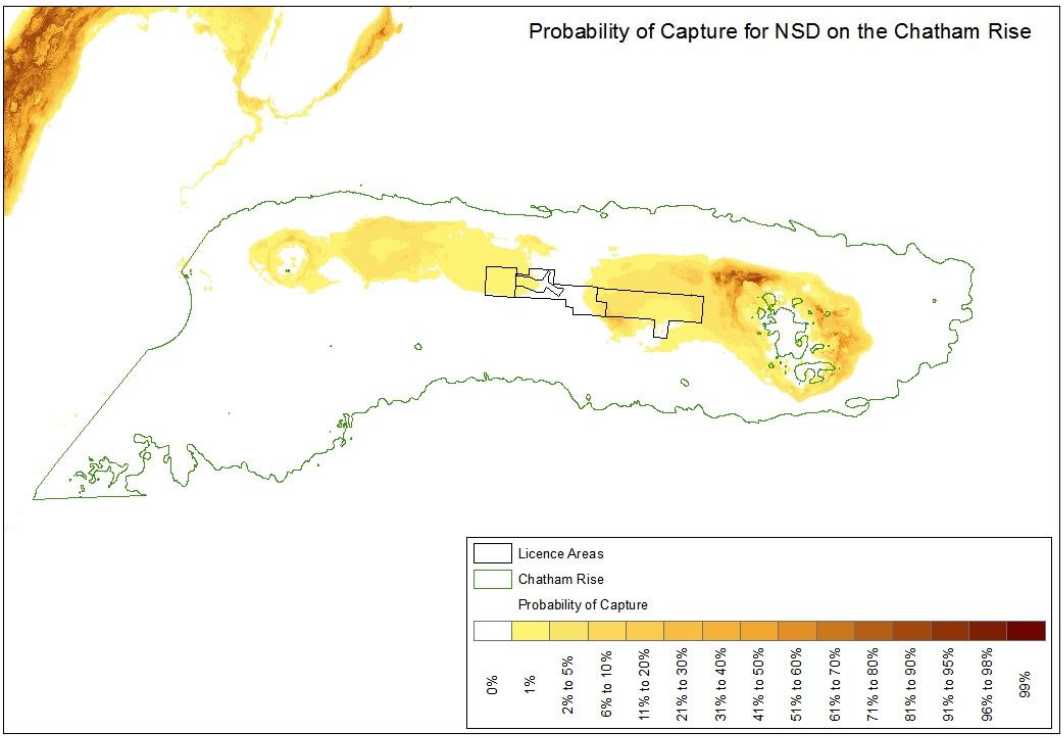

Figure 68: Probability of capture for northern spiny dogfish (Squalus mitsukurii; NSD) on the Chatham Rise.

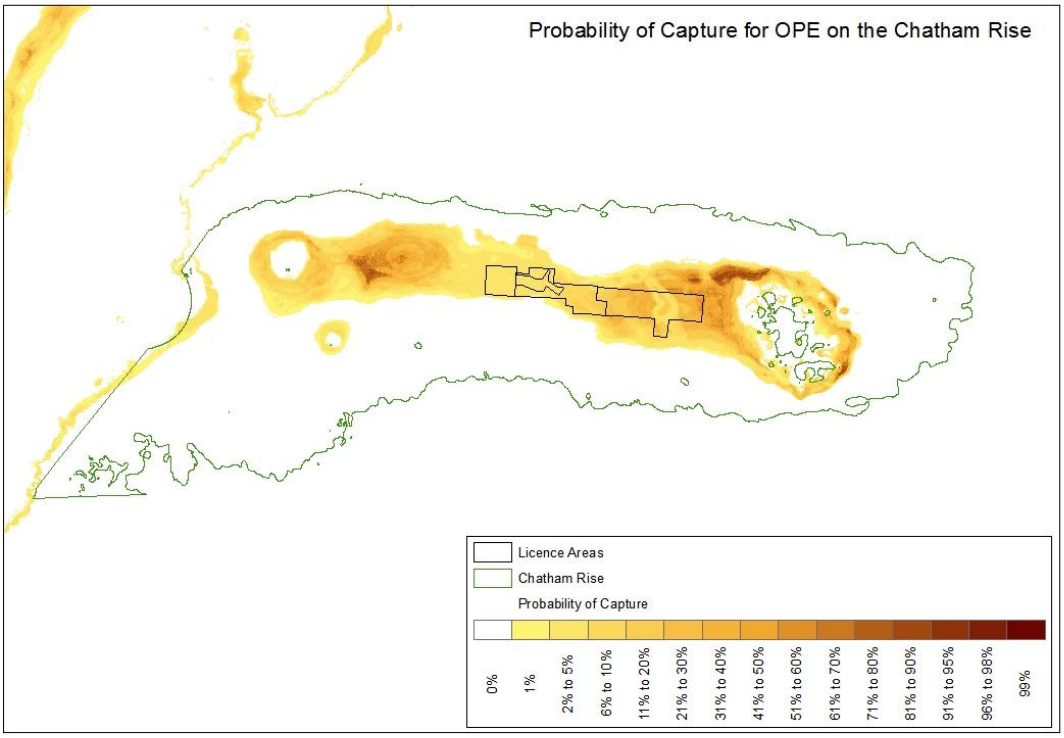

Figure 69: Probability of capture for orange perch (Lepidoperca aurantia; OPE) on the Chatham Rise.

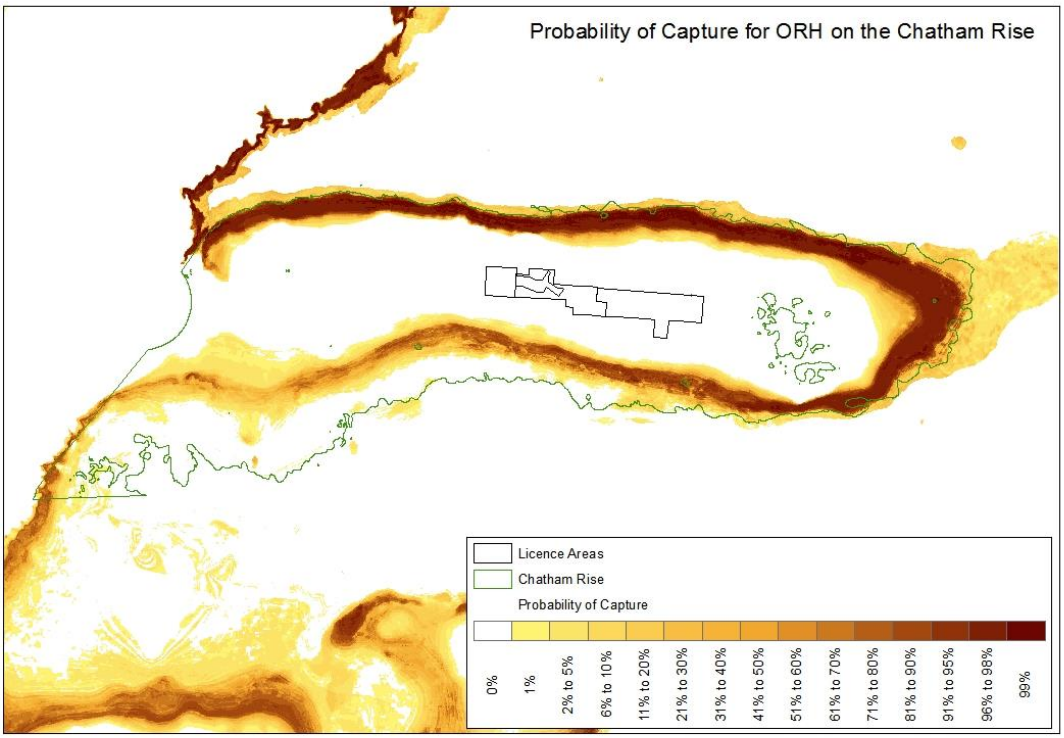

Figure 70: Probability of capture for orange roughy (Hoplostethus atlanticus; ORH) on the Chatham Rise.

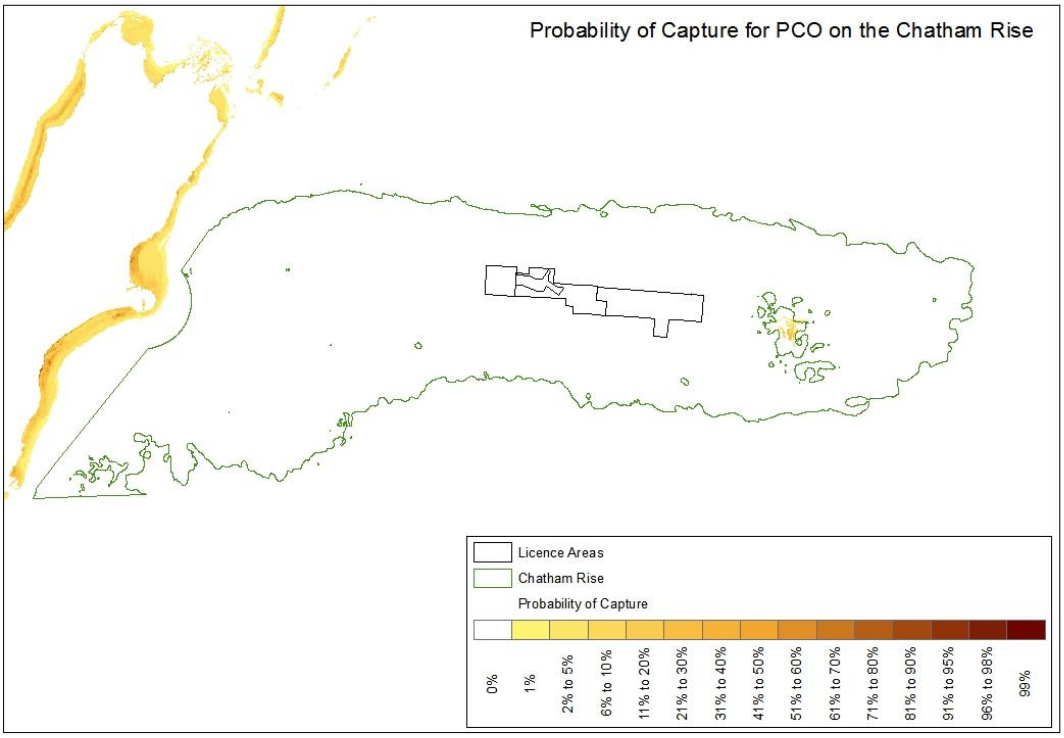

Figure 71: Probability of capture for ahuru (Auchenoceros punctatus; PCO) on the Chatham Rise.

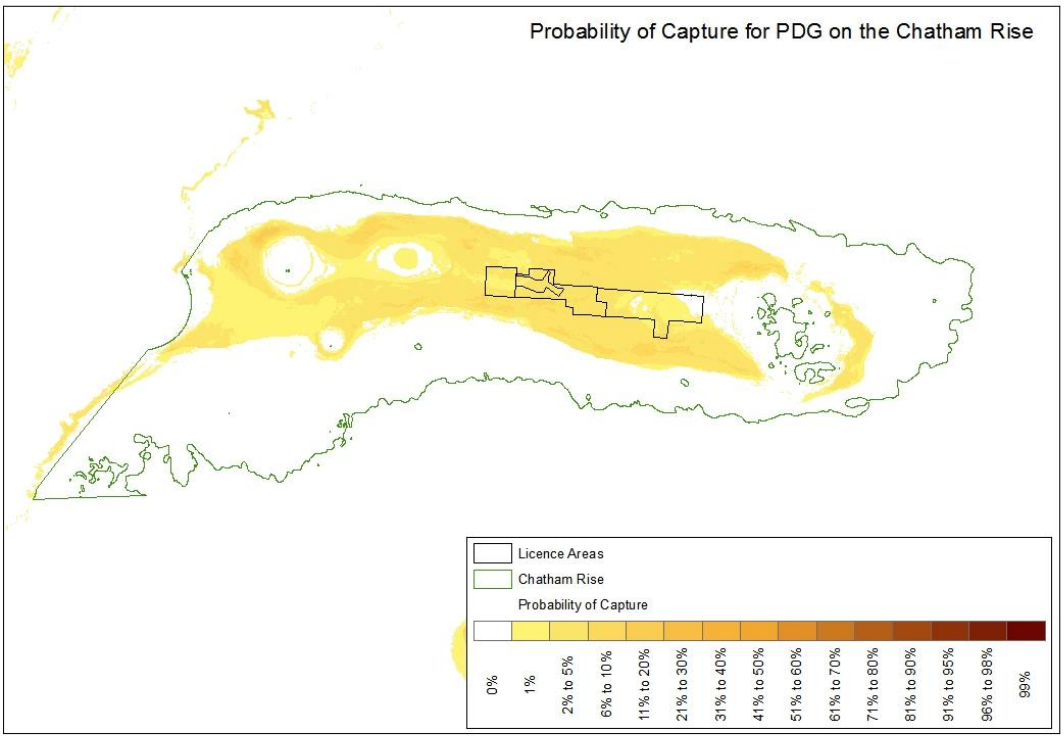

Figure 72: Probability of capture for prickly dogfish (Oxynotus bruniensis; PDG) on the Chatham Rise.

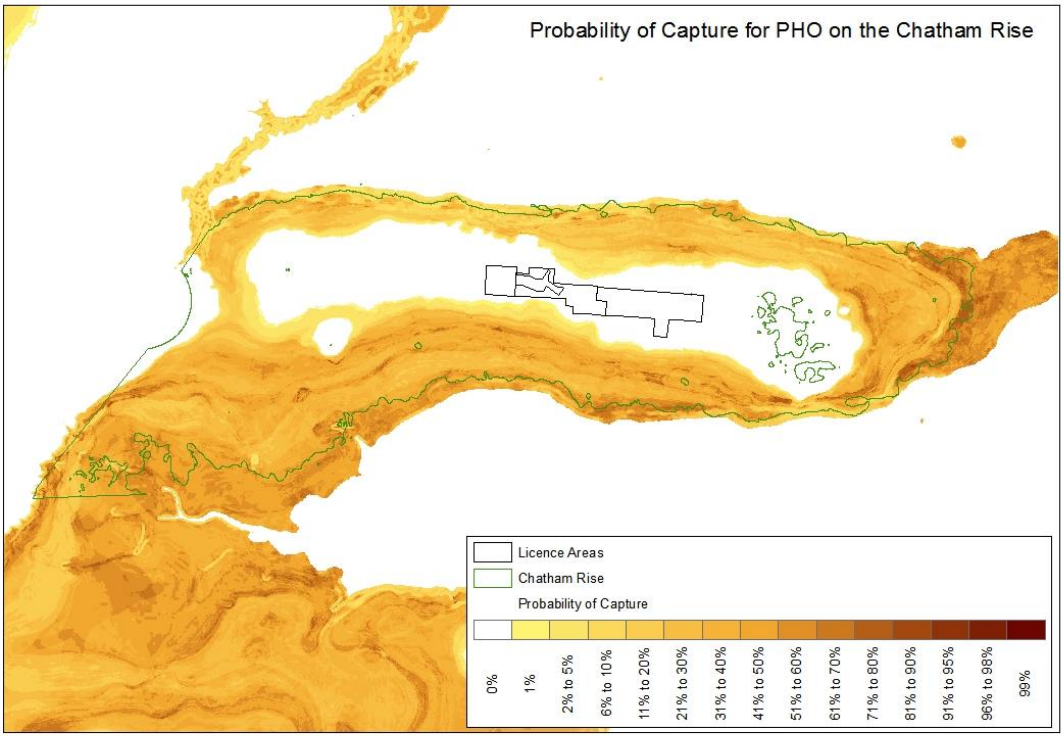

Figure 73: Probability of capture for lighthouse fish (Photichthys argenteus; PHO) on the Chatham Rise.

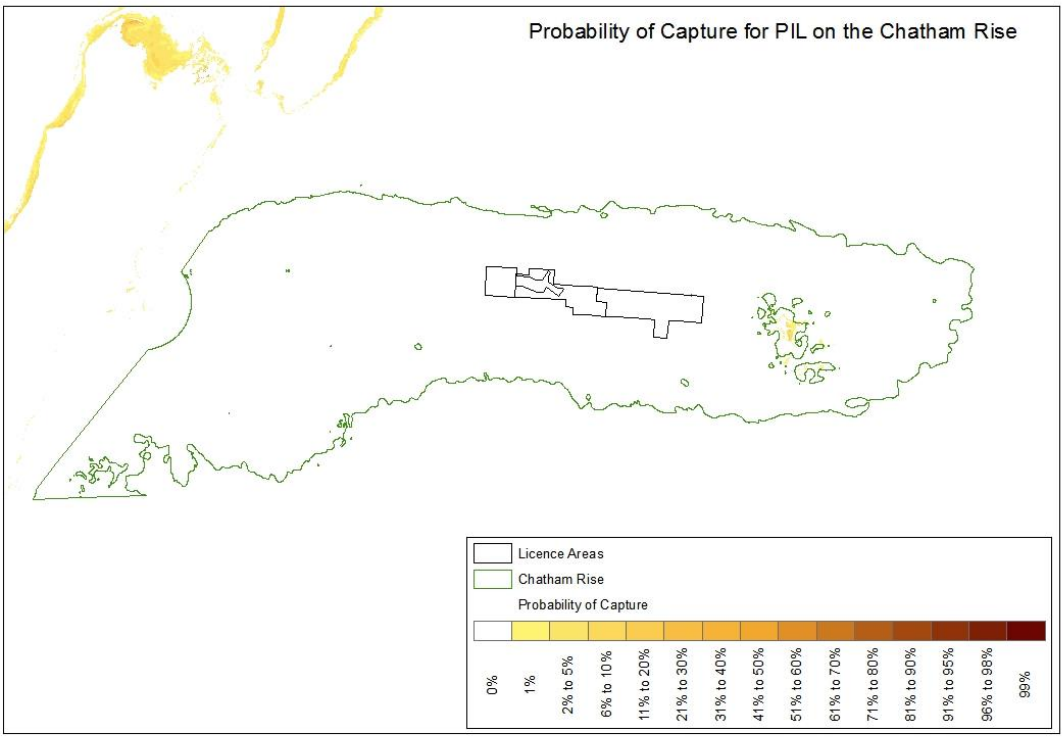

Figure 74: Probability of capture for pilchard (Sardinops neopilchardus; PIL) on the Chatham Rise.

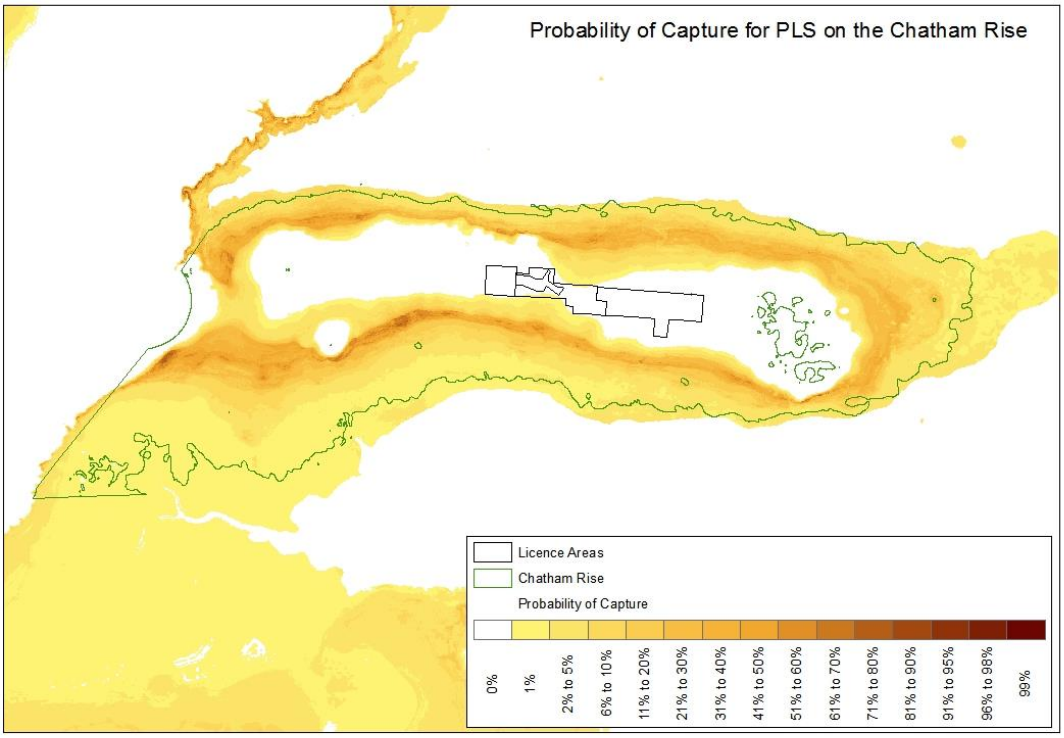

Figure 75: Probability of capture for Plunket's shark (Proscymnodon plunketi; PSL) on the Chatham Rise.

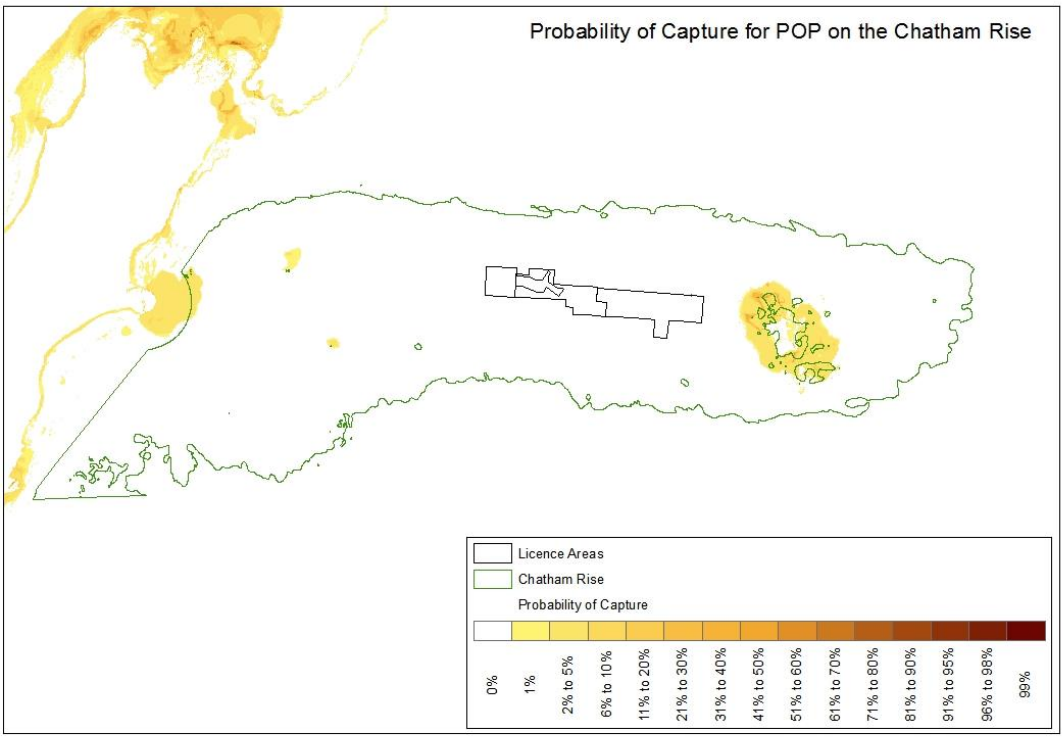

Figure 76: Probability of capture for porcupine fish (Allomycterus jaculiferus; POP) on the Chatham Rise.

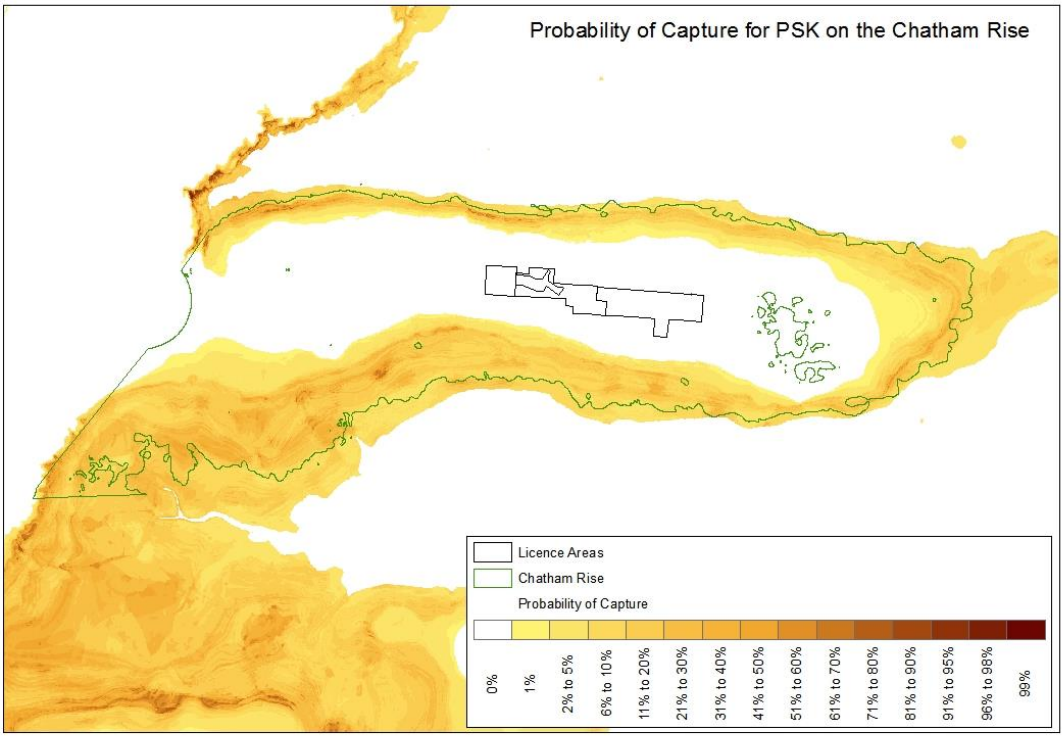

Figure 77: Probability of capture for longnosed deepsea skate (Bathyraja shuntovi; PSK) on the Chatham Rise.

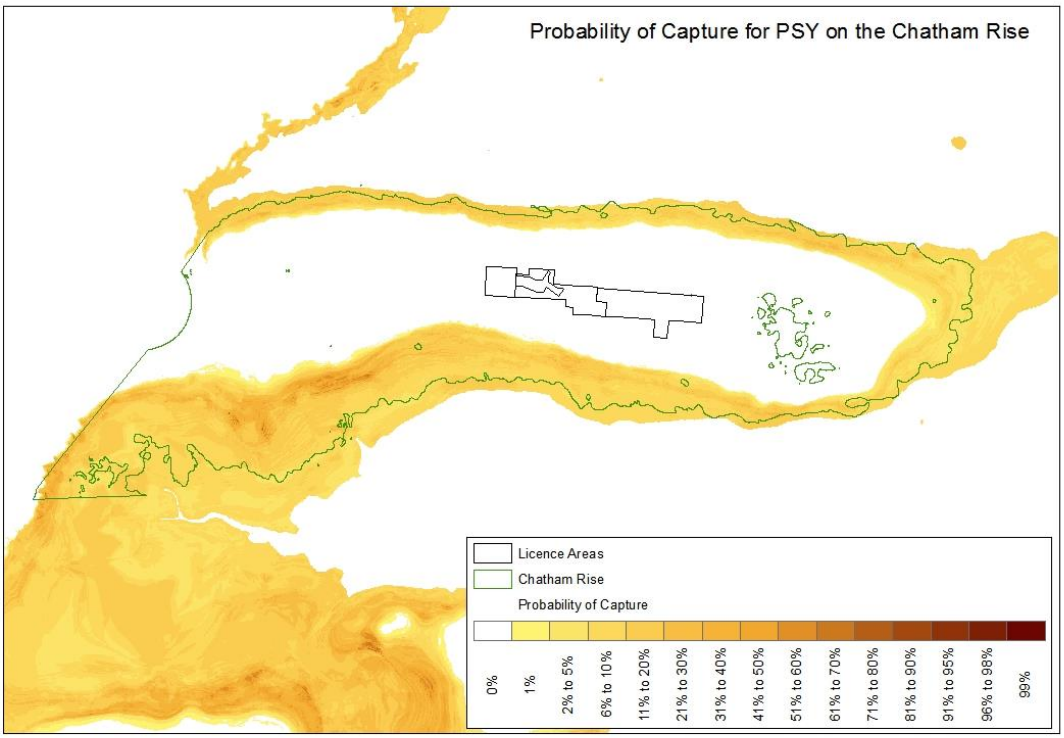

Figure 78: Probability of capture for blob fish (Psychrolutes microporos; PSY) on the Chatham Rise.

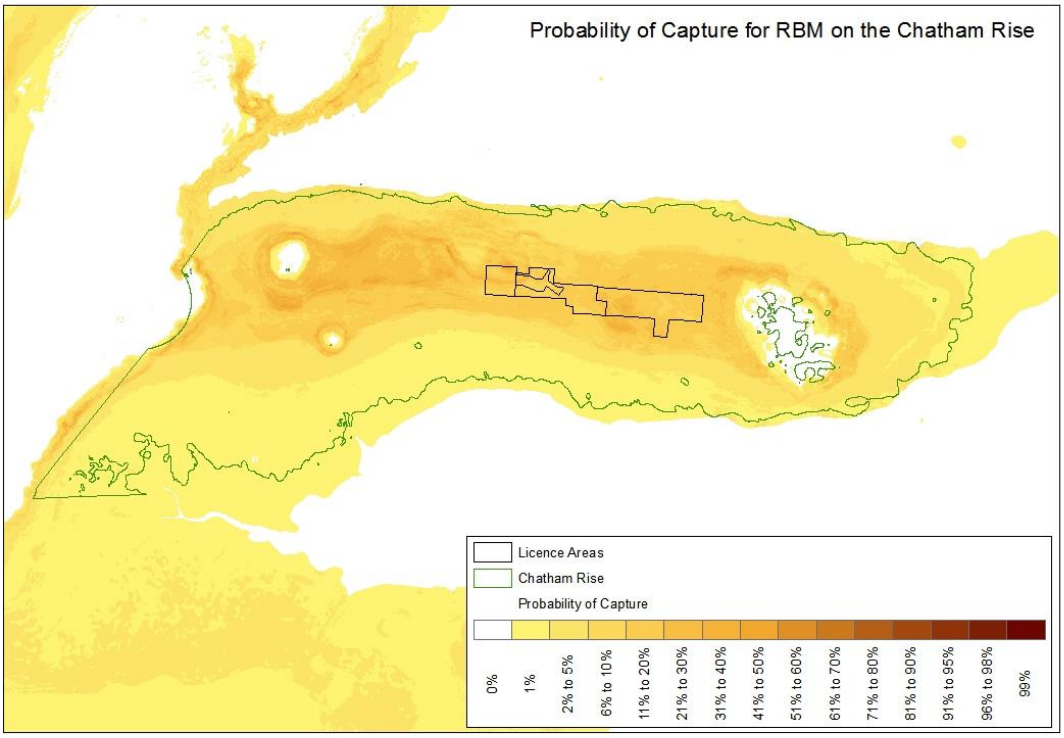

Figure 79: Probability of capture for Ray's bream (Brame brema; RBM) on the Chatham Rise.

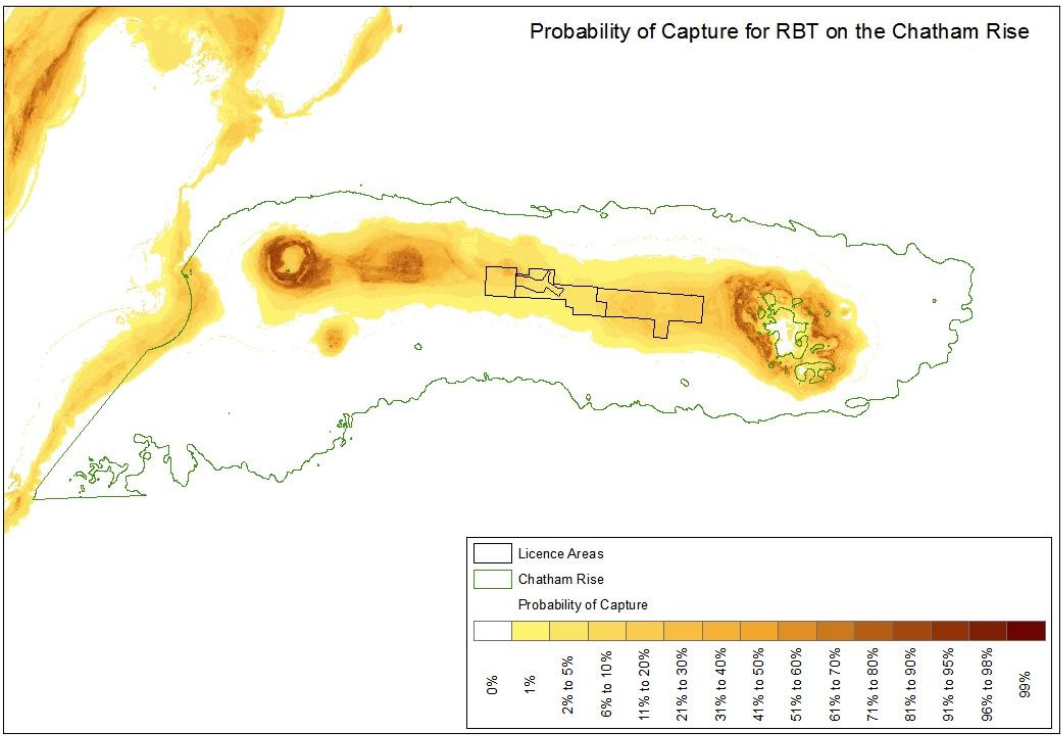

Figure 80: Probability of capture for redbait (Emmelichthys nitidus; RBT) on the Chatham Rise.

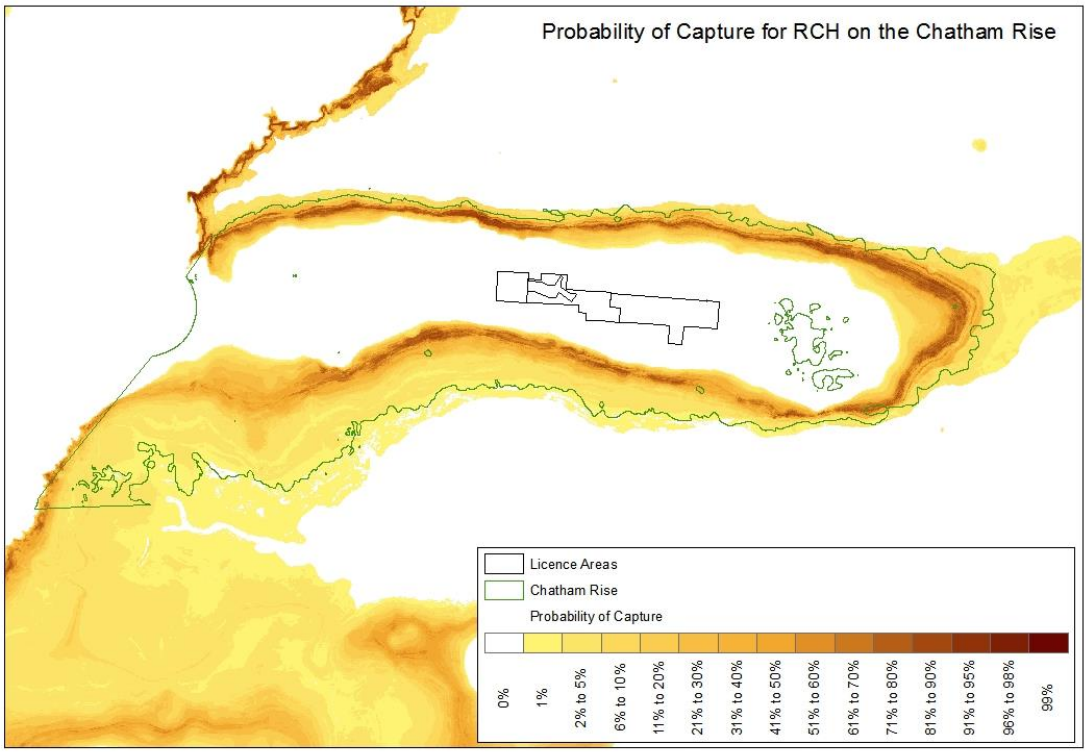

Figure 81: Probability of capture for Pacific spookfish (Rhinochimaera pacifica; RCH) on the Chatham Rise.

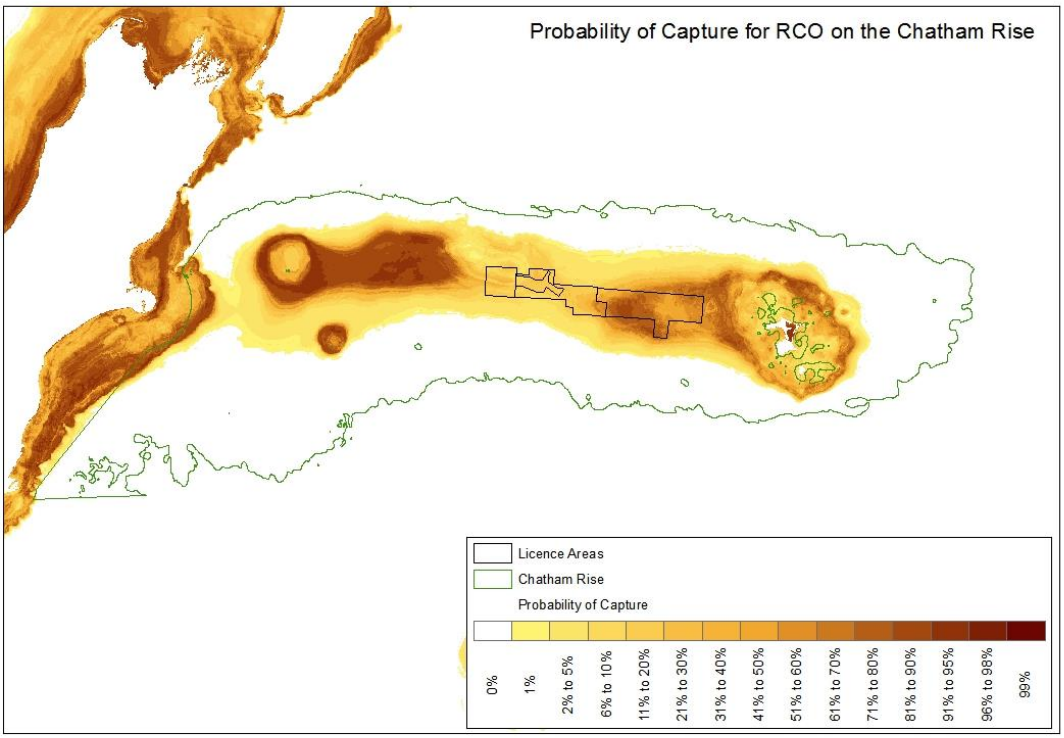

Figure 82: Probability of capture for red cod (Pseudophycis bachus; RCO) on the Chatham Rise.

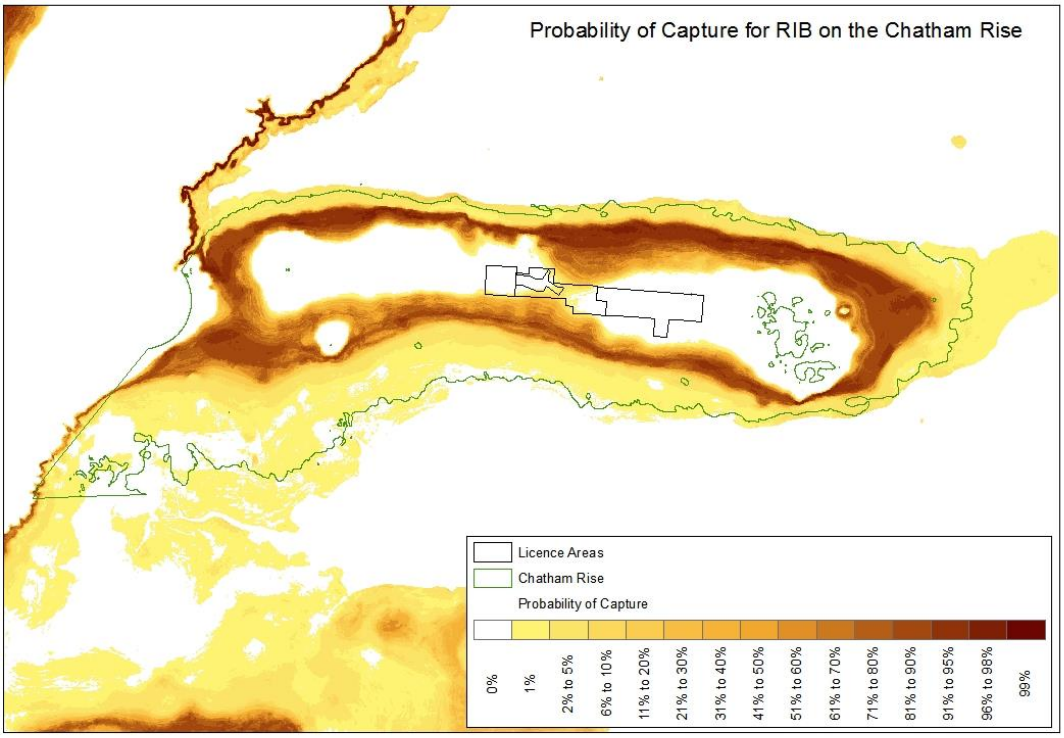

Figure 83: Probability of capture for ribaldo (Mora moro; RIB) on the Chatham Rise.

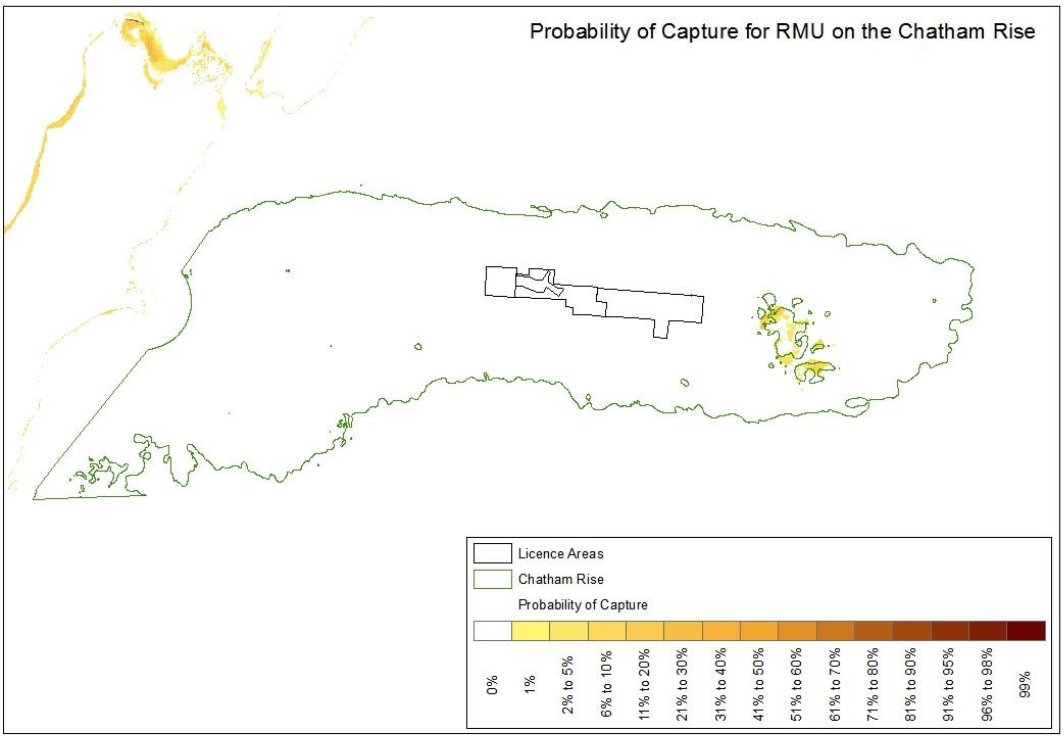

Figure 84: Probability of capture for red mullet (Upeneichthys lineatus; RMU) on the Chatham Rise.

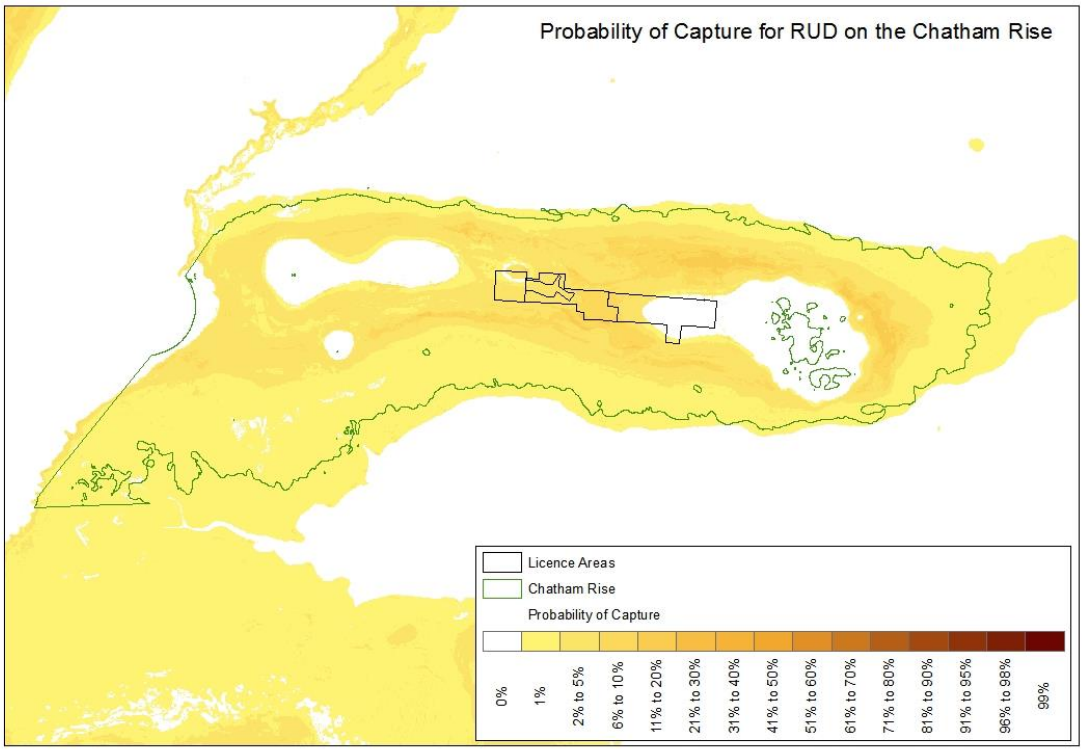

Figure 85: Probability of capture for rudderfish (Centrolophus niger; RUD) on the Chatham Rise.

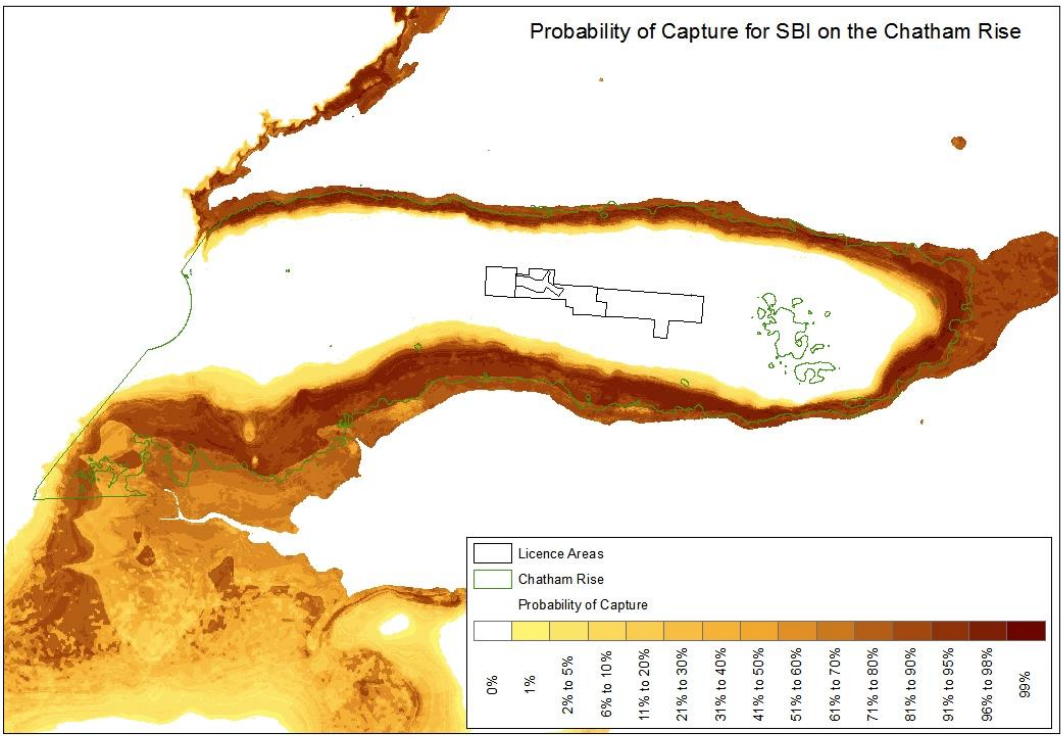

Figure 86: Probability of capture for bigscaled brown slickhead (Alepocephalus australis; SBI) on the Chatham Rise.

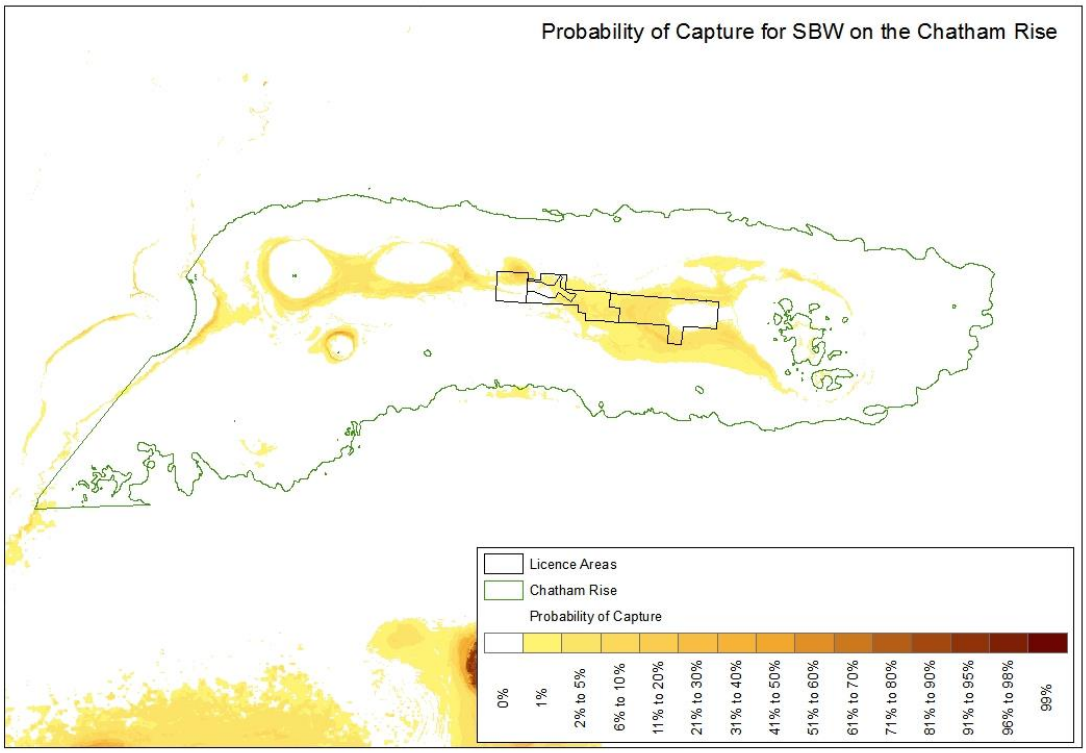

Figure 87: Probability of capture for southern blue whiting (Micromesistius australis; SBW) on the Chatham Rise.

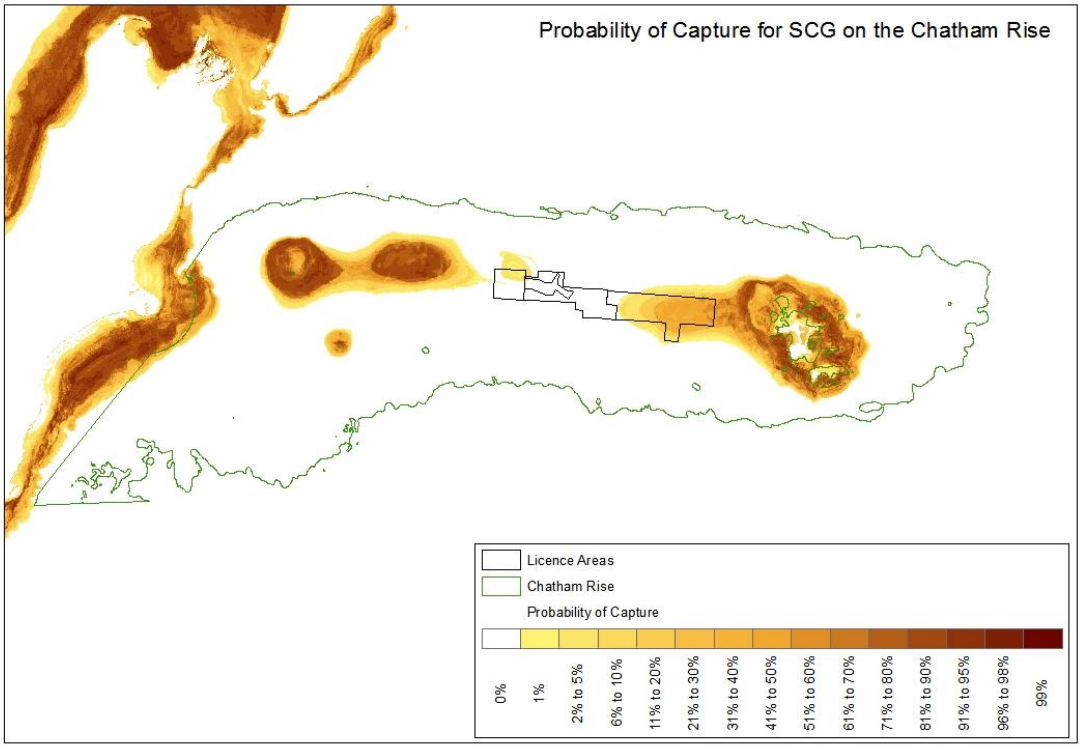

Figure 88: Probability of capture for scaly gurnard (Lepidotrigla brachyoptera; SCG) on the Chatham Rise.

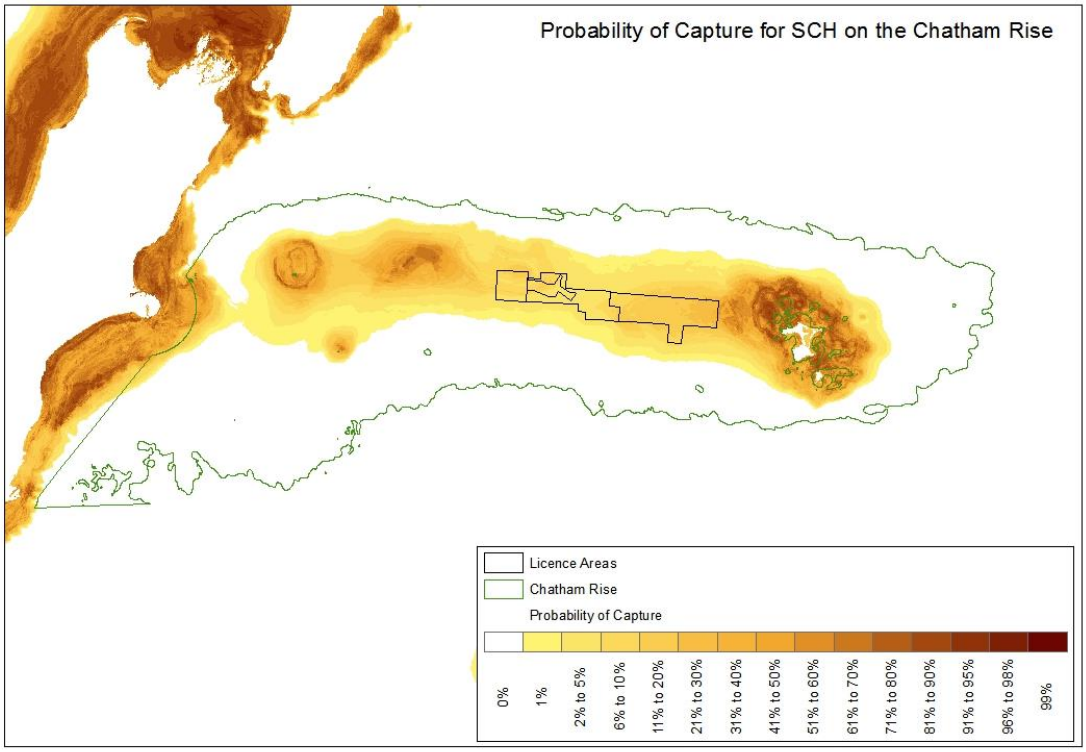

Figure 89: Probability of capture for school shark (Galeorhinus galeus; SCH) on the Chatham Rise.

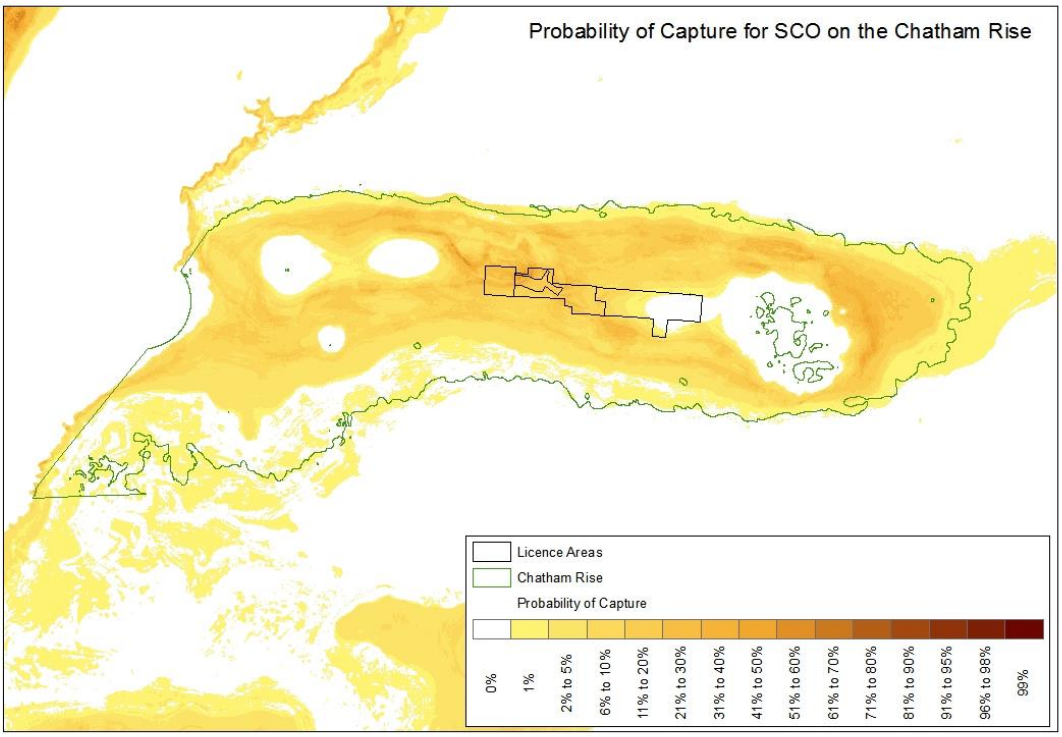

Figure 90: Probability of capture for swollenhead conger (Bassanago bulbiceps; SCO) on the Chatham Rise.

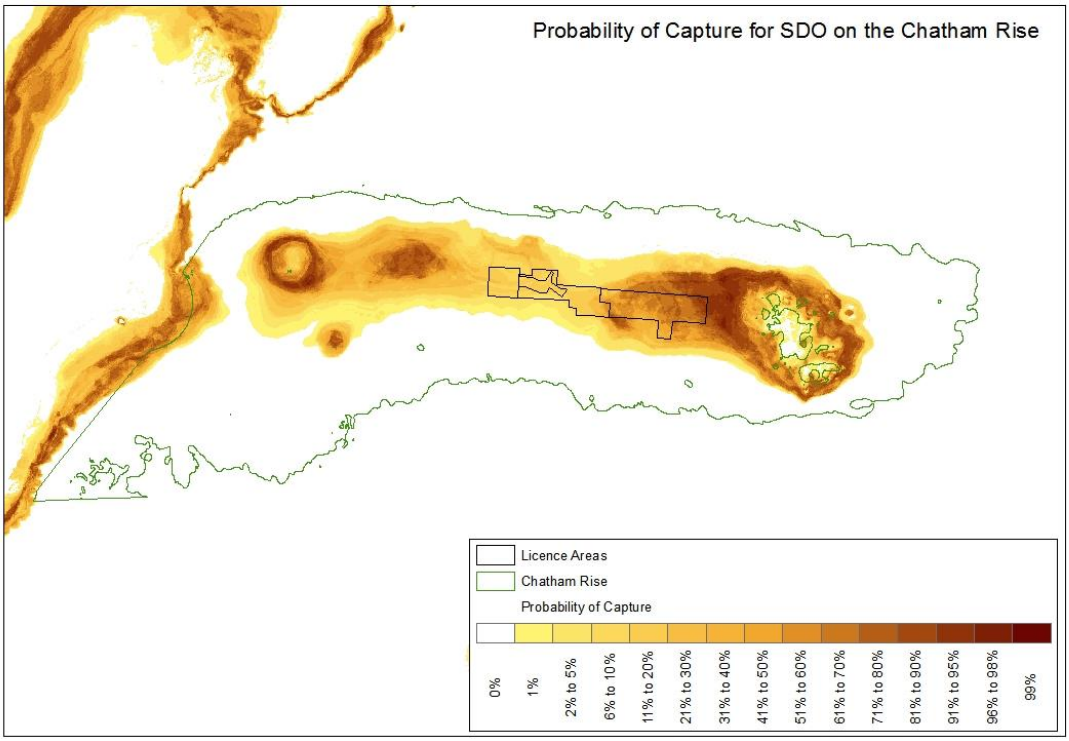

Figure 91: Probability of capture for silver dory (Cyttus novaezealandiae; SDO) on the Chatham Rise.

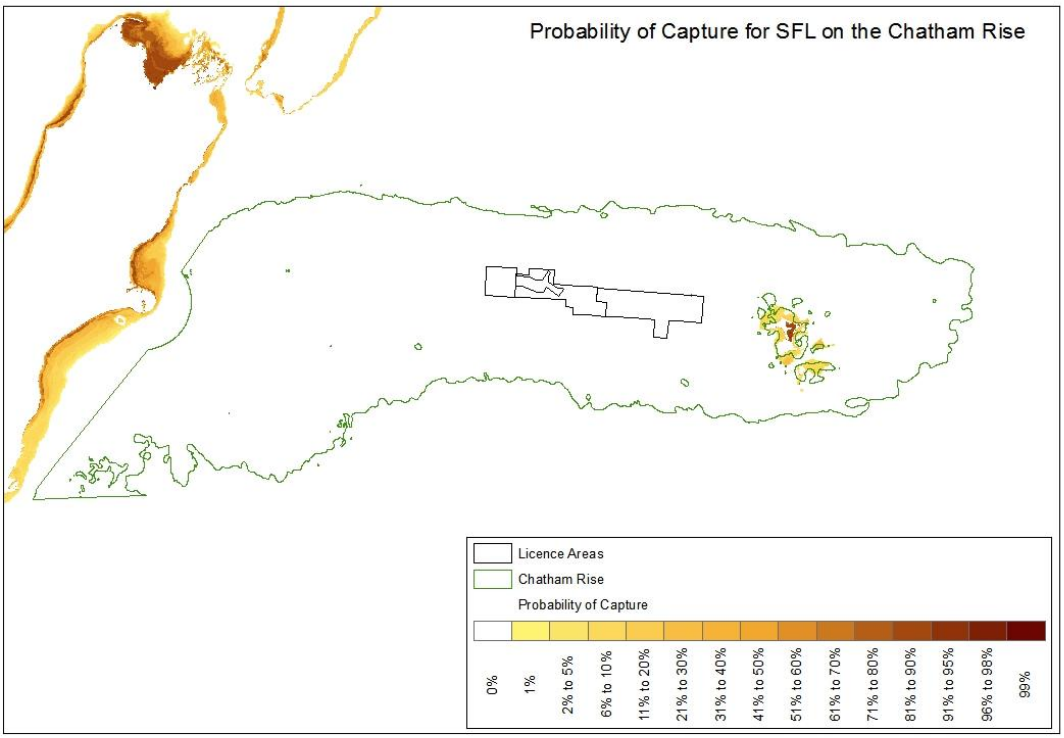

Figure 92: Probability of capture for sand flounder (Rhombosolea plebeian; SFL) on the Chatham Rise.

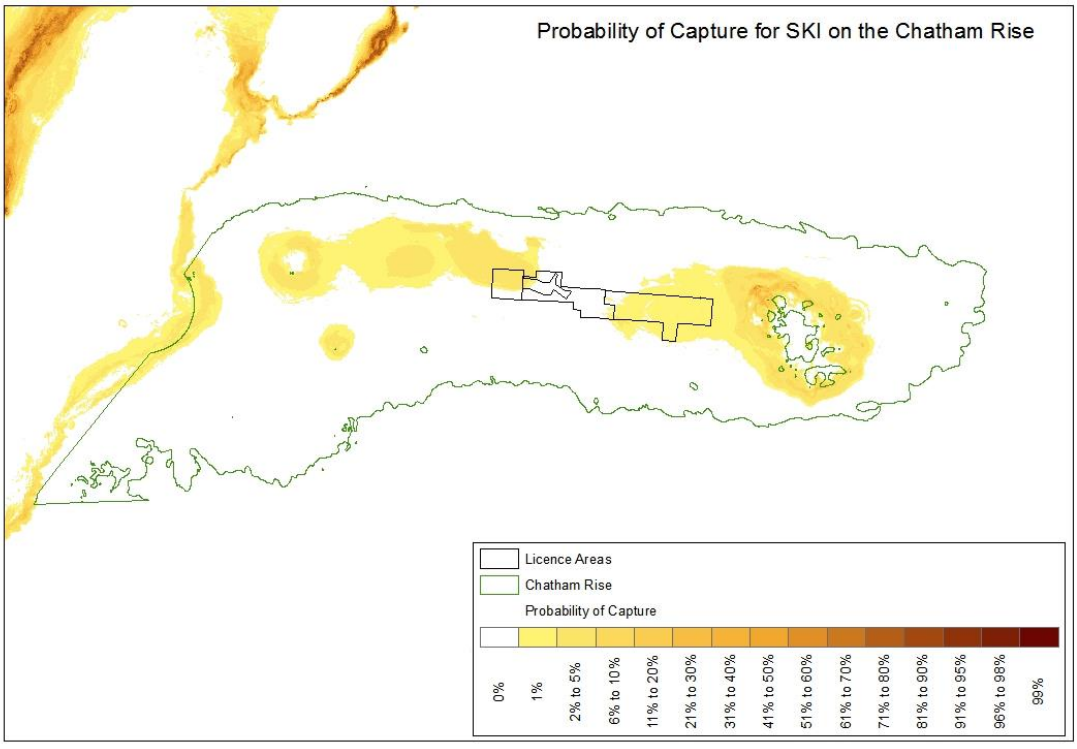

Figure 93: Probability of capture for gemfish (Rexea solandri; SKI) on the Chatham Rise.

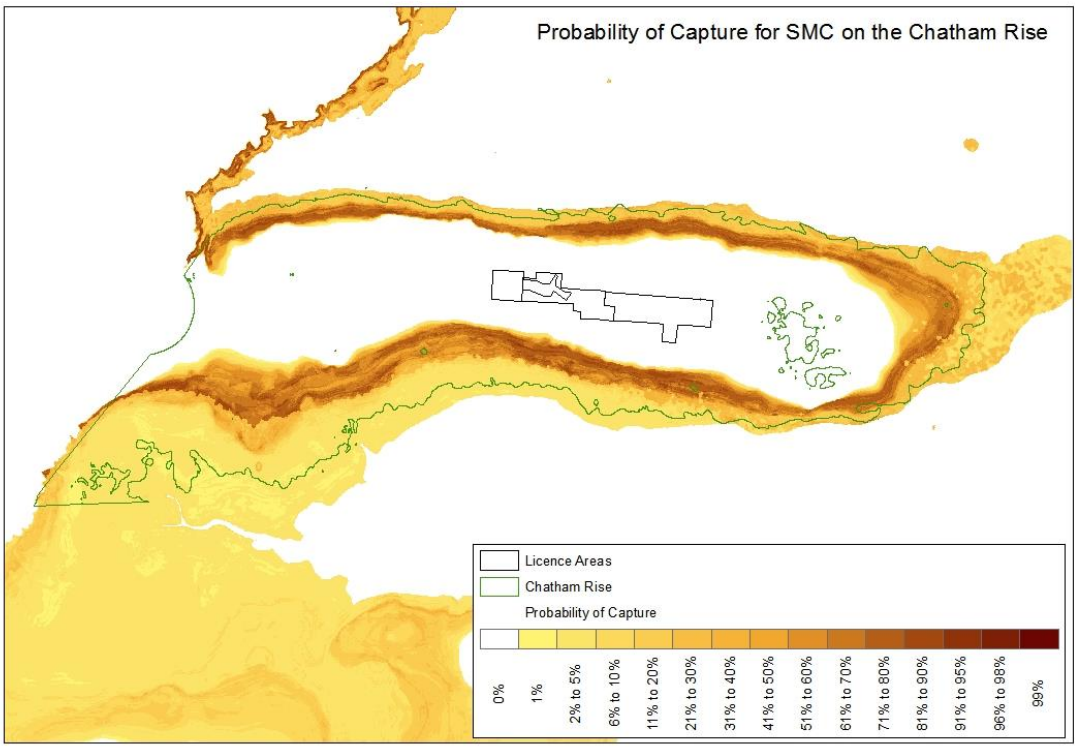

Figure 94: Probability of capture for small-headed cod (Lepidion microcephalus; SMC) on the Chatham Rise.

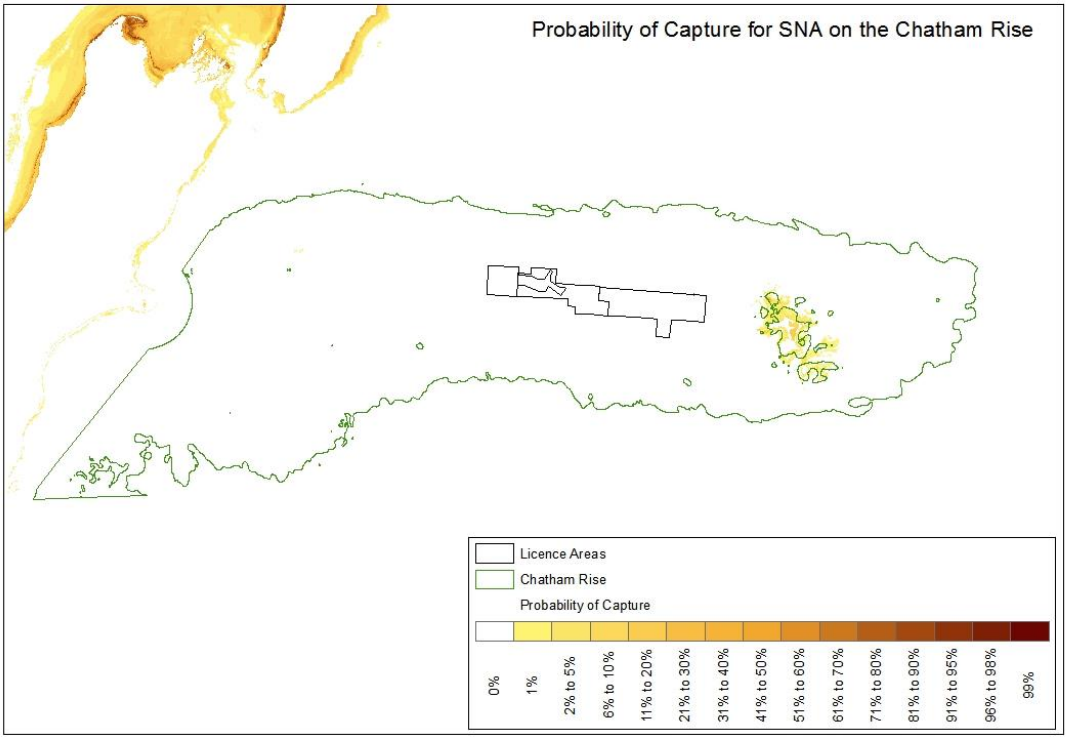

Figure 95: Probability of capture for snapper (Pagrus auratus; SNA) on the Chatham Rise.

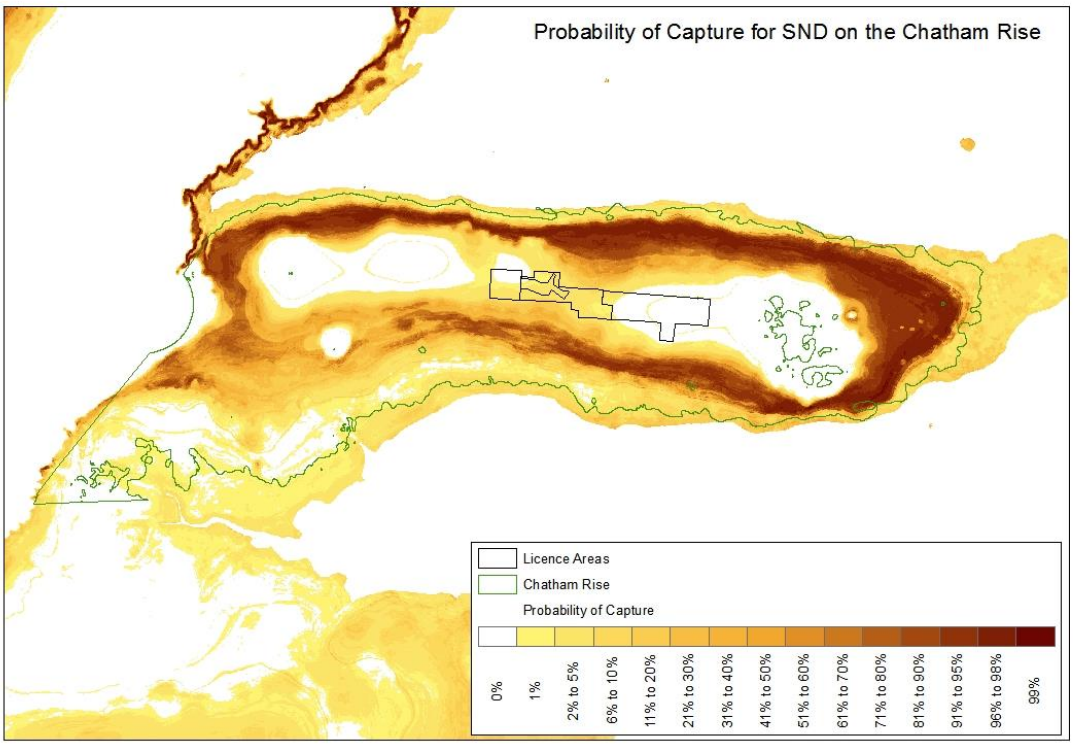

Figure 96: Probability of capture for shovelnose spiny dogfish (Deania calcea; SND) on the Chatham Rise.

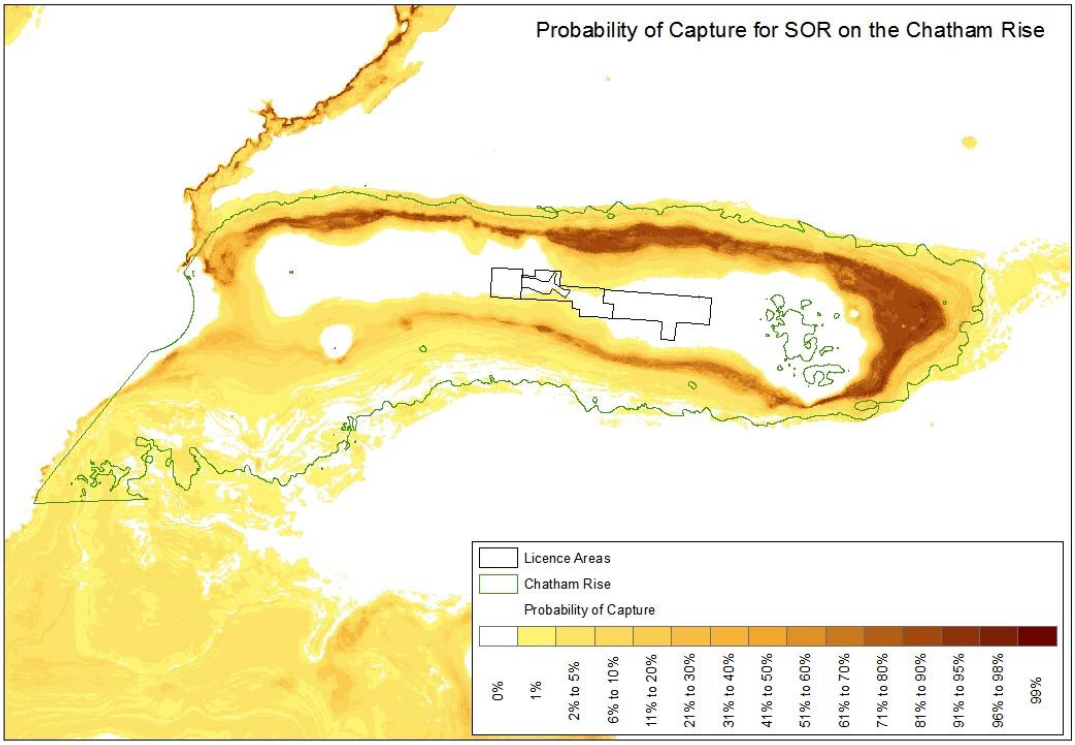

Figure 97: Probability of capture for spiky oreo (Neocyttus rhomboidalis; SOR) on the Chatham Rise.

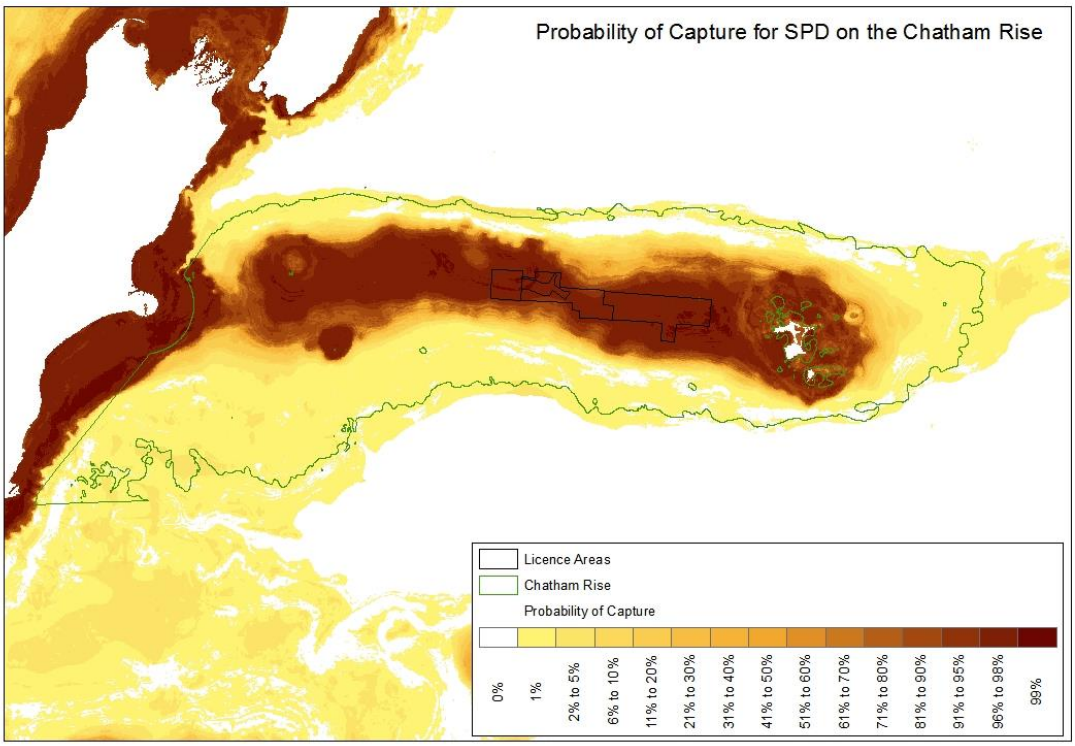

Figure 98: Probability of capture for spiny dogfish (Squalus acanthias; SPD) on the Chatham Rise.

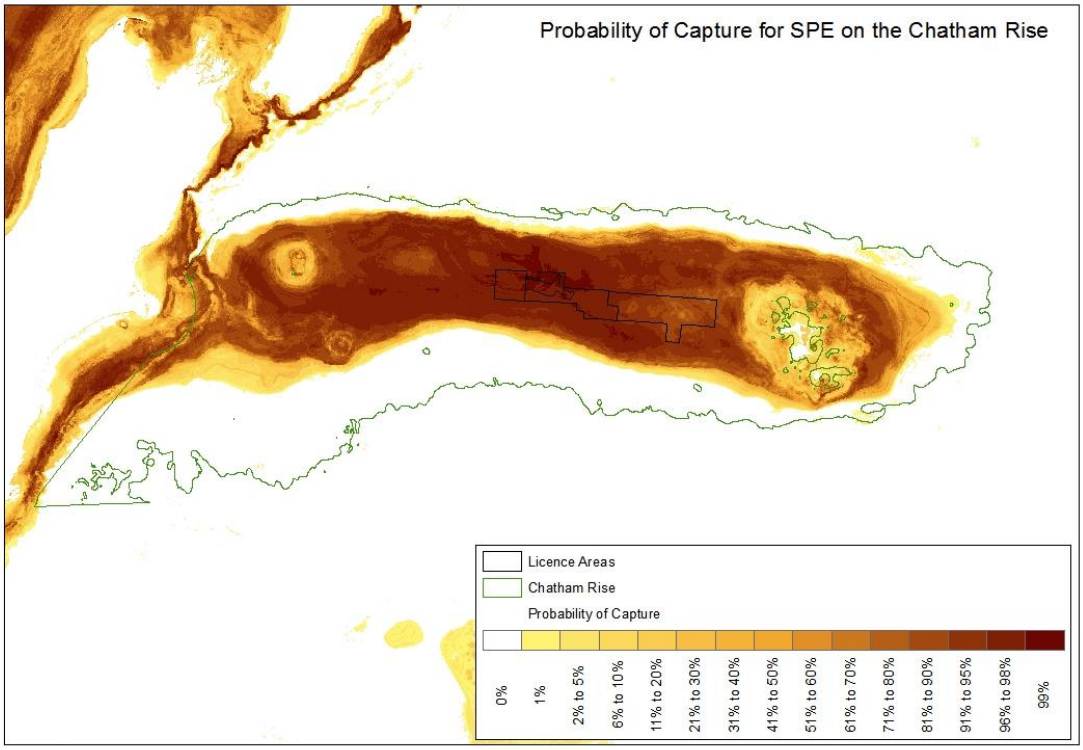

Figure 99: Probability of capture for sea perch (Helicolenus sp.; SPE) on the Chatham Rise.

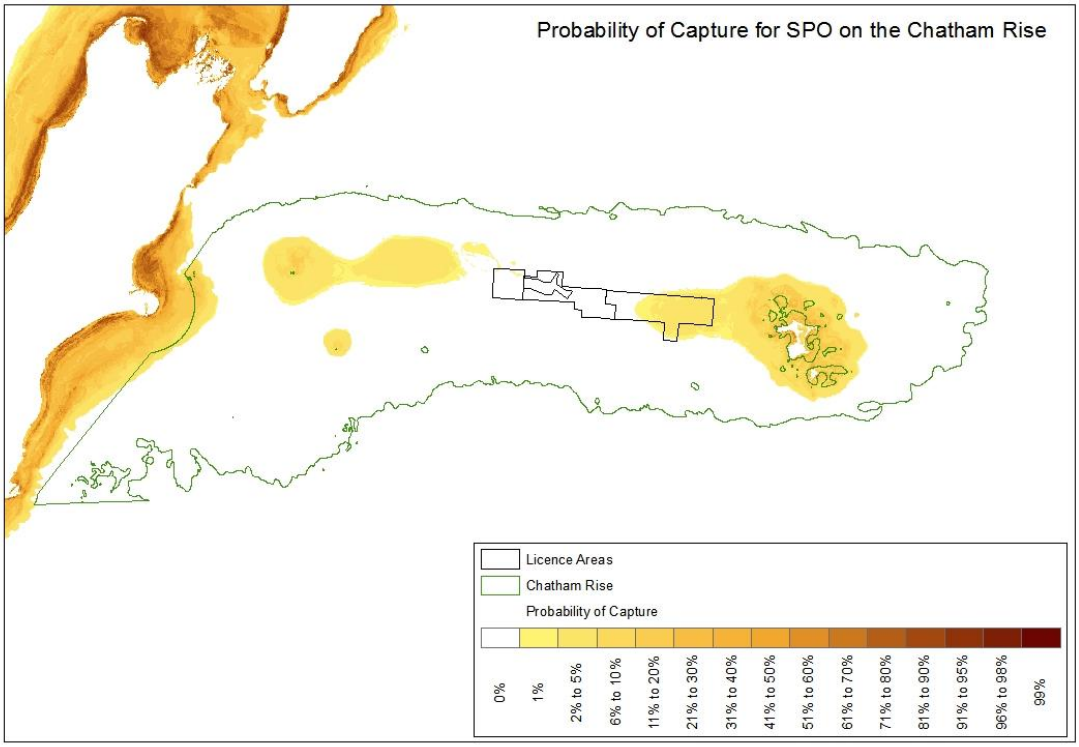

Figure 100: Probability of capture for rig (Mustelus lenticulatus; SPO) on the Chatham Rise.

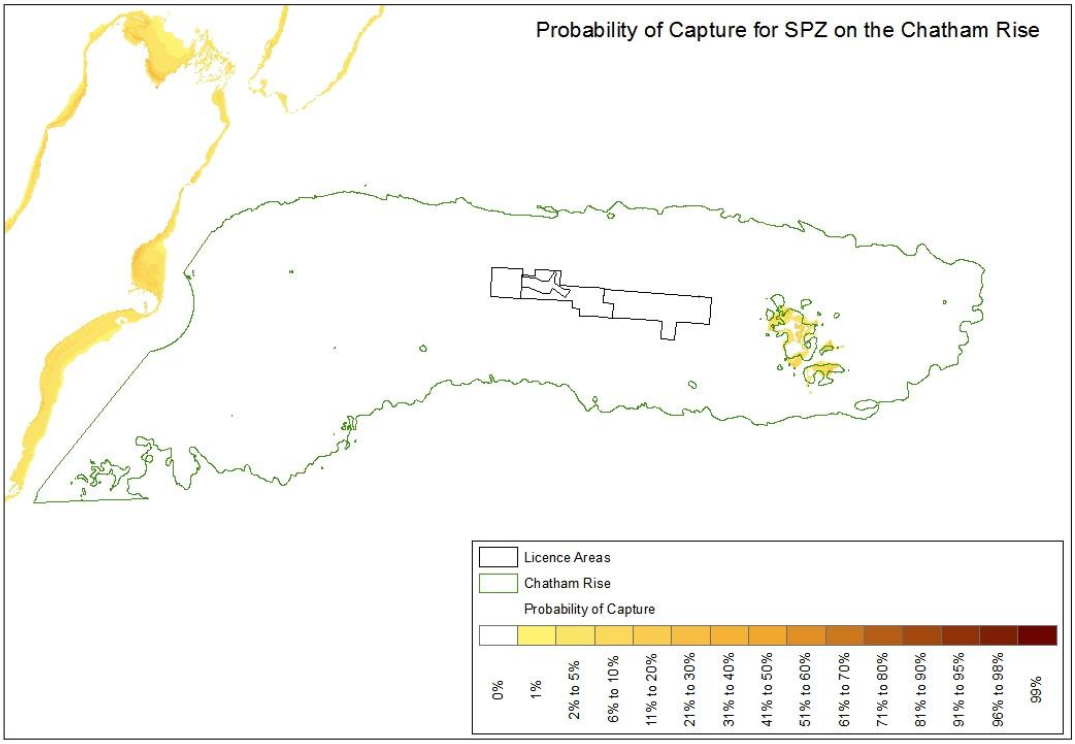

Figure 101: Probability of capture for spotted stargazer (Genyagnus monopterygius; SPZ) on the Chatham Rise.

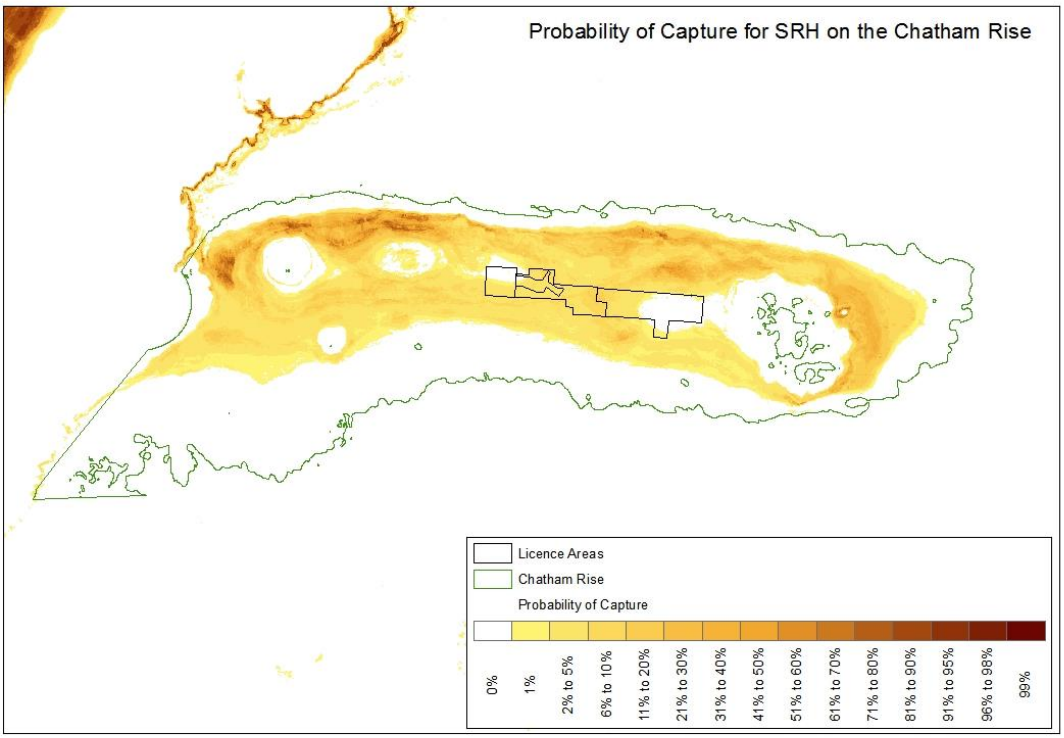

Figure 102: Probability of capture for silver roughy (Hoplostethus mediterraneus; SRH) on the Chatham Rise.

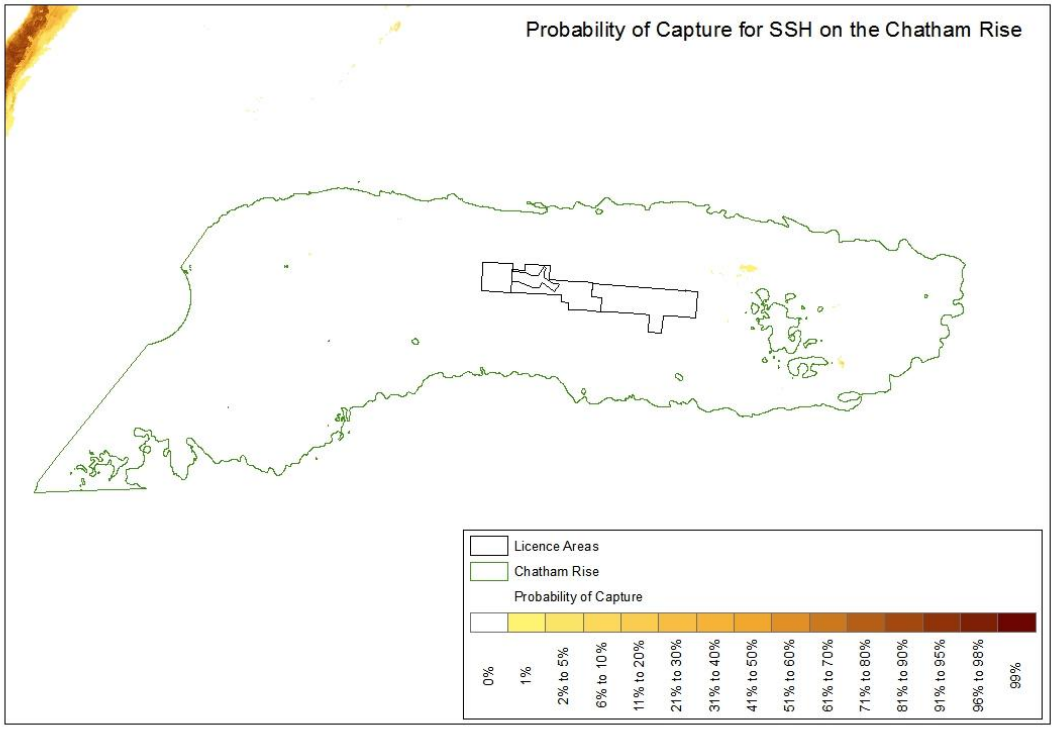

Figure 103: Probability of capture for slender smooth-hound (Gollum attenuates; SSH) on the Chatham Rise.

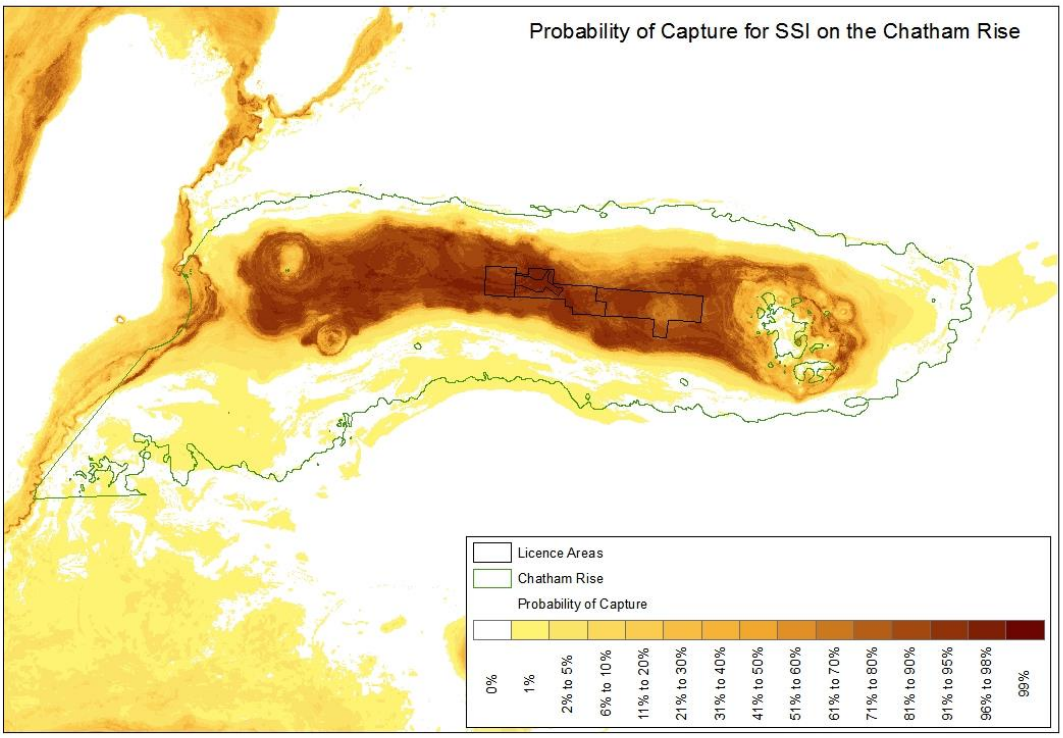

Figure 104: Probability of capture for silverside (Argentina elongate; SSI) on the Chatham Rise.

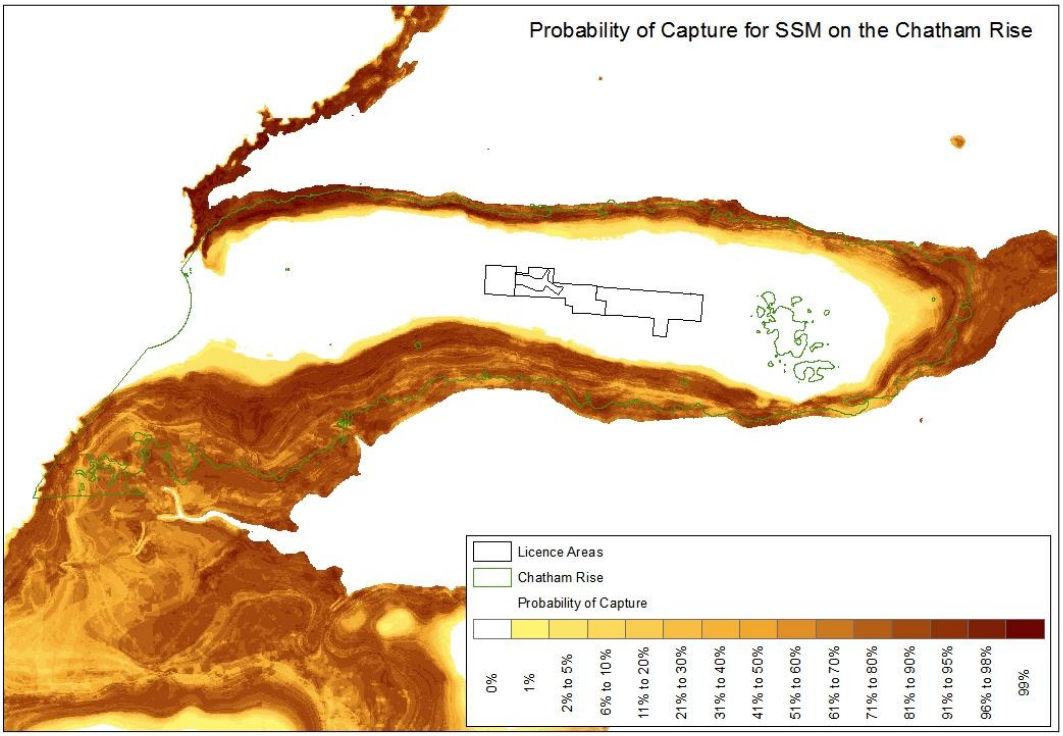

Figure 105: Probability of capture for smallscaled brown slickhead (Alepocephalus antipodianus; SSM) on the Chatham Rise.

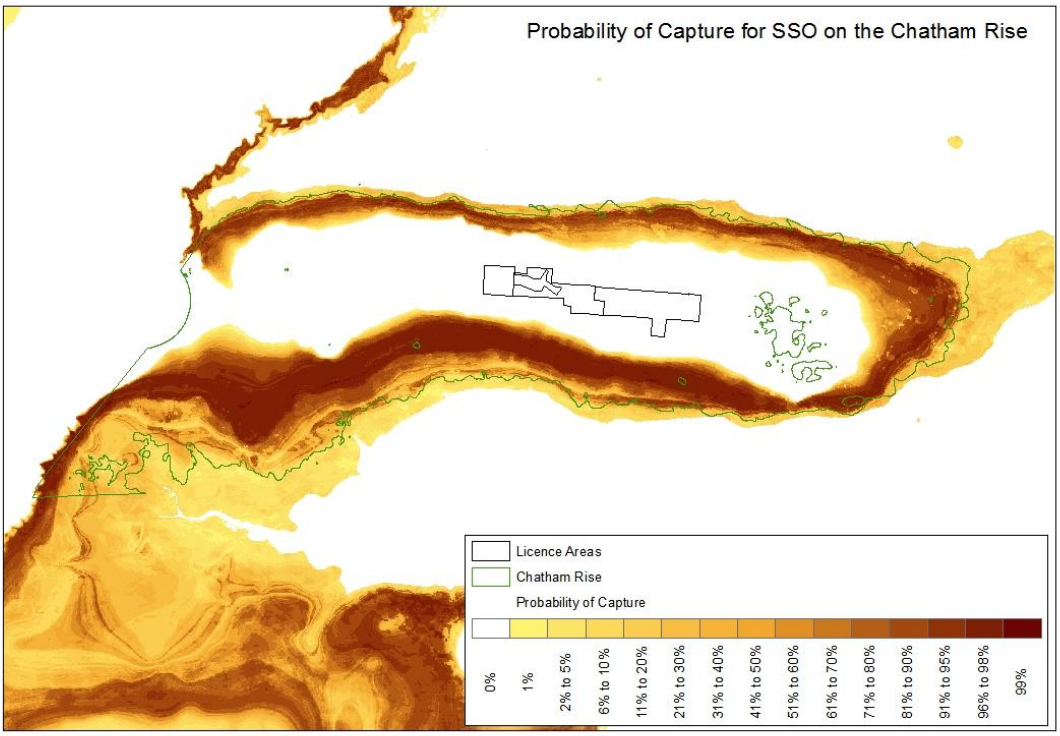

Figure 106: Probability of capture for smooth oreo (Pseudocyttus maculatus; SSO) on the Chatham Rise.

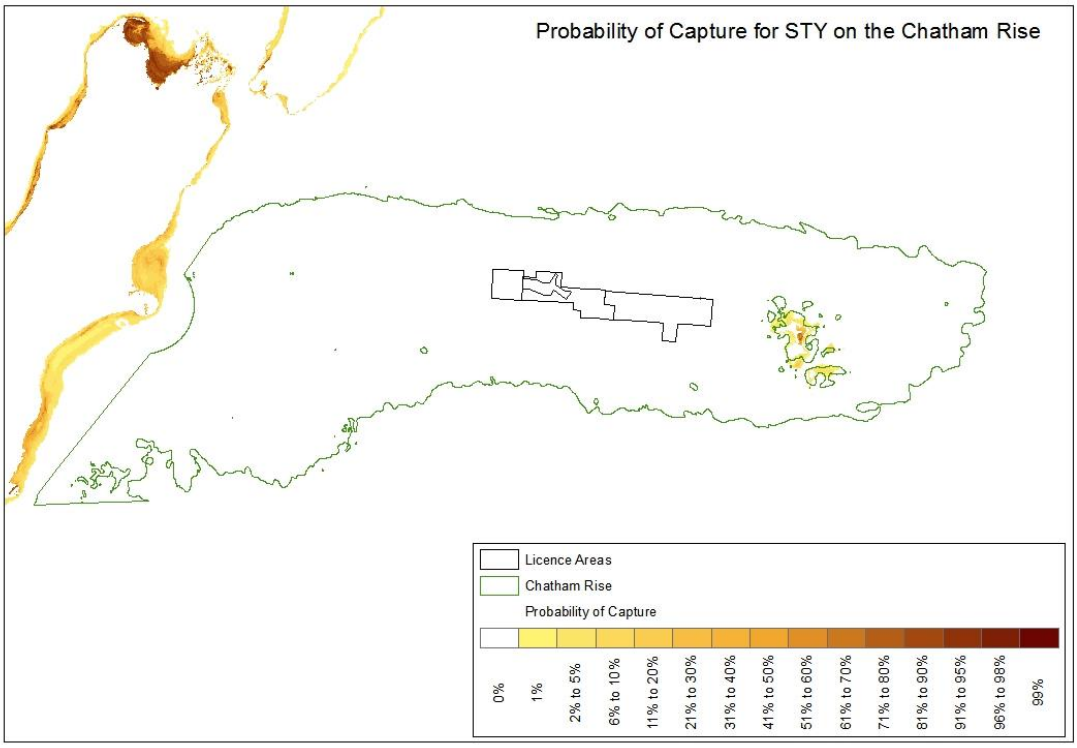

Figure 107: Probability of capture for spotty (Notolabrus celidotus; STY) on the Chatham Rise.

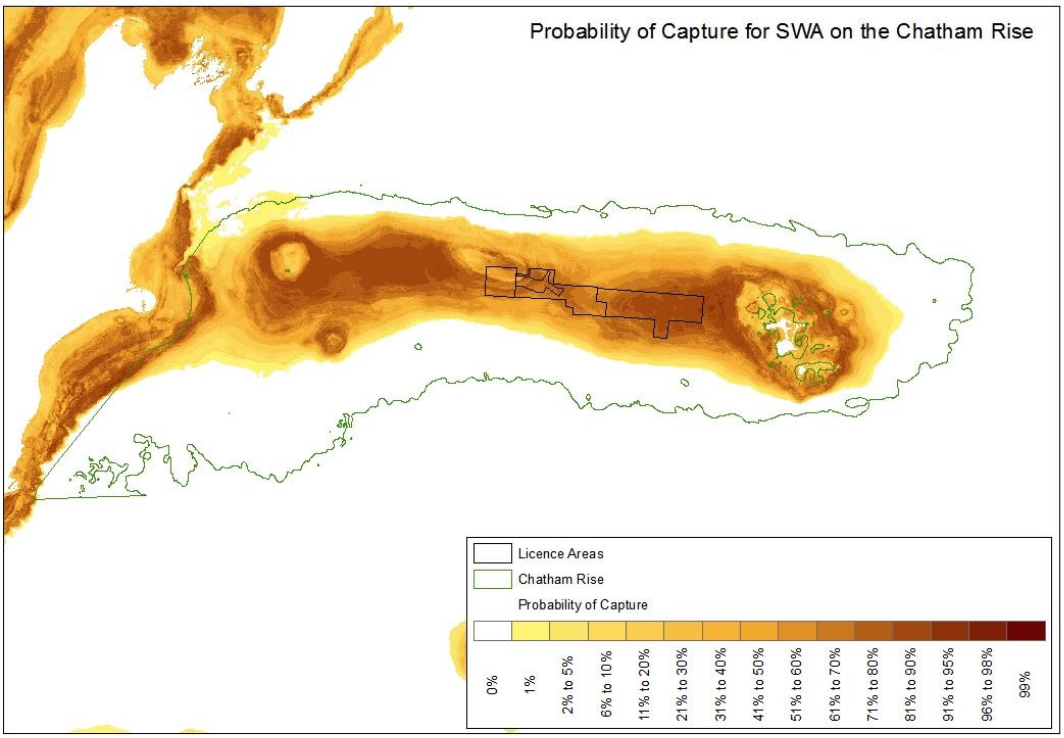

Figure 108: Probability of capture for silver warehou (Seriolella punctate; SWA) on the Chatham Rise.

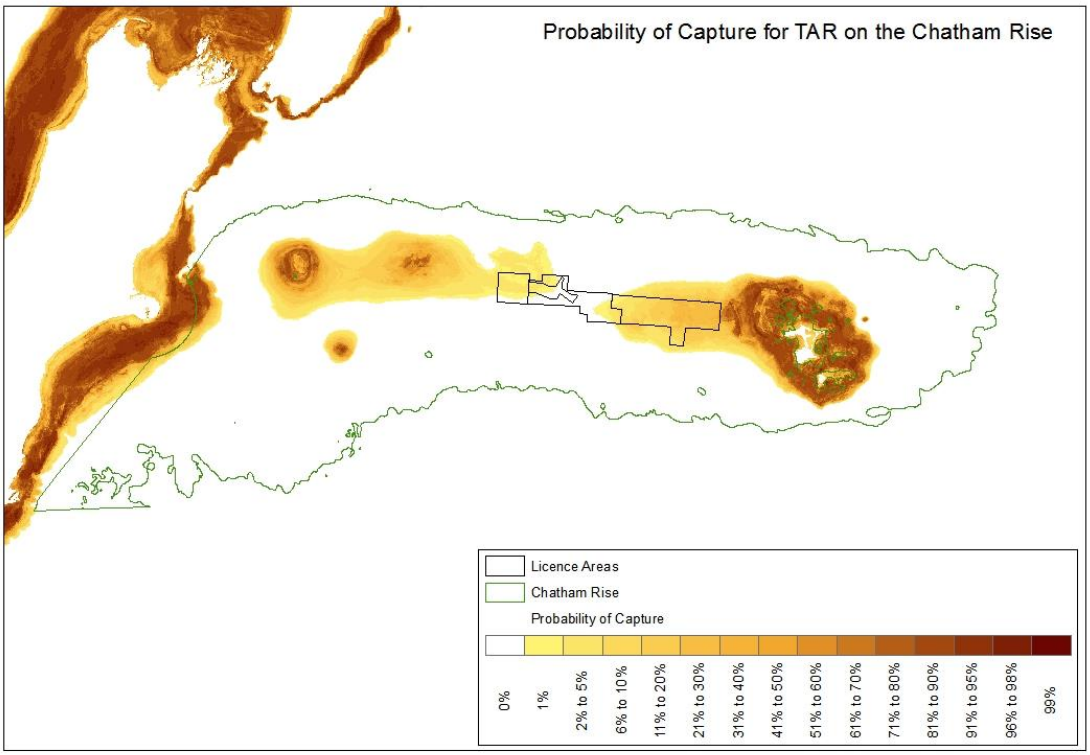

Figure 109: Probability of capture for tarakihi (Nemadactylus macropterus; TAR) on the Chatham Rise.

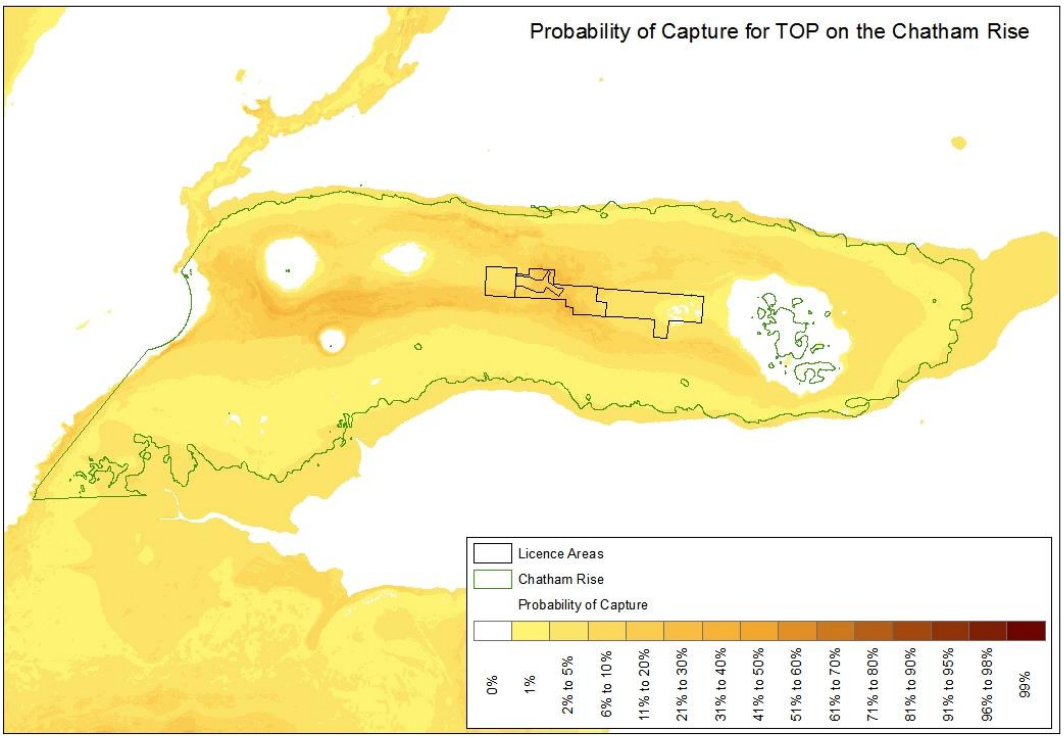

Figure 110: Probability of capture for pale toadfish (Ambophthalmos angustus; TOP) on the Chatham Rise.

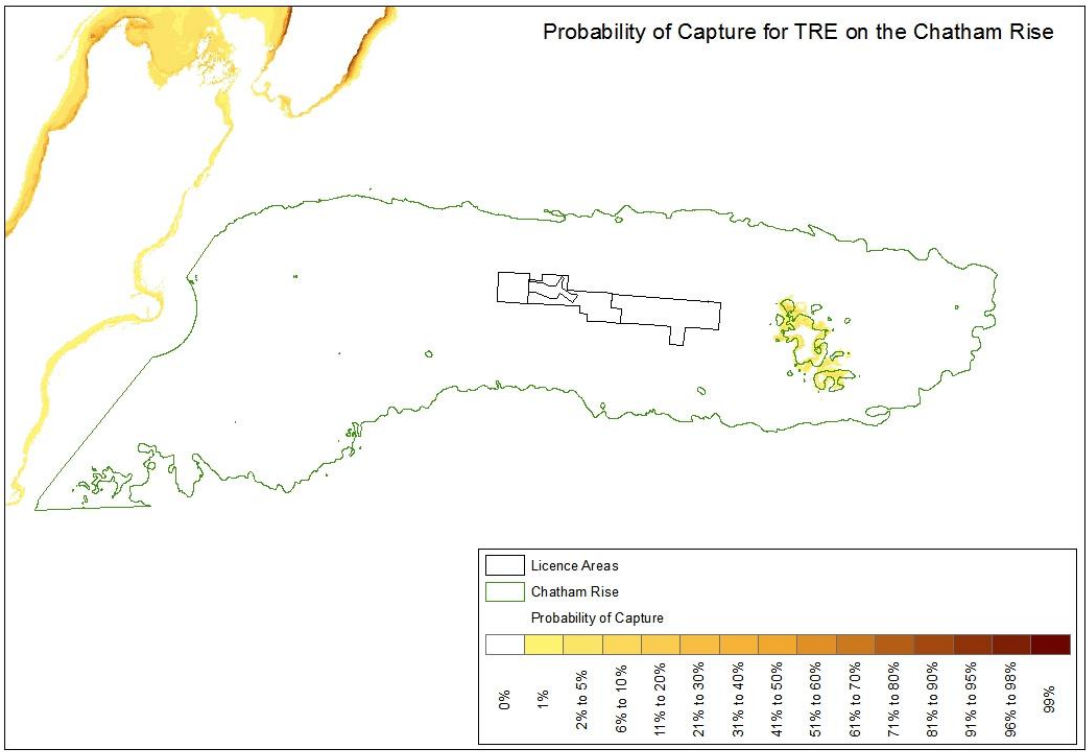

Figure 111: Probability of capture for trevally (Pseudocaranx dentex; TRE) on the Chatham Rise.

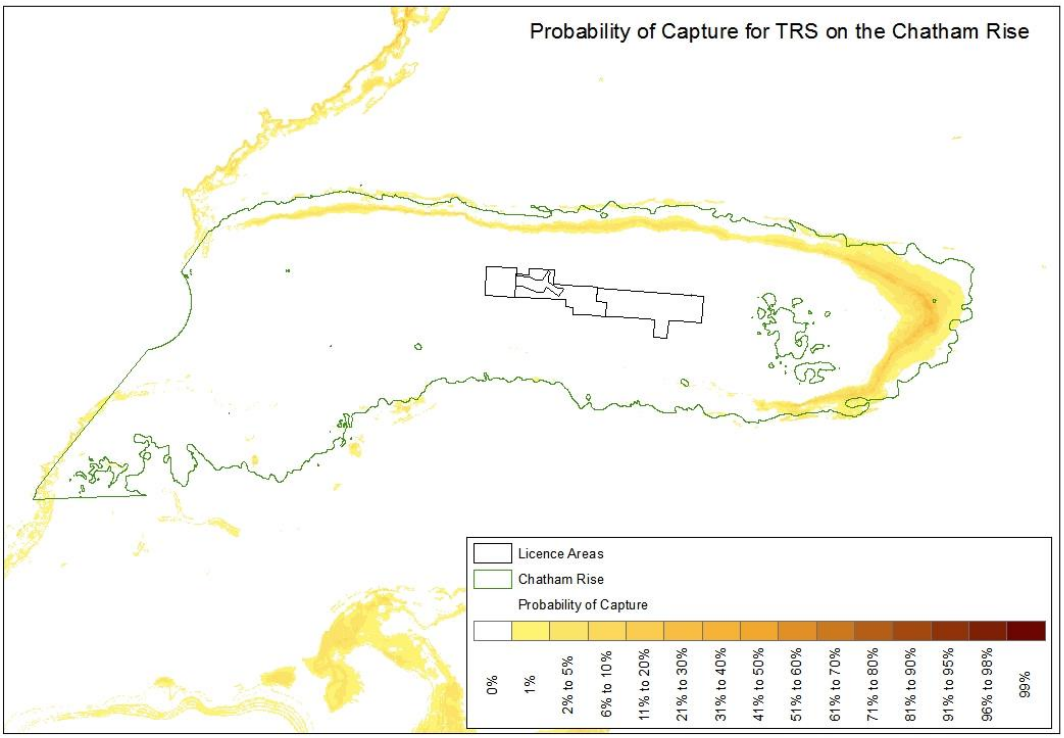

Figure 112: Probability of capture for cape scorpionfish (Trachyscorpia capensis; TRE) on the Chatham Rise.

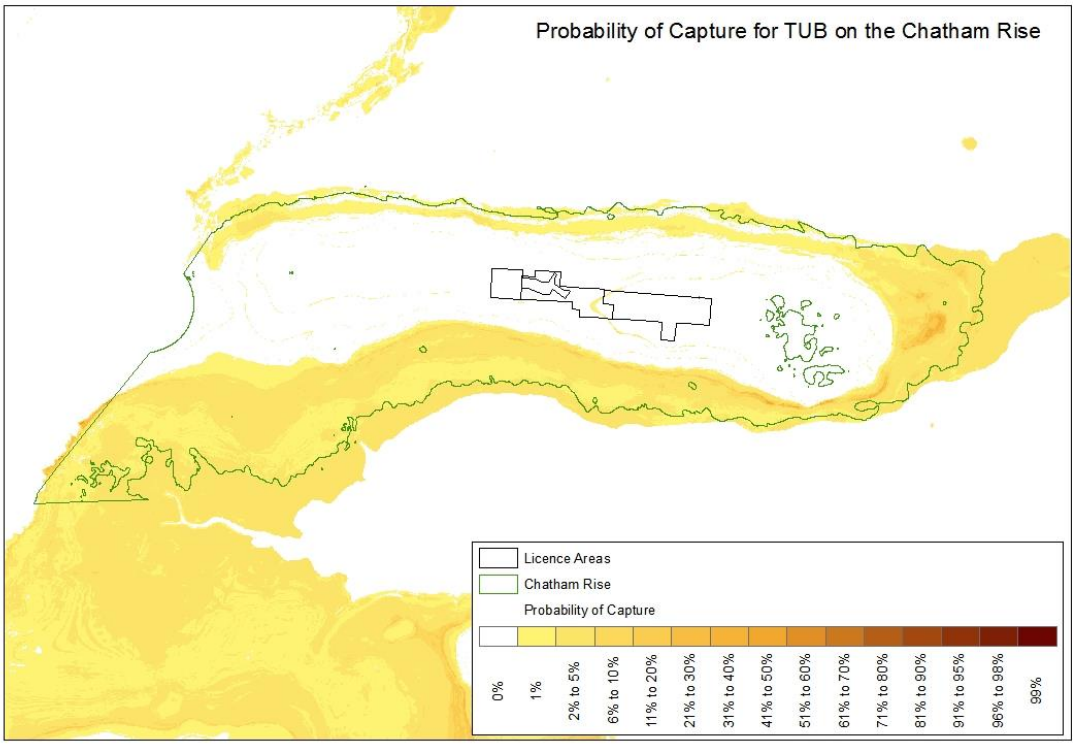

Figure 113: Probability of capture for Tubbia tasmanica (TUB) on the Chatham Rise.

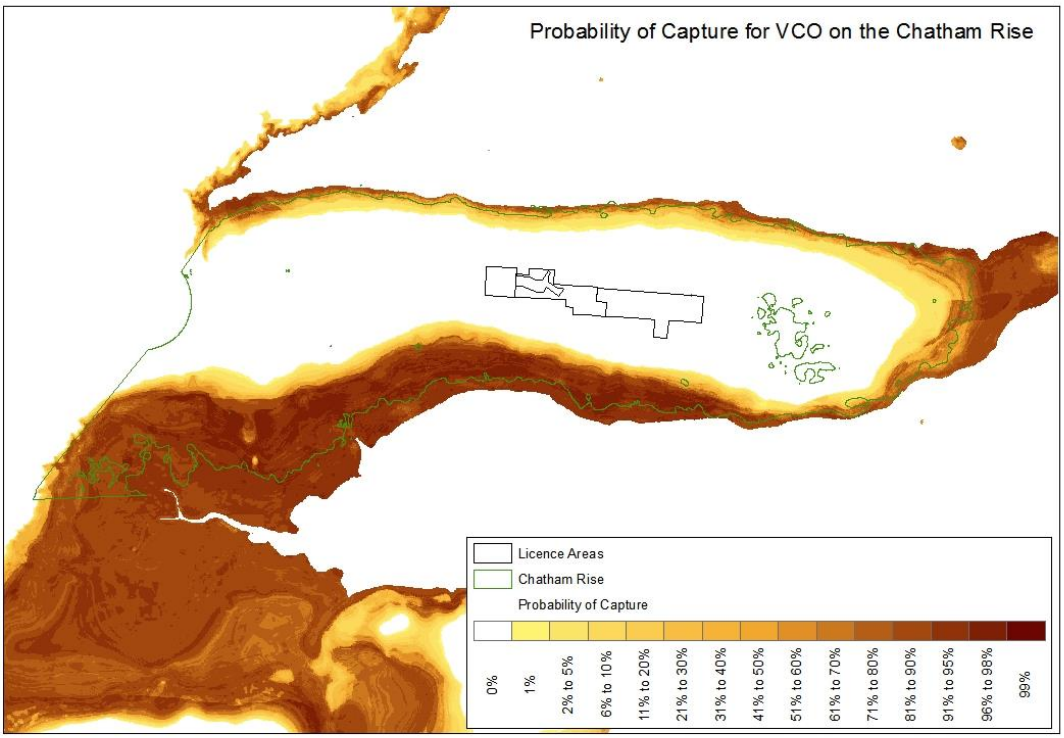

Figure 114: Probability of capture for violet cod (Antimora rostrata; VCO) on the Chatham Rise.

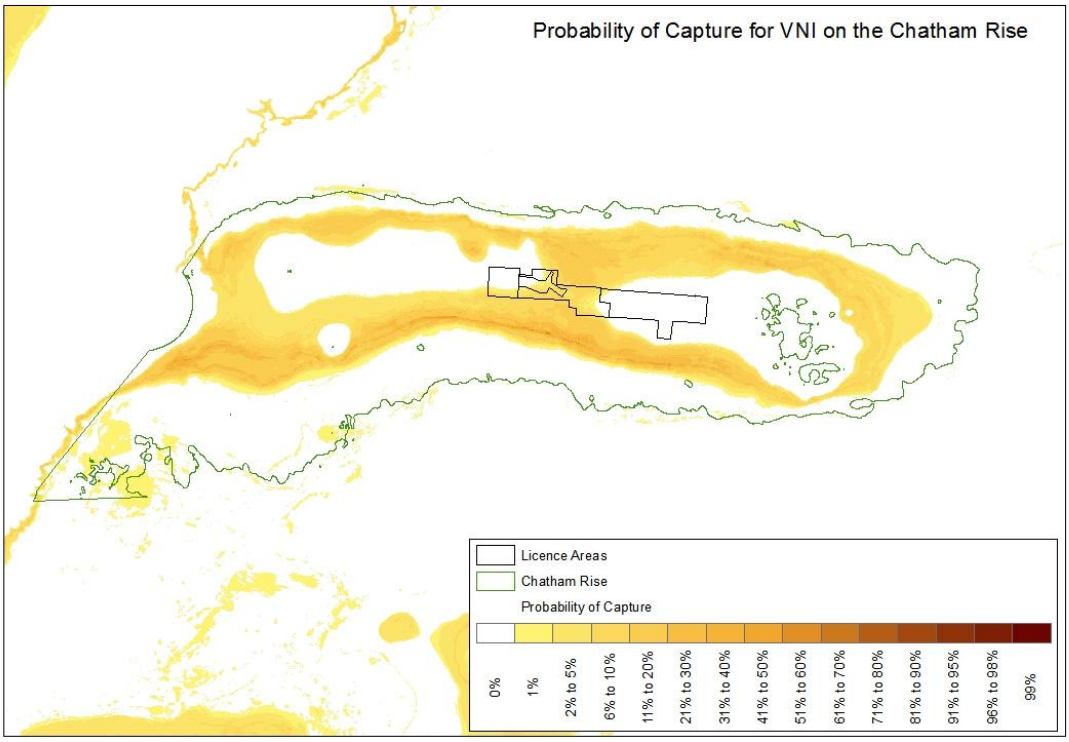

Figure 115: Probability of capture for blackspot rattail (Lucigadus nigromaculatus; VNI) on the Chatham Rise.

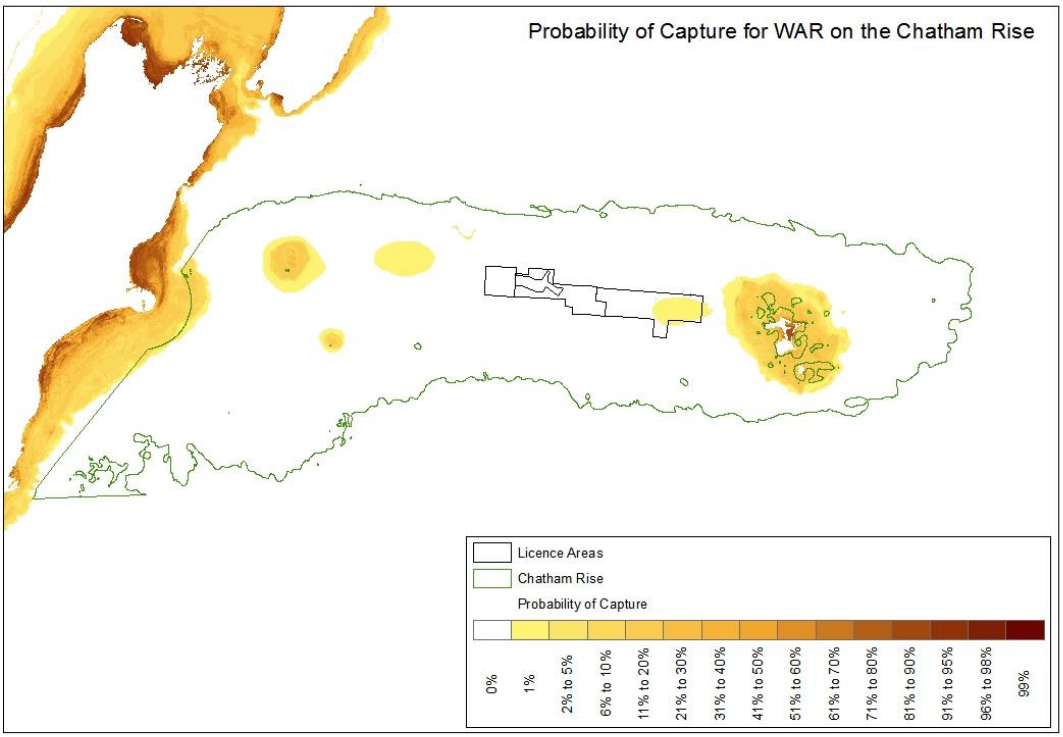

Figure 116: Probability of capture for common warehou (Seriolella brama; WAR) on the Chatham Rise.

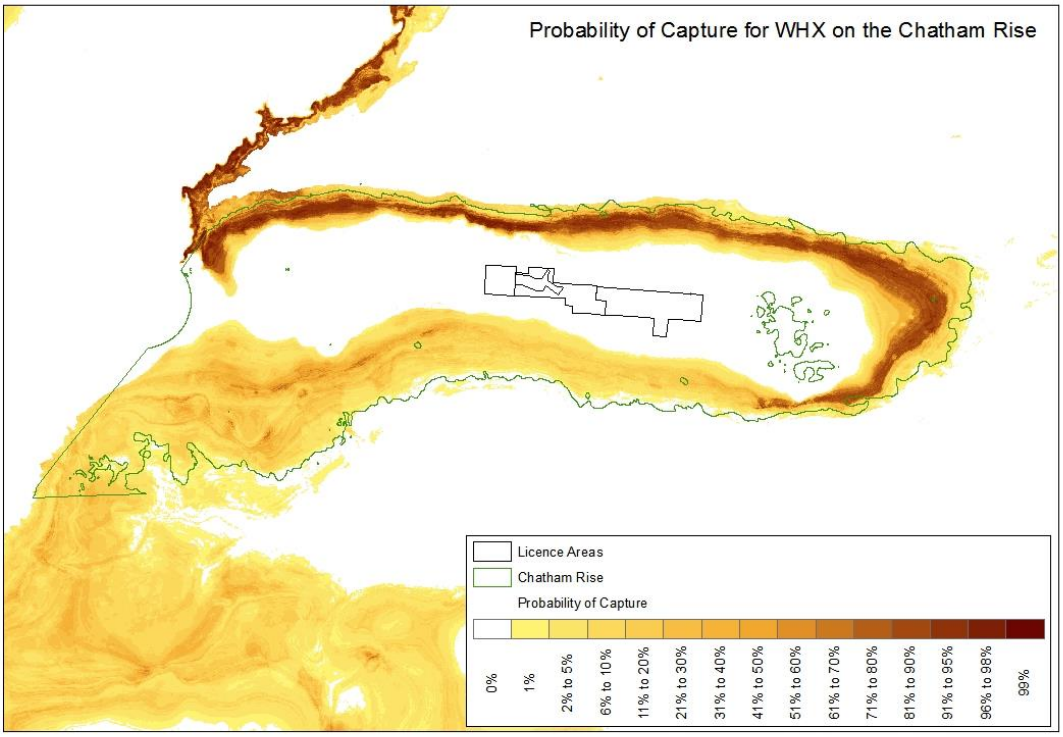

Figure 117: Probability of capture for white (unicorn) rattail (Trachyrincus longirostris; Trachyrincus sp.; WHX) on the Chatham Rise.

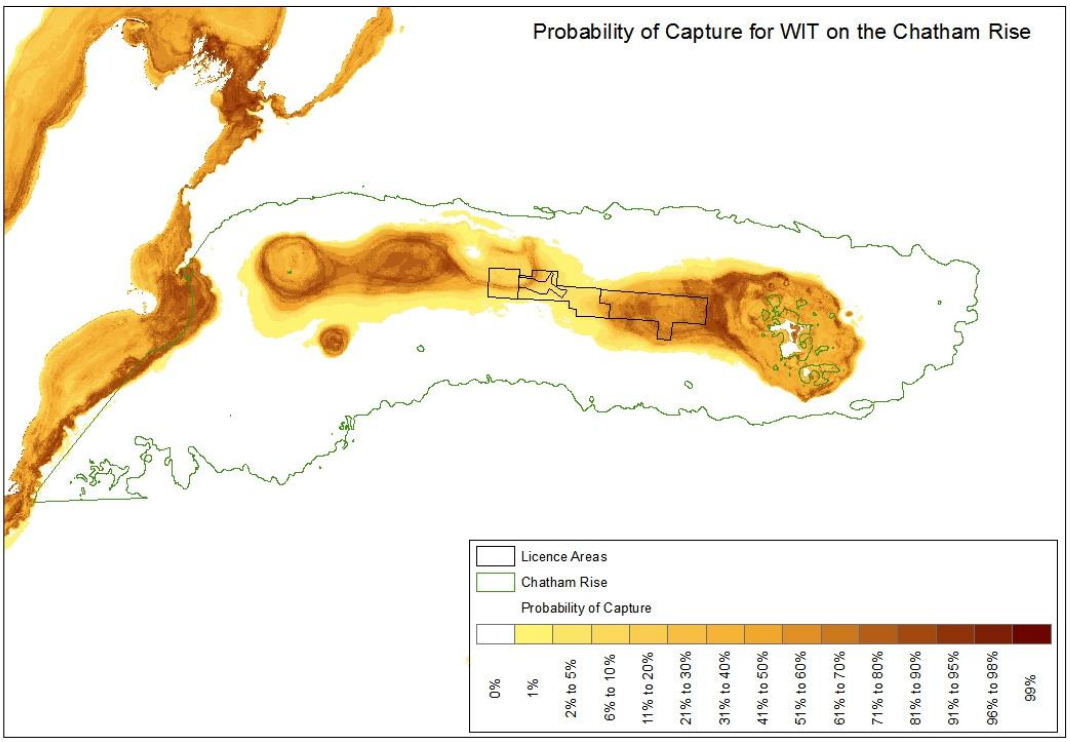

Figure 118: Probability of capture for witch (Arnoglossus scapha; WIT) on the Chatham Rise.

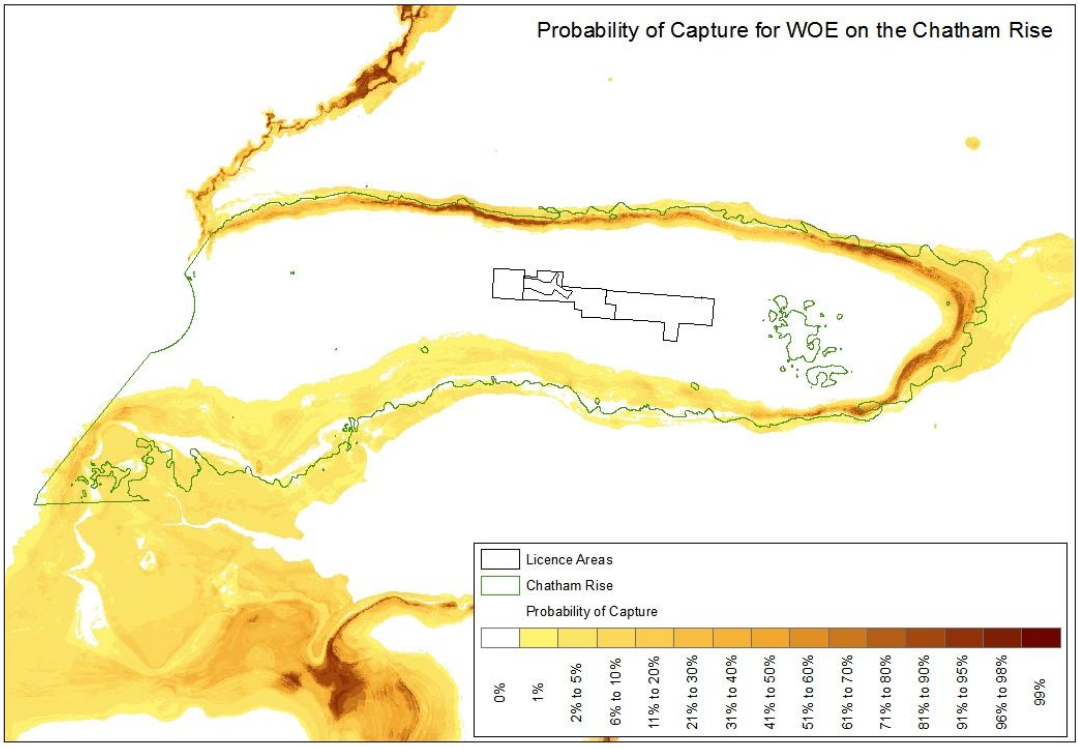

Figure 119: Probability of capture for warty oreo (Allocyttus verrucosus; WOE) on the Chatham Rise.

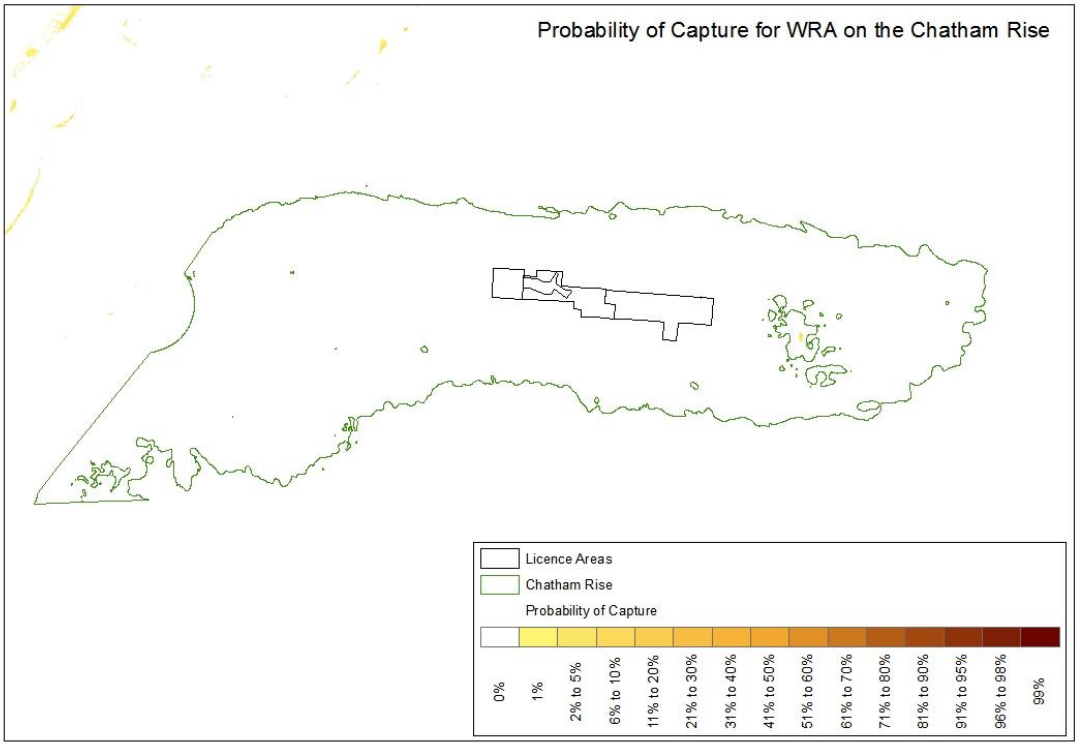

Figure 120: Probability of capture for whiptail ray (Dasyatis thetidis; WRA) on the Chatham Rise.

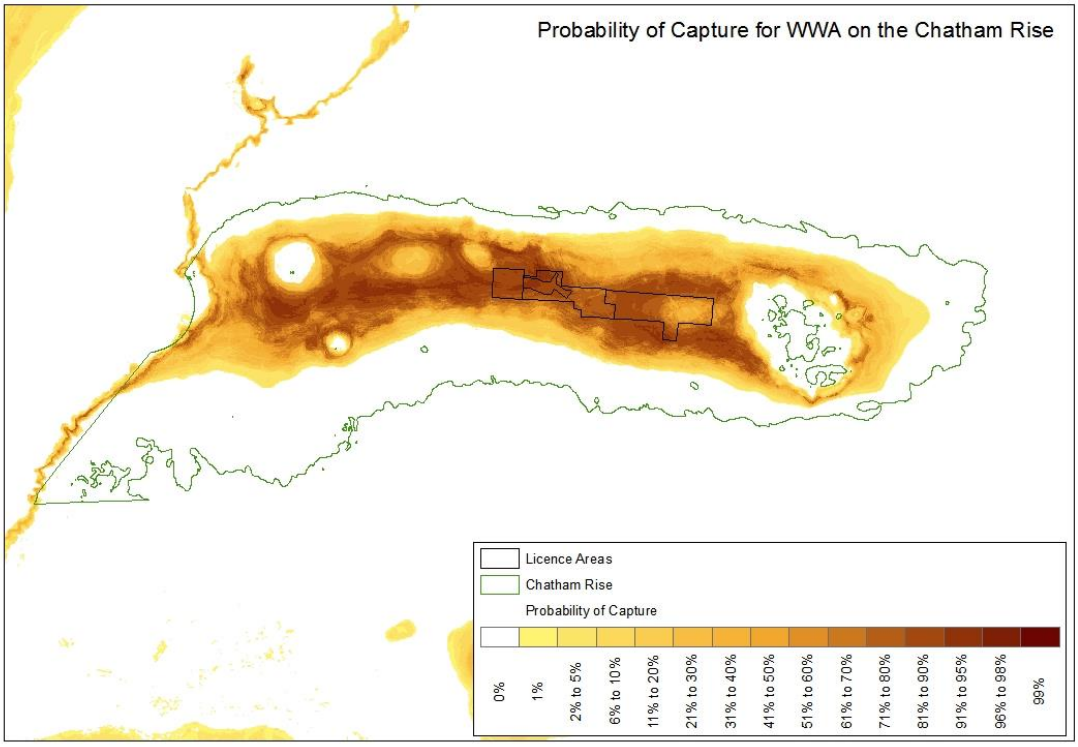

Figure 121: Probability of capture for white warehou (Seriolella caerulea; WWA) on the Chatham Rise.

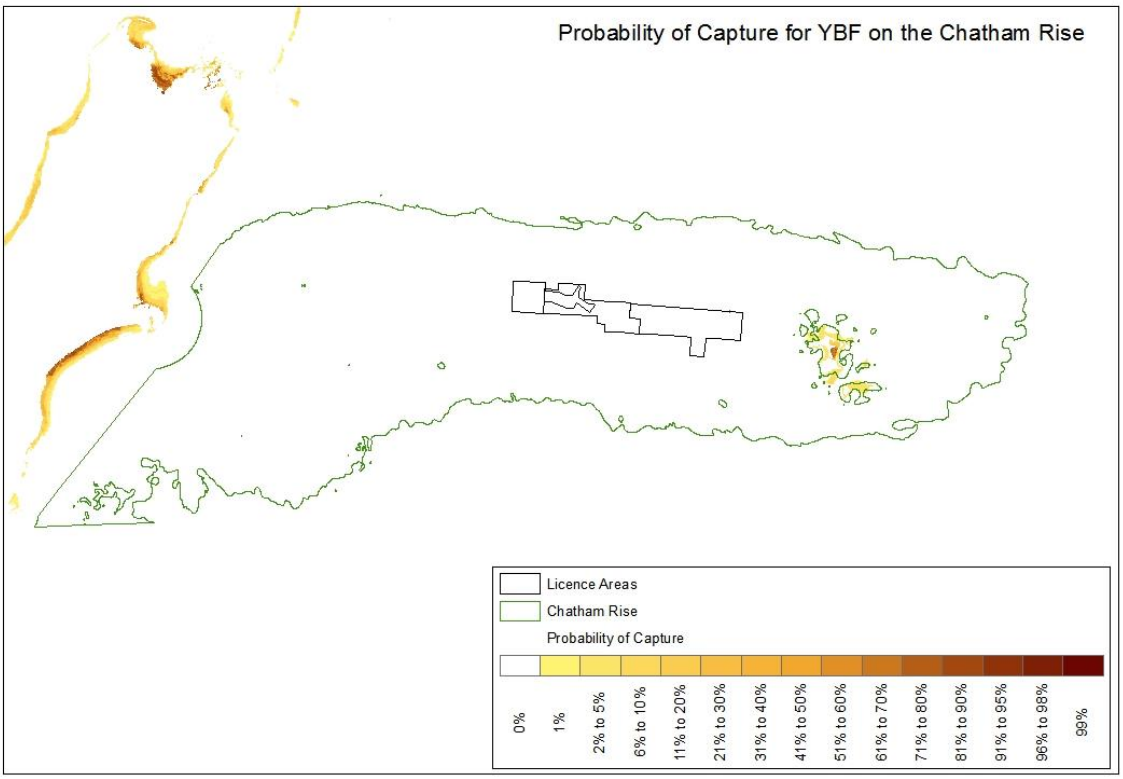

Figure 122: Probability of capture for yellow-belly flounder (Rhombosolea leporine, YBF) on the Chatham Rise.

APPENDIX A

Report Limitations

APPENDIX A
Report Limitations

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