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Abstract

Abstract text

Keywords

Keyword 1, keyword 2, …

Introduction

Write your paper like normal. Add citations like this (NMFS, 2016). Multiple citations like so (Ovaskainen *et al.*, 2016; Thorson *et al.*, 2017). A more complex reference (for details see NWFSC, 2016).

Sometimes you want to put in equations inline, $\sum_{s=1}^{S} \frac{d_s}{r_s} R_s$, where d_s is something you care about, and s, r_s is something else.

Super important equations get their own lines like so:

$$log(\text{Bycatch}) = \alpha + \beta \; log(\text{Effort}) + \epsilon$$

$$\epsilon \sim \mathcal{N}(0, \sigma^2)$$

Methods

Sub-heading

We used data from this region (Fig. 1). Here's a list of species we care about (Table 1), and see Table 2 for a list by year.

Sub-heading 2

More text and equations.

Results

Our big main result

We found some results (Figs. 1 and 2).

Our slightly more subtle result

The main result was cool, but then there is some nuance to show (27% lower averaged across species, Fig. 2).

Discussion

Wow those results were interesting!

Acknowledgements

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References

NMFS. 2016. National bycatch reduction strategy. U.S. Dep. Commer., NOAA, Natl. Mar. Fish. Serv., Silver Spring, MD.

Ovaskainen, O., Roy, D. B., Fox, R., and Anderson, B. J. 2016. Uncovering hidden spatial structure in species communities with spatially explicit joint species distribution models. Methods in Ecology and Evolution, 7: 428–436.

Thorson, J. T., Fonner, R., Haltuch, M. A., Ono, K., and Winker, H. 2017. Accounting for spatiotemporal variation and fisher targeting when estimating abundance from multispecies fishery data. Canadian Journal of Fisheries and Aquatic Science, 74: 1794–1807.

Table 1: Total bycatch (mt) and bycatch rate (percent of hauls) for species selected from the U.S. West Coast Groundfish Observer Program (WCGOP) dataset. All selected species are exclusively discarded. The summarized data are 35,440 post-IFQ hauls (4,007 trips) observed from 2011-2015 in the area north of Cape Falcon, Oregon (45.77° N).

Species	Catch (mt)	% Hauls
Big skate	185.4	12.9
Black skate	72.0	15.2
Brown cat shark	113.4	45.1
California slickhead	32.0	9.2
Dungeness crab	547.9	29.4
Grenadier	452.9	28.8
Octopus	16.9	13.9
Pacific hake	727.9	56.7
Pacific halibut	306.8	31.0
Rosethorn rockfish	3.2	4.2
Sandpaper skate	162.1	50.6
Slender sole	160.5	26.4
Spiny dogfish shark	1216.5	43.3
Spotted ratfish	295.1	42.7
Tanner crab	494.8	39.9

Table 2: Total bycatch (mt) and bycatch rate (percent of hauls) for species selected from the U.S. West Coast Groundfish Observer Program (WCGOP) dataset. All selected species are exclusively discarded. The summarized data are 35,440 post-IFQ hauls (4,007 trips) observed from 2011-2015 in the area north of Cape Falcon, Oregon (45.77° N).

	2011		2012		2013		2014		2015	
Species	Catch (mt)	% Hauls	Catch (mt)	% Hauls	Catch (mt)	% Hauls	Catch (mt)	% Hauls	Catch (mt)	% Hauls
Big skate	25.2	10.2	33.9	10.8	24.1	9.1	68.2	17.9	34.0	18.5
Black skate	18.5	17.3	15.3	14.4	14.0	15.2	13.7	15.3	10.5	13.3
Brown cat shark	19.3	45.6	21.5	43.5	24.3	45.4	25.4	45.4	22.9	45.8
California slickhead	9.3	12.3	6.3	8.1	6.4	9.0	5.3	9.3	4.7	6.7
Dungeness crab	120.1	27.6	137.8	32.7	98.2	25.3	105.0	31.9	86.8	30.7
Grenadier	116.8	34.0	121.9	29.8	108.1	29.8	64.0	26.0	42.0	22.5
Octopus	3.7	15.9	2.8	13.2	4.7	15.4	3.4	13.2	2.4	10.9
Pacific hake	147.6	55.1	165.8	58.2	148.0	54.2	122.7	56.2	143.8	60.7
Pacific halibut	61.0	29.3	62.3	30.3	63.7	27.1	53.8	33.9	65.9	36.2
Rosethorn rockfish	0.7	3.3	0.7	4.5	0.9	5.9	0.8	4.2	0.1	2.5
Sandpaper skate	25.9	44.9	33.0	48.4	35.0	51.8	33.9	53.9	34.3	55.4
Slender sole	18.7	20.7	35.2	23.6	46.7	26.9	31.7	31.3	28.2	31.2
Spiny dogfish shark	268.7	42.5	261.4	46.5	258.0	39.2	262.9	46.9	165.5	42.2
Spotted ratfish	50.7	37.5	58.7	42.3	69.0	41.9	57.3	44.4	59.4	48.8
Tanner crab	136.3	46.3	85.1	38.6	104.2	39.7	84.3	39.4	84.9	34.4

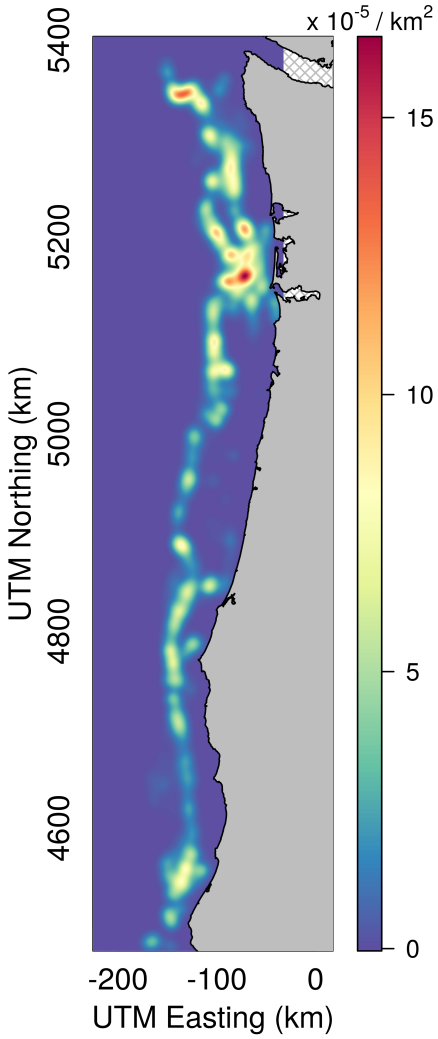

Figure 1: Fishing effort density in the West Coast groundfish trawl fishery from 2011 to 2015 in the area north of Cape Falcon, Oregon (45.77° N). The West Coast Groundfish Observer Program monitored and collected data from 35,440 hauls from all (100 percent) of the 4,007 trips. Fishing effort was smoothed using a bivariate kernel density estimate ('bkde2D' function in R package 'KernSmooth') to ensure that fishing locations were anonymized.

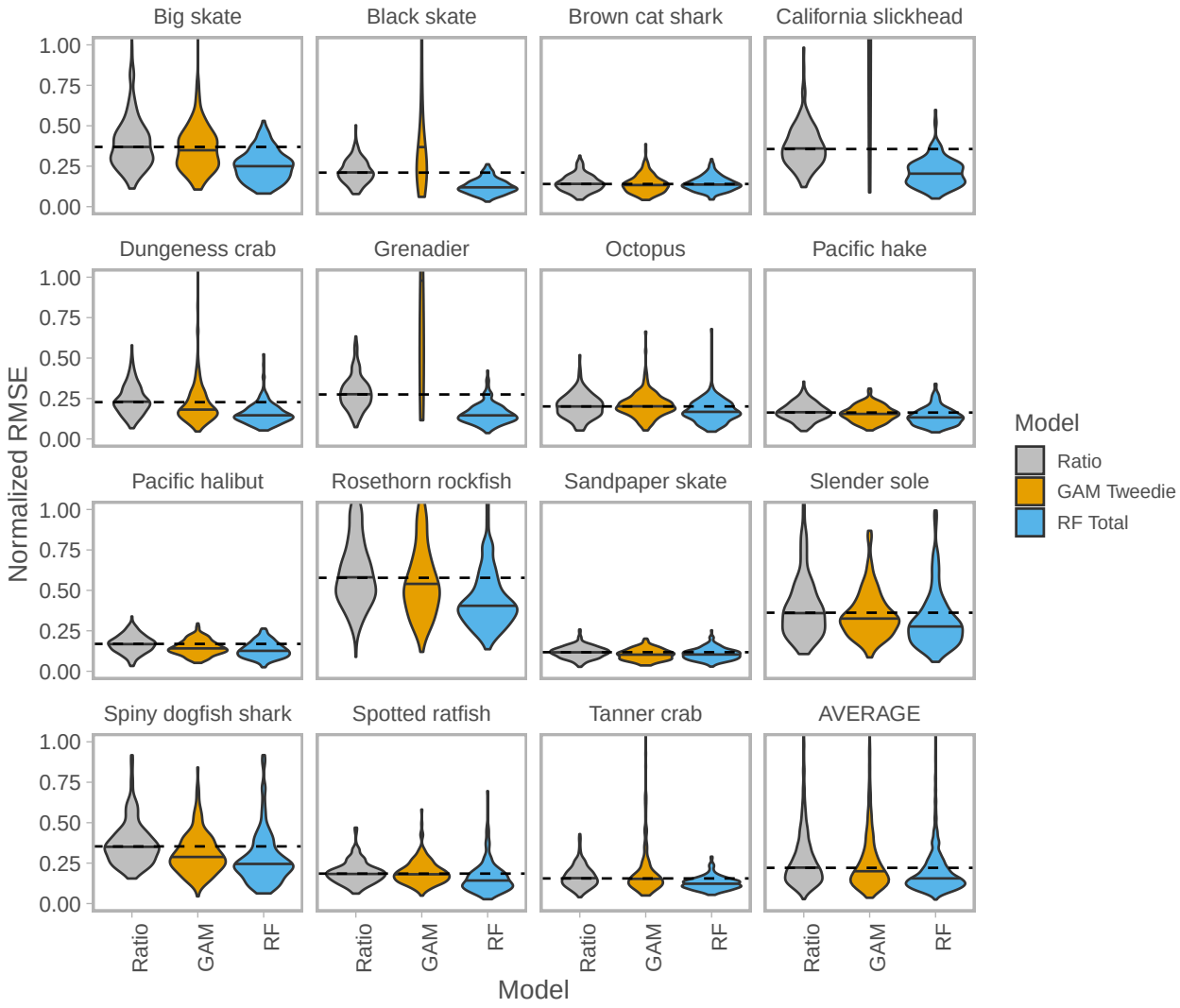

Figure 2: Put your caption here. Watch out for symbols like percent signs because they're protected characters... you can get them in like this: 26%.