Chapter 10: Assessment of Northern Rockfish in the Gulf of Alaska (Executive Summary)

Jonathan Heifetz, Dana Hanselman, S. Kalei Shotwell and James N. Ianelli
November 2008

Introduction

Rockfish are assessed on a biennial stock assessment schedule to coincide with new survey data. We use a separable age-structured model as the primary assessment tool for Gulf of Alaska northern rockfish. This consists of an assessment model, which uses survey and fishery data to generate a historical time series of population estimates and a projection model, which uses results from the assessment model to predict future population estimates and recommended harvest levels. For Gulf of Alaska rockfish in alternate (even) years, we present an executive summary to recommend harvest levels for the next (odd) year. For this off-cycle year, we only updated the 2007 projection model estimates with revised catch data for 2007 and a new catch estimate for 2008. Please refer to last year's full stock assessment, which is available online, for further information regarding the assessment model, (Heifetz et al. 2007, www.afsc.noaa.gov/REFM/docs/2007/GOAnorthern.pdf). A full stock assessment document with updated results for the assessment and projection model will be presented in next year's SAFE report.

Updated catch and projection

New information for this year's projection is updated 2007 catch at 4,187 t and the best estimate of the 2008 catch at 3,904 t. Catch estimates used in last year's model were 3,866 t and 4,550 t for 2007 and 2008, respectively. For the 2009 fishery, we recommend the maximum allowable ABC of 4,363 t from the updated projection. This ABC is similar to that projected in last year's SAFE for 2009 (4,350 t). The corresponding reference values for northern rockfish are summarized in the following table, with the recommended ABC and OFL values in bold. The stock is not overfished, nor is it approaching overfishing status.

Summary	2007 projection: Not Updated		2007 projection: Updated catch*	
Projection Year	2008	2009	**2009**	2010
Tier 3a				
Total Biomass (Age 2+)	93,391	90,672	90,557	88,430
Female Spawning Biomass (t)	29,170	28,180	28,386	27,558
$B_{0\%}$ (t, female spawning biomass)	55,750	--	--	--
$B_{40\%}$ (t, female spawning biomass)	22,300	--	--	--
$B_{35\%}$ (t, female spawning biomass)	19,500	--	--	--
M	0.060	0.060	0.060	0.060
F_{ABC} (maximum allowable = $F_{40\%}$)	0.061	0.061	0.061	0.061
F_{OFL}	0.073	0.073	0.073	0.073
ABC (t, maximum allowable)	4,550	4,350	**4,363**	4,174
OFL (t)	5,430	5,120	**5,204**	4,979

*Projected ABCs and OFLs for 2010 are derived using an expected catch value of 3,761 t for 2009 based on recent ratios of catch to ABC. This calculation is in response to management requests to obtain a more accurate one-year projection.

Area Apportionment

The apportionment percentages are identical to last year, because there is no new survey information. The following table shows the recommended apportionment for 2009.

	Western	Central	Eastern*	Total
Area Apportionment	47.1%	52.9%	0.0%	100%
Area ABC (t)	**2,054**	**2,308**	**1**	**4,363**
Area OFL (t)				**5,204**

*For management purposes, the small ABC of northern rockfish in the Eastern area is combined with other slope rockfish.

Responses to Council, SSC, and Plan Team Comments

The SSC December 2007 minutes included the following comments concerning all stock assessments:

"The SSC notes that the approach for calculating ABC and other biological reference points is not fully described in the SAFE's. It would be desirable to have a general description in the introduction of the SAFE. In each SAFE chapter, specific details could be provided, if the calculation is done differently. For example, the range of years that is used to calculate average recruitment for converting SPR to B_{40} should be given."

We continue to assume that the equilibrium level of recruitment is equal to the average of age 2 recruits from 1979-2005 (year classes between 1977 and 2003) for northern rockfish as detailed in the ABC recommendation of the *Amendment 56 Reference Points* and *ABC recommendation* sections of the *Projections and Harvest Alternatives* of last year's full stock assessment.

The SSC December 2007 minutes included the following comments concerning all rockfish:

"For all of the rockfish assessments, the SSC recognizes the efforts of the stock assessment authors to respond fully to the 2006 CIE review comments. The SSC requests that the draft response to the CIE review be finalized and made available."

The draft response to the 2006 CIE rockfish review is available online at the following web address: ftp://ftp.afsc.noaa.gov/afsc/public/rockfish/RWG%20response%20to%20CIE%20review.pdf

The GOA Plan Team 2007 minutes included the following comments concerning all rockfish:

"Area apportionments for rockfish ABC are a weighted average of previous years' percent exploitable biomass distributions. The Plan Team discussed the merit of exploring the difference that weighting the apportionments by biomass rather than percentages could have on the resultant apportionments. Assessment authors agreed to compare the approaches under different scenarios of biomass distribution."

Please see Appendix A of the Gulf of Alaska Pacific ocean Perch SAFE for a comparison of the effects of weighting proportion or biomass by survey year for determining area apportionment. Simple scenarios assuming no survey error and how that affects bias between the two methods are first presented. This is followed by simulations exploring varying levels of survey error and results on stability.

The SSC December 2007 minutes included the following comments concerning Pacific ocean perch which we determined also concern northern rockfish:

"The SSC requests that the authors include plots of the spatial distribution of the catch in future assessments. The SSC also requests that the tables of commercial catch should include estimates of discard as well as retained catch."

Historical maps of northern rockfish observed catch (kg) for all gear types are provided from 1993 through 2007 (Figures 10.1 – 10.5). Data are available online from Fisheries Monitoring and Analysis Division (FMA, Observer program) at www.afsc.noaa.gov/FMA/spatial_data.htm. Catches are aggregated in 10 km x 10 km (100 km^2) cell blocks and cells representing less than three vessels for a given gear type and year are not provided due to confidentiality issues. Description and appropriate usage of data are available on the webpage given above. Spatial distribution of northern rockfish catch is extremely patchy. Large catches occurred in the mid 1990s in the Albatross Bank region followed by fairly low catches until recently. Catch distribution has spread somewhat to the western GOA in the most recent years (2005-2007) with moderate increases.

Gulfwide discard rates (% discarded) are provided in a separate table embedded in the main text of the full stock assessment (please see the discard rates table of the *Fishery* section in the *Introduction* of last year's full stock assessment, www.afsc.noaa.gov/REFM/docs/2007/GOAnorthern.pdf). We intend to also include these estimates of discard rate in the catch table for the full assessment next year.

Research Priorities

It is critically important to rockfish stock assessments that the GOA trawl surveys continue and that they extend into deeper waters (>300m) in order to cover the range of primary habitat for rockfish. There is little information on larval, post-larval, or early juvenile stages of rockfish. Habitat requirements for these stages are mostly unknown. Research on early life history parameters and essential habitat for these early life stages is vital to effective management of rockfish.

Summaries for Plan Team

Species	Year	Biomass[1]	OFL	ABC	TAC	Catch[2]
Northern rockfish	2007	94,271	5,890	4,938	4,938	4,187
	2008	93,391	5,430	4,549	4,549	3,904
	2009	90,557	5,204	4,362		
	2010	88,430	4,979	4,173		

[1]Biomass estimates from the age structured model, 2008 and 2009 values are for total biomass (age 2+).

Stock/ Assemblage	Area	2008 OFL	ABC	TAC	Catch[2]	2009 OFL	ABC	2010 OFL	ABC
Northern rockfish	W		2,141	2,141	1,851		2,054		1,965
	C		2,408	2,408	2,053		2,308		2,208
	E*								
	Total	5,430	4,549	4,549	3,904	5,204	4362	4,979	4,173

[2]Current as of October 14, 2008 (http://www.fakr.noaa.gov)

* For management purposes, the small ABC for northern rockfish in the Eastern Gulf of Alaska is combined with other slope rockfish.

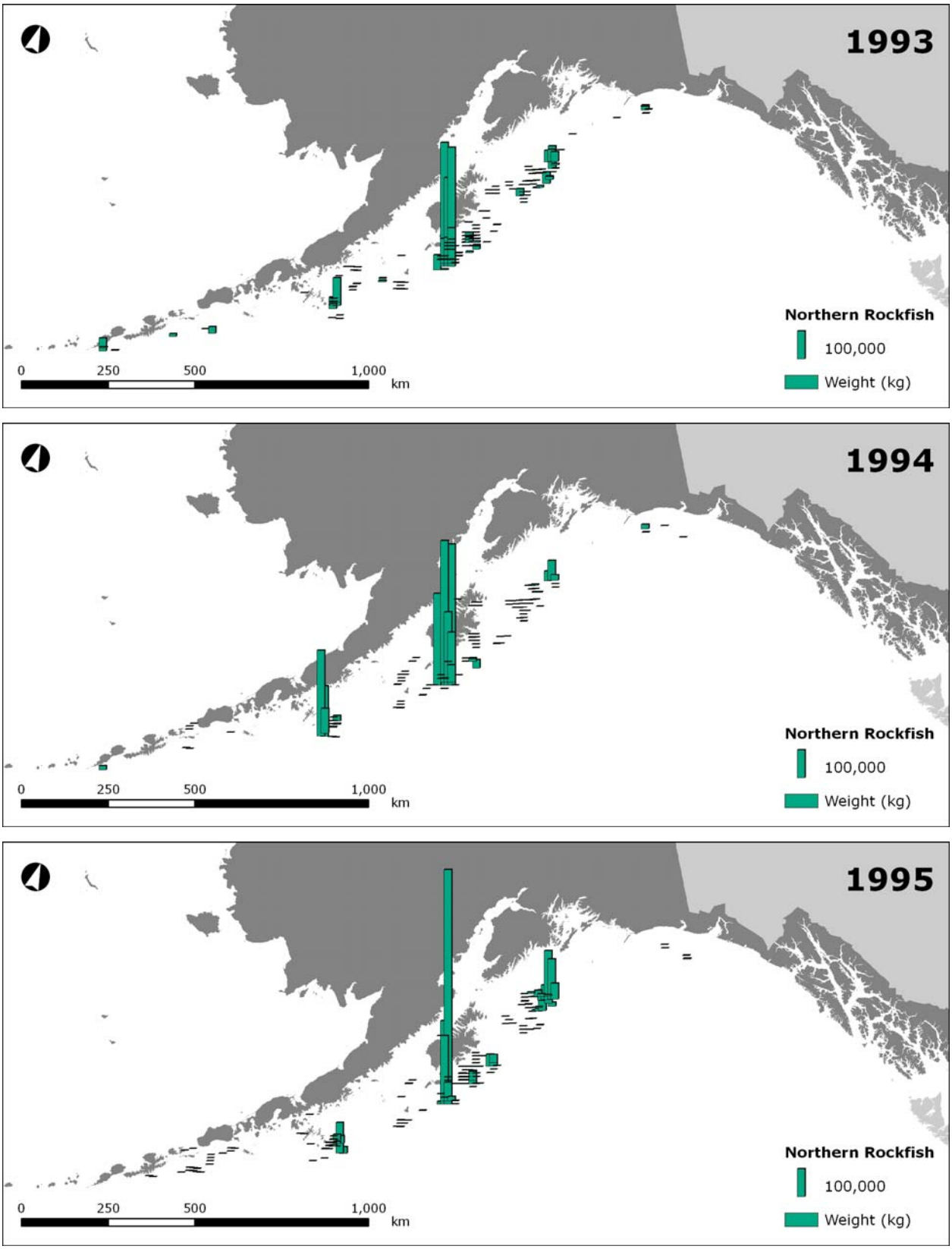

Figure 10.1: Maps of fishery catch based on observer data by 100 km^2 blocks for catch of northern rockfish from 1993-1995.

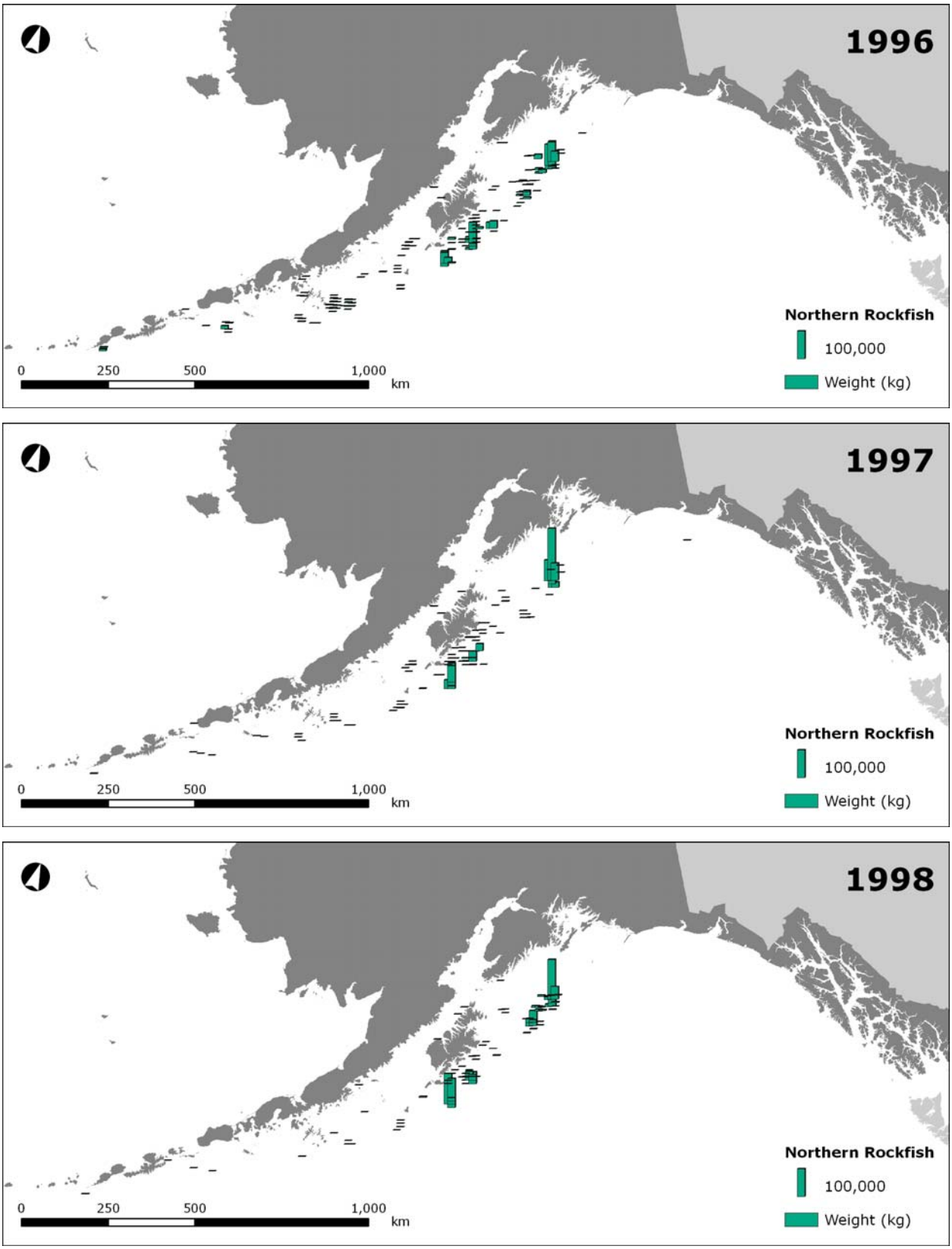

Figure 10.2: Maps of fishery catch based on observer data by 100 km^2 blocks for catch of northern rockfish from 1996-1998.

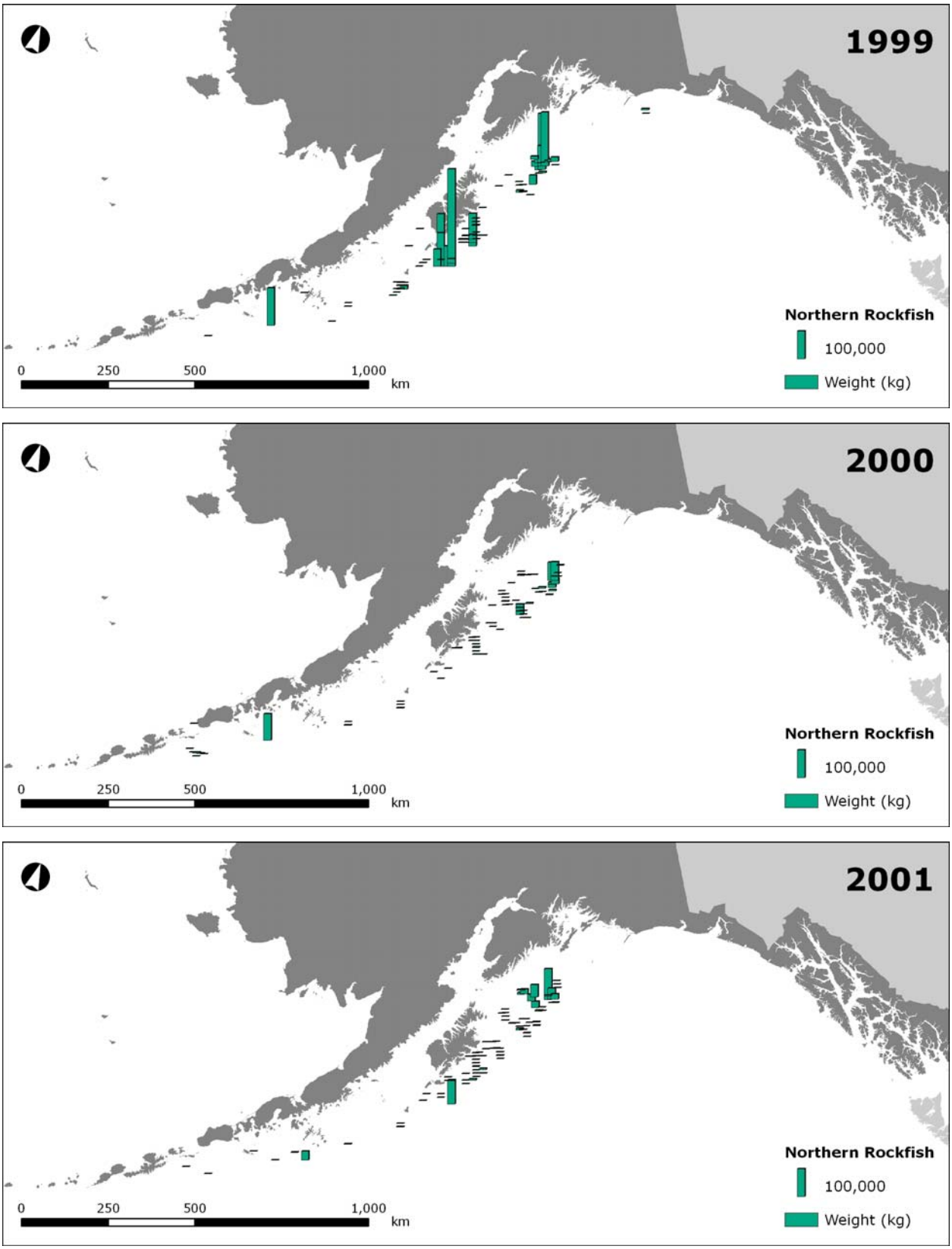

Figure 10.3: Maps of fishery catch based on observer data by 100 km^2 blocks for catch of northern rockfish from 1999-2001.

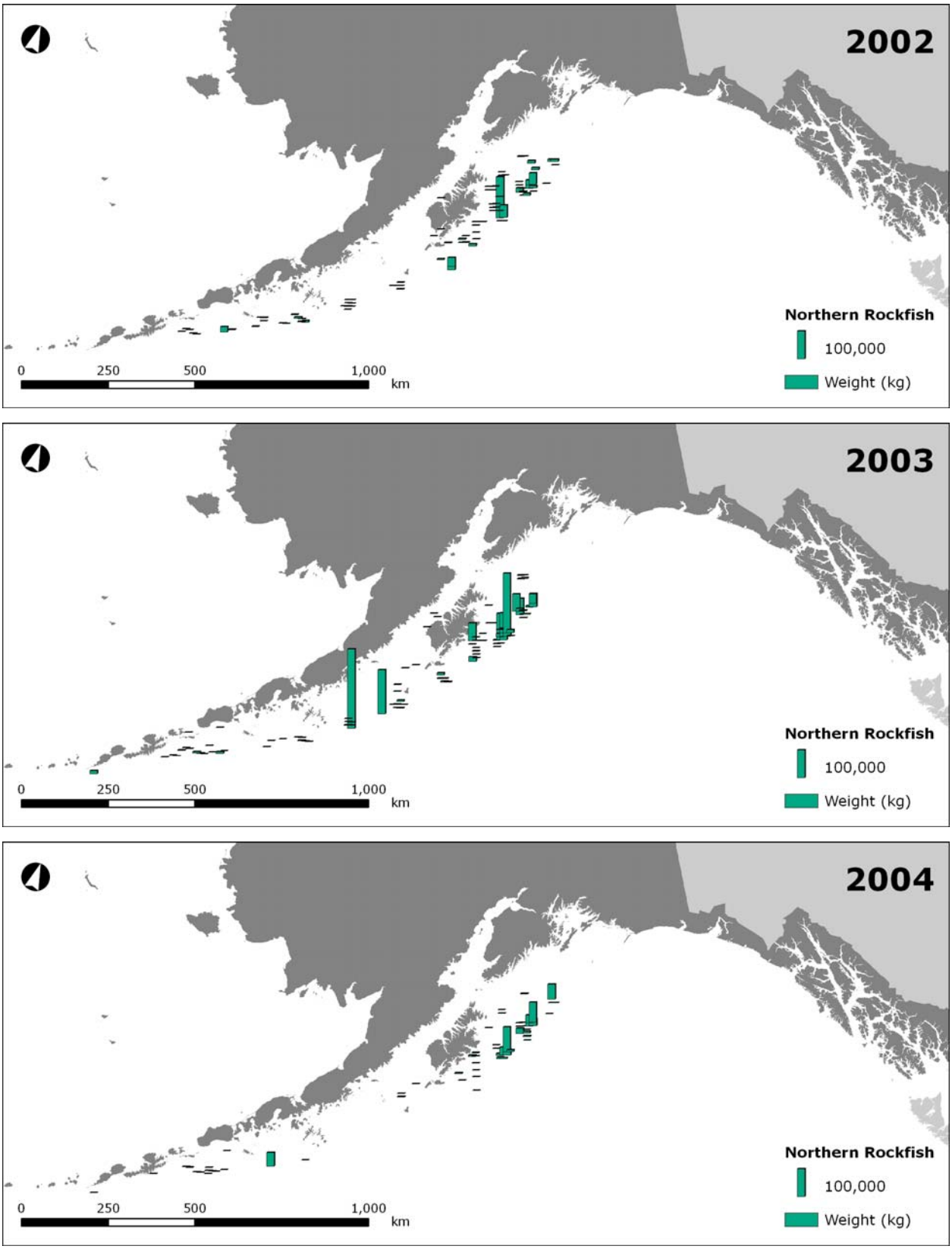

Figure 10.4: Maps of fishery catch based on observer data by 100 km^2 blocks for catch of northern rockfish from 2002-2004.

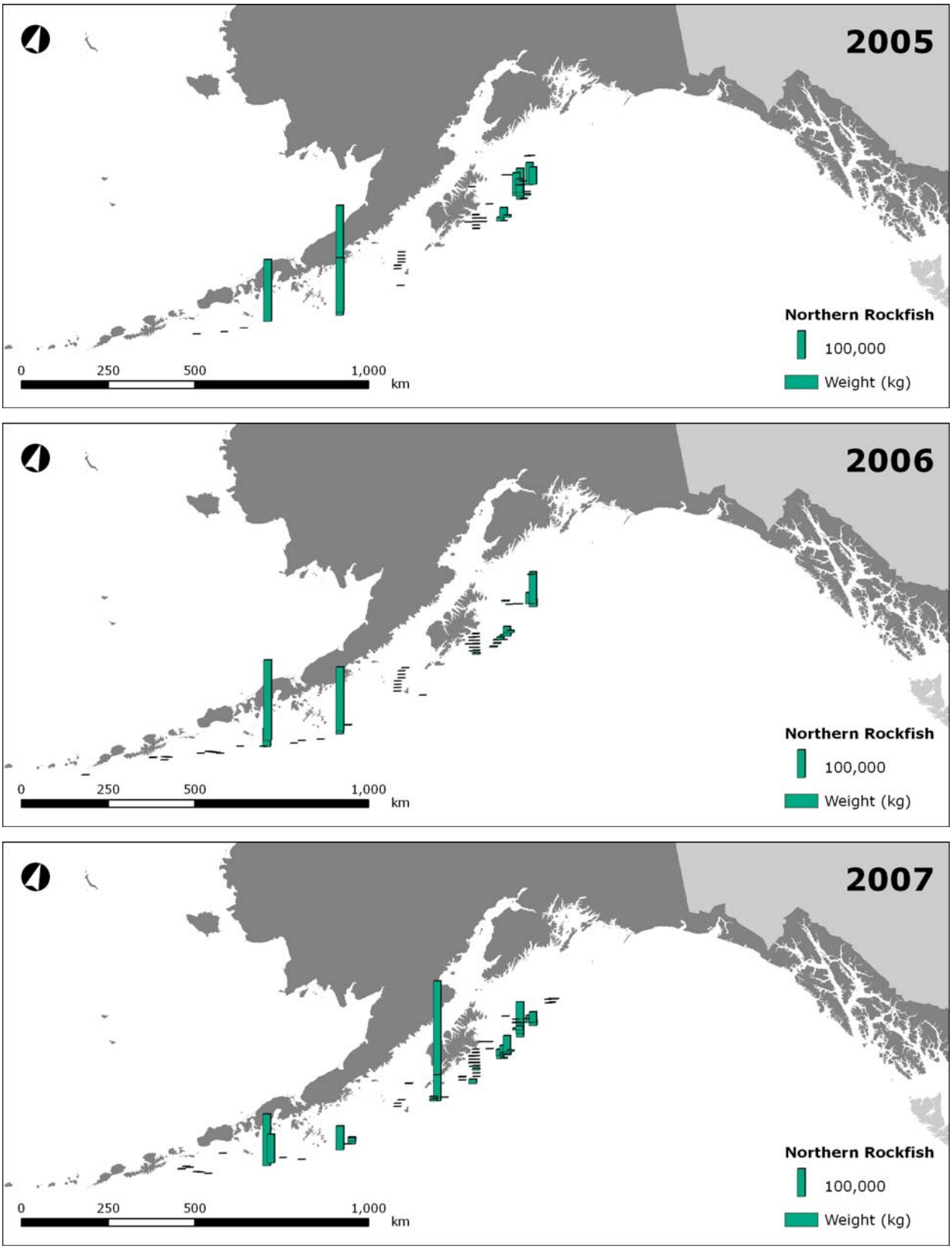

Figure 10.5: Maps of fishery catch based on observer data by 100 km^2 blocks for catch of northern rockfish from 2005-2007.