

Trends in Subsistence Harvests of Ice Seals in the Yukon-Kuskokwim Delta Region, Alaska, 1962–2018

Justin Olnes,^{1,2} Lori Quakenbush,¹ Mark Nelson,¹ Albert Simon,³ John Burns^{1,4} and the Ice Seal Committee⁵

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SUPPLEMENT: ADDITIONAL TABLES AND FIGURES

TABLE S1. Primary sources of data from household surveys of ice seal harvests and whether struck and lost seals are included in annual estimates.

Community	Year	Source	Struck and lost included?
Eek	2013	Ikuta et al., 2016	No
Emmonak	1997	Coffing et al., 1998	Yes
	1998	Coffing et al., 1999	Yes
	2008	Fall et al., 2012	No
	2011	Nelson, 2012	Yes
Hooper Bay	1997	Coffing et al., 1998	Yes
	1998	Coffing et al., 1999	Yes
	2008–18	Olnes et al., 2020	Yes
Quinhagak	1997	Coffing et al., 1998	Yes
	1998	Coffing et al., 1999	Yes
	2008, 2010–14, 2016	Nelson et al., 2018a	Yes
Scammon Bay	2011–12	Nelson and Kaganak, 2013	Yes
	2013	Ikuta et al., 2016	No
Tuntutuliak	2013	Ikuta et al., 2016	No
Tununak	2008–12, 2016	Nelson et al., 2018b	Yes

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¹ Alaska Department of Fish and Game, 1300 College Road, Fairbanks, Alaska 99701, USA

² Corresponding author: justin.olnes@alaska.gov

³ Hooper Bay, Alaska 99604, USA

⁴ Retired.

⁵ <http://www.iceseals.org>

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TABLE S2. Statistical information for trend analysis of the total harvest in 16 Yukon-Kuskokwim Delta region communities during the bounty period (1962–72). Models were performed in a generalized linear framework using a Poisson distribution and a log link function. Final model results are shown in Figure S2. The top model is in bold type.

Model selection	Model	AIC	d.f.	Deviance R-squared
	year	3558.71	2	
	community	6067.87	16	
	community + year	5795.72	17	
	community × year	5183.78	32	0.87
Significance tests	Variable	χ^2	d.f.	<i>p</i> -value
	year	274.10	1	< 0.001
	community	29793.00	15	< 0.001
	interaction term	641.90	15	< 0.001
Trend terms	Community	Trend (±)	Trend <i>p</i> -value	
	Emmonak	+	1.00	
	Alakanuk	–	0.001	
	Scammon Bay	–	0.06	
	Hooper Bay	+	< 0.001	
	Chevak	–	< 0.001	
	Tununak	+	< 0.001	
	Nightmute	–	0.74	
	Tuntutuliak	+	< 0.001	
	Eek	+	< 0.001	
	Mekoryuk	+	< 0.001	
	Chefornak	+	< 0.001	
	Kipnuk	+	< 0.001	
	Kwigillingok	+	< 0.001	
	Quinhagak	+	< 0.001	
	Goodnews Bay	–	< 0.001	
	Platinum	–	< 0.001	

TABLE S3. Statistical information for trend analysis of the total harvest for Hooper Bay, Tununak, and Quinhagak during 2008–18. Models were performed in a generalized linear framework using a Poisson distribution and a log link function. The top model is in bold type.

Model selection	Model	d.f.	AIC	Deviance R-squared
	year	2	4416.60	
	community	3	2060.79	
	community + year	4	1590.91	
	community × year	6	1577.50	0.68
Significance tests	Variable	χ^2	d.f.	<i>p</i> -value
	year	323.01	1	< 0.001
	Community	17.03	2	< 0.001
	Interaction term	17.41	2	< 0.001
Trend terms	Community	Trend (±)	Trend <i>p</i> -value	
	Hooper Bay	–	< 0.001	
	Tununak	–	< 0.001	
	Quinhagak	–	< 0.001	

TABLE S4. Statistical information for trend analysis of the per capita harvest for Hooper Bay, Tununak, and Quinhagak during 2008–18. Models were performed in a generalized linear framework using a Poisson distribution and a log link function. To model the per capita harvest, the log of the human population was applied as an offset in the model. The top model is in bold type.

Model selection	Model	d.f.	AIC	Deviance R-squared
	year	2	2141.13	
	community	3	2242.31	
	community + year	4	1597.18	
	community × year	6	1561.28	0.47
Significance tests	Variable	χ^2	d.f.	<i>p</i> -value
	year	647.13	1	< 0.001
	Community	547.95	2	< 0.001
	Interaction term	39.90	2	< 0.001
Trend terms	Community	Trend (±)	Trend <i>p</i> -value	
	Hooper Bay	–	< 0.001	
	Tununak	–	< 0.001	
	Quinhagak	–	< 0.001	

TABLE S5. Statistical information for trend analysis of the total harvest of ringed seals for Hooper Bay, Tununak, and Quinhagak during 2008–18. Models were performed in a generalized linear framework using a Poisson distribution and a log link function. The top model is in bold type.

Model selection	Model	d.f.	AIC	Deviance R-squared
	year	2	4225.20	
	community	3	1672.51	
	community + year	4	1447.51	
	community × year	6	1443.02	0.69
Significance tests	Variable	χ^2	d.f.	<i>p</i> -value
	year	180.18	1	< 0.001
	Community	8.32	2	0.01
	Interaction term	8.48	2	0.01
Trend terms	Community	Trend (±)	Trend <i>p</i> -value	
	Hooper Bay	–	< 0.001	
	Tununak	–	< 0.001	
	Quinhagak	–	< 0.001	

TABLE S6. Statistical information for trend analysis of the total harvest of bearded seals for Hooper Bay, Tununak, and Quinhagak during 2008–18. Models were performed in a generalized linear framework using a Poisson distribution and a log link function. The top model is in bold type.

Model selection	Model	d.f.	AIC	Deviance R-squared
	year	2	1467.47	
	community	3	448.887	
	community + year	4	366.08	0.83
	community × year	6	369.23	
Significance tests	Variable	χ^2	d.f.	<i>p</i> -value
	year	84.79	1	< 0.001
	Community	1105.39	2	< 0.001
Trend terms	Community	Trend (±)	Trend <i>p</i> -value	
	Hooper Bay	–	< 0.001	
	Tununak	–	< 0.001	
	Quinhagak	–	< 0.001	

TABLE S7. Statistical information for trend analysis of the total harvest of spotted seals for Hooper Bay, Tununak, and Quinhagak during 2008–18. Models were performed in a generalized linear framework using a Poisson distribution and a log link function. The top model is in bold type.

Model selection	Model	d.f.	AIC	Deviance R-squared
	year	2	548.28	
	community	3	579.21	
	community + year	4	372.11	0.63
	community × year	6	374.27	
Significance tests	Variable	χ^2	d.f.	<i>p</i> -value
	year	209.10	1	< 0.001
	Community	180.16	2	< 0.001
Trend terms	Community	Trend (±)	Trend <i>p</i> -value	
	Hooper Bay	–	< 0.001	
	Tununak	–	< 0.001	
	Quinhagak	–	< 0.001	

TABLE S8. Statistical information for trend analysis of the percentage of households that hunted ringed seals at Hooper Bay, Tununak, and Quinhagak during 2008–18. Models were performed in a generalized linear framework using a binomial distribution and a logit link function. The top model is in bold type.

Model selection	Model	d.f.	AIC	Deviance R-squared
	year	2	248.82	
	community	3	216.85	
	community + year	4	207.42	
	community × year	6	204.58	0.47
Significance tests	Variable	χ^2	d.f.	<i>p</i> -value
	year	3.40	1	0.06
	Community	7.22	2	0.02
	Interaction term	7.23	2	0.02
Trend terms	Community	Trend (±)	Trend <i>p</i> -value	
	Hooper Bay	–	0.06	
	Tununak	–	0.02	
	Quinhagak	–	0.001	

TABLE S9. Statistical information for trend analysis of the percentage of households that used ringed seals at Hooper Bay, Tununak, and Quinhagak during 2008–18. Models were performed in a generalized linear framework using a binomial distribution and a logit link function. The top model is in bold type.

Model selection	Model	d.f.	AIC	Deviance R-squared
	year	2	923.63	
	community	3	399.56	
	community + year	4	254.53	0.85
	community × year	6	257.71	
Significance tests	Variable	χ^2	d.f.	<i>p</i> -value
	year	149.00	1	< 0.001
	Community	673.98	2	< 0.001
Trend terms	Community	Trend (±)	Trend <i>p</i> -value	
	Hooper Bay	–	< 0.001	
	Tununak	–	< 0.001	
	Quinhagak	–	< 0.001	

TABLE S10. Statistical information for trend analysis of the percentage of households that hunted bearded seals at Hooper Bay, Tununak, and Quinhagak during 2008–18. Models were performed in a generalized linear framework using a binomial distribution and a logit link function. The top model is in bold type.

Model selection	Model	d.f.	AIC	Deviance R-squared
	year	2	294.11	
	community	3	223.57	
	community + year	4	220.68	0.44
	community × year	6	221.33	
Significance tests	Variable	χ^2	d.f.	<i>p</i> -value
	year	4.66	1	0.03
	Community	77.68	2	< 0.001
Trend terms	Community	Trend (±)	Trend <i>p</i> -value	
	Hooper Bay	–	0.03	
	Tununak	–	0.03	
	Quinhagak	–	0.03	

TABLE S11. Statistical information for trend analysis of the percentage of households that used bearded seals at Hooper Bay, Tununak, and Quinhagak during 2008–18. Models were performed in a generalized linear framework using a binomial distribution and a logit link function. The top model is in bold type.

Model selection	Model	d.f.	AIC	Deviance R-squared
	year	2	1303.86	
	community	3	555.71	
	community + year	4	253.26	
	community × year	6	239.42	0.91
Significance tests	Variable	χ^2	d.f.	<i>p</i> -value
	year	287.79	1	< 0.001
	Community	17.26	2	< 0.001
	Interaction term	16.94	2	< 0.001
Trend terms	Community	Trend (±)	Trend <i>p</i> -value	
	Hooper Bay	–	< 0.001	
	Tununak	–	< 0.001	
	Quinhagak	–	0.02	

TABLE S12. Statistical information for trend analysis of the percentage of households that hunted spotted seals at Hooper Bay, Tununak, and Quinhagak during 2008–18. Models were performed in a generalized linear framework using a binomial distribution and a logit link function. The top model is in bold type.

Model selection	Model	d.f.	AIC	Deviance R-squared
	year	2	216.33	
	community	3	161.37	
	community + year	4	154.70	0.65
	year × community	6	157.14	
Significance tests	Variable	χ^2	d.f.	<i>p</i> -value
	year	8.48	1	0.003
	Community	65.57	2	< 0.001
Trend terms	Community	Trend (±)	Trend <i>p</i> -value	
	Hooper Bay	–	0.003	
	Tununak	–	0.003	
	Quinhagak	–	0.003	

TABLE S13. Statistical information for trend analysis of the percentage of households that used spotted seals at Hooper Bay, Tununak, and Quinhagak during 2008–18. Models were performed in a generalized linear framework using a binomial distribution and a logit link function. The top model is in bold type.

Model selection	Model	d.f.	AIC	Deviance R-squared
	year	2	414.76	
	community	3	219.44	
	year + community	4	197.71	
	community × year	6	182.83	0.83
Significance tests	Variable	χ^2	d.f.	<i>p</i> -value
	year	1.67	1	0.19
	Community	19.05	2	< 0.001
	Interaction term	18.87	2	< 0.001
Trend terms	Community	Trend (±)	Trend <i>p</i> -value	
	Hooper Bay	–	0.19	
	Tununak	–	< 0.001	
	Quinhagak	–	< 0.001	

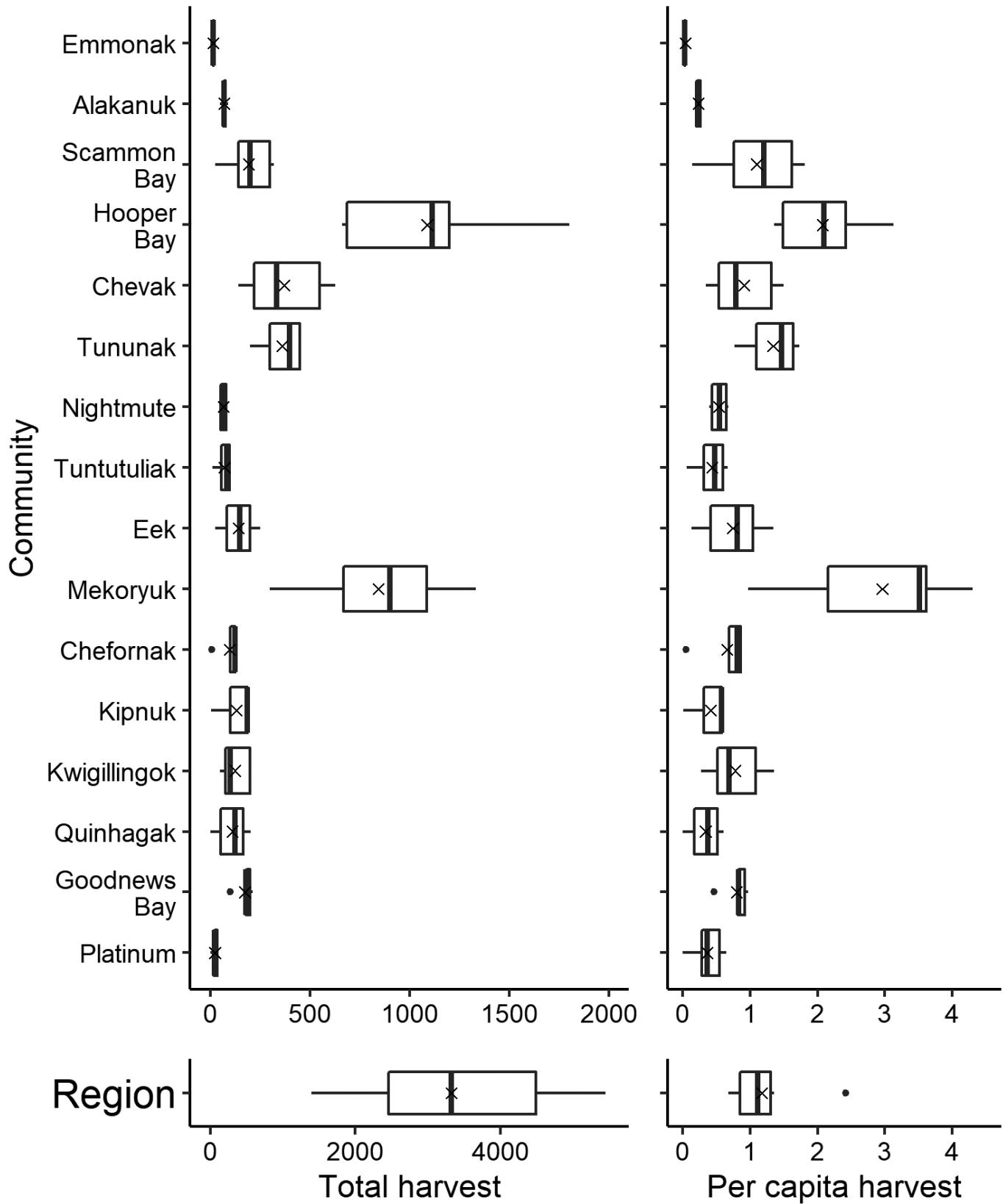


FIG. S1. Community and regional annual total and per capita ice seal (ringed, bearded, spotted, and ribbon combined) harvests for the Yukon-Kuskokwim Delta region reported during the 1962–72 bounty period. Communities are listed from north to south. Note different x-axis scale for total harvest. “x” symbols are the mean, thick vertical lines are the median, and boxes are the interquartile range for each sample.

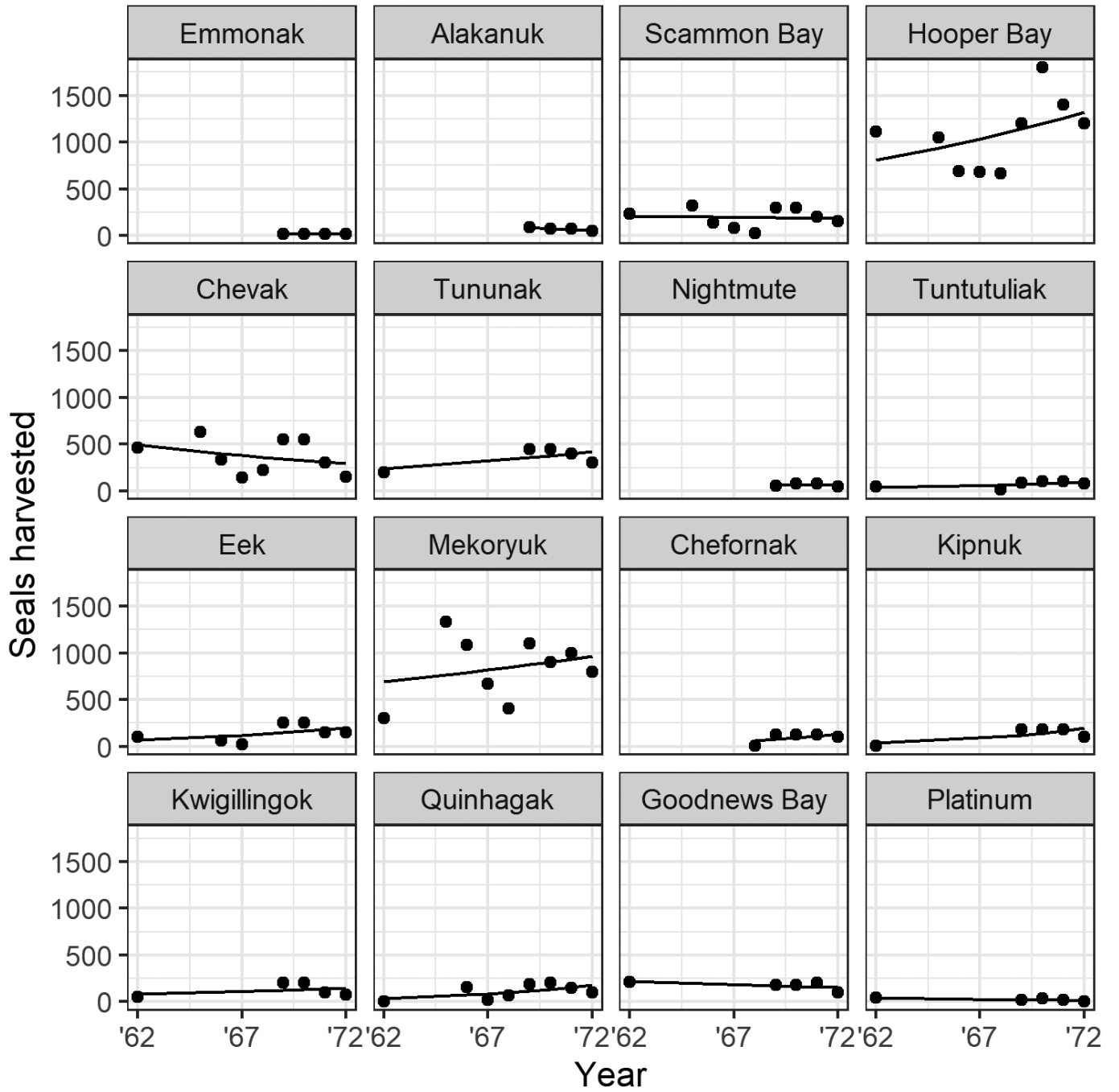


FIG. S2. Total harvests during bounty period (1962–72) for 16 Yukon-Kuskokwim region communities. Trendlines are from top fitted model in Table S2.

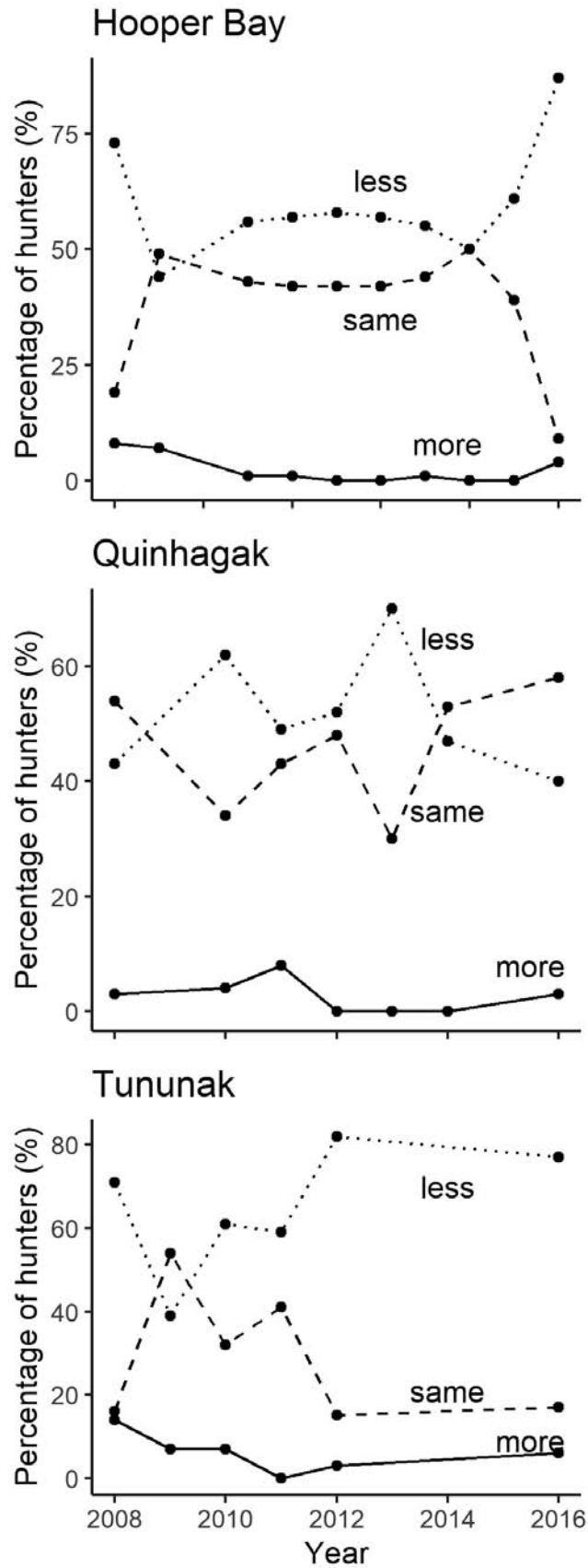


FIG. S3. Responses of Hooper Bay, Quinhagak, and Tununak active hunters by year about whether they hunted more, the same, or less than in prior years.