Regional Information Report No. 1J20-11

2019 Golden King Crab Stock Status and Management Plan for the 2019/2020 Season

by

Joseph Stratman

June 2020

Alaska Department of Fish and Game **Division of Commercial Fisheries**

Symbols and Abbreviations

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Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Measures (fisheries)

fork length	FL
mideye-to-fork	MEF
mideye-to-tail-fork	METF
standard length	SL
total length	TL

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	E
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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ABSTRACT

This report provides a summation of the history of the golden king crab, *Lithodes aequispinus,* fishery, an overview of available data sources and recent management actions, and a review of recent season's fishery dependent data including commercial and personal use fishery recommendations by management area for the 2019/2020 season. The golden king crab fishery in Registration Area A (Southeast Alaska) is managed in seven distinct management areas including Mid-Chatham Strait, East Central, North Stephens Passage, Northern, Icy Strait, Lower Chatham Strait, and Southern.

Key words: golden king crab, GKC, *Lithodes aequispinus*, guideline harvest range, GHR, guideline harvest level, GHL, catch per unit effort, CPUE, 2019/2020 season, Registration Area A, Southeast Alaska.

INTRODUCTION

AREA DESCRIPTION

Golden king crab (*Lithodes aequispinus,* GKC) is managed within all waters of Registration Area A as described in 5 AAC 34.107.

OVERVIEW

The Alaska Department of Fish and Game (department) evaluates stock status and establishes guideline harvest levels (GHLs) for each management area using fishery dependent data including: catch per unit of effort (CPUE), harvest and biological information (carapace length, weight, and maturity) from dockside sampling landings. No population abundance estimates are obtained for GKC stocks.

Harvests of GKC in Southeast (SE) Alaska have fluctuated widely since the development of the fishery in the early 1970s (Figure 1). Harvests reached peak levels in the 1980s, followed by a collapse in the early 1990s. The fishery performance substantially improved with strong increases in recruitment beginning around 1999 and harvests were at relatively high levels from the 1999/2000 to 2010/2011 seasons. Harvests of GKC have steadily declined since the 2010/2011 season. The fishery is currently managed in seven separate management areas, each with a specific guideline harvest range (GHR) and GHL. These areas include: Northern, Icy Strait, North Stephens Passage, East Central, Mid-Chatham Strait, Lower Chatham Strait, and Southern (Figure 2).

2019/2020 GOLDEN KING CRAB SEASON

MANAGEMENT ACTION SUMMARY

The department reviewed available data from fish tickets, logbooks, and dockside sampling for each of the seven GKC management areas in advance of the 2019/2020 season. Based on that review, the Northern, East Central, Mid-Chatham Strait, and Lower Chatham Strait management areas were closed for the 2019/2020 season. GHLs for the North Stephens Passage and Southern management areas were increased (Table 1). The GHL for the Icy Strait management area remained unchanged from the 2019/2020 season.

The Northern, East Central, Mid-Chatham Strait, and Lower Chatham Strait management areas were closed for the 2019/2020 season in response to continued and historically low fishery performance and concern for the long-term reproductive potential of GKC. GKC are vulnerable to overexploitation once fished below sustainable levels given their slow growth and late maturation. In prior seasons, the department has continued to implement reductions in GHLs and closing management areas before harvest has reached GHLs. However, fishery performance has declined to historical lows for a longer duration than experienced during the 1990s collapse, warranting

further management action to rebuild these stocks and ensure sustainable fisheries in the future. The department evaluates the need for inseason closures based on analyses of logbook, fish ticket, and dockside sampling data. In the absence of this information, a more conservative approach is necessary. GHL reductions or preseason closures in future seasons are likely if commercial fishery catch rates do not increase and if stocks in these areas continue to experience poor recruitment.

DATA SOURCES AND LIMITATIONS

There is no fishery-independent stock assessment research for GKC in SE Alaska although some limited size and sex data of GKC bycatch in the annual Tanner crab survey in the North Stephens Passage management area has been collected. All data currently available to assess GKC in SE are fishery dependent. Each data type (commercial fishery CPUE and dockside sampling) has specific limitations. Commercial fishery CPUE, based on logbook data, provides a broad view of fishery performance, but has the additional limitations of potential reporting errors (e.g., numbers of crab, pots lifted, etc.). To date, individual pot soak time has not been recorded on fish tickets or logbooks, so soak time has not been factored into catch/pot or catch/pot/day calculations. Dockside sampling is used to estimate the percent of recruit and post-recruit crab harvested annually. The validity of dockside sampling data depends to a great degree on the number of trips sampled each season. Dockside information on changes in the proportion of recruit to post-recruit crabs is difficult to interpret, especially at low harvest levels. Although significant carry-over of post-recruits is desirable, pulsed recruitment and changes in population abundance, confounds the interpretation of changes in proportions. For these reasons, data are highly variable, and there is less predictive power and a potential for failing to detect signs of recruitment failure. It is possibly a reflection of this high background risk level that the fishery has in the last nineteen years recovered from a designation of "Collapsed and Recovering" (ADF&G 2002). For each of the seven management areas, fishery data are summarized in Tables 1–7. The data available for each management area, including trends in logbook CPUE, recruit composition of harvest, and GKC bycatch data are provided in Figures 3–18.

Averages referenced in relation to CPUE data are calculated using all seasons (except the most recent) since the inception of logbook requirements (1999/2000 through 2017/2018 seasons). Averages referenced in percentage by recruit class from dockside sampling data are calculated using all available data except the most recent season.

MANAGEMENT AREA UPDATES AND RECOMMENDATIONS

MID-CHATHAM STRAIT

The 2018/2019 season harvest for this area was 4,481 lb (Table 2). The area was open for 111 days (Table 3) and was closed short of its GHL due to a continued decline in fishery performance and recruitment on June 2, 2019. Three permit holders participated in the fishery with a total of 525 pot lifts (Table 4). The 2018/2019 logbook CPUE was 1.3 crabs per pot, which is below the average of 3.3 crabs per pot (Table 5, Figure 3). The estimated GKC harvest per boat per day of 13 pounds was the second lowest on record (Table 6). Dockside sampling data, proportion of recruits and post-recruits, show current recruit percentage (36%) lower than the average (37%) and post-recruit percentage (64%) higher than the average (63%) (Table 7, Figure 4).

The Mid Chatham management area **CLOSED** for the 2019/2020 fishing season for several reasons:

- The 2018/2019 season was closed early after 111 days of fishing by emergency order due to stock health concerns related to continued poor fishery performance.
- The logbook CPUE of 1.3 crabs per pot was below the average of 3.3 and the second lowest CPUE on record (Table 5, Figure 3).
- The catch per boat per day of 13 lb was well below the average of 112 lb and the second lowest catch per boat per day on record (Table 6).
- Dockside sampling proportion recruit recruit data are similar to the average, but suggest no recent recruitment (Table 7, Figure 4).

The GHL was reduced 50% prior to the 2015/2016 season, reduced 50% prior to the 2016/2017 season, reduced 50% prior to the 2017/2018 season, and reduced 20% prior to the 2018/2019 season. Despite these drastic GHL reductions in the last few seasons, the department has been unable to set a GHL that the stocks in this area can support. The record poor fishery performance, most notably the poorest CPUE in history, lead to the 2019/2020 season closure for commercial and personal use fishing.

EAST CENTRAL

The East Central GKC fishery has historically been the most important area in terms of total harvest for SE Alaska. From the 1999/2000 to 2018/2019 seasons, approximately 42% of the total regional GKC harvest has come from this management area.

The 2018/2019 season harvest for this area was 6,749 lb (Table 2). The area was open for 64 days (Table 3) and was closed short of its GHL due to a decline in fishery performance and recruitment on April 16, 2019. Six permit holders participated in the fishery with a total of 1,124 pot lifts (Table 4). The 2018/2019 logbook CPUE was 0.9 crabs per pot, which is below the average of 3.4 crabs per pot (Table 5, Figure 5). The estimated GKC harvest per boat per day of 18 pounds was the second lowest on record (Table 6). Dockside sampling data, proportion of recruits and post-recruits, show current recruit percentage (70%) higher than the average (36%) and post-recruit percentage (29%) lower than the average (63%) (Table 7, Figure 6).

The East Central management area GHL **CLOSED** for the 2019/2020 fishing season for several reasons:

- The 2018/2019 season was closed early after 64 days of fishing by emergency order due to stock health concerns related to continued poor fishery performance.
- The logbook CPUE of 0.9 crabs per pot was below the average of 3.4 and the third lowest CPUE on record (Table 5, Figure 3).
- The catch per boat per day of 18 lb was well below the average of 112 lb and the second lowest catch per boat per day on record (Table 6).

The GHL was reduced 75% prior to the 2015/2016 season, reduced 50% prior to the 2016/2017 season, closed to fishing in the 2017/2018 season, and opened for the last GHL fished prior to the 2018/2019 season. Despite these drastic GHL reductions and closures in the last few seasons, the department has been unable to set a GHL that the stocks in this area can support. The record poor

fishery performance, most notably the second poorest CPUE in history, lead to the 2019/2020 season closure for commercial and personal use fishing.

NORTH STEPHENS PASSAGE

The 2018/2019 GKC harvest for this area was 17,581 lb (Table 2). The season was open for 6 days (Table 3), the shortest fishery on record. Eight permit holders participated in the fishery and there were 2,174 pot lifts (Table 4). The 2018/2019 logbook CPUE was 1.0 crabs per pot, which is below the average of 1.6 crabs per pot (Table 5, Figure 7). The GKC catch per boat per day of 366 lb was well above the average of 48 lb and the highest on record (Table 6). Dockside sampling data, proportion of recruits and post-recruits, show current recruit percentage (34%) above the average (31%) and post-recruit percentage (65%) below the average (69%) (Table 7, Figure 8).

The North Stephens Passage GHL increased 20% to **13,000** lb for the 2019/2020 fishing season.

Current management considerations for the North Stephens Passage management area include:

- Logbook data, though difficult to interpret because both Tanner crab and GKC effort are included in the calculations, show below average but stable CPUE (Table 5, Figure 7).
- Dockside sampling data show continued high percentage of recruit crab over the last five seasons (Figure 8).
- GKC bycatch in the annual Tanner crab survey data from Holkham Bay suggests a large recruitment event occurred at a similar time as fishery data indicate, around 2015, and also that there are historically high amounts of recruit and post-recruit class crabs, and an increase in catch of female crabs (Figures 9 & 10).

In 2018/2019, the GKC fishery occurred almost exclusively inside of Holkham Bay (statistical area 111-21) and was the shortest season on record. Good fishery performance as well as high recruit percentage over the last four seasons, combined with indications of a similarly timed recruitment event in GKC catch in the annual Tanner crab stock assessment survey, suggests potential recruitment in the area and possible early stages of a stock recovery. It should be noted that this recovery occurred in the face of annual, concerted Tanner crab and GKC effort in the area. While the pulse of recruit crab was enough to provide for short fisheries in 2017/2018 and 2018/2019, a full improvement of stock health in all components of the population in this area may be a few years off, as possibly evident in a two year drop in pre-recruit CPUE and low CPUE of juvenile males caught in the Tanner crab survey. These considerations lead to a modest 2,000 lb (20%) increase in the GHL for the 2019/2020 season.

NORTHERN

This area was closed in the 2018/2019 season due to continued poor fishery performance.

The Northern management area **CLOSED** for the 2019/2020 fishing season. The justification for this closure is based on the following:

- The 2017/2018 season was closed early after 45 days of fishing by emergency order due to stock health concerns related to continued poor fishery performance.
- Despite a 45-day season, similar to the 46-day average season length (Table 3), total harvest was just 1,852 lb (Table 2), 25% of the GHL (Table 1), and far below the average season harvest of 108,462 lb (Table 2).

- Logbook data has an historically low CPUE, the lowest on record, reminiscent of the 1990s fishery collapse (Table 5, Figure 11).
- The catch per boat per day of 10 lb was the lowest on record, well below the average of 207 lb (Table 6).

The GHL was reduced 75% prior to the 2015/2016 season, reduced 35% prior to the 2016/2017 season, reduced 25% prior to the 2017/2018 season, and closed for the 2018/2019 season. Despite these drastic GHL reductions and closures in the last few seasons, the department has been unable to set a GHL that the stocks in this area can support. The record poor fishery performance of two seasons ago, most notably the poorest CPUE in history, lead to a continued closure for commercial and personal use fishing in the 2019/2020 season.

ICY STRAIT

The 2018/2019 GKC harvest for this area is confidential because fewer than three permits fished (Table 2). The season opened for 34 days (Table 3). Fewer than three permit holders participated in the fishery (Table 4). The 2018/2019 logbook CPUE is also confidential (Table 5, Figure 13).

The GHL for the Icy Strait management area remained at **7,500** lb for the 2019/2020 fishing season for several reasons:

- Logbook data for the most recent season are confidential but showed an increase in CPUE (Table 5).
- Catch per boat per day is confidential, but at its highest level since 2011 (Table 6).
- Percent recruit data are confidential, but recruit percentages increased in the four previous seasons (Figure 14).

Observed trends in available data suggest a relatively stable fishery in this area, and thus the department did not change the GHL for the 2019/2020 season.

LOWER CHATHAM STRAIT

The 2018/2019 GKC harvest for this area is confidential because fewer than three permits fished (Tables 2 and 4). The season opened for 111 days (Table 3) and closed short of its GHL due to a continued decline in indices of relative abundance and recruitment on June 2, 2019. The 2018/2019 logbook CPUE is also confidential (Table 5, Figure 15).

The Lower Chatham Strait management area **CLOSED** for the 2019/2020 fishing season for several reasons:

- The 2018/2019 season closed early by emergency order after 111 days of fishing due to stock health concerns related to continued poor fishery performance (Table 3).
- Logbook data, while confidential, show historically low CPUE (Table 5, Figure 15).
- Dockside sampling data are confidential but suggest that the proportion of recruits is similar to the average, and without any recent significant recruitment events (Table 7, Figure 16).

The GHL was reduced 20% prior to the 2016/2017 season, reduced 30% prior to the 2017/2018 season, and reduced 15% prior to the 2018/2019 season. Despite these GHL reductions in the last few seasons, the department has been unable to set a GHL that the stocks in this area can support.

The poor fishery performance, most notably the second poorest CPUE in history, lead to a 2019/2020 season closure for commercial and personal use fishing.

SOUTHERN

The 2018/2019 GKC harvest for the Southern management area was 20,105 lb (Table 2). The season opened for 35 days (Table 3), the shortest fishery on record. Four permit holders participated in the fishery with a total of 865 pot lifts (Table 4). The 2018/2019 logbook CPUE was 3.8 crabs per pot, similar to the average (Table 5, Figure 17). The GKC catch per boat per day of 144 lb was above the average of 49 lb (Table 6). The proportion of recruits and post-recruits, from dockside sampling data, show current recruit percentage (51%) above the average (37%) and post-recruit percentage (49%) below its average (63%) (Table 7, Figure 18).

The Southern GHL increased to **21,000** lb for the 2019/2020 fishing season for several reasons:

- Logbook CPUE data increased from the previous season to a level near the average (Table 5).
- Catch per boat per day of 144 lb was above the average of 49 lb (Table 6) and at its highest level since 2013.
- Percentage of recruit, which showed little change from the 2011/2012– 2016/2017 seasons, increased to a near record high in 2018/2019 (Table 7, Figure 18).

The stable recruit percentage for a number of seasons followed by an increase in percent recruit the last two seasons suggests some recruitment in the area. Despite a strong fishery performance in 2018/2019, CPUE remains near average. Therefore, there was only a modest 500 lb increase in the GHL for the 2019/2020 season.

REGULATIONS

LEGAL GEAR

GKC taken in Tanner crab pots as described in 5 AAC 35.125(f) may be retained if the CFEC permit holder fishing for Tanner crab is also registered to fish for GKC and both crab fisheries are open at the same time [5 AAC 34.125(a)]. Permit holders with simultaneous registration in GKC and Tanner fisheries are required to comply with inseason reporting requirements in place for the GKC fishery, even if the permit holder begins by targeting Tanner crab.

REGISTRATION

The registration deadline for the 2020 commercial GKC fishery was Tuesday, January 21, 2020. All commercial fishermen registering for the 2019/2020 commercial GKC fishery after January 21, 2020, are required to pay a $45.00 late fee [A.S. 16.05.065]. Simultaneous, though separate, registrations are allowed for golden king and Tanner crab. Processors are reminded that registration for tenders is required.

Commercial fishermen may register and obtain logbook packets, buoy tags, and other fishery information in the Juneau, Sitka, Ketchikan, Petersburg, Wrangell, and Haines area offices. The king crab vessel registration year [5 AAC 34.020(b)] is June 28–June 27. Permit holders wishing to fish in open GKC management areas after June 27, 2020 need to re-register with the department.

Buoy tags are mandatory for all commercial GKC gear and are available in most SE area offices for $1.25 each. Buoy tag placement requirements are in regulation [5 AAC 34.051(b)].

Replacement tags are available at area offices upon receipt of a completed tag replacement affidavit. All missing tag numbers must be provided on the affidavit form before replacements can be issued [5 AAC 34.126]. The completed affidavit form must be signed by the permit holder and a crewmember. All purchased buoy tags are nonrefundable.

Simultaneous Registration Regulations

While the Tanner crab fishery is open, a GKC fisherman who is also registered for the Tanner crab fishery may use a maximum of 80 pots [5 AAC 34.125(b)(3)]. Twenty-four hours after the Tanner crab season closes regionwide in Registration Area A [5 AAC 35.020(k)], or after a fisherman, or his agent, has unregistered from the Tanner crab fishery, fishermen already registered for the GKC fishery may purchase an additional 20 tags in order to fish the maximum of 100 pots for GKC.

LOGBOOK AND REPORTING REQUIREMENTS

Logbooks and inseason reporting are mandatory in the GKC fishery [5 AAC 34.130 & 5 AAC 34.143]. Logbook packets include instructions for filling out the logbooks, logbook sheets, envelopes for their delivery, maps showing ADF&G statistical areas, and all pertinent advisory announcements available at the time the packet is obtained. Logbooks should be sealed in one of the envelopes provided in the registration packets and attached to the fish ticket submitted to the processor upon delivery. The number of crabs, pounds, number of pot lifts, and average soak time (hrs) by statistical area must be recorded on logbooks and fish tickets with the exception that average soak time (hrs) is not required for fish tickets. Each king crab fisherman shall indicate on the fish ticket at the time of landing any king crab harvested which are not purchased by the processor, or which have been discarded at sea [5 AAC 34.075(a)]. Each buyer of king crab shall indicate on the fish ticket any king crab which was not purchased from a load [5 AAC 34.075(b)]. If golden king and Tanner crab are landed on the same trip, separate logbooks must be completed for each species.

For all GKC management areas, inseason reporting will be required daily. The first mandatory call-in for the 2020 season was Monday, February 17, 2020. If there was no harvest to report on February 17, 2020, fishermen were instructed to report the statistical area in which gear had been set or would be set. This reporting requirement applies to all GKC registrants, even if the permit holder begins by targeting Tanner crab. Reporting requirements may be relaxed, by emergency order, inseason. A dedicated phone line, (907) 465-2000, has been established for the reporting of crab logbook data. Fishermen are also requested to call when they change management areas or when discontinuing fishing for the season.

RETENTION OF PARASITIZED GOLDEN KING CRAB

GKCs that are infected with the barnacle parasite, *Briarosaccus callosus*, may be retained regardless of size or sex [5 AAC 34.112]. Either a scar or the externa of the parasite located under the abdominal flap indicates the presence of this parasite. The scar is a dark brown or black spot about ¼ inch in diameter on the soft tissue of the abdominal flap. The externa varies in size, is shaped like a hot dog, and is usually attached to the soft tissue of the abdominal flap. It is possible to have more than one scar or externa on the same crab. The parasite's externa must be removed before the crab is placed into the vessel holding tank.

GOLDEN KING CRAB FISHING IN THE EXCLUSIVE ECONOMIC ZONE (EEZ)

A commissioner's permit is required to fish GKC in the EEZ (Figure 3). The required commissioner's permit may specify season dates, pot limits, and areas of fishing operations. The commissioner's permit will require a detailed logbook for fishing operations and may require observer coverage and other conditions deemed necessary for conservation and management purposes [5 AAC 34.116]. For more information on fishing in the EEZ contact shellfish regional staff in the Douglas or Petersburg area offices.

LOST POTS

Reporting of lost pots or pots left in a closed area in fishing condition should be directed to the Alaska Wildlife Troopers (AWT) offices in Juneau (465-4000) or Ketchikan (225-5118).

OTHER REQUIREMENTS AND INFORMATION

Fishermen with gear in more than one fishery area are asked to make every effort to separate crab in their hold so crab can be sampled by department dockside sampling staff. Zip ties to mark crab are available to permit holders to assist with dockside sampling efforts. For more information on obtaining zip ties and separating crab by fishery area please contact shellfish regional staff in the Douglas or Petersburg area offices.

Fishermen are also reminded that weather delay criteria for Tanner and king crab fisheries have been adopted in regulation. Any delay to the start of the 2020 Tanner and GKC fisheries due to weather will be announced 24 hours before the start of the fisheries [5 AAC 35.110(b) and 34.110(f)].

A person or vessel that operates pots or ring nets for commercial, subsistence, personal use, or sport purposes during the 30 days immediately before the scheduled opening date of the commercial fishery may not participate in that king crab fishery [5 AAC 34.128(a)]. This prohibition does not apply to the operation of commercial shrimp or Dungeness crab pots [5 AAC 34.128 (b)]. Fishermen are reminded to review gear storage requirements and other pertinent regulations in the 2017–2020 King and Tanner Crab Commercial Fishing Regulations booklet.

Fishermen are reminded to account for any groundfish taken for bait prior to or during the GKC fishery. Groundfish harvested for bait should be marked as disposition code 92, landed catch, on the crab fish ticket for the trip on which the bait was taken. Sablefish, halibut, lingcod, thornyhead, shortraker, rougheye, and yelloweye rockfish may not be taken or used for bait, except that the head, tail, fins, closely trimmed skeleton and visera of delivered or processed commercial sablefish, lingcod, thornyhead, shortraker, rougheye, and yelloweye rockfish may be used for bait [5 AAC 28.190].

REFERENCE CITED

ADF&G (Alaska Department of Fish and Game). 2002. Collapsed or recovering shellfish fisheries in the state of Alaska. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 1J02-06, Juneau.

Table 1.–Summary of the golden king crab fishery guideline harvest levels (GHL), in pounds, by management area for 1999/2000 through 2018/2019 commercial seasons.

	Season	Mid-Chatham Strait	East Central	North Stephens Passage	Northern	Icy Strait	Lower Chatham	Southern
GHL (lb)	1999/2000*	75,000	175,000		100,000		25,000	25,000
	2000/2001	125,000	225,000	25,000	110,000	90,000	40,000	15,000
	2001/2002	110,000	225,000	10,000	100,000	40,000	40,000	15,000
	2002/2003	100,000	200,000	20,000	100,000	40,000	15,000	10,000
	2003/2004	100,000	200,000	20,000	100,000	40,000	15,000	10,000
	2004/2005	100,000	200,000	20,000	100,000	40,000	15,000	10,000
	2005/2006	80,000	225,000	20,000	120,000	55,000	15,000	10,000
	2006/2007	80,000	225,000	20,000	120,000	55,000	15,000	10,000
	2007/2008	80,000	225,000	20,000	120,000	55,000	15,000	10,000
	2008/2009	100,000	225,000	20,000	145,000	55,000	25,000	20,000
	2009/2010	110,000	260,000	20,000	145,000	45,000	25,000	20,000
	2010/2011	110,000	260,000	20,000	145,000	45,000	25,000	20,000
	2011/2012	110,000	260,000	20,000	145,000	45,000	25,000	20,000
	2012/2013	110,000	285,000	10,000	105,000	30,000	28,000	22,000
	2013/2014	110,000	200,000	10,000	105,000	20,000	28,000	22,000
	2014/2015	80,000	115,000	8,000	65,000	18,000	28,000	22,000
	2015/2016	40,000	30,000	8,000	15,000	12,000	28,000	22,000
	2016/2017	20,000	15,000	8,000	10,000	10,000	23,000	19,000
	2017/2018	10,000	CLOSED	10,000	7,500	7,500	16,000	19,000
	2018/2019	7,500	15,000	11,000	CLOSED	7,500	14,000	20,500

*During the 1999/2000 season and prior GHLs were combined for the East Central and North Stephens management area and for the Northern and Icy Strait management areas.

Table 2.–Summary of the golden king crab fishery harvest data, in pounds, by management area for 1999/2000 through 2018/2019 commercial seasons.

	Season	Mid-Chatham Strait	East Central	North Stephens Passage	Northern	Icy Strait	Lower Chatham	Southern
Harvest (lb)	1999/2000	79,208	299,585	11,678	34,706	101,111	25,407	**
	2000/2001	126,579	196,810	11,563	108,058	41,221	37,560	**
	2001/2002	113,426	267,637	23,335	131,277	50,080	11,848	**
	2002/2003	78,284	226,905	26,085	178,938	45,106	5,630	1,436
	2003/2004	55,107	233,655	19,608	181,154	53,034	**	**
	2004/2005	61,841	261,035	18,580	142,449	62,843	**	**
	2005/2006	81,463	249,330	16,366	142,455	61,290	**	**
	2006/2007	78,416	243,675	19,450	152,145	71,058	7,736	**
	2007/2008	89,873	251,004	27,441	184,227	58,453	**	**
	2008/2009	123,626	303,811	22,770	156,261	51,026	20,004	**
	2009/2010	141,558	308,013	20,568	176,782	42,136	22,328	20,742
	2010/2011	114,966	305,659	20,714	161,522	44,882	17,786	21,976
	2011/2012	106,620	223,616	15,657	150,453	45,244	**	**
	2012/2013	99,101	265,049	5,323	102,351	8,185	**	**
	2013/2014	43,475	81,375	7,644	39,802	19,583	23,376	19,636
	2014/2015	30,910	25,259	6,280	7,226	12,359	26,424	21,364
	2015/2016	9,228	9,052	5,321	6,939	10,255	**	19,167
	2016/2017	**	972	16,558	5,610	7,007	**	16,722
	2017/2018	**	CLOSED	10,345	1,852	6,458	**	19,908
	2018/2019	4,481	6,749	17,581	CLOSED	**	**	20,105
Avg. (99/00–17/18)		**75,994**	**208,469**	**16,068**	**108,642**	**41,649**	**15,464**	**15,332**

** Confidential data—fewer than three permits fished.

Table 3.–Summary of the golden king crab fishery season length, in days, for each management area for 1999/2000 through 2018/2019 commercial seasons.

	Season	Mid-Chatham Strait	East Central	North Stephens Passage	Northern	Icy Strait	Lower Chatham	Southern
Season length (days)	1999/2000	59	26	26	30	30	104	133
	2000/2001	76	18	162	76	162	153	162
	2001/2002	82	39	39	54	54	132	132
	2002/2003	146	37	29	37	37	228	228
	2003/2004	178	26	75	21	17	178	228
	2004/2005	177	31	111	19	15	177	211
	2005/2006	243	52	253	52	54	319	319
	2006/2007	228	57	98	33	20	298	298
	2007/2008	78	21	36	18	17	209	227
	2008/2009	61	11	89	17	25	176	263
	2009/2010	56	9	78	26	28	127	299
	2010/2011	54	19	114	42	26	217	112
	2011/2012	59	6	255	101	255	95	85
	2012/2013	282	78	282	118	65	282	75
	2013/2014	149	73	148	73	90	148	102
	2014/2015	136	32	49	32	49	284	112
	2015/2016	133	33	64	33	64	268	133
	2016/2017	139	36	19	49	49	139	109
	2017/2018	183	CLOSED	9	45	45	278	102
	2018/2019	111	64	6	CLOSED	34	111	35
Avg. (99/00–17/18)		**133**	**34**	**102**	**46**	**58**	**201**	**175**

Table 4.–Summary of golden king crab fishery effort (permits fished and number of pot lifts) by management area for 1999/2000 through 2018/2019 commercial seasons.

	Season	Mid-Chatham Strait	East Central	North Stephens Passage	Northern	Icy Strait	Lower Chatham	Southern
Effort (# permits)	1999/2000	6	21	11	6	14	5	**
	2000/2001	10	25	11	18	10	4	**
	2001/2002	10	29	10	19	8	4	**
	2002/2003	15	23	7	22	16	6	3
	2003/2004	7	24	10	23	12	**	**
	2004/2005	4	25	8	20	13	**	**
	2005/2006	5	16	3	19	13	**	**
	2006/2007	5	18	5	15	13	3	**
	2007/2008	6	14	7	17	14	**	**
	2008/2009	8	19	10	17	10	3	**
	2009/2010	10	24	7	22	9	5	3
	2010/2011	10	20	8	21	10	5	4
	2011/2012	9	19	6	19	11	**	**
	2012/2013	9	23	3	12	6	**	**
	2013/2014	4	17	4	9	6	3	3
	2014/2015	7	17	11	11	8	4	5
	2015/2016	5	13	9	7	3	**	5
	2016/2017	**	4	8	8	6	**	4
	2017/2018	**	CLOSED	6	4	3	**	3
	2018/2019	3	6	8	CLOSED	**	**	4
Avg. (99/00–17/18)		**7**	**19**	**7**	**15**	**10**	**3**	**3**
Effort (# pot lifts)	1999/2000	2,627	9,276	652	2,545	6,568	934	**
	2000/2001	3,585	8,976	2,610	6,190	3,150	1,481	**
	2001/2002	4,899	14,901	2,634	5,695	3,419	958	**
	2002/2003	4,633	13,057	2,131	6,832	3,392	492	280
	2003/2004	3,487	10,237	2,173	8,016	2,280	**	**
	2004/2005	3,090	11,010	1,499	6,276	2,859	**	**
	2005/2006	4,200	11,657	1,030	6,986	3,466	**	**
	2006/2007	3,326	9,173	1,037	4,406	3,179	379	**
	2007/2008	3,050	6,725	1,351	4,877	2,515	**	**
	2008/2009	3,339	7,241	1,812	5,231	2,595	794	**
	2009/2010	4,119	9,646	1,871	7,335	1,704	1,210	768
	2010/2011	3,745	8,906	2,071	6,473	2,778	1,093	1,110
	2011/2012	4,117	5,249	2,646	8,242	2,626	**	**
	2012/2013	4,469	18,713	665	6,163	740	**	**
	2013/2014	2,555	6,824	1,588	3,188	1,440	1,046	913
	2014/2015	2,461	3,943	2,103	1,378	1,576	1,081	1,290
	2015/2016	763	1,719	1,676	855	819	**	1,306
	2016/2017	**	281	2,728	766	833	**	1,109
	2017/2018	**	CLOSED	2,124	441	855	**	1,017
	2018/2019	525	1,124	2,174	CLOSED	**	**	865
Avg. (99/00–17/18)		**3,128**	**8,749**	**1,811**	**4,837**	**2,463**	**772**	**695**

** Confidential data—fewer than three permits fished.

Table 5.–Summary of golden king crab fishery average logbook catch per unit effort (CPUE; crab per pot lift) by management area for 1999/2000 through 2018/2019 commercial seasons.

	Season	Mid-Chatham Strait	East Central	North Stephens Passage	Northern	Icy Strait	Lower Chatham	Southern
Average Logbook CPUE (crab/pot)	1999/2000	4.3	4.8	6.1	2.3	2.2	2.7	**
	2000/2001	3.8	3.0	0.9	2.3	1.6	3.9	**
	2001/2002	3.2	2.6	1.3	3.5	2.1	2.2	**
	2002/2003	2.3	2.6	1.4	3.0	1.7	2.0	0.9
	2003/2004	2.4	3.4	1.3	3.1	3.2	**	**
	2004/2005	3.2	3.6	2.0	3.2	3.3	**	**
	2005/2006	3.4	3.4	2.3	2.8	2.5	**	**
	2006/2007	3.7	4.2	2.7	4.9	3.6	3.8	**
	2007/2008	4.5	5.5	2.6	4.7	3.0	**	**
	2008/2009	6.3	6.5	1.8	4.0	2.5	4.5	**
	2009/2010	5.0	4.9	1.1	2.9	2.5	3.6	3.7
	2010/2011	4.5	5.0	1.0	3.1	2.0	2.6	3.0
	2011/2012	3.9	5.8	0.8	2.0	1.7	**	**
	2012/2013	3.0	1.8	0.7	1.9	1.4	**	**
	2013/2014	2.3	1.7	0.6	1.3	1.5	3.5	3.1
	2014/2015	1.9	0.9	0.6	0.7	1.1	3.3	2.7
	2015/2016	2.0	0.7	0.7	1.1	1.7	**	2.3
	2016/2017	**	0.4	1.1	0.9	1.0	**	2.5
	2017/2018	**	CLOSED	1.2	0.6	1.3	**	3.7
	2018/2019	1.3	0.9	1.0	CLOSED	**	**	3.8
Avg. (99/00–17/18)		**3.3**	**3.4**	**1.6**	**2.6**	**2.1**	**3.6**	**3.7**

** Confidential data—fewer than three permits fished.

Table 6.–Summary of the golden king crab commercial fishery harvest by pounds (lb) per boat per day for each management area for 1999/2000 through 2018/2019 seasons.

	Season	Mid-Chatham Strait	East Central	North Stephens Passage	Northern	Icy Strait	Lower Chatham	Southern
lbs/boat /day	1999/2000	224	549	41	193	241	49	**
	2000/2001	167	437	6	79	25	61	**
	2001/2002	138	237	60	128	116	22	**
	2002/2003	36	267	128	220	76	4*	2*
	2003/2004	44	374	26	375	260	**	**
	2004/2005	87	337	21	375	322	**	**
	2005/2006	67	300	22*	144	87	**	**
	2006/2007	69	238	40	307	273	9*	**
	2007/2008	192	854	109	602	246	**	**
	2008/2009	253	1454	26	541	204	38	**
	2009/2010	253	1426	38	309	167	35	23*
	2010/2011	213	804	23	183	173	16*	49
	2011/2012	201	1962	10*	78	16*	**	**
	2012/2013	39	148	6*	72	21	**	**
	2013/2014	73	66	13	61	36	53	64
	2014/2015	32	46	12	21	32	23*	38
	2015/2016	14	23	10	30	53	**	29
	2016/2017	**	7	124	14	24	**	38
	2017/2018	**	CLOSED	192	10	48	**	65
	2018/2019	13	18	366	CLOSED	**	**	144
Avg. (99/00-17/18)		**112**	**529**	**48**	**197**	**127**	**38**	**49**

*Values may be underestimated due to the fact that the season continued into the fall with no fishing effort in the summer months.

** Confidential data—fewer than three permits fished.

Table 7.–Summary of the percentage of recruits (Rec.) and post recruits (PR), with total number of individual crab sampled (N) from dockside sampling data collected during the golden king crab fishery by management area from the 1999/2000 through 2018/2019 seasons.

Season	Mid-Chatham Strait			East Central			N. Stephens Passage			Northern			Icy Strait			Lower Chatham			Southern		
	% Rec.	% PR	N	% Rec.	% PR	N	% Rec.	% PR	N	% Rec.	% PR	N	% Rec.	% PR	N	% Rec.	% PR	N	% Rec.	% PR	N
1999/2000	37.4	61.8	475	42.4	57.1	2,233	39.1	59.9	195	34.7	65.3	150	41.4	57.8	633	40.8	57.9	75	–	–	–
2000/2001	24.8	75.2	657	40.5	58.8	2,638	25.7	62.5	299	22.8	74.5	401	16.4	83.6	434	26.0	46.5	198	–	–	–
2001/2002	33.7	66	299	43.2	56.1	2,915	35.8	63.5	428	15.7	84.3	580	11.0	89.0	200	56.3	42.1	187	**	**	**
2002/2003	28.9	70.8	783	37.4	59.4	2,490	39.0	61.0	344	16.4	83.2	535	5.3	94.7	75	–	–	–	33.3	66.7	12
2003/2004	56.4	42.3	154	37.5	62.3	1,496	32.8	67.2	180	29.9	70.1	354	18.0	82.0	100	–	–	–	–	–	–
2004/2005	59.5	38.1	241	41.3	58.4	1,507	44.9	55.1	49	35.8	63.8	217	14.0	86.0	50	–	–	–	–	–	–
2005/2006	38.0	60.0	49	51.6	47.9	1,686	–	–	–	23.8	76.2	265	14.7	84.3	195	–	–	–	–	–	–
2006/2007	47.3	52.5	399	47.9	51.6	1,567	25.7	74.3	245	14.2	85.5	274	11.6	88.4	155	–	–	–	–	–	–
2007/2008	55.1	44.4	448	48.0	51.6	944	21.3	78.7	150	13.8	86.2	225	–	–	–	–	–	–	–	–	–
2008/2009	52.7	47.3	150	53.1	46.5	523	20.0	80.0	100	13.8	86.2	195	13.0	87.0	69	–	–	–	**	**	**
2009/2010	34.4	56.0	473	42.0	57.2	919	4.2	95.8	263	14.8	85.2	365	–	–	–	76.0	24.0	50	–	–	–
2010/2011	30.7	69.3	300	30.6	69.4	819	5.8	94.2	359	7.8	91.4	661	7.4	90.9	119	67.0	33.0	100	41.8	57.8	398
2011/2012	30.6	69.4	304	31.7	68.3	754	8.4	91.1	357	6.1	93.8	850	14.2	85.1	645	**	**	**	**	**	**
2012/2013	21.1	78.5	246	19.5	80.3	1,513	6.0	94.0	266	6.5	93.5	712	–	–	–	**	**	**	**	**	**
2013/2014	26.6	73.2	488	22.3	77.6	1,053	14.5	85.5	338	4.4	95.6	495	4.0	96.0	50	64.4	34.0	246	32.0	68.0	200
2014/2015	33.8	64.2	394	22.8	77.2	777	42.4	56.7	325	16.4	83.6	177	12.7	87.0	298	64.0	33.5	195	32.2	67.2	476
2015/2016	28.9	69.0	139	21.3	78.7	310	74.3	20.8	137	14.8	85.2	115	19.2	79.8	309	**	**	**	37.0	62.5	575
2016/2017	**	**	**	13.1	86.9	61	57.3	40.2	160	25.7	74.3	218	30.8	69.2	117	**	**	**	39.6	60.0	249
2017/2018	**	**	**	CLOSED			49.5	49.5	188	31.6	68.4	57	38.1	61.9	160	–	–	–	43.7	44.6	388
2018/2019	34.5	62.1	28	69.5	28.9	184	34.2	65.2	186	CLOSED			**	**	**	**	**	**	50.7	49.3	150
Avg (99/00–17/18)	**36.7**	**62**	**309**	**37.7**	**61.8**	**1284**	**30.6**	**68.2**	**241**	**18.4**	**81.4**	**360**	**17.5**	**82.1**	**219**	**55.5**	**40.9**	**142**	**38.4**	**60.4**	**239**

** Confidential data—fewer than three permits fished.

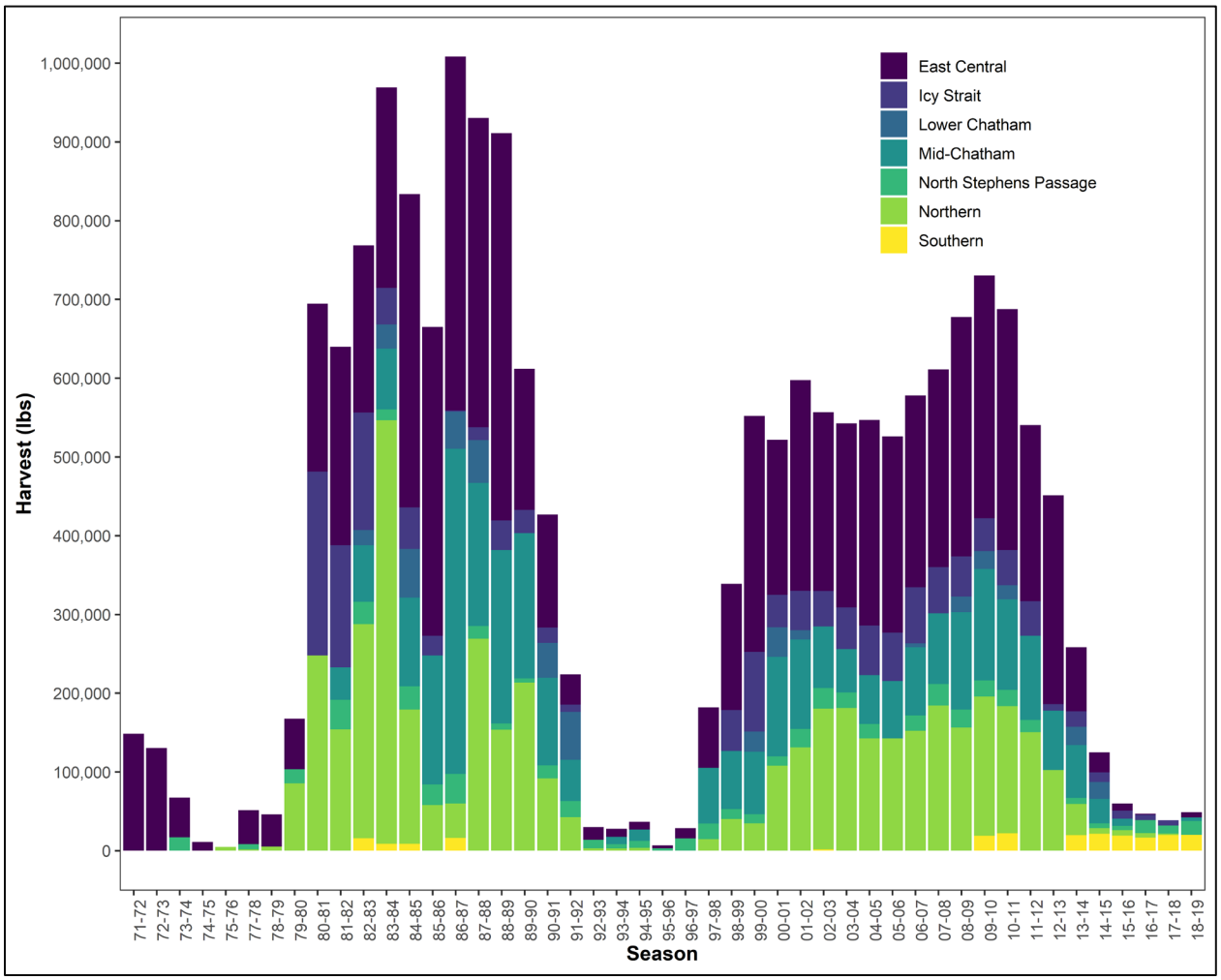

Figure 1.–Southeast Alaska golden king crab commercial harvest, 1970/1971–2018/2019 seasons.

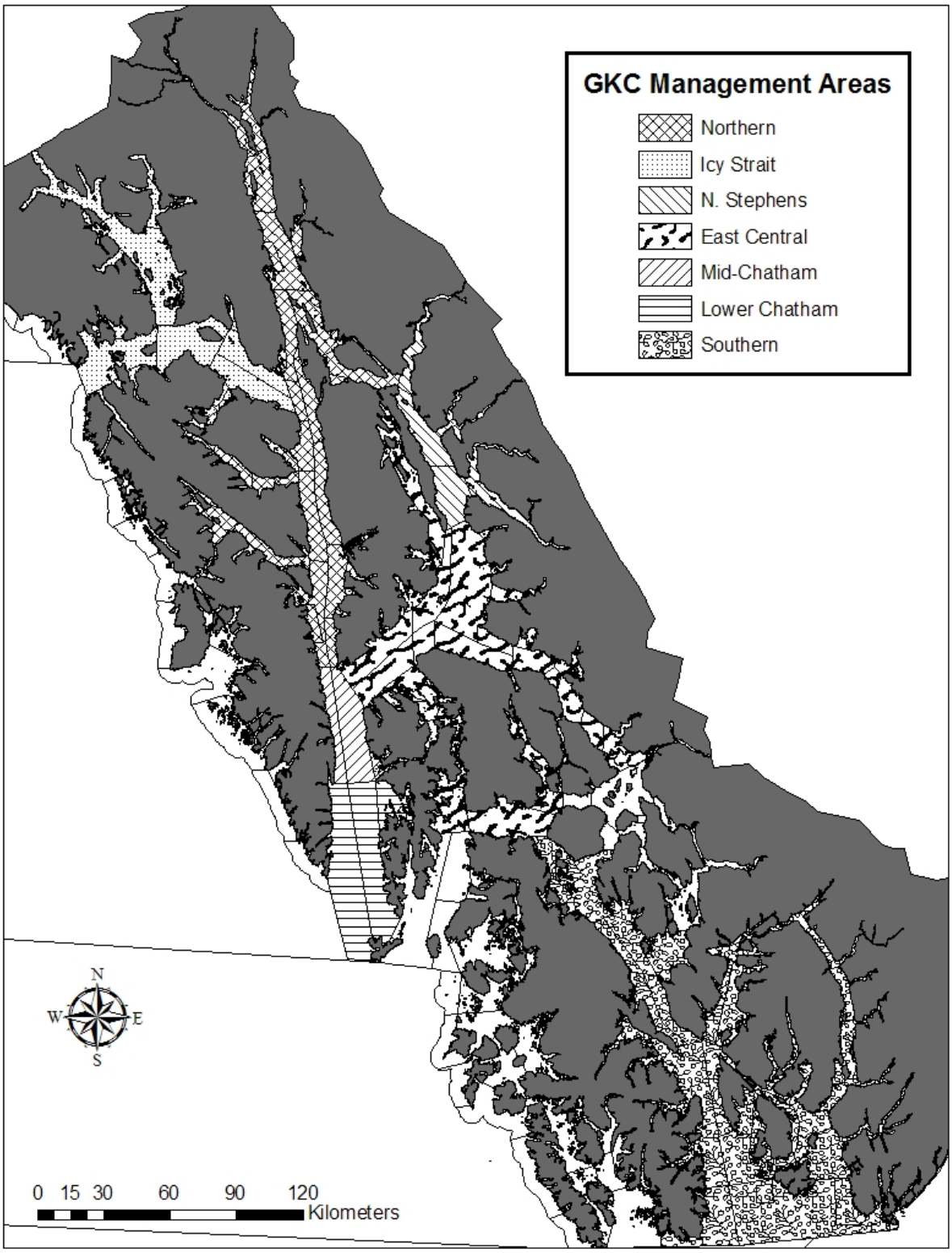

Figure 2.–Golden king crab management areas for Southeast Alaska.

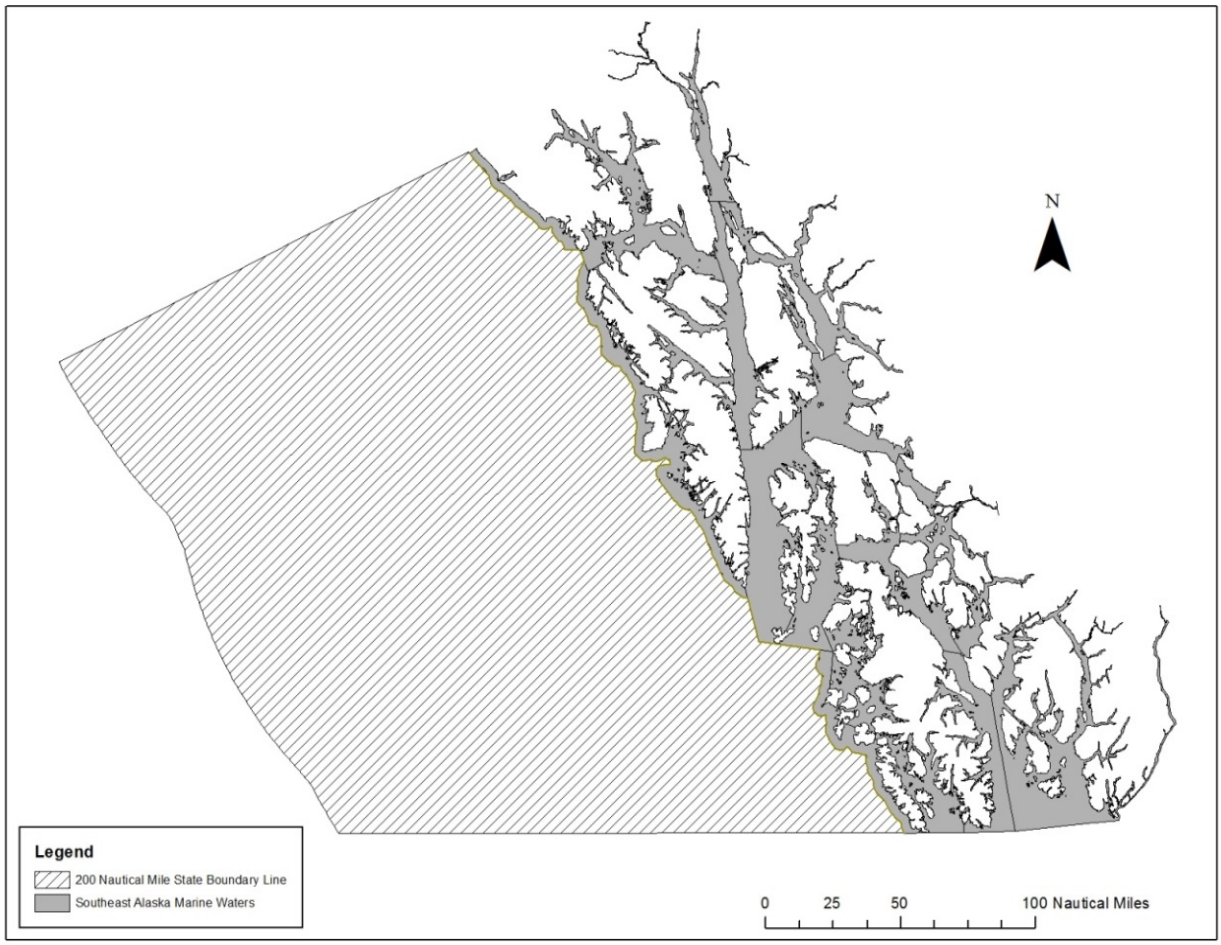

Figure 3.–Map of Exclusive Economic Zone (EEZ) where fishing for GKC is allowed under the conditions of a permit issued by the commissioner [5 AAC 34.116].

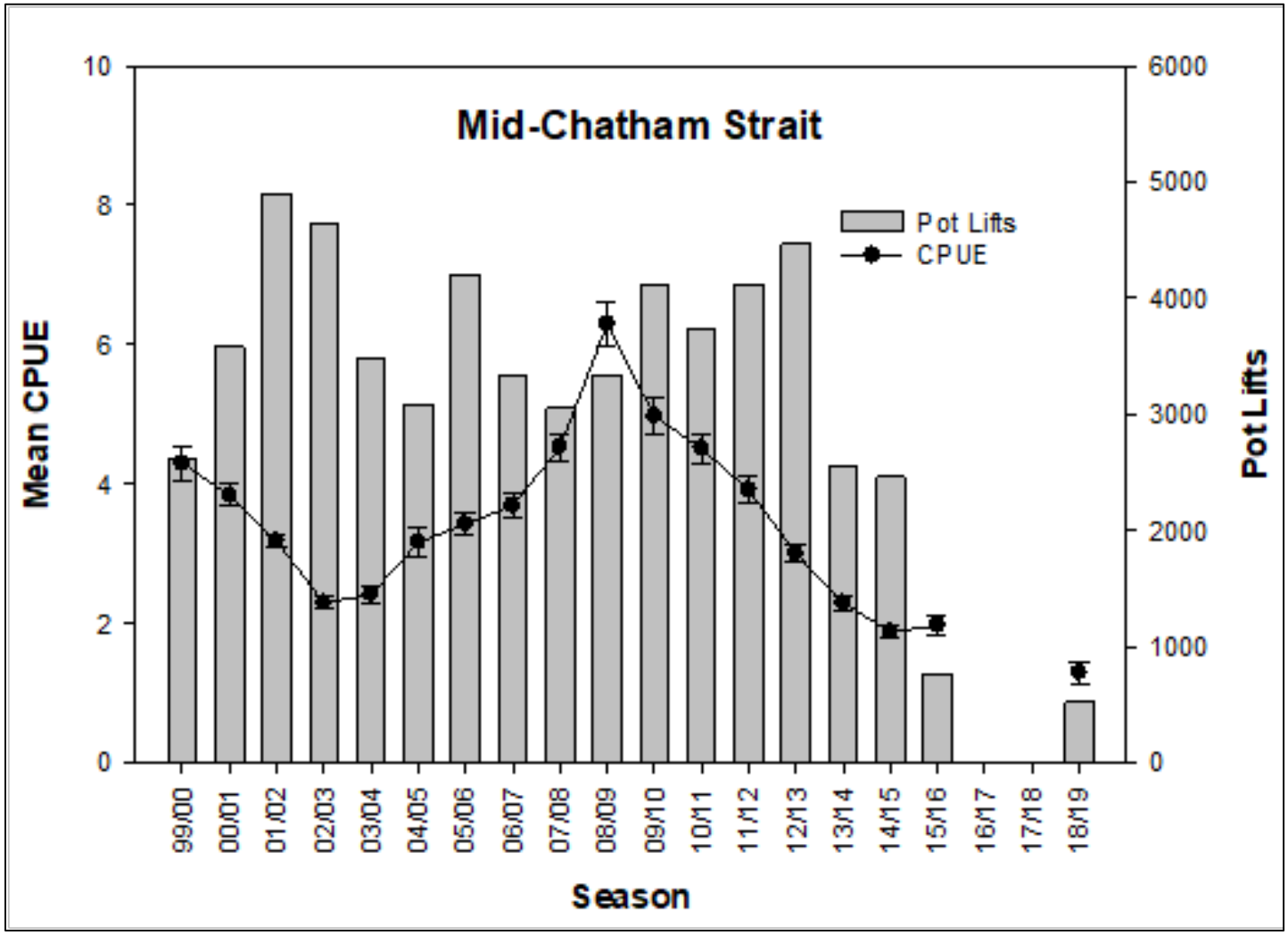

Figure 4.–Golden king crab CPUE and pot lifts from logbook data for Mid-Chatham Strait, 1999/2000–2018/2019 seasons.

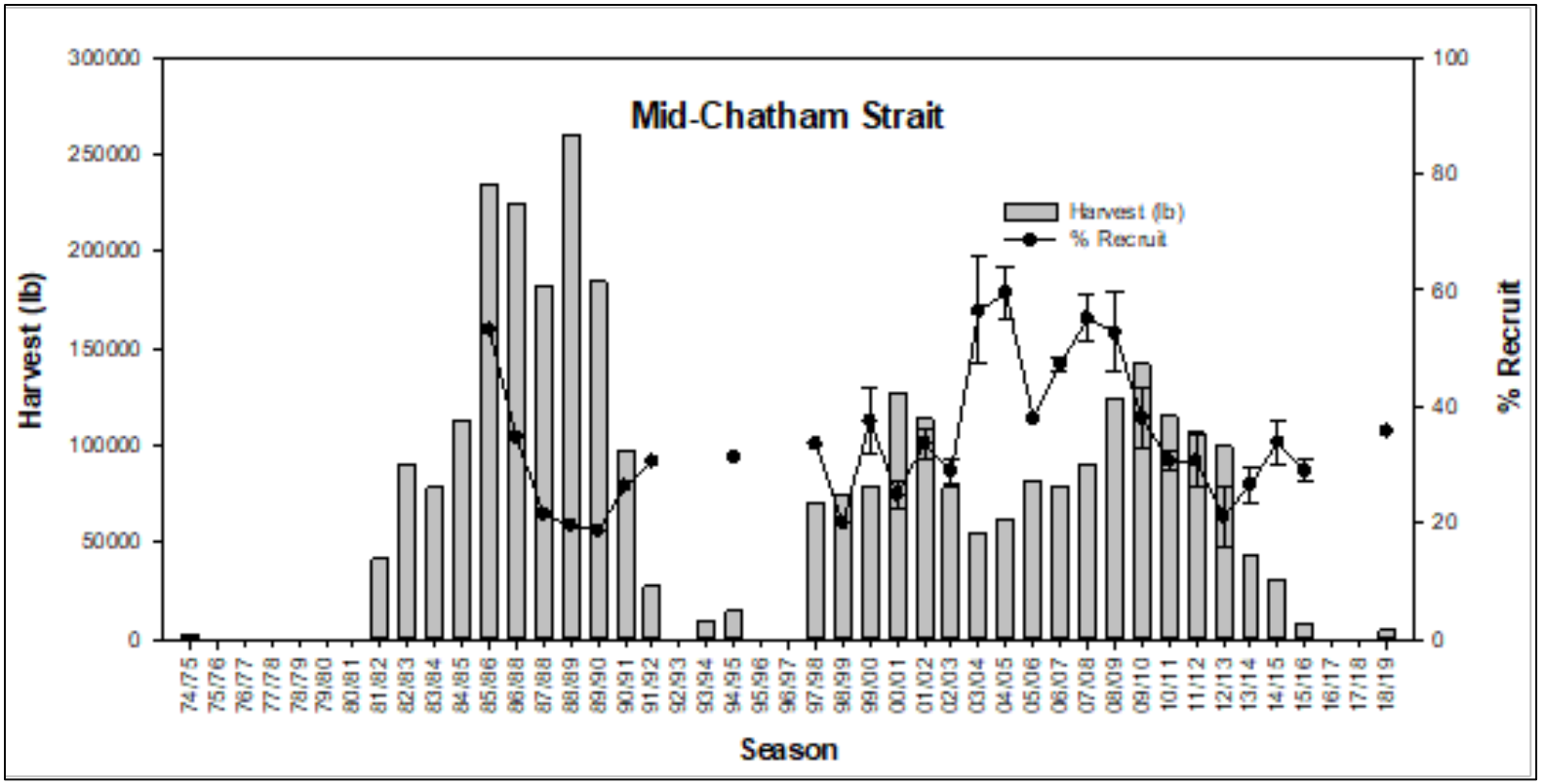

Figure 5.–Mid-Chatham Strait trends in harvest and recruit class from dockside sampling of commercial golden king crab catches, 1974/1975–2018/2019 seasons (error bars for 1999/2000–2018/2019 seasons reflect variance by trip).

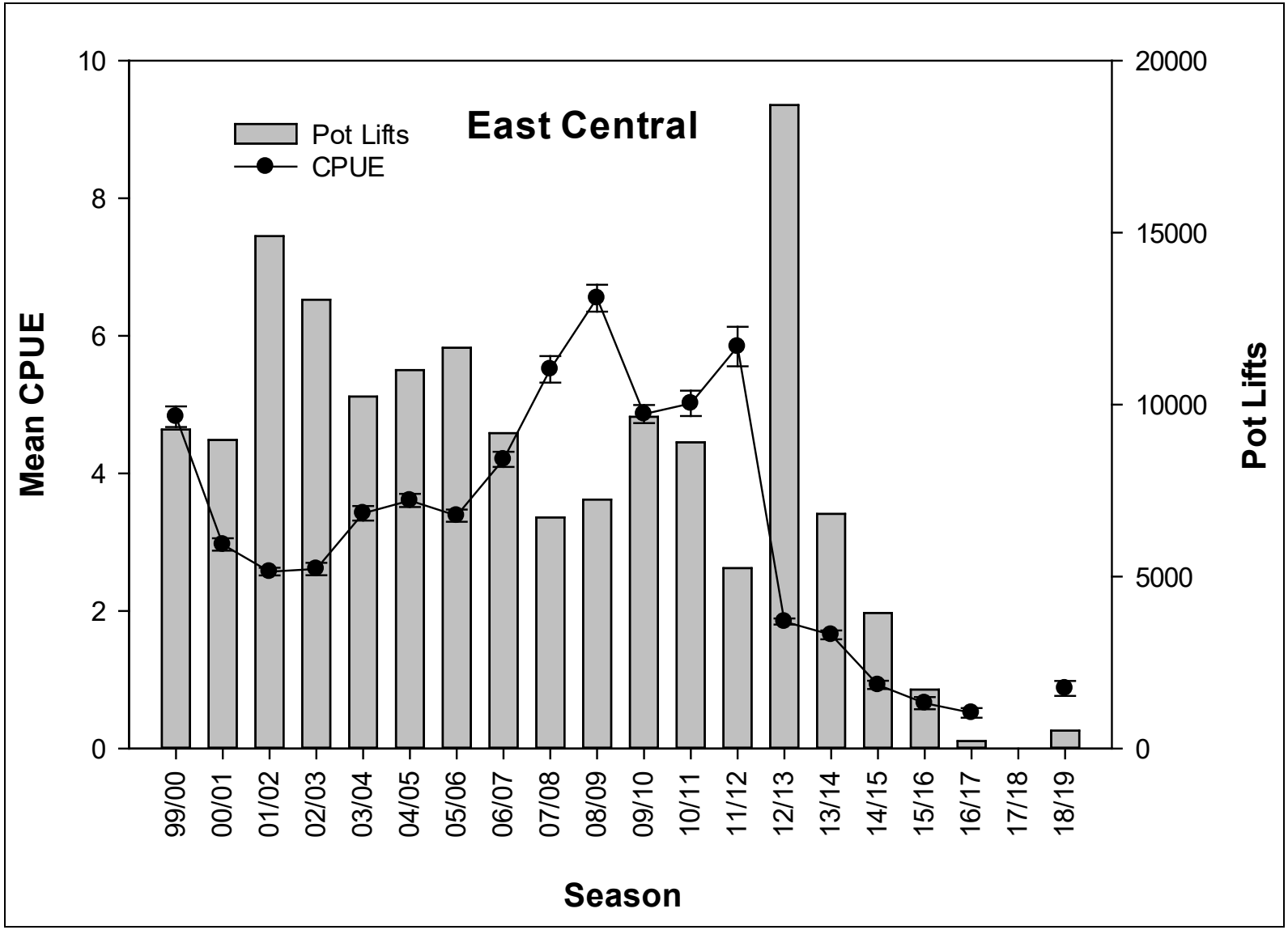

Figure 6.–Golden king crab CPUE and pot lifts from logbook data for East Central, 1999/2000–2018/2019 seasons.

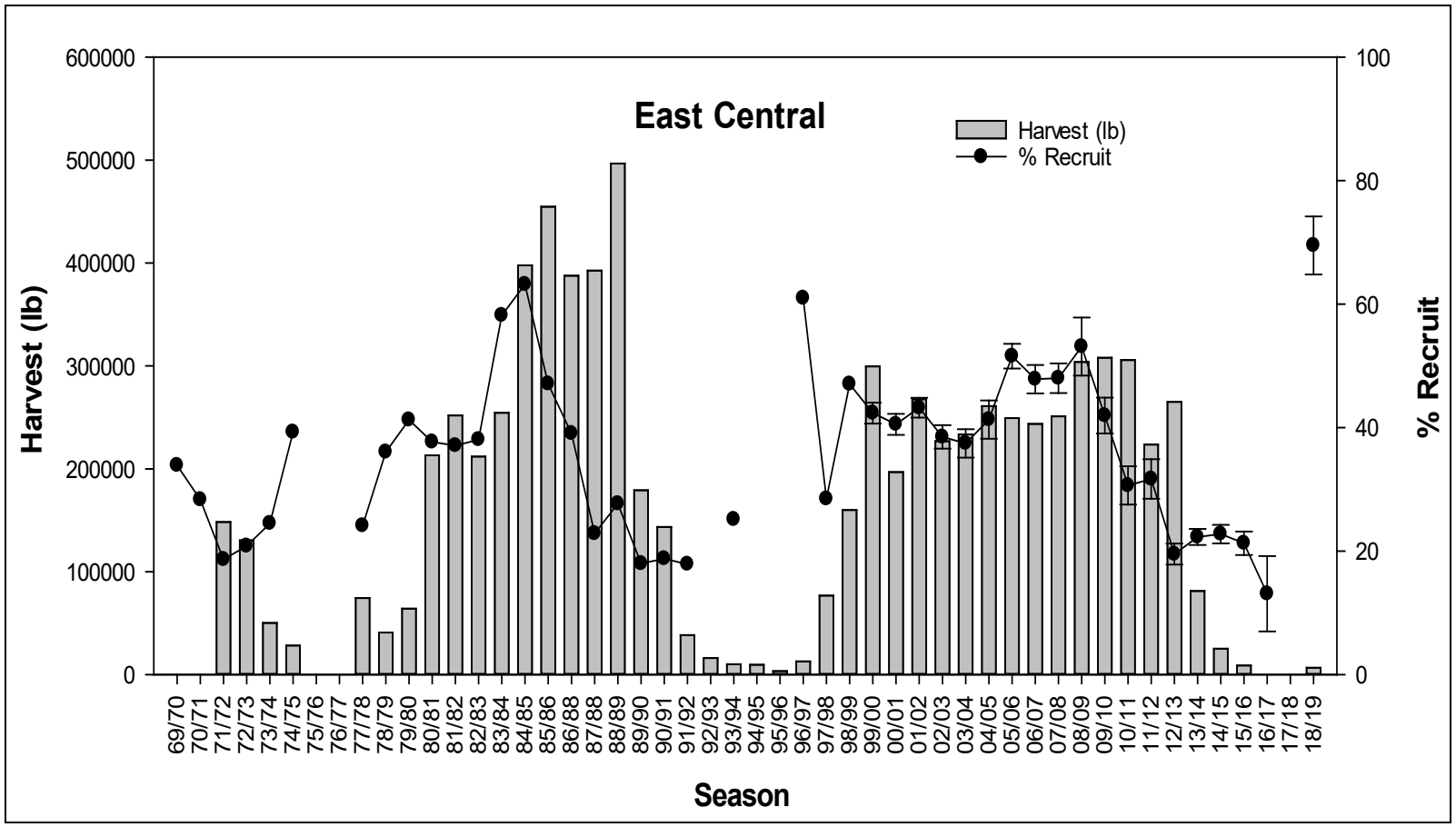

Figure 7.–East Central trends in harvest and recruit class from dockside sampling of commercial golden king crab catches, 1969/1970–2018/2019 seasons (error bars for 1999/2000–2018/2019 seasons reflect variance by trip).

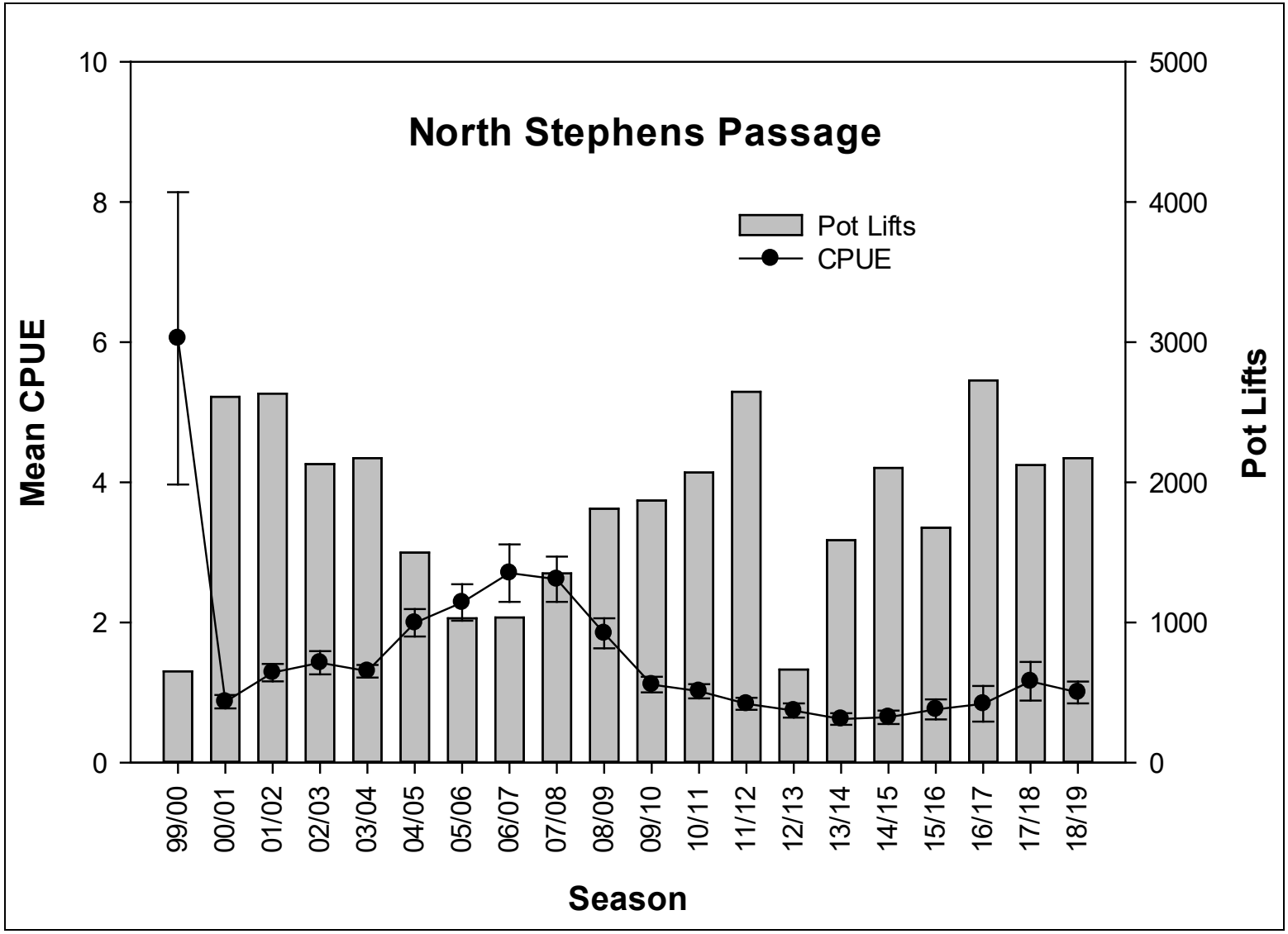

Figure 8.–Golden king crab CPUE and pot lifts from logbook data for North Stephens Passage, 1999/2000–2018/2019 seasons.

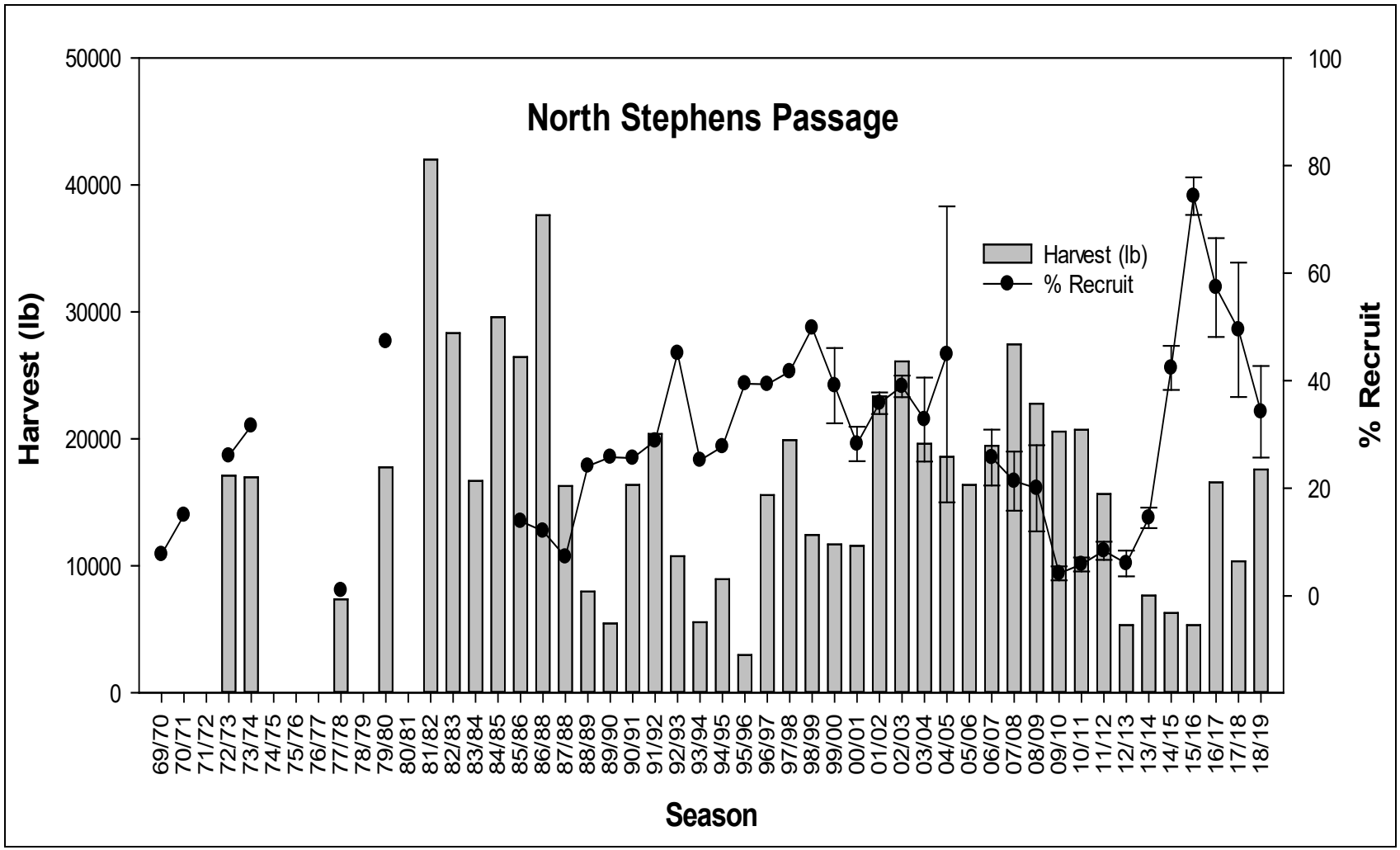

Figure 9.–North Stephens Passage trends in harvest and recruit class from dockside sampling of commercial golden king crab catches, 1969/1970–2018/2019 seasons (error bars for 1999/2000–2018/2019 seasons reflect variance by trip).

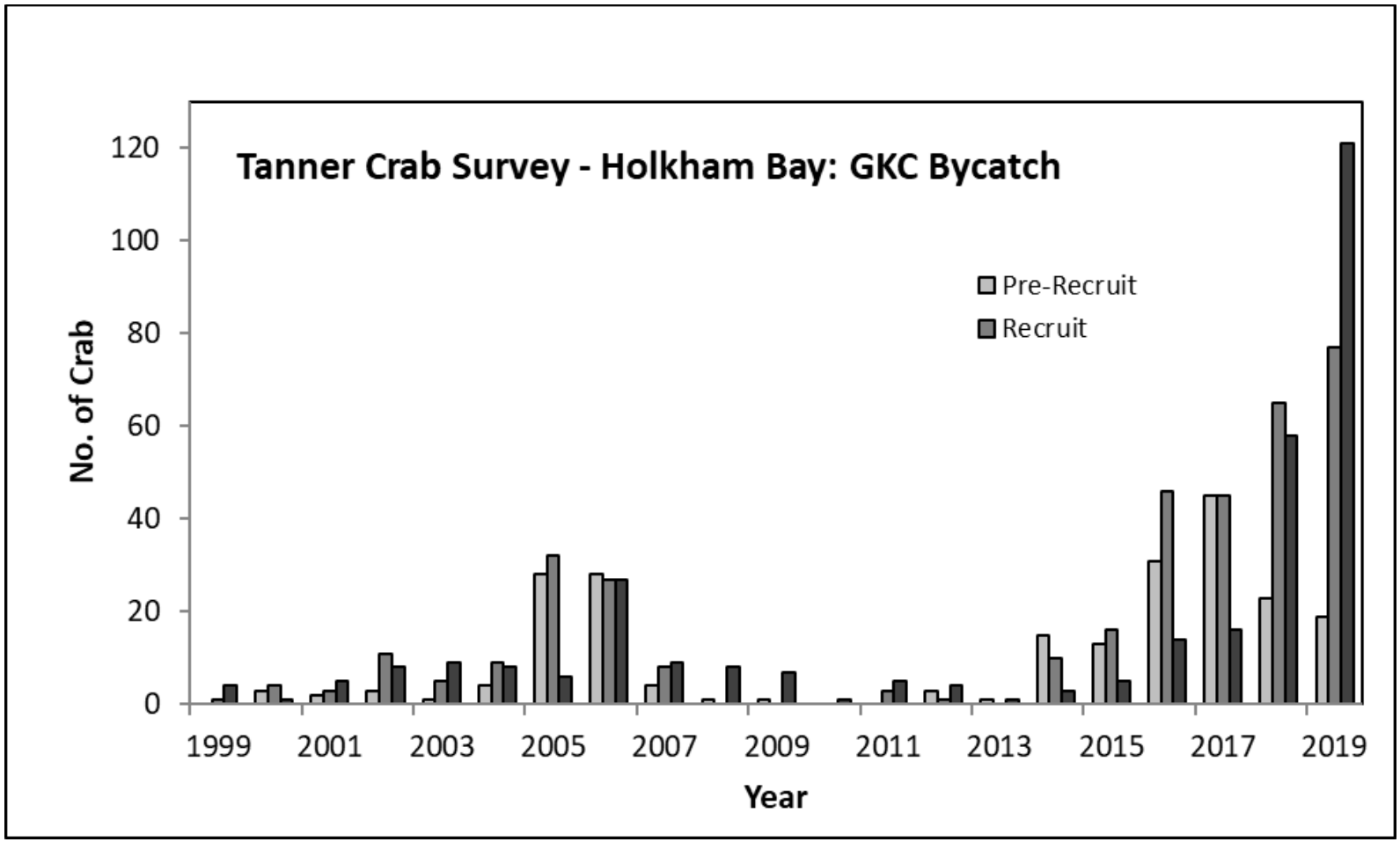

Figure 10.–Golden king crab bycatch of pre-recruit, recruit, and post-recruit class crabs caught in the annual Tanner crab survey in Holkham Bay, 1999–2019.

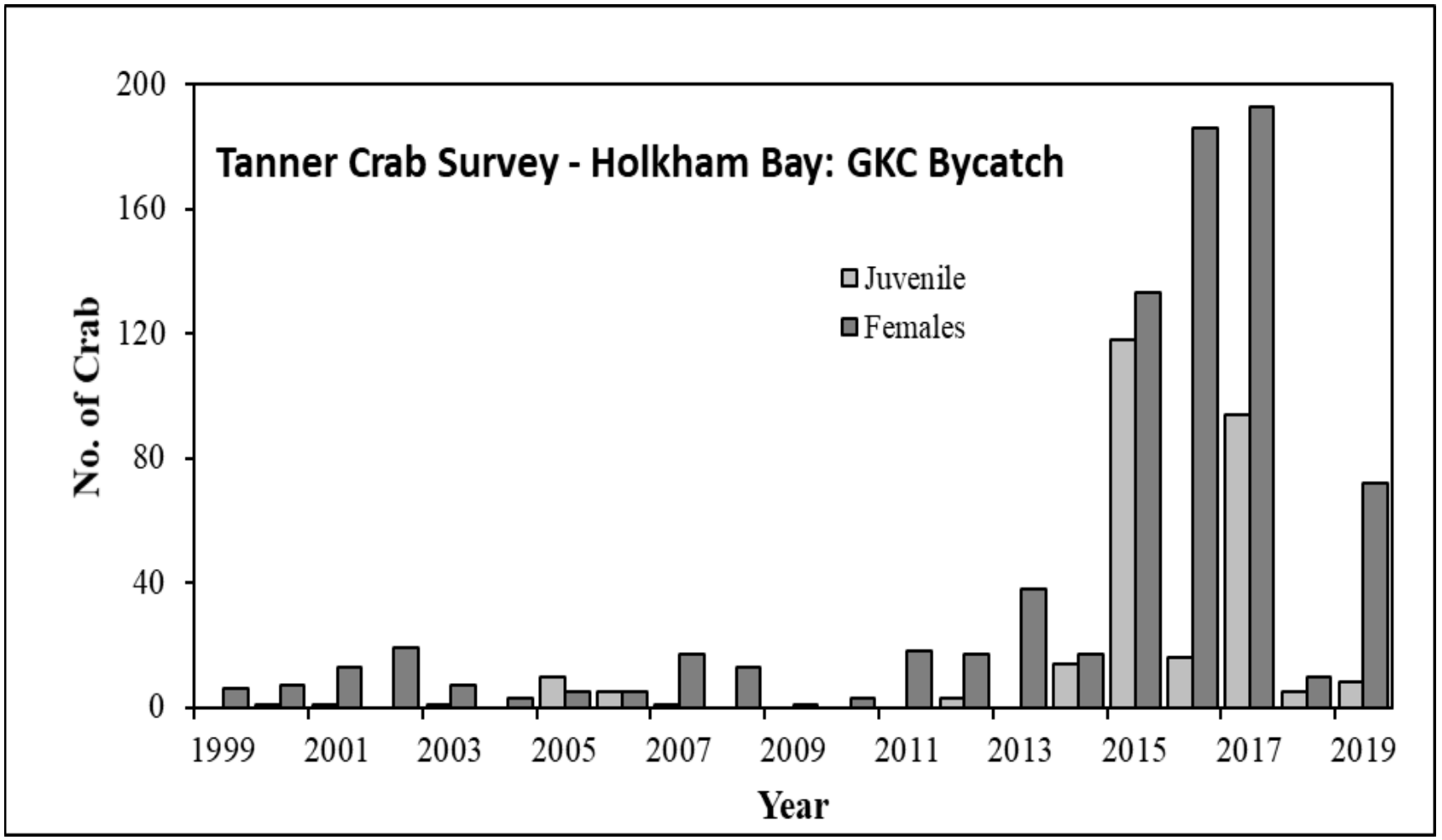

Figure 11.–Golden king crab bycatch of juvenile male and female class crabs caught in the annual Tanner crab survey in Holkham Bay, 1999–2019.

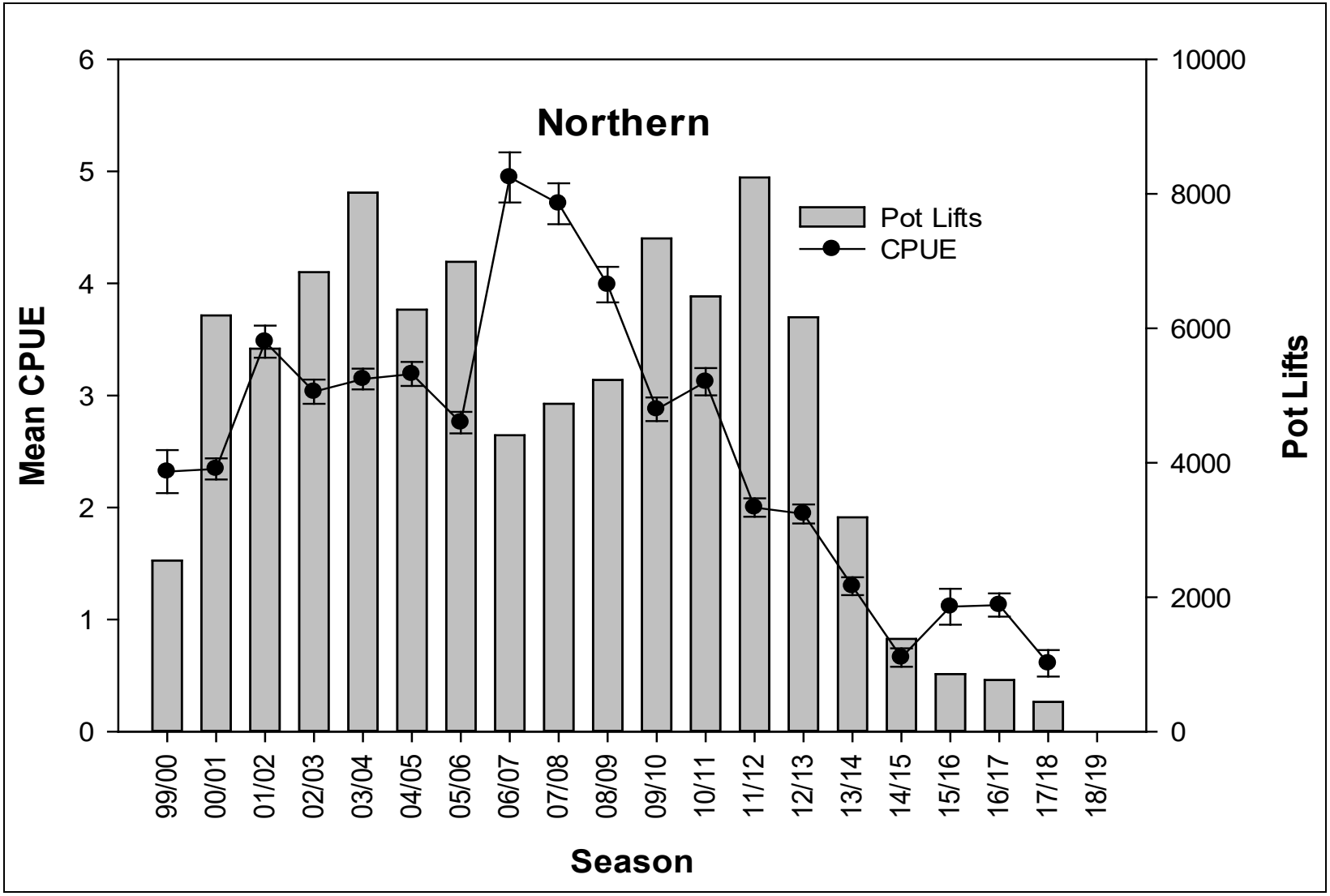

Figure 12.–Golden king crab CPUE and pot lifts from logbook data for Northern, 1999/2000–2018/2019 seasons.

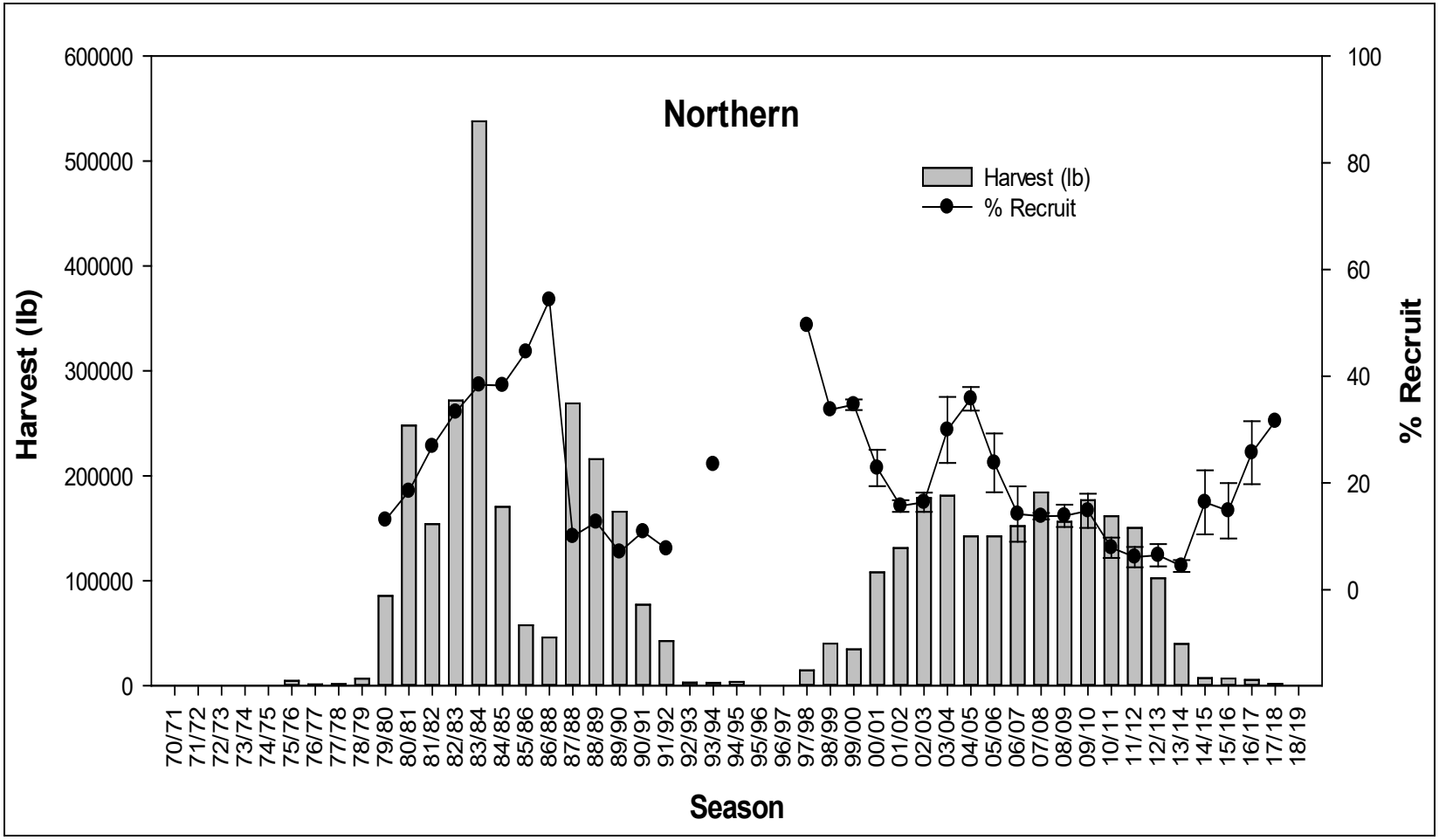

Figure 13.–Northern trends in harvest and recruit class from dockside sampling of commercial golden king crab catches, 1970/1971–2018/2019 seasons (error bars for 1999/2000–2018/2019 seasons reflect variance by trip).

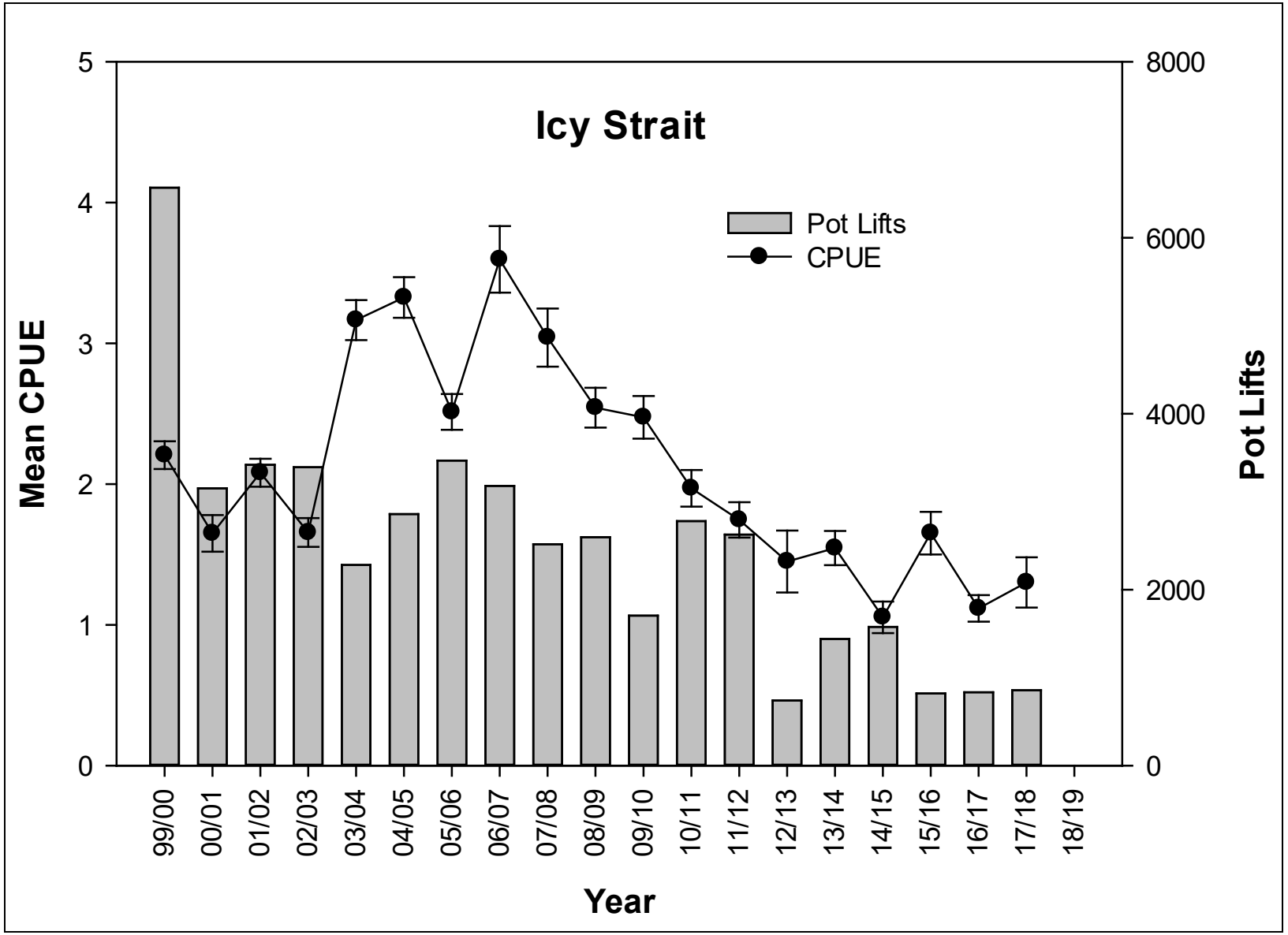

Figure 14.–Golden king crab CPUE and pot lifts from logbook data for Icy Strait, 1999/2000–2018/2019 seasons.

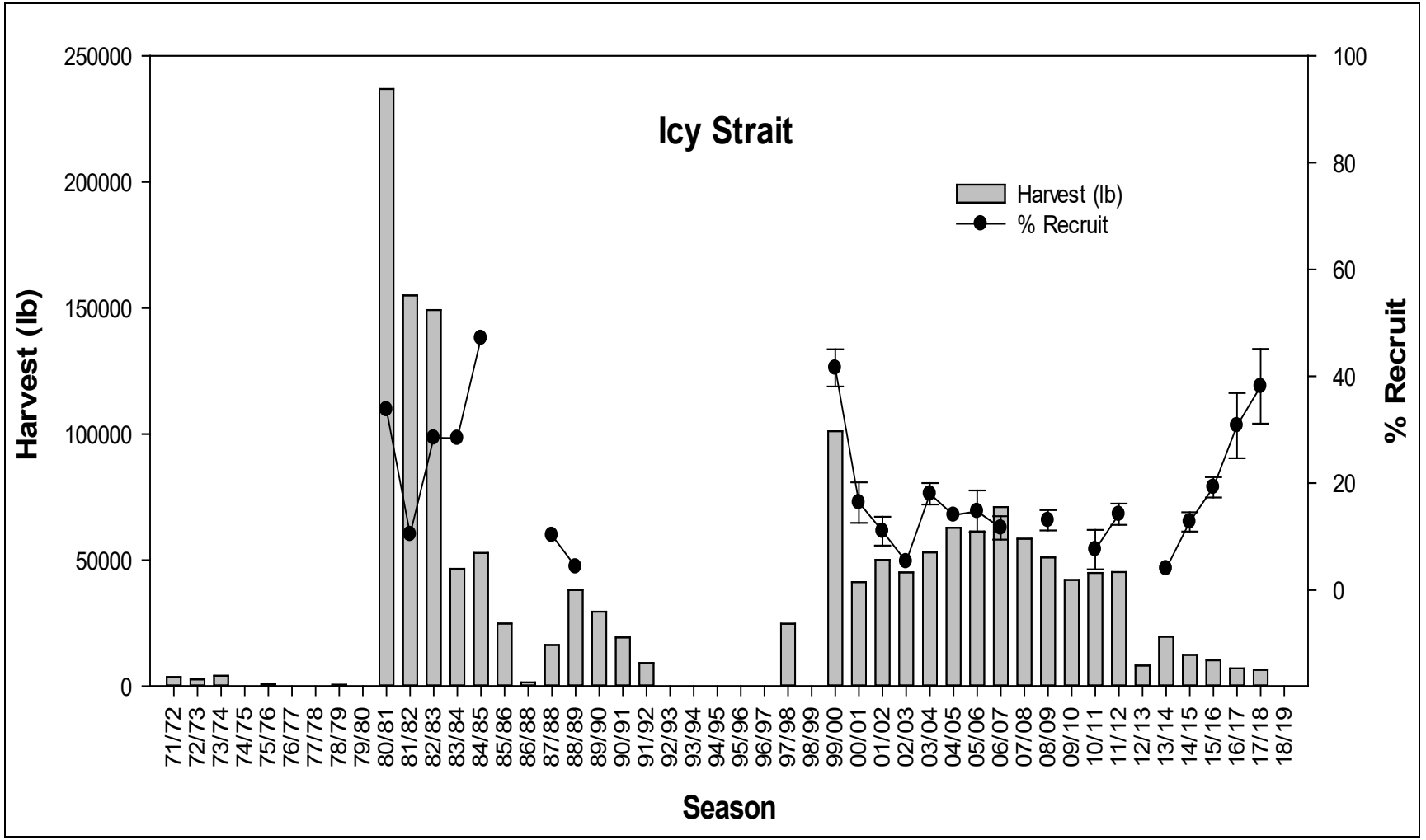

Figure 15.–Icy Strait trends in harvest and recruit class from dockside sampling of commercial golden king crab catches, 1971/1972–2018/2019 seasons (error bars for 1999/2000–2018/2019 seasons reflect variance by trip).

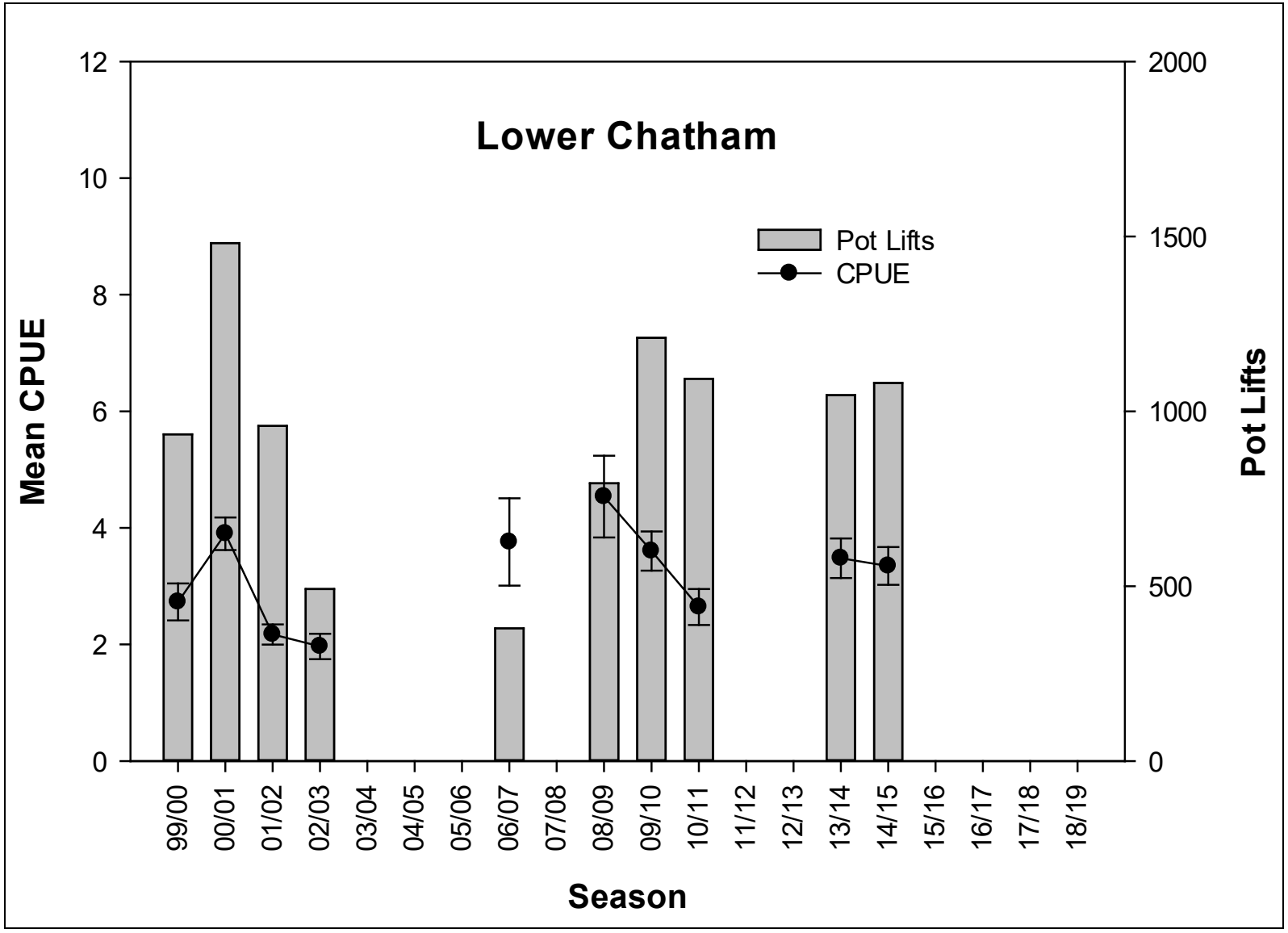

Figure 16.–Golden king crab CPUE and pot lifts from logbook data for Lower Chatham Strait, 1999/2000–2018/2019 seasons.

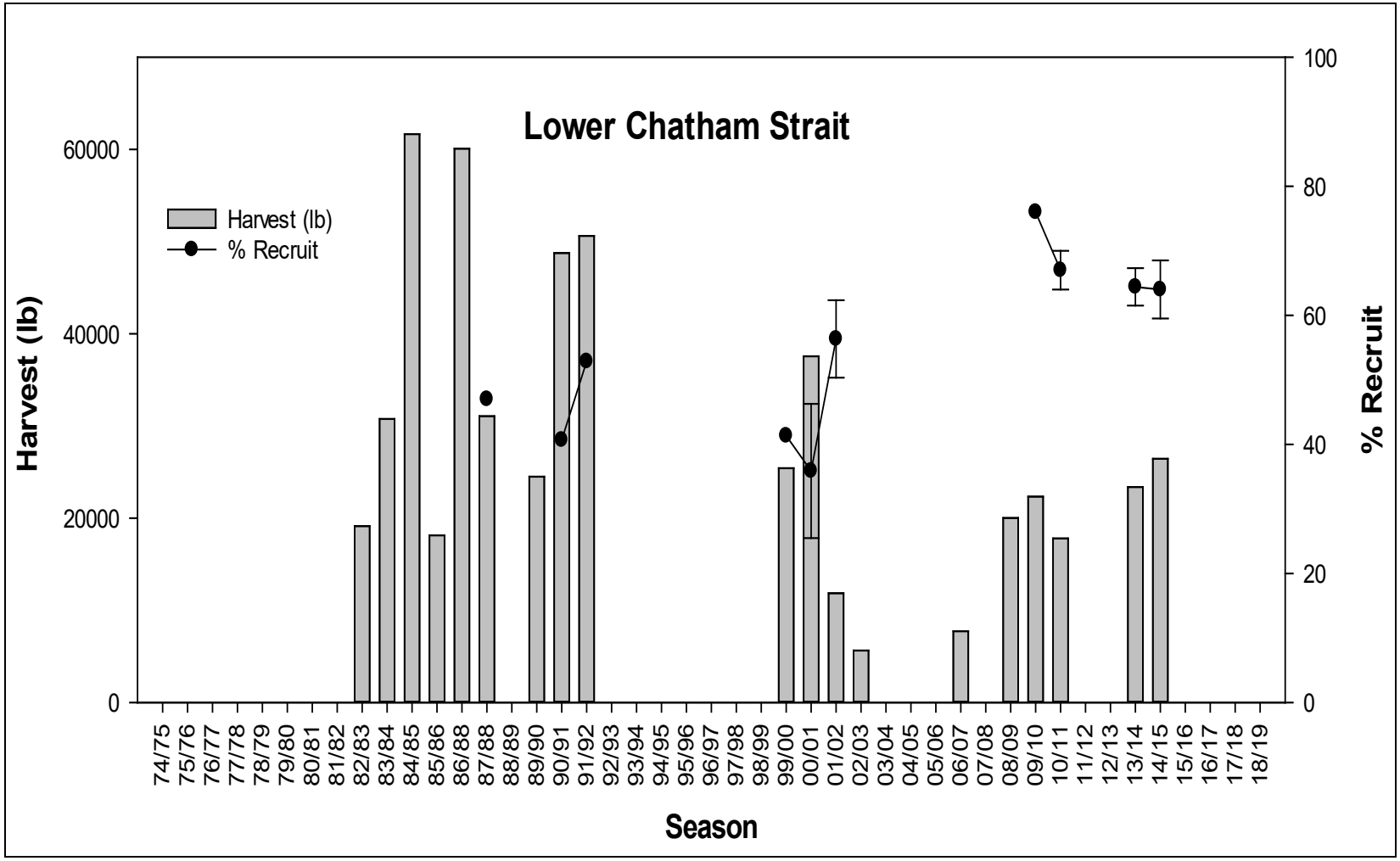

Figure 17.–Lower Chatham Strait trends in harvest and recruit class from dockside sampling of commercial golden king crab catches, 1974/1975–2018/2019 seasons (error bars for 1999/2000–2018/2019 seasons reflect variance by trip).

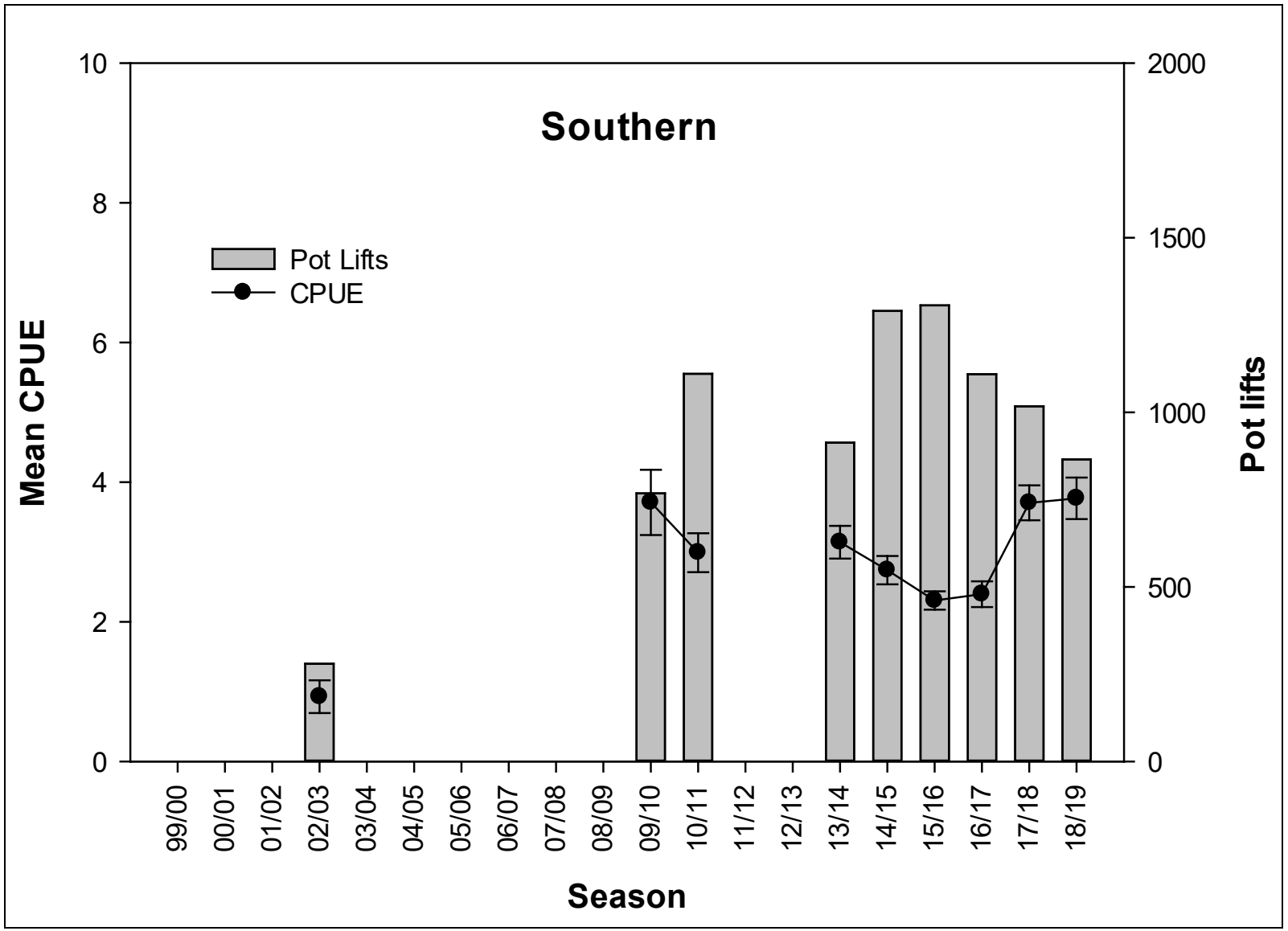

Figure 18.–Golden king crab CPUE and pot lifts from logbook data for Southern, 1999/2000–2018/2019 seasons.

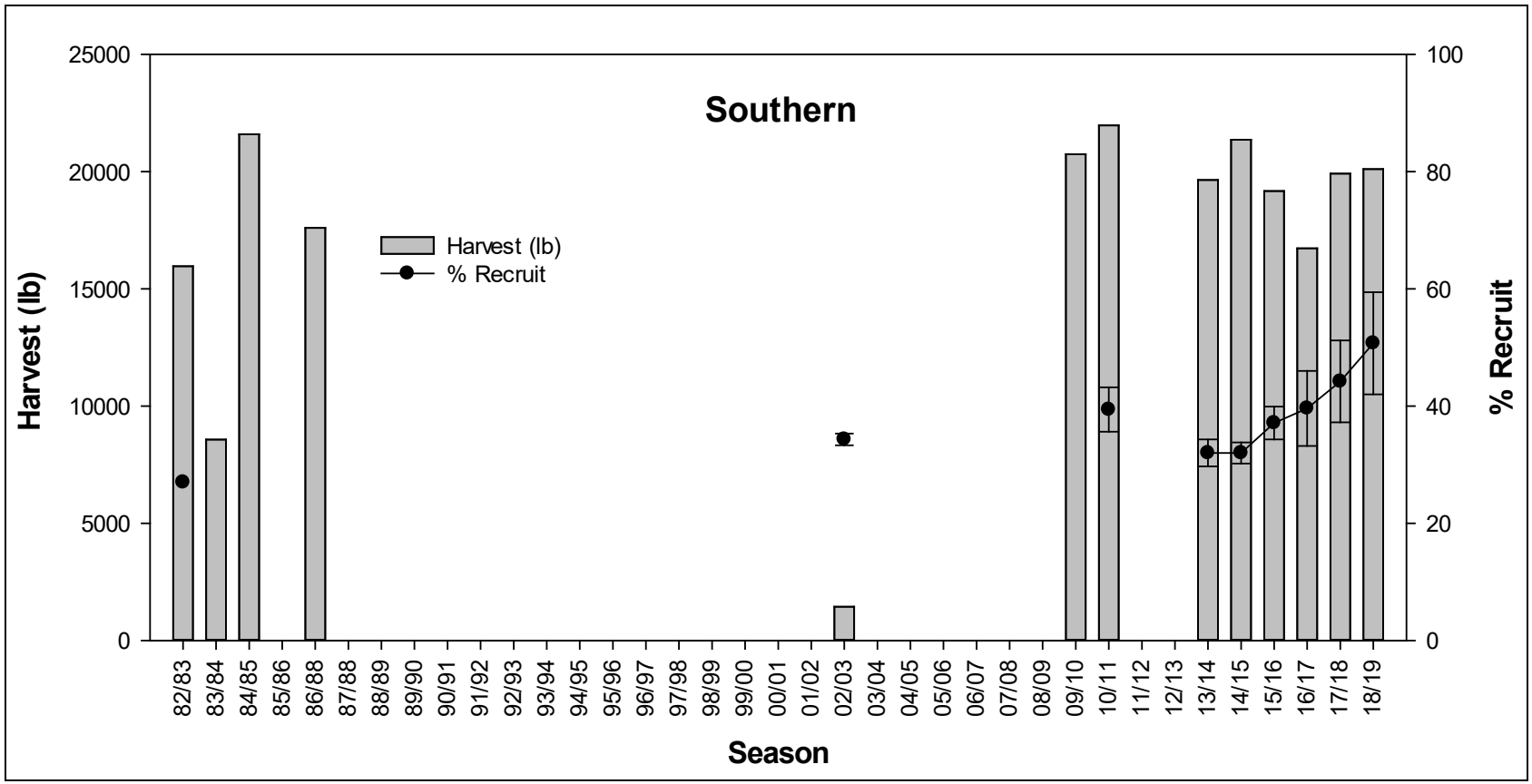

Figure 19.–Southern trends in harvest and recruit class from dockside sampling of commercial golden king crab catches, 1982/1983–2018/2019 seasons (error bars for 2002/2003–2018/2019 seasons reflect variance by trip).