California's Dungeness Crab Fishery

Report to the DCTF – Oct 2009

California Department of Fish and Game
Marine Invertebrate Management Project

- Catch and Effort Patterns
- Permits
- Economics if Time Available
- Research if Time Available

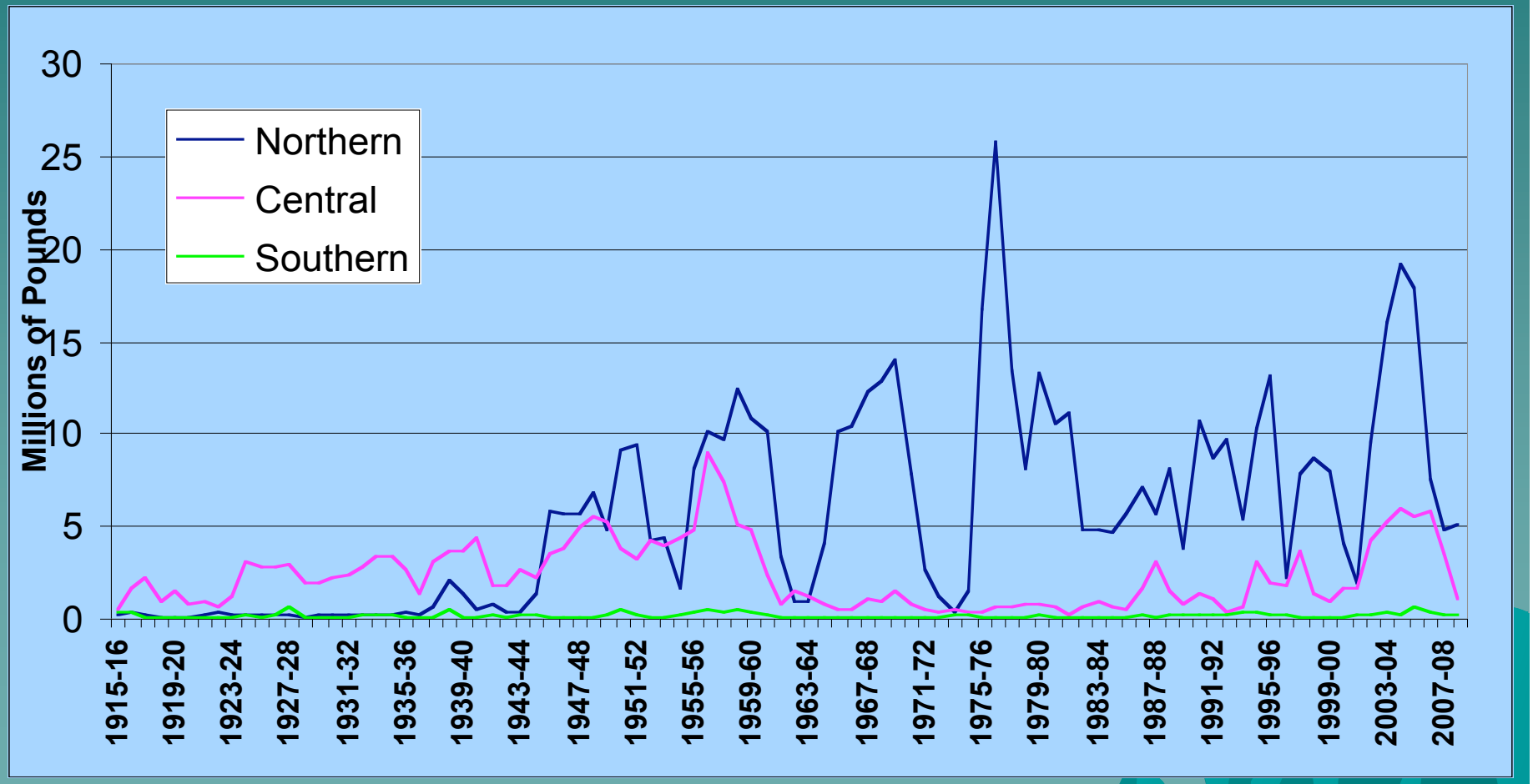
Regulatory Structure

- Commercial Fishery Regulated by State Legislature
- Sport Fisheries Regulated by FG Commission
- DFG Enforces Regulations
- Commercial Management Scheme
  - Restricted Access
  - Size – minimum size 6.25 inches
  - Sex – keep males only
  - Season -
- Two management areas

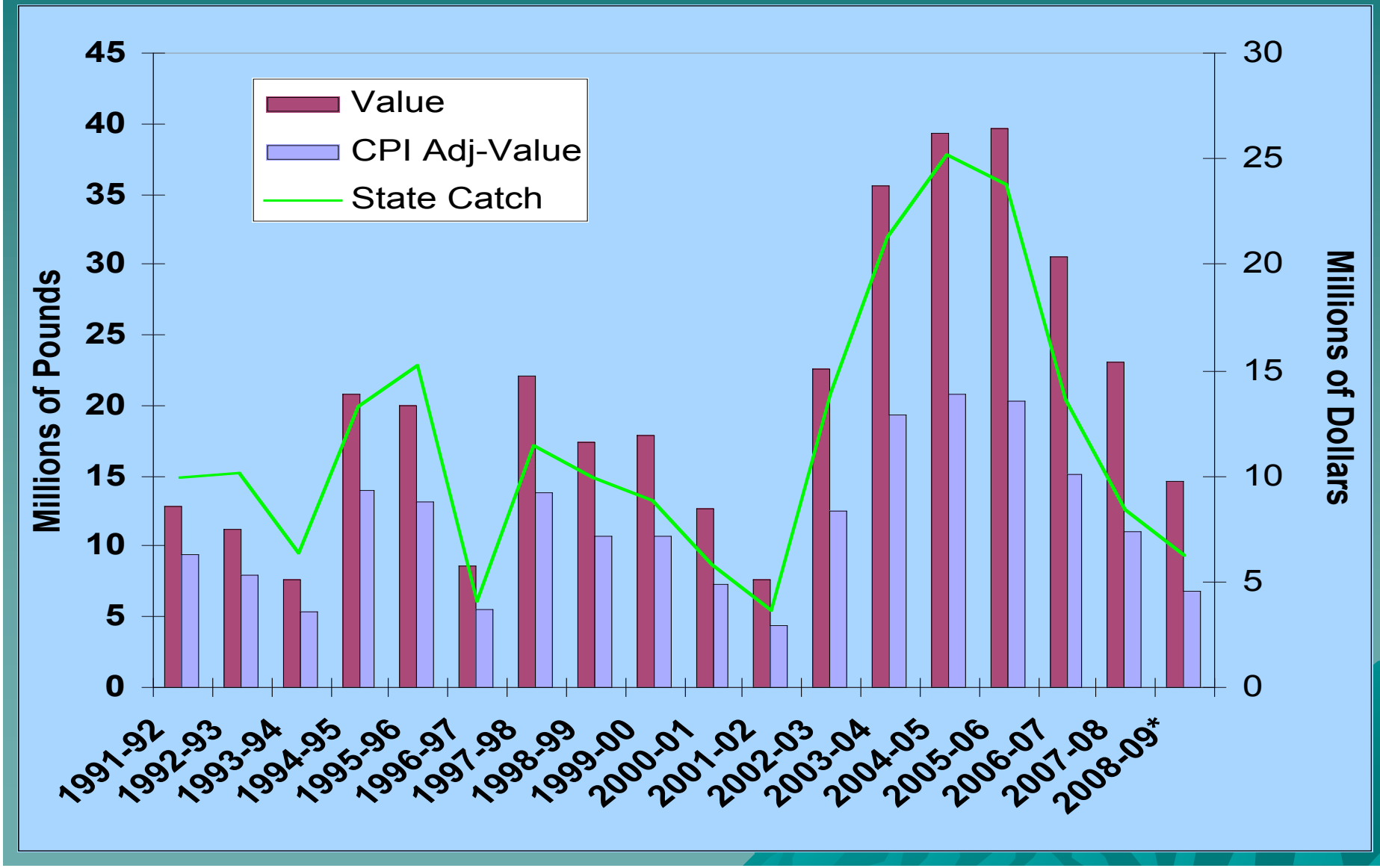
Management Areas
Northern
Central
Crescent City
Eureka
Fort Bragg
Bodega Bay
San Francisco
Half Moon Bay
Monterey
Morro Bay
DFG. November 2007. D:\Projects\McVeigh\PPT_2007-11-13.mxd

Dungeness Crab Landings 1915-2008

Catch by Region



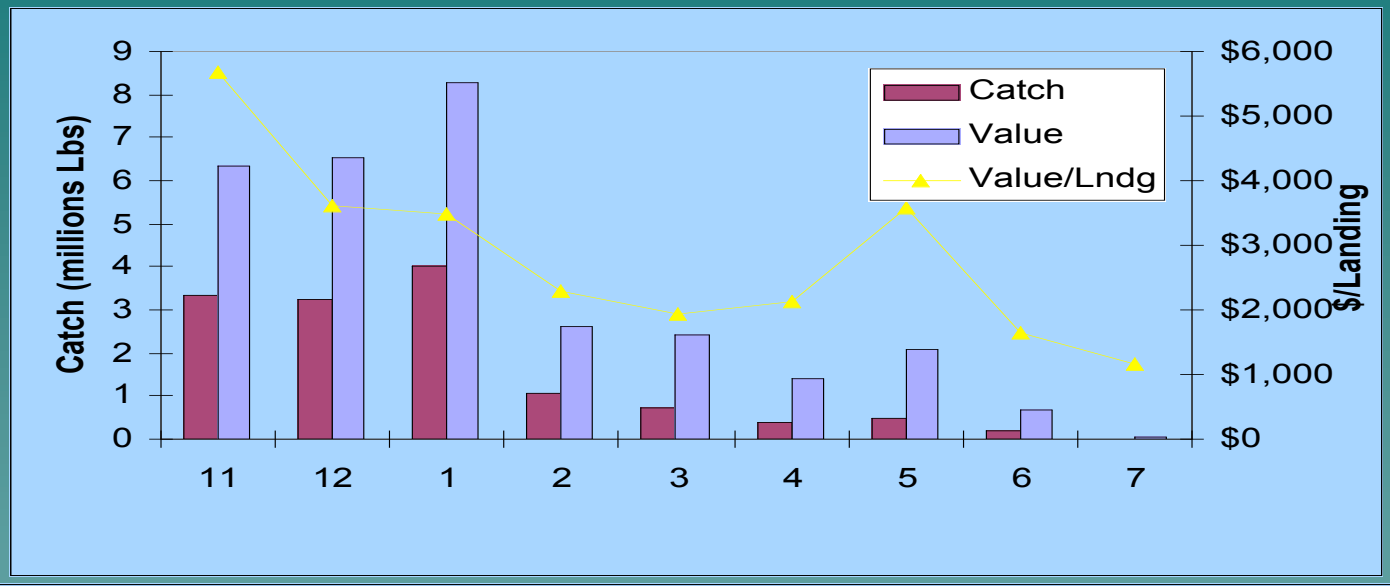
Statewide Catch, Value and CPI- adjusted Value, 1991 - 2008

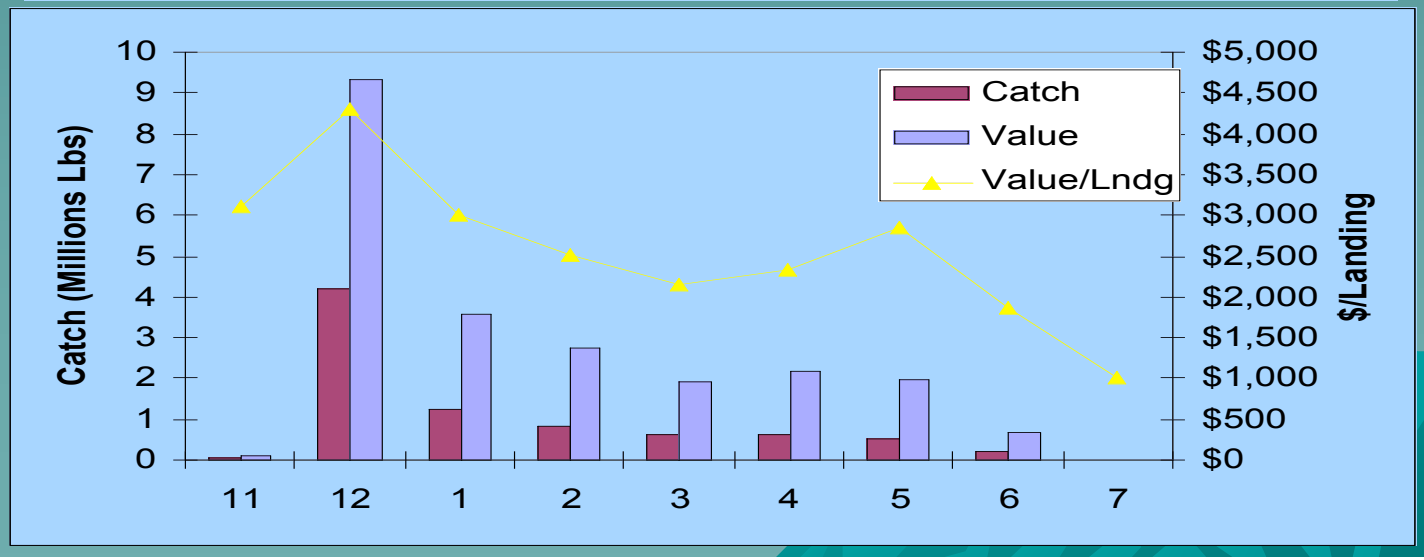


Statewide Catch and Value by Month

TOP 2006/07=No Delays – 13.5 million Lbs

BOTTOM 2007/08=Oil Spill – 8.2 million Lbs

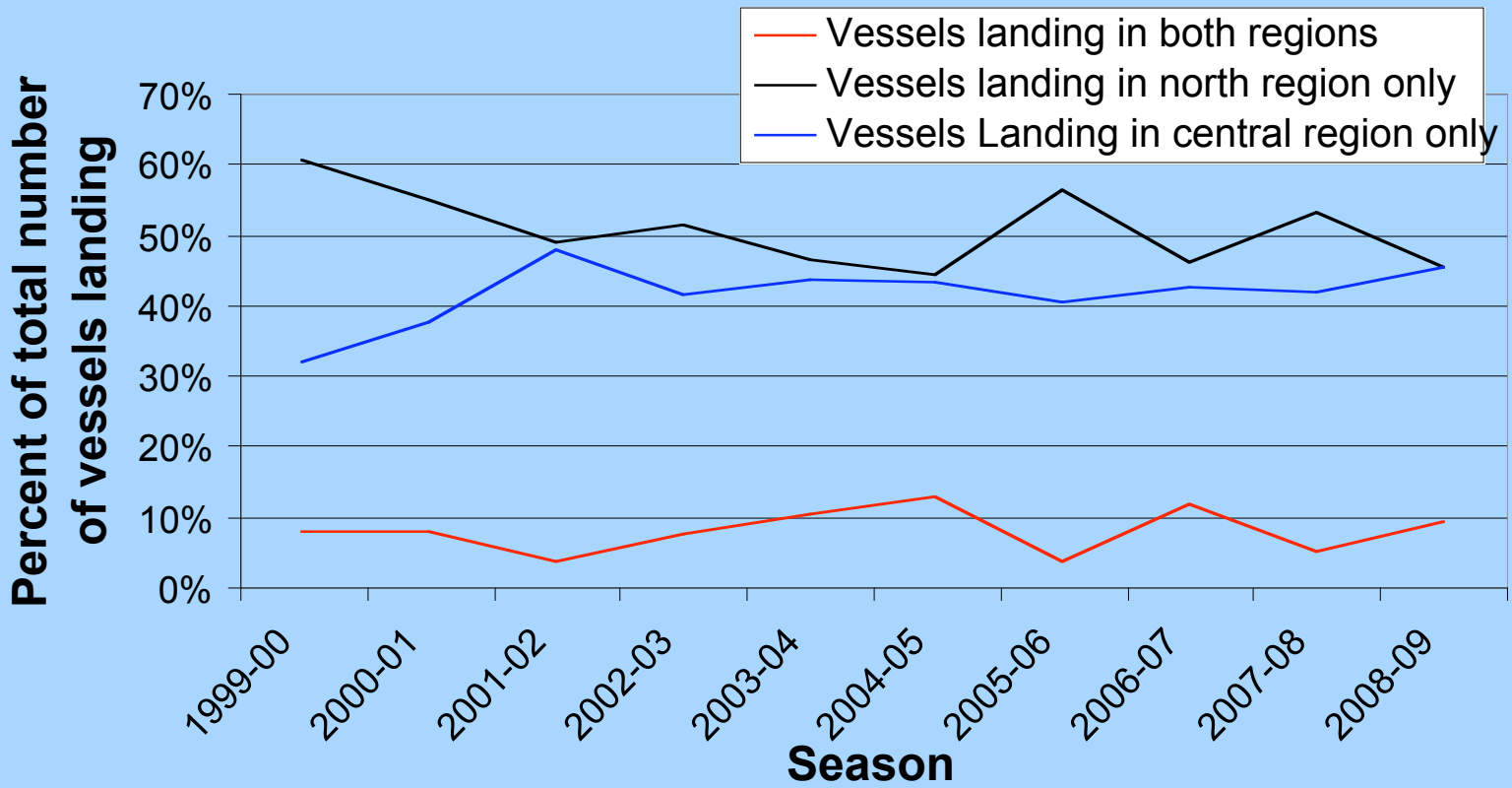




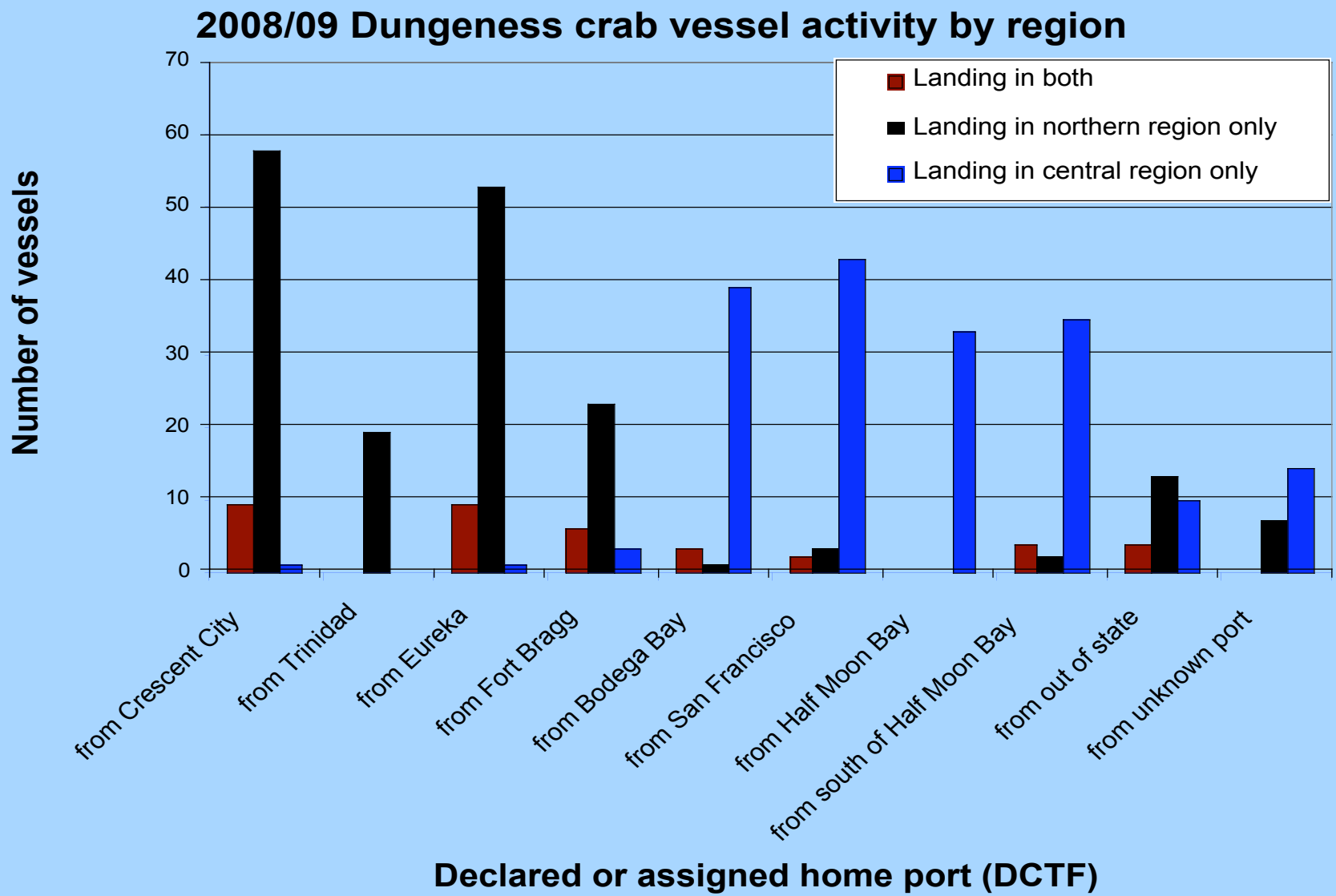
Larger boats tend to travel between regions more than smaller boats

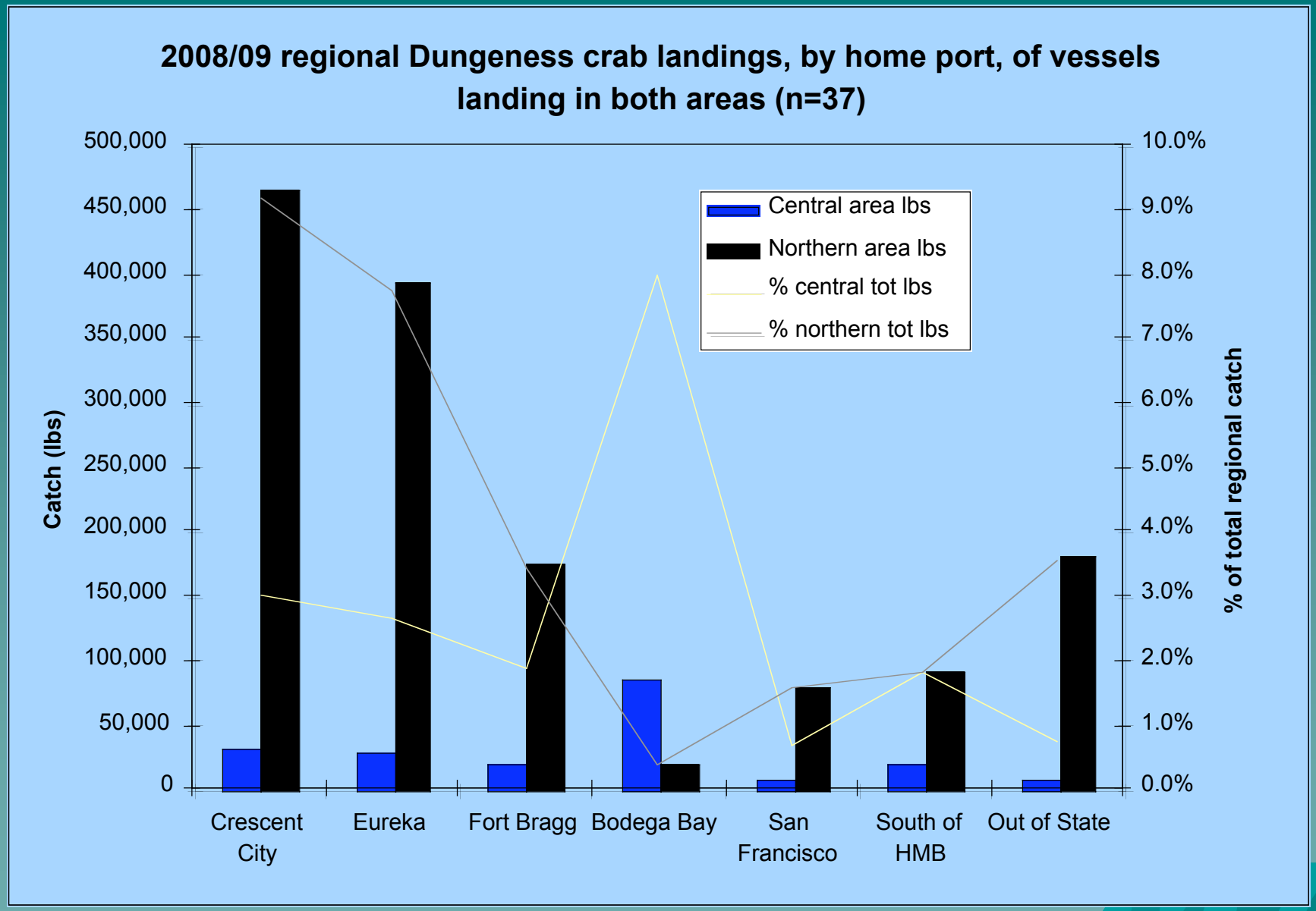
- Vessels landing crab in 2008/09 season
  - Of the 55 vessels less than 30 feet, none landed crab in both regions.
  - Of the 267 vessels between 30 and 50 feet, 18 (**7%**) landed crab in both regions.
  - Of the vessels 52 over 50 feet, 19 (***35%***) landed crab in both regions.

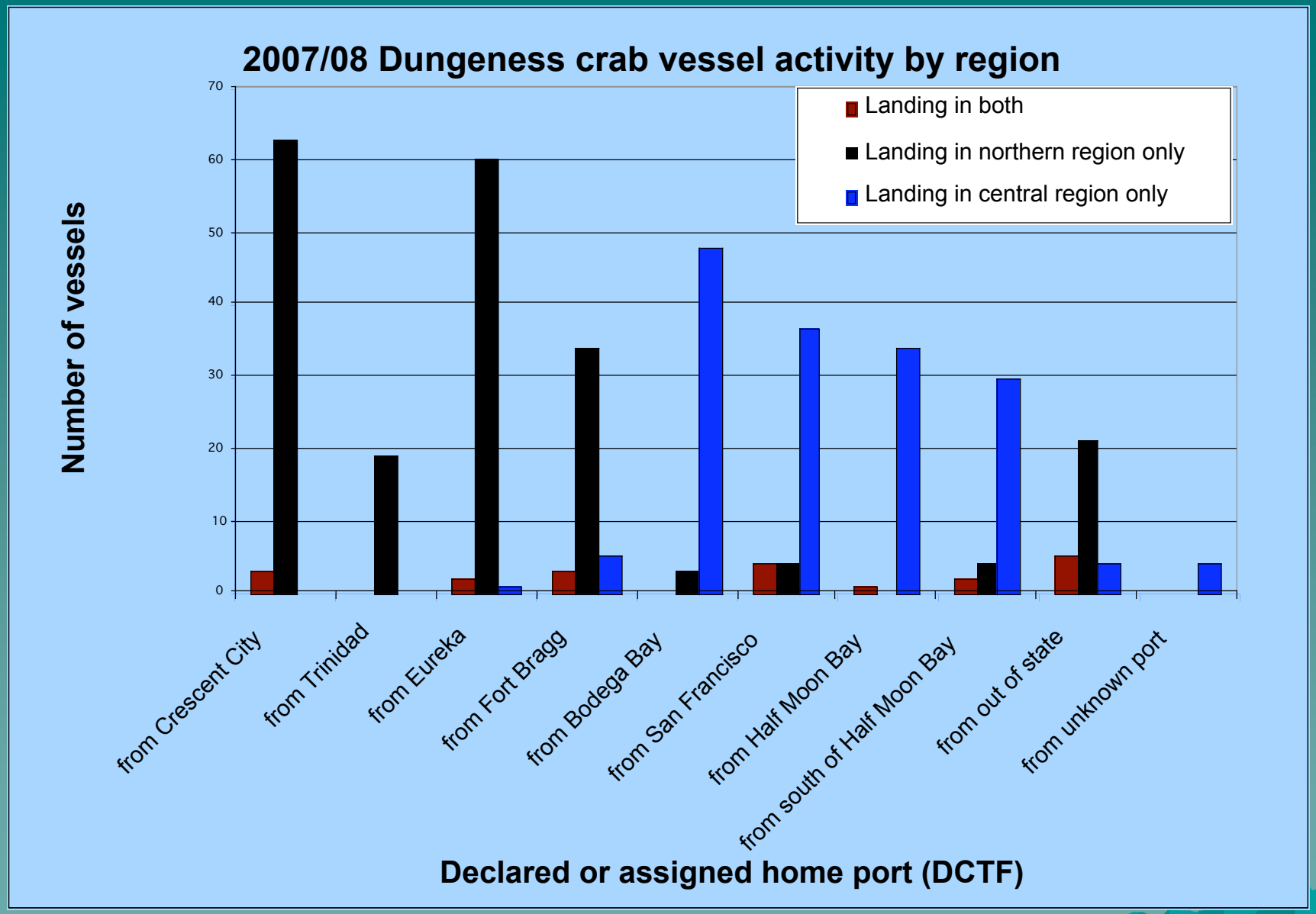
Regional Dungeness crab vessel landing trend 1999-00 to 2008-09



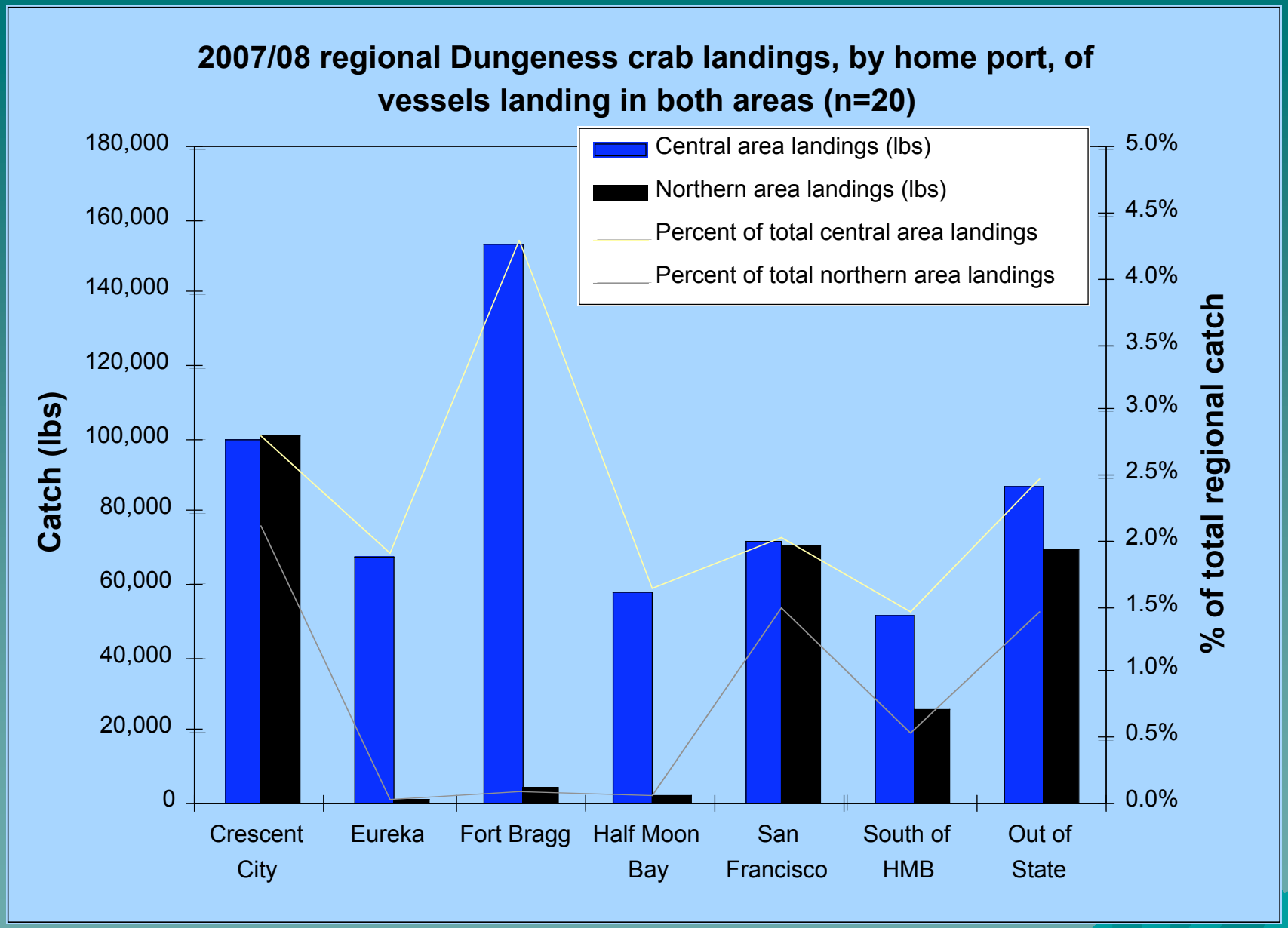
Season	Total Vessels Landing	Vessels landing in both regions		Vessels landing in north region only		Vessels Landing in central region only	
1999/00 to 2008/09		Number	Percent of total	Number	Percent of total	Number	Percent of total
Average	407	32	8%	206	51%	168	41%


2008/09 Dungeness crab vessel activity by region
Number of vessels
70
60
50
40
30
20
10
0
Landing in both
Landing in northern region only
Landing in central region only
from Crescent City
from Trinidad
from Eureka
from Fort Bragg
from Bodega Bay
from San Francisco
from Half Moon Bay
from south of Half Moon Bay
from out of state
from unknown port
Declared or assigned home port (DCTF)

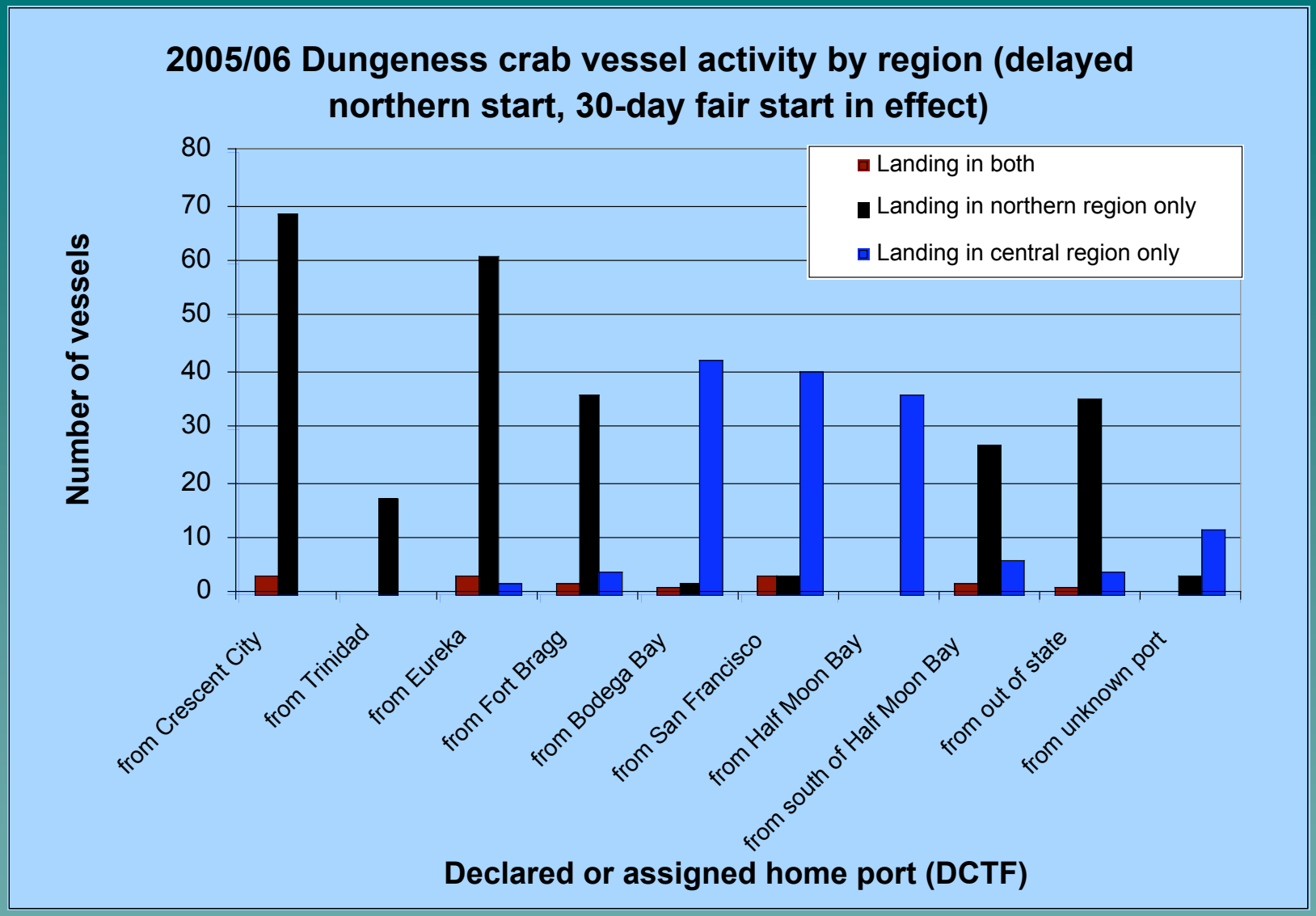

2008/09 regional Dungeness crab landings, by home port, of vessels landing in both areas (n=37)
Catch (lbs)
500,000
450,000
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
10.0%
9.0%
8.0%
7.0%
6.0%
5.0%
4.0%
3.0%
2.0%
1.0%
0.0%
% of total regional catch
Central area lbs
Northern area lbs
% central tot lbs
% northern tot lbs
Crescent City
Eureka
Fort Bragg
Bodega Bay
San Francisco
South of HMB
Out of State



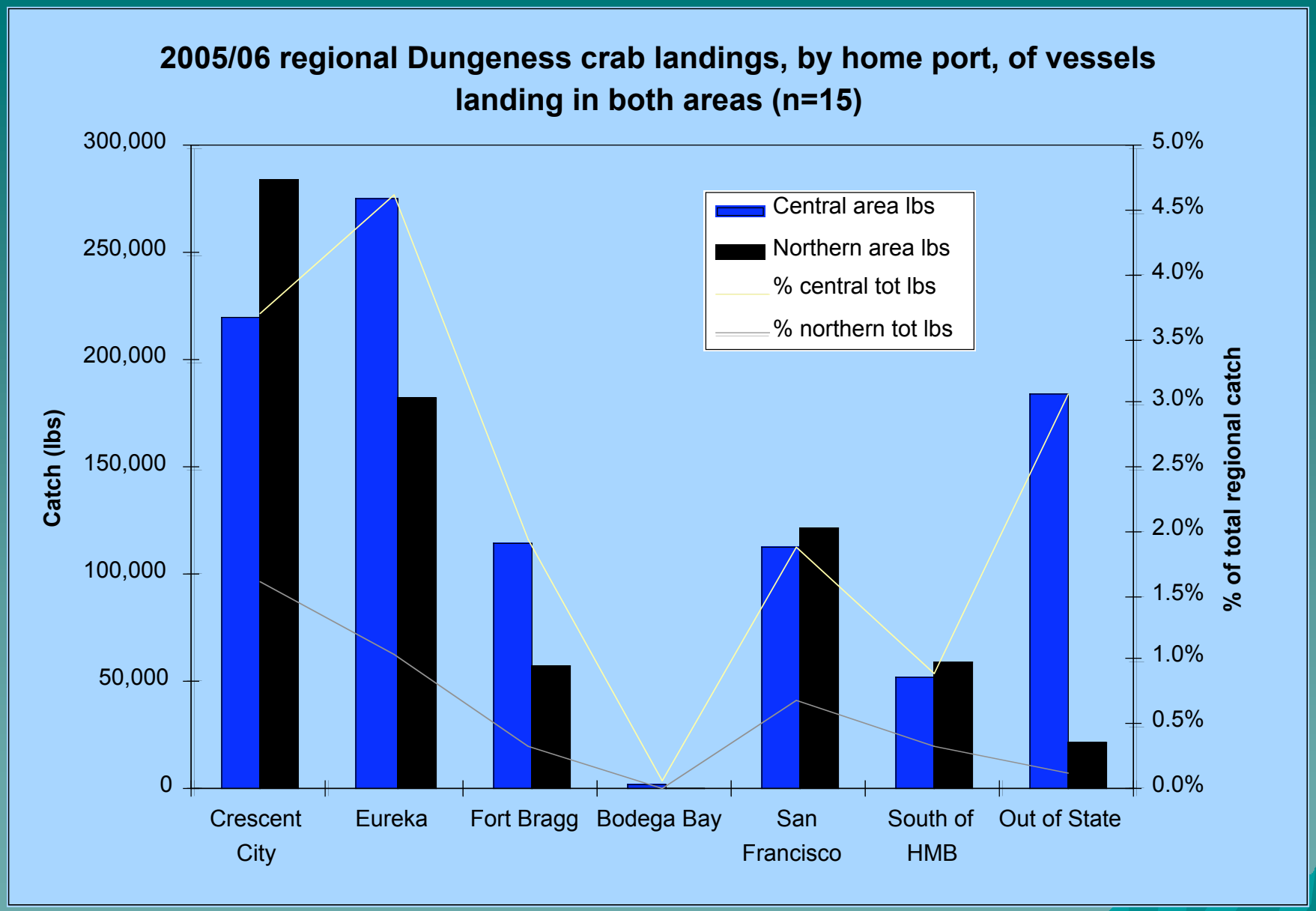
In the 2007/08 season, delayed by the Cosco Busan oil spill, 20 of 391 (5%) vessels landed crab in both regions.



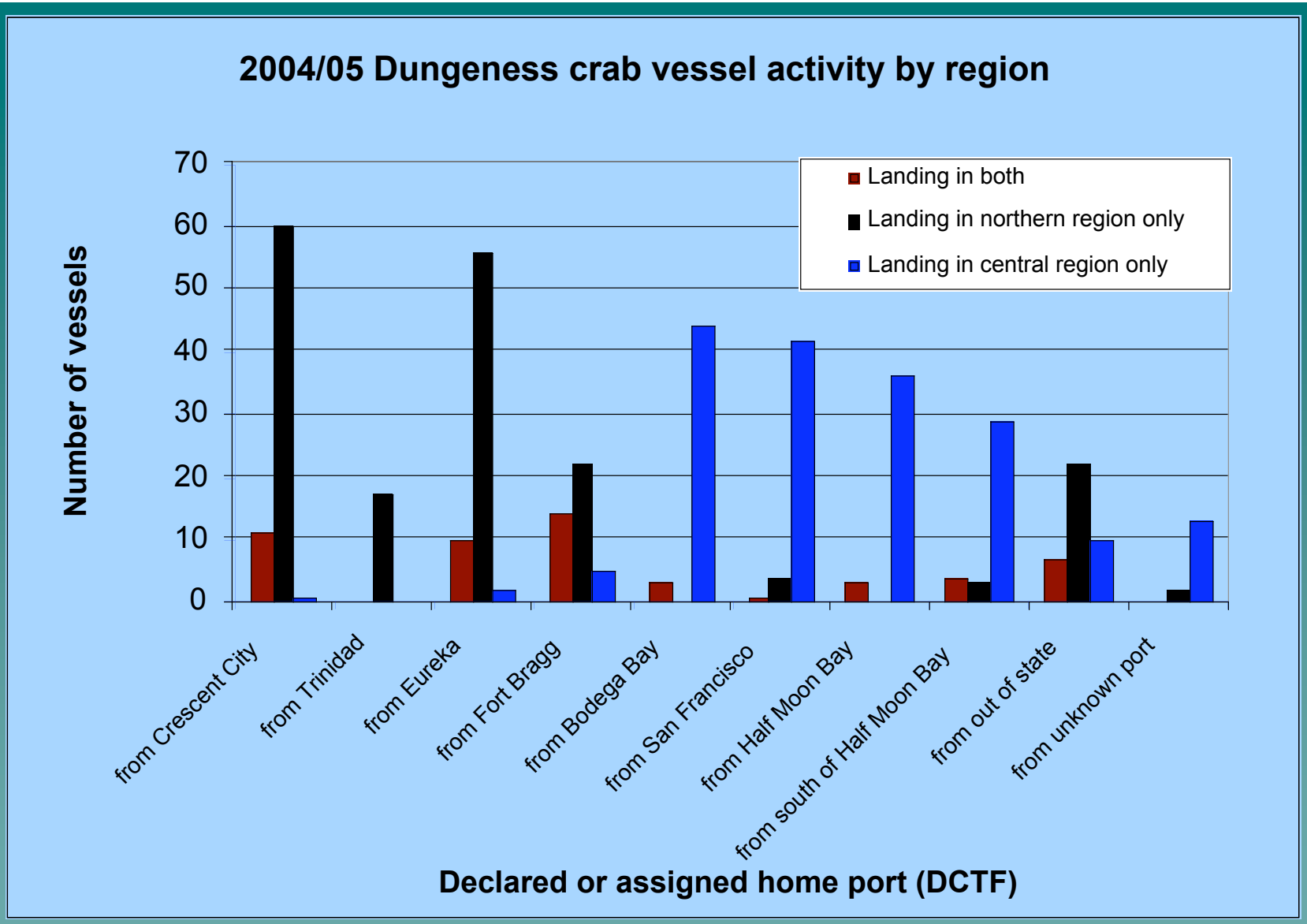
During 2007/08, vessels landing in both regions took 17% of total central catch and 6% of total northern catch.



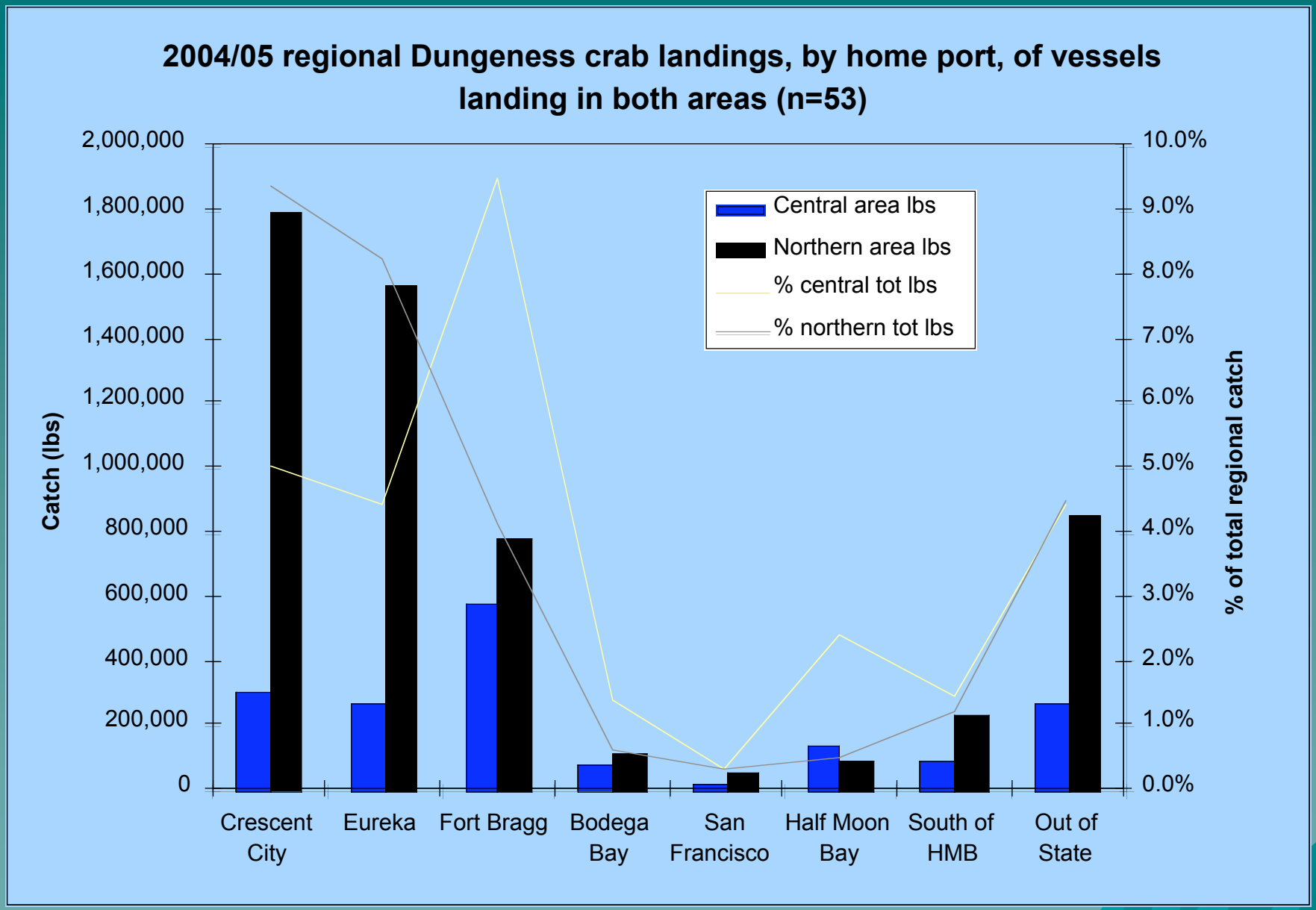
In the 2005/06 season, when there was a delayed northern start and a 30-day fair start in effect, only 15 of 414 (4%) vessels landed crab in both regions.



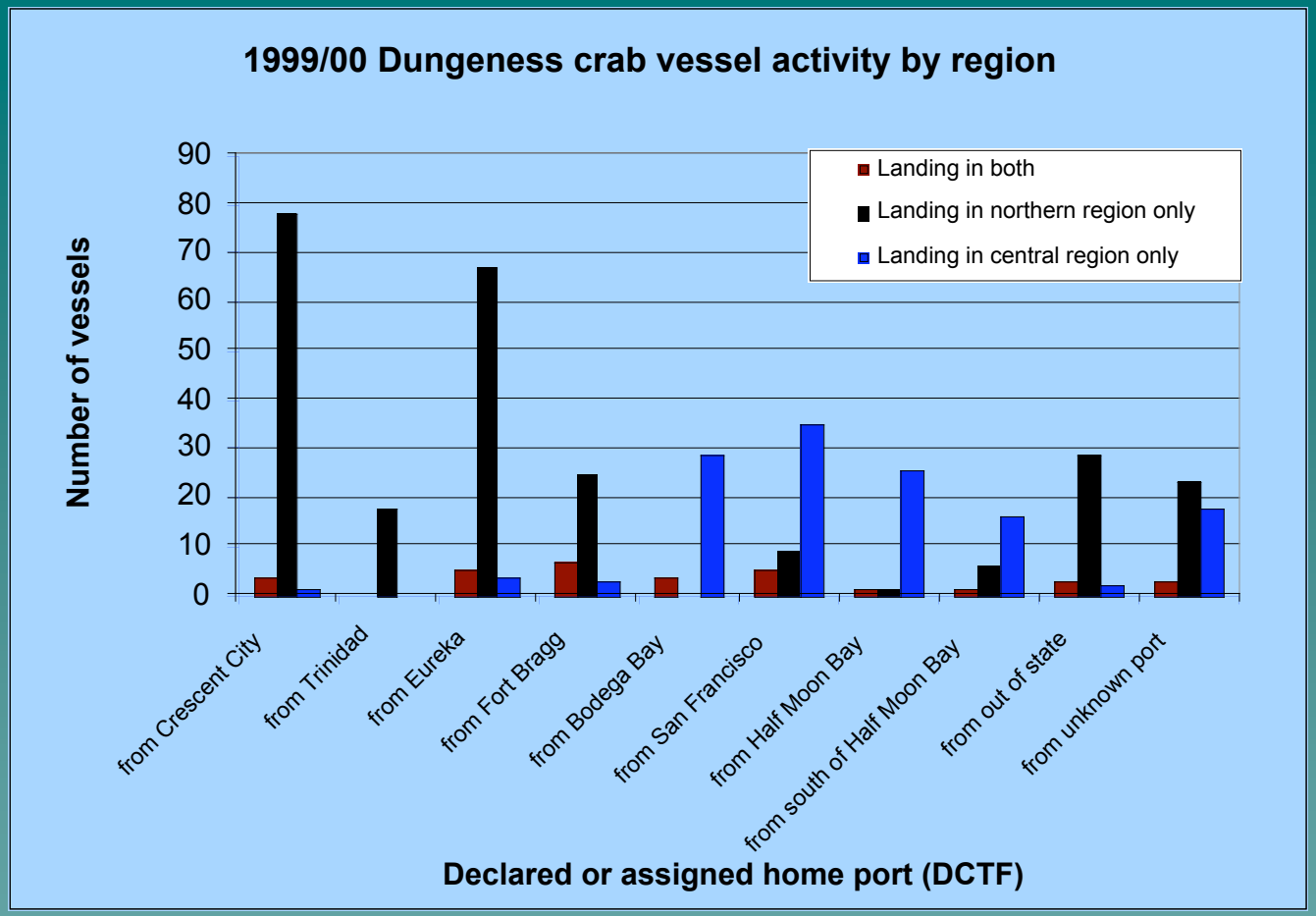
During 2005/06, vessels landing in both regions took 16% of total central catch and 4% of total northern catch.



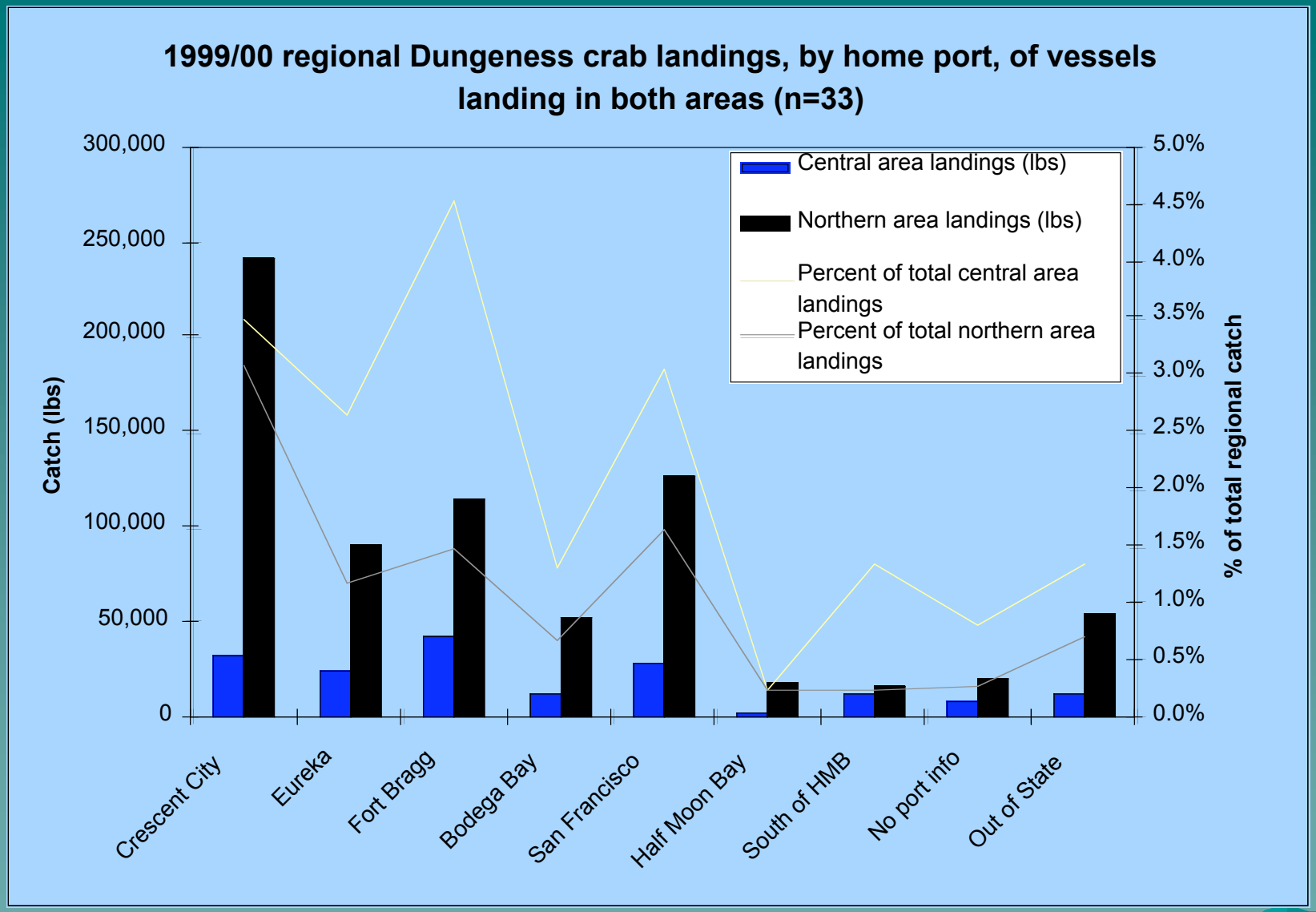
In the 2004/05 season, approximately equal to 2005/06 landings, 53 of 421 (13%) vessels landed crab in both regions.



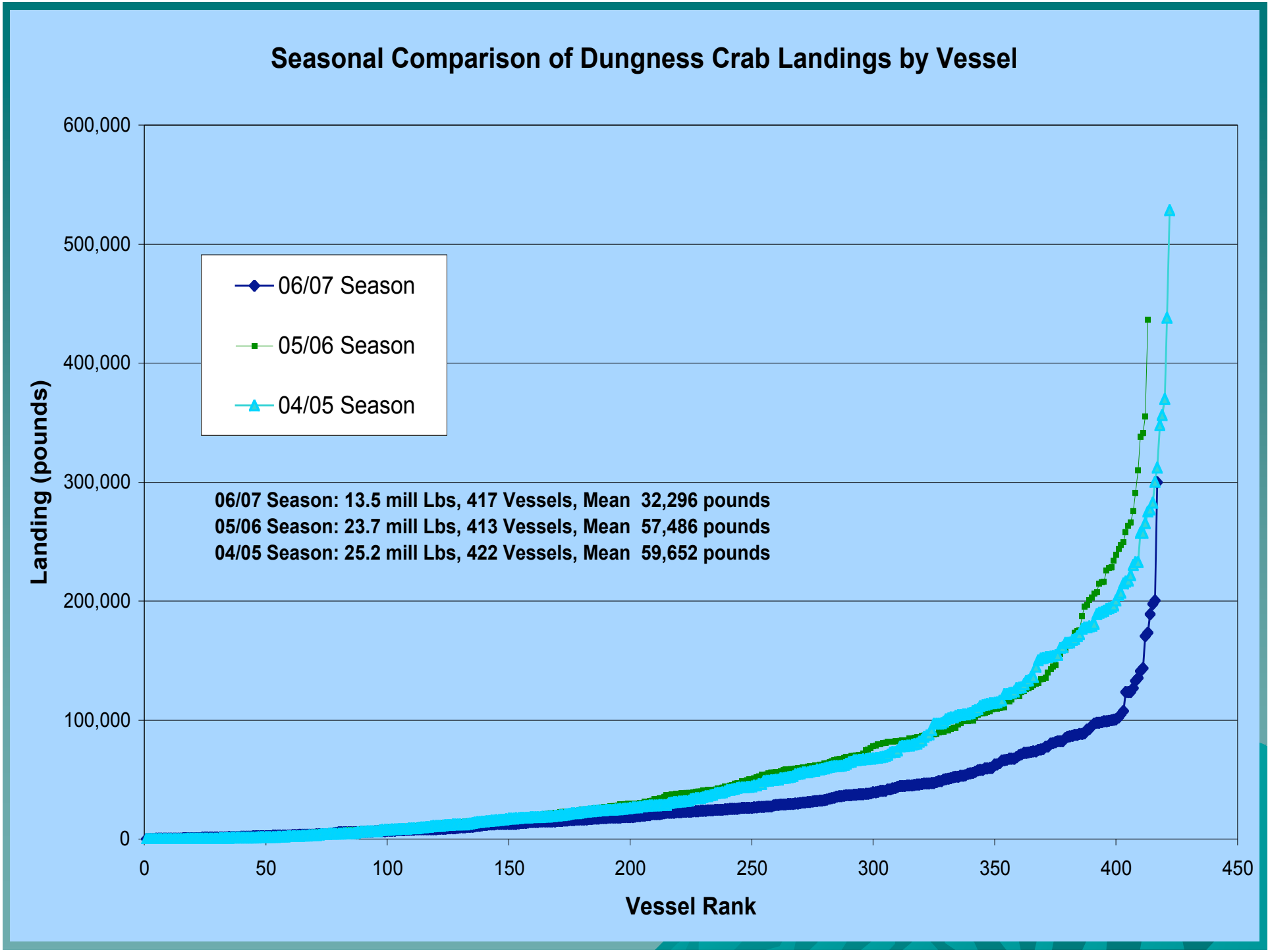
During 2004/05, vessels landing in both regions took 26% of total central catch and 28% of total northern catch.



In the 1999/00 season, approximately equal to 2008/09 landings, only 33 of 423 (8%) vessels landed crab in both regions.



During 1999/00, vessels landing in both regions took 19% of total central catch and 9% of total northern catch.


Seasonal Comparison of Dungness Crab Landings by Vessel
600,000
500,000
400,000
300,000
200,000
100,000
0
Landing (pounds)
06/07 Season
05/06 Season
04/05 Season
06/07 Season: 13.5 mill Lbs, 417 Vessels, Mean 32,296 pounds
05/06 Season: 23.7 mill Lbs, 413 Vessels, Mean 57,486 pounds
04/05 Season: 25.2 mill Lbs, 422 Vessels, Mean 59,652 pounds
0
50
100
150
200
250
300
350
400
450
Vessel Rank

Commercial Dungeness Crab Catch by Boat Code: 2003/04, 2004/05, 2005/06

Preliminary Data

05/06 Data Incomplete

Ranked by 05/06 Season

		03/04		04/05		05/06		Total 3 SEASONS		High	Highest
Row#	BTCODE	Receipts	Catch	Receipts	Catch	Receipts	Catch	Receipts	Catch	Catch	Season Y/YY
1	1065.54	69	594,174	50	437,997	43	423,450	162	1,455,621	594,174	304
2	692.02	28	445,668	18	394,228	33	354,371	79	1,194,267	445,668	304
3	653.04	26	411,267	27	347,610	28	341,036	81	1,099,913	411,267	304
4	749.50	143	298,998	116	276,371	98	338,175	357	913,544	338,175	506
5	870.48	9	169,520	7	102,321	15	310,161	31	582,002	310,161	506
6	86.60			27	312,257	31	285,890	58	598,147	312,257	405
7	719.38	40	337,669	42	369,653	29	275,510	111	982,832	369,653	405
8	472.34	17	289,322	13	221,596	13	266,050	43	776,968	289,322	304
9	93.72			28	257,431	41	255,242	69	512,673	257,431	405
10	494.84	40	109,714	1	313	23	252,393	64	362,420	252,393	506
11	615.98	21	347,015	23	300,127	19	249,526	63	896,668	347,015	304
12	627.52	19	323,426	17	216,295	16	247,206	52	786,927	323,426	304

State of Residency Status of a Dungeness Crab Vessel Permit

- Not a condition of the permit
- Can change from year to year based on vessel owner's residency
- Code section 7601 describes how resident vs. non-resident is determined using USCG certificate of documentation, or DMV vessel registration
  - Must show documentation upon renewal
  - Reviewed when a vessel changes ownership
  - No annual review for Dungeness fleet

Average landings from 1999/00 through 2008/09 seasons by residency status

Resident Permit	24,541 lbs
Non-resident Permit	31,200 lbs
Both resident & non-resident	37,513 lbs
No permit information	1,242 lbs

Average fleet rank show a similar trend

Vessel Permits 1999-2008

- Can't use 2009 data because permit renewals can be made as late at March 31,2010
- In 1999, there were 688 permits
- In 2008, there were 616 permits
- Over the past 10 years
  - 72 permits were not renewed, a 10% decrease in fleet size
  - 15% <u>decrease</u> in resident permits
  - 26% <u>increase</u> in non-resident permits

2008/2009 unused permits by length class

616	total permitted vessels 2008	
381	permitted vessels landed crab in 2008/09	61.9 %
235	permitted vessels did not land in 2008/09	38.1%
	Of those vessels with no landings	
40	were <30 ft	17.0%
132	were 30-50 ft	56.2%
19	were >50 ft	8.1%
44	had no length data	18.7%

=90

Permit Profile for the West Coast Commercial Dungeness Crab Fleet

(as of December 2006)

		State			
State Issuing permits	**No. of Boats**	**OR**	**WA**	**CA**	**Other**
TOTAL No. of Boats	1134	431	223	622	0
Multiple permits		**Residency**			
		OR	**WA**	**CA**	**Other**
OR + WA	57	11	45	0	1
CA + OR	60	40	2	16	2
CA + WA	5	0	2	2	1
CA + OR + WA	10	3	3	3	1

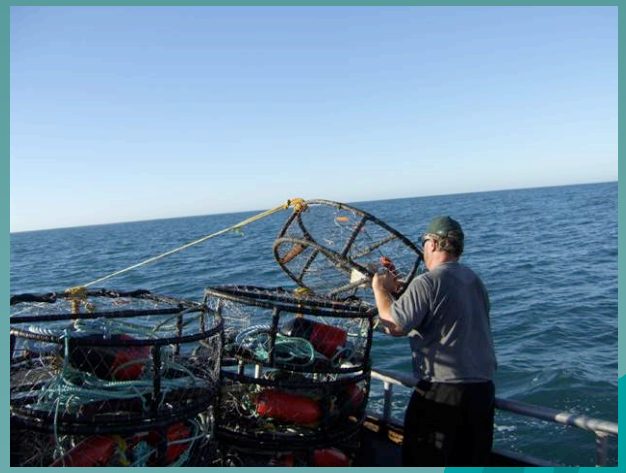
Boat Length Profile

	State			
Boat Overall Length (ft)	**OR**	**WA**	**CA***	**Total**
<25	22	0	34	56
25-29	27	11	62	100
30-34	32	15	102	149
34-39	58	18	106	182
40-44	54	23	102	179
45-49	69	41	80	190
50-54	48	24	36	108
55-59	40	50	21	111
60-69	44	23	17	84
70-79	22	11	4	37
80-89	11	3	0	14
	3	0	2	5
unknown	1	4	50	55
TOTAL	431	223	616	

* 2008 length data

California Fishing Effort

- Estimated 150,000 pots fished in California, no tracking mechanism
- No pot limit per boat
- Limited entry – but increased effort by multi-purpose vessels



Exploring Trap Limits

- Fisherman worksheet w/variables
- Calculating alternate trap limit options
- Oregon example: 150K traps, 434 permits
- Trap limit estimator models
- How to Rank Boats
- LRB trap program cost estimates

ODFW Pot Limit Worksheet

Collaboration Group_____

Pot Limit Proposal Variables

1) The total number of pots in the Oregon crab fishery should be limited to (circle one):
140,000 150,000 170,000 185,000

2) The number of tiers our breakout group prefers is (circle one): 1 2 3

3) The percentages of the Oregon permitted fleet that should fall within each tier and the number of pots allocated to each permit holder within each tier:

Tier 1_____% Tier 1_____(# of pots)

Tier 2_____% Tier 2_____(# of pots)

Tier 3_____% Tier 3_____(# of pots)

4) The qualifying criteria for each tier should be based on (circle all that apply):
Landings History Vessel Size Participation History Declaration History

5) The fishing season data used to assess the above criteria should be taken from the following season(s) (circle all that apply):
1995-96 1996-97 1997-98

1998-99 1999-00 2000-01

TRAP TAG COSTS

PERSONNEL COSTS - CREATE AND ORDER BUOY TAGS

Staff	Total Hours	Hourly Rate	Cost
Commercial Fishing Analyst (AGPA)	10	$28.79	$287.90
Procurement Analyst (AGPA)	10	$28.79	$287.90
Program Tech I	500	$16.55	$8,275.00
Key Data Operator	100	$16.55	$1,655.00
Total Staff Cost			$10,505.80

ANNUAL PRINTING

Item	Quantity	Cost
Crab Buoy Tags (600 vessels 375 tags per vessel)	225,000	$155,250.00

*.69 per tag from vendor

ANNUAL COSTS ASSOCIATED WITH THE DISTRIBUTION AND ACCOUNTING FOR NEW ITEM

Description	Cost per Item	Number of Items	Cost
Warehouse and Staff Time to Inventory Distribute and account for new Item	$ 0.27	225,000	$ 60,750.00

Postage for mailing	**$ 20,000.00**
Total Annual On-going Costs	**$ 237,050.80**

California CPFV Catch from Logs – 2004/05

PortCode		Total #Ang	Total #Kept	Total #Released	Total CPUE
220	EUR	55	347	0	6.3
223	FB	1,470	10,913	6,302	7.4
231	TRN	499	4,262	33	8.5
425	EMER	1,623	8,288	1,368	5.1
440	SF	26	60	8	2.3
452	HMB	10	60	18	6.0
472	BERK	1,170	6,424	917	5.5
473	BOD	1,009	5,299	933	5.3
550	MON	118	252	12	2.1
593	SCRZ	32	24	0	0.8
Grand Total		**6,012**	**35,929**	**9,591**	**6.0**

annual partyboats fishing crab

1995 - 12

1996 - 9

1997 - 10

1998 - 11

1999 - 13

2000 - 13

2001 - 22

2002 - 28

2003 - 23

2004 - 27

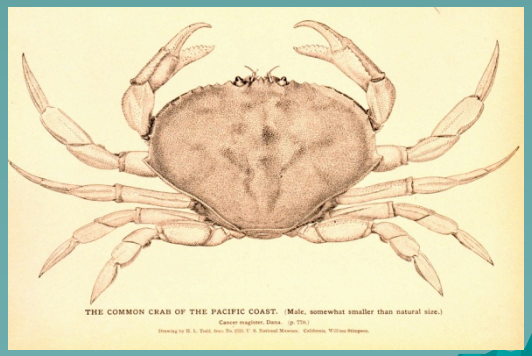
Possible End Show V1

Outline

- Economic Assessment of CA's Marine Resources

  -California Ocean Fish Harvester Economic Model (COFHE)

- Marketing and Processing Factors in Commercial Dungeness Crab Fishery



www.organictobe.org

Economic Assessment of CA's Marine Resources

http://www.dfg.ca.gov/marine/economicstructure.asp

- Currently there is a gap in understanding economic impacts of management/policy decisions

- The report "the Economic Structure of California's Commercial Fisheries" by Hackett et al. (2009) provides:

  - Costs, total revenues and net revenues by fishing sector/operational configuration (OC) (e.g. small-vessel Dungeness crab fishery) and location, based on 2006 data

  - California Ocean Fish Harvester Economic Model (COFHE)

  - Model can be used to forecast economic impacts of Dungeness crab fishery management changes

Economic Assessment of CA's Marine Resources

http://www.dfg.ca.gov/marine/economicstructure.asp

- **Total Annual Costs**:
  -Dungeness crab-medium/ large vessels: **$17,245,198**
  -Dungeness crab-small vessels (<26 ft): **$953,406**

  -Salmon & Dungeness-medium/large vessels: **$7,033,223**
  -Salmon & Dungeness-small vessels: **$322,797**

- **Total Annual Ex-vessel Revenue**:
  -Dungeness crab-medium/ large vessels: **$35,263,699**
  -Dungeness crab-small vessels (<26 ft): **$485,100**

  -Salmon & Dungeness-medium/large vessels: **$11,184,783**
  -Salmon and Dungeness-small vessels: **$321,939**

Note: According to DFG 2006 annual landing report, total value of commercial Dungeness crab landing was $44,868,658 (http://www.dfg.ca.gov/marine/landings06/table15.pdf)

Note: Calculations based on 2006 data

Economic Assessment of CA's Marine Resources

http://www.dfg.ca.gov/marine/economicstructure.asp

- **Dungeness crab-medium/ large vessels Annual Ex-Revenue by Region:**
  -North Coast: **$26,462,089**
  -North-Central Coast: **$5,457,020**

- **Dungeness crab-small vessels Annual Ex-Revenue by Region:**
  -North Coast: **$310,829**
  -North-Central Coast: **$174,271**

- **Salmon & Dungeness crab-medium/large vessels Annual Ex-Revenue by Region:**
  -North Coast: **$3,918,576**
  -North-Central Coast: **$6,494,637**

- **Salmon & Dungeness crab-medium/large vessels Annual Ex-Revenue by Region:**
  -North Coast: **$88,017**
  -North-Central Coast: **$232,967**

Note: Calculations based on 2006 data

Table 1. Top Economic Cost Categories for Dungeness crab in 200

Fixed Cost Category	Costs D.C. Medium/large vessels	Fixed Cost Category	Costs D.C. Small vessels
Wage	$3,532,052	**Wage**	$488,476
Federal taxes	$1,811,155	**Engine purchase**	$60,506
Hull repair	$1,078,906	**Federal taxes**	$52,792
Gear purchase	$962,455	**Fuel**	$37,225
Gear repair	$792,832	**Bait**	$33,458

Economic Assessment of CA's Marine Resources

California Ocean Fish Harvester Economic Model (COFHE)

- ***Purpose***: "assess the direct, indirect, and induced economic impacts of changes in fisheries and fisheries management"
- Using the results of the COFHE model to assess near-term economic impacts of changes in a fishing restriction (e.g. limiting allowable harvest) involves a three-step process:

1) Determine how the change is expected to increase or decrease the expected value of landings by the specific operational configuration

2) Identify the study area of interest (e.g. county, region, statewide)

3) Find the multipliers of interest for each OC identified in Step 1 in the COFHE multiplier tables that correspond with the study area of interest identified in Step 2, and multiply the expected direct change in landed value by each OC identified in Step 1 by the appropriate impact effect coefficients from the appropriate look-up tables

Marketing and Processing Factors in Commercial Dungeness crab Fishery

http://repositories.cdlib.org/cgi/viewcontent.cgi?article=3087&context=anrcs/californiaagriculture

- In 2004, Hackett et al. analyzed market and processing factors that affect the Dungeness crab fishery

- Key findings:

  - Dungeness crab has "derby dynamic": **80-90%** of landings occur between late November through December each season

  - Despite short live crab market period (from mid- November to end of January), frozen and picked meat products are generally worth more per pound than fresh crab, as consumers value convenience over freshness

  - As fresh crab is sold almost exclusively before the end of January (through Super Bowl weekend), it is difficult to determine whether its demand would increase if it were available beyond January

Table 2. Characteristics of Individuals with California Dungeness crab Vessel Permits (n = number of respondents)

	n
Length of primary crab fishing vessel	
Small: < 30 feet	35
Medium: 30–50 feet	137
Large: > 50 feet	63
Tenure in fishery	
0 to ≤ 9 years	42
> 9 to ≤ 19 years	61
> 19 to ≤ 29 years	77
> 29 years	56
% of gross income from Dungeness crab fishing, 2002	
≤ 20%	17
> 20% to ≤ 40%	46
> 40% to ≤ 60%	66
> 60% to ≤ 80%	83
> 80% to 100%	23
Mean number of days fishing Dungeness crab, 1998–2000	
≤ 50 days	32
> 50 to ≤100 days	53
> 100 to ≤ 150 days	62
> 150 to ≤ 200 days	50
> 200 days	19
Mean number of traps fished, 1998–2000	
≤ 200 traps	67
> 200 to ≤ 400 traps	96
> 400 to ≤ 600 traps	40
> 600 traps	21

In Dewees et al. 2004 “Racing for crabs…”

Possible End Show V2

CA/OR/WA Shared Management Issues

Existing

- Pre-season quality test
- State permits extend into federal waters

Potential

- Pot limits in WA and OR… none in CA
- Change season start date
- Logbooks
- Anticipating Washington's permit/boat buy back

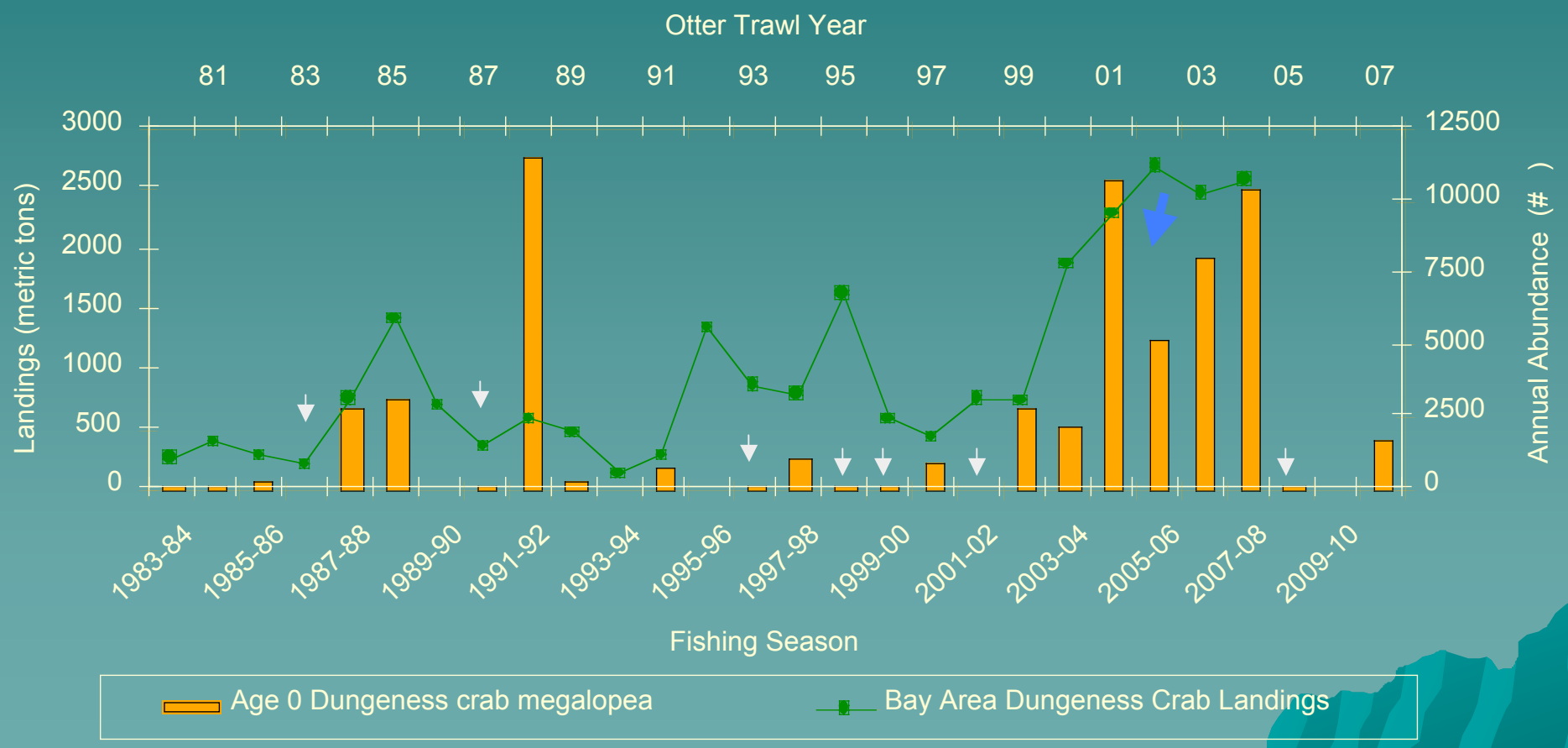
Dungeness Crab Research

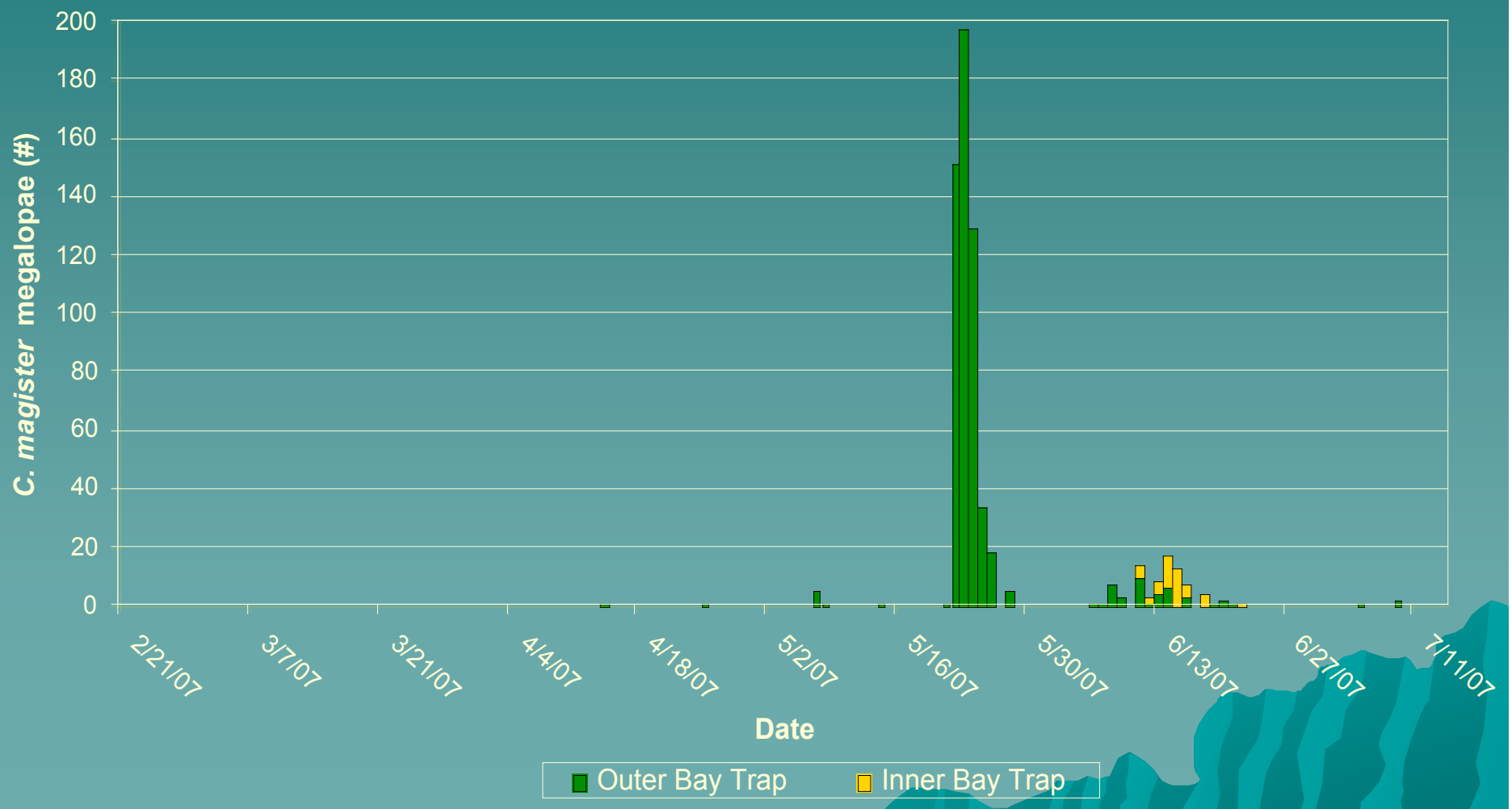
Cancer magister

Juvenile *C. magister* in Eel River Estuary

San Francisco Bay Study

Age 0 annual abundance vs. catch (2 year lag)



Bodega Bay
Dungeness Crab Megalopae Study

C. magister megalopae caught in two light traps within Bodega Bay, 2007