Collaborating with the commercial fishing industry:

An intensive, cost-effective method to improve red king crab stock assessment

Chris Siddon, ADF&G

Outline

1) Background

RKC in Southeast Alaska

2)Biomass Estimate Comparison

CSA, Mark/Recapture

(St. James, Pybus)

3)Cost Effectiveness of Collaboration


ALASKA
And Surroundings
ARCTIC OCEAN
Beaufort Sea
Chukchi Sea
Bering Sea
Bristol Bay
NORTH PACIFIC OCEAN


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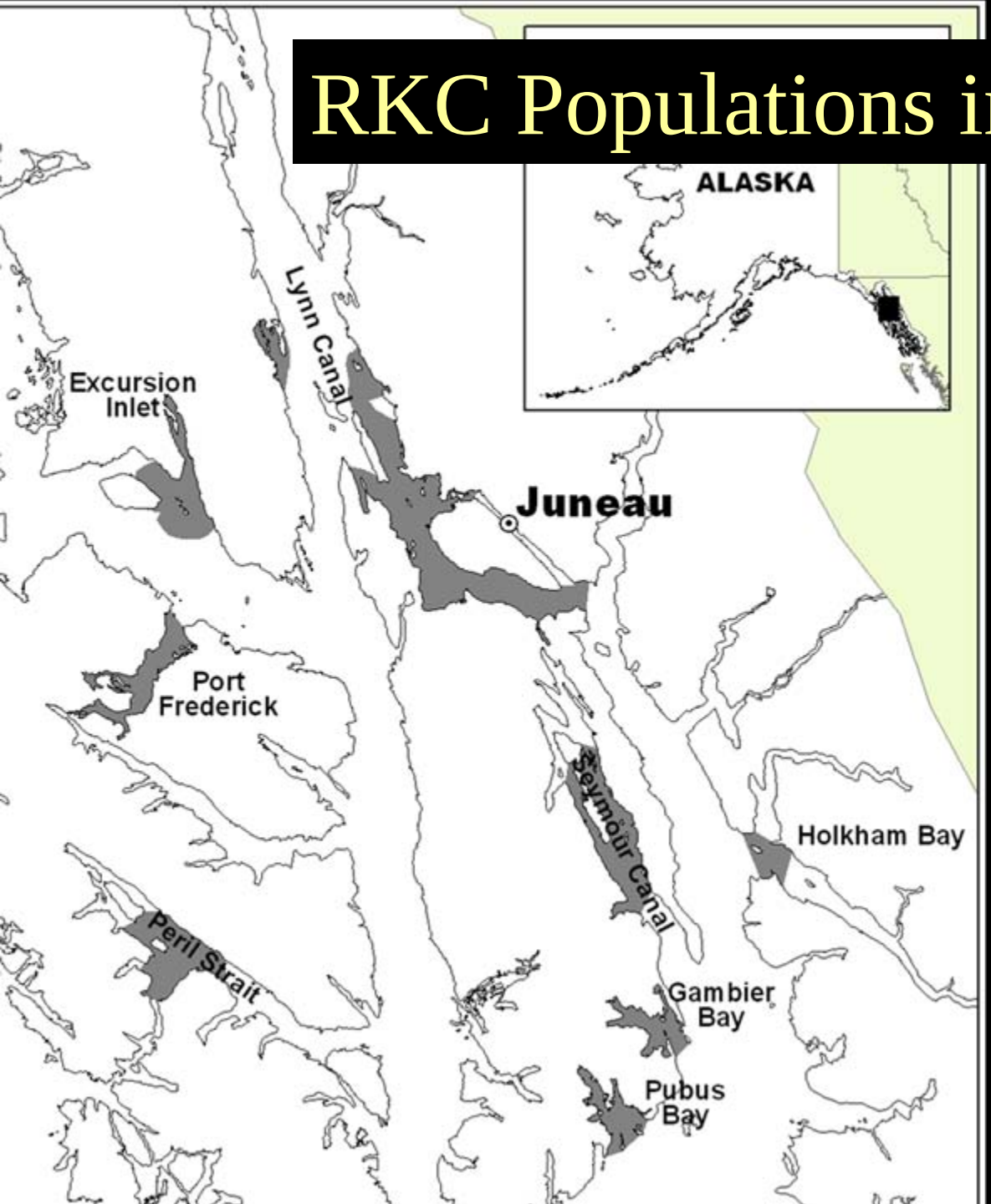
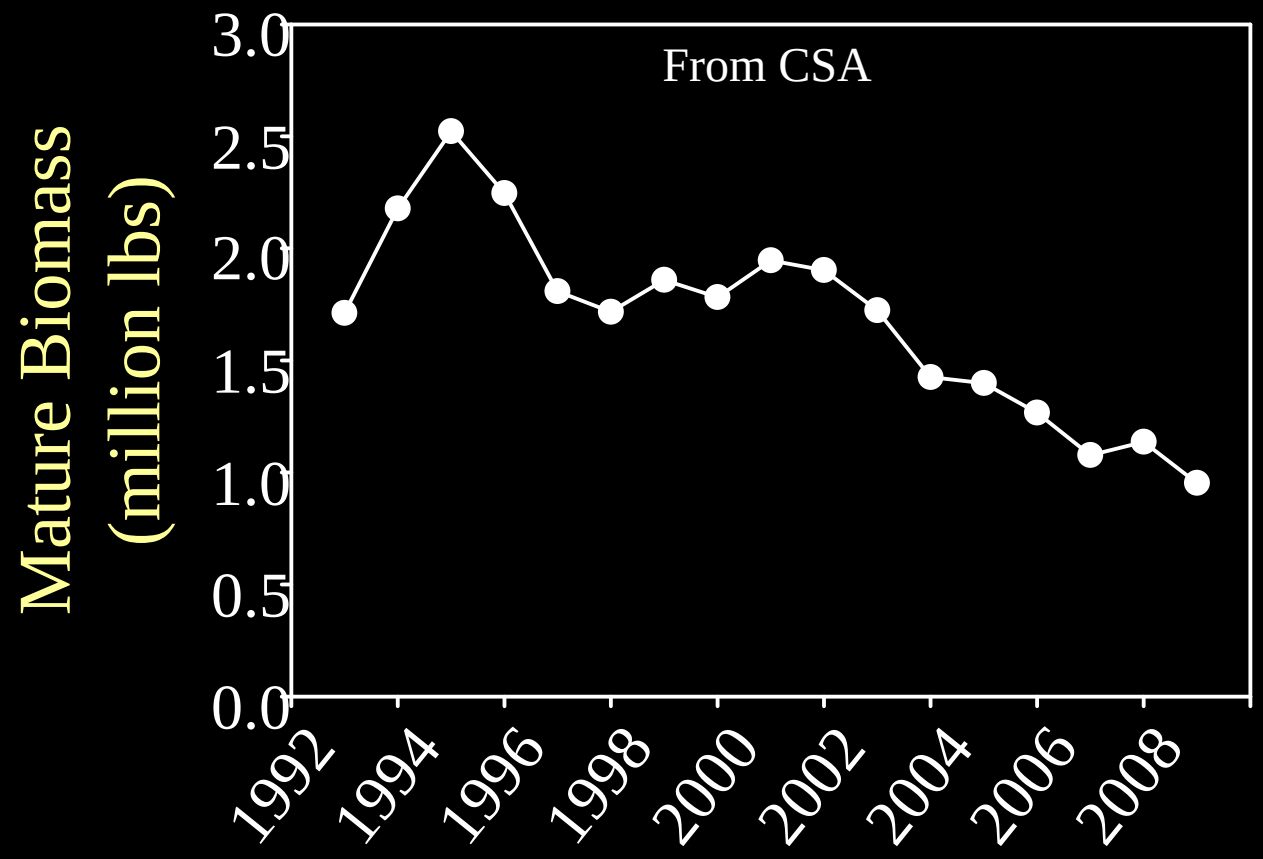
RKC Populations in SEAK

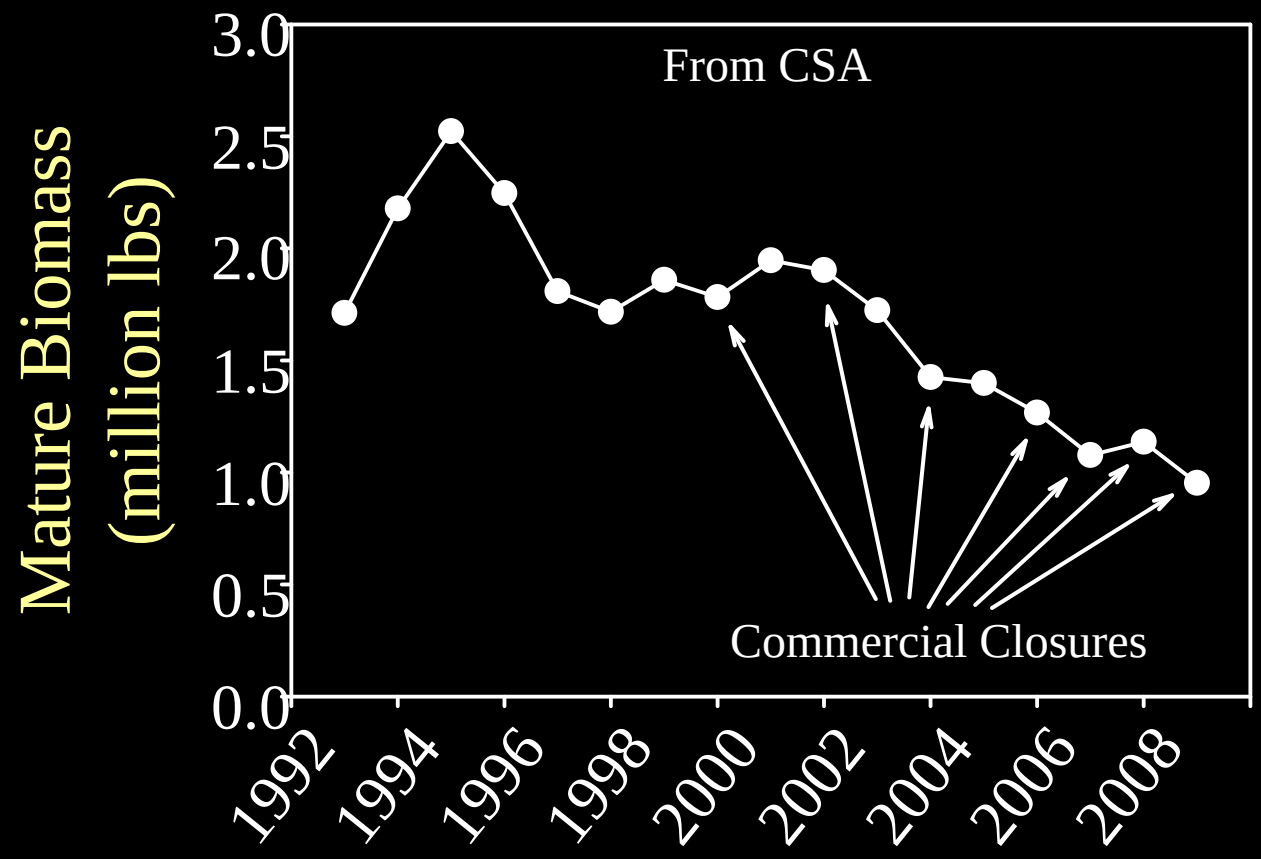


9 Surveyed Areas
70% of comm. catch
Fjord system
Small populations

RKC Regional Mature Biomass Estimates

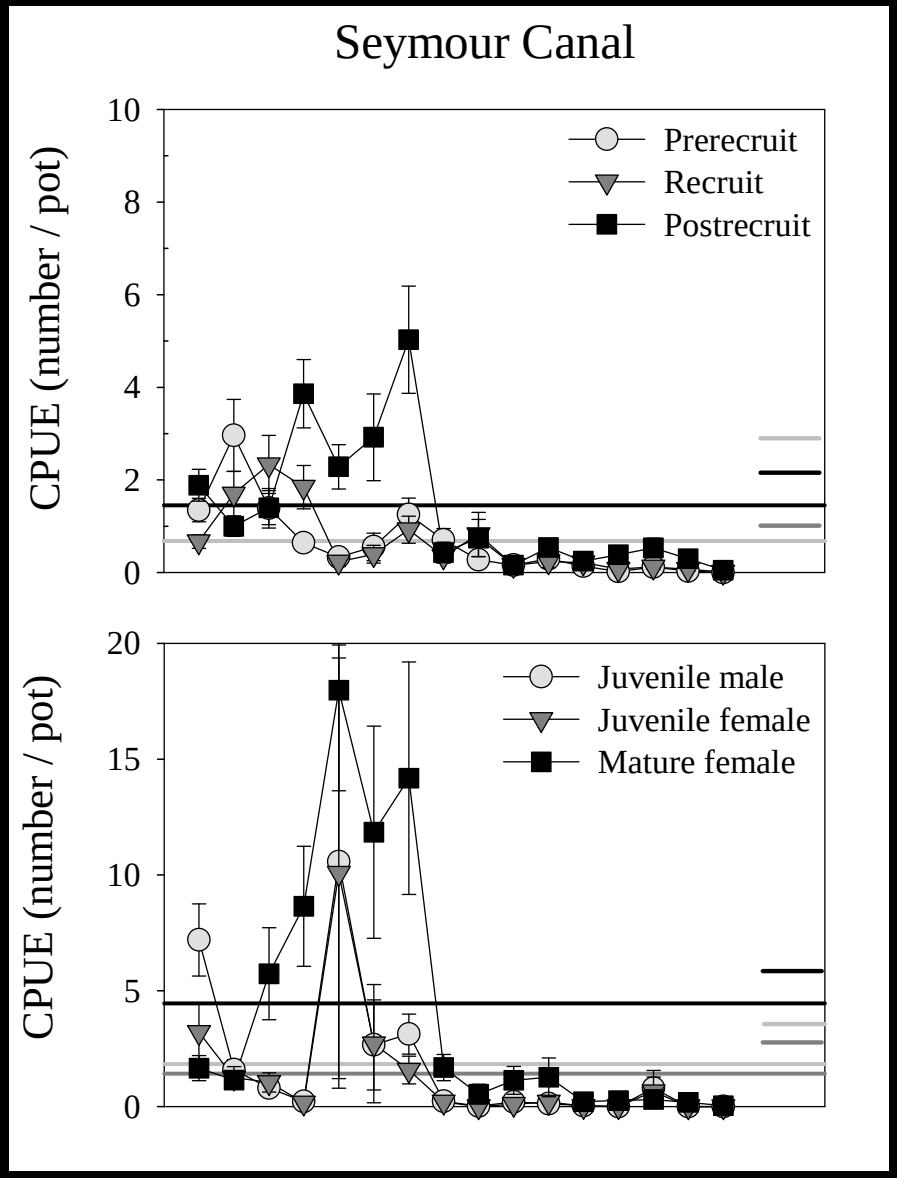


RKC Regional Mature Biomass Estimates



No response to closures,

But observations of crab from other fisheries (Tanner)

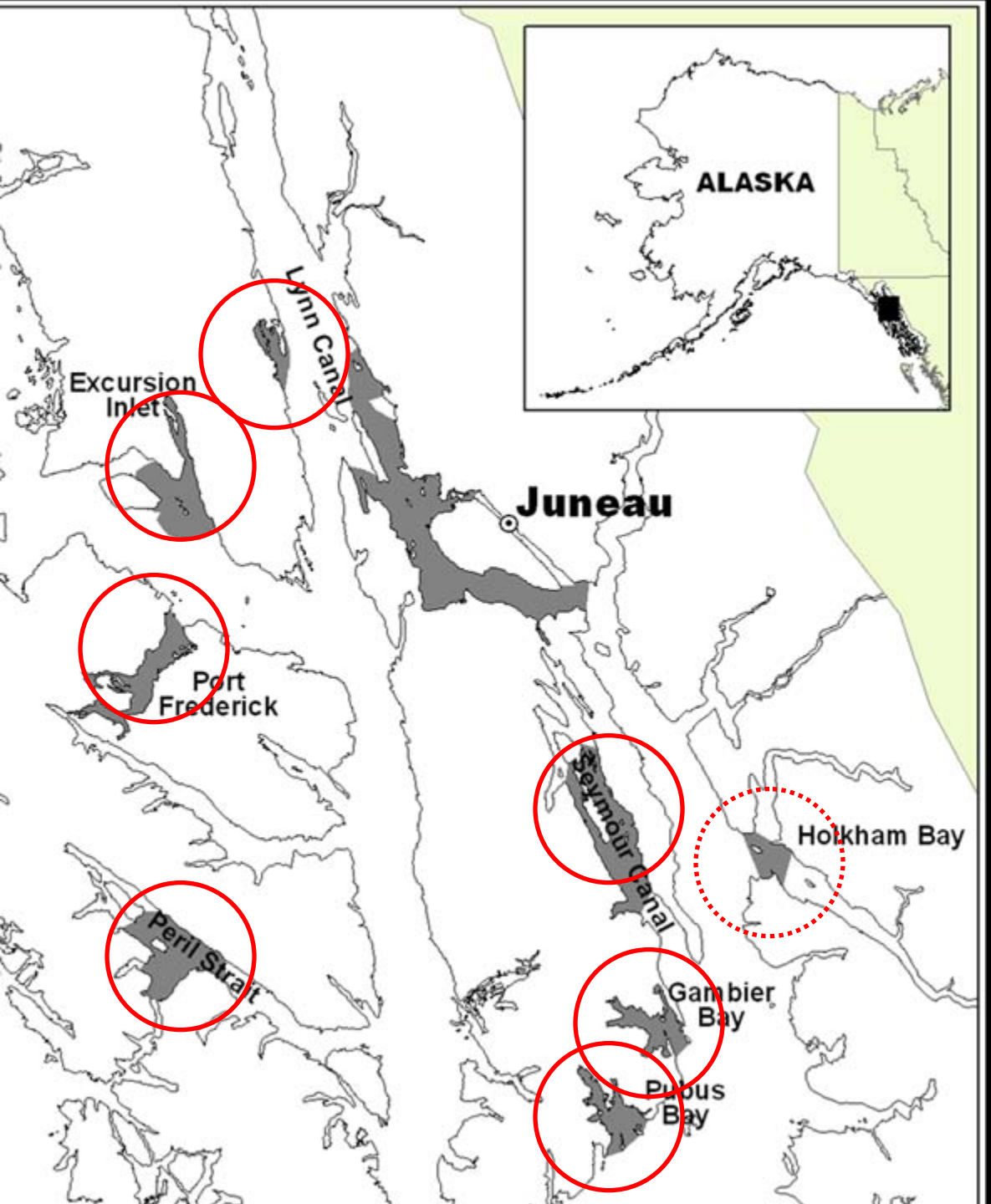


Population decline?
Migration?
What's the cause?

Main Question

Can we groundtruth RKC Biomass estimates?
(How do 2 estimates compare?)

Scientifically sound and fleet support



Approach

2 Estimates
8/9 areas

7 completed
1 to do

Commercial Vessels

Outline

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CSA, Mark/Recapture

(St. James, Pybus)

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Catch-Survey Analysis

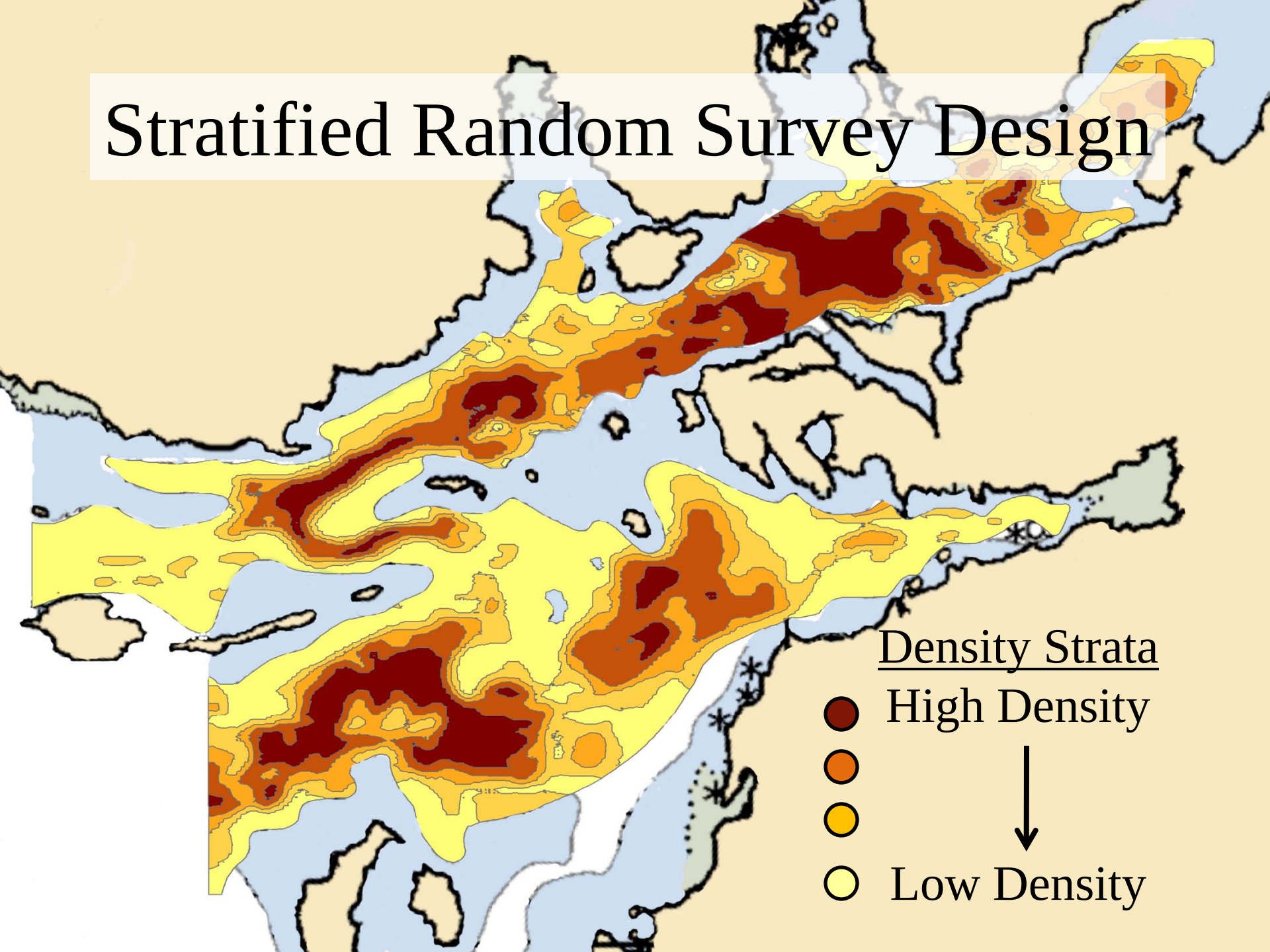
Commercial Catch + Survey CPUE => q

Abundance = CPUE / q

Assumptions:

- CPUE proportional to Abundance
- Natural mortality is known
- Catchability (q) is equal for all mature crab
- No migration
- All crab have same probability of being caught (random sampling)

Stratified Random Survey Design



Mark/Recapture

Peterson Estimate

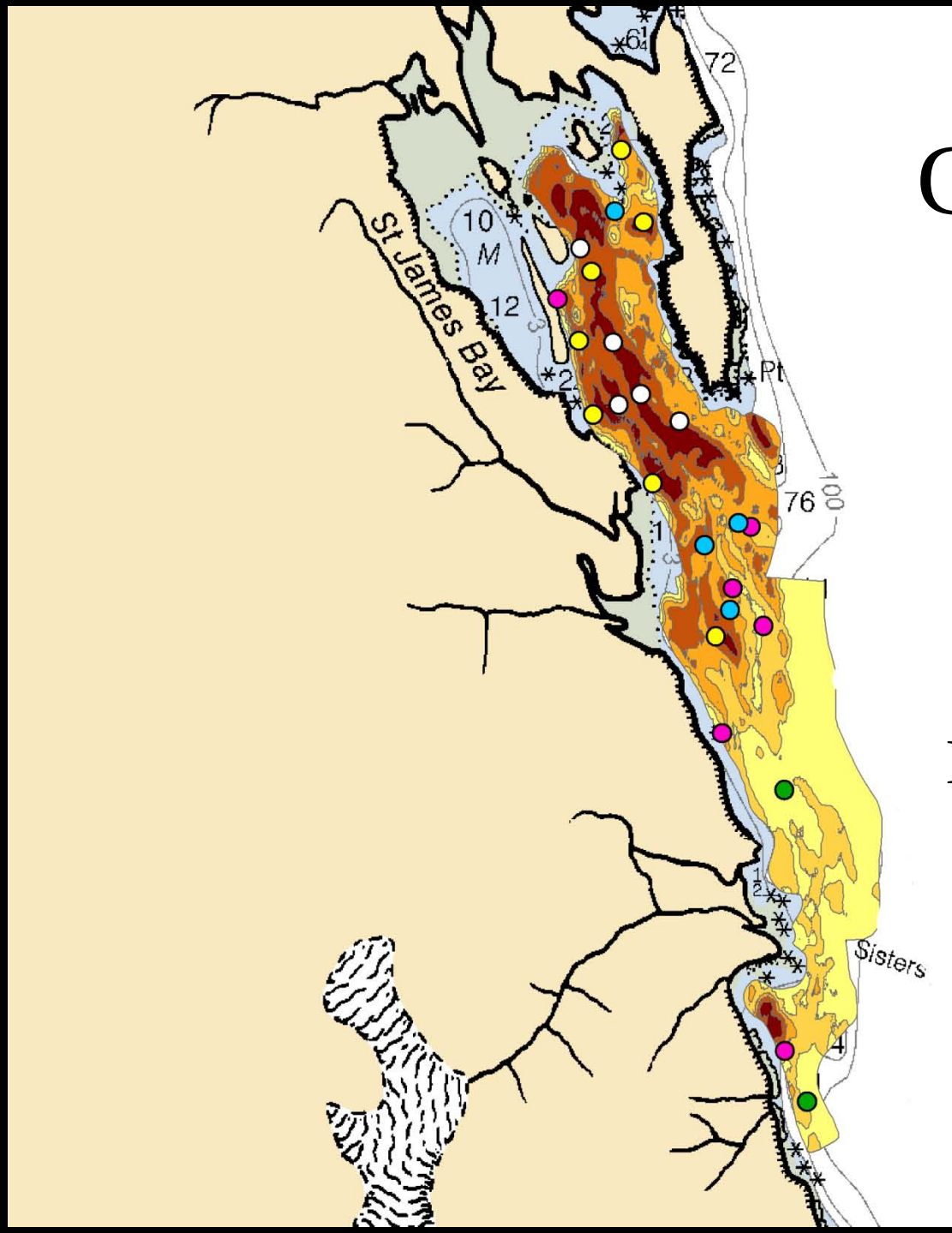
$(n_1 n_2)/m_2$

Recapture 30-60 days later (Fall)

No tag loss (double tags)

No evidence of molting (shell condition)

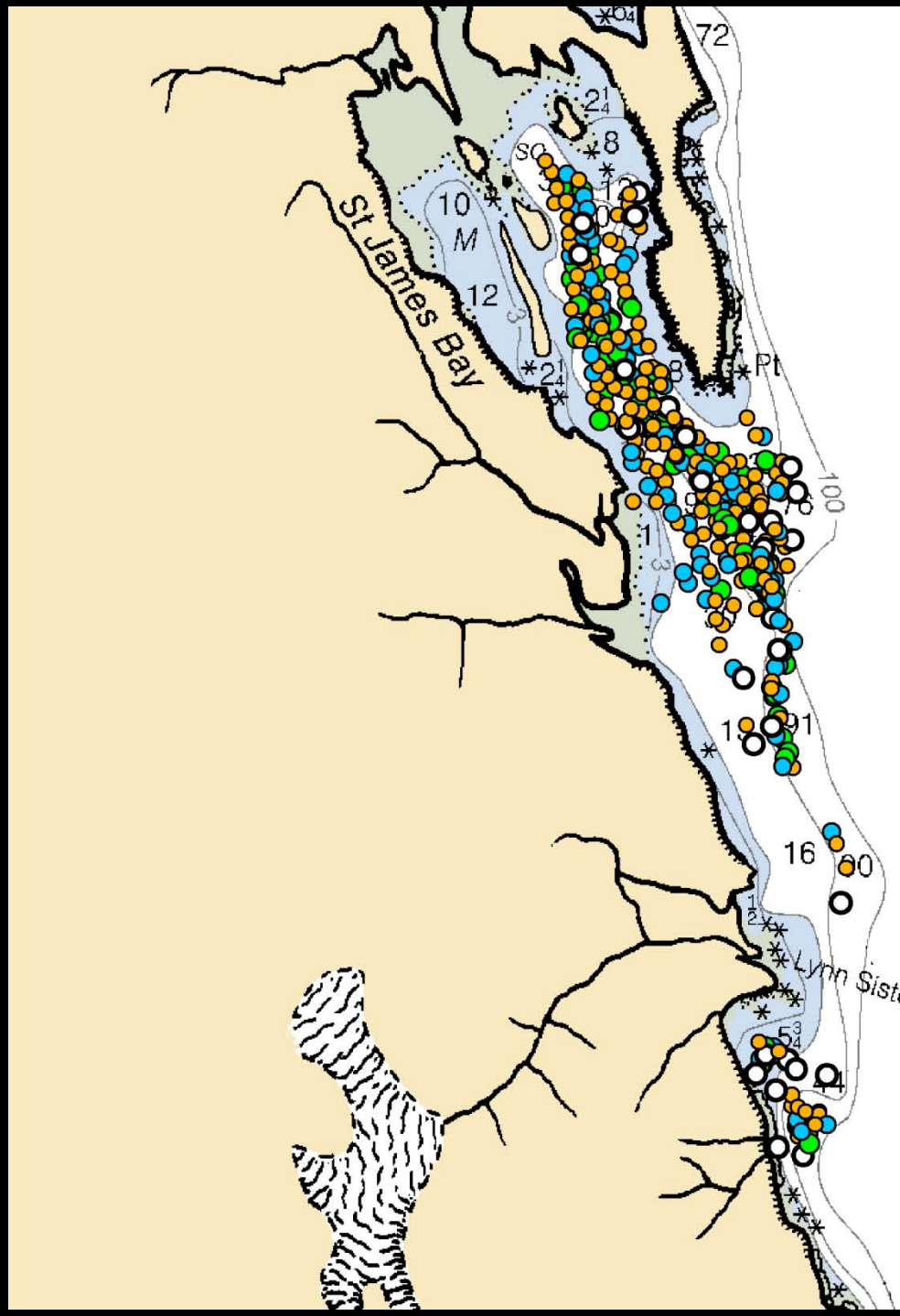
St. James Bay



Catch-Survey

24 pot lifts
+ all historic data

N = 5,300 legal crab



Mark

Legal Crab / Pot

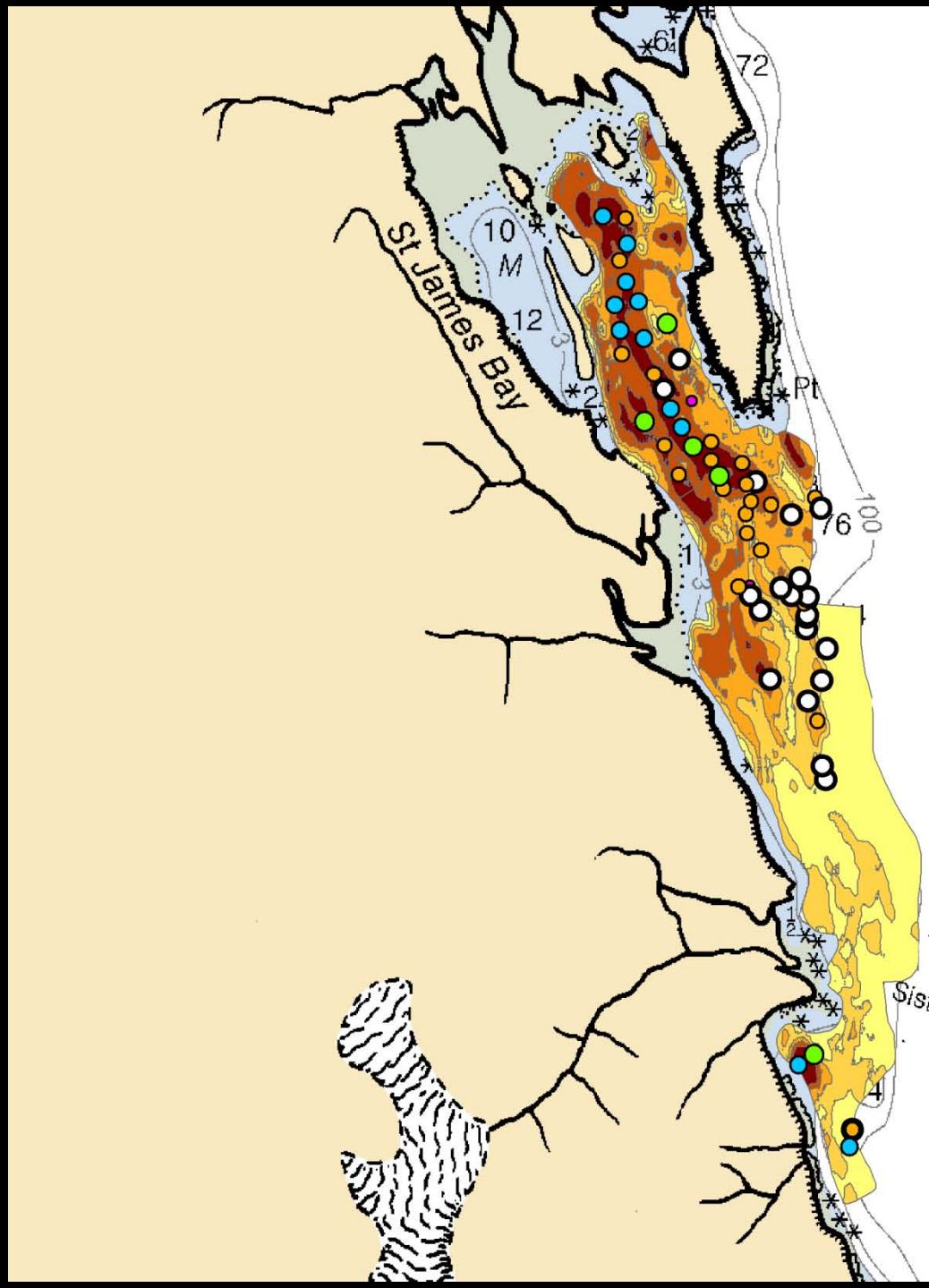
- >10
- 6 – 10
- 1 – 5
- 0

Caught and marked: 2,424

~ 20,000 lbs

362 total potlifts

(150 in 2003 fishery)



Recapture

Legal Crab / Pot

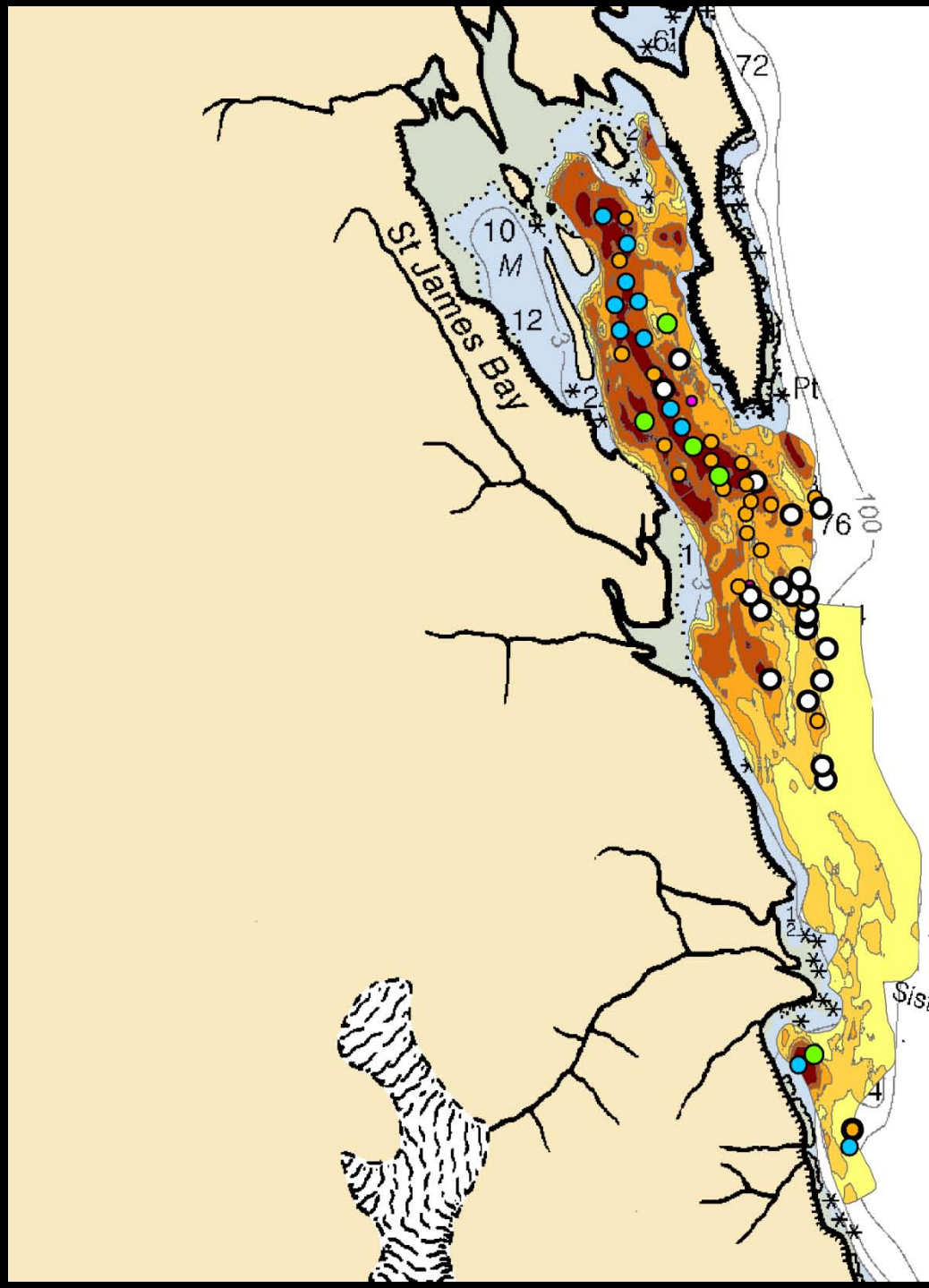
- >10
- 6 – 10
- 1 – 5
- 0

Caught and marked: 2,424

Recaptured: 209

With tags: 59 (29%)

N = 8,340



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- >10
- 6 – 10
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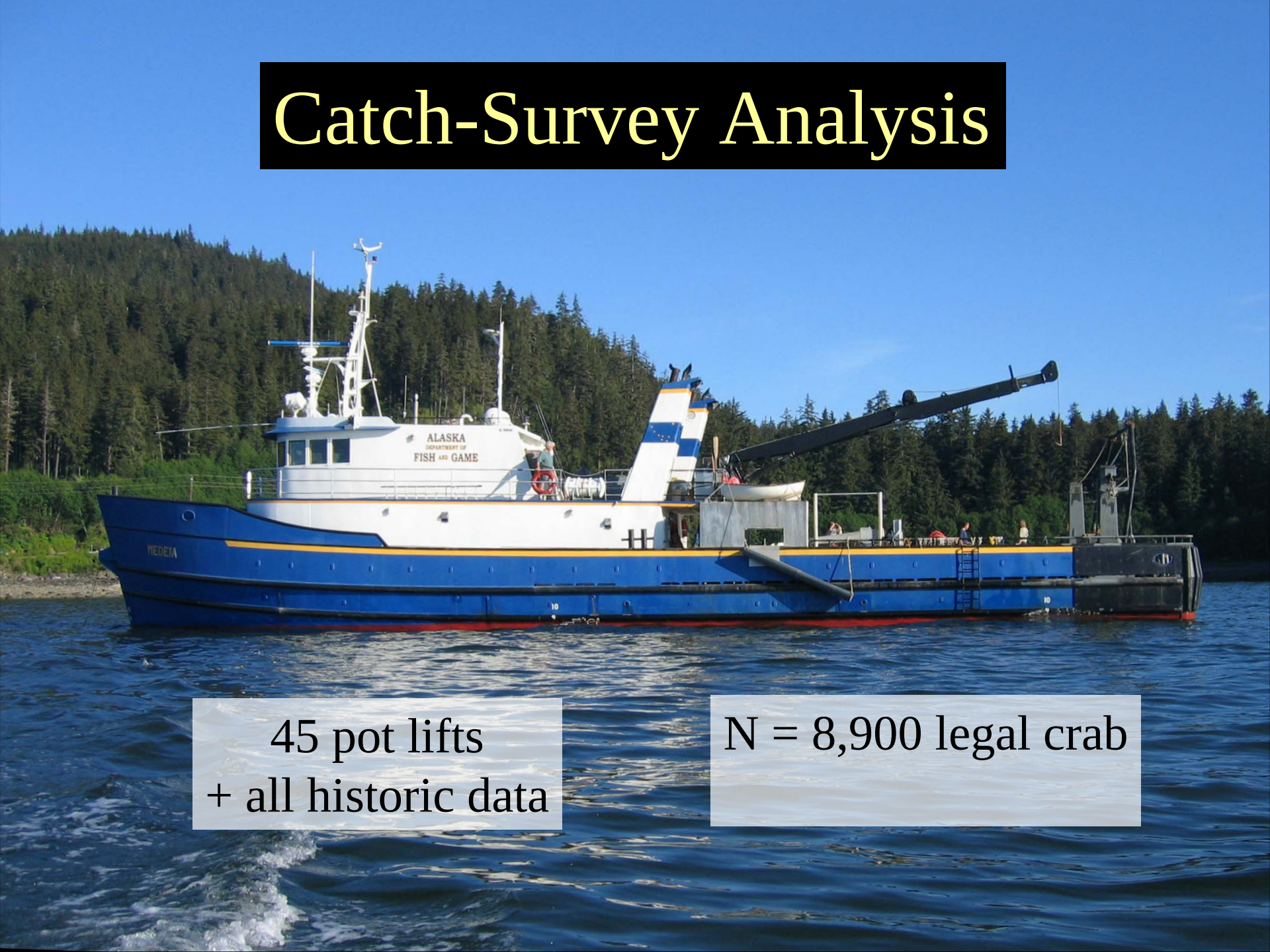
N = 8,340

N = 5,300

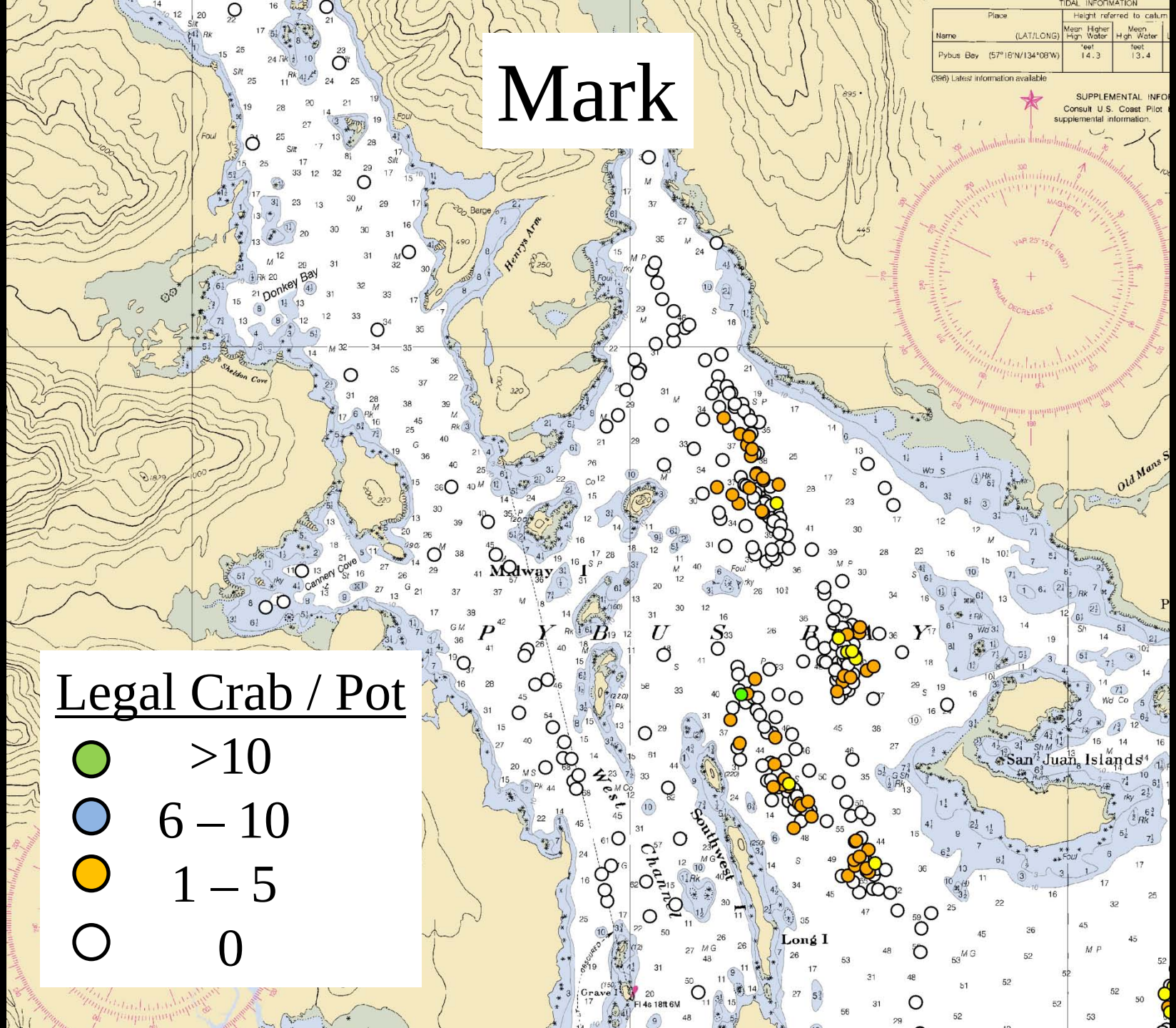

Pybus Bay

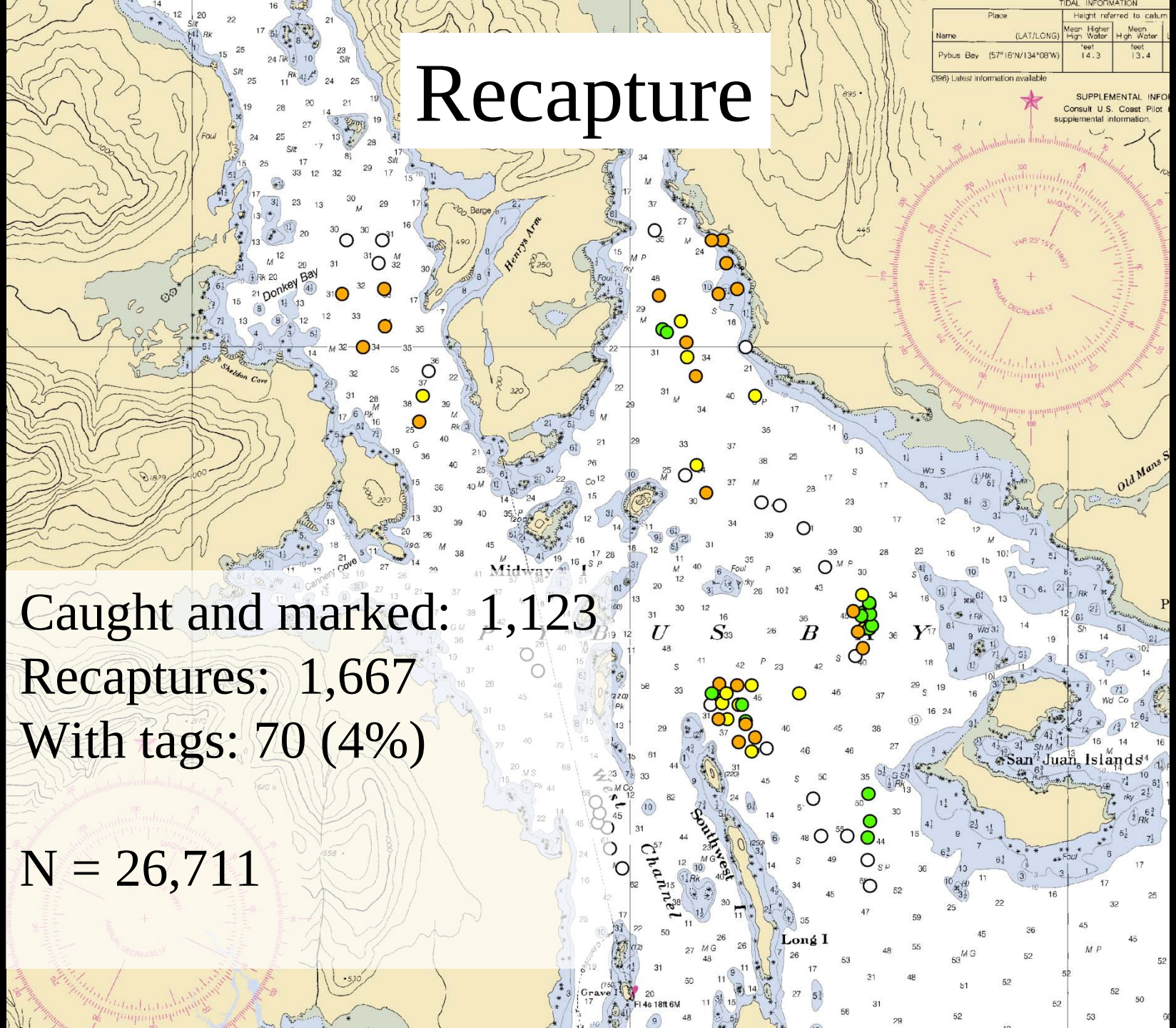
Catch-Survey Analysis



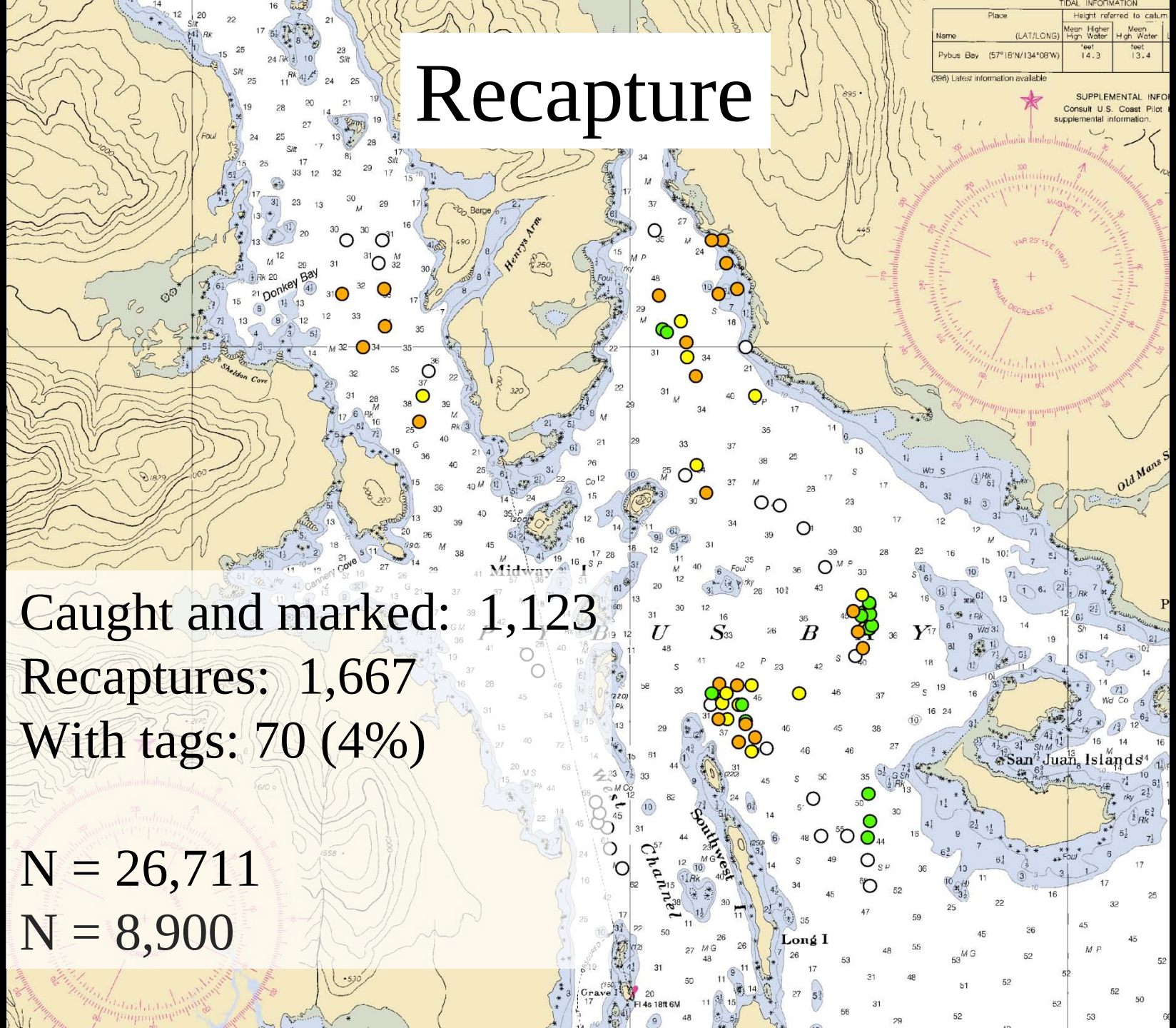
45 pot lifts
+ all historic data

N = 8,900 legal crab


Mark
Legal Crab / Pot
>10
6 – 10
1 – 5
0
Donkey Bay
Sheldon Cove
Henrys Arm
Barge
Cannery Cove
Midway I
West Channel
Southwest I
Long I
San Juan Islands
Grave I
Fl 4s 18ft 6M
TIDAL INFORMATION
Pybus Bay (57°16'N/134°08'W)
14.3
13.4
(396) Latest information available


Recapture
Caught and marked: 1,123
Recaptures: 1,667
With tags: 70 (4%)
N = 26,711
Donkey Bay
Sheldon Cove
Henrys Arm
Barge
Midway I
Old Mans S
San Juan Islands
Southwest Channel
West I
Long I
Grave I
Fl 4s 18ft 6M
TIDAL INFORMATION
Pybus Bay (57°16'N/134°08'W)
14.3
13.4
MAGNETIC
VAR 25°15'E (1997)
ANNUAL DECREASE 12'

Recapture



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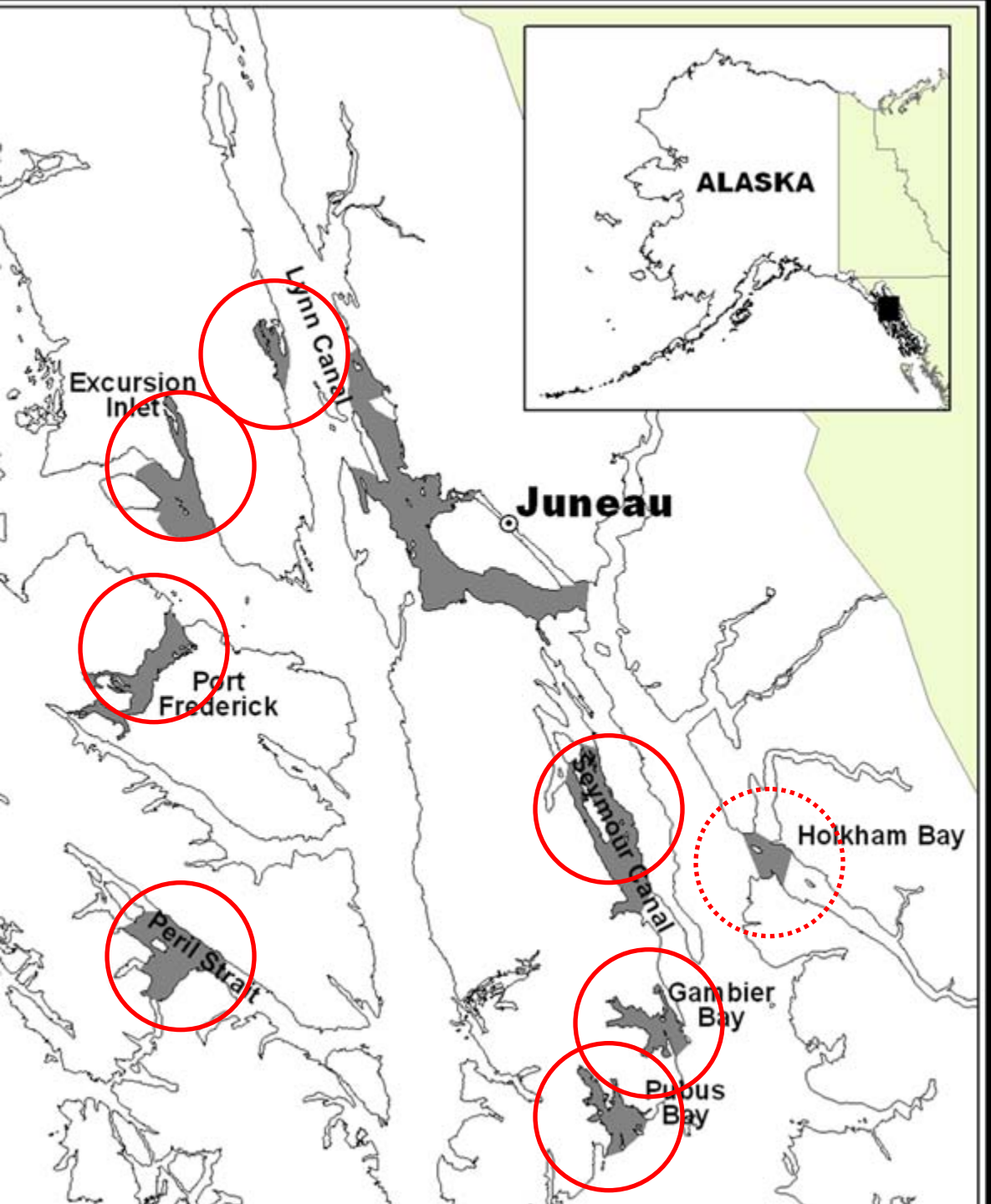
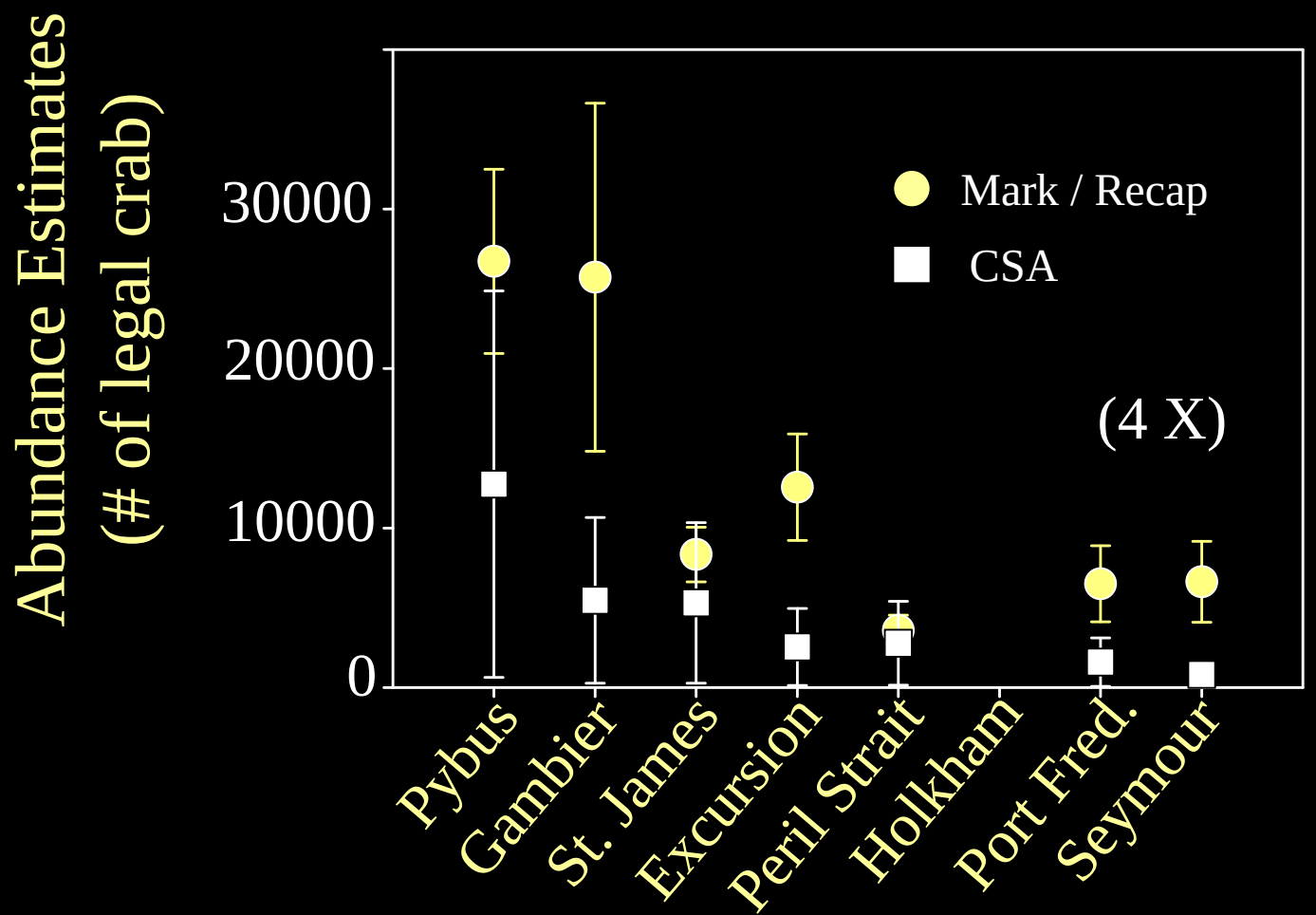

ALASKA
Lynn Canal
Excursion Inlet
Juneau
Port Frederick
Seymour Canal
Holkham Bay
Peril Strait
Gambier Bay
Pybus Bay

Estimate Comparison

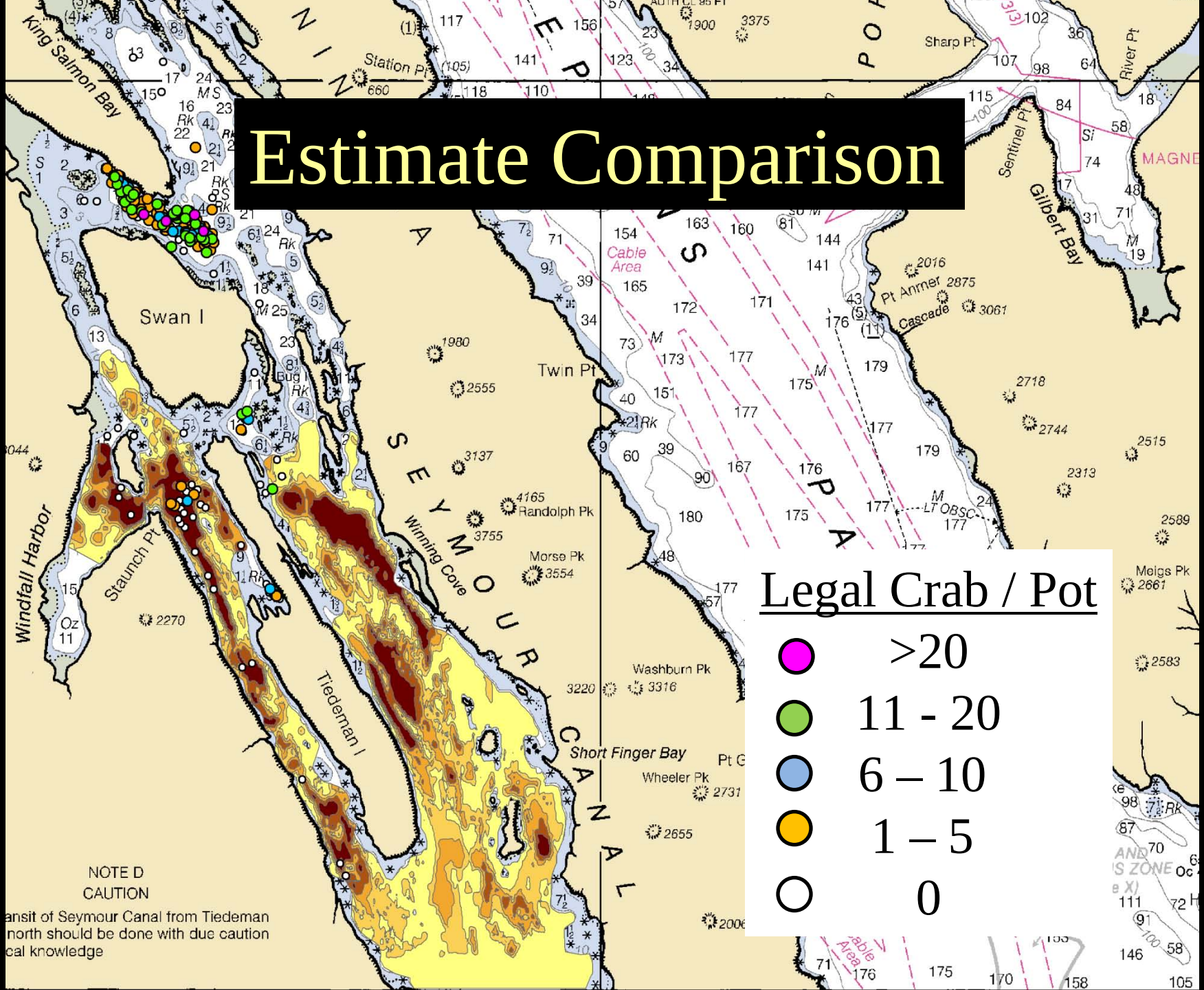


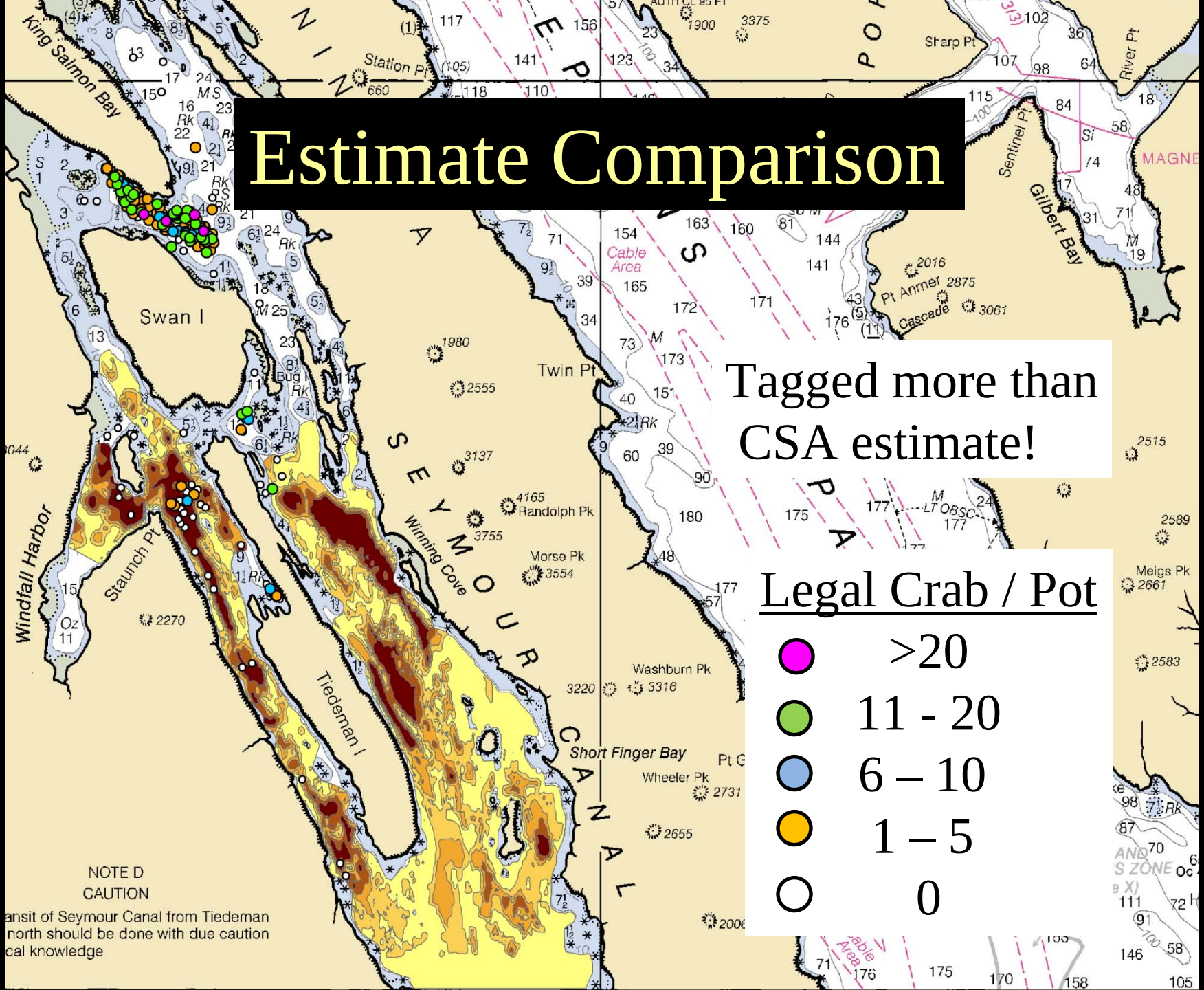
Estimate Comparison

But which estimate is “right”?

1) Mark / Recapture less likely to violate assumptions

2) Seymour Canal example


Estimate Comparison
Legal Crab / Pot
>20
11 - 20
6 – 10
1 – 5
0
King Salmon Bay
Station Pt
Sharp Pt
River Pt
Sentinel Pt
Gilbert Bay
Swan I
Twin Pt
Cable Area
Pt Anmer
Cascade
Windfall Harbor
Staunch Pt
Bug I
Randolph Pk
Morse Pk
Wimming Cove
Tiedeman I
Washburn Pk
Short Finger Bay
Wheeler Pk
Meigs Pk
SEYMOUR CANAL
NOTE D
CAUTION
ansit of Seymour Canal from Tiedeman
north should be done with due caution
cal knowledge


Estimate Comparison
Tagged more than CSA estimate!
Legal Crab / Pot
>20
11 - 20
6 – 10
1 – 5
0
Swan I
Twin Pt
Windfall Harbor
Staunch Pt
Tiedeman I
Wimming Cove
Randolph Pk
Morse Pk
Washburn Pk
Short Finger Bay
Wheeler Pk
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Sentinel Pt
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King Salmon Bay
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Cost Comparison

Expenditures

	M / R	CSA
Vessels (fuel)	2	1
Personnel	8	7
Effort (bait)	80	22

Effort (potlifts/day) major difference

Cost Comparison

	M / R	CSA
Cost / Day	$3848	$3172
Effort / Day	49	20
Cost / Effort	$78	$159

50% less for Mark/Recapture

Cost Comparison

	M / R	CSA
Cost / Day	$3848	$3172
Effort / Day	49	20
Cost / Effort	$78	$159

Not cheap, but cost effective!

Conclusions

1) Mark/Recap > CSA for 7 Bays (be critical)

2) Collaborative research is cost effective (not necessarily inexpensive)

3) Collaboration is good (but not perfect)

4) Good relationships provide additional benefits (funds / habitat data)

Acknowledgements

Commercial Fleet

R. Littleton (Angjenl)
J. Jensen (Harvester)
Y. Nilsen (Aleutian Dream)
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L. Norheim (Frigidland)
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E. Norman (Taku Fisheries)
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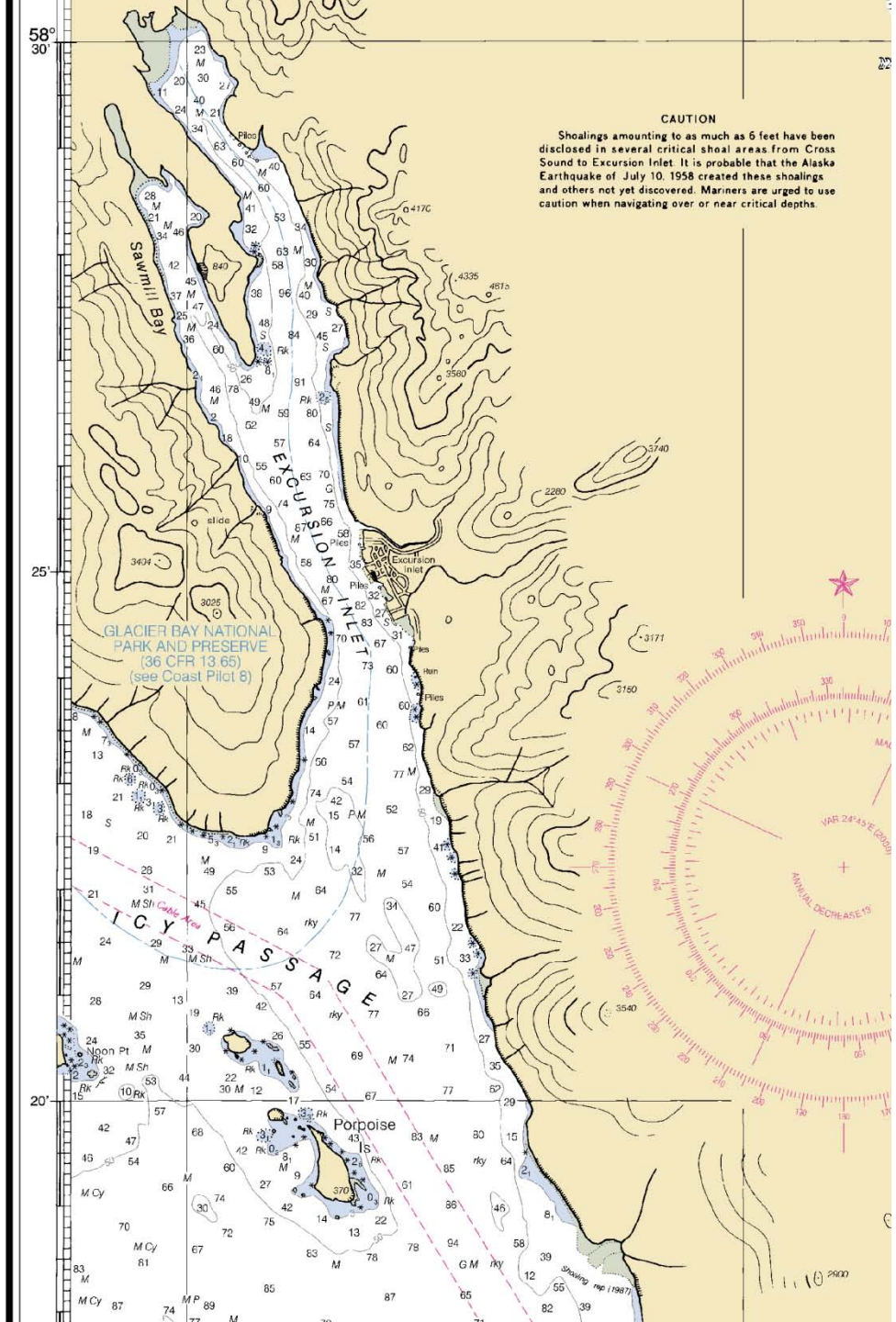
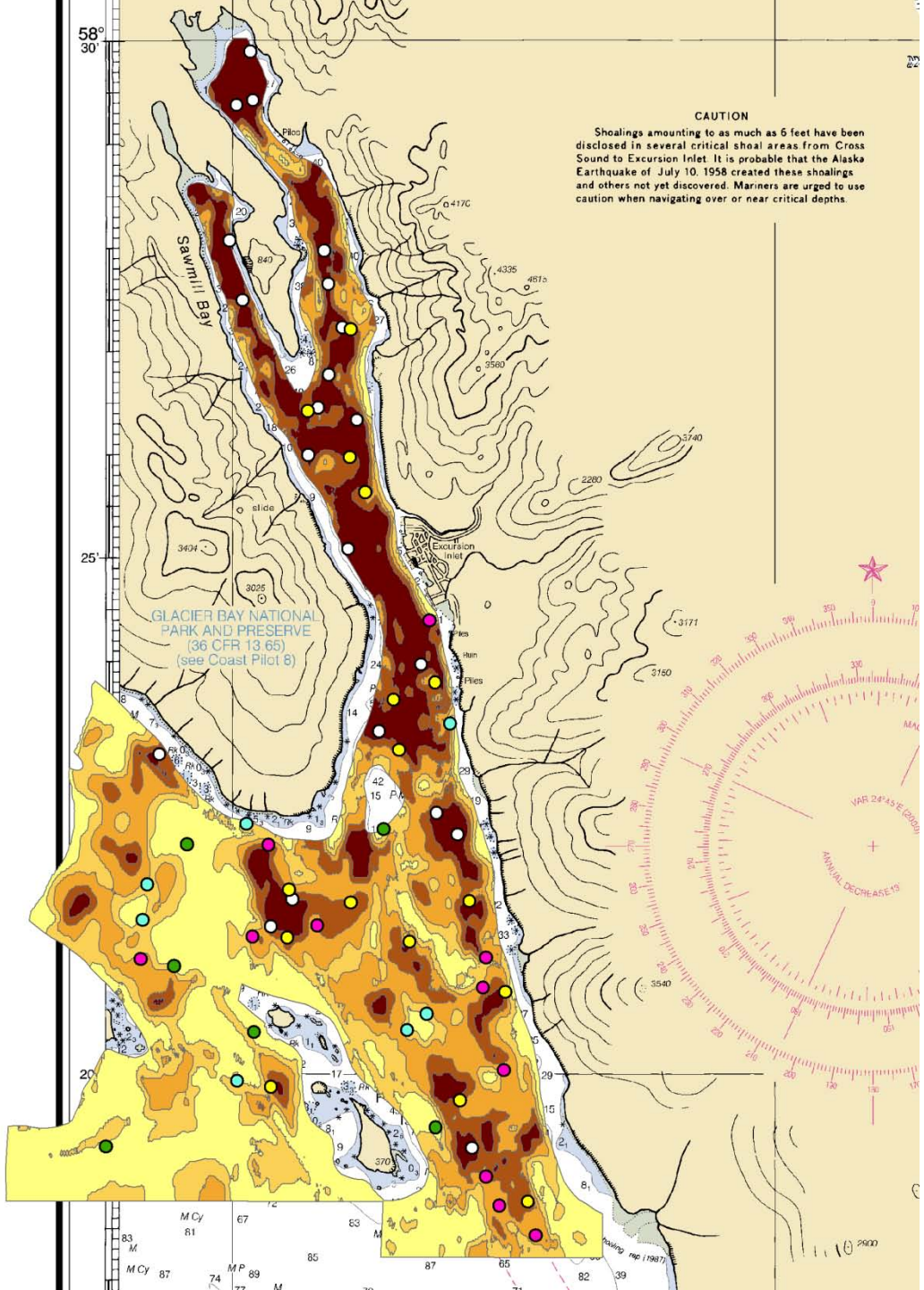
J. Meucci
T. Koeneman



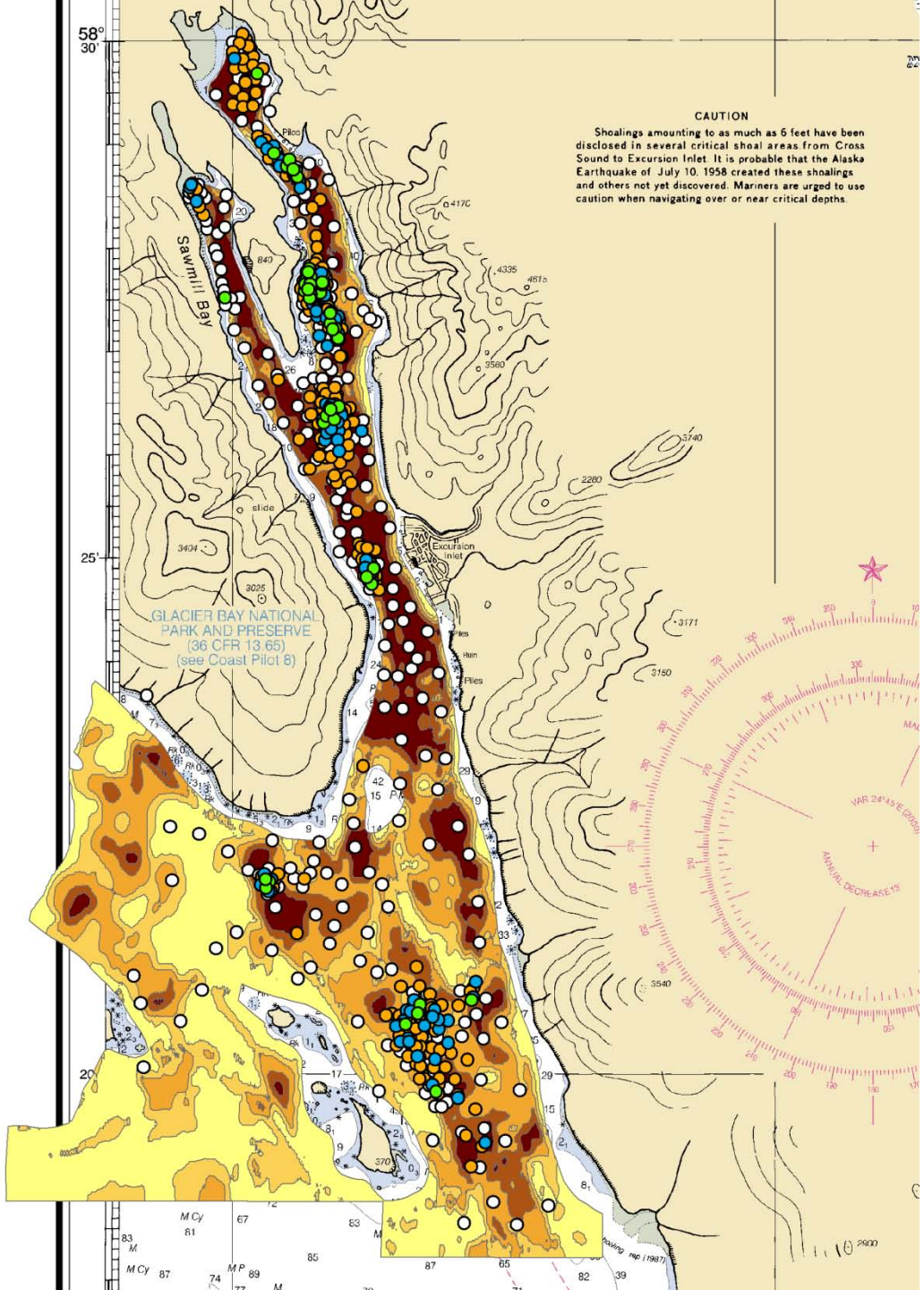
Excursion Inlet



Catch-Survey

44 pot lifts
+ all historic data

N = 2,500 legal crab



Mark

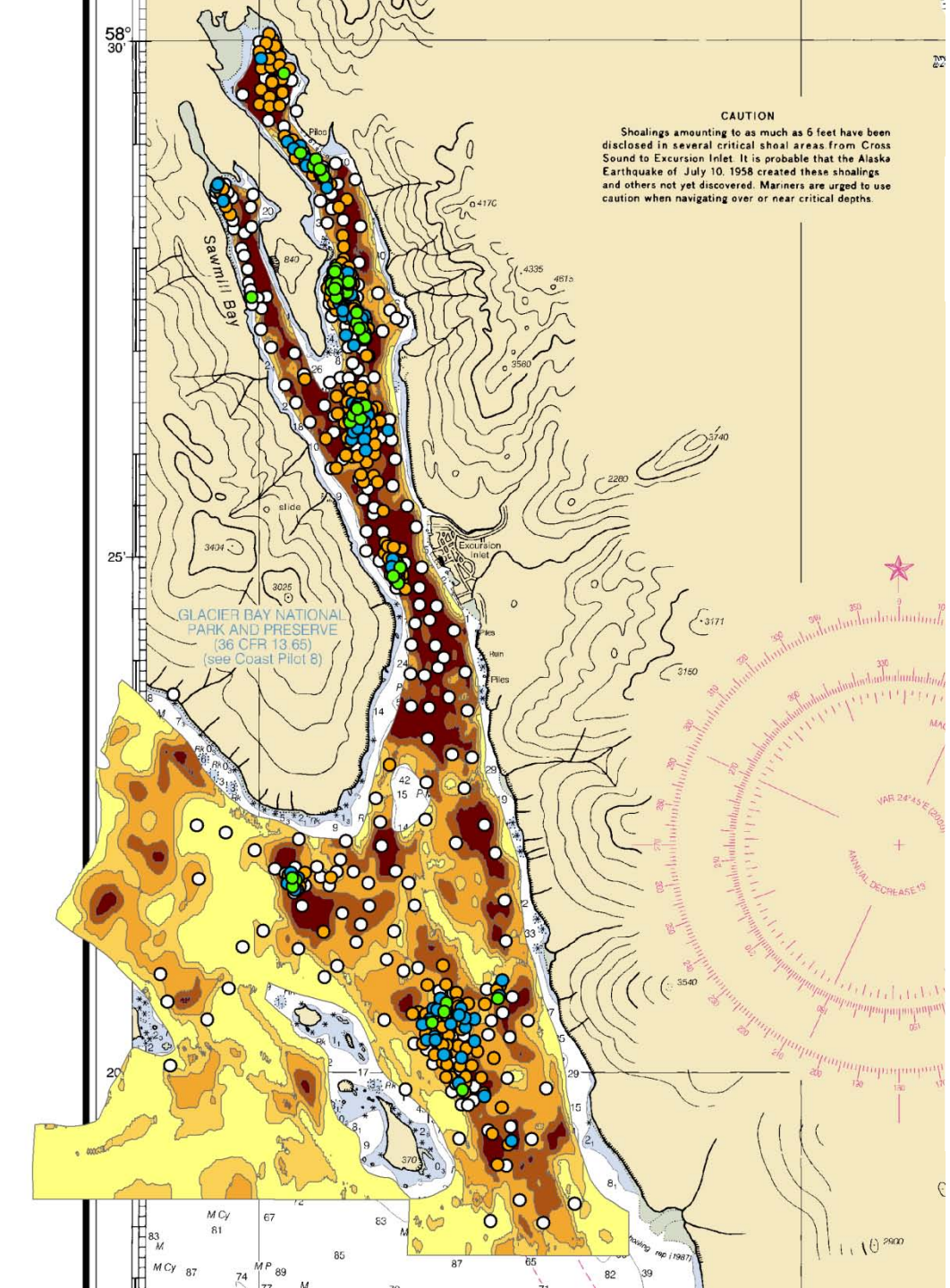
Legal Crab / Pot

- >10
- 6 – 10
- 1 – 5
- 0

Caught and marked: 1,690

600 total potlifts

(710 in 2003 fishery)



Mark/Recapture

Legal Crab / Pot

- >10
- 6 – 10
- 1 – 5
- 0

Caught and marked: 1,690

Recaptures: 312

With tags: 42 (13%)

N = 12,554

What's next?

Are results consistent regionwide?

(4 areas left)

How will research be utilized?

(e.g., what do we do if CSA consistently over/under-estimates)