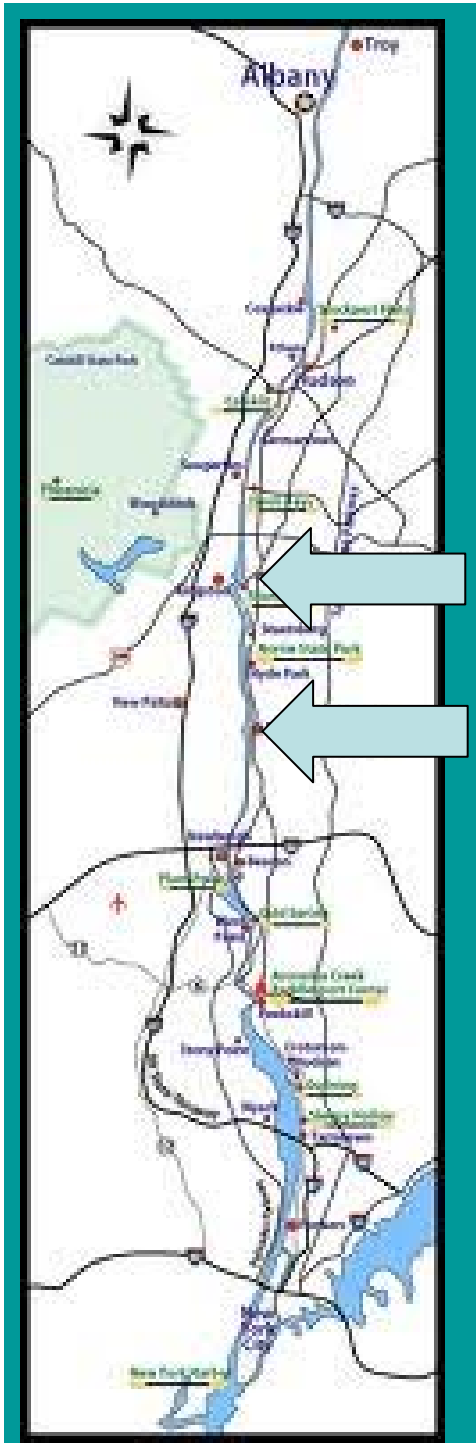
Chinese Mitten Crabs in Hudson River Tributaries

Robert E. Schmidt
Bard College at Simon's Rock
Great Barrington, MA

Chinese Mitten Crab
Eriocheir sinensis

- First seen in Hudson River in fall 2007
- Native of eastern China north to Korea
- Catadromous (juveniles in freshwater, adults spawn in marine environments)
- Recorded as alien in:
  - Europe (Germany to Spain) since 1920s
  - California since 1990s
  - Great Lakes and St. Lawrence River
  - Chesapeake Bay


Chinese Mitten Crab Life History
Temperature
Salinity
Zoeae
I II III IV V
Temperature
Salinity
Salinity
Brooding
Mating
Temperature
Downstream Migration
Megalopae
Day length
Staging
Gonad Development
Settlement
Salinity?
Adult
Juvenile:
Age 0
Age 3
Upstream
Migration
Age 1
Food
Density
South
Bay
Age 2



Hudson River Estuary:

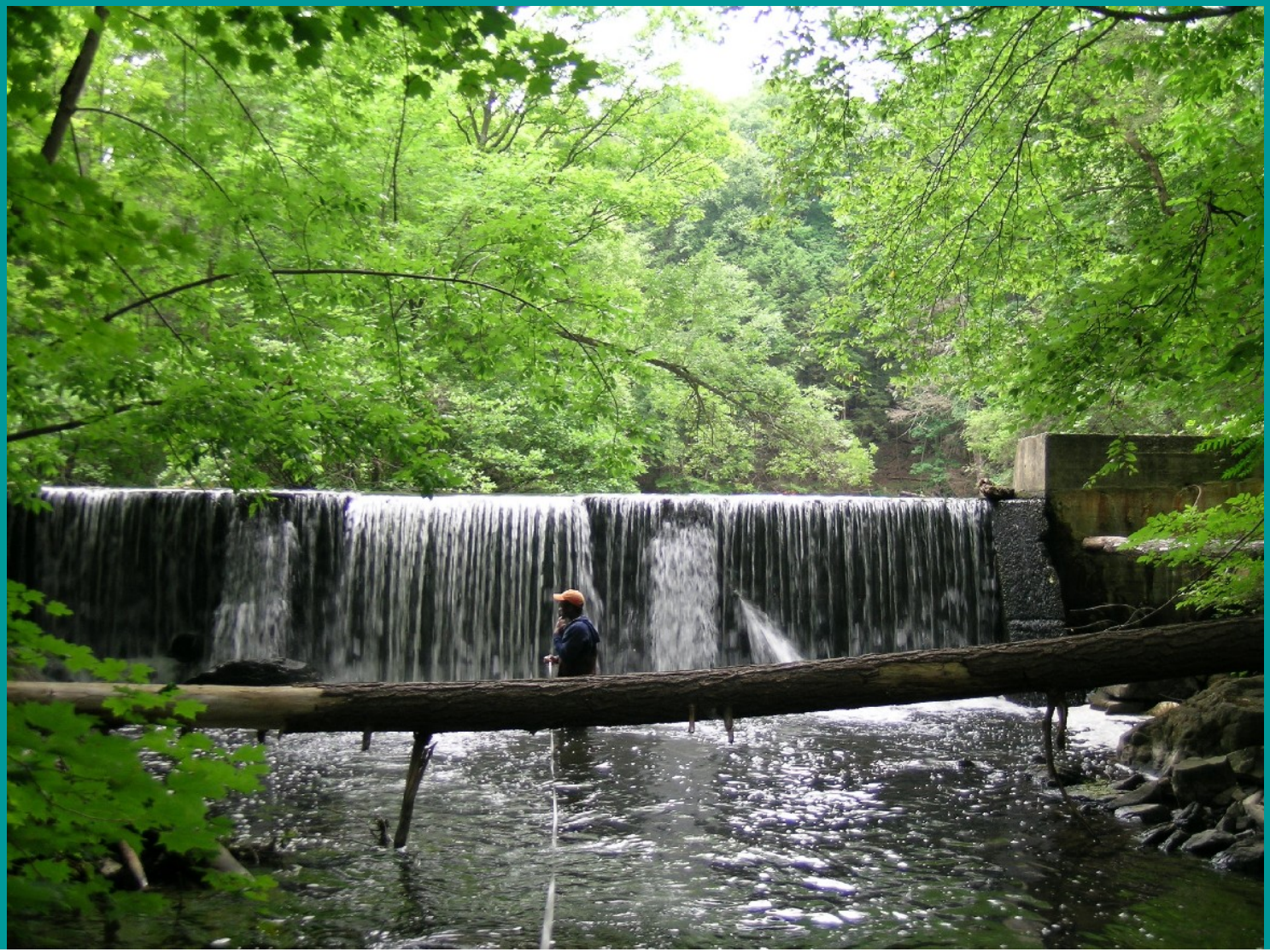
153 miles of tidal water

Salt wedge- River Mile 40-60

~79 tributary streams

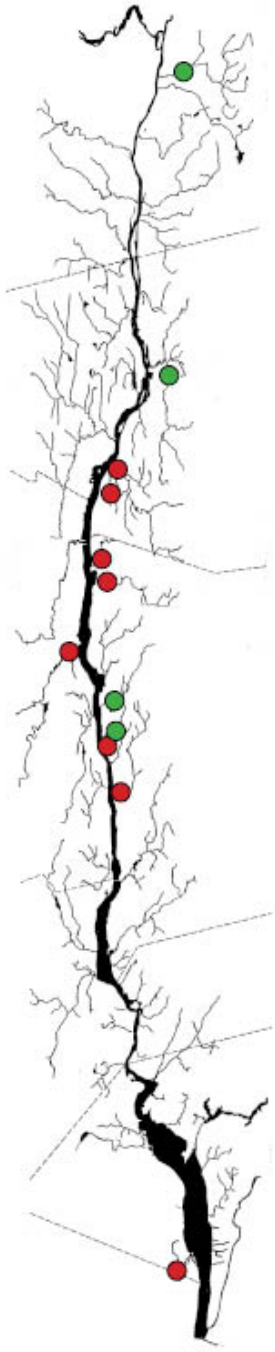
Natural Waterfall on the Saw Kill ~80 m upstream of tidal water

First Dam on the Saw Kill
~40 m upstream of falls




Eel Ladder, base of dam, Saw Kill

My First Juvenile Chinese Mitten Crab- June 3, 2008 in the eel ladder, Saw Kill, 21 mm CW



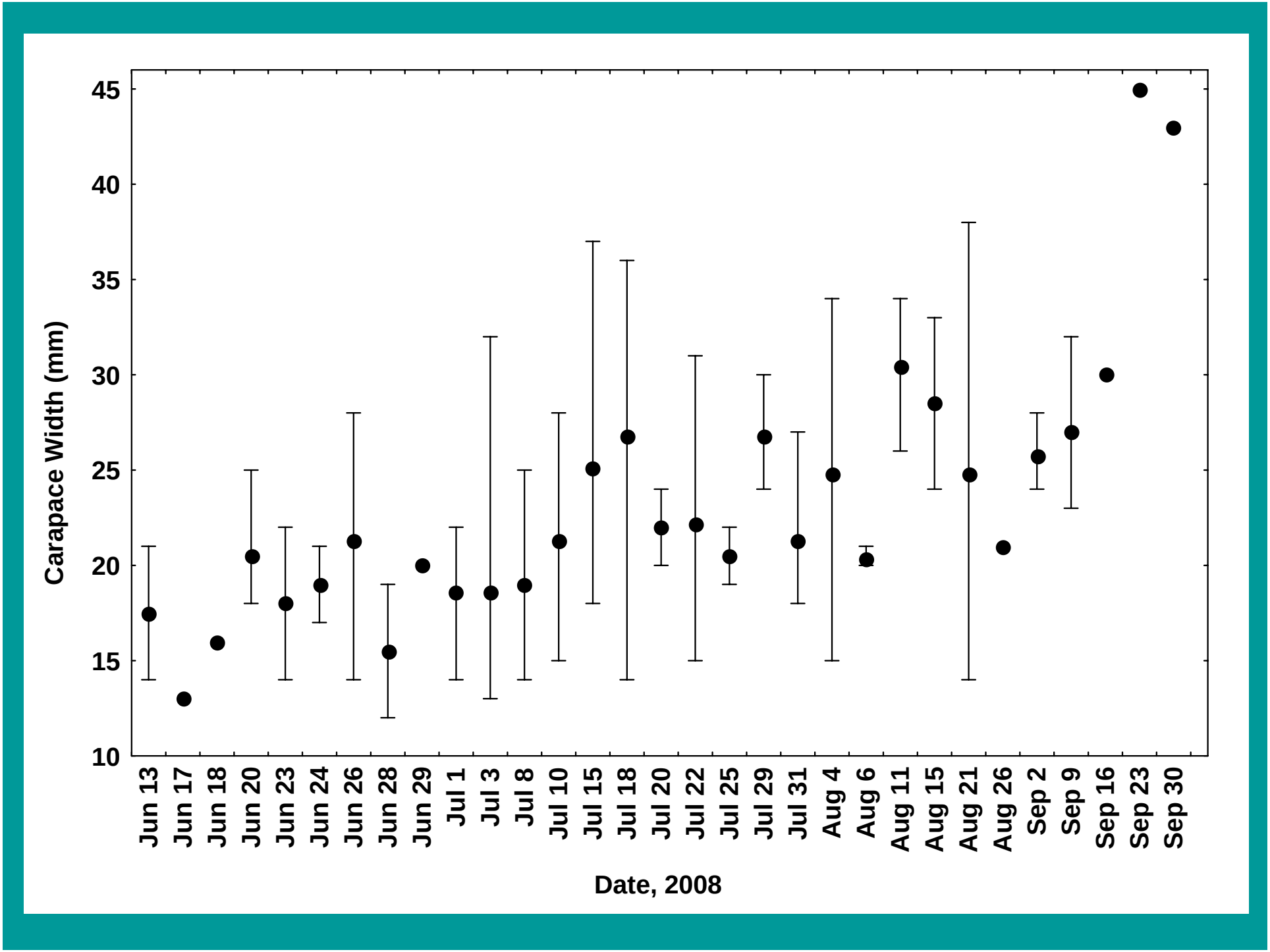
Distribution of Mitten Crabs in 2008

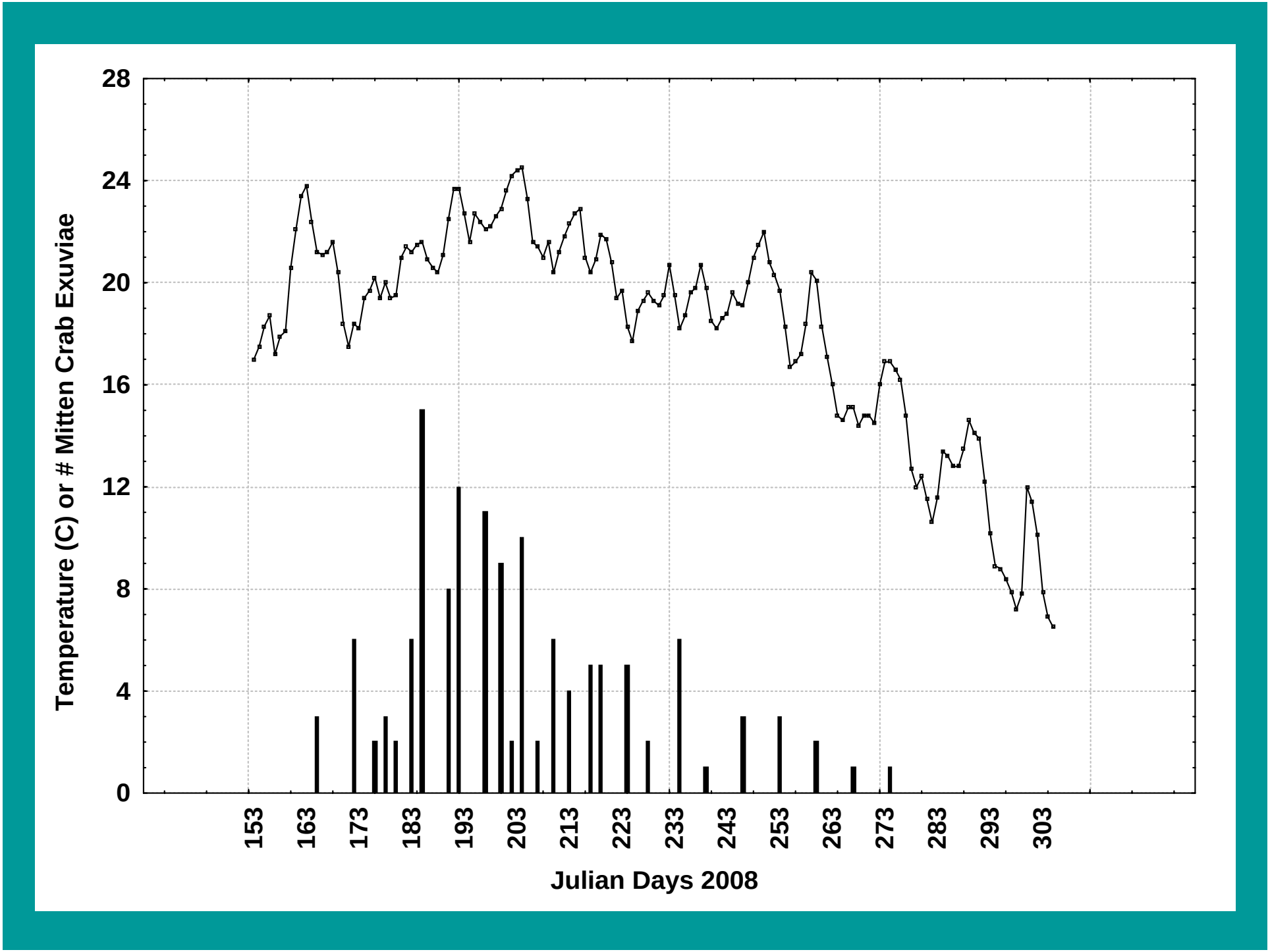
Red dots =

Crabs present

Green dots =

Crabs absent


Carapace Width (mm)
45
40
35
30
25
20
15
10
Jun 13
Jun 17
Jun 18
Jun 20
Jun 23
Jun 24
Jun 26
Jun 28
Jun 29
Jul 1
Jul 3
Jul 8
Jul 10
Jul 15
Jul 18
Jul 20
Jul 22
Jul 25
Jul 29
Jul 31
Aug 4
Aug 6
Aug 11
Aug 15
Aug 21
Aug 26
Sep 2
Sep 9
Sep 16
Sep 23
Sep 30
Date, 2008


Temperature (C) or # Mitten Crab Exuviae
28
24
20
16
12
8
4
0
153
163
173
183
193
203
213
223
233
243
253
263
273
283
293
303
Julian Days 2008

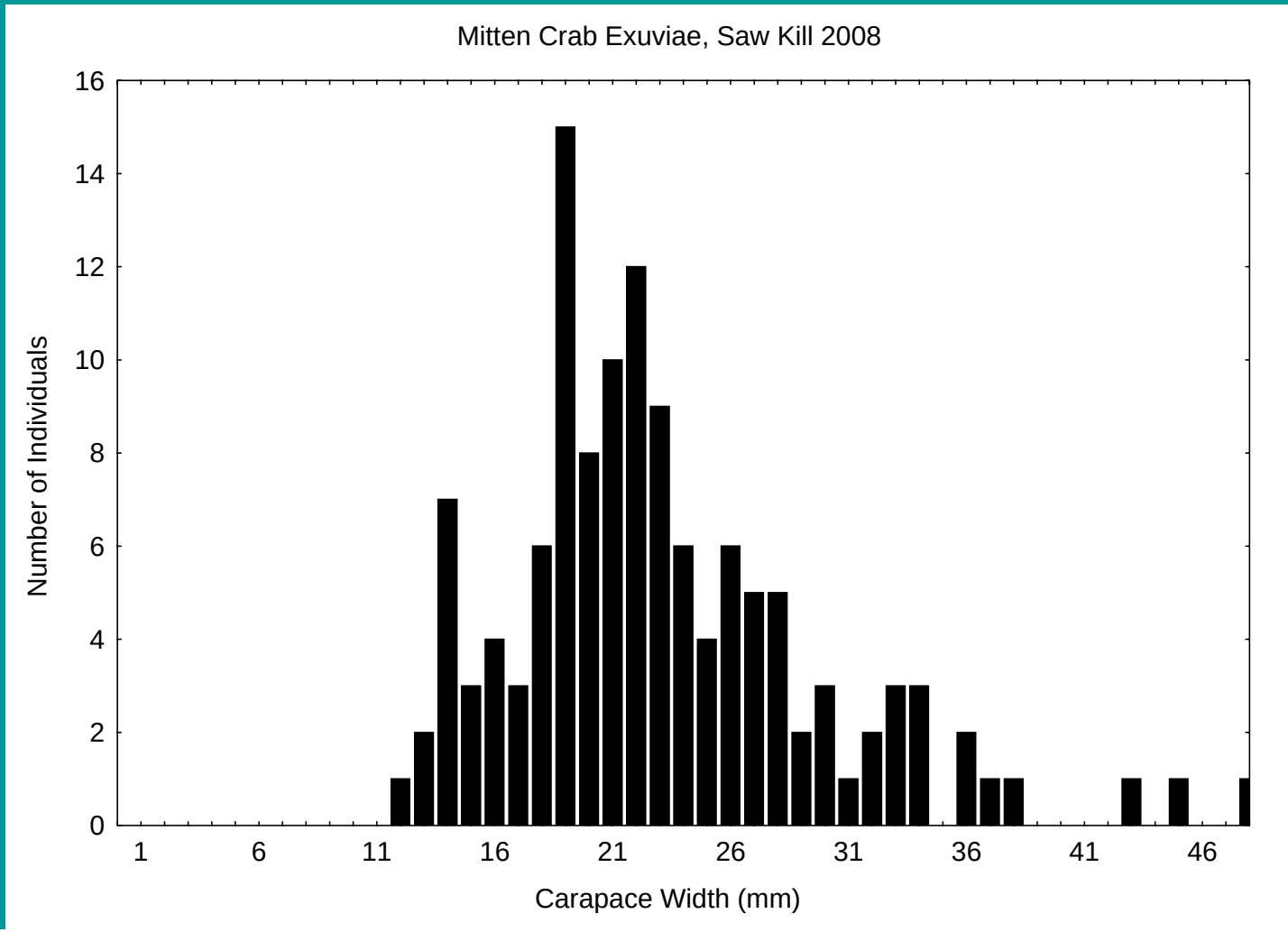
Methods

- Visit each stream twice a week, June-October
- Collect all mitten crabs seen, measure (CW), sex
- Mostly collected exuviae
- 2008: only sampled Saw Kill, Annandale
- 2009-2010: sampled Saw Kill and
  - Maritje Kill (Hyde Park)
  - Fall Kill (Poughkeepsie)

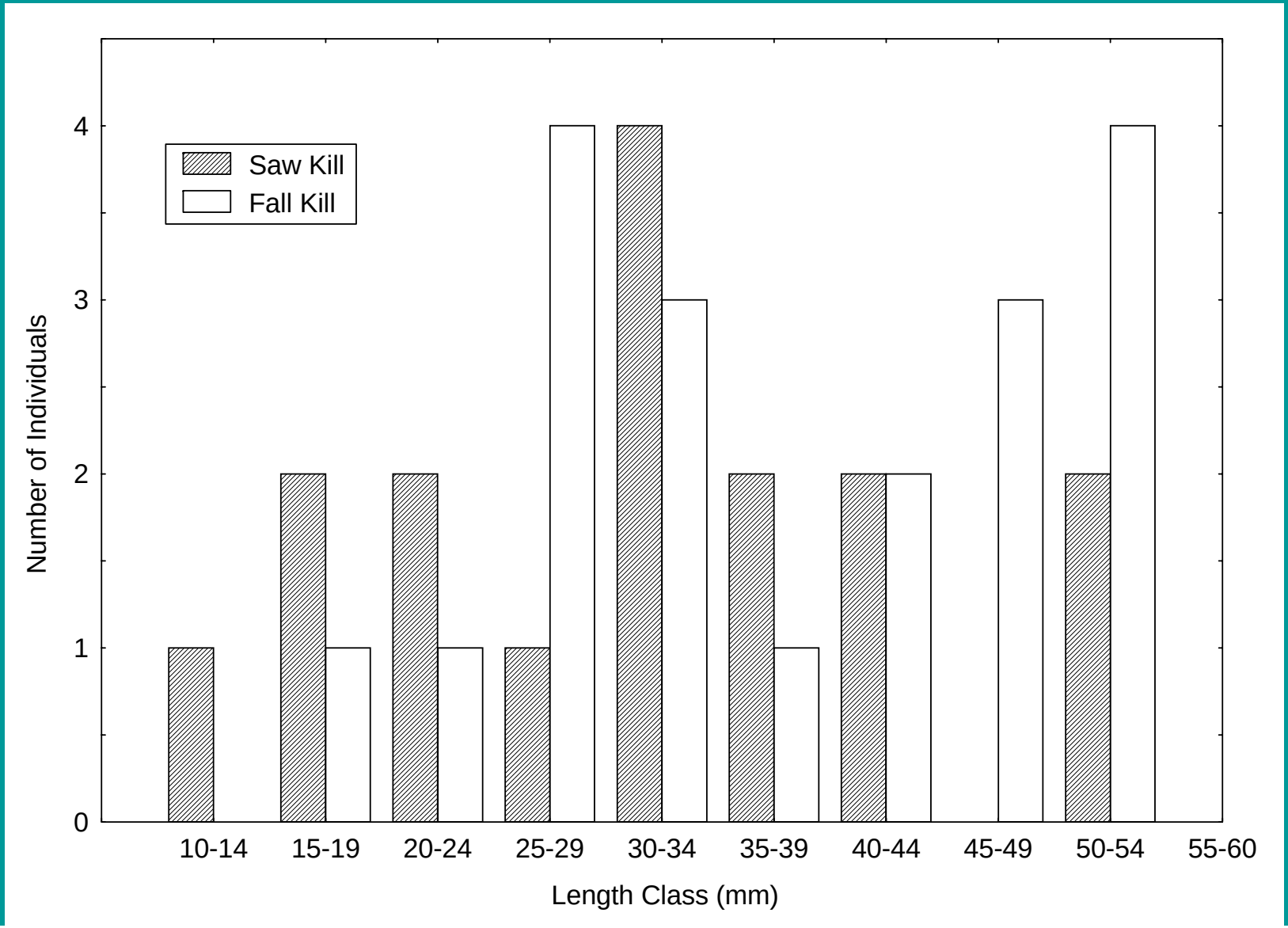
Summary Data, 3 Years of Searching

	SK 2008	SK 2009	FK 2009	MK 2010	FK 2010
# Trips	31	37	26	31	31
Total Crabs	143	17	22	2	16
CPUE	4.6	0.5	0.8	0.06	0.5
# Male	45	6	12	0	9
# Female	36	6	6	1	5
Unknown sex	49	5	4	1	2
% Sexable	62.3	70.1	81.8	50.0	87.5
F:M	1:1.25	1:1	1:2	-	1:1.8
Mean Size	22.8	32.1	38.6	15.0	38.6
Size Range	12-48	14-52	23-56	-	18-66

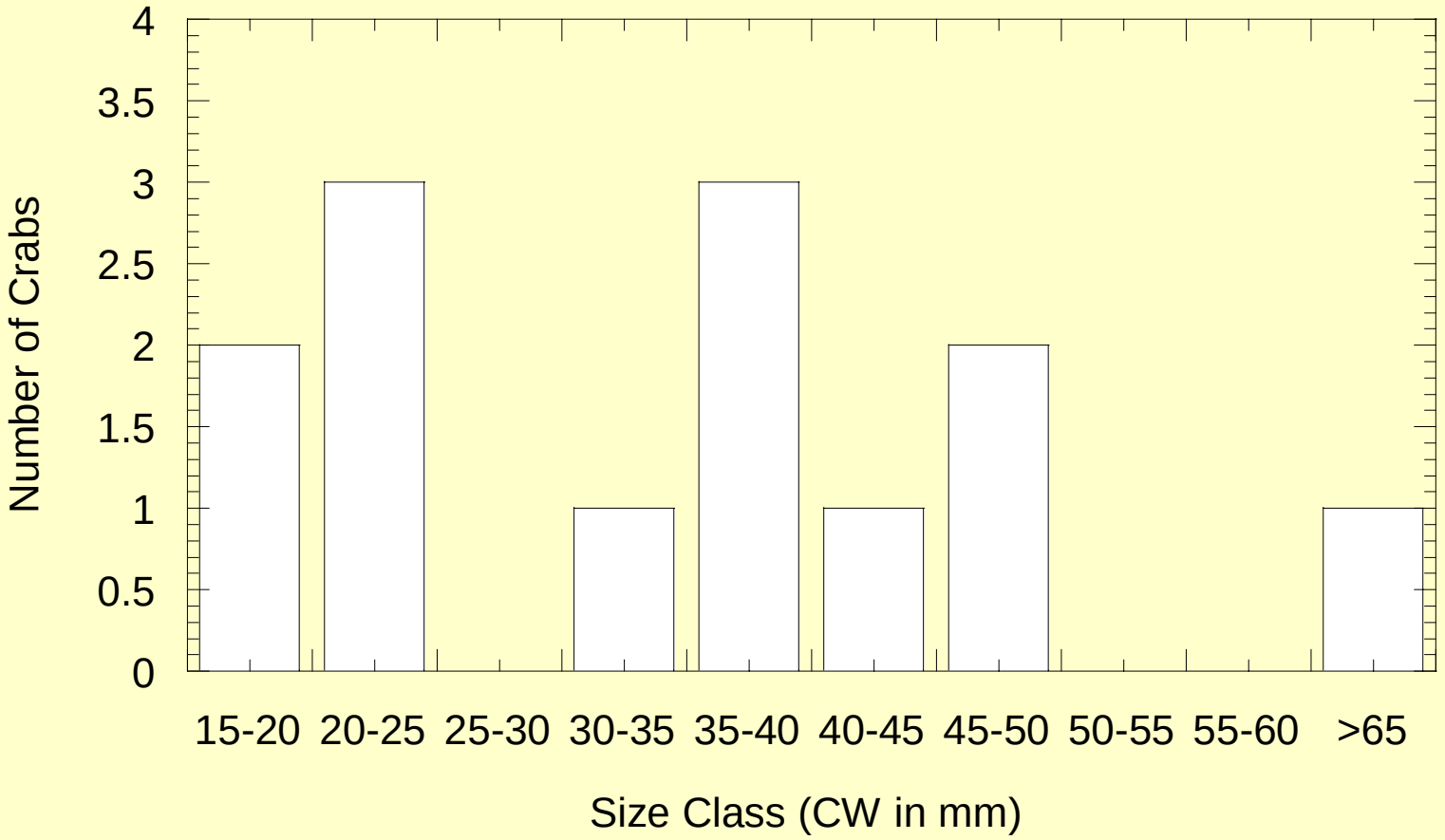
Size Frequency 2008



Size Frequency 2009



Size Frequency
Fall Kill 2010



Mitten Crabs in the Hudson 2011-2012

2011- searches in Saw Kill- No Crabs

2012- searches in Saw Kill- No Crabs

2011 & 2012- No Crabs reported in the Hudson River

Conclusion/Hypothesis I

Mitten crab population has declined over the three years of my study, none after 2010.

St. Lawrence- Crabs every year 2004-2008, none since.

Not necessarily good news: It took 14 years for mitten crabs to establish in Europe.

But They Are Still Here

2011- Delaware and Maryland reported one each

2012- One confirmed from a fish ladder in Mianus River, Connecticut- 29 mm CW

and

One reported, not yet confirmed from Maryland

Conclusion/Hypothesis II

Number of small crabs decreased: Indicates recruitment failure- somewhere in early life stages.

Number of large crabs decreased: Sexual maturity and emigration to salt water.

Conclusion/Hypothesis III

Mortality among small crabs within a season is high.

Sampling sites correlated with very high American eel density (~14,000/ha).

Suggest eel predation on small crabs is substantial.

Monitoring

Most mitten crab records are random encounters.

How many crabs does it take before someone accidently finds one?

Are you sure they are not here already?

-zooplankton tows for larval stages (marine)

-dredges, trawls for settled juveniles (brackish)

-one year olds (freshwater)

Should be prepared to do these things!!

Is It Possible to Affect Mitten Crab Populations?

1. Can you increase American eel density?
2. Gravid female crabs may congregate. Find them with ROV? Can trawling in winter catch significant numbers?
3. Downstream migrants can be trapped with fykes.
4. Mitten crabs have surprising reactions to electricity.

THANKS

Hudson River Foundation

Hudson River National Estuarine Research Reserve

Student Interns, Bard College at Simon’s Rock

Erin Swift, Ira Shadis, Leah Pitman, Nik Kotovich, Nico Hernandez, and Ian Hetterich