Green Crab (GC) Recapture Project 2021 in a Cove on the Kennebec

Early in 2021 members of the ASCC tried to learn about techniques to mark GCs in preparation of a recapture project which we hoped would help us answer the questions: Is it possible for us to recapture GCs? What is the approximate size of the population in the trapping area on the Kennebec? And in addition, we were interested in describing changes within the population that occur during the summer.

Identify lasting marking technique:
We set two traps near Squirrel Point to catch GCs for the initial marking trials. Marking tools included a towel, hair dryer, white acrylic paint pens, black permanent markers, and nail polish. We also borrowed two "Green Crab Condos", specialized traps with individual cells, with the goal to prevent cannibalism. GCs were marked and placed in their individual "condo". The traps were placed in the intertidal zone on the Kennebec. We checked them regularly for about 10 days.

Many crabs seemed sluggish after just a couple of days. Maybe this was caused by an abrupt change of their environment, the difference in salinity and dissolved oxygen between the capture site at the South end of the island and the intertidal location in the brackish cove? Some GCs died, others disappeared or were able to cross into neighboring cells and it looked like cannibalism had occurred. After ten days the remaining GCs were composted. The acrylic paint pen markings lasted the entire time.

GC 24 marked on 8-4-2022

We found this marking procedure the most successful: dry off crab's carapace with towel and/or hair dryer, apply white acrylic paint and dry again before releasing the crab. The acrylic paint pen allows precise markings. How exactly would we mark each crab? We contemplated symbols and numbers, for trap location, project day and a combination that included sequence numbers to help us identify specific individuals.

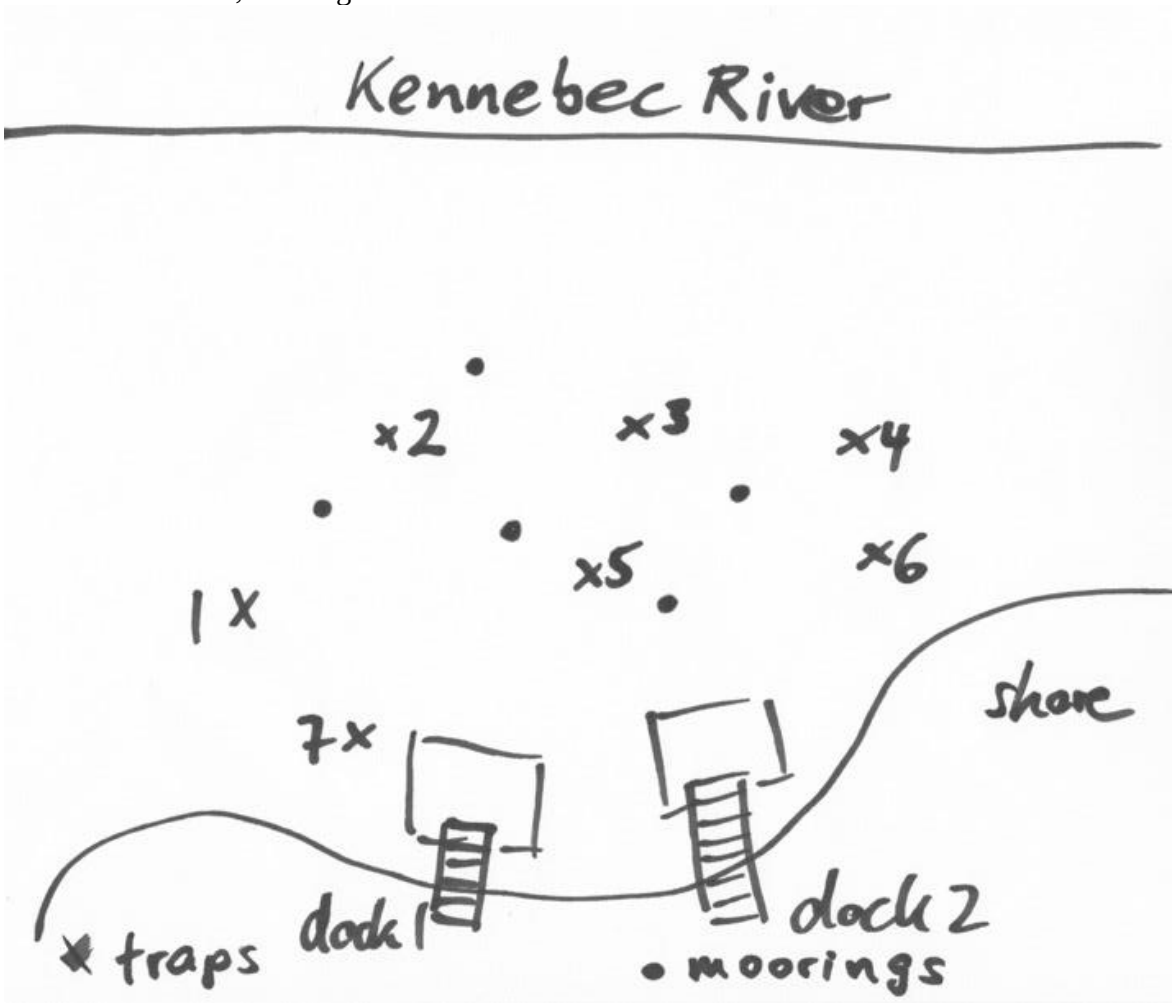
Recapture Trapping 8-4-2021 to 9-25-2021:
On three project days seven baited, modified eel traps were set over night in the cove according to the map below. On 8-4-21 we caught a total of 36 GCs, marked their carapaces with an acrylic paint pen, using sequence numbers 1-36 and a central dot. We then released them in the center of the trapping area. On 9-1-21 we caught a total of 62 crabs and marked with Acrylic Paint Pen, sequence numbers 1-62 and a horizontal bar. We released the GCs as before. On 9-25-2021 we trapped a total of 164 crabs with 1 recapture.

2021 recapture project

	Day 1: 8-4-21	Day 2: 9-1-21	Day 3: 9-25-21
Male	34 (94.4%)	51 (82.3%)	116 (70.7%)
Female	2 (5.6%)	11 (17.7%)	48 (29.3%)
Total	36	62	164
Recapture	-	-	1
Marking technique	Acrylic Paint Pen	Acrylic Paint Pen	Acrylic Paint Pen

Total numbers of GCs as well as the percentage of females increased during the project interval. We recaptured one male GC marked 48 on project day 3, caught on day 2 in trap #7 near one dock, recaptured in trap #5 near release site in center of cove. 48 is a male, yellow orange (9-1-21), 6.5cm, missing 1 claw and 1 leg. We noticed change of carapace color to orange (9-25-21) and recorded the same size and identical extremities missing.

Trap locations in the cove 1-7, drawing-not to scale



Lincoln-Petersen method to estimate population size:

The data in the model include the number of individuals marked in the first trapping event (*m*); the total number of individuals that are captured in the second sample (*n*); and the number of individuals in the second sample that have markings (*x*). These data are used to estimate the total population size, *N*, x/n=m/N and N=nm/x

Estimated population size based on two survey days, using data from 9-1-2021 and 9-25-2021:
m # marked in sample 1 on 9-1-2021 =62
n # total # in sample 2 on 9-25-2021 =164
x # marked recaptured in sample 2 =1

N=(164x62)/1 N estimate of total population=10168

(The population size will be overestimated with a large margin of error when the number of recaptured GCs is small.)

In 2022 we plan to adjust the setup and will shorten trapping intervals as we are hoping to increase the probability of recaptures. If you are interested in studying the curious ways of the green crab with us, please contact clams@arrowsic.org.