mendocino kelp forest restoration

urchin trapping data insights

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Science Questions

- How is urchin trapping CPUE affected by approach, season, timing, soak time? (can also explore trap type, bait type using Phase I and/or Phase II summer sampling) [Survey123]
- What is the effect of *in situ* urchin density on trap CPUE? What is the attraction distance of traps? [UTM and S123]
- What is the effect of trap on *in situ* density? [Survey123 & UTM & Ecosystem monitoring]
- What are the relative CPUE of hand removal alone (Albion), trapping alone (Caspar) and combo of two (Noyo) [Landings and Survey123 & & Ecosystem monitoring (site effect)]
    - Inform the use and cost of different tools for restoration among different scenarios

Specific Data Exploration

PHASE 1 Survey123 DATA

- Explore count of purple urchin by: bait type, soak time, trap type, depth
- Explore size of purple urchin by: bait type, soak time, trap type, depth
- Is there a difference in CPUE between trap types?!! (focus on kelp)
- How does soak time affect CPUE – is there an “optimal?” (focus on kelp)
- What is the difference in CPUE among bait types – any clear leader
- interaction of bait type x soak time

PHASE 2 Survey123 DATA

- Explore seasonality
- Analyse different baiting methods (standard vs loaded) and deployment methods (single vs multi)

UTM

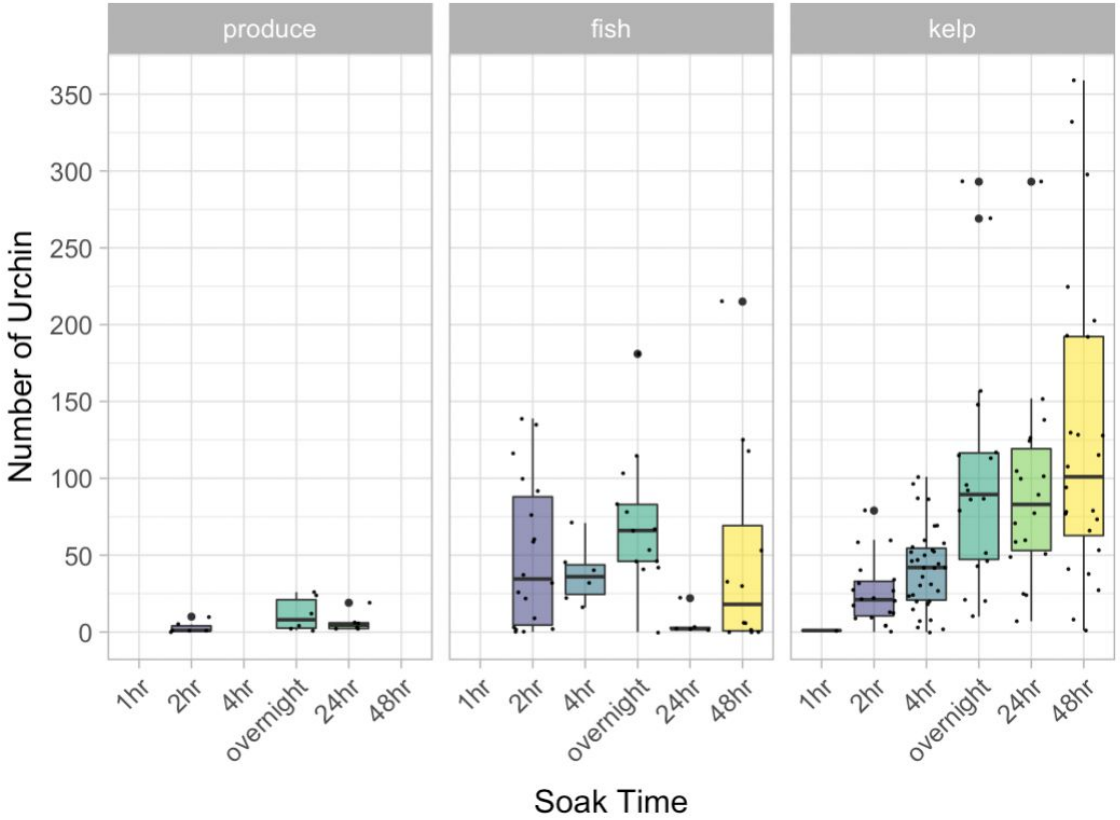
- Do transects seem correct length? Longer than needed? (if shortened – could do more)
- Explore / calculate:
    - “difference” = after – before (positive means incoming; negative means outgoing)
    - can look at +/- a long distance re “moving towards trap” AND/OR just moving
    - Distance of switch in difference – TBD; is this possible?

EM data

Survey 123 - 2021 (Phase 1)

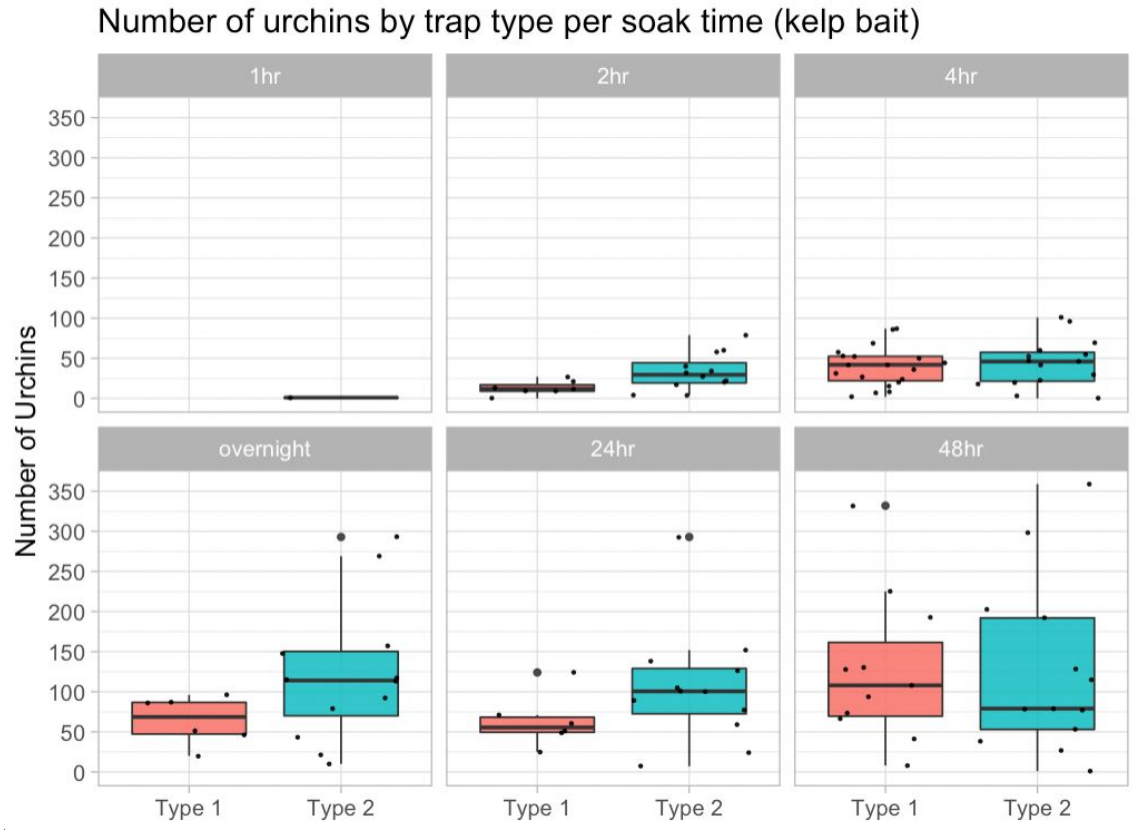
Purple Urchin Count Data

Number of urchins per soak time by bait type



Purple Urchin Count Data

Are there any differences between trap types? - interaction with deployment time?



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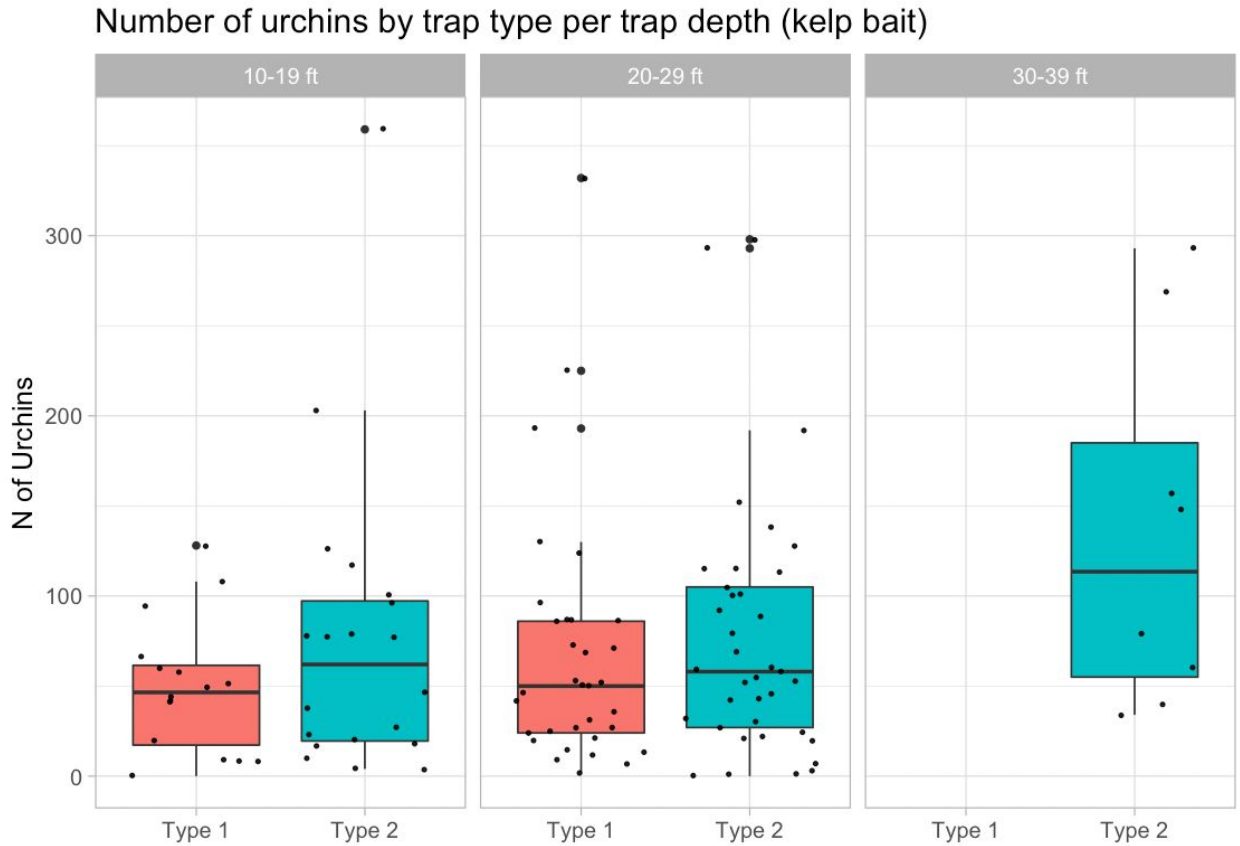
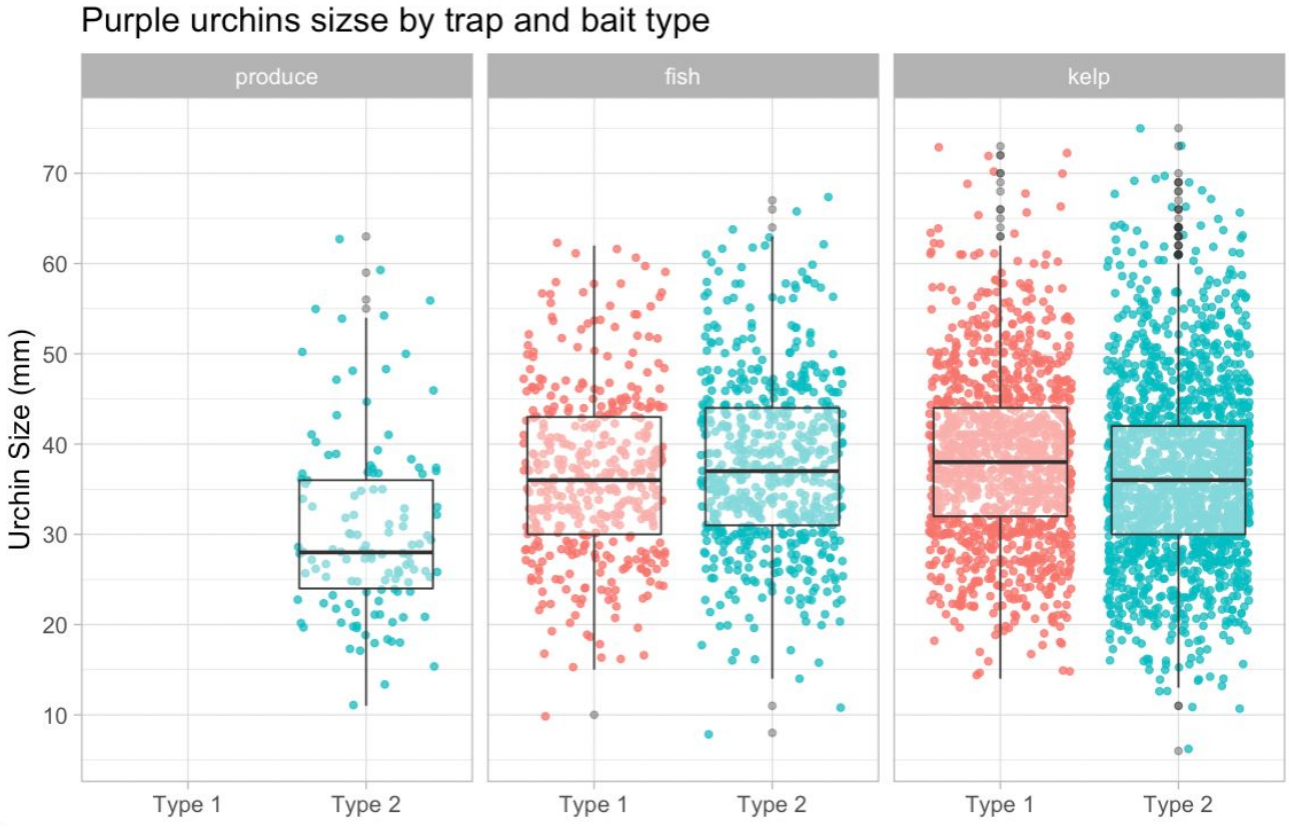


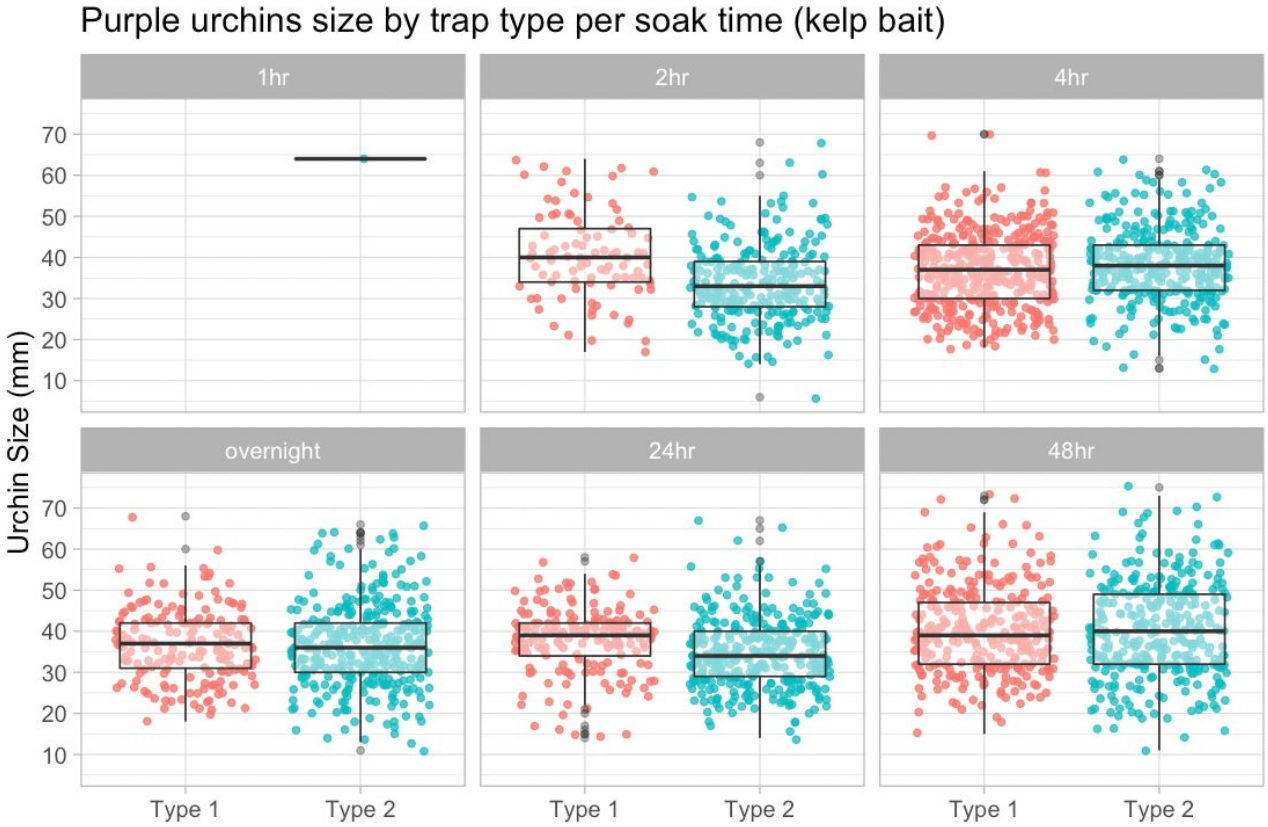
Purple Urchin Size Data

Are there any differences between trap types? Interaction with bait type?



Purple Urchin Size Data

Are there any differences between trap types? Interaction with deploy time?



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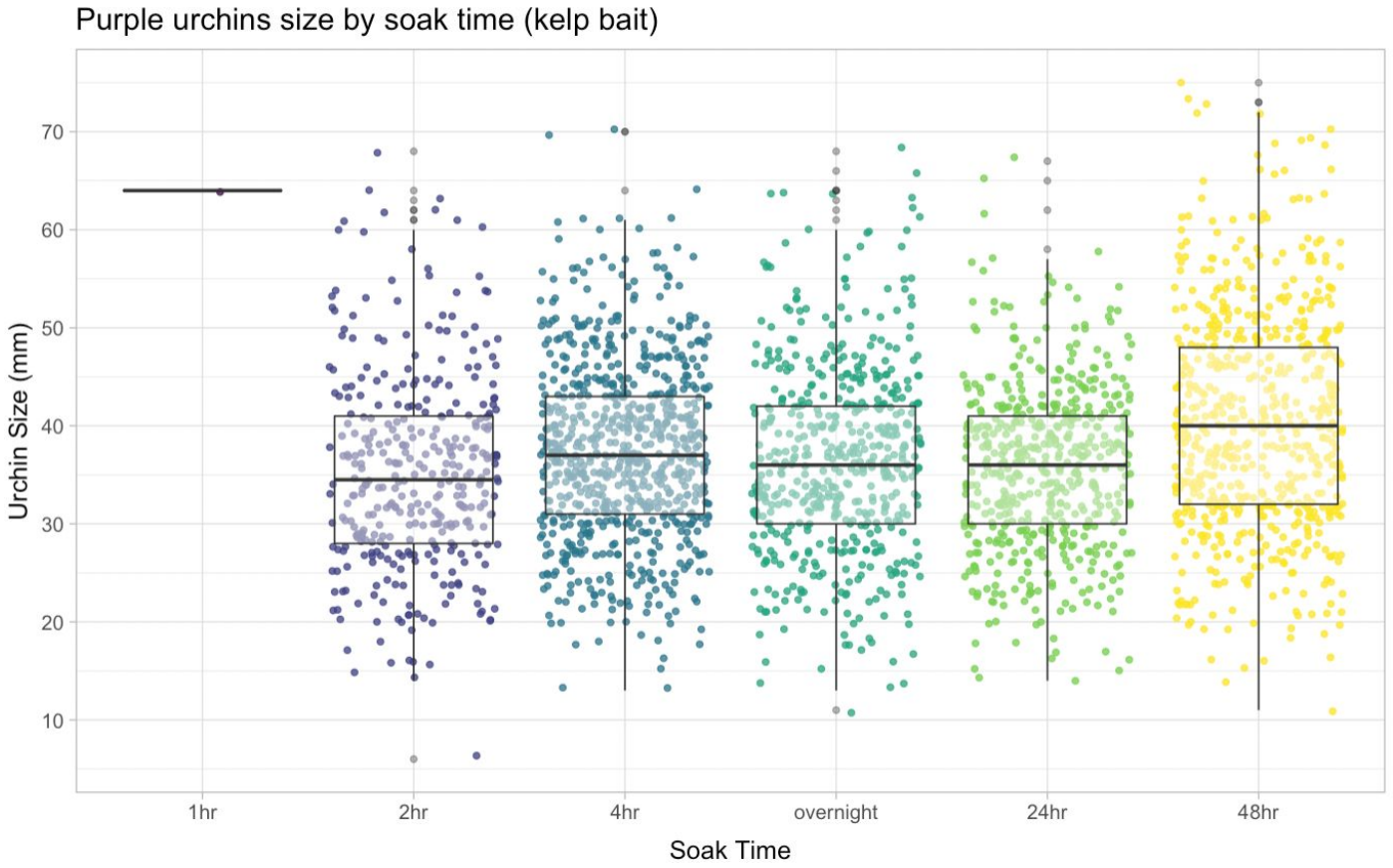


Conclusion from Phase 1

Recommendations:

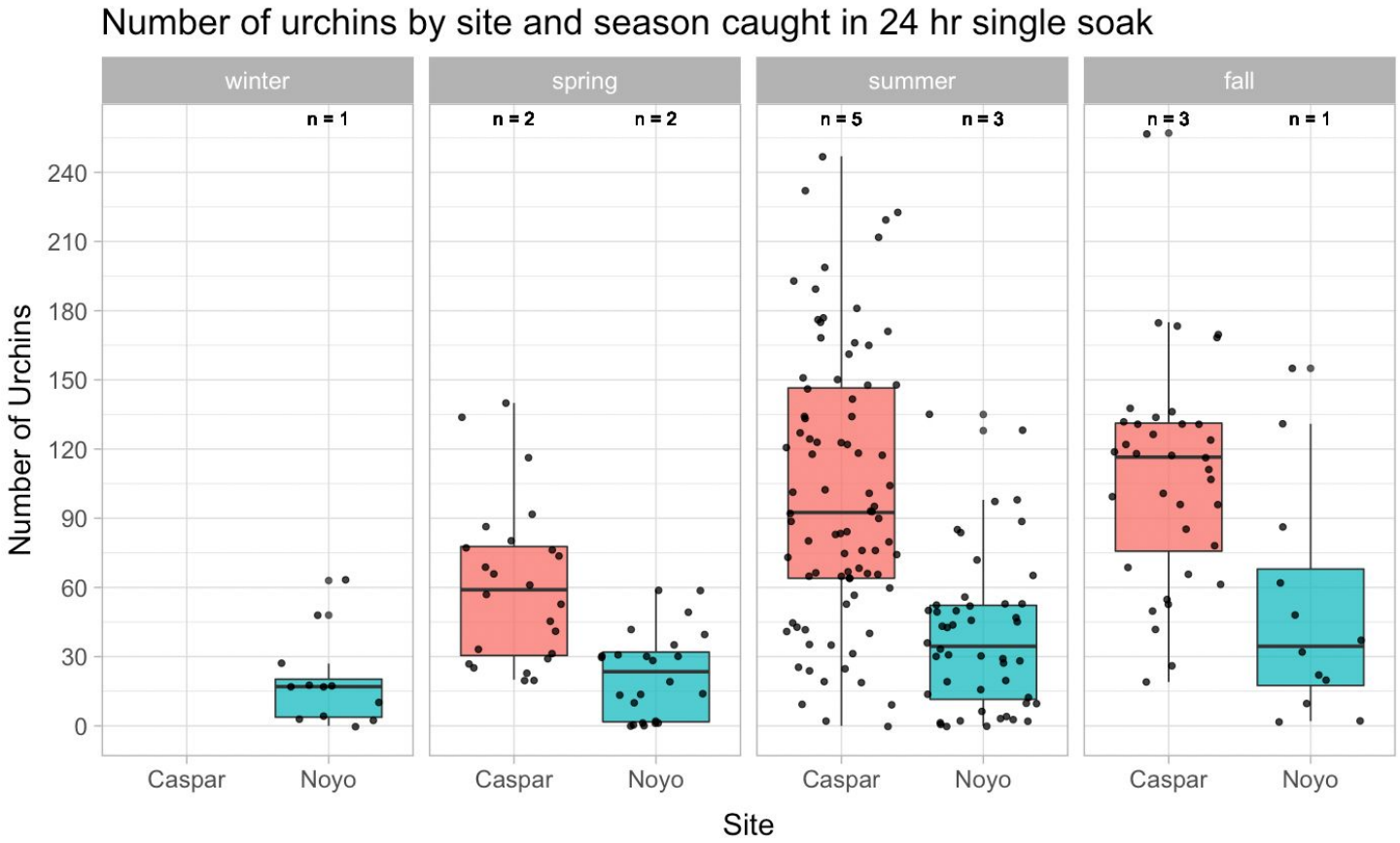
- Use either trap type but more justifiable to settle on and use one trap type into the future
- Use kelp as bait, not produce or fish
- Trap type, Bait type and deployment time do not strongly affect the size distribution of urchins
- Traps catch urchins between 10-75 cm

Survey 123 and UTM data 2022
Phase 2

Overview of deployments Phase 2

Season	Deployment	Date	Location	Number Traps	UTM Surveys	Bait Method	Deployment Method
Winter	d1	02/25	Noyo	12	4	Standard	Single
Spring	d1	05/13	Caspar	12	4	Standard	Single
	d1	05/13	Noyo	12	4	Standard	Single
	d2	05/27	Caspar	12	4	Standard	Single
	d2	05/27	Noyo	12	4	Standard	Single
Summer	d1	06/08	Caspar	12	4	Standard	Single
	d1	06/08	Noyo	12	4	Standard	Single
	d2	06/28	Caspar	24	4	Loaded	Single
	d3	07/20	Noyo	24	3	Loaded	Single
	d4	07/27	Caspar	12	4	Loaded	Single
	d4	07/27	Noyo	12	4	Loaded	Single
	d5	08/09	Caspar	24	4	Loaded	Single
	d6	08/29	Caspar	12	4	Loaded	Single
	d6	08/29 & 08/30	Caspar	12	0	Loaded	Multi
Fall	d1	09/15	Caspar	12	4	Loaded	Single
	d1	09/15	Noyo	12	4	Loaded	Single
	d2	09/21	Caspar	12	4	Loaded	Single
	d2	09/21 & 09/22	Caspar	12	0	Loaded	Multi
	d3	10/09	Caspar	12	4	Loaded	Single
	d3	10/09 & 10/10	Caspar	12	0	Loaded	Multi

Number of urchins by season and site (single 24 hr soak)



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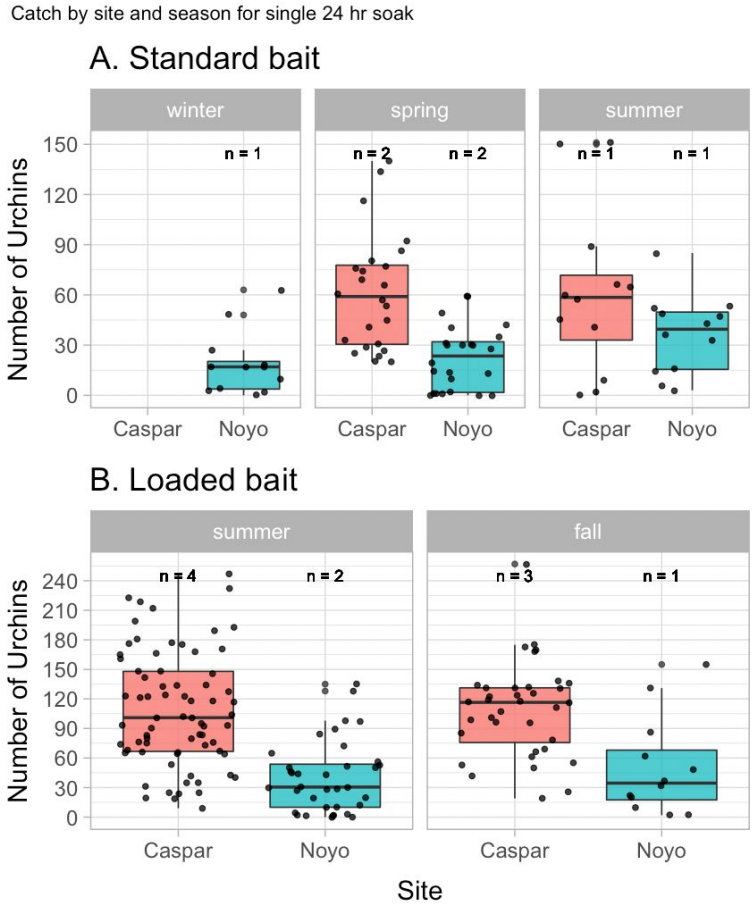
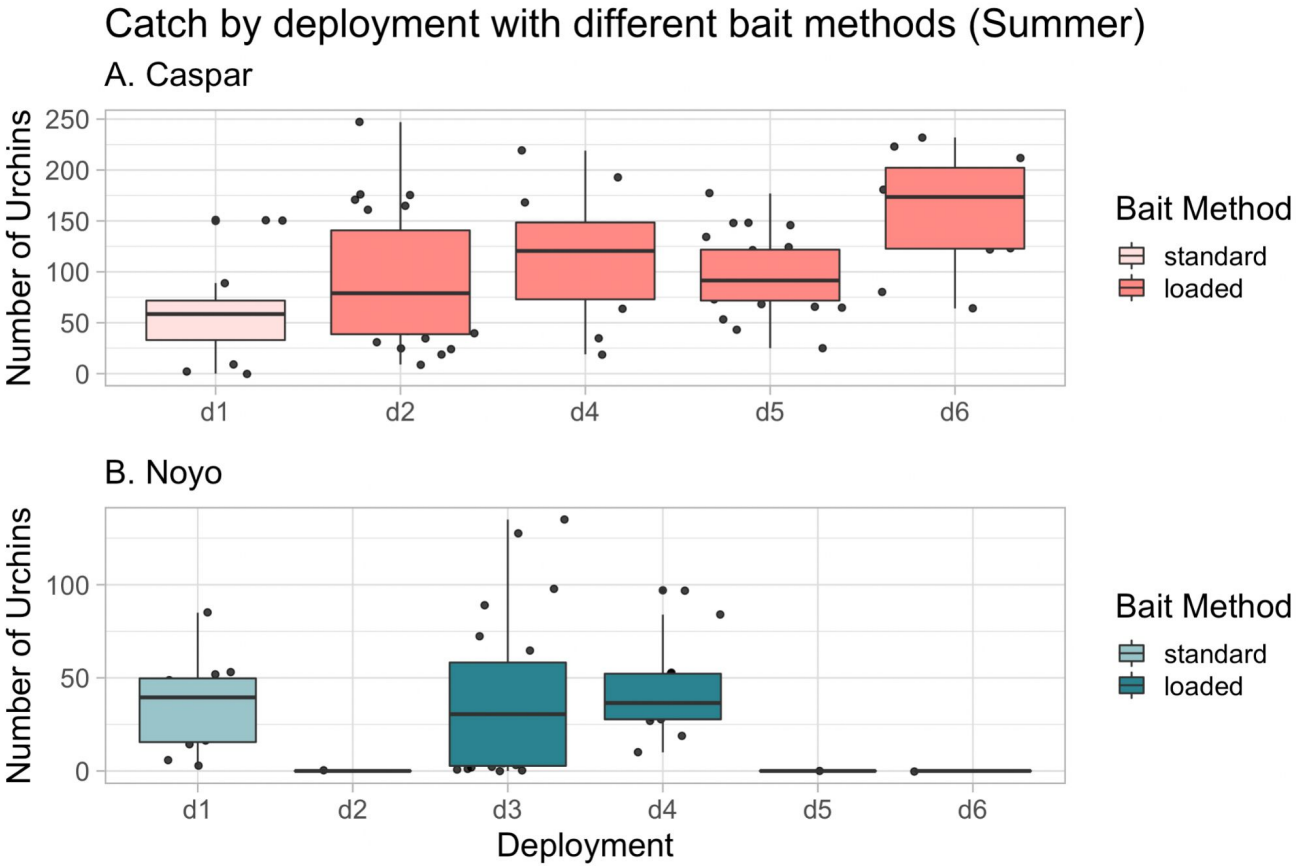


Survey 123 by season (Single 24 hr soak)

Survey 123 Summer Deployments and bait method



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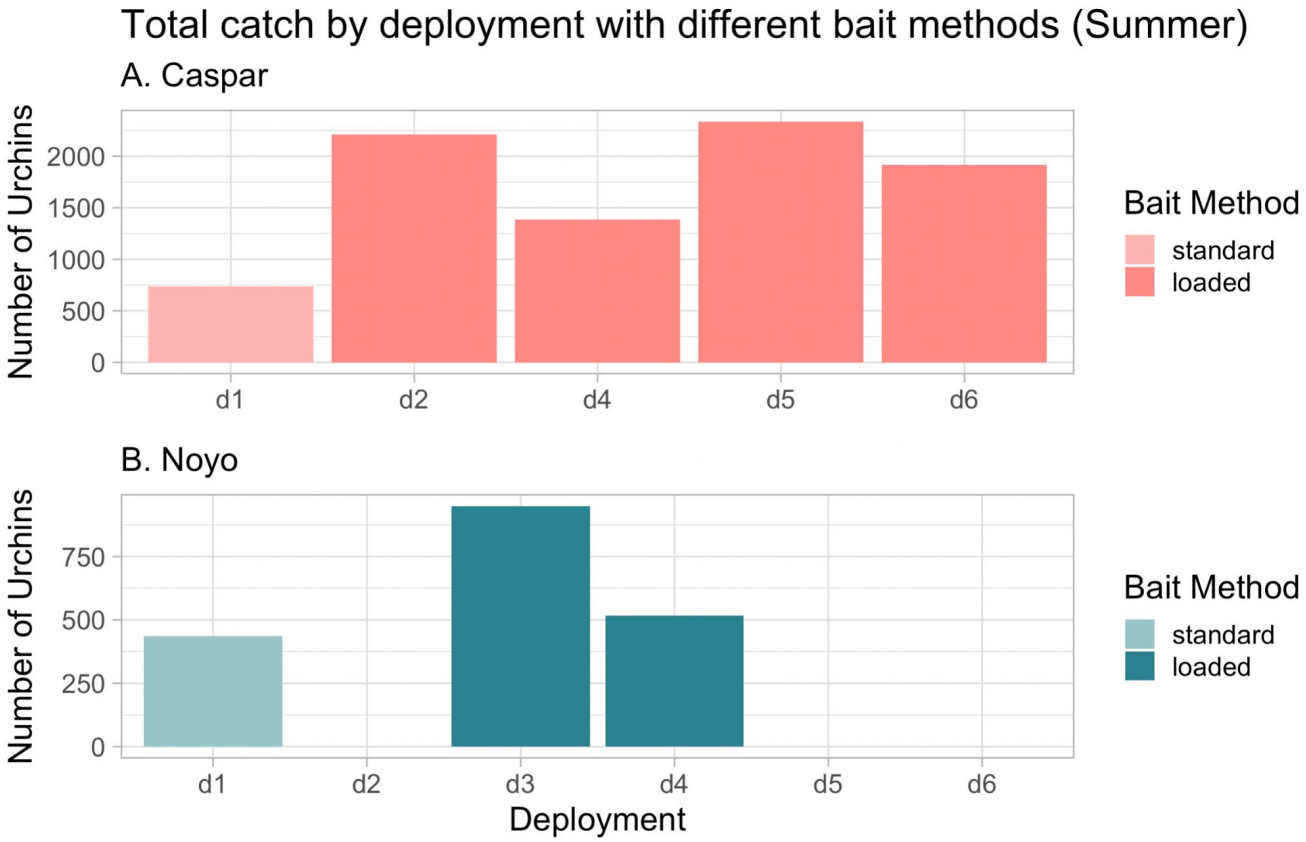
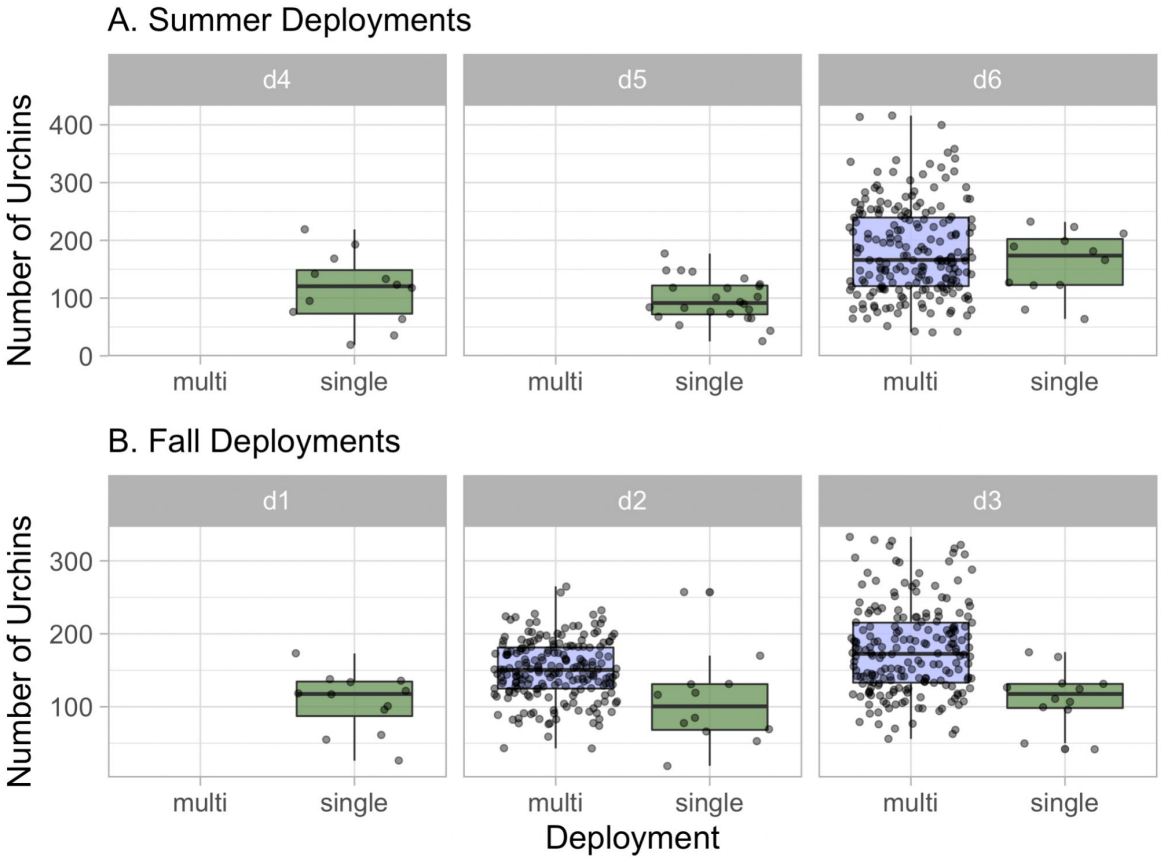
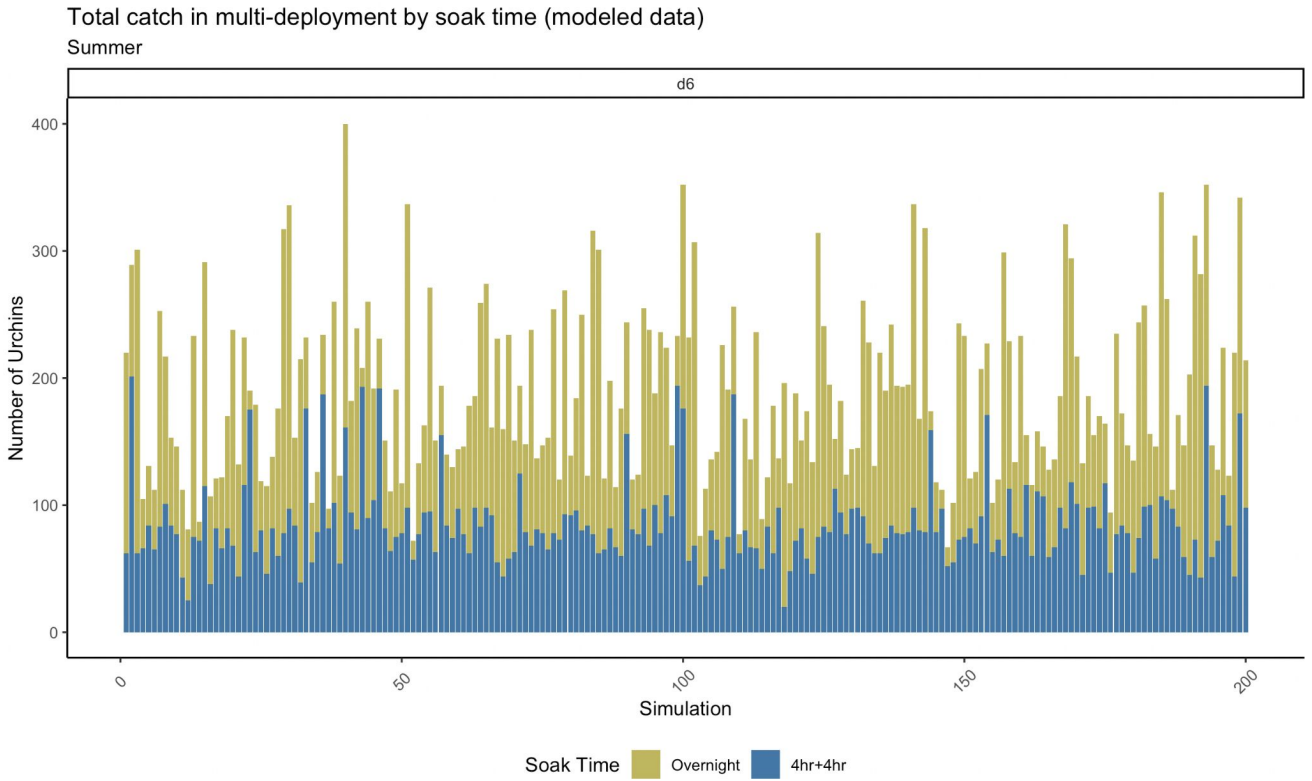


Comparing single vs multi-deployments at Caspar - random sample analysis with replacement



Comparing single vs multi-deployments at Caspar - random sample analysis with replacement

Is overnight catch driving the total catch for multi deployments?



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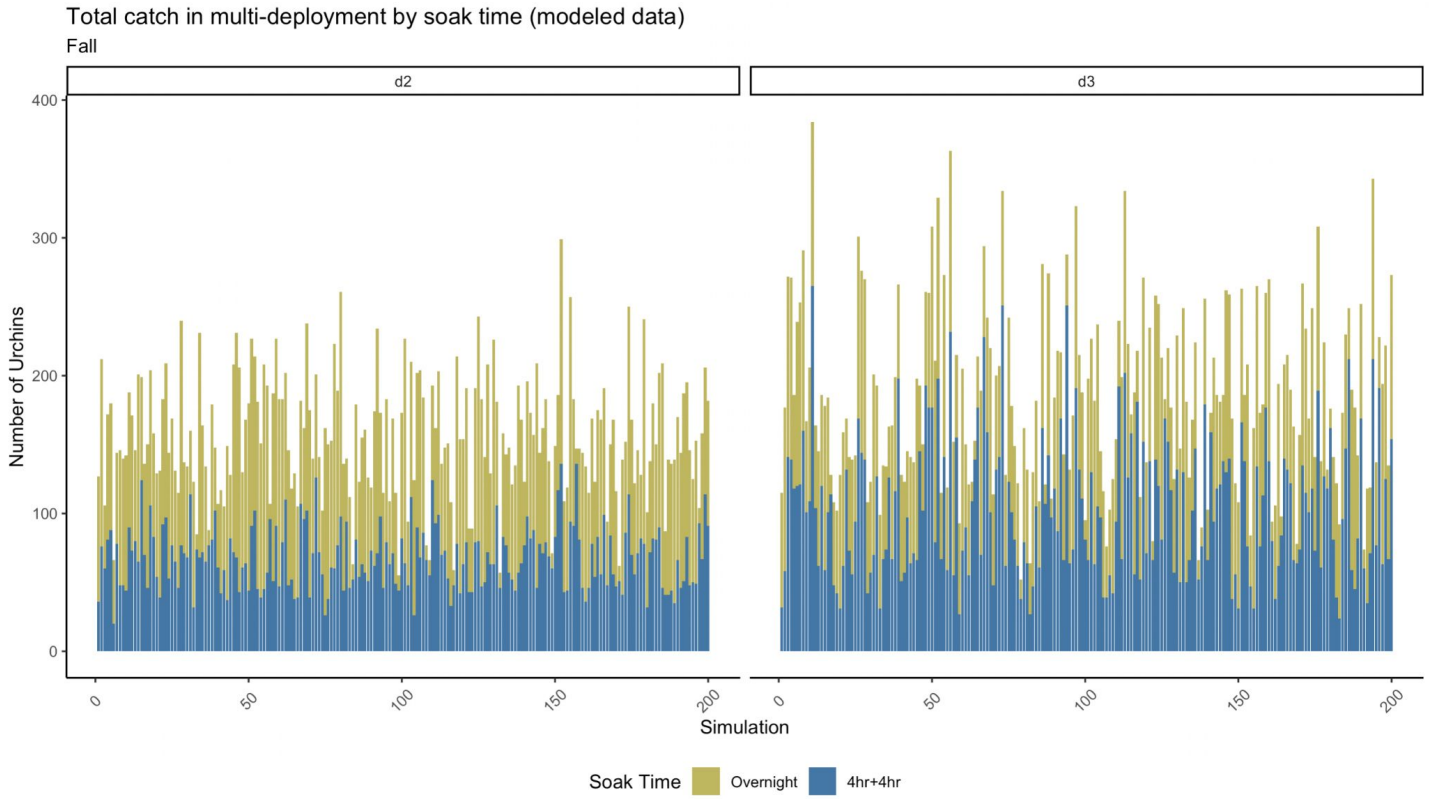
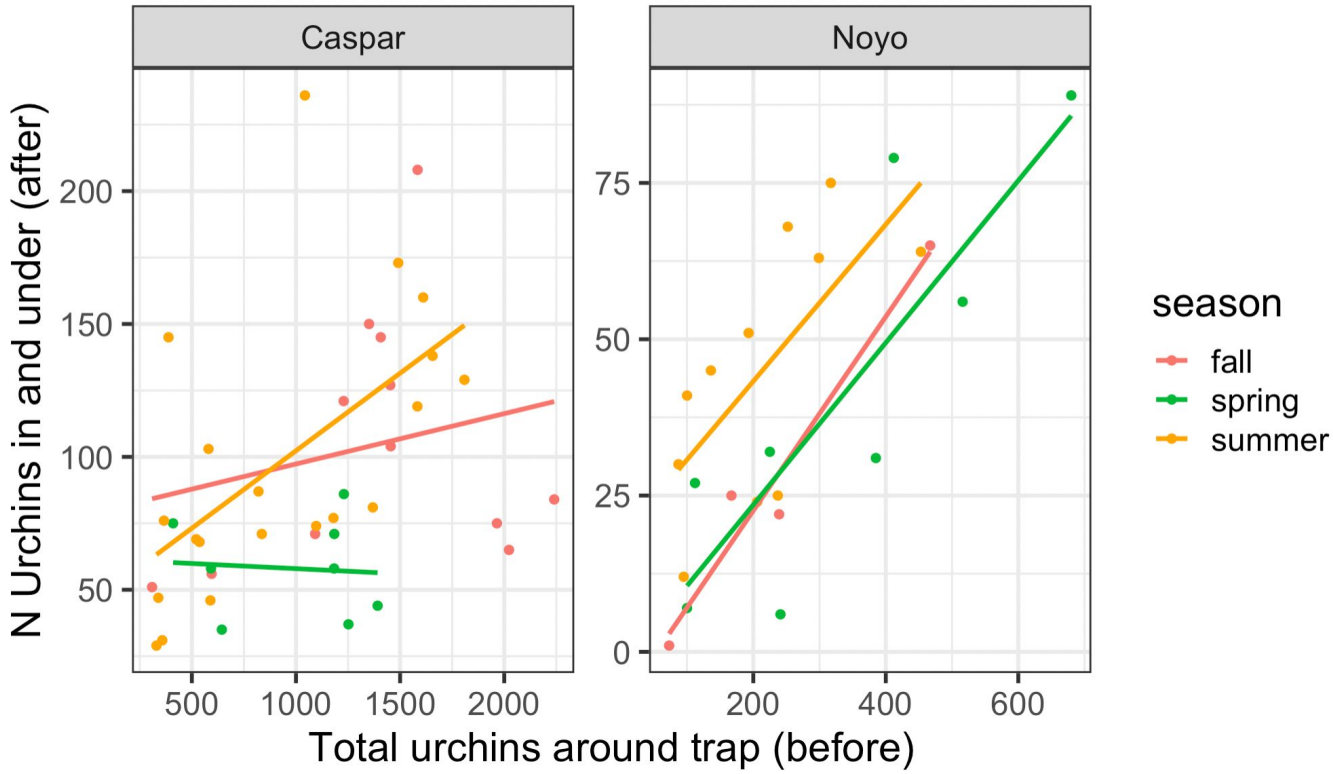


Total urchins around trap (before), sum of all transect vs urchins in and under trap (after)



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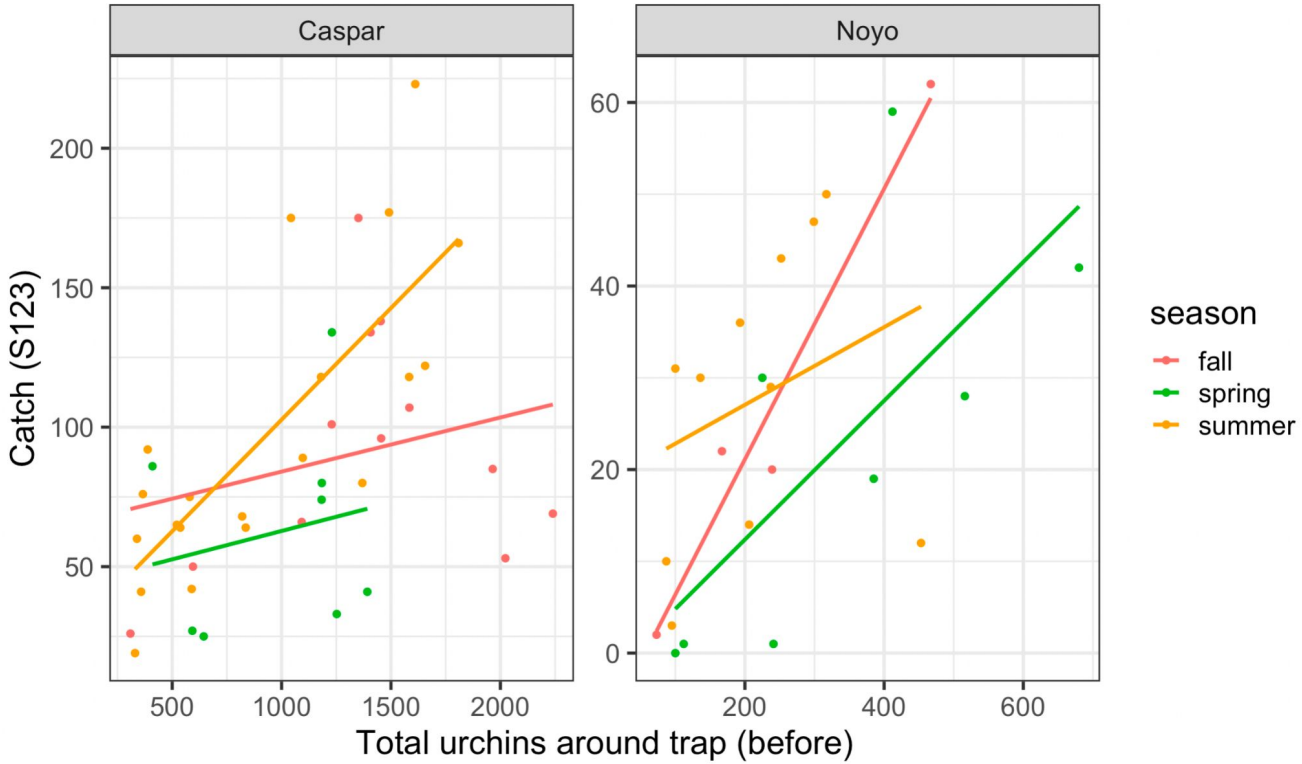

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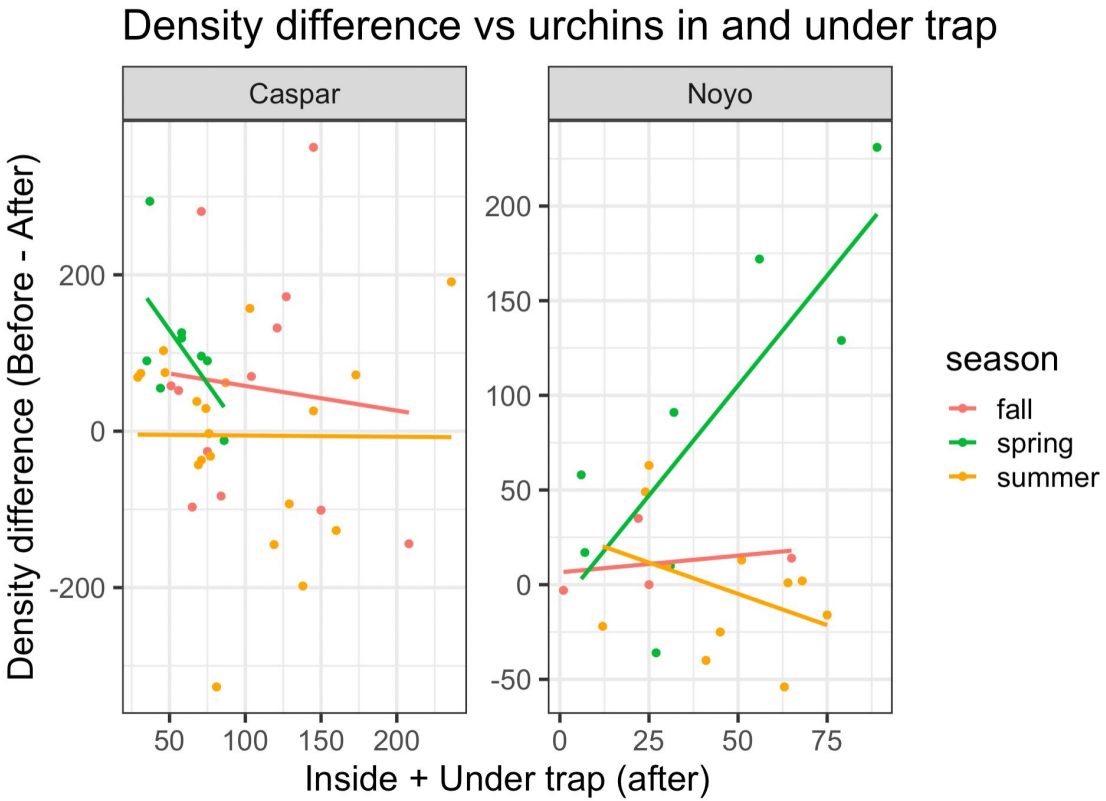

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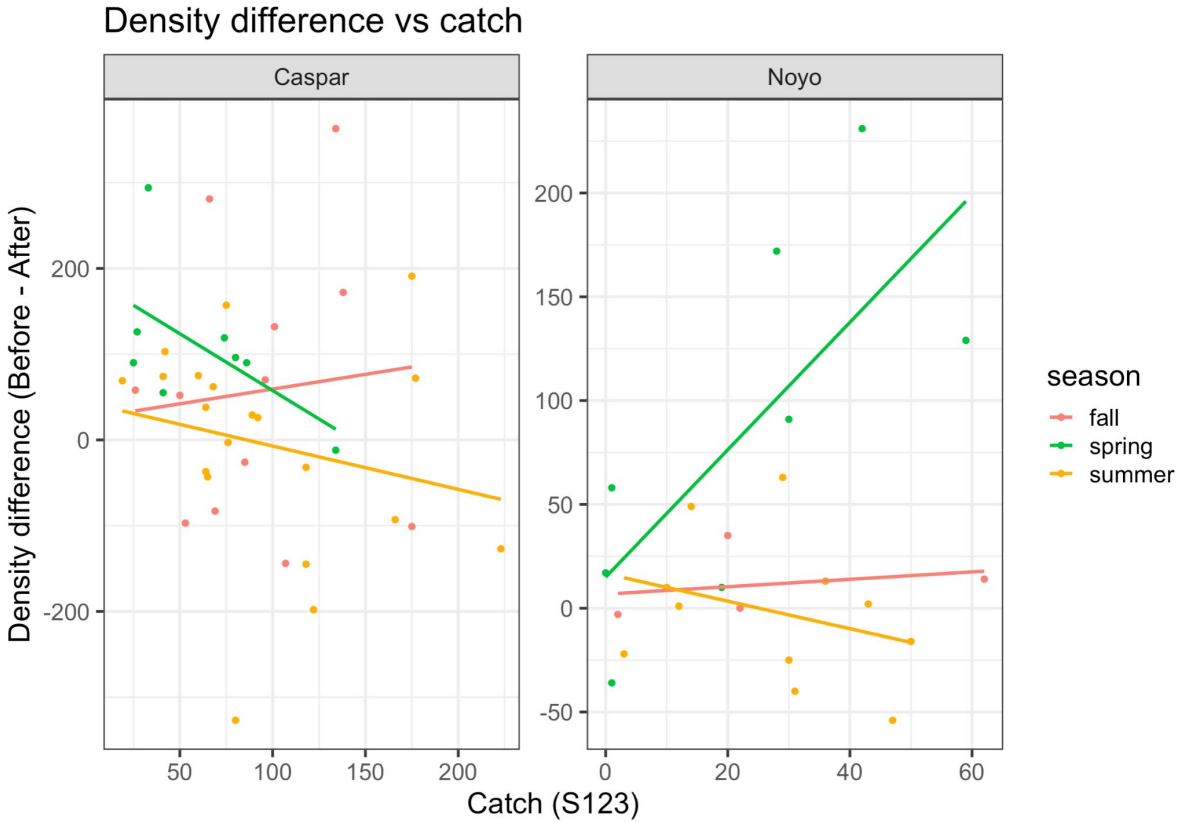

Main Takeaways

- We did not see patterns in meter by meter data
- UTM data are most useful as a measure of urchins density around a trap
- Recommendations: Continue some measure of urchins density around a trap but it does not need to be detailed meter by meter.