



Diet of introduced American bullfrog (*Lithobates catesbeianus*) after five years of control shows decreased conspecific and plant usage.

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# Concerns

- Predation
- Reorganization of the food web,
- Changes in nutrient flows and sinks
- Spread pathogens
- Extinction of species



(Bucciarelli et al. 2014; Kraus 2015; Nicholson et al. 2020)

# The removal of an invasive species can have unintended consequences

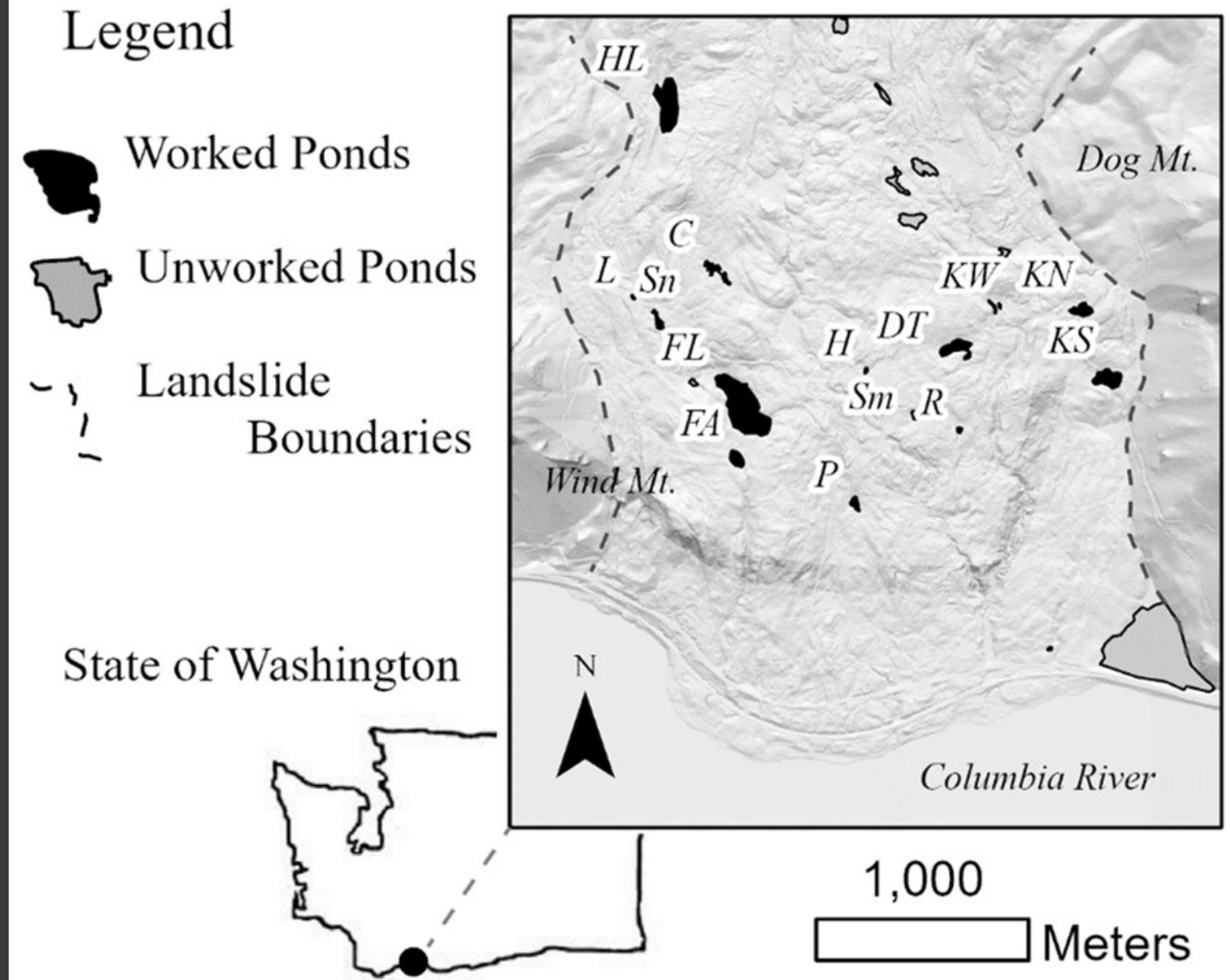
- Sheep on Santa Cruz Island in California - 23% increase in woody overstory (Beltran et al. 2014)
- Fish in Sydney, Australia resulted - native tadpole abundance x140 (Pollard et al., 2017)
- Cats - > Pacific rat - < breeding success of Cook's petrel in New Zealand (Rayner et al. 2007)



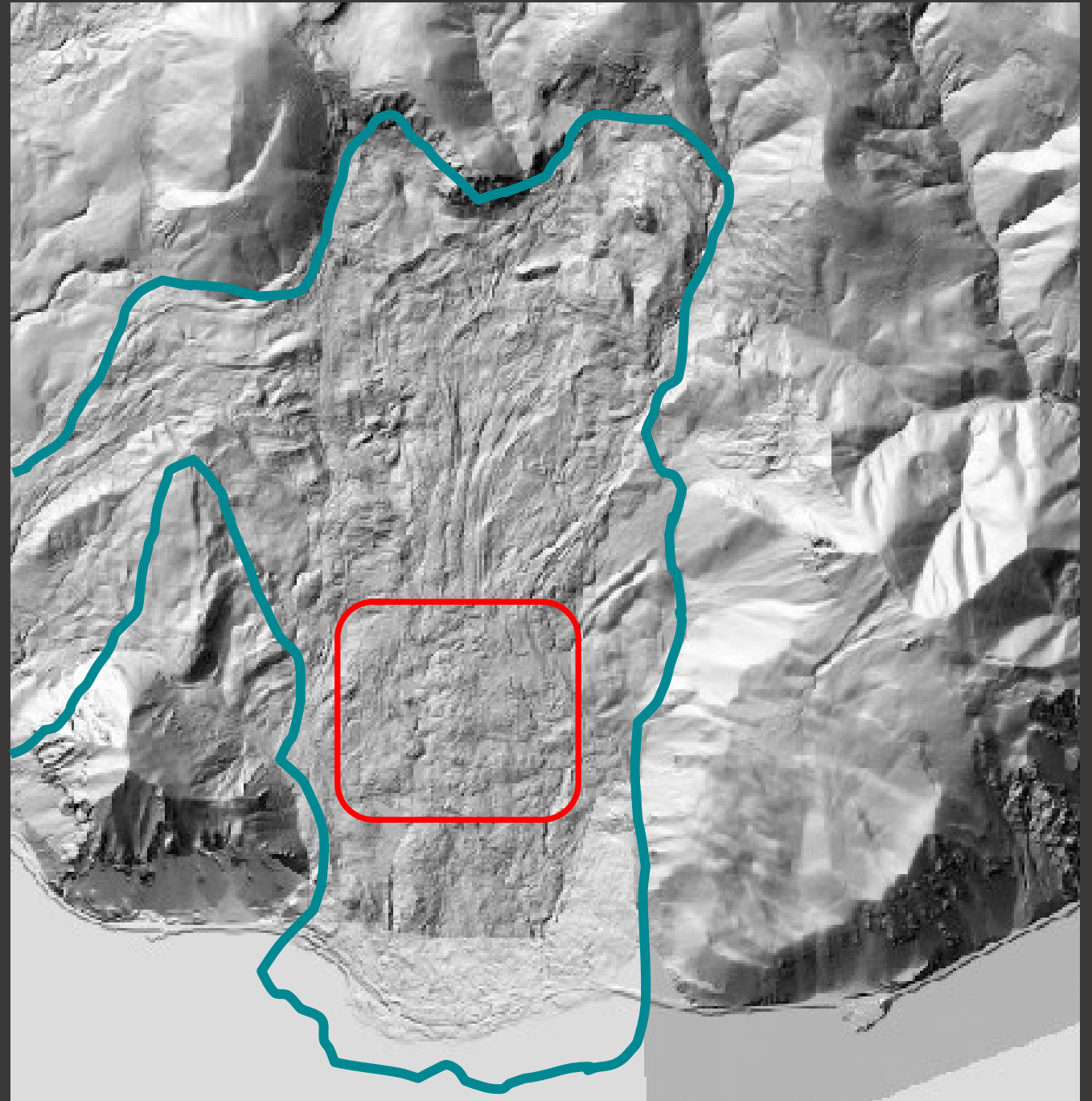
What happens to their diet as bullfrog densities fall?

# Study site

- ~ 1300 acres
- 30+ ponds
- Temperate
- Bordered by two mountains and the Columbia River



Better View of Landslide



Egg Mass removals

156

856 hours

Valley wide removals

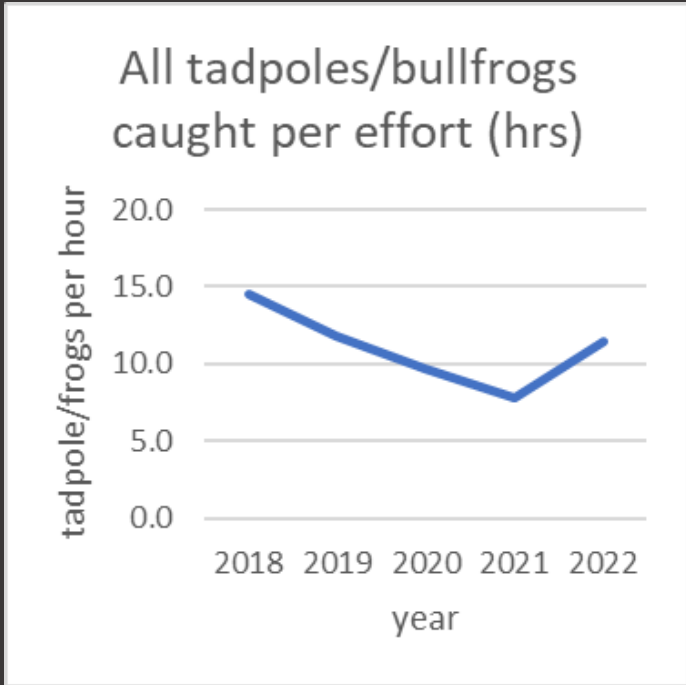
7,264

132 nights 669 hours

Stomachs analyzed

3,651

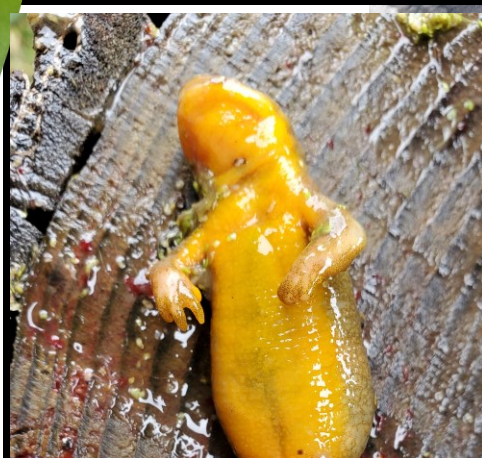
Ordinal Year  
Unique Dataset



Analzyed frog counts by pond

Pond Name	≥ 80 mm					< 80 mm					total
	1st year	2nd year	3rd year	4th year	5th year	1st year	2nd year	3rd year	4th year	5th year	
Celilo	9					11					20
Dead Tree	123	63	40	17	22	53	47	28	41	73	507
Frog Annex	17	4	30	35	5	36	7	37	95	18	284
Frog Lake	153	84	44	50	49	151	83	58	143	201	1,016
Harvey	0	0	0			3	4	3			10
Home Lake	57	47	46	17		73	162	150	283		835
Kapp North	7	24	40	4	3	28	41	11	0	2	160
Kapp South	57	75	57	16	12	136	128	24	36	3	544
Kapp West	0	0	0	0	2	0	0	0	0	0	2
Kapp West West	1	0				0	0				1
Little Pond	1	12	0			0	7	0			20
Phillips	7	24	10			8	34	8			91
Raccoon	6	0	0	1		4	0	0	1		12
Smith	11	4	11	13	12	16	9	10	22	3	111
Snag	18	0				15	5				38
total	467	337	278	153	105	534	527	329	621	300	3,651

# Total removals over 4 years

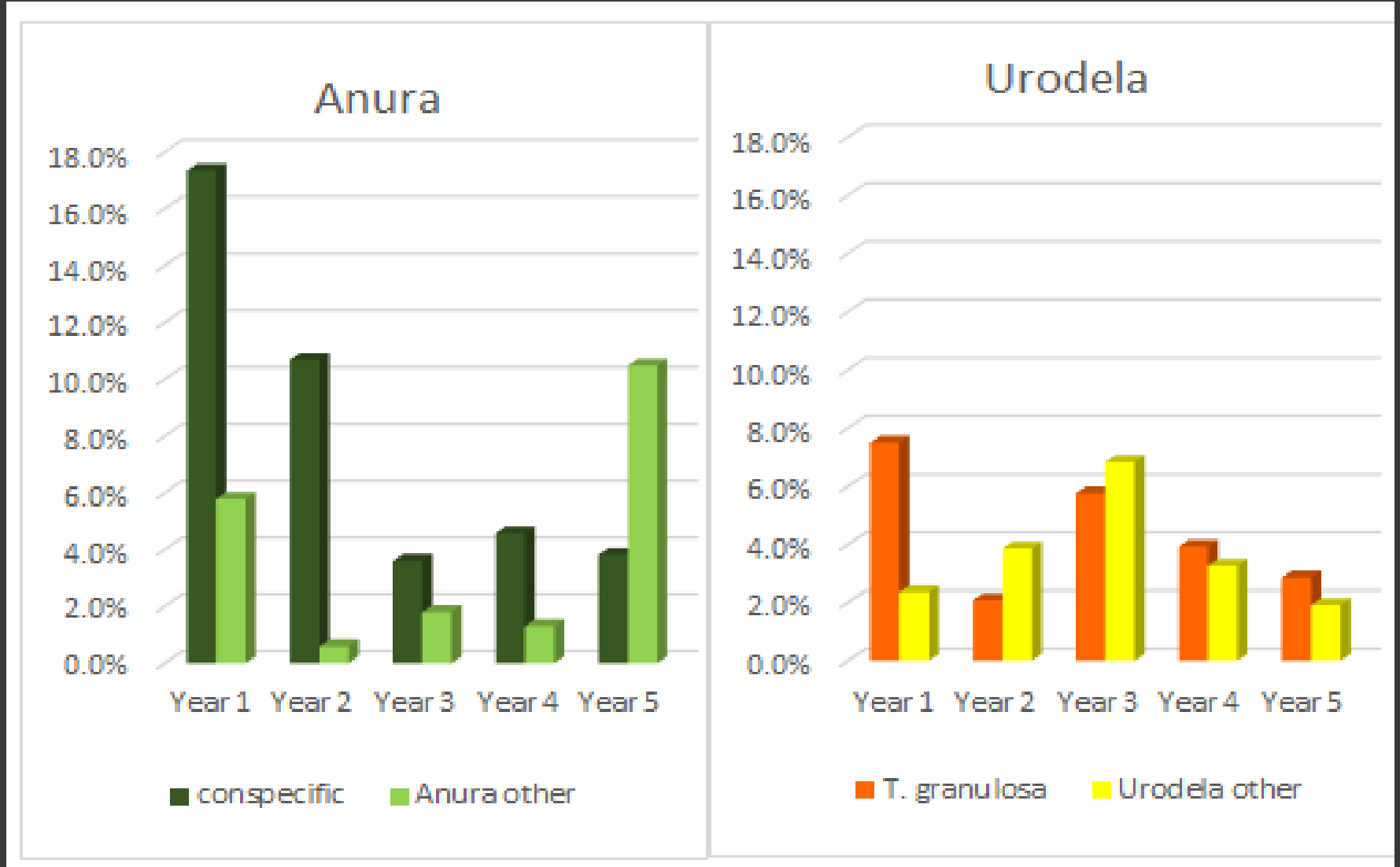


Diet items  
by Taxa

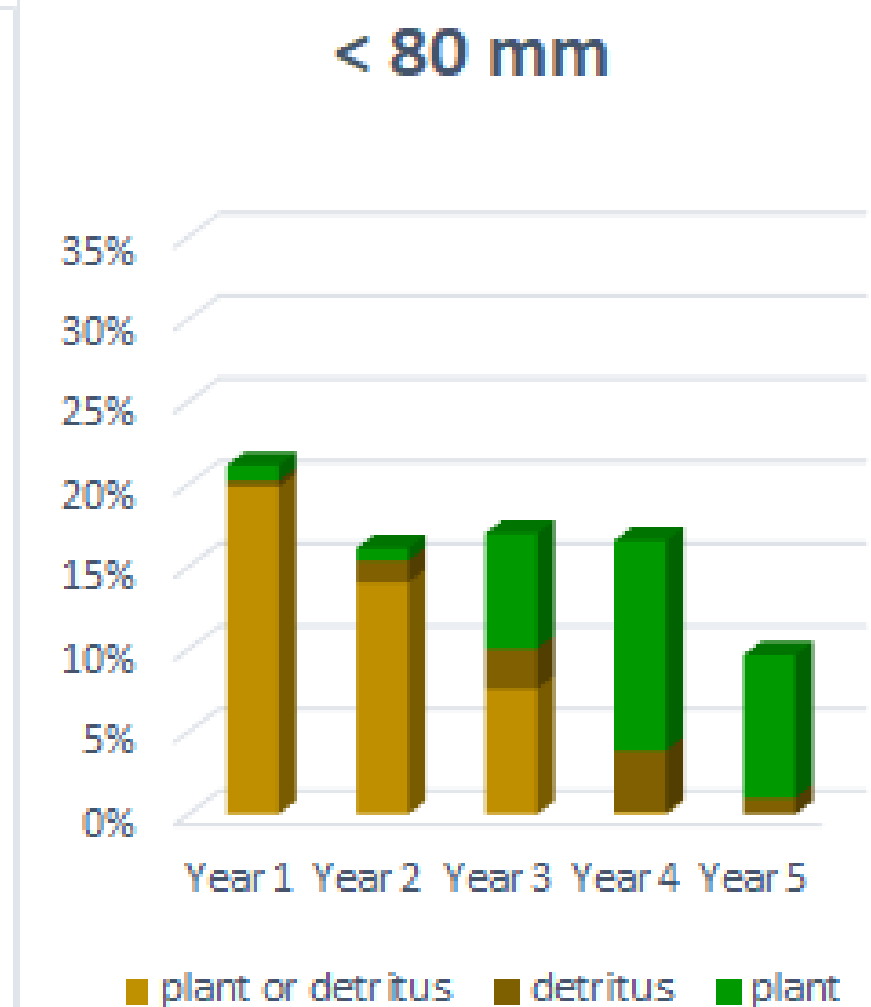
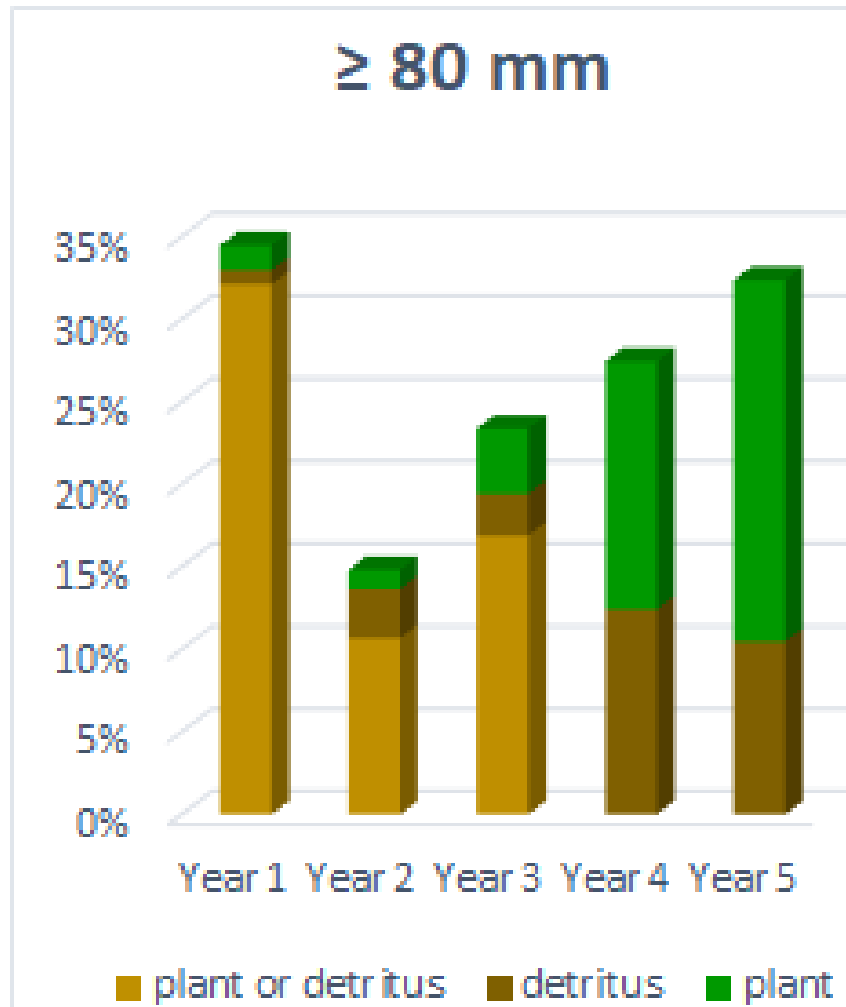




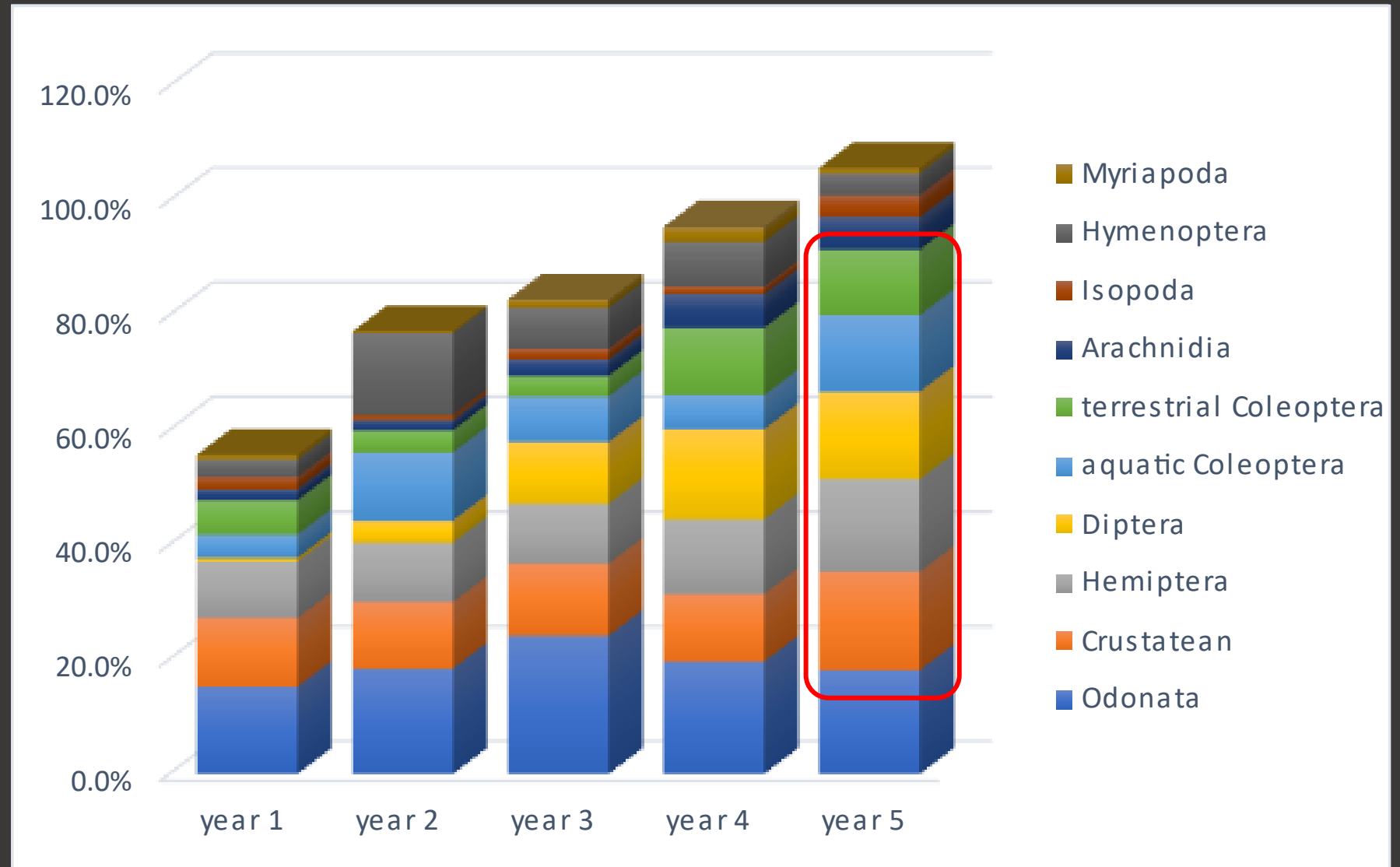
# Changes in Amphibian Consumption



# Changes in plant and detritus consumption



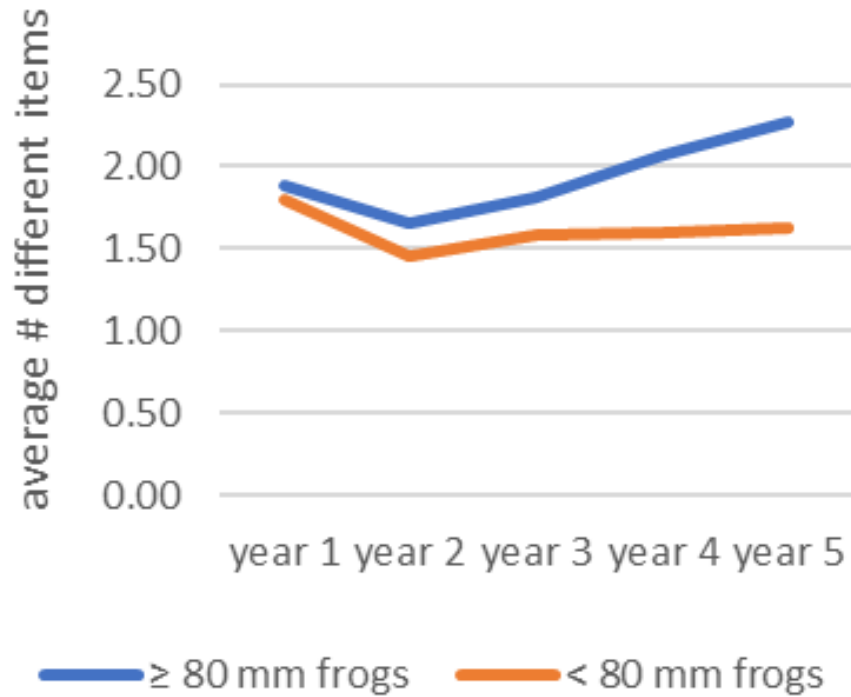
# Changes in Arthropod consumption $\geq 80$ mm



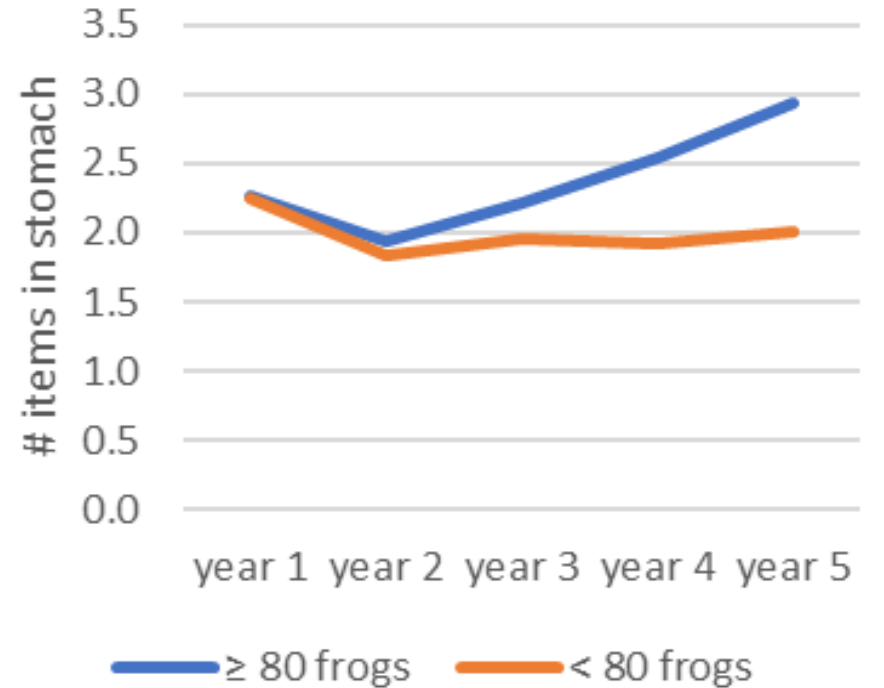
# Change in Richness and number of items



Overall richness of stomach contents



mean # items per stomach



# Why does it matter?

Floating macrophytes  
(de Tezanos et al. 2014)

Temperatures, pH, light infiltration



2016



2021



Control Level?

No control

Control

Complete extirpation

# Limitations

- Data created from control work not systematic sampling
- Expertise level in Arthropod identification
- No trophic level availability information

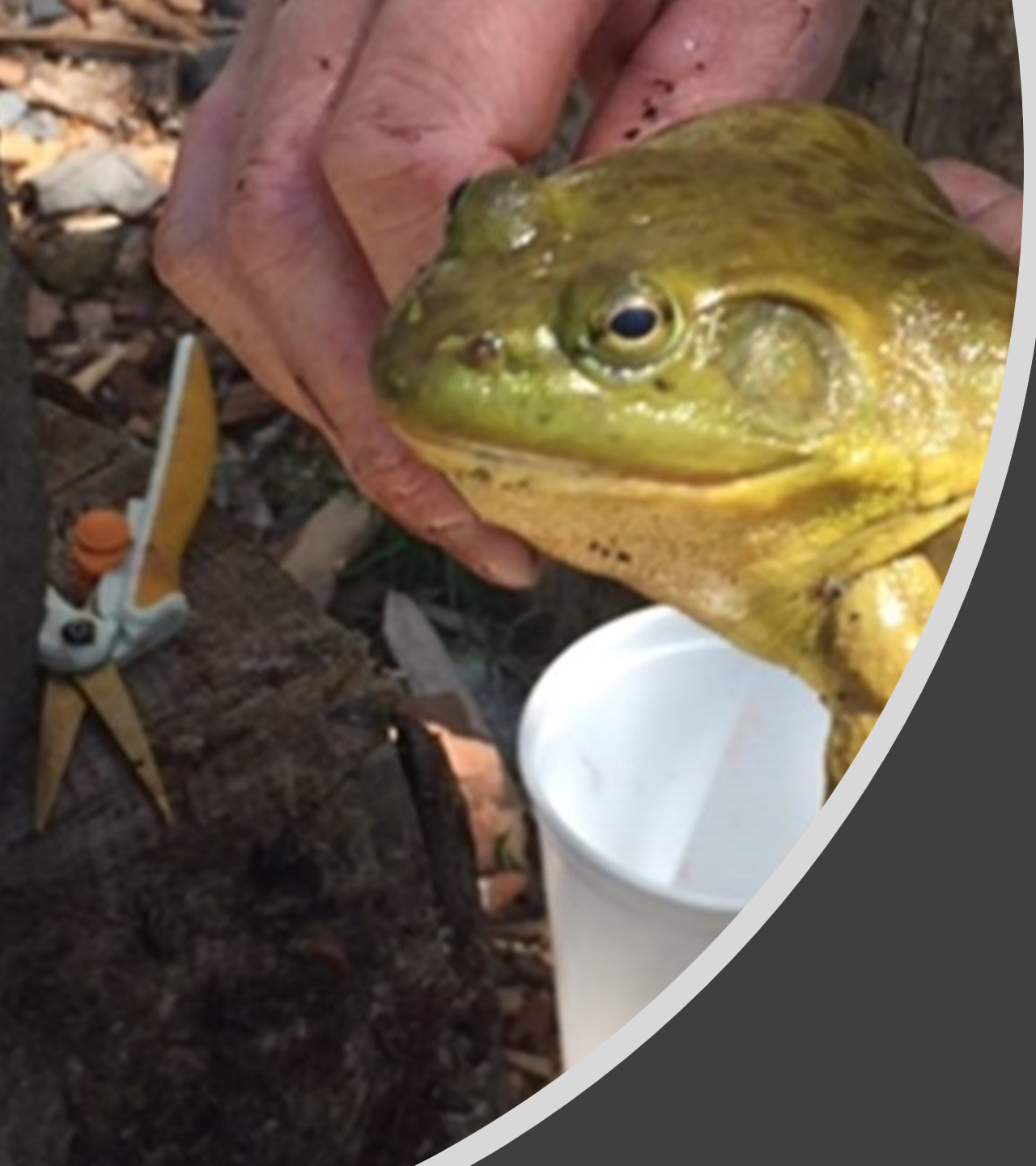
# Additional Research

- Pond productivity as control work progresses
- How does the bullfrog hunting strategy change



# References

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Questions?

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