Investigating Bullfrog Management on the Front Range

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ADAPTATION
ENVIRONMENTAL SERVICES

Executive Summary

Title: Investigating Bullfrog Management on the Front Range

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Key Findings:

- In total, 214 bullfrogs were captured; 201 American Bullfrogs were captured by hand, 13 were captured with funnel traps, and 0 were captured with bucket traps.
- Hand-capturing was the most successful technique.
- Funnel traps with glow sticks had a slightly higher rate of capture than funnel traps with no glow sticks or bait.
- City of Longmont (n = 5), Hodgson Harris (n = 4) and Anderson (n = 4) properties were most successful at capturing bullfrogs with funnel traps.
- Hand-capturing was the most cost effective method because more bullfrogs were caught on average per visit.
- 100% of participants at the Colorado Open Space Alliance (COSA) Conference said they would support humane, lethal control of American Bullfrogs

Potential Management Implications:

- Funnel and bucket traps do not appear to be cost effective or efficient
- We recommend further research to explore the effectiveness of hand-capture, seining and potentially electro-frogging and shooting
- Identify through GIS and field surveys American bullfrog metapopulation dynamics (e.g. dispersal and source and sink water bodies) as this will direct your agency where best to apply efforts

Item	SOW Deliverable	Reported
Capturing techniques	Identify the best bullfrog eradication techniques	See Report
Quick Sheet Guide	Provide monitoring recommendations and review how best to maximize cost-efficiency per removal technique	See Appendix
Conferences	Present findings to at least one conference	Colorado Open Space Alliance (COSA) 2018

Abstract

American Bullfrogs threaten native wildlife species on the Front Range through predation and competition. It is imperative that American Bullfrogs (*Lithobates* [*Rana*] *catesbeianus*) are controlled and eventually eradicated from the Front Range for the health of our wetlands. This study investigated American Bullfrog management methods by assessing multiple eradication techniques. In spring and fall 2018, we focused on two techniques; funnel and bucket trapping across seven sites collaborating with four agencies. Additionally, we piloted a technique of hand-capturing in fall of 2018. We captured a total of 214 bullfrogs. Hand-capturing (n=201) was the most successful and cost effective because on average 67 bullfrogs were caught per visit compared to 0.325 bullfrogs caught on average per visit using the other trapping methods. Funnel trapping showed very limited success and bucket trapping was not successful. While these methods demonstrated success in other studies, we do not recommend them at this time along the Front Range for cost effectiveness. Additional research is needed to further test these techniques, with an assortment of different types of wetlands, water transparency, and water bodies on the Front Range. American bullfrog control and eradication must be planned carefully to achieve success and maintain cost-effectiveness. Our first year of work provides us with preliminary results, regarding which capturing methods were most successful, and we will continue to work closely with agencies to achieve this goal. This study and future studies will help guide strategic efforts in bullfrog management and its ongoing implementation.

Keywords: American Bullfrogs, funnel traps, bucket traps, hand-capture, cost-effectiveness, Front Range

Introduction

Invasive species pose a significant threat to the world's biological diversity (Chapin et al. 2000). American Bullfrogs are one of the most ecologically destructive of invasive alien vertebrate species in the region (Kraus, 2009 & CABI, 2011). Bullfrogs have been documented to eat small fish, young ducklings, sparrows, snakes, wood ducks, and amphibians (Stewart 1967, Hewitt 1950, McAtee 1921, Wright 1920).

In particular they have been documented to predate a Colorado species of greatest conservation need, the Northern Leopard Frog (*Lithobates pipiens)* (McAlpine and Dilworth 1989, Leonard et al. 1993) and the Federal endangered species, Preble's Meadow Jumping Mouse (Trainor et al. 2007). In some lowland areas of Colorado (Hammerson 1999) and elsewhere (Lannoo et al. 1994), Northern Leopard Frog population reductions or extirpations have been associated with the presence of the increasingly abundant American Bullfrog (Hammerson 1982, Johnson et al. 2011), with both larval and adult life stages negatively impacting Northern Leopard Frogs (Hammerson 1999). American bullfrogs have negative effects on native wildlife due to predation, competition and transmission of disease (Kates and Ferrer 2003, Schwalbe and Rosen 1988).

A plan to strategically eliminate isolated bullfrog populations and disrupt metapopulation dynamics is key for success (Orchard 2011, Akins and Jones 2013). Our first step is to identify the most effective techniques for removal and determine how to maximize cost effectiveness. We identified two techniques for the purposes of this project, funnel traps and bucket traps with glow sticks and bait. Funnel traps aim to capture larval bullfrogs, while bucket traps aim to capture

adults. A third technique, hand-capture, was used at the end of the season due to low results from funnel traps and bucket traps. This techniques is aimed at capturing metamorphs and adults.

This project was part of an interagency grant to Adaptation Environmental Services (AES) with Boulder County Parks and Open Space (BCPOS), City of Boulder Open Space and Mountain Parks (OSMP), and Jefferson County Open Space (JCOS). One additional agency, the City of Longmont, was also part of the project. Our 2018 objectives were**:**

- To investigate bullfrog management methods by:
    1. Assessing the effectiveness of the funnel trap, bucket trap techniques and hand capture.
    2. Determining how best to maximize cost-efficiency per removal technique.
- To share our goals, efforts, and results with other professionals at one or more conferences.

Testing these techniques will create expectations for effectiveness and cost, and work in conjunction with existing agency efforts for management goals. This requires close collaboration and organization with neighboring land managers.

Methods

A scientific collection permit (no. 18HP2337) was acquired for this research from Colorado Parks and Wildlife to legally handle herptiles for voucher and identification purposes, and activities reported according to its issuance. (AES staff also possessed State fishing licenses, as bullfrogs are regulated as a game species.) Appropriate documentation was carried on our person at all times and all protocols for property access during and after hours were followed.

Disinfection protocol took place by removing all obvious mud, debris, and vegetation on footwear, clothing and traps. All items were then sprayed with 10% bleach to water solution before each new trapping event.

We collaborated with each agency, BCPOS, OSMP, JCOS and the City of Longmont to choose sites for the project. Two sites were selected for each agency, except City of Longmont, which selected one (See a map in Appendix II). Three (3) techniques- funnel trap, bucket trap, and hand capture-were used over the course of the project period:

1. Funnel traps
    - Funnel-traps were placed within wetland areas utilizing areas with emergent vegetation and other cover first before open water areas, as these open areas allow fish to easily feed on amphibians and their larva. Bait and glow lights were used as an attractant (Yeager et al. 2014).
2. Bucket traps
    - Transparent large buckets, submerged with just the lip floating on the surface, were placed in the water to attract adult bullfrogs. Glow lights were used as an attractant. A galvanized ¼" wire mesh top was added, designed for frogs to fall through but difficult to hop or swim out. This method is based on personal communication with Arizona Game and Fish, and Yeager et al. (2014), which found that light is an effective tool for attracting amphibians.
3. Hand-capture
    - Each pond was circled after dark, with a flashlight. Technicians circled the pond together and searched for bullfrogs, particularly looking for eye-shine. Bullfrogs were captured by hand or a dip net, depending upon what was most accessible at

that moment of capture. Hand-capture thereby refers to capturing an adult bullfrogs either by the hand or with a dip-net, whereas dip-nets were used to target an individual rather than randomly sample a water body.

Funnel trap and bucket trap deployed in water.

(From left to right) Hand-capturing method

Twenty-four (24) funnel traps total and six bucket traps total to be deployed for four nights in the spring (May and June) at each of the 7 sites (Table 1). The 24 funnel traps were divided into four treatments, with 6 traps each. The treatments included funnel traps with bait (wet dog food), or a

glow stick, or bait and a glow stick or empty. The six bucket traps were divided into two treatments. Three bucket traps had a glow stick placed inside and three had nothing additional placed inside.

In the fall (September), twenty-four (24) funnel traps (6 per treatment) were deployed for two nights at each site, and bucket traps were replaced with one night of hand-capturing at each site (Table 1). In some instances, we were unable to deploy traps as planned and we deployed traps at a second site of the same agency to preserve trap-night efforts. See Table 2, which describes the corresponding trapping techniques that were used according to season and agency.

Traps were deployed in the evening, just before sundown and retrieved the next morning. Since the timing of sundown changes through the spring and fall season, the hours shifted weekly from between 18:00 hours and 20:00 hours for deployment and between the 6:00 hour and the 9:00 hour for pick up. Records were kept tracking the number of bullfrogs captured by each technique, including total time spent in the field, to determine cost effectiveness. In addition, all reptiles or amphibians observed on site were recorded.

NOTE: With agency sponsors approval, we abandoned bucket-trapping for our Fall trap nights and replaced this technique to pilot “hand-capturing” effectiveness. This technique is achieved by visiting a water body after sundown, spot-lighting frogs with a flashlight, and then approaching and grabbing them by hand or dipnet. Hand-capture thereby refers to capturing an adult bullfrogs either by the hand or with a dip-net, whereas dip-nets were used to target an individual rather than randomly sample a water body. All captured frogs were placed in temporary containment (i.e. cloth bags) prior to cooling as described below.

Any bullfrogs captured were humanely euthanized with a two step-freeze method described and used by Stan Orchard (2011). Bullfrogs captured were put into a refrigerator, to lower their core body temperature to below 35°F. This cools them to torpor. After at least 12 hours they are transferred to a freezer, which quick-freezes the now torpid frogs. "Cold is a natural anaesthetic for amphibians and freezing leaves an uncontaminated, chemical-free carcass that can be safely used to feed injured wildlife, donated to high schools for educational dissections, or composted (Orchard 2011)."

Results

Bullfrog Capture

Two hundred and fourteen bullfrogs were trapped across all sites and seasons (Figure 1 and 2). This includes 86 adults, 115 sub-adults and 13 tadpoles. The majority of the bullfrogs, 201, were hand-captured (sub-adult and adults). Funnel traps with glow sticks had the next highest capture rate with n = 7 bullfrogs (Figure 1). According to sites, the City of Longmont had the most success with funnel traps, n =5, followed by Hodgson Harris and Anderson, n = 4 (Figure 3). No bullfrogs were caught in bucket traps. Six additional species of reptiles and amphibians were observed on agency properties (Table 3).

Cost effectiveness

In total, 32.71 hours were spent at field sites throughout the entire season. This time includes decontamination between sites, preparing and setting up funnel and bucket traps (drop off and retrieval) and hand-capturing on site. It does not include time spent traveling to or between sites,

or office time. About 26.51 hours were spent on funnel and bucket traps alone. About 6.2 total hours were spent in the field hand-capturing.

On average we spent 124 (6.2 hours*60 minutes/ 3 sites) minutes during each hand-capture event, which resulted in 67 bullfrogs captured on average per visit. Technicians spent on average 37.05 minutes (1,482 minutes (24.71 hours*60 minutes)/ 40 site visits) at each site using funnel and bucket trapping. In addition, 0.325 bullfrogs (13 bullfrogs/ 40 site visits) were captured on average per trapping event. These results indicate that hand capturing was the most cost-effective trapping method for our study.

Outreach

AES, OSMP and JCOS presented at the 2018 Colorado Open Space Alliance (COSA) on September 11th. The presentation included the general natural history of bullfrogs, information about the invasive-nature of the species, previous successful examples of bullfrog removal, our preliminary results and our future goals. We reached 34 participants. The presentation included polling questions for the audience. At the beginning of our presentation 44% of the audience perceived bullfrogs as 'invasive predators that must be removed', while 22% thought they were 'just another frog, and frogs are a good thing!'. About 63% of the audience does not currently control bullfrogs, but they are present on their managed lands. At the end of our presentation, 81% of our audience changed their opinion on American bullfrogs and 100% of the audience would support humane, lethal control (Appendix I).

Discussion

The capture rate for both bucket and funnel traps were below our expectations, despite success in other studies (Antonishak et al. 2017, Bennett et al. 2012, Grayson and Roe 2007). After the spring season, we met to discuss our preliminary results with each agency. Upon review of our preliminary results, each agency decided to remove the bucket traps from the project for the fall season, due to low success in the spring. We added one night of hand-capture for each agency instead of using bucket traps. Hand-capturing was much more successful than either funnel or bucket traps due to time and number of bullfrogs caught per event.

Of note, our trapping was successful in confirming Northern Leopard Frog reproduction at one Boulder County site through the capture of a tadpole identified by our and BCPOS staff. Knowing that Northern Leopard Frogs are still attempting to breed at this site highlights an urgency to target areas like this for bullfrog control. Further monitoring of interspecific competition at this site is highly recommended to be done by staff, volunteers, and/ or acoustic monitoring devices. The rediscovery of this Species of Greatest Conservation Need (SGCN), as noted by Colorado Park and Wildlife, is exciting and energizing in our conservation efforts.

Limitations

While our results show little success from these techniques, previous studies have used aquatic funnel traps to capture larval amphibians with success. These studies have also shown increased success with the use of glow sticks as an attractant (Antonishak et al. 2017, Bennett et al. 2012, Grayson and Roe 2007). Our bucket traps were unable to capture any frogs. This method was based on personal communication with Arizona Game and Fish, and similar traps had been successful for bullfrogs (Snow and Witmer 2011) in CO and Cane toads, *Rhinella [Bufo] marina*, in Australia (Yeager et al. 2014). Furthermore, water transparency may place a role in

the effectiveness of glow sticks as attractants. If the water is too dark or murky, it seems plausible that frogs would not see or sense this, and perhaps favor another attractant (e.g. food) instead.

Both funnel and bucket trapping are passive techniques. For passive techniques to be successful, the target species, in our case, American Bullfrogs, must first encounter the trap. Therefore, a water body with relatively few frogs is less likely to have bullfrogs encounter a trap compared to a water body with a relatively high number of frogs. Once the targeted species encounters the trap, the species must be captured by the trap and it must be retained until retrieval (Luhring et al. 2016).

Water level at several sites, including Anderson, Hodgson Harris and Hildebrand was very low due to lower than average snowfall in CO during the 2017-18 winter. In the spring, we were not able to use bucket traps at Hodgson Harris or Hildebrand due to low water levels. We did not deploy any funnel traps at Hildebrand in the fall because there was no water. At Anderson, the water level was also low in the fall, and we were unable to deploy all 24 funnel traps. Whenever we were unable to deploy traps at one site, we added additional traps to another site owned by the same agency to preserve our trap-night effort. This ensured the same number of traps were still being set instead of having an inconsistent number of total traps for each site.

We also suspect that bullfrog populations were low at several sites including North Table Mountain, Hildebrand and Sawhill. We did not observe any adult or larval bullfrogs at these sites throughout the project period. While our trapping success was also minimal at sites with healthy bullfrog populations, we recommend that sites be chosen with large bullfrog populations to increase chances for success in the future (Luhring et al. 2016).

At the City of Longmont site, five funnel traps were destroyed due to raccoon activity. This site was also inundated with crayfish in the funnel traps. It was also the most successful at capturing bullfrogs in funnel traps, n = 5. Variables from potential source and feeder ponds, interspecific competition for food or cover, to water visibility may have influenced the success of this site compared to others. In addition, many bullfrogs could be present and concentrated within the inlet of those reservoirs because of an abundance of tall, monotypic emergent vegetation such as cattails and teasel, suspected to benefit bullfrogs. Carefully mapping bullfrog populations, and their year-to-year activity, may help elucidate a prescription and strategy for eradication. While this was not the goal of our research, it certainly remains on our minds as the overall objective in this for native species conservation by our partners.

Outreach

The COSA presentation was very successful, as our audience was engaged and overall positive toward our presentation. It is important to note that while many of the audience members present did not currently control bullfrogs on their managed lands, 100% support humane, lethal control. Education is therefore an important tool to assist in our regional bullfrog eradication effort, and we recommend further human dimensions evaluations throughout eradication efforts to continue our understanding of public perception. It is important land managers as well as the public learn about the issue with American bullfrogs, as well as their identification and impacts on species like the Northern Leopard Frog. As the public and land managers learn to recognize the difference between an invasive, injurious predator and a cute, lovable frog, they will continue to accept humane, lethal removal.

Future Implications

We were fortunate to find an opportunity to expand our research from this project. The bullfrog stomach contents will be dissected for a high-school science project. The results will be used to further understand the impacts of the American bullfrog on the Front Range.

Additional studies may be needed to completely rule out funnel and bucket trapping, however, preliminary results show that they may have limited success, especially in areas where bullfrog populations are not high. We suggest conducting research that assesses the effectiveness of hand-capturing, seining, shooting and potentially electro-frogging, based on our success with hand-capturing this year and results of efforts by our partners (i.e. AZ Game and Fish).

Overall, it will likely require multiple methods per waterbody to fully eradicate bullfrogs from an area (T. Jones, AZ Game and Fish, personal communication). Bullfrogs live in different types of ponds, some are vegetated, some are connected, etc. Our future goal is to create a prescription to inform agencies on the best methods for the best water body type (Table 6).

A future step will be committing to the process of control and eradication, and likely staying with this for three to five years. This level of commitment allows for the removal of immigrating bullfrogs, as the metapopulation is being disrupted, and existing tadpoles and metamorphs (Akins and Jones 2013). This will help us all work closely together and tackle this ecological pandemic.

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Table 1. 2018 Project Design. At each trapping site 24 funnel traps were placed in the ponds. The 24 traps were divided into 4 treatments; 6 traps had a glow stick, 6 traps had bait, 6 traps had a glow stick and bait, and 6 were empty. In addition, 6 bucket traps were placed around the pond, 3 were empty and 3 had a glow stick in the bucket. See Table 2 for when the techniques were used at each site.

Technique	**Experimental Treatments**			**Control**
	number distributed per night at each site			
	Glow sticks	**Bait**	**Glow sticks and bait**	**Empty**
Funnel trap (24 total)	6	6	6	6
Buckets (6 total)	3	N/A	N/A	3
Hand-capture	N/A			

Table 2. Site selection for each agency with trapping techniques used by season.

Agency	Site	Bucket Trap	Funnel Trap		Hand-capture
JCOS	**North Table Mountain (NTM)**	x	x	x	
	Hildebrand		x		
OSMP	**Sawhill**	x	x	x	
	Anderson	x	x	x	x
	Eggleston #4				x
BCPOS	**Hodgson Harris Reservoir**	x	x	x	
	104th Pond	x	x		
	AHI			x	x
City of Longmont	**Recreation Pond**	x	x	x	x
		Spring		**Fall**	

Table 3. Additional reptiles and amphibians observed on site, but not trapped.

Site	Common Name	Scientific Name
104th	Bullsnake	*Pituophis catenifer*
	Plains garter snake	*Thamnophis radix*
North Table Mountain	Plains garter snake	*Thamnophis radix*
Sawhill	Yellow-bellied racer	*Coluber constrictor*
	Common garter snake	*Thamnophis sirtalis*
Eggleston #4	Woodhouse's toad	*Anaxyrus woodhousii*
	Painted turtle	*Chrysemys picta*

Table 4. This is example of a future prescription we aim to create for local agencies as a way of guiding the bullfrog eradication process. Tested techniques would lead to "x" best practices allowing managers to effectively plan and budget for methods. (The "x" notations below are not indicative of methods researched on the Front Range of CO.)

	Eradication Method			
Landscape	**Hand-capture**	**Seining**	**Funnel Trap**	**Electro-frogging**
Permanent				**x**
Ephemeral	**x**	**x**		
Vegetated			**x**	**x**
Unvegetated		**x**		
Connected			**x**	**x**
Disconnected	**x**	**x**		**x**

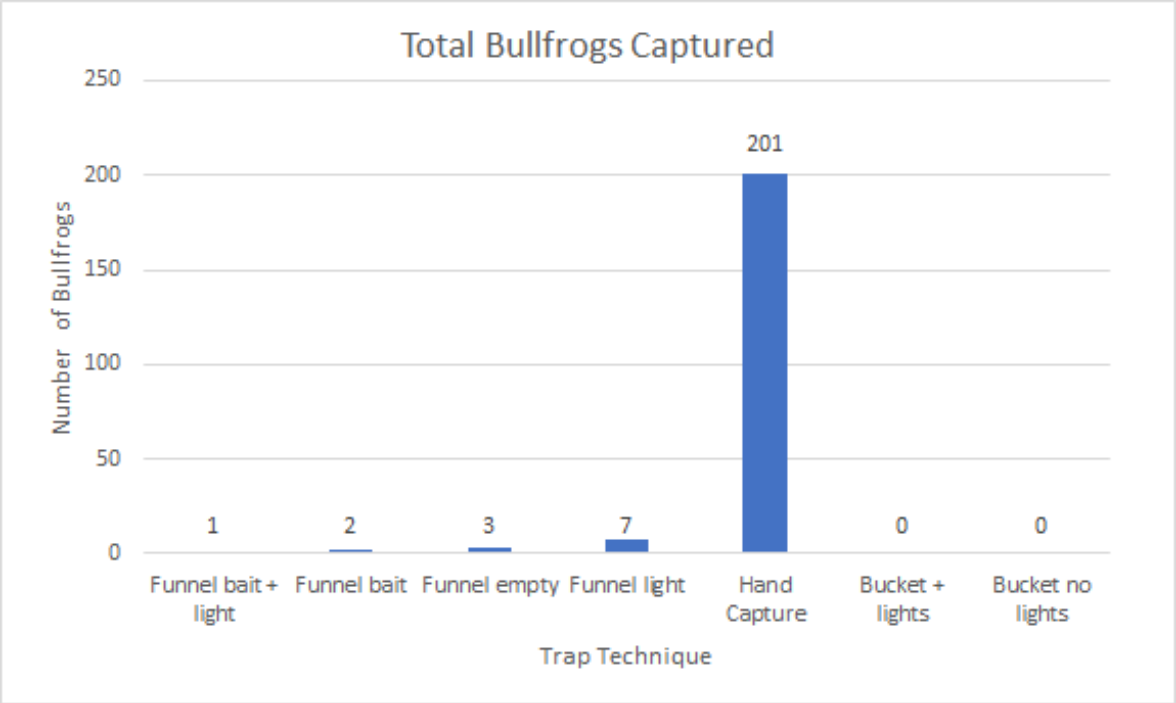


Figure 1. Total number of bullfrogs at all sites throughout the project period by trapping technique.

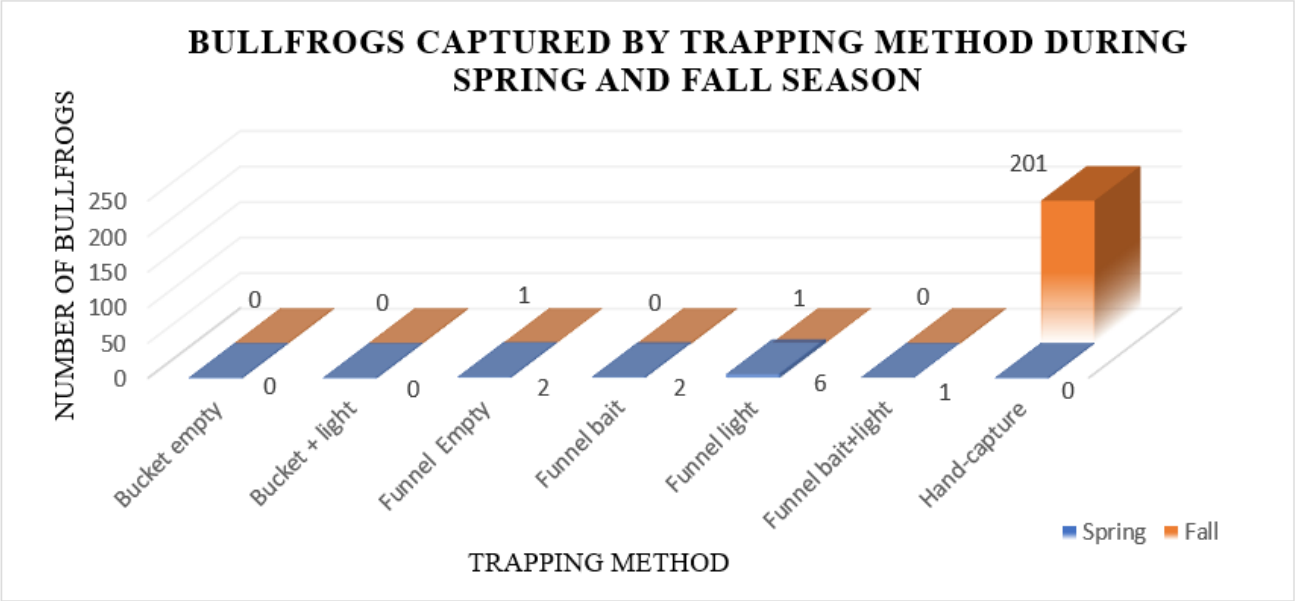
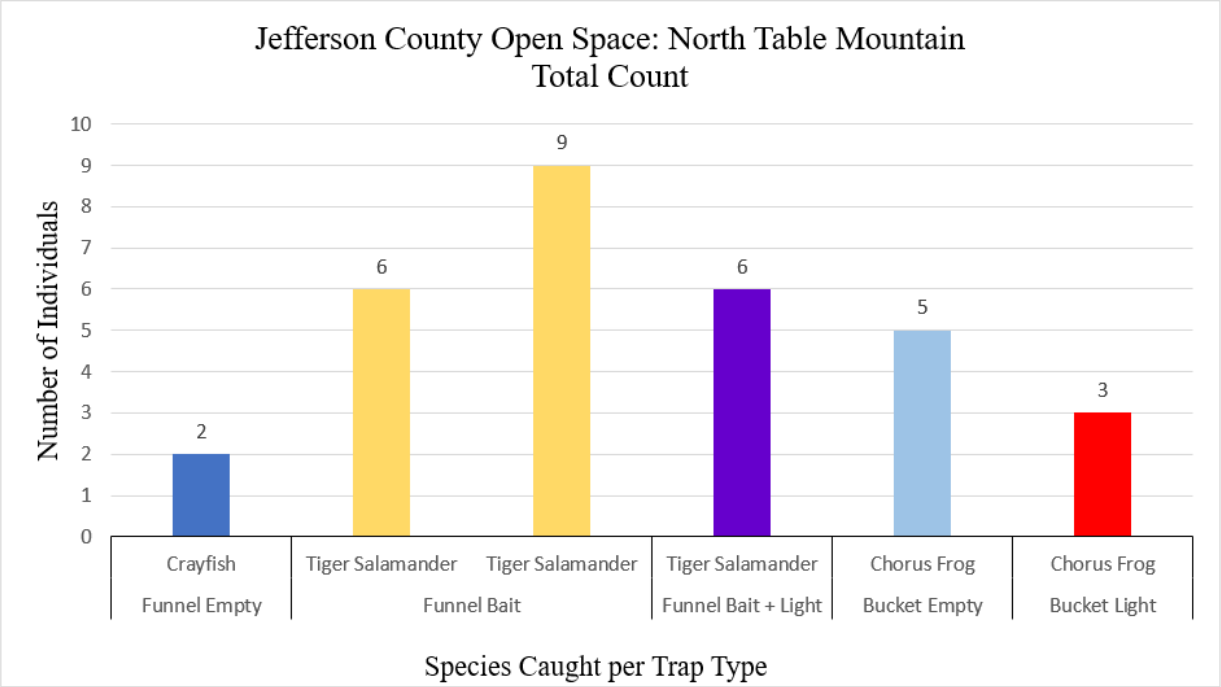
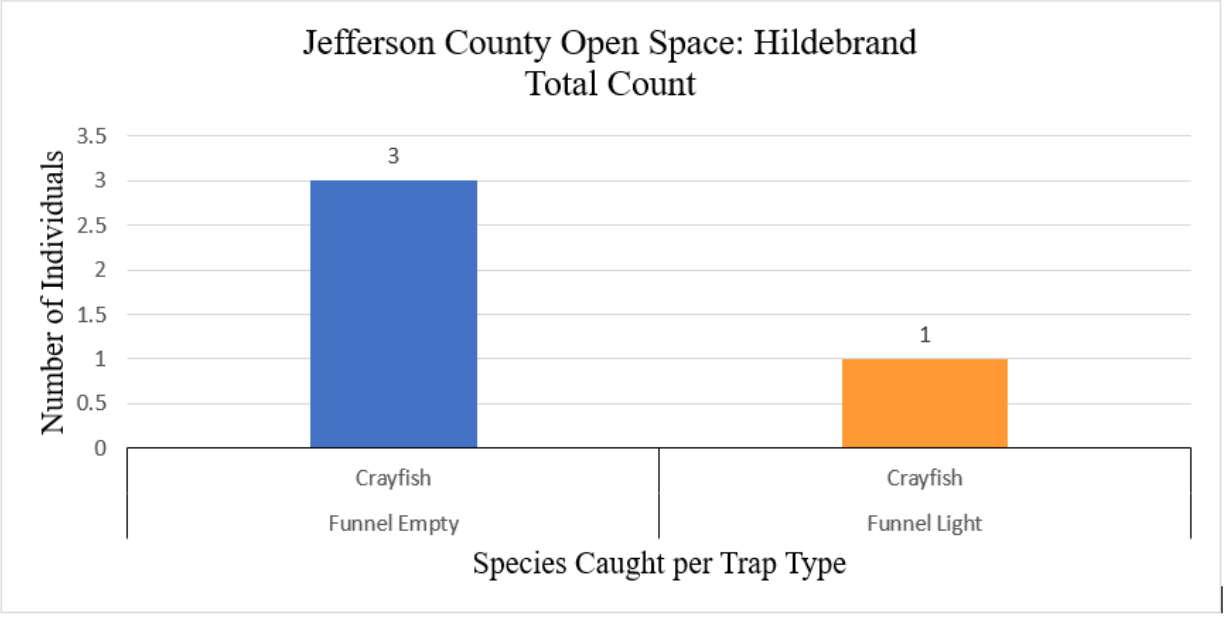


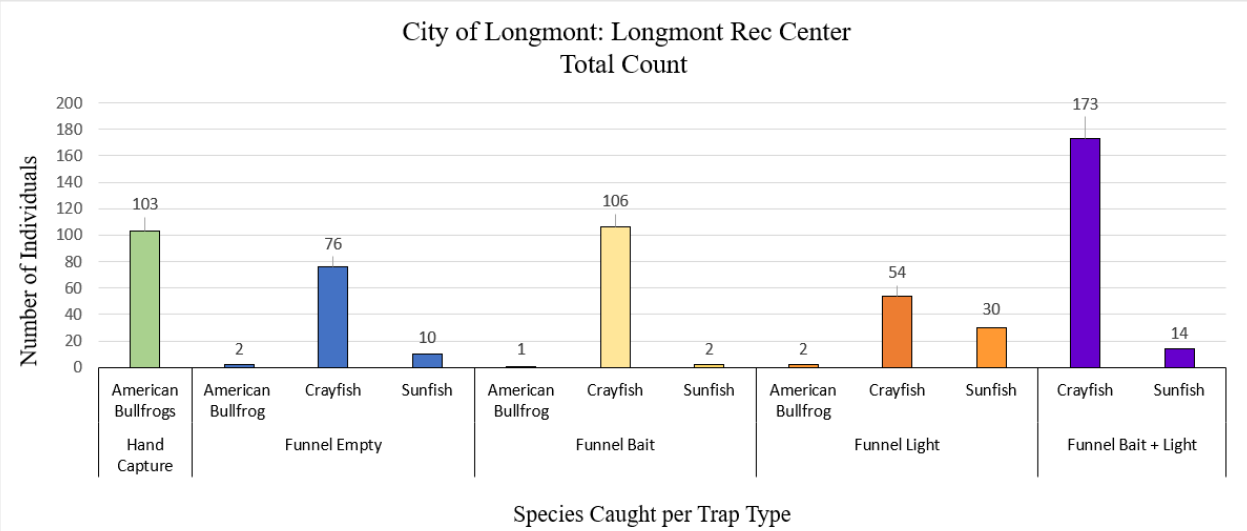
Figure 2: Total bullfrog count across all sites according to season n = 214. Note that hand-capturing nights only occurred in the fall, and bucket traps were removed.



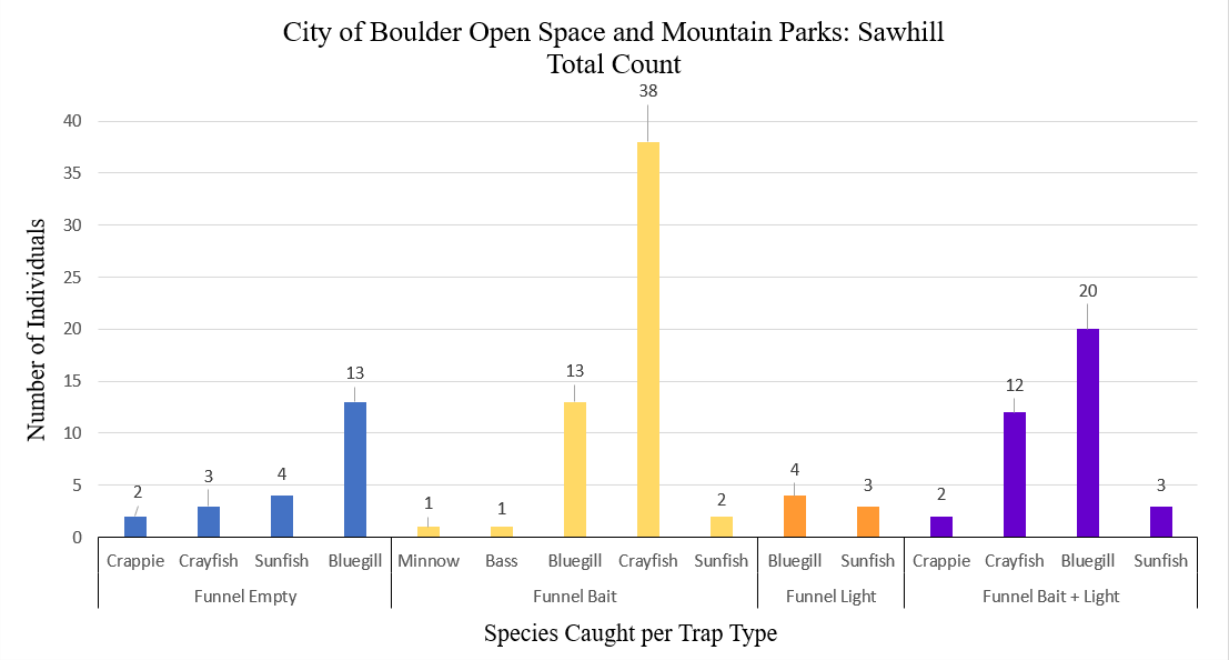
Figures 3a. Count of bullfrogs and by-catch captures by trapping techniques at each site throughout the 2018 season at Jefferson County, North Table Mountain. Zero bullfrogs were captured at this site. The x-axis is divided by trap type, with multiple species listed per trapping method if more than one occurred.



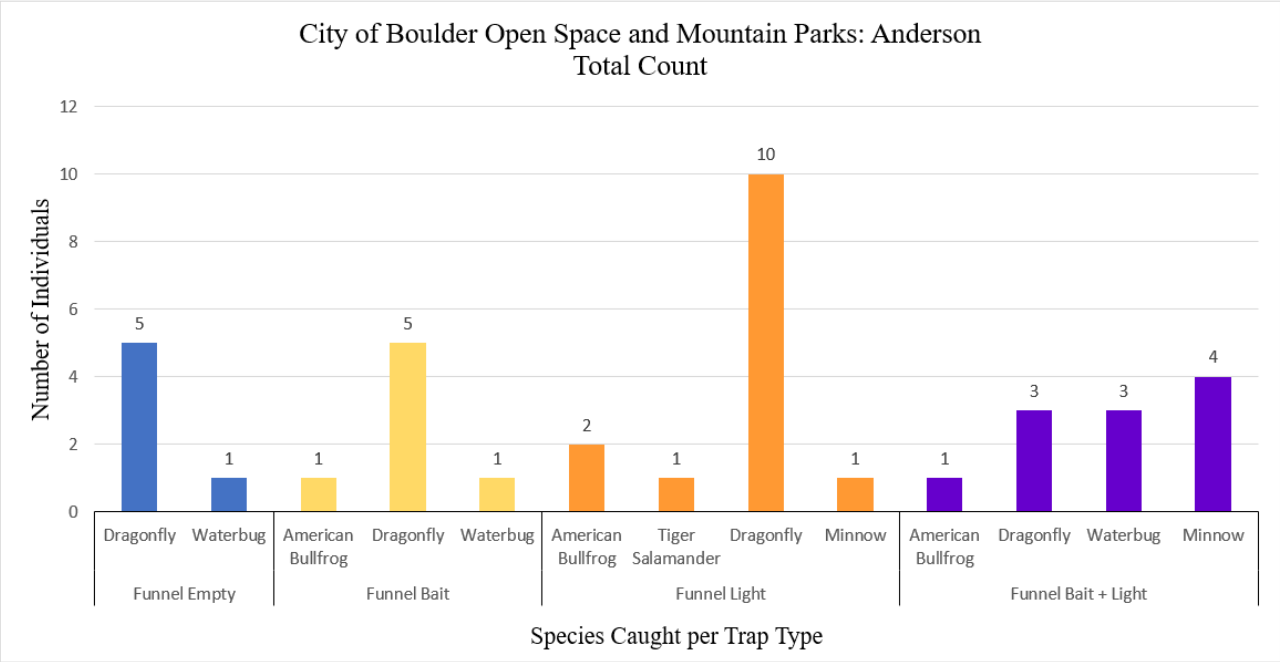
3b: Count of bullfrogs and by-catch captures by trapping techniques at each site throughout the 2018 season at Jefferson County, Hildebrand. Zero bullfrogs were caught at this site. The x-axis is divided by trap type, with multiple species listed per trapping method if more than one occurred.



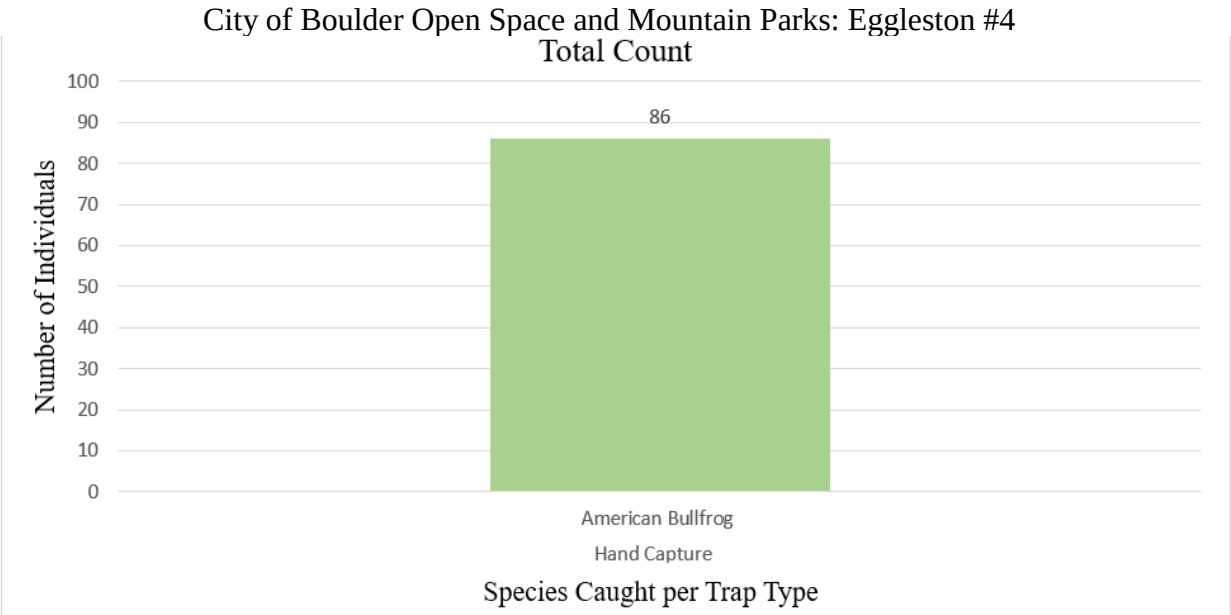
3c: Count of bullfrogs and by-catch captures by trapping techniques at each site throughout the 2018 season at City of Longmont, Longmont Rec Center. A total of 108 bullfrogs were caught at this site.The x-axis is divided by trap type, with multiple species listed per trapping method if more than one occurred.



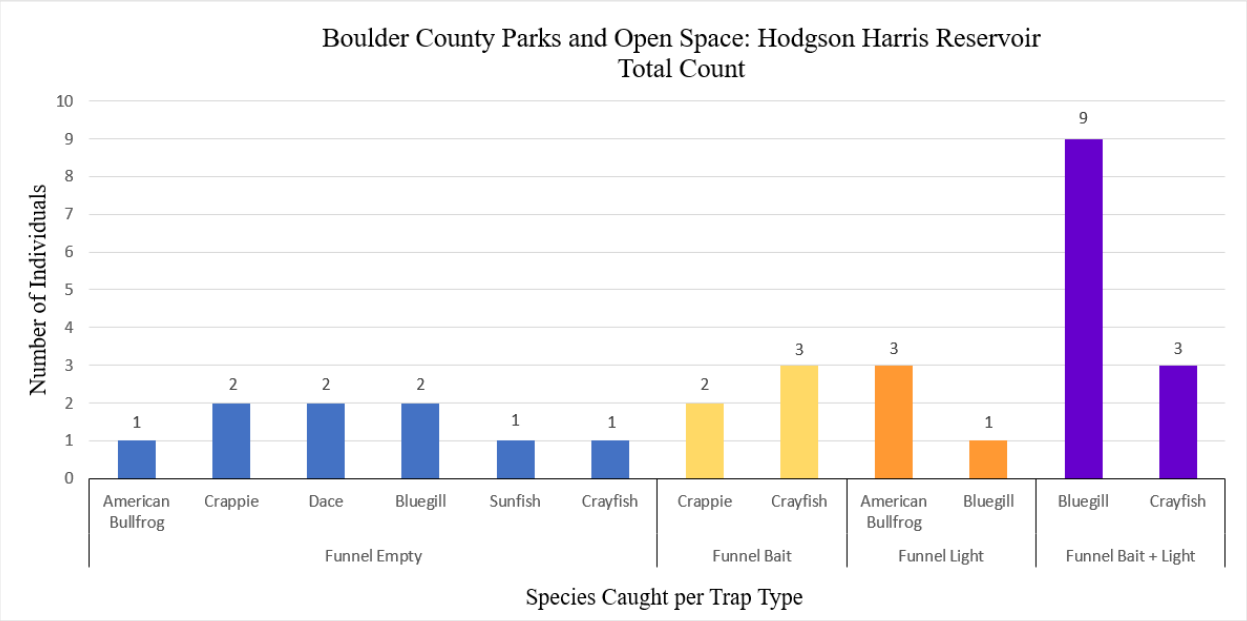
3d: Count of bullfrogs and by-catch captures by trapping techniques at each site throughout the 2018 season at Boulder County, Sawhill. Zero bullfrogs were caught at this site.The x-axis is divided by trap type, with multiple species listed per trapping method if more than one occurred.



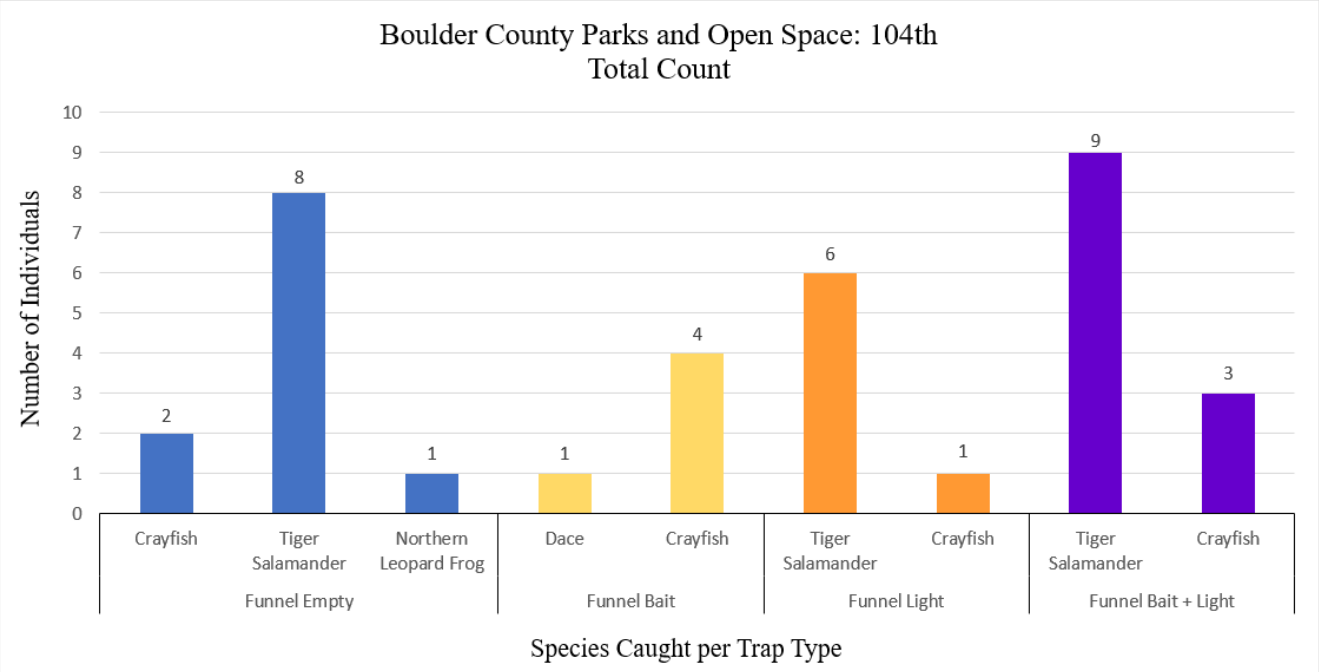
3e: Count of bullfrogs and by-catch captures by trapping techniques at each site throughout the 2018 season at Boulder County, Anderson. A total of 4 bullfrogs were captured at this site.The x-axis is divided by trap type, with multiple species listed per trapping method if more than one occurred.



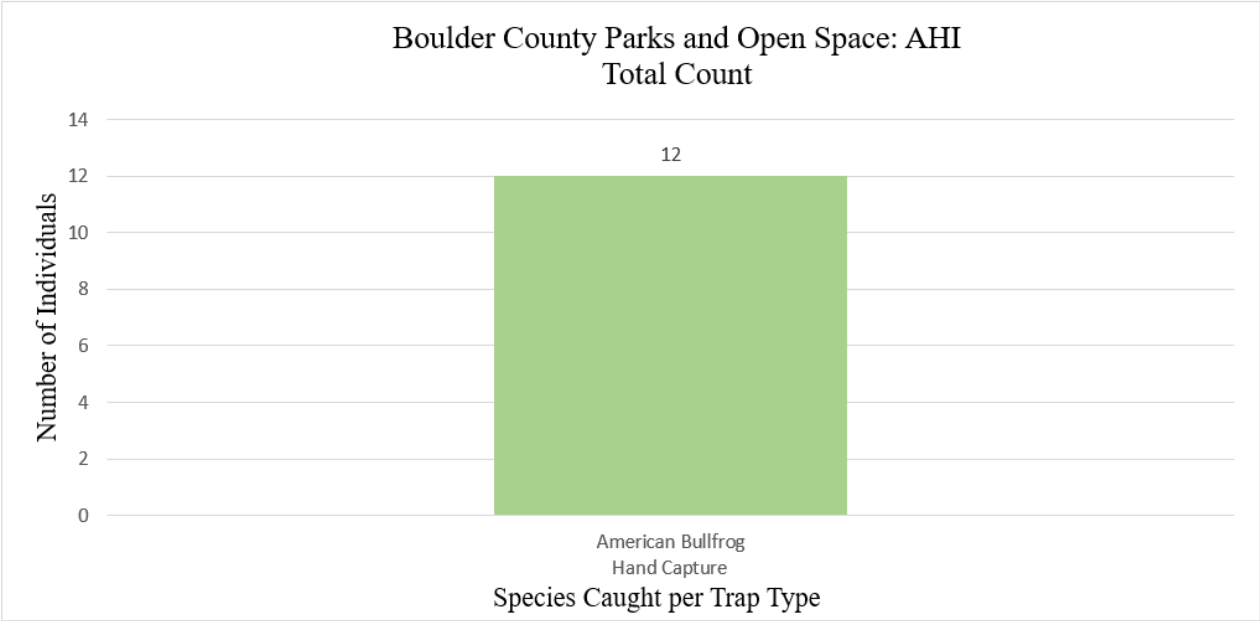
3f: Count of bullfrogs and by-catch captures by trapping techniques at each site throughout the 2018 season at City of Boulder, Eggleston #4. A total of 86 bullfrogs were captured at this site. The x-axis is divided by trap type, with multiple species listed per trapping method if more than one occurred.



3g: Count of bullfrogs and by-catch captures by trapping techniques at each site throughout the 2018 season at Boulder County, Hodgson Harris Reservoir. A total of 4 bullfrogs were captured at this site.The x-axis is divided by trap type, with multiple species listed per trapping method if more than one occurred.



3h: Count of bullfrogs and by-catch captures by trapping techniques at each site throughout the 2018 season at Boulder County, 104th. The x-axis is divided by trap type, with multiple species listed per trapping method if more than one occurred. Zero bullfrogs were captured at this site.



3i: Count of bullfrogs and by-catch captures by trapping techniques at each site throughout the 2018 season at Boulder County, AHI. The x-axis is divided by trap type, with multiple species listed per trapping method if more than one occurred. A total of 12 bullfrogs were captured at this site.

Appendices

Appendix I. Colorado Open Space Alliance Poll Results

Appendix II. Map depicting the location of all sites chosen for the project

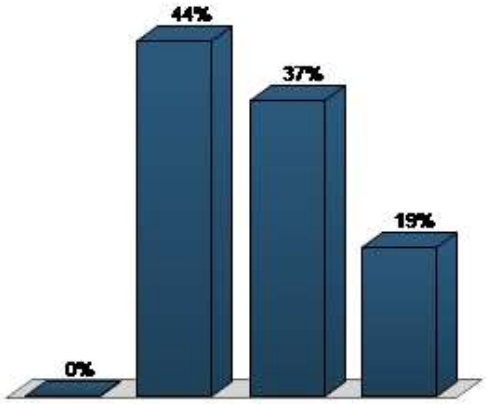
Session Name: 9-11-2018 11-49 AM_bullfrogs

Date Created:	9/11/2018 10:32:29 AM	**Active Participants:**	34 of 34
Average Score:	0.00%	**Questions:**	10

Results by Question

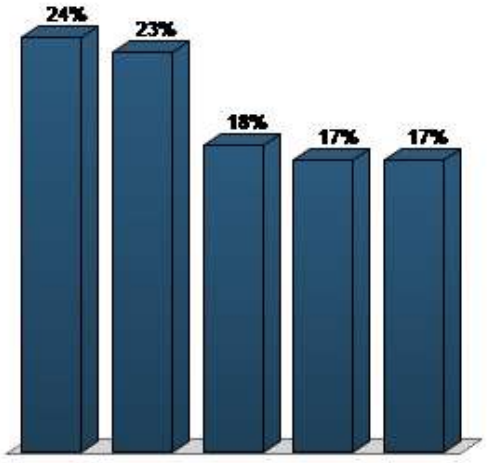
1. How large can an adult bullfrog grow? (Multiple Choice)

	Responses	
	Percent	**Count**
4 inches	0%	0
8 inches	44.44%	12
1 foot	37.04%	10
2 feet	18.52%	5
Totals	**100%**	**27**



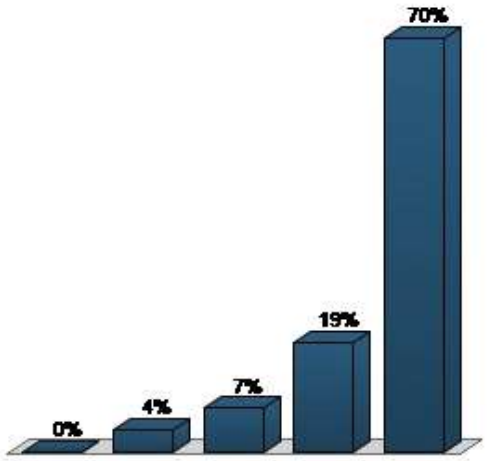
2. Where are bullfrogs likely to be found? (Choose all that apply) (Multiple Choice - Multiple Response)

	Responses	
	Percent	**Count**
Ponds	24.32%	27
Wetlands	23.42%	26
Rivers	18.02%	20
Farms	17.12%	19
Lakes	17.12%	19
Totals	**100%**	**111**



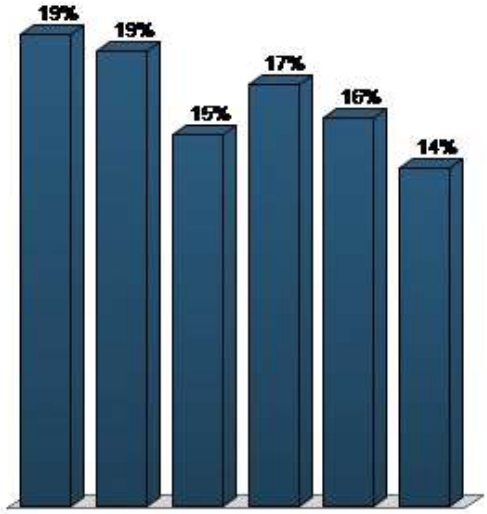
3. A juvenile bullfrog is called a tadpole. How long does it takea tadpole to mature to an adult? (Multiple Choice)

	Responses	
	Percent	**Count**
5 years	0%	0
3-4 years	3.7%	1
2-3 years	7.41%	2
1-2 years	18.52%	5
< 1 year	70.37%	19
Totals	**100%**	**27**



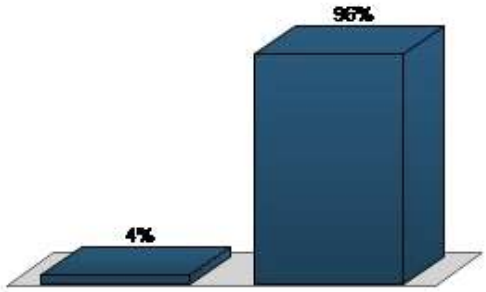
4. What do bullfrogs eat? (Choose all that apply) (Multiple Choice - Multiple Response)

	Responses	
	Percent	**Count**
Insects	19.31%	28
Amphibians	18.62%	27
Birds	15.17%	22
Fish	17.24%	25
Reptiles	15.86%	23
Mammals	13.79%	20
Totals	**100%**	**145**



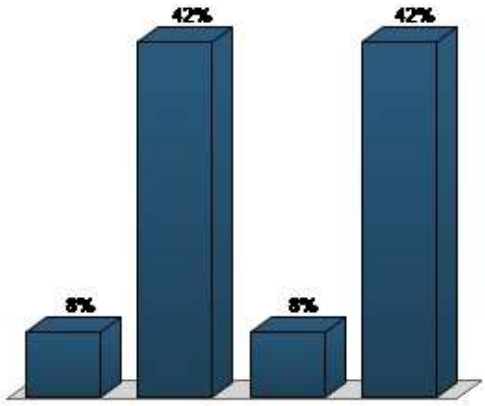
5. This is a bullfrog. (True / False)

	Responses	
	Percent	**Count**
True	3.7%	1
False	96.3%	26
Totals	**100%**	**27**



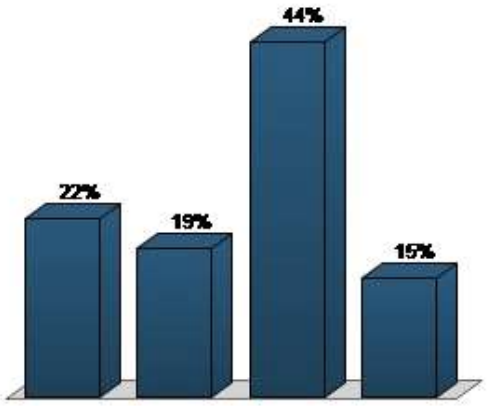
6. Which frog is a bullfrog? (Multiple Choice)

	Responses	
	Percent	**Count**
Left	7.69%	2
Right	42.31%	11
Neither	7.69%	2
Both	42.31%	11
Totals	**100%**	**26**



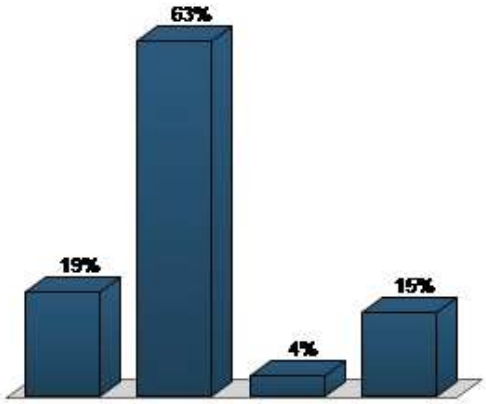
7. Before today, what was your perception of bullfrogs? (Multiple Choice)

	Responses	
	Percent	**Count**
I thought they were just another frog, and frogs are a good thing!	22.22%	6
An invasive species, but not that big of deal.	18.52%	5
Invasive predators that must be removed!	44.44%	12
I never really thought about bullfrogs that much.	14.81%	4
Totals	**100%**	**27**



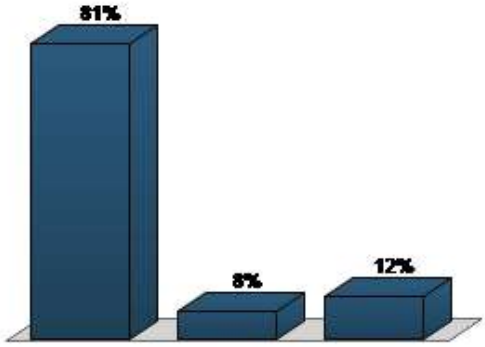
8. Does your organization currently control bullfrogs? (Multiple Choice)

	Responses	
	Percent	**Count**
Yes, they are on our lands and we control them.	18.52%	5
No, they are on our lands but we do not control them.	62.96%	17
No, they are not on our lands.	3.7%	1
Unsure	14.81%	4
Totals	**100%**	**27**



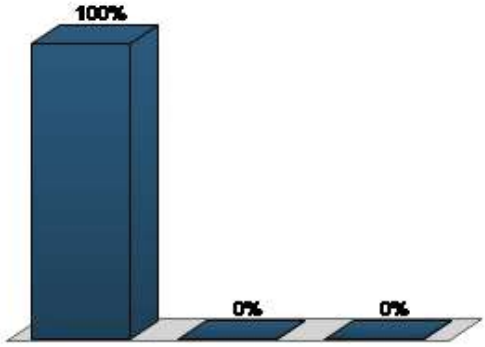
9. Have your opinions about bullfrogs changed as a result of this presentation? (Multiple Choice)

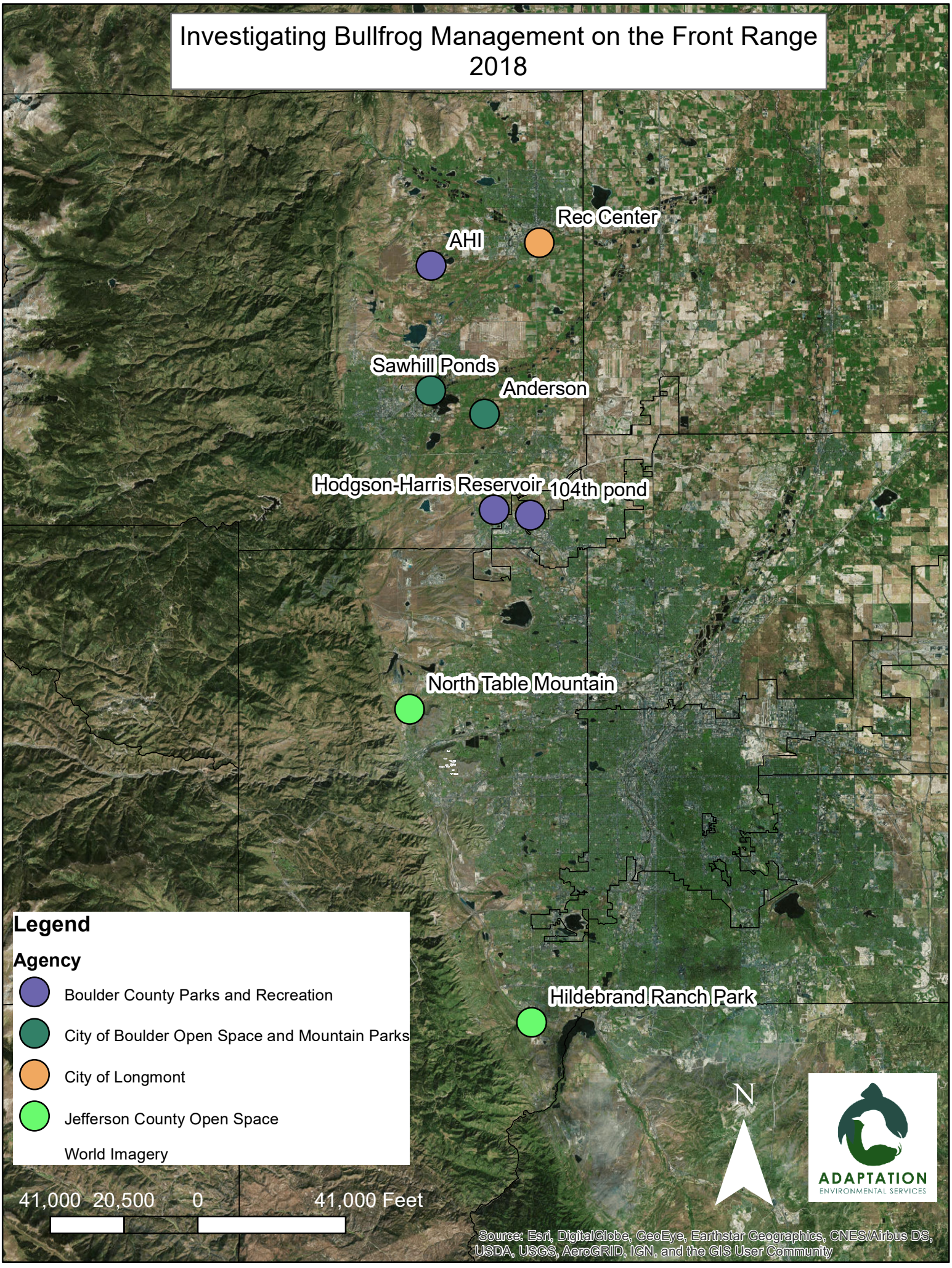
	Responses	
	Percent	**Count**
Yes	80.77%	21
No	7.69%	2
Neutral	11.54%	3
Totals	**100%**	**26**



10. Would you support humane, lethal control of bullfrogs in parks or open spaces? (Multiple Choice)

	Responses	
	Percent	**Count**
Yes	100%	25
No	0%	0
Still undecided	0%	0
Totals	**100%**	**25**




Investigating Bullfrog Management on the Front Range
2018
Rec Center
AHI
Sawhill Ponds
Anderson
Hodgson-Harris Reservoir
104th pond
North Table Mountain
Hildebrand Ranch Park
Legend
Agency
Boulder County Parks and Recreation
City of Boulder Open Space and Mountain Parks
City of Longmont
Jefferson County Open Space
World Imagery
41,000 20,500 0 41,000 Feet
N
ADAPTATION
ENVIRONMENTAL SERVICES
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community