

**Florida Burrowing Owl Conservation- Volunteer Program Enhancement in Partnership
with Project Perch**

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Burrowing Owl Conservation Program Enhancement in Partnership with Project Perch

Abstract

The work completed in partnership with Project Perch was to assess, further develop, and communicate Florida burrowing owl conservation programs and service projects for use by volunteers. This research explores the role of the volunteer with the non-profit organization, Project Perch, which works to protect and nurture the Florida burrowing owl (*Athene cunicularia floridana*). Using literature review, primary and secondary research, the project's goal was to encourage conservation efforts and stewardship around the Florida burrowing owl through participatory mitigation activities and immersive citizen science. Citizen scientists and community volunteers contributing to the management of threatened species remain motivated to continue their work through experiential learning and observable environmental improvements.

Keywords: youth environmentalism, informal learning, pro-environmental behaviour, experiential learning, volunteer programs, citizen science, participatory research, Florida burrowing owl, *Athene cunicularia floridana*

Introduction

Exposure to outdoor programming influences the likelihood of environmental attitude formation useful to the individual and ecosystems at large (C. Monroe, et al., 2021). Analysis of informal learning techniques including outdoor activities such as gardening, observing animals, and other learner-motivated topics, show us that education outside of traditional classroom settings is beneficial (Fisher-Maltese et al., 2018). Informal learning experiences enhance youth leadership and development programs, promote environmental stewardship, community service, and social projects which present a set of unique opportunities for stewards and citizen scientists to get educated and involved with the conservation efforts (Goodwin, et al., 2010). Service projects which immerse volunteers in proactive conservation and wildlife protection are likely to make an

impact on participants, and their active participation alongside scientists could affect the capacity of volunteers to advance biodiversity goals and outcomes (Larson et al., 2020).

Project Perch is a local burrowing owl conservation organization whose mission is to protect and nurture the owls in Southeast Florida. The vision for collaborating with them was to create scalable programs for communities to protect a threatened local species. By taking part in conservation projects such as Project Perch, we, as humans, have the unique power to make positive changes and undo some of the harm we have done to the environment.

Florida burrowing owls (*Athene cunicularia floridana*) are one of the smallest owls, only about nine inches tall, with a twenty-one-inch wingspan. Of the one-hundred-seventy-one species of owls worldwide, it is the only owl that lives underground.

They have long legs and a short tail, are mostly brown with numerous white or tan spots, and have white eyebrows just above bright yellow eyes. The owls inspire art, science, and sustainability collaboration in



schools and communities. Classified as threatened by the Florida Fish and Wildlife Conservation Commission (FWC, 2022), the owls, burrows, and their eggs are protected from harassment and/or disturbance by state law. The greatest threats to the Florida burrowing owl's longevity are predation (Mckie et al., 2005), harassment, and loss of habitat (Bowen, 2001). Residential and commercial development and associated land use activities can result in collapse, flooding, and opportunities for harassment (Mealey, 2007).

“Project Perch’s mission is to protect and nurture the owls in South Florida. Specifically, Project Perch: Provides protection by finding and educating “caretakers” for as many owls as possible and promotes the population by working with landowners to provide artificial burrows with nest boxes.”

There is proven success and momentum with Project Perch, however, without appropriate education and information, humans may imperil the owls by creating burrows artificially then abandoning them, forcing the owls to adapt to urbanized environmental stimuli to which they are unaccustomed (Franco and Marcal, 2018).

Permitting and mitigation expertise introduced by Project Perch alleviates the risk of unknowing harm to the owls (FWC, 2022). Project Perch, in fulfilling its mission, developed best practices for protecting the owls and mitigating perilous circumstances. Artificial burrow and nest box designs (Appendices C-G) have proven successful in regional owl colonies and educational materials were developed by Project Perch volunteer contributors. Needs for capacity building through additional mitigation, education, training, and outreach revealed the opportunity for collaboration with Project Perch. This program enhancement project was designed to operationalize their scientific work into a volunteer outreach program which encourages volunteers and citizen scientists to get involved and take part in conservation and protection of burrowing owls in their own neighborhoods. Sustainable outdoor recreational activities and the promotion of citizen stewardship is a growing movement in the field of outdoor educational programming in the United States (Selin et al., 2022). Capacity building was a key motive for the volunteer enhancement program with Project Perch. Although learning about Florida burrowing owls, taking part in census activities, and donating money to conservation organizations certainly help the species’ threatened status, building habitats using Project Perch’s proven techniques is an engaging activity which takes the volunteer experience to new levels. Engaged citizen science activities, which

are action oriented, can lead to successful recruitment, satisfaction, motivation, and retention of volunteers (Phillips, et al., 2018). To accomplish an increase in volunteer capacity and scalable benefits of Project Perch's existing programming, first-hand experiential learning was required. Participatory research unites action with outcomes which actively engage community goals and interests (Frantz et al., 2021). Outcomes of participatory research can succeed in building knowledge, experience, skills, capacities, and understandings by both the researcher and participants (Delyser and Sui, 2014).

Dr. Brian Mealey designed a Flood-Zone Artificial Burrow System (FZ-ABS) to mitigate for the Florida burrowing owl in South Florida (Campbell, 2021). According to Project Perch, habitat restoration and supplementation through an effective FZ-ABS includes burrow design and appropriate placement in the environment along with protection from disturbance. The FZ-ABS continues to be effective in passively attracting owls, retaining owls, and allowing owls to nest in a landscaped environment. Growth in the owl population is documented and evidenced using FZ-ABS and the need for additional burrows (Campbell, 2021). Validation of the success rate may help Project Perch to better identify and understand what circumstances at each site lead to its success or failure over time and how to better engage its volunteers to mitigate for *Athene cunicularia floridana*. Through a volunteer lens, immersive participation (Goerisch, 2017) in Project Perch's methods was explored to support the work, findings, and successes of the organization's mitigation efforts which encourage participatory environmental activism by volunteers.

Methodology

Methodology began with review of the Project Perch website (Project Perch, 2022) and existing peer reviewed journal articles and partner developed learning materials about Florida burrowing owls and how the burrows are located, built, installed, protected, and maintained. A table (Appendix A) of field work examples was developed to exemplify the range of burrow characteristics including natural versus artificial, intentional, or passive mitigation, and permitted or voluntary remediation circumstances. Field work was accomplished alongside one of the project directors, which enabled a knowledge transfer via a subject matter expert and experiential learning. Burrowing owl nesting locations in need of mitigation were plotted on a generalized map (Appendix B). Exact coordinates are not disclosed due to the protective nature of the work, and the protocol of Project Perch does not encourage publishing the locations of nesting sites.

Mitigations were completed using the construction and best practice guidelines created by Project Perch. The Flood Zone- Artificial Burrow System (Campbell, 2021) was the standard for construction and mitigation activities (Appendices C-F). A newly constructed mitigation burrow is successful if Florida burrowing owls (owls) take up residence. Not all mitigation burrows are successful. To understand implementation of the FZ-ABS, a set of sites in need of mitigation activities was visited and cared for. Each site was listed in a spreadsheet in Microsoft Excel with two columns of data. The first indicated the number of resident owls upon mitigation, then the second column indicated the number of resident owls after the mitigation. A correlation graph was generated and using a paired t-test, the difference in the number of resident owls was calculated to determine the mean of differences, then the standard deviation of differences. This summary data defined the test statistics “t-1 and t-2” which will be calculated to determine the significant p-value.

Field work at each location, numbered 1 through 8 (Appendix A) was conducted in the months of September, October, and November 2022 under the direction of and with Project Perch. Each location was a known location for one or more threatened Florida burrowing owls, further referred to as owls. The sites varied in the amount of work required for the mitigation (Appendix A), and the success of each was determined by comparing observations of resident owls pre-mitigation and post-mitigation. Activities at sites which did not include burrow installations and were solely maintenance or repair activities, contributed to the volunteer experience but were not included in the correlation results for mitigation success. Excluded sites and activities were the protection re-installation at site ID-2 and the annual report visit at site ID-7.

At location ID-1, on September 26, 2022, an owl burrow was observed in the playing area of a human soccer field (Figure 2). Temporary protection was installed, and the property was explored to locate a reasonable location to install a passive mitigation Flood Zone- Artificial Burrow System (FZ-ABS). Approximately 50 yards away from the existing burrow, a pair of FZ-ABS were installed (Figures 3,4).

At Location ID-2, on October 4, 2022, protective barriers for 13 burrow sites were detangled (Figure 5,6) and reinstalled (Figure 7).

At location 3, on October 7, 2022, 4 owls were observed at a burrow beneath a park playground slab (Figure 8). Temporary protection placed by park employees was damaged. Approximately 30 yards away from this burrow, a pair of FZ-ABS were installed (Figure 9). Once the new FZ-ABS was installed, and the owls flushed into the trees a camera scope was inserted into the burrow to ensure there were no owls in the burrow (Figure 10). The camera indicated an owl in the burrow and the camera was extracted. Once the owl vacated the burrow, it was scoped again to 7.5 feet until it

reached the rear wall of the burrow (Figure 11), indicating that it was unoccupied. The unoccupied burrow was then backfilled with sand and concrete slurry. A neighbour reported later that day that the owls were observed at the new burrows.

At location 5, on October 26, 2022, a pair of FZ-ABS were installed (Figure 12) to accommodate passive mitigation for owls that were nested on a golf course driving range (Figure 13). At the site of the driving range burrow, a deceased owl with head trauma was observed, collected, and transported for necropsy.

Location 6, a private residence, was visited on November 3, 2022, with the purpose of installing an FZ-ABS to allow passive mitigation (Figure 14) of an owl which was observed to have burrowed beneath a concrete slab at the front of the residence. Later that day, the homeowner reported that the owl had moved to the new burrow location and that another owl was now paired with it.

Back at Location 2, on November 12, 2022, a rehabilitated owl was released to the colony. An unoccupied burrow was located, and the opening was cleared. A previously frozen mouse was placed at the borrow opening and the owl was released (Figure 15).

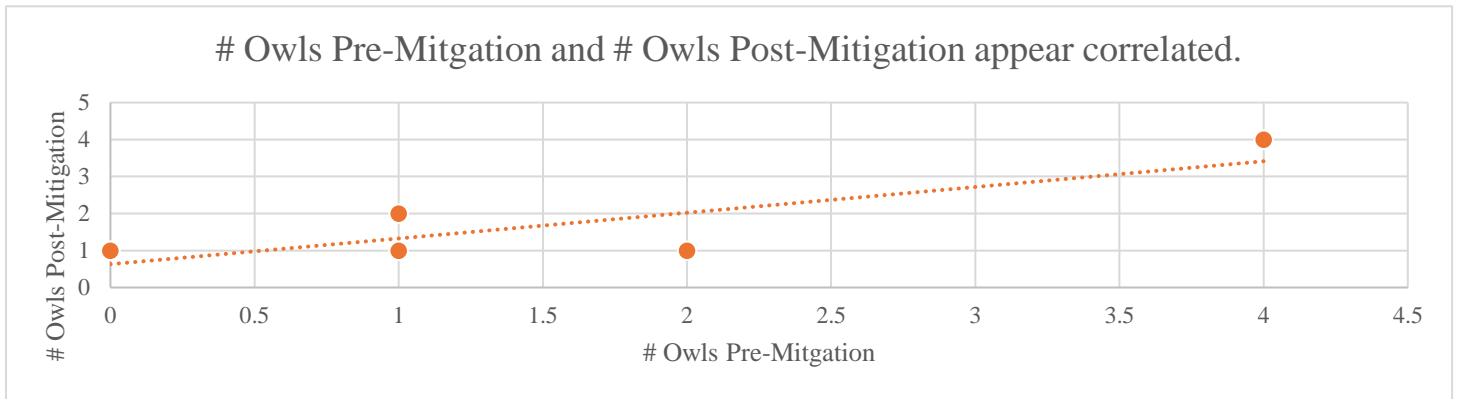
Results

Literature Review

The literature review surrounding Florida burrowing owls led to creation of the Owl Guardian Action List tool (Appendix I) which incorporates opportunities for all ages to find owl guardian activities that can be completed at a self-guided pace.

Participatory Mitigation

Figure (1)- Mitigation Success Correlation



The T-test ($p=.35$) suggests a correlation between the number of resident owls pre-mitigation and post-mitigation, however due to the small data sample it does not support the hypothesis that FZ-ABS mitigations are successful.

Table (1)- Mitigation results

Location (Do not disclose exact coordinates)	Generic Location ID	# Owls Pre-Mitigation	# Owls Post-Mitigation
Coral Springs Sportsplex	1	1	1
Craig Rupp K9 Park / FPL ROW	2	0	1
Ashley Hale Park	3	4	4
Rock Creek	4	0	1
Country Club of Miami	5	2	1
Private Residence	6	1	2
West Park	7	1	1
Seminole Park	8	1	1
		0.350616663	P-Value =T.TEST(C2:C9,D2:D9,2,1)

Discussion

Volunteer engagement and preferences gleaned from the Owl Guardian Action List tool can be used for Project Perch to further engage volunteers to learn and grow within the organization. The immersive field and work resulted in successful mitigation and protection for dozens of owls and implied that future analysis of volunteer retention and progress can be monitored and improved on (Oteros-Rozas et al., 2015). Future

development of the volunteer program at Project Perch can include tiered Owl Guardian awards and recognition for volunteers, youth groups, and citizen scientists of all ages. By setting level goals based on age group and level of interest and involvement, the rate of increased volunteer activity and engagement can be analysed in the future (Larson et al., 2020). By design, the Owl Guardian Action List tool can be published to the Project Perch website and in its digital format, it contains web links to the online activities and additional information available for self-guided journeys to Owl Guardianship.

The participatory mitigation field work results were consistent with the findings of Project Perch founders and contributors- the FZ-ABS is likely an effective mitigation practice for which immediate observable success was possible, however due to the limited amount of data and the variables surrounding the site locations considered in this research, the mitigation success was not a dependable result, statistically or by correlation. The research did not aim to prove that the FZ-ABS is effective, however through a volunteer lens, participating in the installation of the FZ-ABS, and then witnessing the owls waiting just yards away for us to leave so they could investigate their new homes, was proof of concept of Project Perch's methods, efforts, and best practices. Volunteers are likely to continue their time with an organization when results of their individual efforts are clearly communicated and the feedback is immediate (Phillips, et al., 2018). Participatory research and citizen science as outlets to explore environmental stewardship are gaining momentum through non-profit organizations such as Project Perch. Volunteer enthusiasm and retention may be the wondrous side effects of a successful and engaging environmental mitigation program.

Conclusion

Participatory research and immersive environmental activism have the potential to leave a lasting impression on the volunteer as an individual. The satisfaction experienced with mitigating for the Florida burrowing owl will help keep a volunteer engaged and maintaining a participatory role in wildlife protection. Taking part in hands-on habitat mitigations is valuable to the individual and the environment. The work with Project Perch lends to the realization that an individual can, in fact, make a measurable difference in the livelihood of a threatened species. A future study of the volunteer experience is needed to formally document the effects of participation in such programs. This will be possible through Project Perch's implementation of the Owl Guardian Action List tool. Additional statistical and correlative analysis which explores mitigation activities carried out by volunteers will be possible with larger sample size of participants and sites. Future work will help to further assess and develop the volunteer experience at Project Perch and once completed, shall be included as an addendum to this paper.

Acknowledgements

Special thanks to Project Perch Founder, Kelly Heffernan and Project Perch Director, Paul Kragh, for their insights and training, and for welcoming my inquiries and participation in Project Perch's work to protect and nurture the Florida burrowing owl. Immersion into their mitigation techniques opened my eyes to how an individual's actions can make a lasting, observable difference in protecting a threatened species. The joy and fulfilment of helping the owls will be with me and my family forever.

Figure (2)- Temporary Protection Installed at location ID-1



Figure (3)- Installed FZ-ABS at location ID-1



Figure (4)- Completed Mitigation location ID-1



Figures (5-6)- Tangled burrow protection due to human error at location ID-2

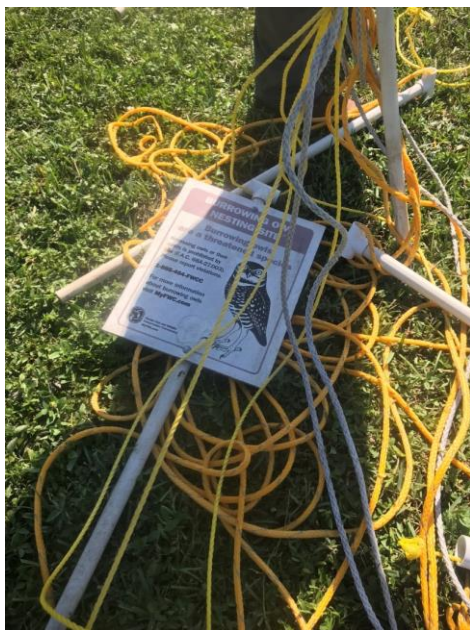


Figure (7) – One of thirteen reinstated protection sites at location ID-2



Figure (8)- Burrows beneath playground slab at location ID-3



Figure (9)- FZ-ABS installed at location ID-3



Figure (10)- Scope and excavation at location ID-3



Figure (11)- Scope length shown at location ID-3



Figure (12)- New FZ-ABS at location ID-5



Figure (13)- Driving range burrow location ID-5



Figure (14)- Passive mitigation at location ID-6



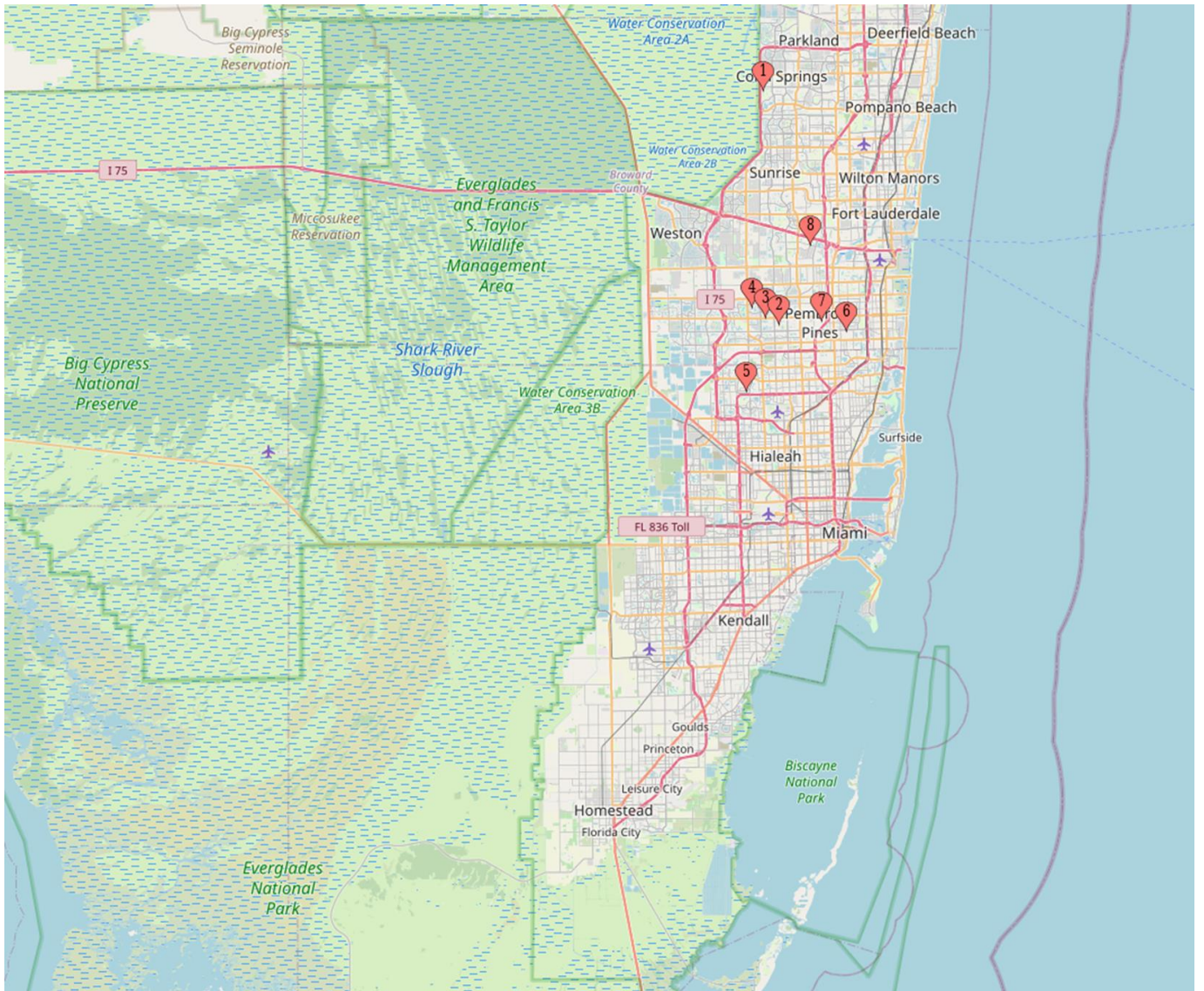
Figure (14)- Rehabilitated release at location ID-2



Appendix A-Field Work Matrix

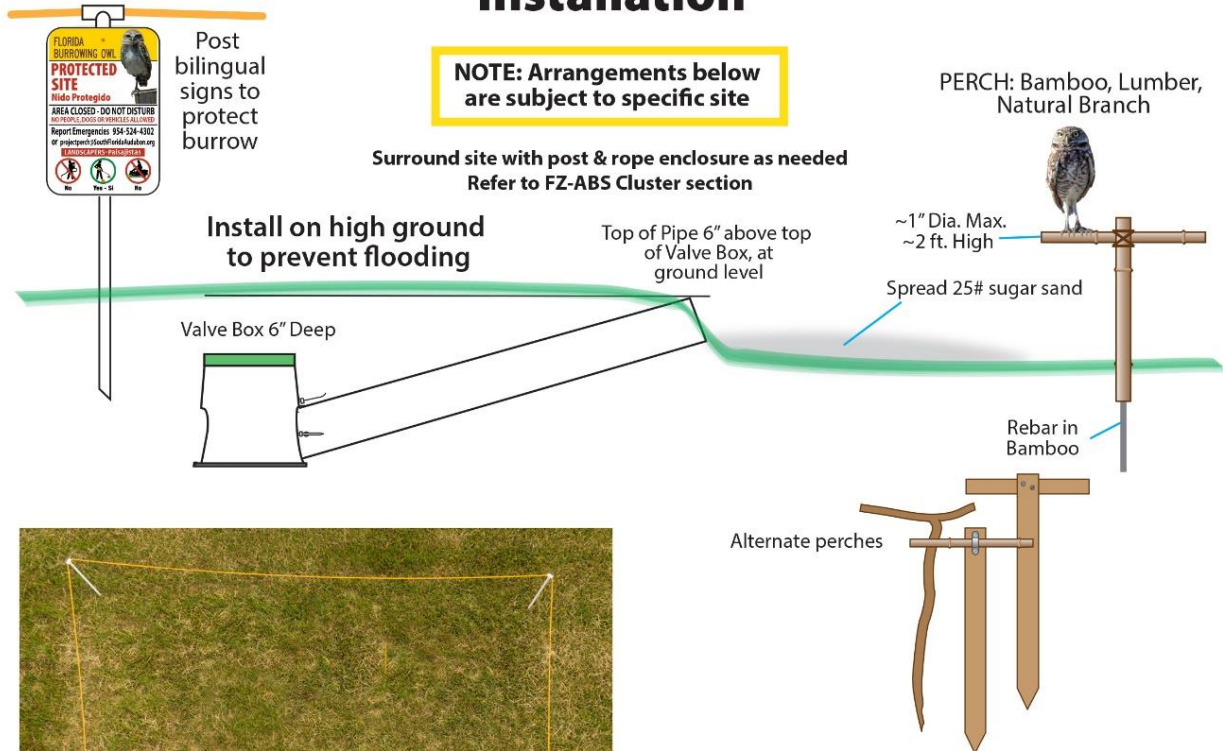
Location (Do not disclose exact coordinates)	Generic Location ID	Mitigation Type	Date	Activities
Coral Springs Sportsplex	1	Passive/ Permit	9/26/2022	Protect burrow on ball field; install pair of artificial burrows
Craig Rupp K9 Park / FPL ROW	2	Maintenance / Permit	10/4/2022	Reinstall borrow protection around 13 burrow sites
Ashley Hale Park	3	Excavation / Permit	10/7/2022	Install pair of artificial burrows; camera scope threatened burrow, excavate, and fill
Rock Creek	4	Rehabilitated Release	10/6/2022	Release rehabilitated injured owl to rescue location
Country Club of Miami	5	Passive / Permit Pending	10/26/2022	Investigate vandalism and tampering complaint; install pair of artificial burrows
Private Residence	6	Passive / Permit	11/3/2022	Install pair of artificial burrows
West Park	7	Annual Report / Maintenance	11/3/2022	Inspect and clear debris from burrow sites; maintain protection; document for annual report
Seminole Park	8	Excavation / Permit	11/8/2022	Camera scope of threatened burrow and excavate, fill in
Craig Rupp K9 Park / FPL ROW	2	Rehabilitated Release	11/12/2022	Release rehabilitated injured owl to rescue location

Appendix B- Field Locations #1-#8 Map (S Florida)



FLORIDA BURROWING OWLS FZ-ABS (Flood Zone Artificial Burrow System)

Installation



Designed by Dr. Brian Mealey & Grant Campbell
Recommended for Florida Burrowing Owls by South Florida Audubon's Project Perch

Visit [ProjectPerch@SouthFloridaAudubon.org] for downloadable files

Visit (<https://myfwc.com/license/wildlife/protected-wildlife-permits/burrowing-owl/>) for permit regulations

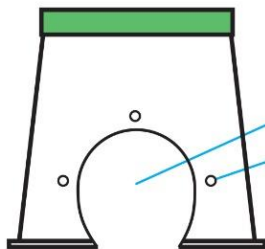
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FLORIDA BURROWING OWLS FZ-ABS (Flood Zone Artificial Burrow System)

Nest Box Preparation

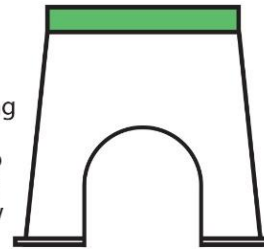
NDS 10-inch W. x 11.63 inch H.
Round Irrigation Valve Box



Cut out to
6.25" Dia.
~0.25" Dia.

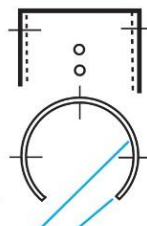
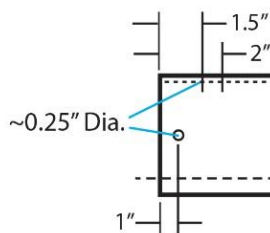
**Modify
Valve Box
to accept 6" Pipe**

Rear
opening
allows
owls to
extend
burrow



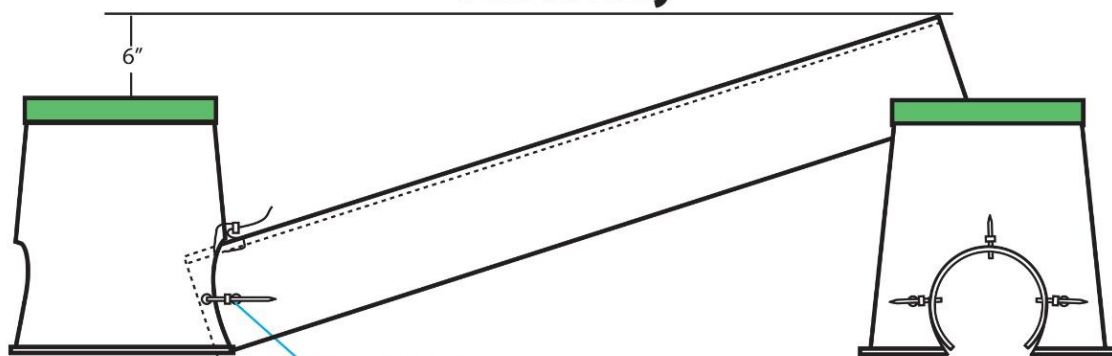
Pipe Preparation

6-inch Sewer Main PVC Pipe Schedule 40 (preferred)
Cut to **40 inch** Minimum Length



De-burr sawn edges

Assembly



Nylon Cable Ties

Attach Pipe with Cable Ties



Designed by Dr. Brian Mealey & Grant Campbell
Recommended for Florida Burrowing Owls by South Florida Audubon's Project Perch

Visit [ProjectPerch@SouthFloridaAudubon.org] for downloadable files

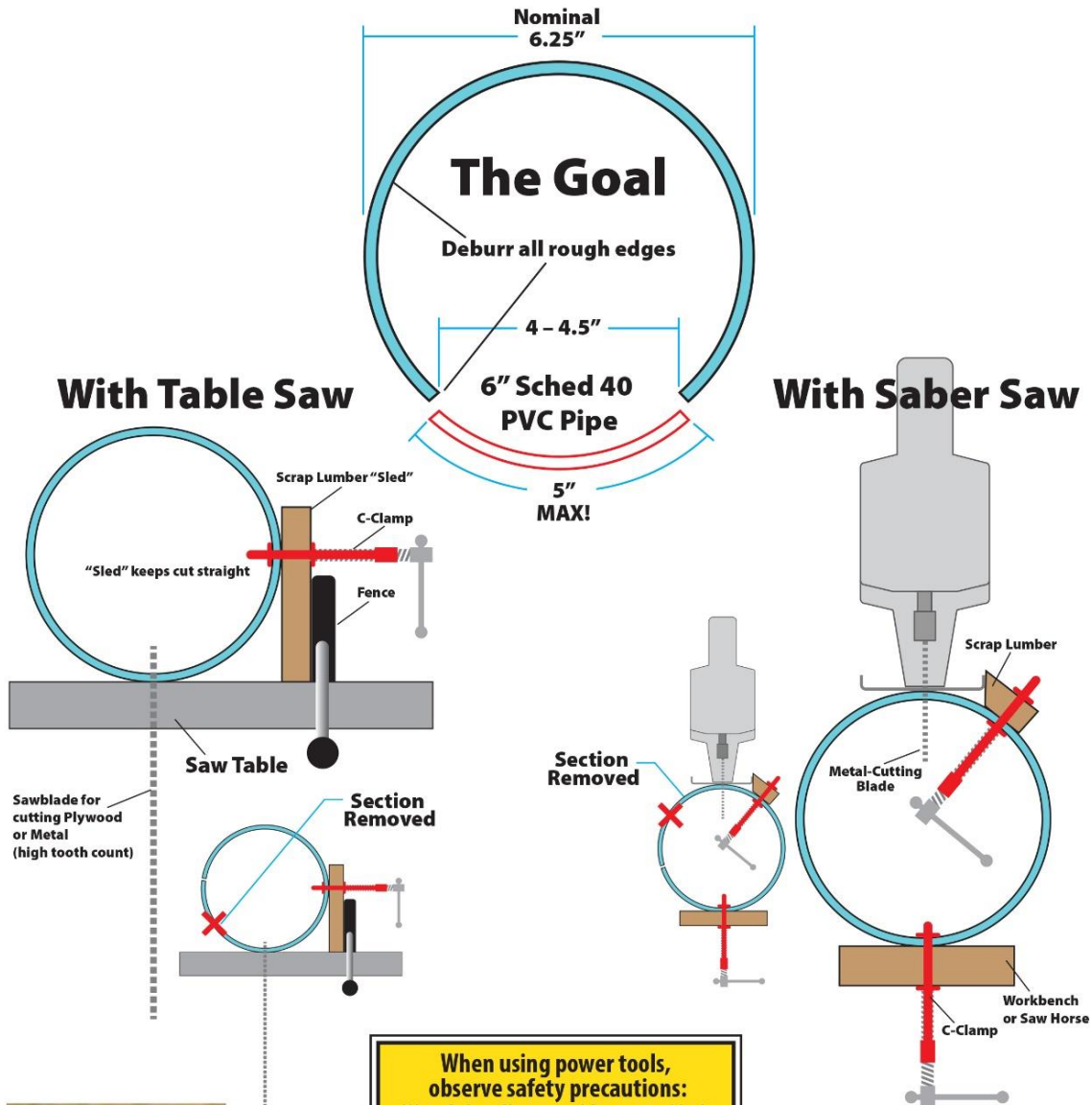
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FLORIDA BURROWING OWLS FZ-ABS (Flood Zone Artificial Burrow System)

Techniques for Cutting 6" PVC Pipe



Designed by Dr. Brian Mealey & Grant Campbell
Recommended for Florida Burrowing Owls by South Florida Audubon's Project Perch

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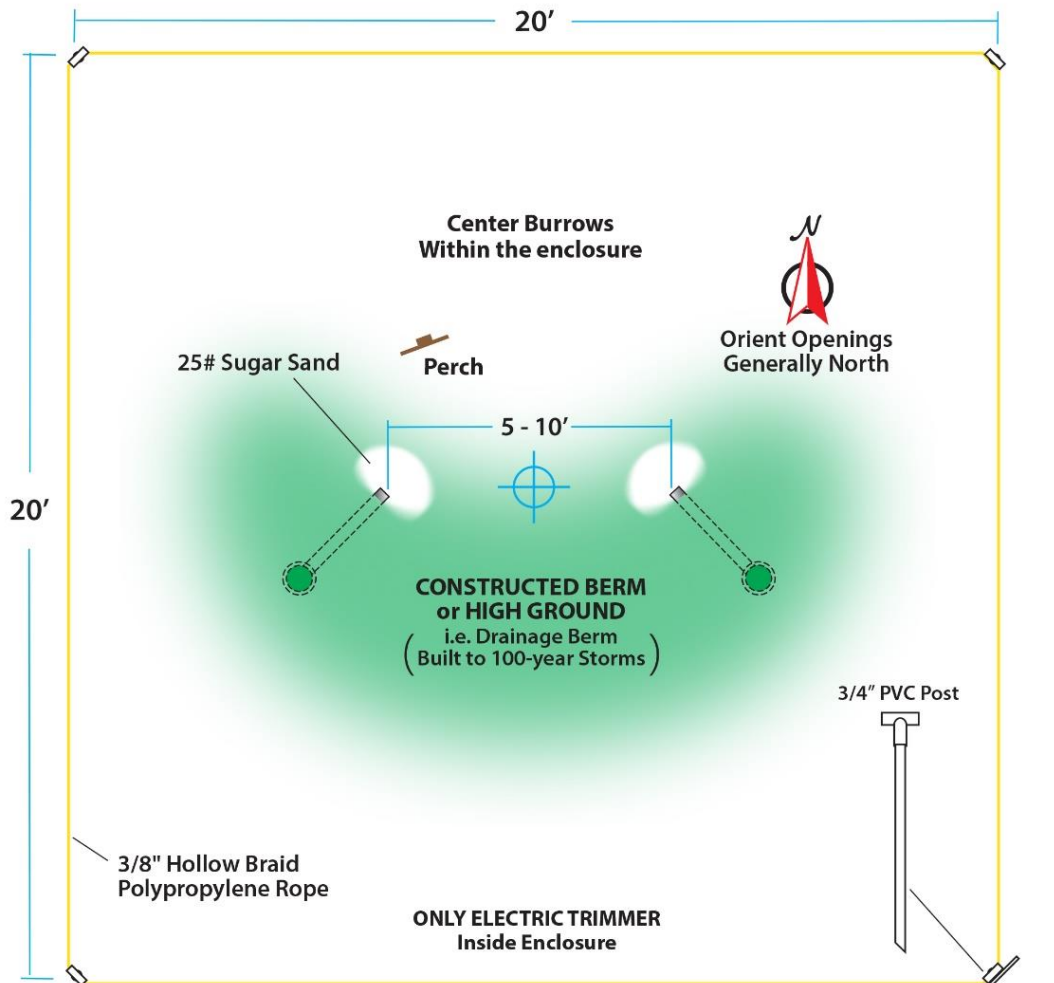
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3/2021

Appendix F- Publication courtesy of Project Perch

FLORIDA BURROWING OWLS FZ-ABS (Flood Zone Artificial Burrow System)

FZ-ABS Cluster

(Not to Scale. Sites must be adapted to suit locations)



Two Full Artificial Burrows with Nesting Chambers
More Attractive to Owls, Keeps them Safer,
Provides Additional Burrow for Growing Young

REFER TO:
FZ-ABS Burrow Pages 1-3 for Details on Constructing FZ-ABS
and Perches

"Protected Site"
Sign



Designed by Dr. Brian Mealey & Grant Campbell
Recommended for Florida Burrowing Owls by South Florida Audubon's Project Perch

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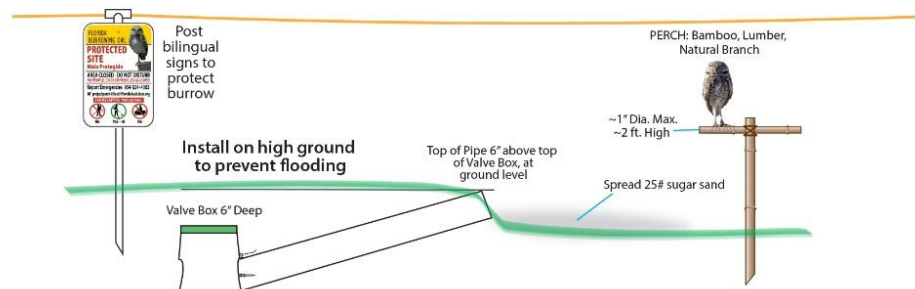
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3/2021

A Flood Zone – Artificial Burrow System (FZ-ABS)

Designed specifically for the Florida Burrowing Owl (Athene cunicularia floridiana)

By Dr. Brian Mealey and Project Perch



Why this Design?

Florida's Burrowing Owls dig it (literally) & the FZ-ABS gives them a head start!

Reduces Flooding:

- Burrows put in on high ground, & above Florida's water table
- Pipe cut-out provides good drainage & water can't funnel down the pipe
- Pipe slightly angled, keeps tunnel closer to the surface

Reduces Burrow Collapse:

- Sewer pipe is durable
- Rugged valve control box protects nesting area
- Fence protects burrow from heavy mowers

Simulates Natural Burrows:

- 6" PVC pipe has similar opening & size
- Pipe cut-out allows the owls to dig & move soil around
- Pipe slows sod overgrowth (owls can't dig through sod)
- White sugar sand mimics sandier Florida soil
- 2 Burrows close together is common

Provides More Security:

- Fence protects from other disturbances
- A close perch gives good visibility & quick access to the burrow
- 2 Burrows keep an owl family safer, can reduce predation
- Signs help people report problems

(Abstract) In 2005, Dr. Brian Mealey designed a Flood-Zone Artificial Burrow System (FZ-ABS) to mitigate for the Florida burrowing owl, Athene cunicularia floridana, in South Florida. The FZ-ABS is tailored to provide maximum drainage, a shallower installation above a higher water table and is made of a more durable pipe so it can withstand the constant pressure of commercial mowing equipment. In complete contrast to its Western cousin, the Florida burrowing owl digs and maintains its own burrow. The FZ-ABS better simulates a natural burrow by allowing the owl to maintain its burrow using their talons in the dirt. This article also documents what improvements have been made to the design and why. An effective FZ-ABS is part burrow design but also placement in the environment and protection from disturbance. In the last 10 years, the FZ-ABS continues to prove its effectiveness in passively attracting owls, retaining owls and allowing owls to nest in a landscaped environment. When expansion FZ-ABS are provided, there has been documented growth in the owl populations evidenced by the need for additional burrows.



For the full article, visit:
ProjectPerch@SouthFloridaAudubon.org

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Appendix H –Journal Submittal Template for Taylor & Francis Publications

Taylor & Francis Word Template for journal articles

Author Name^{a*} and A. N. Author^b

^aDepartment, University, City, Country; ^bDepartment, University, City, Country

Provide full correspondence details here including e-mail for the *corresponding author

Provide short biographical notes on all contributors here if the journal requires them.

Repeat the title of your article here

Type or paste your abstract here as prescribed by the journal's instructions for authors. Type or paste your abstract here as prescribed by the journal's instructions for authors. Type or paste your abstract here as prescribed by the journal's instructions for authors. Type or paste your abstract here.

Keywords: word; another word; lower case except names

Subject classification codes: include these here if the journal requires them

Heading 1: use this style for level one headings

Paragraph: use this for the first paragraph in a section, or to continue after an extract.

New paragraph: use this style when you need to begin a new paragraph.

Display quotations of over 40 words, or as needed.

For bulleted lists: () For numbered lists Displayed equation ()

Heading 2: use this style for level two headings

Heading 3: use this style for level three headings

Heading 4: create the heading in italics. Run the text on after a punctuation mark.

Acknowledgements, avoiding identifying any of the authors prior to peer review

1. This is a note. The style name is Footnotes, but it can also be applied to endnotes.

References: see the journal's instructions for authors for details on style

Table 1. Type your title here. Obtain permission and include the acknowledgement required by the copyright holder if a table is being reproduced from another source.

Figure 1. Type your caption here. Obtain permission and include the acknowledgement required by the copyright holder if a figure is being reproduced from another source.

Appendix I- Owl Guardian Action List

Owl Guardian Action List- How will you help?

Printable resources and information are available on our website link: ProjectPerch.org

		DONE?
Learn!	<input type="checkbox"/> Work on some Burrowing Owl Coloring Pages	
	<input type="checkbox"/> Participate in the Burrowing Owl Art Contest	
	<input type="checkbox"/> Complete the Digby the Burrowing Owl Activity Pages	
	<input type="checkbox"/> Make your Digby the Burrowing Owl Paper Puppet	
	<input type="checkbox"/> Request a presentation for your school or group	
	<input type="checkbox"/> Read the Book <i>Buffy the Burrowing Owl</i> with a Librarian	
Play!	<input type="checkbox"/> Read the Book <i>Hoot</i> by Carl Hiaasen	
	<input type="checkbox"/> Watch the Presentation " Burrowing Owl Basics"	
	<input type="checkbox"/> Watch the video: Tiny Lovable Hunters	
Watch!	<input type="checkbox"/> Check out our videos on YouTube:	
	<input type="checkbox"/> https://www.youtube.com/@projectperch7379	
	<input type="checkbox"/> Follow us on Facebook:	
	<input type="checkbox"/> https://www.facebook.com/ProjectPerch/	
Protect!	<input type="checkbox"/> Report an unprotected burrow	
	<input type="checkbox"/> Watch the owls with binoculars and look for owlets	
	<input type="checkbox"/> Bell your cat!	
	<input type="checkbox"/> Volunteer to host a burrow in your neighborhood	
	<input type="checkbox"/> Help us install and protect new burrows	
Nurture!	<input type="checkbox"/> Calling all Scouts! Let us guide you through ways to help the owls while earning service awards and badges	
	<input type="checkbox"/> Help us monitor existing burrows	
	<input type="checkbox"/> Donate	

Share your checklist with us! Email: owl@projectperch.org

Tell us about yourself so we can help guide you through these and other exciting activities to help the Florida Burrowing Owls:



Name:

Age:

Email Address:

What's your favorite thing about helping the owls?

.....

Appendix J- Partner Information

Project Perch

Kelly Heffernan – Director & Founder – Avian Biologist

Phone: (978) 412-5313

Paul Kragh – Director of Burrowing Owl Conservation

Phone: (954) 383-1044

Email: owl@projectperch.org

Web: projectperch.org

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