Increasing Engagement at El Refugio de Vida Silvastre Embalse La Plata Through Virtual Media

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Abstract

La Plata, a nature refuge in central Puerto Rico, has been closed to the public due to hurricanes, drought, COVID 19, and a bridge collapse. Since La Plata has no form of direct virtual communication with current or potential visitors these closures severely limit their outreach. Our goal with this project was to provide La Plata with the structure for an interactive website which would allow them to connect with visitors regardless of the ability to physically enter the refuge. We began our project by using previously collected data to look into who normally visits and what activities they pursue, This gave us an idea of the audiences our website would be catering to. From there we conducted interviews and follow up surveys to collect information on both the refuge and potential presentation models. With both of these in mind we began the process of developing our website, prioritizing its overall structure, interactive components, and associated media. Our final step was creating a guide for transferring ownership of, updating, and publishing the website we created. In our final deliverable we provided La Plata with a website, guide, and recommendations for further updates.

Acknowledgements

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Finally, we would like to thank the four individuals who user tested our website as well as the several people who filled out our website design surveys.

List of Abbreviations

DNER Department of Natural and Environmental Resources

IQP Interactive Qualifying Project

NPS National Park Service

PRASA Puerto Rico Aqueduct and Sewer Authority

SaaS Software as a Service

SEO Search Engine Optimization

SSL Secure Sockets Layer

URI Univeral Resource Identifier

WYSIWYG What You See Is What You Get

Contents

List of Figures

Introduction

Climate change presents one of the largest challenges to the world today. Large scale events involving extreme weather patterns illustrate the direness of our situation (Keellings and Ayala, 2019). The effects of these climate driven events can be seen, studied, and used to educate the public near natural protected areas, locations that receive government protection due to ecological value (Naidoo et al., 2019). These areas can be sites for monitoring and healing of damages caused by human interaction, such as pollution and degradation of high value soils due to urbanization. Nature refuges also present opportunities to have people engage with and value nature. Nature-based activities at these sites incentivise further protection of natural areas and visitors' continued awareness of and participation with the world around them. Protected areas provide potential interaction between visitors, researchers, and the natural world, however they are sometimes not accessible to all people and are susceptible to closures. The hours of light in the day, hazardous weather events, and the refuge's location all contribute to limitations on access. Increased outreach from these areas using a virtual medium presents a potential solution to these limitations as access to information and experiences cannot be limited by physical factors.

In the mid north of Puerto Rico, four miles southeast of Toa Alta, El Refugio de Vida Silvestre Embalse La Plata is a nature refuge that provides clean water, protection for native flora and fauna, educational outreach programs, and recreational activities for surrounding communities and visitors. They also serve as an essential habitat for several other species that dwell in this region. As an integral natural resource for nearly all living things in this area of Puerto Rico their upkeep and protection is paramount. In the last 10 years, a recent bridge collapse, COVID 19, hurricanes, and drought have all contributed to closures of the refuge. Due to these frequent closures the organization overseeing operations at La Plata, The Department of Natural and Environmental Resources (DNER), sought out a solution to increase engagement with current and potential visitors through the creation of a website.

The DNER has its own website that serves to present information on department-wide projects, news, and background information. La Plata, one of many protected areas managed by the DNER, has only a single article on the site. Presenting a further barrier to engagement between La Plata and potential visitors, all written content on the DNER website appears in Spanish with no other language variations. Non-affiliated sites, like Tripadvisor, shared visitor testimonials, and travel guides often contain more information than the DNER website itself. Gathering information, aside from visiting the reservoir itself, or conversing with locals who often grew up nearby, proved challenging for us even with access to a partially translated management plan. With our website development we hoped to address these issues.

We aimed to have the website appeal to the different types of visitors at the refuge. To do so, we first had to determine who visits the park and why. Then we gathered information that they would find helpful, grouping this into different sections of the website. We realized that visitors speak both English and Spanish, and therefore we created a website where users can choose either language. We worked with the DNER to determine audience groups based on prior visitors' activities and perceived goals in visiting. In further discussion we established priorities and requests for the website. In the end, this project will provide content for current audiences of the reservoir and spread awareness to new target demographics.

We designed the website to promote tourism, capture the experience of visiting La

Plata, and establish an outlet for operations during future park closures. We promoted tourism and sought to explore the refuge by including an interactive map. This map allowed potential visitors to better visualize their trip. Important components included media like photography and videography which we used to initially draw in our audiences and provide information in an engaging form. Our design of the overall website structure, including placement of the virtual tour, aided in creating a website that the DNER could update and manage as their main form of outreach from La Plata. We further expanded this outreach through the introduction of virtual seminars and other forms of interactive media. Any interactive media we were unable to integrate into the website were included as suggestions for further project work. The conclusive final product was a fully operational website and a written guide on usage, content creation, and maintenance.

Background

We began our project by first exploring the effects of La Plata being shut down and the implications of the loss of protected areas within Puerto Rico. From there we sought out a solution to the loss of outreach from La Plata and found an answer in the form of an interactive website. Which led us to research other websites and literature for answers on the best practices for destination web design.

Vulnerability to Natural Disasters in Puerto Rico

Disasters in Puerto Rico cause issues with food security and access to clean water. As an island, natural resources like arable land and water are limited. Puerto Rico imports the majority of its food and uses reservoirs because of this. Natural disasters that cut off access to ports for imports and water reserves like the reservoirs, are exceptionally detrimental. Changing weather patterns, high energy storms, rising ocean levels, and loss of wildlife can inflict exceptionally detrimental effects, not only on an immediate level but with repercussions years into the future (Zimmerman et al., 2020). Over the last 30 years Puerto Rico has been subject to more than a dozen floods, the second worst drought ever recorded in the US, and more frequent high energy storms.

Rapid development of urbanized lands compounds issues caused by climate change. As new developments expand near protected areas, there are detrimental effects to those lands and the services they provide. For example, pollution from these development projects impacts species of plants whose roots protect the integrity of soils. This causes soil runoff and subsequent flooding which enters the waterways and often contaminates clean water supply (De Jesus Crespo et al., 2019).

Protection of natural land areas is an important mitigation strategy. These strategies include increasing innate resistance to disasters and teaching resilience strategies to neighboring communities through outreach programs. Innate resistance develops through lakes that hold water reserves, the evolutionary advantages of certain plants, like trees that impede hurricane force winds, and porous soils, called karst soils. Community outreach programs often involve classes on sustainability, home gardening, and even fishing. Protection of natural areas and the services they provide helps to limit vulnerability to natural disasters.

La Plata Provides Resources for People from Puerto Rico and Abroad

El Refugio de Vida Silvestre Embalse La Plata is a wildlife refuge located to the southeast of San Juan, near Toa Alta, Puerto Rico. It is currently overseen by the DNER, an organization whose mission is to protect natural resources throughout Puerto Rico.

The DNER oversees 20 national forests, 34 nature reserves, and 5 nature refuges. The main attraction at La Plata is a reservoir, built in 1973 by the Puerto Rico Aqueducts and Sewers Authority (PRASA), which provides potable drinking water for neighboring communities, an area for recreation, and protection for native flora and fauna (Ferré-sadurní, 2017).

La Plata provides an accessible experience to those who visit. Paved walking paths connect recreational areas and allow for visitors to experience the reservoir regardless of age and ability. Other amenities provided include 24 gazebos, grills, boat ramps, several parking lots, and an amphitheater for educational programming. Visitors from Puerto Rico and abroad register for their day at the visitor center then partake in recreational activities like birdwatching, fishing, picnicking, water sports, and enjoying nature. Fishing and bird watching attract vocal communities from across the globe and serve as a basis for educational programming at La Plata in addition to programs aimed towards education and sustainability. These seminars are given by the site manager Sra. Marinelly Valentin-Sivico and volunteers from the community. Many of the seminars delivered serve to engage all visitors of the reservoir, however some serve to increase disaster readiness throughout the surrounding communities.

La Plata also acts as a central hub for visitors to engage in sustainability and education projects. The refuge cannot accept monetary donations, however those looking to support operations can volunteer their time. To start these projects, individuals reach out to staff at the reservoir who obtain approval for the project. Some prior projects at La Plata include, building reptile and amphibian habitats that help the reservoir manage invasive species, a project on the importance of birds, and projects addressing recovery from natural disasters. These projects included hugelkultur a composting technique which uses debris from high energy storms and One Seed at a Time a project where native fruit trees were repopulated in the hopes of maintaining biodiversity on the island as well as in the future producing a food source for visitors and the surrounding community. Information on volunteering, educational programs, and recreation at La Plata can only be found by directly contacting staff at the reservoir. This lack of information severely impairs the ability for management to continue developing when operations at the reservoir are impacted.

Ecotourism Supports La Plata and Neighboring Communities

Ecotourists at La Plata affect the surrounding community through supporting the local economy. Ecotourism has come to mean traveling to natural areas with an expressed interest in improved conservation efforts and providing a positive impact on local communities (Hvenegaard and Dearden, 1998). Ecotourists at La Plata often partake in a variety of activities, the largest being fishing. A visitor fishing at La Plata brings an average revenue of $50-$70 (USD) per outing to the surrounding region. This generally includes the price of fishing supplies, bait, and food for the fishers however; that price-point excludes the cost of gas to reach the reservoir, boat maintenance, gas and other consumables for the boat, and any additional unrelated costs such as a fishing licensing fee. With these additional costs included the total amount going out to the local community is around $200 per fisher per outing. Many micro enterprises can flourish off of ecotourism that occurs through La Plata activities like fishing. This is further exemplified through the ideal geographical location at which La Plata is held. It is very close to San Juan and allows for easy access to the city. Furthermore, being that Puerto Rico is a tropical area, these activities that take place are available year round, so it acts as a constant source of revenue for local businesses and entrepreneurs hoping to make a name for them-

selves. This is not without its issues though; given the niche nature of what is offered at La Plata, they have problems attracting tourists to the region given the lack of knowledge of La Plata's existence amongst many other factors that presently make it hard to reach the region.

Challenges to Tourism at La Plata

The frequency and amount of visitation to protected areas varies and relies on factors that transcend the boundaries of the areas themselves. Key factors in determining visitation include initial knowledge of the area, financial constraints, accessibility, available leisure time, weather, and climate (Fisichelli et al., 2015). Two different sets of factors exist, the factors for general visitation and for local communities. Locals often are inspired to visit through community outreach programs, usually implemented within the school system, and by word of mouth. This is illustrated even more with La Plata as the majority of their visitors grew up near the reservoir and took trips with their family. They use the reservoir to gather for events, recreate and learn. For non-locals the perceived local community, political issues, and available information are important factors that influence their decision making (Nayyar et al., 2018). A lack of information for non-local visitors to plan their visit and learn about the area severely hinders their willingness to travel.

La Plata does not currently have adequate online outreach. The DNER has a website written in Spanish that is currently the main source of online outreach for the reservoir. This website primarily serves as a general hub for information that pertains to all of the natural areas overseen by the DNER, the website also includes legislation that concerns environmental protections afforded to certain areas of Puerto Rico. The sheer number of projects and other news featured on the DNER's website does not create a distinct focus on La Plata, and draws away from the importance of the reservoir. Also, the accessibility is further hindered by language barriers. In order to tackle these issues the new website will need to incorporate projects that are taking place at La Plata and cater to visitors who speak English and Spanish. In making informed design decisions, we will draw upon inspiration from other websites and primary literature that have addressed these issues.

Online outreach is especially important as natural areas are susceptible to being impacted by changing weather patterns and natural disasters. While warming temperatures allow for longer "busy" seasons, they also contribute to the development of higher energy storms, which force the closure of these areas (Fisichelli et al., 2015). La Plata was shut down due to two natural disasters within the region that forced a closure of operations at the reservoir itself. During the beginning of March 2021 the bridge connecting the reservoir to the outside community collapsed leading to a lack of passage to the area. This was further compounded by the novel coronavirus pandemic which led to a closure of the area. The response for these closures marked an urgent need for a virtual platform to provide services to visitors despite being unable to attend in person.

Online Engagement Strategies from National Parks

In order to understand building online engagement for La Plata, we reviewed seven websites of established parks in the US and around the world to gain. We began by looking at the National Parks Services website as it serves as a hub for conserved areas throughout the U.S. This provides a parallel to the DNER website which provides information on conserved areas in Puerto Rico. After establishing this initial comparison we then conducted a review into outreach from natural protected areas outside of the US to gain an understanding of effective and ineffective engagement strategies.

Established parks in the US use websites for three purposes: advocating for the protection of the area, educating the populace, and entertaining potential visitors. For example, the United States National Park Services' website contains information about national parks throughout the US and displays how protected areas gain widespread presence amongst citizens in and outside of the US. The main site's directory has 3 components: (1) Plan your Visit; (2) Learn and Explore; (3) Get involved. Subsections will allow the user to quickly find the information and experience they want from the site, while also being a subtle nudge towards further engagement using active verbs. The website tabs allow for the selection of different experiences by the user based on what they click. For example, the "Plan your Visit" and the "Learn and Explore" tabs contain two divergent sets of information that pertain to specific audiences. This allows for a more personalized experience for the user as they select their own path through the site.

The Yellowstone National Park site provides a detailed example of these initial engagement strategies. At first glance, the Yellowstone National Park website instantly prompts you to take photos of the park. The website's first page provides information about wildlife, and other natural landscapes. They continue to provide information about the activities taking place at the park and "things to do", providing a holistic list of items and attractions around the park. Furthermore, you can view videos that are first-person walking tours of optimized lengths that can be enjoyed from the comfort of your own household. They provide opportunities to become involved in maintaining the park as well as listing some of the current projects. The very bottom of the page provides information about the area surrounding the park and the surrounding community.

In reviewing an additional seven websites from different National Parks, we discovered themes of recreation, education and protection that correspond to different kinds of visitors or user segments. Recreation and education translate to user segments intuitively, being composed of those seeking recreation and those seeking to learn. The theme of protection, however, does not translate as literally to an audience segment. As protection is the main purpose of these areas, protection is most accurately translated to an audience segment of anyone actively supporting or visiting the park. Websites that tailored their engagement strategies to their visitors and audience segments were more effective than those who did not.

We first considered which engagement strategies were more effective. These strategies were seen to target different user segments. The recreation segment, for example, would best be engaged by invitations to partake in varied activities throughout the park or dares to break records. Strategies such as direct site visitors through questions, puzzles, and providing newsletters are better suited towards those seeking to learn or the educational segment. An example of this engagement strategy can be seen in Figure 1 from a Thai National Parks page where the site opens with a series of questions aimed towards inciting the visitor's interest in learning more about the parks.

Finally, the "protection" segment can best be engaged by strategies that allow for users to effectively interact with the site or enact change such as allowing visitors to share their visits or providing them with information to get more involved. These strategies represent a few effective practices seen within websites providing outreach from natural protected areas.

We also noted some strategies that were less effective. First, creating a multilingual site that does not have proper formatting in one or more of the languages. This loss causes viewers to feel discouraged and often negates the effective strategies discussed ear-

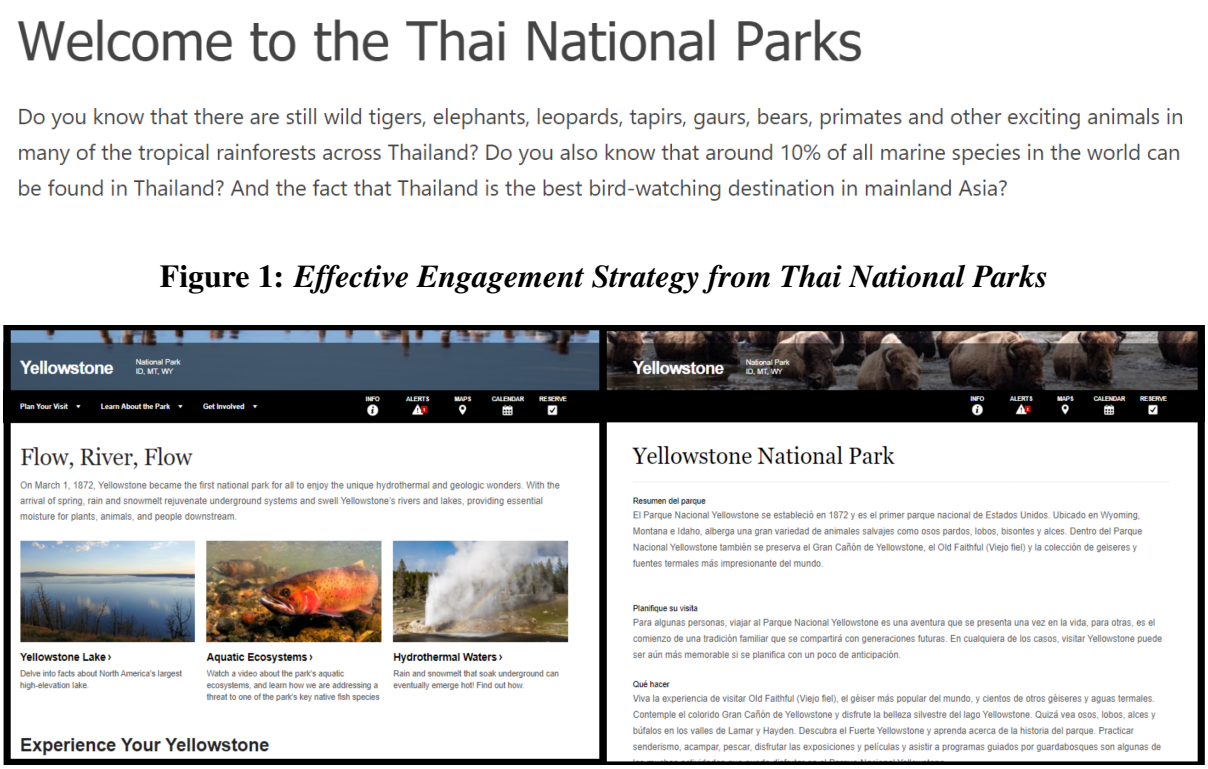

Figure 1: ***Effective Engagement Strategy from Thai National Parks***

Figure 2: ***Comparison of the Yellowstone Website in English (left) and Spanish (right)***

lier. Figure 2 shows this loss of formatting when translating the Yellowstone Page from English to Spanish.

Not taking into account visual impairments or disabilities when designing the site is another problem seen with these strategies. An example of this can be seen by the support us button in Figure 3 showing a section of the Australian wildlife conservancy page.

Using vibrant colors and interesting color combinations is an important strategy for initially engaging visitors, however, this strategy becomes less effective when content cannot be read or seen by the visitor. Finally, sites need to include descriptive audio options and subtitles for their videos in order to effectively reach all audiences. By understanding potential limitations and applying promotional and organizational skills to the reservoir, we will be able to attract visitors from all over to La Plata and its surrounding community.

Web Design for Destination Websites

Visitors go through a 4 step process when they are looking at destination websites. This process includes finding the website, making first impressions, looking for information, and continued engagement with the site. We used this 4 step process to guide our research into the best practices for designing a website.

Visitors find travel information using search engines and directly through the web addresses or URLs. New visitors with no previous experience with their intended destination will often employ the first method of using search engines (Luna-Nevarez and Hyman, 2012). The most popular search engines are Google, Bing, and DuckDuckGo. These all use different algorithms to create search engine result pages which display relevant ranked web resources. Key factors like overall website architecture, keywords,

links to the site and individual usage data create this ranking system (Ziakis et al., 2019). Search Engine Optimization (SEO), a common practice in website development, uses these factors to maximize visitors on the site. As we are attempting to gain interest in visitors organically visiting the site, being within the first page of search results is important. Although search engine algorithms change frequently, by applying an understanding of SEO, we hope to generate organic visitors, and improve traffic on our site.

Figure 3: ***Ineffective Use of Color in Website Design***

Once a visitor arrives on the site their first impression dictates their continued usage of the site. This first impression is often based on a combination of factors including perceived trustworthiness and overall aesthetics (Luna-Nevarez and Hyman, 2012). If there are issues with any of these factors the visitor will often leave the site. By leaving, they contribute the overall "bounce rate" or rate of visitors clicking out of a target website after their initial arrival (Ziakis et al., 2019). We can limit the bounce rate, and by doing so, increase our visibility in search engine results by developing a well organized and friendly user interface that establishes trustworthiness.

Visitors develop trust with a site through their first impression. A good first impression can result in the "halo effect" where the user sees the rest of their experience with the site with a positive disposition while a negative first impression will do the opposite. The process of forming this first impression and trust occurs subconsciously as the visitor initially takes in the site and forms opinions (Seckler et al., 2015). Because this opinion is formed in such a brief window, estimated to be from 50 milliseconds to 60 seconds, clearly conveying the intentions of the site is important. Visitors more clearly understand the primary focus of a website when it is conveyed within the headings and titles of the site (Luna-Nevarez and Hyman, 2012). After evaluating intentions often the visitor will move on to getting a sense of honesty from the site. This sense is based on the factual information of the site being truthful and is therefore easy to design for. The final component of building trust is competence. Competence includes the visitors overall evaluation of the website and is similar to the standards for SEO. Some questions to think about when designing for competence are: "How easy is the site to navigate?"; "Does it feel like the site is breakable?"; "Does it have a working search feature?" By answering these key questions we can guide our designs towards ones that convey a sense of competence and build trust. Many of the key factors of establishing trust, especially competence, factor into designing aesthetics.

Aesthetics directly impact the user experience. There are two general types of aesthetics, classical and expressive. Clean lines and symmetry help build the basis of classical aesthetics while animations and originality evoke more of an expressive design style. Many destination websites fall somewhere in between these two aesthetics, favoring a simple more visually attractive format. Well-organized, friendly, and pleasing user interfaces create positive first impressions that attract and maintain target audiences. (Hartono and Holsapple, 2019; Seckler et al., 2015; Ziakis et al., 2019). Important elements of design are color palette, consistency, symmetry, repetition, pattern, shape and form. These elements can be seen in Figure XX. They have

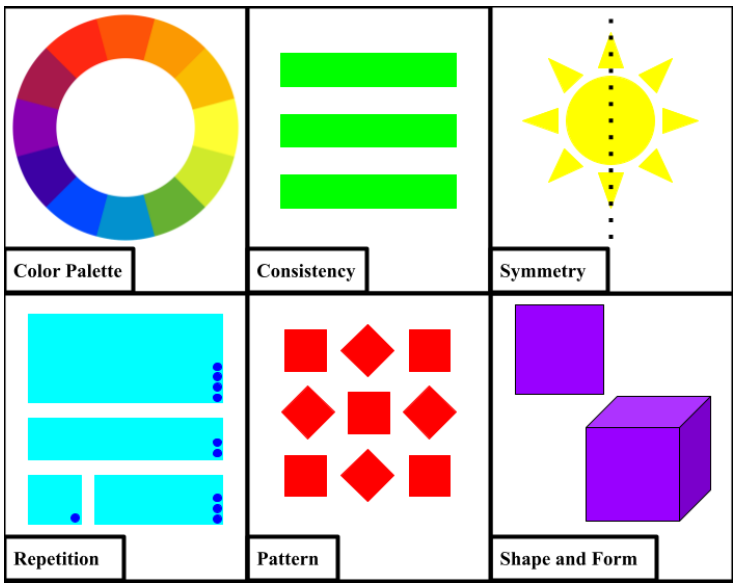

Figure 4: ***Elements of Design.***

the ability to influence the users mood, interactions, behaviors and, as discussed above, trust.

Color preferences within user interfaces vary with cultural influences. Color has a long history of being used in marketing. For different cultures color has different meanings and symbolic connotations. For example the color black is often connotated with fear and darkness in western culture, while it is a preferred design color in other countries. In our attempt to make a website that attracts visitors from abroad we need to take into consideration the meanings of colors universally. The most used colors in global website interfaces include white, grey, yellow, black, and blue (Kondratova and Goldfarb, 2007). Tourist websites often employ a substantial amount of images. Colors used with images, especially background images, should include tertiary and complementary colors to create contrast. When combined with the structure color can help direct visitors attention and initially captivate new viewers.

The remaining design concepts of consistency, symmetry, pattern, shape, and form all help to dictate the overall structure for the web page as visitors respond better to information that is organized logically. Often this means implementing a form of informed redundancy where styles are repeated throughout the website in the same order or with similar content (Luna-Nevarez and Hyman, 2012). This allows the visitor to gain a better innate sense of how the site functions and navigate the site more intuitively. Visitors build better trust through this structural design when content and design are uniform and implemented in such a way that elements do not appear strange (Seckler et al., 2015). Creating a well-designed, intuitive, and consistent interface that encourages visitors to further explore the website requires both a knowledge of the audiences of the website and user testing to understand the user experience.

Visitors are more likely to stay on a page that promotes information that directly relates to their interests (Gofman et al., 2009). Dividing the audience into subgroups that have similar behaviors, demographic, or motivation allows for a more audience centered approach to design (Villaespesa and Stack, 2015). This division is referred to as audience segmentation and the subgroups segments. When designing an interface that caters to different subgroups the most important characteristic to keep in mind is motivation. Often audience segmentation occurs with an already existing audience group where either site metrics or real time data can inform the segments (Jansen et al., 2017). We will not have access to this information when designing the initial website for La Plata, however we can implement segmented content into the website that can be later refined through the use of analytics.

Analytics help website developers under-

stand particular areas of interest for different audiences. Google Analytics, a popular solution for personal and commercial web metrics, enables web developers to gain various statistics to quantify inbound/outbound traffic and usage of specific web pages within the overarching site. Sources of traffic, bounce rate, and other statistics can be compared over a select duration of time to gauge performance, which is particularly useful for maintainers (Plaza, 2011). Aside from the inherent benefits of collecting usage data, it is also possible to aggregate feedback from/on audience segments. As a result, we can identify and form trends based on our visitor's point of entry into the website, time spent on specific pages, and their overall behavior. This is especially valuable not only for understanding the activity of target audiences, but also in figuring out methods to expand and optimize it

Visitors are more likely to revisit a site if the content seems relevant and useful to their own goals. A website's ability to project certain sentiments or desired characteristics can increase usage by specific target audiences. For example, an individual may use and recommend a website that has a "smart, cheerful, exciting and friendly" atmosphere to their peers in an attempt to project these characteristics as part of the image of themselves (Dittmar, 1992; Hartono and Holsapple, 2019). Seeking feedback from target audiences through the use of surveys, focus groups and other studies may allow developers to design the website with a specific target in mind.

Methodology & Results

The goal of this project was to provide a website to enable populations around the world to engage with and experience La Plata reservoir. In our project we worked with staff at La Plata to develop an interactive website that informs people who are planning a visit and engages visitors who cannot travel to the refuge in person. Our final deliverable consisted of a website and a user's manual from which the DNER can learn to operate, update, and maintain the website. The process in producing these deliverables was guided by the following objectives:

1. Characterize current visitors of the reservoir and their purpose in visiting.
2. Identify features and activities of the reservoir relevant to those visitor groups.
3. Identify best practices that attract and engage visitors of destination websites.
4. Design and iterate the website interface and content based on above research.
5. Present a guide for future website maintenance.

Scope of the Project

Given the brief timeline of the project we provided the DNER with our sense of what might be feasible. We aimed in our 8 weeks to develop base formatting and key features of the website. Content placed on the website was provided by the DNER and modified to match our needs. This allowed us more time to work on the technical aspects of the project and populate pages of the website that are of highest priority for local visitors.

Objective I: Characterize current visitors of the reservoir and their purpose in visiting

Successful web designers develop content that meets the needs of their target audiences (Gofman et al., 2009). We began by establishing what type of visitors come to the refuge using survey data taken by the DNER and data from their management plan. The primary visitor group are fishers.

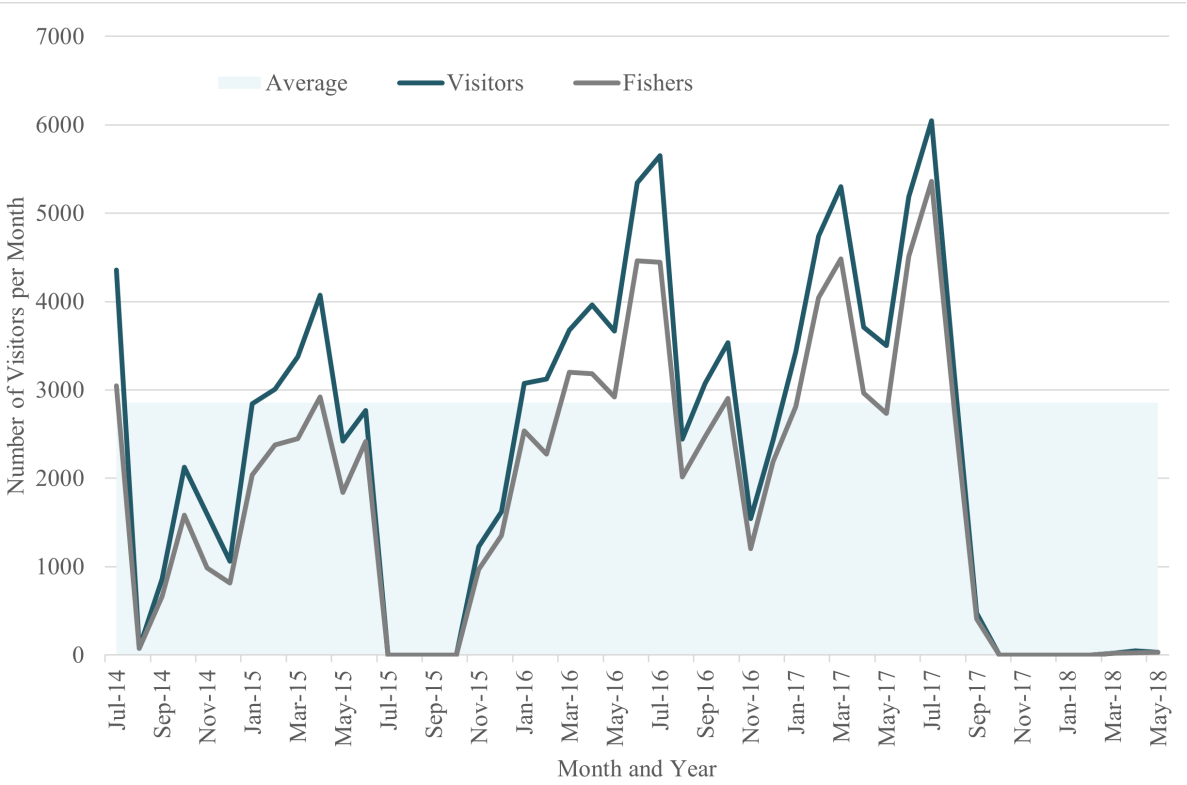

Figure 5: ***DNER Data on Anglers at The Reservoir***

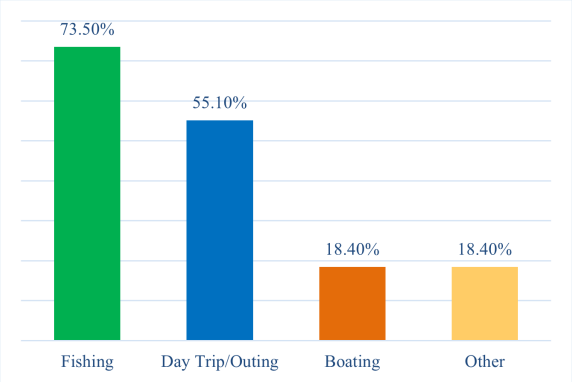

Figure 6: ***Major Activities at La Plata***

In a DNER survey conducted from July of 2014 to May of 2016, the park saw an average visitation of 2,858 visitors per month, 2,302 of which were fishers. On average, we found that 81 percent of the visitors to the refuge participate in fishing as illustrated in Figure 5.

We identified other types of visitors based on the activities they pursued at the reservoir. A survey conducted as part of the 2013 management plan was administered among 196 visitors of the refuge. It tasked visitors with identifying their reasons for coming to the reservoir. Many visitors of the refuge participate in multiple activities when visiting, which can be seen in Figure 6.

Day Trip/outing refers to people that come to La Plata for the day without a specific purpose, while the "other" category involves activities like bird watching, service projects, and group events. Discussion with the DNER helped us develop a better understanding of current and desired target audiences. The DNER identified anglers, bird watchers, scouts, and people who enjoy nature as their main visitor groups. When we asked who they wanted to see coming to the reservoir and visiting our website, the consensus was "everyone". Keeping this in mind, we developed a broad initial segmentation of our audiences as (1) those seeking to plan a visit, often people from Puerto Rico who come to the reservoir with their families; (2) those looking for recreation, mainly fishing, boat-

ing and birdwatching; (3) those seeking to learn whether through live seminars, information on the website, or hands on through educational projects.

Objective II: Identify features and activities of the reservoir relevant to those visitor groups

These three audience segments have different motivations for visiting the reservoir. Through discussion with the DNER we identified several family groups that often visit and participate in varied activities as potential interviewees. In total we conducted 3 interviews, with 8 people in total. Two members of our team and a DNER employee providing translational help worked together to conduct and record each interview. We asked the interviewees about their main reasons for visiting, their connection to the reservoir, and features and activities they found important. The full list of guiding questions for each interview can be found in Supplemental Materials B (SM-B).

We initially reviewed transcripts of these interviews to get insight into each interviewees motivation in visiting the refuge. In this review we determined that there were three important characteristics of the reservoir that kept these visitors coming back as seen in Figure 7.

These three characteristics stemmed from answers we got throughout the interviews. Our interviewees all pursued different activities at La Plata, conducting research, therapy, fishing, enjoying nature, working with the scouts being just a few of them. This diverse group, however, brought up these three common experiences. Because these experiences were universal to the experience of La Plata we deemed it important to include how La Plata accommodates different people, creates a sense of community, and displays the region's natural beauty. This could be done by featuring the paven walkways through the refuge and the seminars that are taught to persons with disabilities, expanding the La Plata community to an online form through feedback with the DNER, and including the atmosphere of La Plata through diverse media.

We looked closely at differences between what we learned from the DNER surveys and our interviews. This scrutiny helped us to discover that visitors highly value areas like the butterfly farm.When we analyzed these results with those from Objective 1, we could clearly see that people most often come to La Plata to fish, boat, and enjoy nature. Since La Plata does not offer rentals for boats or fishing equipment many of the visitors who engage in these activities are locals pursuing day trips.

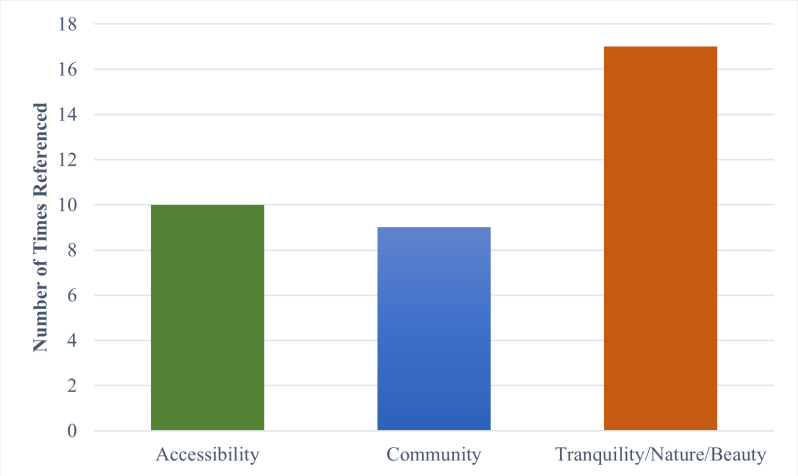

Figure 7: ***Interview Themes***

Other activities that people enjoyed were birdwatching, conducting research,and participating in the seminars offered. These serve to more clearly define our audience groups as we can now see that people planning trips will mostly be from Puerto Rico and "those seeking to learn" segment also includes independent researchers. Using this information we can better target these audience groups, their wants, and needs.

Objective III: Identify best practices that attract and engage visitors of destination websites

We combined information on the current audience segments and experiences at the reservoir to guide our research on presentation strategies. To choose what presentation models we wanted, we conducted a literature review of strategies used in web design. Overall destination web design practices place an emphasis on simple and clean web design with intuitive navigation and an emphasis on interactivity (Luna-Nevarez and Hyman, 2012). In terms of what makes the website layout more intuitive and clean we realized our pages needed hyperlinked images that lead to other sections. When regarding park websites like in Figure 8 the images on the homepage with informative titles link to other pages. This allows the visitor to take control of their experience and pursue topics that interest them.

Evaluating the quality of a website is difficult due to the wide variety of users and the relative newness of the field of study (Law et al., 2010). We decided to use our studies in web design to add questions to our interviews and follow-up surveys so we could better understand what audiences at La Plata look for in a website. As we developed these findings we better understood optimizing web design for the engagement and enjoyment of our target audiences.

We used the opinions of our interview subjects to focus our content for the website. Distinctively, an interviewee expressed their interest in making La Plata a unique space. They described their normal day, as finding a comfortable place on the lake to observe endemic fauna. This indicated that outside of viewing the lake itself, the many insects and animals that reside in the refuge comprise a key part of their experience. In particular, this interview made us learn that we overlooked a critical part of any organic experience: sound. We realized that by implementing ambient nature sound we would create a more desirable and immersive atmosphere for visitors who could not visit the refuge in person. As such, we incorporated bird sounds to our birdwatching page and used more organic nature sounds in our virtual tours. Others we interviewed suggested displaying fauna and natural sights of the local ecosystem. Hence, we decided to insert more visuals overall, with emphasis on the mountainous terrain comprising horizons distant from La Plata, and the lake itself. These details were particularly helpful in creating a refined website for interested parties to access.

After each interview we had our participants fill out two surveys with questions found in SM-D and SM-E. One set of these questions, SM-D, were more direct and asked questions with a multiple choice format. The other set of questions in SM-E were open-ended and inquired about what our interviewees do at La Plata and what media can we use to implement said experiences. Additionally, the follow up surveys used a series of questions based on examples of different designs, and media from other virtual tours. These surveys allowed us to gauge interest in virtual learning and entertainment through videos, online seminars and interactive web activities among our specific audiences. Specifically, we asked DNER related contacts their prefered method of viewing their specific segmented content. Our survey consisted of questions related to the preferred method of delivery they would like

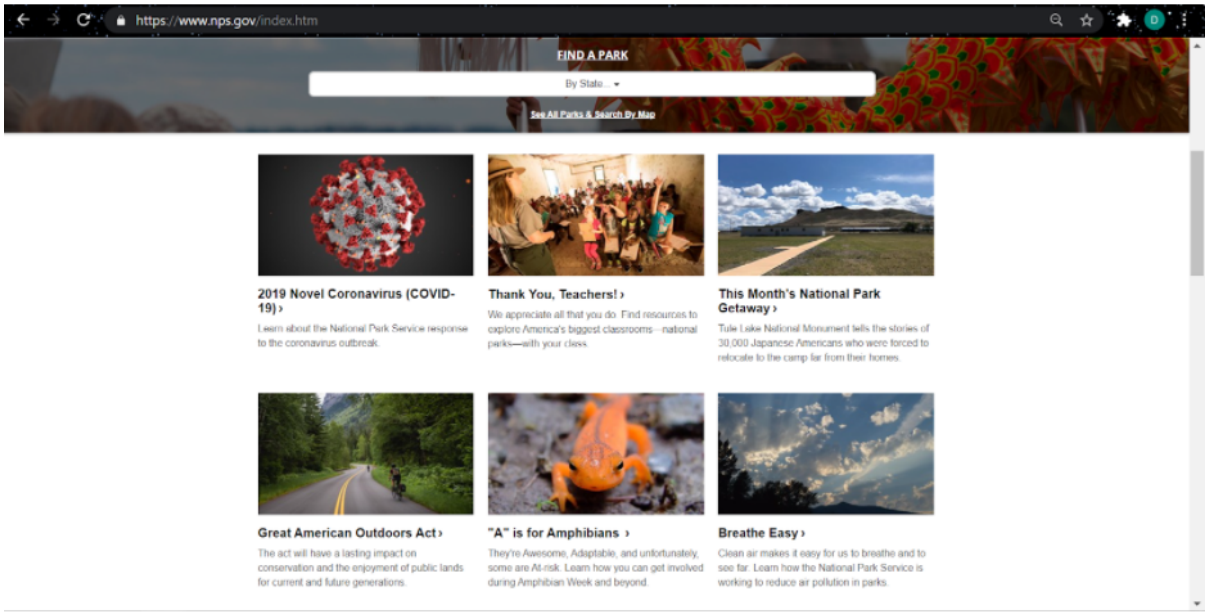

Figure 8: ***Homepage of National Park Services Website***

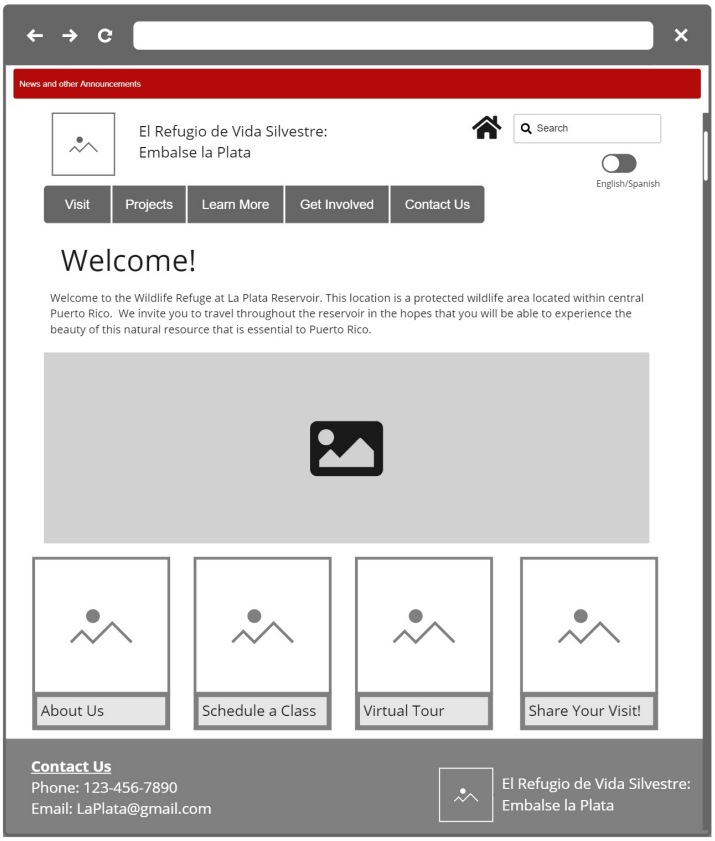

Figure 9: ***Basic Website Layout***

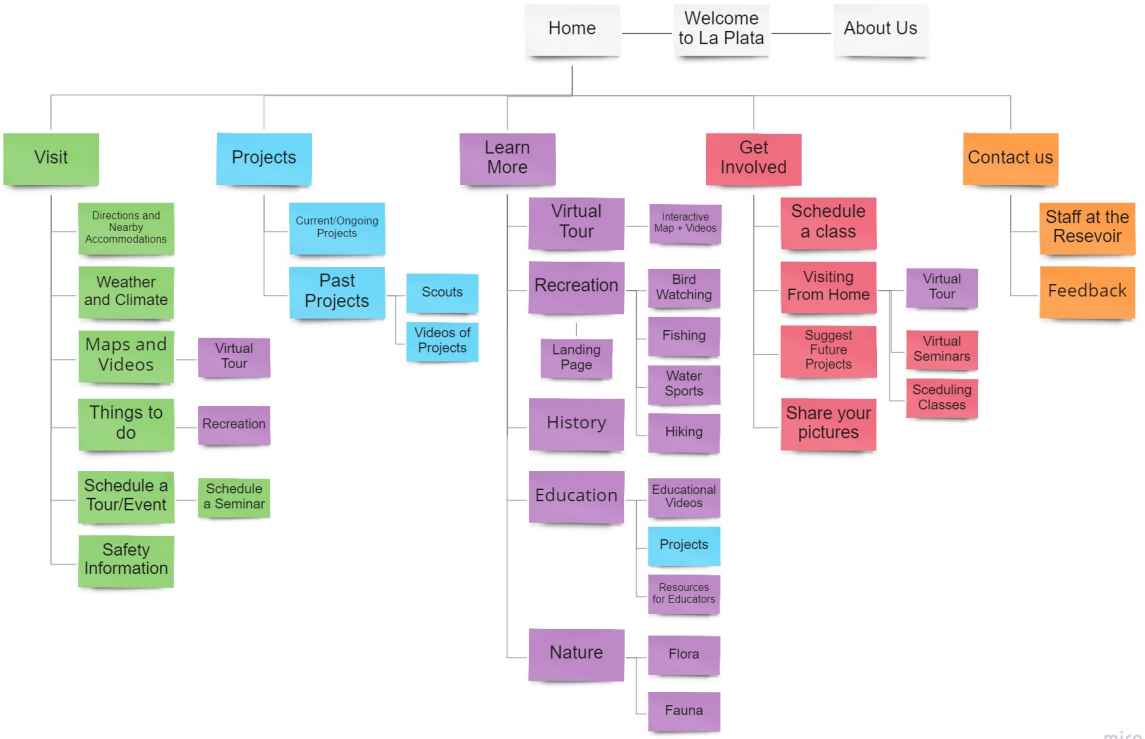

Figure 10: ***Initial Website Topology***

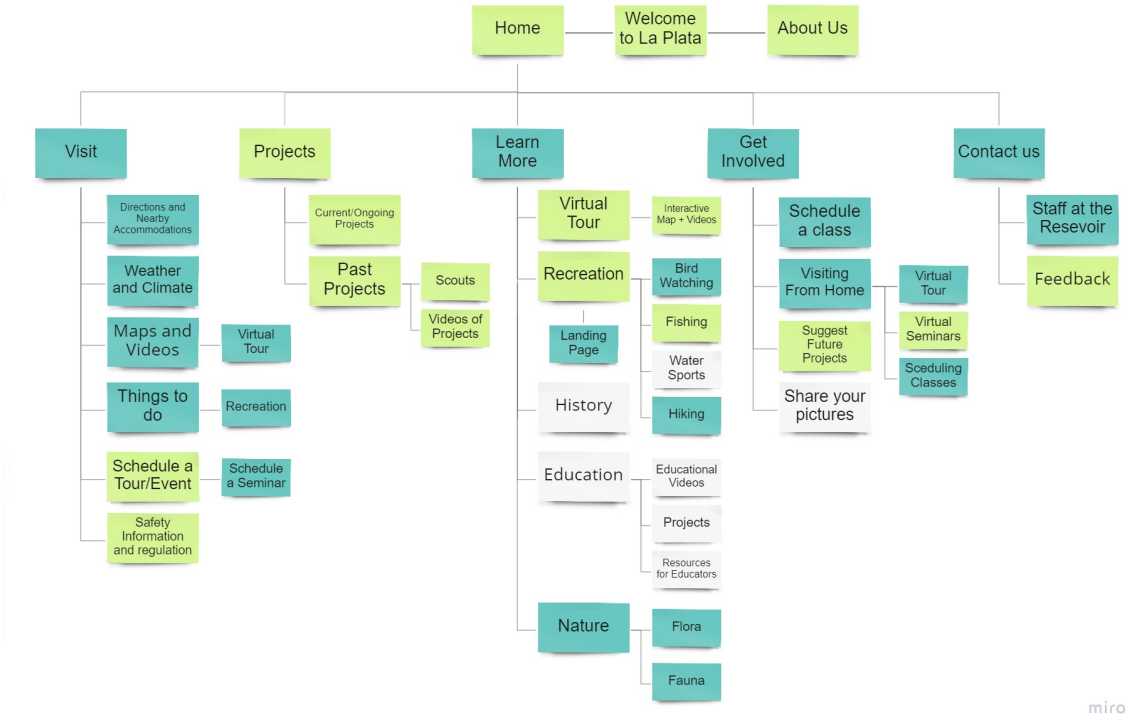

Figure 11: ***Website Layout Indicating Areas We Prioritized for Completion***

The options that we initially presented to the DNER were varied and required differing amounts of time to complete, leading to our emphasis on specificity. The data we gathered through these interviews and follow up surveys was vital to our project as we made logical conclusions on how to proceed with website design based on our findings on two factors: enjoyability and popularity. Bearing these findings in mind, we aimed to establish precedence on what the website should include. We used our survey and interview data to reinforce the conclusions of our research. This gave us the knowledge with which we could proceed to formatting and designing the actual website.

Objective IV: Design and Iterate the website interface and content based on above research

With the information collected above, we began by determining our website priorities, then we researched hosting, creating an interface design, website testing, and finally publishing. Throughout the previous objectives, we communicated with our sponsor and community members about their wants and needs for the website's content. This culminated in a "wishlist" of desired features, topics and media that we used for initial prototyping. We were also provided with written materials and other media that we then indexed using an inventory-tracking spreadsheet. Using our inventory system we were able to request new and/or missing materials. Accessibility for pre-established audience segments was one of the primary design goals for these prototypes, to increase the potential user engagement.

Following the establishment of these design objectives, a general website format was drafted, as seen in Figures 9 and 10. Additional content was placed as more written information and media was provided by the DNER. We presented the initial layout as well as subsequent iterations to the DNER staff for critique and refinement.

After receiving critiques on this initial chart, we realized we needed to prioritize developing an overall website structure with example pages that can be built from as a template. Figure 11 shows our final plan for the website with prioritized areas in dark green.The lighter green pages are integral supplementary pages that need to be completed after the dark green ones. The final grey or white tabs are those we did not think we would have to complete.

The limited technical background of both the team and the DNER served as an additional constraint in determining the design of the website. While we initially considered the idea of adding to the DNER's current online resources, we soon realized that working with a .gov website was out of scope (Dot-Gov, 2018). So, we realized that we needed to create the website through a third party service that could allow us to fulfill the DNER's needs.

We investigated six different web hosting platforms and the different plans they offered. Each service needed to allow the website to be built without code. Our initial search began with Weebly, Wix, Squarespace, Hostgator, Strikingly, and GoDaddy, all commonly-used website development and design platforms. We initially compared pricing, bandwidth, and storage, taking into consideration contracts and promotional material. A comparison of these websites is shown in Figure 12.

We performed a cost benefit analysis to decide which website hosting platform to use, and Squarespace was the best fit for the project. Squarespace is a website builder with ample storage and bandwidth that also enables users to export their website for further expansion, or, in this case a smooth transition to the dot.gov domain.

After deciding to use Squarespace we began content development. Using the raw footage we requested from the DNER, we

SERVICE	PLAN	$/MO (ANNUAL)	$/MO (MONTHLY)	BANDWIDTH	STORAGE	METRICS	SEO	ADVERTISING
WEEBLY	PROFESSIONAL	$12.00	$16.00	NL	UNLIMITED	Y	Y	NL
	PERFORMANCE	$26.00	$29.00	NL	UNLIMITED	Y	Y	NL
WIX	VIP	$39.00	$47.00	NL	35 GB	Y*	Y*	
	BUSINESS BASIC	$23.00	$28.00	NL	20 GB	N*	N*	$300 VOUCH
	BUSINESS UNLIMITED	$27.00	$33.00	NL	35 GB	N*	N*	
	BUSINESS VIP	$49.00	$56.00	NL	50 GB	Y	N*	
SQUARESPACE	BUSINESS	$18.00	$26.00	UNLIMITED	UNLIMITED	ADVANCED	Y	UP TO $100 GOOGLE ADS
	COMMERCE BASIC	$26.00	$30.00	UNLIMITED	UNLIMITED	ADVANCED		
	COMMERCE ADVANCED	$40.00	$46.00	UNLIMITED	UNLIMITED	ADVANCED		
LEGEND								
NL	Not listed on website / available without sign-in.	Y	Included with plan.	Y*	Included, but only for the first year.	N*	Not included with plan, but can be added.	

Figure 12: ***Hosting Service Comparison Spreadsheet***

created an introductory video, walking tours, and showcases of current projects through the reservoir. We also incorporated coordinates provided by the sponsor into an interactive map where information or media about the specified region is provided. Multiple layers of pre- and post-production were required in order to create the videos. We used a general process beginning with inventory of raw footage and ending with storyboarding and screenwriting. The actual editing portion began as we combined and shortened videos to create overall visual effects. From there, we mixed and edited audio. Then, we submitted the video to final audio editing and then sent it to be encoded before uploading it for public view. The Adobe suite, the "industry standard," was used as the primary method of editing all media placed on the website. Although we mostly used Adobe Suite, a few additional programs were necessary for specific purposes. Figure 13 shows a summary of the software used in generating the visual and interactive assets for our webpage, more detail can be found in SM-K.

Other key components of the website under development included a comments section, a place to suggest new projects, and a system to allow for scheduling events.

Media	Editing Software	Purpose
Videos	Premier Pro	Video Editing
	Audition	Audio Editing
	After Effects	Final Render and Composition
	Media Encoder	Final Render and Composition
	Youtube	Live Streaming
Photos	Photoshop	Photo Editing
	Lightroom	Photo Editing
Interactive Map	MapHub	Creating Exclusively Map Elements

Figure 13: ***Media Editing Software Spreadsheet***

As the Squarespace plan we used is commonly utilized by small businesses, with the web builder being further extended by hundreds of third-party addons or embedded code, all of these components could be integrated with relative ease. There are several technological options that would allow us to create these forms including:

1. An email linking to the website that aggregates all user feedback. This email would then need to be moderated by DNER staff.

2. A forum where the DNER has full ad-

ministrative control of all commentary. While this leads to a system of constructive criticism and questions being clearly displayed on the website, it does not follow the DNER's request to have sole access to the responses.

3. A database comment system that congregates comments and sends them to the DNER's desired contact information. This is very similar to the email alias in option 1 above.

4. Linking the directors' emails in a section on the webpage aptly named "Contact Us". If other methods fall out of the scope of the project, this method will be implemented.

We chose to use the first option of using an email, as we had already created an email in conjunction with the website and this email can be used to aggregate all information as it regards to the website.

We used a combination of services offered by Squarespace and a third party solution called Acuity to implement seminar scheduling into the website. Through Squarespace the DNER can post any upcoming events or scheduled seminars they have. If a potential visitor does not find an event or a specific seminar they wish to go to on the schedule of events they can then book a seminar using the Acuity feature. This will allow La Plata to schedule events, attract tourists, prepare for any seminars they need to offer, and increase dialogue and a sense of community with visitors.

Our original plan was to test our prototype web design using focus groups, however, after facing major setbacks in scheduling our interviews, we chose to use surveys. Surveys were distributed through the WPI community using various organizations and platforms. Each consisted of questions about the user experience and a place to indicate willingness for further participation in our studies. The first question of the survey was specifically used to segment the audience testing our website, while the rest were used to gauge levels of interactivity, ease of use, trust, and enjoyability. A full list of the questions used can be found in SM-F.

After receiving the initial survey data, we decided to move on to user testing with our improved website design. We were unable to test with contacts who had visited La Plata, but instead tested 4 different users who were planning an initial visit to La Plata. Each user was tasked with talking through their process of going through the site as directed by the group member acting as a moderator. This moderator was also responsible for keeping thorough notes which were later used in making design decisions.

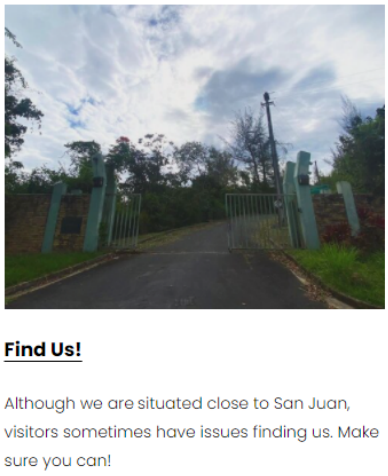

Figure 14: ***Hyperlinked Image Setup***

Our primary goals were: (1) assessing if the tester had issues finding information; (2) how many clicks it took them to find their final destination; (3) the amount of time spent on each page. These three assessments and any commentary from the user were all taken into account when later refining the website.

We made several changes to the website based on user feedback. The first changes were navigational. Users found it difficult to navigate back to and between pages they had

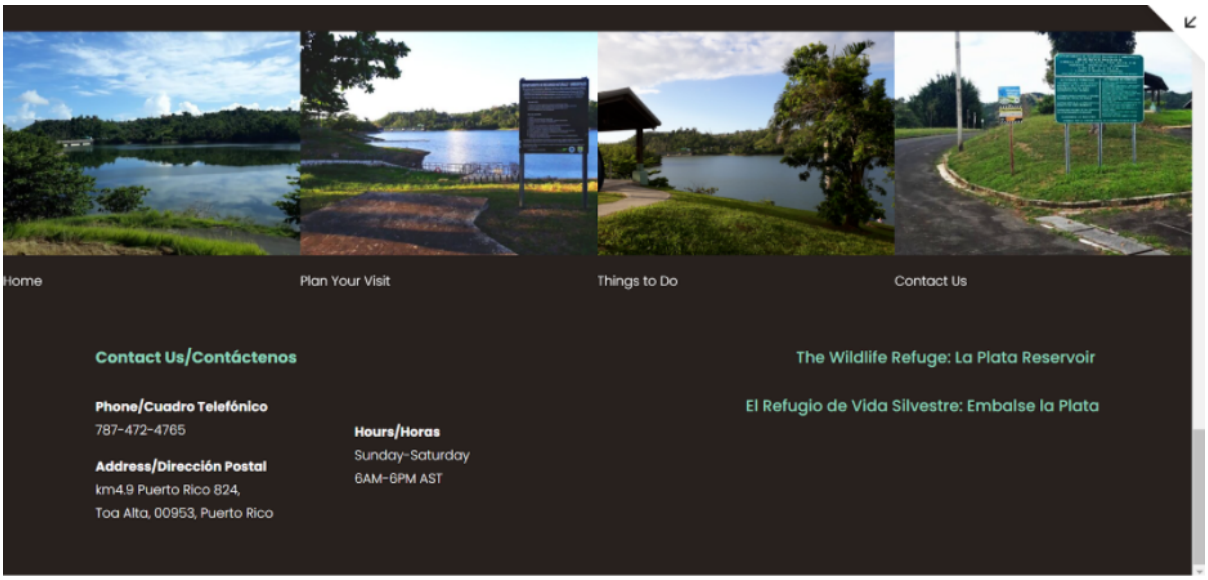

Figure 15: ***Navigation Bar***

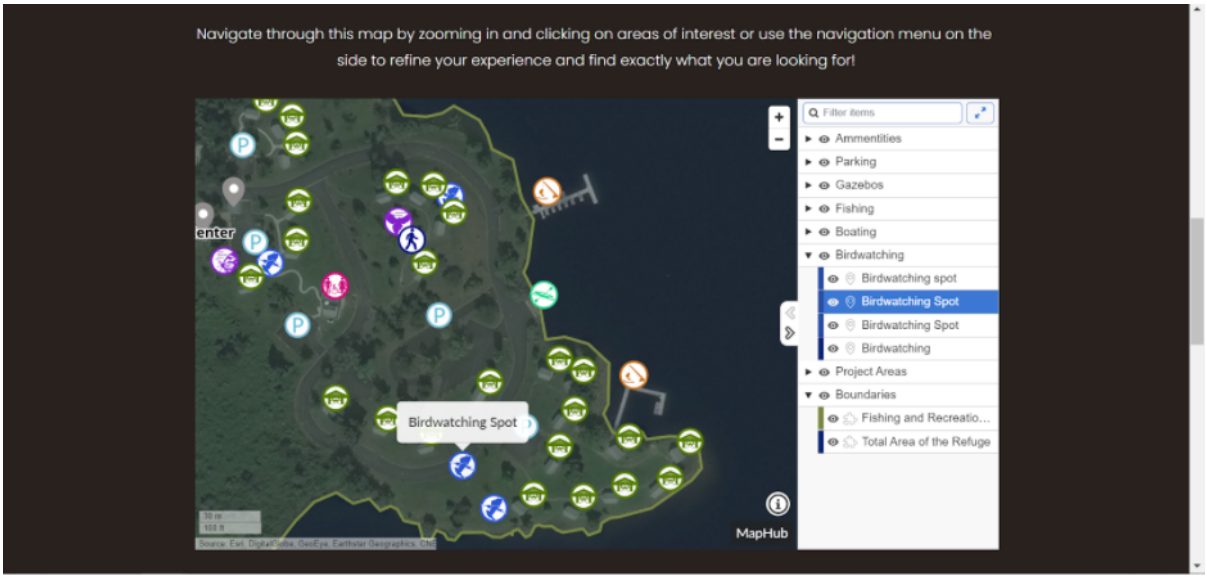

Figure 16: ***Updated Interactive Map***

visited. To remedy this we added features like a navigation bar at the bottom of each page and, on some pages, hyperlinks that allow you to return to your previous page. The four button navigation bar is shown in Figure 15. From there we began to address issues with uniformity. Previously our site had included buttons, images you could click on, and text as ways to navigate between pages. Based on feedback we chose to use the same format seen in Figure 14 for any linked images.

Based on feedback we also added several updates to the virtual tours page. These included adding more videos featuring La Plata and modifying the interactive map to include directions, modified iconography, a legend, and a search feature as seen in Figure 16.

We also received some feedback we were unable to implement. All of the users commented on the navigational "quirks" to the site because of the language selection feature; The tabs at the top of the page branch from the language selection. While we cannot change this due to the structuring of Squarespace, if the site were ever exported to a WordPress format this could potentially be remedied. Many of the users also commented on a lack of hiking or a "real experience with nature." These are features that La Plata does not currently have and we could not include them in our designs. Finally we also received comments that our videos and photos were occasionally lackluster or the lack of people in the photos was off putting. Due to limitations on the media we received we did not have the resources to change the photos or videos on the site. Since we were unable to add these suggestions, we are including them in our recommendations and providing the DNER with a guide for how they can continue to update the site.

Objective V: Present a guide for future website maintenance

The end goal of our project was a functional website structure that could be updated and maintained by the DNER. To allow the DNER this ability without our continued assistance we decided to write a guide on the basics of website upkeep. We wrote this guide throughout the process of designing and integrating our website. As we worked on important developmental steps of setting up the website architecture, aesthetics and associated media we wrote the associated pages of the guide. Upon relative completion of our deliverables, the website and the guide, we passed both items over to the DNER staff with recommendations for publishing and potentially transferring to the DNER's dot-gov domain.

Deliverables

The La Plata website is the main deliverable for this project; its purpose is to attract visitors, and maintain engagement given difficulties the coronavirus pandemic and natural disasters in the past have caused. The overall structure of the website can be found in Figure xx. This figure lends itself to understanding the navigation of the website the colors determine what level of organization each page is on. The home page leads you to English and Spanish which divide into the other main hub pages. For simplicity of the graphic Spanish pages were omitted as they follow the same structure as the English pages. We were unable to complete the entire website, however we successfully created the website structure. We completed a majority of the pages specified in Figure XX, only History, Education, and several of the individual Project pages were not completed.

Sharing our Deliverable

The following represents the potential user experience of a fisher local to La Plata who has never visited before:

"Upon clicking into the new La Plata website I am greeted with the homepage and a language selection. As an ecotourist that only speaks English, I click the English language option." (Figure 17)

"There I am greeted with the 'About Us' page [Figure 18]. This page features many items that allow me to learn more about the park and plan my possible visit. Scrolling through the page I can see various links and subpages showcasing the general outline of the website, and the purpose of La Plata. As someone who wants to learn more about the reservoir so that I can plan my visit, I click the 'Plan your visit' tab. Here, I am greeted with varying pieces of information including the hours the park is open, recommendations for first time visitors, a simple map that shows amenities and varying points of interest within the reservoir, and some rules and regulations (Figure 19). After seeing all of this I am drawn to learn more about activities I could potentially pursue at La Plata as I am interested in going there in person."

"When I click 'Things to Do' at the bottom of the page to learn more, I see a list of all of the recreational activities that are available to me and other park goers (Figure 20). Since this is my first experience with La Plata, I first look at the virtual tour. In that page I can view videos showing an overview of the reservoir. Viewing the walking tours gives me a general outlook of what I can see and witness in person. The interactive map, found in between these tour videos lets me learn about points of interest within the area of the reservoir. Now even more interested in learning more and going to La Plata so I go back to 'Things to Do'. From there I click on 'Recreation'. This brings me to a webpage similar in structure to 'Things to Do', where I can go and learn about all 5 different activities."

"I am by far most interested in fishing as I heard from a friend that it is one of the major reasons I should visit La Plata. From the recreation hub I click on the 'Fishing' page. On this page I can scroll down to learn more about fishing regulations, each type of fish, different fishing methods, necessary equipment, and I can even click a button to schedule a seminar. I like to schedule events ahead of time when I am planning a trip so I navigate to schedule a seminar. The seminar page lets me view the different types of seminars offered at La Plata, and provides a calendar where I can add a seminar. After reading about the seminars offered on Flora and Fauna at the reservoir, I am extremely interested in learning more about nature at the refuge. I remember seeing nature on the 'Things to Do' page so I navigated back there using the navigation bar found at the bottom of the page. When I click on nature I am presented with two options, flora and fauna at the refuge. I'm interested in seeing what animals are in the reservoir other than the fish featured on the fishing page so I click on 'Fauna'. As I scroll on the fauna page I learn about the different animals studied at the reservoir. Now I just have a few questions I want to ask so I scroll to the bottom of the page to find their contact us page. From there I just leave a message and my email and I cannot wait to receive a reply back!"

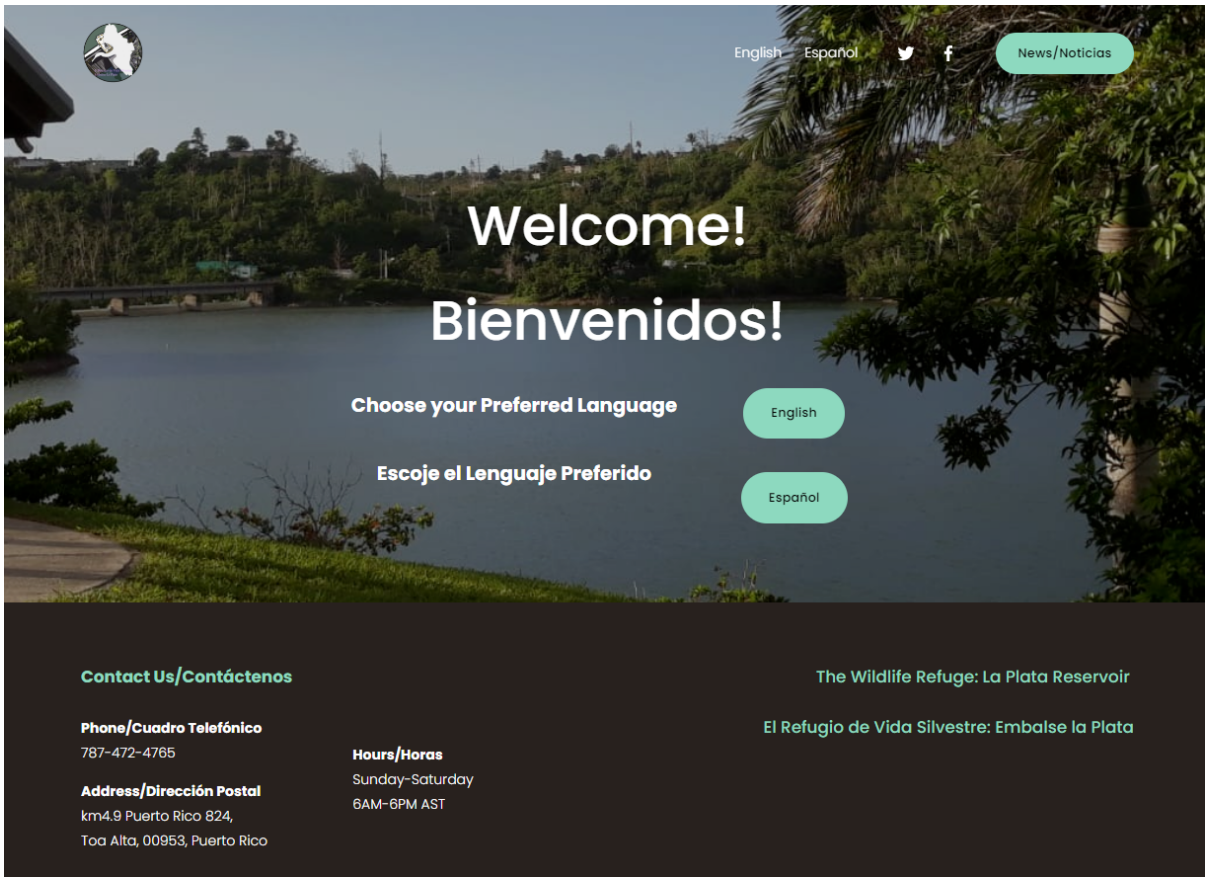

Figure 17: ***Website Homepage / Language Select***

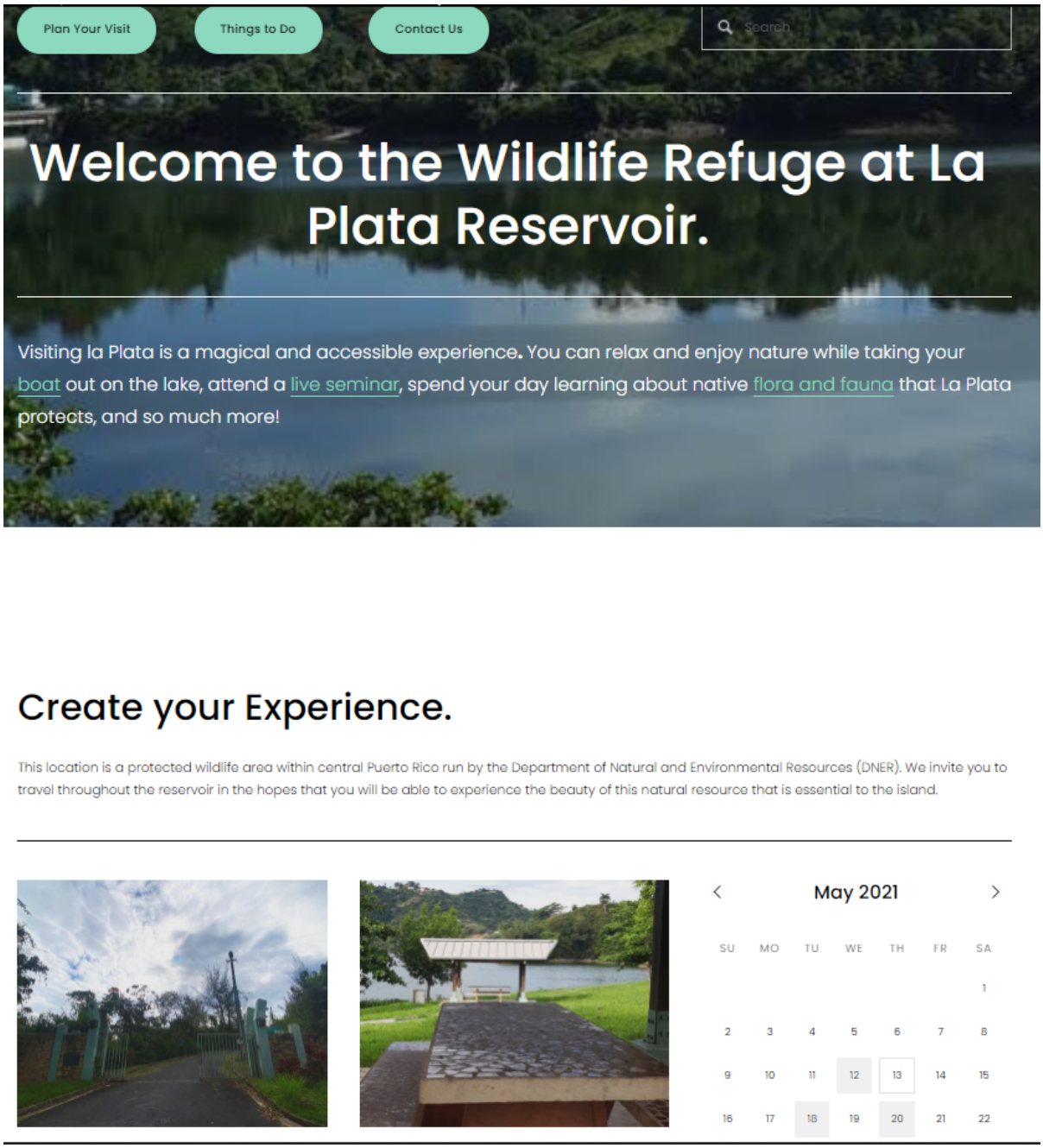

Figure 18: ***About Us Page***

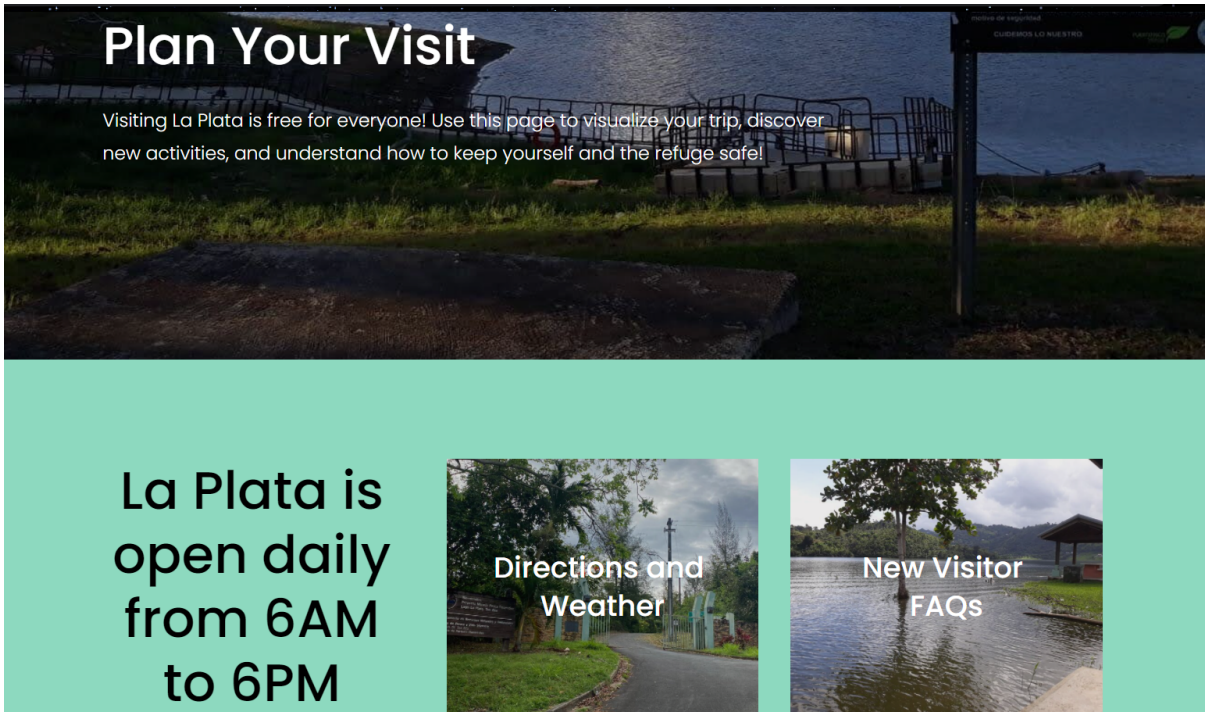

Figure 19: ***Plan Your Visit Page***

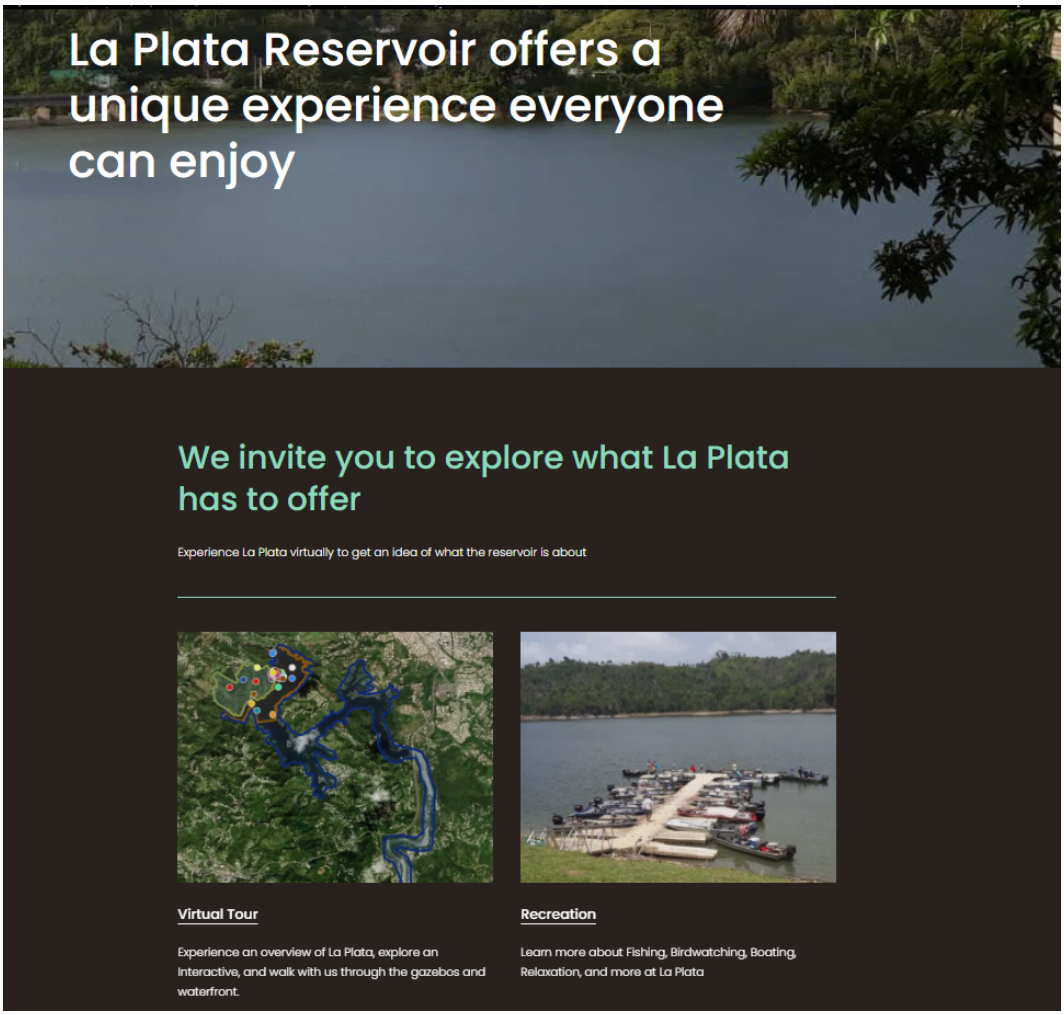

Figure 20: ***Recreation Page***

The User Guide

A user guide was also created in order to aid the DNER in updating and maintaining the website once it was passed off onto them. This user guide constituted many sections of the website including web design, how to organize varying portions of the website itself. The guide has 8 chapters, the breakdown of those chapters can be seen in the Figure 21.

The guide is structured with headings, descriptions, and images with descriptive text instructing the reader in an easy to understand stepwise process. We hope that these images work in conjunction with descriptive text to provide ample instruction on how to perform tasks and updates to the website. These different sections combined to form our final deliverable, a guide made to provide a simplistic version of how to understand, add to and edit, our project.

Recommendations & Conclusions

The goal of our project was to develop an interactive website for the DNER that would allow them to continue outreach in the event of closure as well as attract tourists during normal operations. When we began the project, we knew our scope would be limited given the time necessary to develop a fully functional website. Given an eight week timeframe, we met with the DNER to decide what we were to prioritize within the scope of the project. We decided that our priorities would be to establish the overall structure of the website and implement key features such as the interactive map, anonymous feedback/suggestion forms, and scheduling for live seminars. As we worked through our methods, results, and deliverables, we realized a set of conclusions: (1) with the allotted time for working on our website we would need to communicate our established scope for the project and focus on completing fully our priorities and giving the DNER the ability to complete the website themselves; (2) audience segmentation will be an ongoing process that can be developed using the website; (3) analytics can be used to improve the website.

Basics Understanding of the Website		Upkeep of External Media	
Chapter 1	Accessing your Account	Chapter 5	Videos and Seminars
Chapter 2	Adding Pages	Chapter 6	Seminar Scheduling Feature
Chapter 3	Adding Content	Chapter 7	Interactive Map
Chapter 4	Editing Content	Chapter 8	Publishing

Figure 21: ***Summary of Guide Contents by Chapter***

Scope of Our Project and Completing the Website

We successfully completed the overall hierarchy of our website following the priorities we laid out in our methods and results chapter. During user testing, we managed to iterate and refine all of the features we deemed to be primary or secondary priority. History and education, two sections we had initially marked as lowest priority, were left unfinished and unlinked in the finalized site. We also created several pages on the website as templates for the DNER to update in the future as La Plata and its management projects develop. These pages are found within folders like Projects and Recreation and represent components of the website that will need to be updated frequently.

Figure 22 shows the state of the website at the end of our project. Green denotes the page being finished, yellow the page needs work and red the page does not exist or is in the "template" state as mentioned above. We hope that with our guide, the DNER will be able to to fill out pages we lacked information for or had deemed less high priority with relative ease.

We recommend that as pages are updated, the DNER replaces some of the photos and videos on the site. Currently many of the photos and videos on the site do not have people in them, so it is difficult for a potential visitor to view themselves participating in activities at the refuge When operations resume at La Plata, the DNER staff can take photos and videos that include people enjoying the amenities, watching live seminars, and participating in recreational activities at the reservoir. Including these photos on the site on the home page, recreation, projects and their subsets will allow potential visitors to get a more accurate sense of visiting La Plata. Given this more personal representation we can also build trust with site visitors and develop a familiar aesthetic that helps to keep visitors on the site (Seckler et al., 2015). While these photos will provide a more personal element to the website they do not increase engagement with the visitor.

We also have several recommendations for adding interactive elements to the site. These elements could develop engagement with the site as a whole and help develop the learner user group. Some examples of interactive media include interactive activities, resources for educators, and educational video content. In the future these ideas could be incorporated into an education page to provide an amazing platform where anyone interested could learn and reinforce their knowledge of La Plata. A complete list of the interactive activities we brainstormed are in SM-O.

Aside from updates, we also need to consider the technical implications of transferring ownership of the website to the DNER. We plan to present two options: using Squarespace to fully operate their website or exporting the website to a WordPress format to be integrated into the architecture of their pre-existing website.

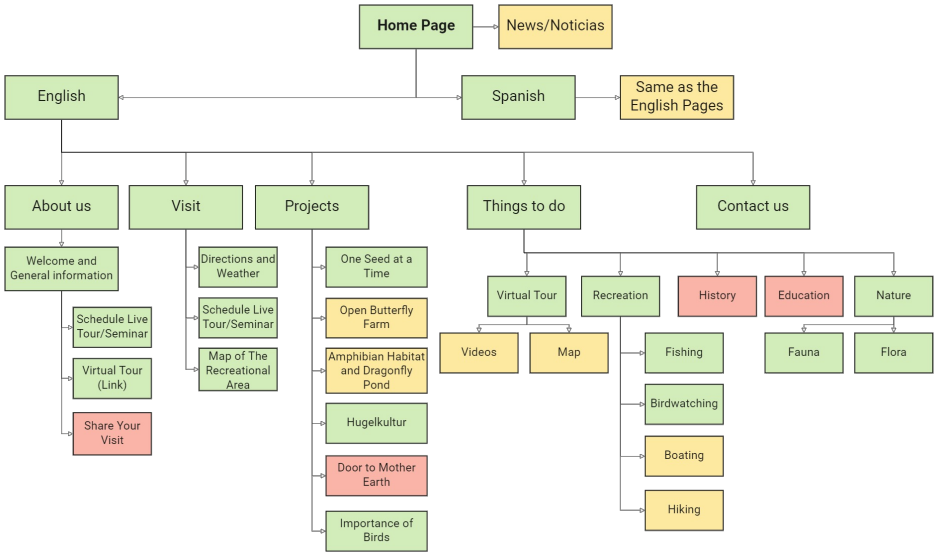

Figure 22: ***Final Website Topology***

Potential issues concerning integration include:

1. Fundamental structural and aesthetic differences in interface design.

2. The monolingual nature of the currently existing DNER website.

3. Complications resulting from the process of exporting the site from Squarespace to WordPress.

These complications are further detailed in the guide. We recommend that the DNER conducts a brief cost/benefit analysis using the information we provide to best determine how to proceed based on their plans for the website and the potential of incorporating the site into the https://drna.pr.gov/ domain.

Improved Use of Audience Segmentation

The current audience segments that we identified initially for the site stemmed from a background knowledge in other natural protected area's websites, primary literature, and information from previous operations at La Plata. Due to the materials we were able to receive and the current state of the reservoir we deemed it more of a priority to cater to potential local visitors. One of our hopes, however, was to develop new user segments:(1) people who only visit the site virtually (2) new tourist groups. Whether we were successful in targeting local visitors or even bringing in these new audiences, the audiences as we currently understand them are going to change, especially as the refuge itself develops. We recommend that in the future the DNER, or another research team, uses analytics on our website to develop our current audience segments and look into creating more segmented material which could potentially bring in more non-local tourists. Once new segments are developed or the initial segments refined, design changes can be implemented. The landing page or in our case the "About Us" page for each language can be updated to include materials that cater towards the prioritized segments. For example, from our surveys we found that people interested in hiking constitute a large amount of tourists from abroad. La Plata has plans to create hiking trails within their reforestation project areas in the future. These trails might help to bring in an audience segment that desires a closer connection to nature, if that segment develops a trail guide or images featuring this new hiking opportunity could be implemented on the home page and in the virtual tours.

Improvements Using Analytics

Using Google Analytics, the DNER can quantify and expand on the specificity of who is interested in the reservoir based on usage data. Following the site's completion, it will be possible to view what pages and content are most appealing to the users of the site and how to better their experience. For example, if people are consistently avoiding a section of the website, you can determine the cause through historical metrics. Then, you can either pivot away from the concept or refine it as necessary until satisfactory results appear. It is for this reason that the DNER should put efforts into familiarizing itself with Analytics, such that the usefulness of this resource can be fully utilized.

One should note the quantity of data that is available to the managers of the site is immense enough to potentially serve as an independent analytical continuation of the website. Accordingly, one essential feature of the guide will be in detailing the semantics of two key factors for analytics, the first concerning overall operation, with the second acknowledging an interface that is suboptimal for typical users whilst making SEO far simpler for those unfamiliar with web development.

Overall, we know that this project will be

a gateway for the DNER of Puerto Rico to take their services and community to a virtual landscape, allowing them to interact with their users even when the refuge is closed or visitors cannot be there in person.

Author Contributions and other technical details can be found in SUPPLEMENTAL MATERIALS.

For this project, SUPPLEMENTAL MATERIALS may be found at https://digital.wpi.edu/ by using the browser to locate Puerto Rico projects and then searching with the project title.

References

De Jesus Crespo, R., Wu, J., Myer, M., Yee, S., and Fulford, R. (2019). Flood protection ecosystem services in the coast of puerto rico: Associations between extreme weather, flood hazard mitigation and gastrointestinal illness. *The Science of the total environment*, 676:343–355.

Dittmar, H. (1992). *The social psychology of material possessions: To have is to be*. Palgrave MacMillan.

Dot-Gov (2018). Domain requirements — dotgov.

Ferré-sadurní, L. (2017). In a puerto rican town, 'water came out of nowhere'.

Fisichelli, N. A., Schuurman, G. W., Monahan, W. B., and Ziesler, P. S. (2015). Protected area tourism in a changing climate: Will visitation at us national parks warm up or overheat? *PloS one*, 10(6):e0128226–e0128226.

Gofman, A., Moskowitz, H. R., and Mets, T. (2009). Integrating science into web design: consumer-driven web site optimization. *Journal of Consumer Marketing*.

Hartono, E. and Holsapple, C. W. (2019). Website visual design qualities: a threefold framework. *ACM Transactions on Management Information Systems (TMIS)*, 10(1):1–21.

Hvenegaard, G. T. and Dearden, P. (1998). Ecotourism versus tourism in a thai national park. *Annals of tourism Research*, 25(3):700–720.

Jansen, B. J., Jung, S.-G., Salminen, J., An, J., and Kwak, H. (2017). Viewed by too many or viewed too little: Using information dissemination for audience segmentation. *Proceedings of the Association for Information Science and Technology*, 54(1):189–196.

Keellings, D. and Ayala, J. J. H. (2019). Extreme rainfall associated with hurricane maria over puerto rico and its connections to climate variability and change. *Geophysical Research Letters*, 46(5):2964–2973.

Kondratova, I. and Goldfarb, I. (2007). Color your website: use of colors on the web. In *International conference on usability and internationalization*, pages 123–132. Springer.

Law, R., Qi, S., and Buhalis, D. (2010). Progress in tourism management: A review of website evaluation in tourism research. *Tourism management*, 31(3):297–313.

Luna-Nevarez, C. and Hyman, M. R. (2012). Common practices in destination website design. *Journal of destination marketing & management*, 1(1-2):94–106.

Naidoo, R., Gerkey, D., Hole, D., Pfaff, A., Ellis, A., Golden, C., Herrera, D., Johnson, K., Mulligan, M., Ricketts, T., et al. (2019). Evaluating the impacts of protected areas on human well-being across the developing world. *Science Advances*, 5(4):eaav3006.

Nayyar, A., Mahapatra, B., Le, D., and Suseendran, G. (2018). Virtual reality (vr) & augmented reality (ar) technologies for tourism and hospitality industry. *International Journal of Engineering & Technology*, 7(2.21):156–160.

Plaza, B. (2011). Google analytics for measuring website performance. *Tourism Management*, 32(3):477–481.

Seckler, M., Heinz, S., Forde, S., Tuch, A. N., and Opwis, K. (2015). Trust and distrust on the web: User experiences and website characteristics. *Computers in human behavior*, 45:39–50.

Villaespesa, E. and Stack, J. (2015). Finding the motivation behind a click: Definition and implementation of a website audience segmentation. *MW2015: Museums and the Web 2015*.

Ziakis, C., Vlachopoulou, M., Kyrkoudis, T., and Karagkiozidou, M. (2019). Important factors for improving google search rank. *Future internet*, 11(2):32.

Zimmerman, J. K., Willig, M. R., and Hernández-Delgado, E. A. (2020). Resistance, resilience, and vulnerability of social-ecological systems to hurricanes in puerto rico. *Ecosphere*, 11(10):e03159.