FDOU Project 26B Task 5 – Our Florida Reefs (OFR) Process Consultation

Florida Department of Environmental Protection
Coral Reef Conservation Program
Project 26B

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Project 26B Task 5

Executive Summary

This report contains a summary of all process and technical consultations that were delivered by Point 97 to the Our Florida Reefs (OFR) process during 2014 and 2015. The bulk of these consultations centered on the design and implementation of an online coastal and ocean use survey, as well as an online data viewing and decision support tool.

An initial data-viewing version of the Marine Planner was established in the first month of the project, and added to throughout the year. Analysis tools added to the Marine Planner during the spring of 2015 took many months of planning, and were driven by a 200 x 200 m grid that was used to summarize 60 critical datasets for the planning process.

The OFR coastal and ocean use survey was developed over the summer of 2014 and implemented that fall. Development of the language, ordering, and focus of each question was done collaboratively during August and September of 2014. The spatial questions were carefully designed with the user interaction, time of data entry, and later use of the data in the Marine Planner were all being considered.

Point 97 offered technical support throughout the year through emails, phone calls, and webinars. The bulk of support requests came from users of the online survey. Defects (bugs) in the code were dealt with via triage, and were most recently identified and resolved in August 2015.

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List of Acronyms

CRCP - Coral Reef Conservation Program
CWG - Community working group
FDEP - Florida Department of Environmental Protection
DST - Decision support tool
OFR - Our Florida Reefs
SEFCRI - Southeast Florida Coral Reef Initiative

1. INTRODUCTION

In 2014, Point 97 was contracted to build and deliver a survey tool, marine planner, decision support tool, and consult on technical and process issues to support the *Our Florida Reefs* (OFR) community planning process. This process was being led by the Florida Department of Environmental Protections Coral Reef Conservation Program (FDEP CRCP) as an original local action strategy of the Southeast Florida Coral Reef Initiative. Data from the survey was collected over the winter of 2014 - 2015, is now visualized in the marine planner, and was used to inform and support decision making during the spring and summer of 2015 by the North and South Community Working Groups (CWGs) on coastal and ocean uses.

Point 97 served as technical and process experts to guide the OFR Support and Tool Teams to develop the survey and marine planner, but all decisions were made collaboratively over many conference calls, emails, and webinars. This report describes the essential components of the survey and the marine planner, and where possible expands on the logic for design, user interface, or decisions made regarding implementation of the tools. This report also describes the nature of common technical support requests, important defects found in the tools during development, and resolutions for these issues.

2. MARINE PLANNER

Marine planner is a web-based data visualization and decision support tool. The OFR survey data, as well as many other data layers, are visualized and processed in this tool to provide users the ability to visualize spatial data and propose spatial options to meet management objectives, based on user selected data. The marine planner was also developed with the functionality to filter data sets based on user input and to compare various spatial options. The OFR marine planner was designed and developed in parallel with the survey, and went through many iterations.

2.1. Marine Planner Lite

Point 97's first deliverable was to provide a lite version of marine planner that incorporated the OFR design, look, and feel. Initial datasets were loaded into the system, and tested to establish next steps for data processing management. Many of the basic tools, default views, database, and other elements were established in the first 10 days for marine planner lite.

2.1.1. Data Tab
In the Marine Planner table of contents, the first tab is Data. This tab contains a clickable accordion of major data themes that expands to show all data layers for a given theme. The data themes used in the OFR Marine Planner are: Coral, Fish, Habitat, Management, People, and Water.
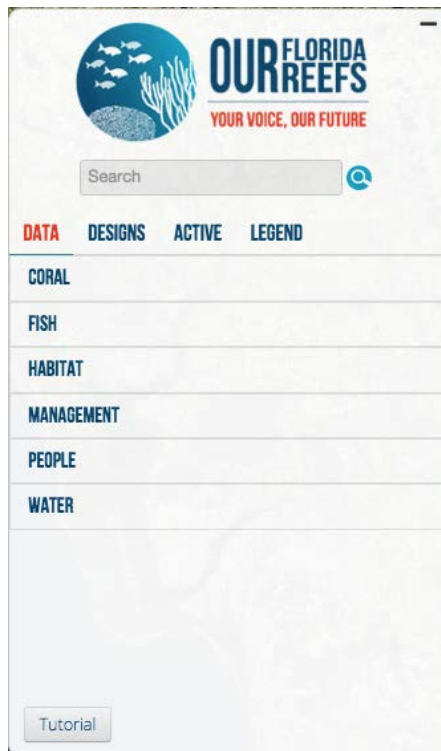
Figure 1. Data tab in Marine Planner with six data themes.

2.1.2. Designs Tab

The Designs tab is the second tab in the Marine Planner table of contents. This tab is only visible and can only be used by registered users of the site. This tab is where users go to create, view, edit, and organize their drawing or filtered designs.
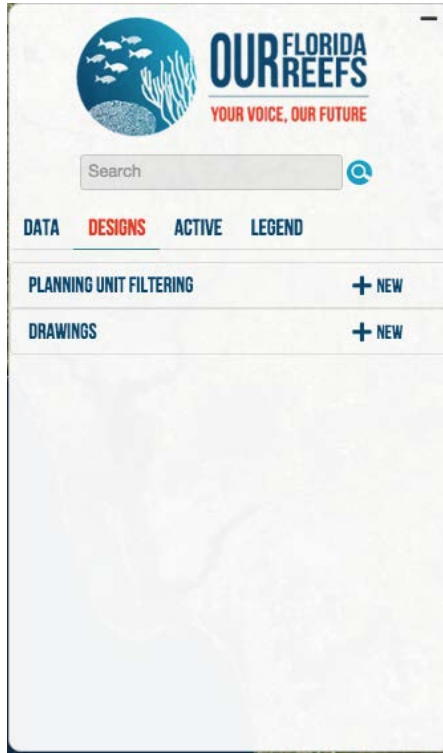
Figure 2. Designs tab in Marine Planner with both drawing and filtered design tools.

2.1.3. Active Tab

The Active tab in the OFR Marine Planner lists all the layers that are active, or currently turned on by the user. In this tab the user has the ability to change the order of layers by dragging and dropping, change the opacity of a layer, and to turn off layers.
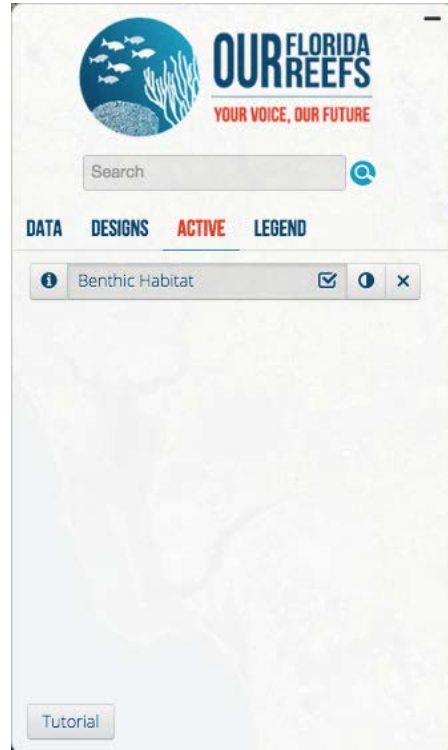
Figure 3. Active tab in Marine Planner showing all layers that are currently visible on map.

2.1.4. Legend Tab

The Legend tab in Marine Planner is where all legends for each layer are stored when the layer is active. Users can go to this tab to understand the various polygon, point, line, icon, classification, or ramp colors with units.
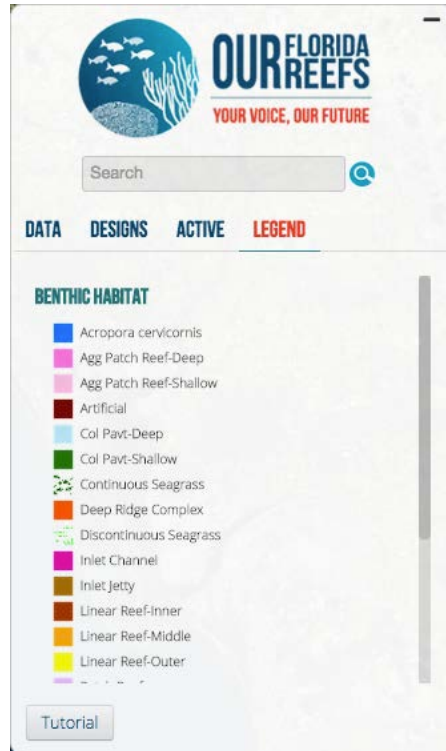
Figure 4. Legend tab in Marine Planner showing the legends of all active layers.

2.1.5. User Tutorial

Point 97 developed a self-guided user tutorial for Marine Planner that is visible to registered users in the table of contents. This tutorial steps a user through the important tools and tabs of the Marine Planner, and offers additional troubleshooting through a support email at the end.
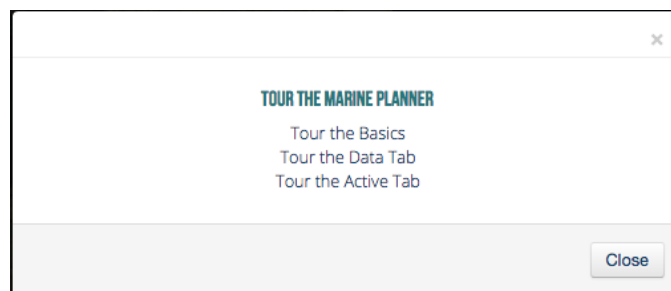
Figure 5. Marine Planner tutorial.

2.2. Data Layer Storage

The OFR Project Team leveraged an existing ArcGIS Online and ArcREST system at the Florida Fish and Wildlife Commission (FWC), and stored all project data layers there. Using an ArcREST to manage the data layers accelerated the process of setting up marine planner, and allowed for staff to easily add layers, or make edits to metadata or legends of specific layers by replacing the file stored there. Additional control of layers was given to OFR Support Staff during administrative training in February 2015. The administrative system allows administrators to manage many features of marine planner, users and groups, and data layers and attributes.

2.3. Designs

The decision support tools of marine planner live in the "Designs" tab of the table of contents. This tab is where users filter data to then visualize and draw spatial options for their recommended management actions, and generate and share reports and shapes for new management recommendations. The OFR tool suite included both an on-the-fly drawing design type and a criteria-based filtering design type. Once users created their designs, be it a filtering design or drawing design, they could share across the groups in which they belonged. Administrators could set groups by assigning users. This feature is useful for the OFR process, where two planning groups the North and South Community Working Groups (CWGs), will need to share and discuss recommendations amongst each other. Designs can also be exported with associated data, to be analyzed further in ArcGIS (or similar program), and potentially later stored on the ArcREST for public display as final recommendations.

2.3.1. Planning Grid
Critical to all designs and analyses was the 200x200 m planning grid and summarized data. The resolution of this grid was debated at length during development. A higher resolution grid was desired for more detailed spatial patterns of use on the reefs, but technical considerations, specifically the speed and performance of the tools, dictated that the number of cells in the grid be limited. After testing on various machines and internet browsers, a 200 x 200 m grid that comprised approximately 40,000 grid cells and extended to the 5 nautical mile line (or where all coral reefs were included) was chosen.

The data summarized to the planning grid formed the basis of how scenarios and reports were generated in both design types, and were selected carefully given their utility to the planning process. For example the percent cover of corals is a critical layer for planning in the region, and this value was calculated for each planning unit in the planning grid. The OFR support team summarized approximately 60 layers to the grid, each with specific summary statistics or metrics.

2.3.2. Drawing Designs

Adding a new drawing is easy to use, and the user can use their mouse or computer trackpad to create a polygon by clicking on the map to start drawing, and then click again to add vertices. When the drawing is to the users liking they can double click to finish. After the drawing step, the rough shape of the polygon automatically clips to the planning grid, which creates a report of all of the data that was summarized to the grid within that area, for instance the average of average depths is calculated for all grid cells in the drawing clipped shape. Summary reports for drawings are generated for the clipped shape and available for the user to see by clicking on the shape in the map.

Drawings that are active in the marine planner can be compared in bar graphs by clicking the "View Comparison Reports" button. Active drawings are compared against nine different criteria including percent reef (in shape), percent reef (relative to entire planning area), maximum number of fish species, maximum number of coral species, diving activity days, fishing activity days, total activity days, depth range and percent sand. These comparison reports give users the ability to assess tradeoffs of different areas given these metrics, and against the management objectives they will be planning for. The OFR Support Team made a strong recommendation for next steps in development of the tool, and requested that a user could draw multiple polygons as a part of one shape or recommendation. One could see the utility of this in creating a system of areas along the coast, and generating the summary reports on cumulative impact of those polygons. However, this new feature was not part of the current contract and would take up to 60 additional developer hours to implement.
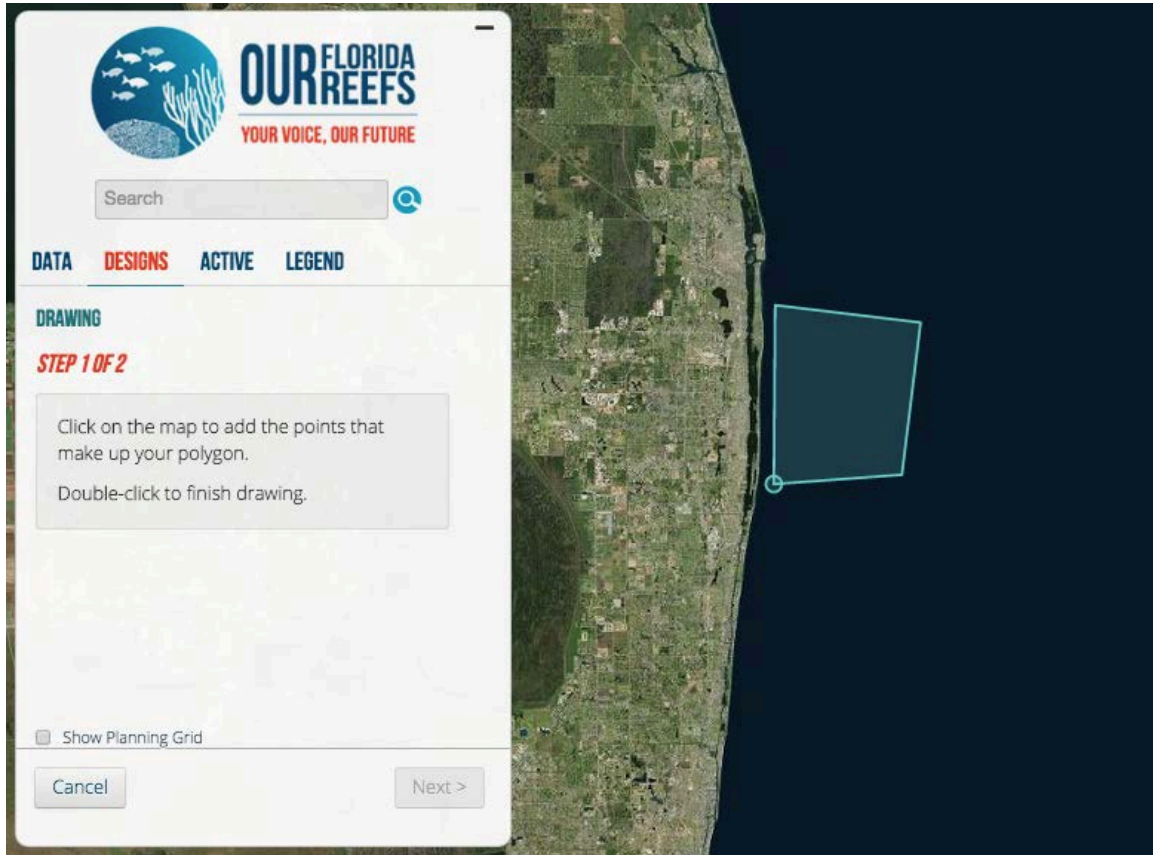
Figure 6. Example of the drawing tool during use, where the blue polygon will be finished with a double click in the southwest corner. After the double click, the shape will be used to clip the planning grid, and a summary report will be generated.

2.3.3. Filtered Designs

Again, the filtering designs are driven by the planning grid and summarized data, which consists of 37 of the total layers in the marine planner. As a filtering design is created, the user is stepped through five pages of filtering criteria organized by data theme: Habitat, Coral, Fish, People, and Management. Each filterable layer has its own filtering widget (double slider bar allow the user to set a maximum and minimum), number entry boxes, or drop down menus to create filters on the dataset. The units, information boxes, layer toggles, and language surrounding each filter was discussed at length between Point 97 and the OFR Support Team. From the perspective of the Point 97 team, the number of layers should have been limited to approximately 10 to avoid overwhelming users. However, prior use cases for marine planner focused on one management objective of the tool, and the OFR process intends to be as inclusive and flexible in planning with regard to what can be planned for. Having the greater number of filters in the tool allows for this flexibility, and guidance during the designing process will prompt users as to what is important for a given management objective.

Figure 7. Example of one filtering page with list of filters that can be set by the user. In this example the Average Depth filter is expanded, and the user is filtering to include only those grid cells with an average depth between 115 and 139 feet, which yields 642 grid cells.

3. COASTAL AND OCEAN USE SURVEY

In close collaboration with the OFR Decision Support Tool Project Team, Point 97 staff drafted a coastal and ocean use survey between June and July 2014. The OFR Coastal Ocean Use survey targeted reef users in the southeast Florida region, from Miami-Dade County north to Martin County, and from shore out to 5 nautical miles. This opt-in method means the survey did not collect a random sample. The resulting data can be used to establish spatial patterns (extent and intensity) for particular activities of respondents only. These spatial patterns are useful for the OFR community planning process, especially in concert with the other datasets being used for planning. Reef resource users were recruited through outreach at targeted venues such as stakeholder meetings, dive shops, and community events.

3.1. Overall Design

Design of the survey was iterative and included discussions of the questions, planning area, subsequent analyses and visualizations, interface for users, supported platforms, and technical support for users.

3.1.1. Planning Grid
All spatial data collected in the survey was summarized to the 200 x 200 m planning grid that was created for the marine planner.

3.1.2. User Interface
The user interface of the survey was kept simple with click interaction, introductory pages for mapping questions, and clear directions. The survey was optimized for the Google Chrome web browser, but was also supported in Microsoft Internet Explorer v.9+, Apple Safari v.5+, and Mozilla Firefox. Respondents could navigate forward through questions with a "Continue" button provided in the survey, and backward with the browsers "Back" button. Once a user completed the survey, they were not allowed to reenter the survey, and so a last page for submission was provided to warn the user that they would not be able to return after clicking "Submit".

3.1.3. Dashboard for OFR Support Team
A web-based dashboard was built to tabulate and visualize data as the survey was live. Tables and a map of activity intensity were available and filterable for OFR Support Team staff to use for planning of outreach activities. For instance, if no snorkelers were found in the data tables after a few weeks of data collection, outreach activities could be designed to recruit respondents from that population of reef resource users. Similarly, if no activities were seen in the map of reefs of Broward County, outreach activities could be tailored to target users of that area.

3.2. Non-spatial Question Design

Initial questions were based on other successful examples of regional surveys conducted by Point 97 in Washington, the Northeast, and the Mid-Atlantic, but were customized to fit the OFR process and goals. Non-spatial questions collected information about activities, expenditures, and demographics about survey respondents.

3.2.1. Activities
Respondents were asked to indicate which activities they participated in during the past 12 months in the southeast Florida region. Several iterations of the activity list were discussed both internally at Point 97 as well as with the OFR Support and Project Tool Teams. The final list of activities presented to survey respondents was organized and edited from a recommended set of standard coastal use activities,

and are listed fully in the Task 3 Coastal and Ocean Use Survey Report. The Florida survey captured both commercial and recreational uses, which was an important consideration for sampling goals. For instance, the commercial category included two activity categories for charters. Diving and fishing charters are both popular activities in the southeast Florida region and collecting data from the captains ensured that areas and intensity of use would be represented in the data, even if all the customers did not participate. Additionally, comparing charter activity data of captains versus customers could also provide insights for use-patterns and ground truth footprints of this sector.

3.2.2. Expenditures

Expenditure data was collected for each activity that a respondent selected in the activity question. Respondents were asked to indicate the average amount of money they spent per day when engaging in their activities the last 12 months, and that estimates should include all expenses (e.g. gas, parking, toll, gear, tanks, rentals, bait, hotel, etc.). Respondents indicated their average per day expenditures by selecting one of six spending categories: <$50, $51-100, $101-500, $501-1000, $1000-5000, and >$5000. The expenditure data collected this way does not give a value of the reef, but helps describe patterns of spending for a given activity.

3.2.3. Demographics

Demographic questions regarding gender, age, education, race, and income level were all placed after the spatial questions. The logic for this placement was that the priority for the survey was the use data, which was near the beginning. In case a respondent chose not to, or was unable to, complete the survey the ancillary demographic data would be sacrificed near the end. The demographic questions were designed to be directly comparable to another use dataset for the area (Dr. Shivlani) as well as census data to identify whether a representative sample was collected.

3.3. Spatial Question Design

Because reef users may not want to share the exact location of their activity, a 150 m selection tool was developed. In the two spatial questions of the survey, activity areas and favorite spots, respondents used the 150 m circle selection tool to represent their use. Additionally, their selected locations were summarized to all planning units that intercepted the selection circle, meaning the user had the potential of selecting anywhere from a 200 x 200 m area to a 400 x 400 m area. In both mapping questions, respondents could switch the basemap displayed (aerial satellite or nautical charts), and turn on and off several important layers (e.g. benthic habitat, popular dive sites) to facilitate the placement of their activity circles. Respondents were able to navigate to their desired place in the map using a text search, by entering geographic coordinates of their area, or pan and zoom using their mouse. Placement of activity circles was only allowed at small scales (zoomed in) and within the planning grid boundaries. A warning box would pop-up if the respondent was zoomed out too far or attempting to place an area outside the planning area. The 150 m circle method was chosen over other options

(e.g. pennies mapping) because of the ease of use for the respondent and to reduce overall survey length.

3.3.1. Activity Mapping
Once a 150 m circle was placed, a modal question popped-up and asked for the number of days the respondent spent doing that activity in the past 12 months. After this the respondent was asked whether they wanted to map more areas for that activity or switch activities. In the activity mapping question, respondents were only allowed to map one activity at a time, and a text box at the top of the screen displayed the activity currently being mapped. This kept the respondent focused on each activity, but they could switch back and forth between activities at any time if needed. These data were the most important for the OFR planning process, as the extent and intensity data for each activity could be considered in management objectives.

3.3.2. Favorite Spot
The favorite spot mapping question was identical to the activity mapping; however, the respondent was only able to map one area. Once the 150 m area was placed, the modal question first asked why they chose this spot, and second what was the primary activity at this spot. This data is important to the planning process and may indicate highly regarded areas and why they are highly regarded. According to the initial results detailed in the Task 3 Coastal and Ocean Use Survey Report, users found their favorite spots most important because of the activities they could engage in there.

4. TECHNICAL SUPPORT

Throughout the contract period, Point 97 offered technical expertise and support, both during development and as products were pushed to production servers and users began to use the systems. The bulk of technical support was accomplished through email requests and exchange, however, some issues were resolved during conference calls and webinars. In a webinar on February 26, 2015, Point 97 turned over administrative control and taught OFR staff how to use the Django administrative tools to mange users and groups, data layers, data themes, and general marine planner settings. Support requests were submitted both for the survey and marine planner; however, the survey had many more users compared to the marine planner at the time of writing this report.

During the busiest development periods for the survey and the marine planner, many defects that were identified had to be prioritized against, and scheduled with, outstanding features that were still under development. The Point 97 team worked very closely with project partners during these critical periods to ensure minimum amount of functionality in the tool and survey were met, but always strived to improve the tool.

4.1. Survey Support

During survey registration, and in the monthly email reminders, survey respondents were offered the survey support email address as help for any issues they were experiencing or to opt-out of the survey. Issues that came up during the survey included difficulty using the mapping question, registration issues, resuming the survey after a break, geofence issues (survey boundary issues), and users wanting to opt-out of the survey. Over the course of the survey, we received 34 emails for support.

The common complaint with the mapping question was often that the user had such a large footprint of use that mapping every area and every activity would take too long. These respondents were encouraged to estimate the center of their track or the center of the general area of use as a quick way to contribute their data. Much of the feedback collected in the final question of the survey dealt with this shortcoming of the mapping question. Many respondents suggested that a mapping tool that allow larger areas to be selected should have been employed.

Another common issue was the geofence, or boundary, of the planning area. The SEFCRI boundary was chosen to focus respondents on southeast Florida reefs, but this area did not include many beaches and inland waterways of the region. The replies to these requests included explanations of the study region, and in some cases respondents opted out of further participation because they were not represented in the study region.

4.2. Marine Planner Technical Issues

At the time of this report, the marine planner and DSTs have only been used in a few meetings, and the public process of creating management recommendations has just begun. The OFR Support Team and Point 97 have discovered many of the defects in the marine planner during development. One significant issue was found early on the Surface Tablets that were purchased by the OFR Support Team for survey outreach activities and demonstration of the marine planner. The open-source code on which marine planner is built became unsupported with certain Windows OS updates, as well as with updates the Internet Explorer. Solutions to this issue were explored over a four month period, but finally deemed to great to overcome, and the tablets were agreed to be left unsupported for some features, such as the DSTs, however basic navigation of the marine planner data was still an option.

Another significant defect was found in the endpoint server that was used to package the survey data for the marine planner early in May 2015, just before the first public meetings at which the data would be used. The endpoint server contained a script that was intended to summarize the data to the planning grid, where use data were tabulated in every planning unit by adding up all survey responses that overlapped with each unit. This represented the spatial aspect of the data well, but when tabulated, it overestimated the intensity of use. It was decided that the intensity should be proportionately assigned, or distributed in proportion to the amount of overlap with planning grid cells for the planning grid summary. The raw data were given to the OFR Support Team. During

quality assurance checks they noted instances where data were double counted. After a week of troubleshooting, the endpoint had to be abandoned and the survey data was summarized to the grid by hand.

Several additional defects in the designs tab were found in July 2015 and resolved in August. First the sliding scale bars in the filtering tool were found to have incorrect minimum and maximum values compared to what was in the specific datasets. A query was run to identify those values in the current summarized data, and the appropriate adjustments were made. The sliding scale bars also have text entry boxes where users can manually enter a value, and through use of this feature it was found that the three digit box was not large enough for some datasets. The size of that text box was changed to five digits, so all numbers were visible by user. Finally, when a user entered values in the text box and clicked enter, nothing happened on screen. The solution for this was to direct the analysis to run whether the sliding scale bar was used, or when a user entered a number in the text box and hit enter.

4.3. Process Consultation Meetings

Point97 and various representatives of staff attended meeting regularly from April of 2014 through September 2015. These meetings consisted of entire project team participation as well as meetings between Point97 and the Tool Support Team and FDEP CRCP staff. While the contract called for far fewer meeting commitments, Point97 accommodated the process and attended more than 30 meetings. Most meetings were scheduled as needed, however at times weekly check-in meetings were also necessary. Below is a list of some of the meetings attended and a brief description of meeting content.

2014

April 9
Kickoff meeting with entire Tool Project Team which included the GIS Support Team as well as FDEP CRCP staff.

May 9
This meeting was to clarify some items that will allow us to hit the ground running and meet the first deadline.
- Process - Will most decisions be made at the group level? Same group for design and data? Different point persons? Who will pull together Kick-Off Meeting?
- Data - Who is the point person? Does a data list exist? Has data been compiled? Categorized?
- Design - Who is the point person? Do style/design sheets already exist for current OFR site?
- Admin - Who is the point person, or administrator, of the current OFR site?
May 27
Provided updates on progress on the Marine Planner and discussed the layers that are currently being included in the initial version.

Also entered into preliminary discussions about the survey.

June 4

This meeting was about general updates on the Marine Planner development progress. In Addition Point97 received valuable information and feedback on how to ensure the Marine Planner had the look and feel of the entire OFR process, including such things as color scheme and font.

June 16

Sat in on the call led by FDEP CRCP regarding the upcoming training of Community Working Group members.

July 1

This was a meeting to discuss general updates in progress.

July 24

Meeting to discuss metadata for OFR Marine Planner.

July 29

Meeting to discuss the OFR survey grid. Discussion included size of the planning units as well as extent of the planning units, e.g. how far offshore should the units extend. Recommendation: Point97 had to inform the Tool Project Team that limitations in the software will limit the number of planning units. We will work on a solution to increase the planning unit limit; however, the more units within the survey, the slower the survey will run.

August 2

Meeting to discuss the OFR survey grid. Point97 was able to make some strides on improving grid performance.

September – December

During this time period Point97 met with the Tool Support Team and FDEP CRCP staff on a weekly basis to discuss any arising issues, resolutions, additions, or needs of the Marine Planner, survey, or decision support tool.

2015

January – April
During this time period Point97 met with the Tool Support Team and FDEP CRCP staff on a weekly basis to discuss any arising issues, resolutions, additions, or needs of the Marine Planner, survey, or decision support tool.

June 29
Meeting to discuss specifics of the print feature both in the Marine Planner and Designs tab.
- Print feature will be a 2 page document
- The map needs to have DRAFT on it
- The map needs to have a legend
- The map needs to have a disclaimer both about using the map for navigation and that is a draft product of the OFR process.
- Print function will be available to all persons that use the online Marine Planner
- Designs and drawings are not in the legend,
    - Recommendation: We will work to see if we can add them to the legend; however, the legend tab is pulling from the arcrest server and the designs are stored separately. The work around is once we have something we do want to put forward then we would add it as a feature.
- Metadata Drawing - includes title, summary report but not formatted because can't do html, information about everything within that drawing
- Designs - title and it will say which filters were used and what the parameters were (min and max), no summary report.

Also discussed the need to develop a timeline/cost for the following possible additions:
1. More than 1 polygon in a single drawing. This would include the summarization of stats for multiple polygons. So your 1 drawing may have many polygons and we would want, if possible, the stats for each polygon as well as all polygons within the drawing.
2. Registration system for public to have access to filter features
3. Measuring tool
4. Labeling the drawings

July 21
This meeting focused on tile caching issues.

September 28
This call addressed the changes at Poin97 both in the company and personnel. We discussed the path forward including the current contract and the current purchase order.