



U.S. Fish & Wildlife Service

Migratory Bird Hunter Survey Enhancements

IDIA 612: Interaction and Interface Design

University of Baltimore

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OVERVIEW

The annual Waterfowl Harvest Diary Survey is an important resource for the United States Fish & Wildlife Service. The purpose of the survey, sent out to a random sample of approximately 100,000 waterfowl hunters, each uniquely identified by federal hunter number from across the United States, is to not only help in the evaluation of harvesting trends, hunter demographics, and hunting pressure, but also to establish waterfowl hunting regulations for the coming season. While the survey is sent out as close to the beginning of the waterfowl season as possible, roughly half of the selected sample hunters complete and return it (Wilkins, 2015).

The number of completed surveys has been decreasing. FWS speculates that hunters are frustrated with the format, seeing the paper-based, physical-mailed survey as a burden. Additionally, due to the survey distribution workflow established by FWS, printing and postage costs grow exponentially for every survey that goes without a response. When the pre-season survey has yielded no response, the unresponsive hunter receives a reminder postcard at the conclusion of the season. If no response is received by FWS at the end of three weeks, the hunter receives a full survey packet in the mail. If the hunter still does not respond at the end of an additional three weeks, FWS prints and mails another full survey packet (Wilkins, 2015).

The responses that do come in are plagued with data errors. Of principal concern to FWS are where hunts took place, how many hunts took place, how many birds were harvested, how many birds were killed and lost, and what kind of birds were harvested. The paper form provides no data validation. The participant is asked to capture data by the day, and sum it for the season, separately and manually. The information provided by the hunter is often invalid and contradictory. It is validated and normalized manually, or at times dismissed, by FWS staff at an annual estimated cost of over \$20,000.00. (Wilkins, 2015).

GOALS

The survey is beneficial to many departments, so it is necessary to determine what enhancements need to be made moving forward. The enhancements should focus on increasing response rates, decreasing administrative costs, decreasing workload for the survey participant hunter, as well as increasing data quality. With a firm understanding of the waterfowl hunting demographic and familiarity with the functionality of journaling products comparable to the FWS Waterfowl Harvest Diary Survey, this information is married with further research in the use of contemporary online application and data validation technologies. Fictional user profiles will be introduced, and actionable recommendations for enhancing the Harvest Diary Survey will be proposed for FWS' consideration and implementation. These include a redesign and normalization of the paper survey, the development and launch of a responsive web interface to capture Waterfowl Harvest Diary Survey data, and a proposed application programming interface (API) integration in relationship with existing hunter journaling applications.

This paper will review the current demographics of waterfowl hunters along with increasing technological trends and advancements within the industry directly related to this area of concentration. Based on the heuristics, a prototype for an enhanced harvest survey was developed that should be suitable and convenient for the target demographic while fulfilling FWS goals. The prototype was first drafted on paper, peer-reviewed, revised, user tested and revised again. It was then developed as a technical prototype in *Axure RP Pro 7.0*. The technical prototype was peer-reviewed, revised, user tested and revised again. A final design, both for an enhanced paper survey and a final digital survey, are included as a final proposed solution to conclude this paper.

USER ANALYSIS & DEMOGRAPHICS

There are an estimated 2.6 million migratory bird hunters nationwide, according to FWS reporting in 2014, with the average hunter spending an estimated nine days hunting per season. Their passion lies in the camaraderie of family and friends as well as the pleasure of being immersed in and connected to nature (NSSF & AFWA, 2013). While hunters in general find great passion in the entire process of the hunt (NSSF & AFWA, 2013), they also strongly value conservation. The money spent on licenses, stamps, tags, permits, and some hunting-related equipment directly goes back into wildlife conservation (FWS, 2014; NSSF & AFWA, 2013).

It is important to note that hunters in general tend to be both better educated and have higher incomes than most prevailing stereotypes would suggest (Heberlein, 1987). In 2014, FWS reported that a vast majority of hunters, 89 percent, have received education well beyond high school. It could be speculated that at least a portion of the remaining 11 percent, having received less than 11 years of education, may well fit into the 16 to 17 year old hunting population, which may account for a demographic that is still in high school. Additionally, FWS reported in 2014, that among hunters, a 64 percent majority have household incomes totalling over \$50,000.00, with the largest group reporting an income between \$75,000.00 to \$99,999.00. With higher than perceived incomes and an often deep-rooted passion for waterfowling, it should come as no surprise when 2014 FWS reports indicate a total of \$1.8 billion spent in waterfowl-related expenditures such as travel and equipment, including "...guns, decoys, hunting dogs, camping equipment, special hunting clothing..." and more, an expense these hunters are more than willing to pay to remain involved (NSSF & AFWA, 2013; FWS, 2015). In fact, nearly 20 percent of duck hunters, which make up the largest population of total waterfowl hunters, are reported to spend over \$1,000 annually in their commitment to continued participation (FWS, 2011; NFC & WMI, 2006).

The two most significant age groups making up the vast majority of waterfowl hunters are those between 25-44 and those between 45-64 (NFC & WMI, 2006). Buckley et al. calls to attention that “waterfowl hunting...takes stamina” time, and diligence (2015). This could be a good indication into why waterfowl hunters begin to increase after the age of 25, yet tend to decrease after the age of 65 (NFC & WMI, 2006; FWS, 2014). However, the hunting regulations on waterfowl are becoming increasingly more complex, and Larsen reports that waterfowling “...could be the most challenging hunting pursuit to learn”, not only in terms of regulations but also in terms of bird identification, which is critical. Larsen goes on to say that “patience, sacrifice, [and] respect...are requirements in the hunting world”, which is a difficult concept to grasp in a society geared around instant gratification (2015). This makes it imperative to get kids hunting at a younger age, and there are many outlets encouraging and offering mentorship for those starting later.

Technology is perhaps the biggest change in the way hunters are approaching a hunt. Just a few decades ago, perspective hunters relied on hunting magazines, game wardens, and taking the time to scout out good hunting areas; whereas today’s hunters have a plethora of information right at their fingertips via mobile applications and myriad websites, blogs, and forums available on the internet (Larsen, 2015). Today’s hunters are using iPads, iPhones, mounted Gopro cameras, and other mobile applications to plan, execute and share their hunt. (Tucker, 2014).

The following personas were derived from demographic research on waterfowl hunters. While each persona offers a diverse perspective, both were created with common demographic traits in mind. The personas will aid in further research and development of a more user friendly Waterfowl Harvest Diary Survey for FWS.

PERSONAS

JEREMY: USER PROFILE



"A day in the blind is the best kind of day. If there are birds to be shot, so much the better..."

...but even a day in the open watching the bobbing decoys and the changing weather, forgetting about the every-day stress, and enjoying the good companionship of friends, my hunting dog eagerly waiting by my side, that in itself a more worth-while experience."

occupation: Human Resources Manager

age: 39

education: Master's Degree

income: \$85,000

Circumstance: Consumed with work and family life. Enjoys waterfowl hunting, which he's been doing since he was a young boy, as a means to escape from the stress of every-day life and enjoy the companionship of friends and nature. Spends the time and resources needed to always up-to-date on the latest equipment and gear.

Goals: Find an easy way to document hunts, preferably on his mobile device so it can be done in real-time.

CHRIS: USER PROFILE



"I can still remember my first time on Cross Lake, everytime I come here I reminisce on all the hunts and adventures.

Maybe in the next year I'll break down and get a smart phone, I'd like to be able to send pictures of Cross Lake and my hunts to friends"

occupation: Retired History Teacher

age: 65

education: Bachelors

income: Low

Circumstance: Chris has been waterfowl hunting on the same lake since he was a child. He knows the land like the back of his hand. Time is plentiful for hunting but financial resources are not. Luckily for Chris, he lives about 15 minutes from his favorite hunting spot.

Goals: Chris would love to save up enough money to send his grandson to a young hunters summer camp. He would love to pass down his passion for waterfowl hunting just like his grandfather did.

BACKGROUND

Ducks Unlimited Waterfowler's Journal, produced by Ducks Unlimited, Inc., and the *Hunting Journal*, produced by Mt. Lookout Media, are two existing digital products currently in the market that collect data similar to the FWS Waterfowl Harvest survey. While only a subset of the game a hunter can document using Mt. Lookout Media's products, Ducks Unlimited has focused exclusively on allowing hunters to track their seasonal and per-hunt waterfowl yield (Ducks Unlimited, Inc., 2014; Mt. Lookout Media, 2014). The *Ducks Unlimited Waterfowler's Journal* is offered as a free, native mobile application for both Android (Ducks Unlimited, Inc., 2013) and iPhone (Ducks Unlimited, Inc., 2014). It is complimented by an online journal accessible through the desktop browser (Ducks Unlimited, Inc., 2015). The *Hunting Journal* is also offered both as a native mobile application and a desktop website (Mt. Lookout Media, 2014), as shown in Figure 1, but it is currently only offered for the Apple iPhone. There is both a free version and a pro version, which is available at a download and install cost of \$3.99. The free version allows the user to start a journal entry, add identifying information for a hunt, and make notes (Mt. Lookout Media, 2011). The user then has to visit the online Pro Hunting Journal from their desktop browser at home, find the journal entry they created through the free mobile application, and document their harvested game (Mt. Lookout Media, 2014). The Pro version of the mobile application allows the hunter to document the full set of information available in the online desktop journal, including functionality to build detailed maps equipped with images and hunt-relevant markers to assist future hunts (Mt. Lookout Media, 2015). All of these products require registration, and a valid user email address in order to create a username and password.

WATERFOWL JOURNALING IN THE WILD

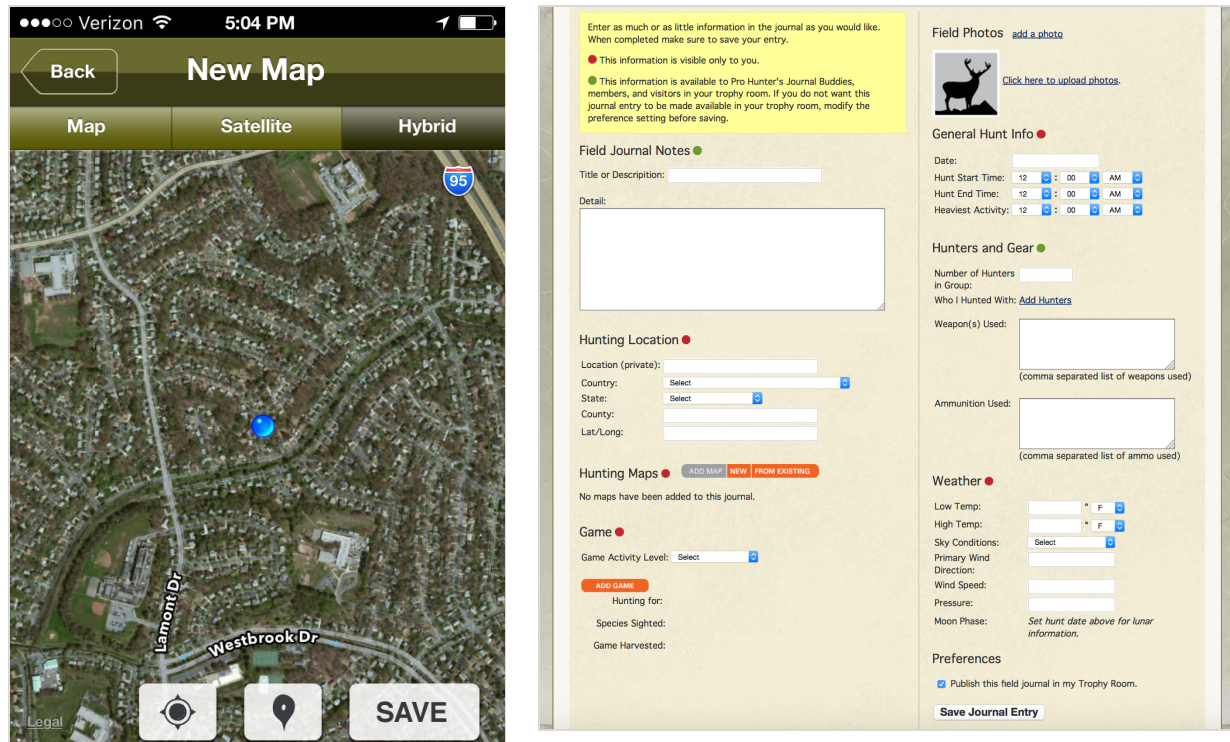


Figure 1. Screenshots from Hunter's Journal mobile app (left) and desktop application (right). These screenshots show a hunter logging their hunting location through the mobile app and pick up and completing the rest of their hunting details via the desktop application, respectively.

The use of these products reveal shared functionality and information entry, that while important to individual hunters, do not align with the current documented data collection goals of the FWS Waterfowl Harvest Diary Survey (Wilkins, 2015). These include moon phases, general game activity levels, weather details, temperature, weapons and ammunition, photos, free-form notes, map-building, hunt sharing and publication, and hunter-to-hunter communication and community-building through social networking. Additionally, neither product systematically derives the county of the hunt, nor asks the hunter for the number of birds killed but lost, which is important data needed by FWS (Ducks Unlimited, Inc., 2014, Mt Lookout Media, 2011).

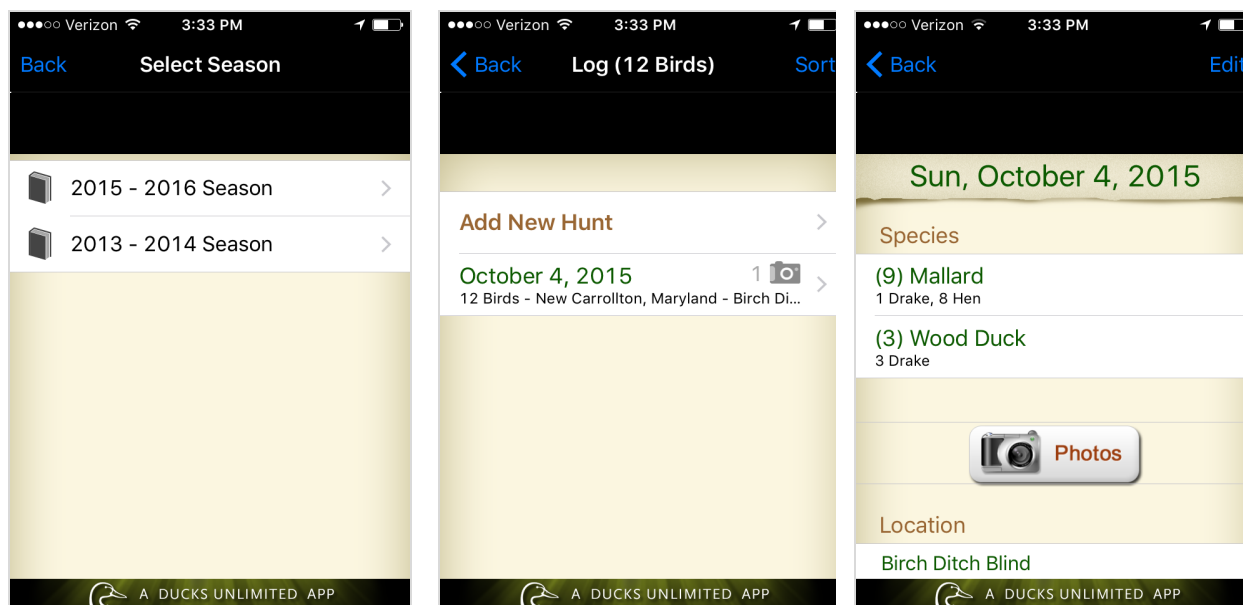


Figure 2. Screenshots from *Waterfowler's Journal*. These screenshots show the logging of specific hunt dates and birds downed for multiple seasons.

Both systems capture the majority of the core dataset collected through the FWS Waterfowl Harvest Diary Survey, albeit in different ways. Figure 2 shows an example of how this is done through the *Waterfowler's Journal*. Each hunt is listed distinctly by date and are then categorized by season. Season seems to be defined by asking the hunter to declare a “home state” from which these date ranges are derived (Ducks Unlimited Inc., 2015; Mt. Lookout Media, 2014). Hunt location is established differently between the applications. The *Waterfowler's Journal* asks the user to enter a City and State as free-form text, without validation (Ducks Unlimited Inc., 2014). The *Hunter's Journal* uses GPS geolocation to map the hunter's position in the field and add it to the journal entry for a particular hunt, as seen in Figure 1. This mapped location can be created as text-entry or edited using the desktop version of the journal (Mt. Lookout Media, 2014). The *Waterfowler's Journal* offers forty-two varieties of waterfowl categorized by Dabbling, Diving, Geese and Other, as shown in Figure 3. Each is accompanied by information on how to identify the species, and a mechanism to count drakes or hens, banded or not banded, distinctly within each species (Ducks Unlimited Inc., 2014). The

Hunter's Journal offers thirty-four species of waterfowl, including an option to add unlisted game as free-form text (Mt. Lookout Media, 2014).

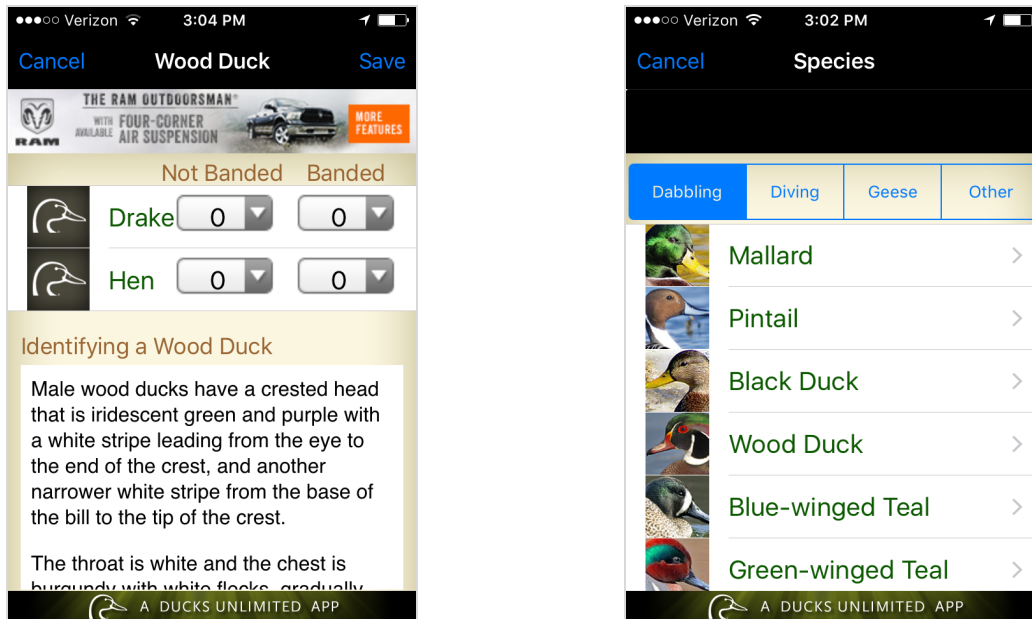


Figure 3. Screenshots from Waterfowler's Journal. These screenshots show the waterfowl categorization and species breakdown available for selection, as well as how to identify each.

PAPER PROTOTYPES

Based on research of the target demographic showing hunters to be primarily middle income, educated, technology users—an initial sketch of a responsive web-based Hunter Survey was developed for the desktop and mobile browser. The prototype was peer-reviewed by graduate students at the University of Baltimore, user-tested, expert tested, and refined. All of this took place over a three week period. The mobile and desktop versions of the paper prototype are on display in this paper. The focus will be on major functionality and structure, any deviation between mobile and desktop, and the overall evolution to a final paper prototype.

ROUND 1 DESIGN

A high-level user flow diagram, as shown in Figure 4, was drafted to outline the path in navigation that a hunter might take through the application. This diagram defines the initial concepts for a page to Log In requiring hunter authentication, a method to Opt Out, a page to Add A Hunt, a Hunt Log page to review added hunts, and an ability to Edit added hunts.

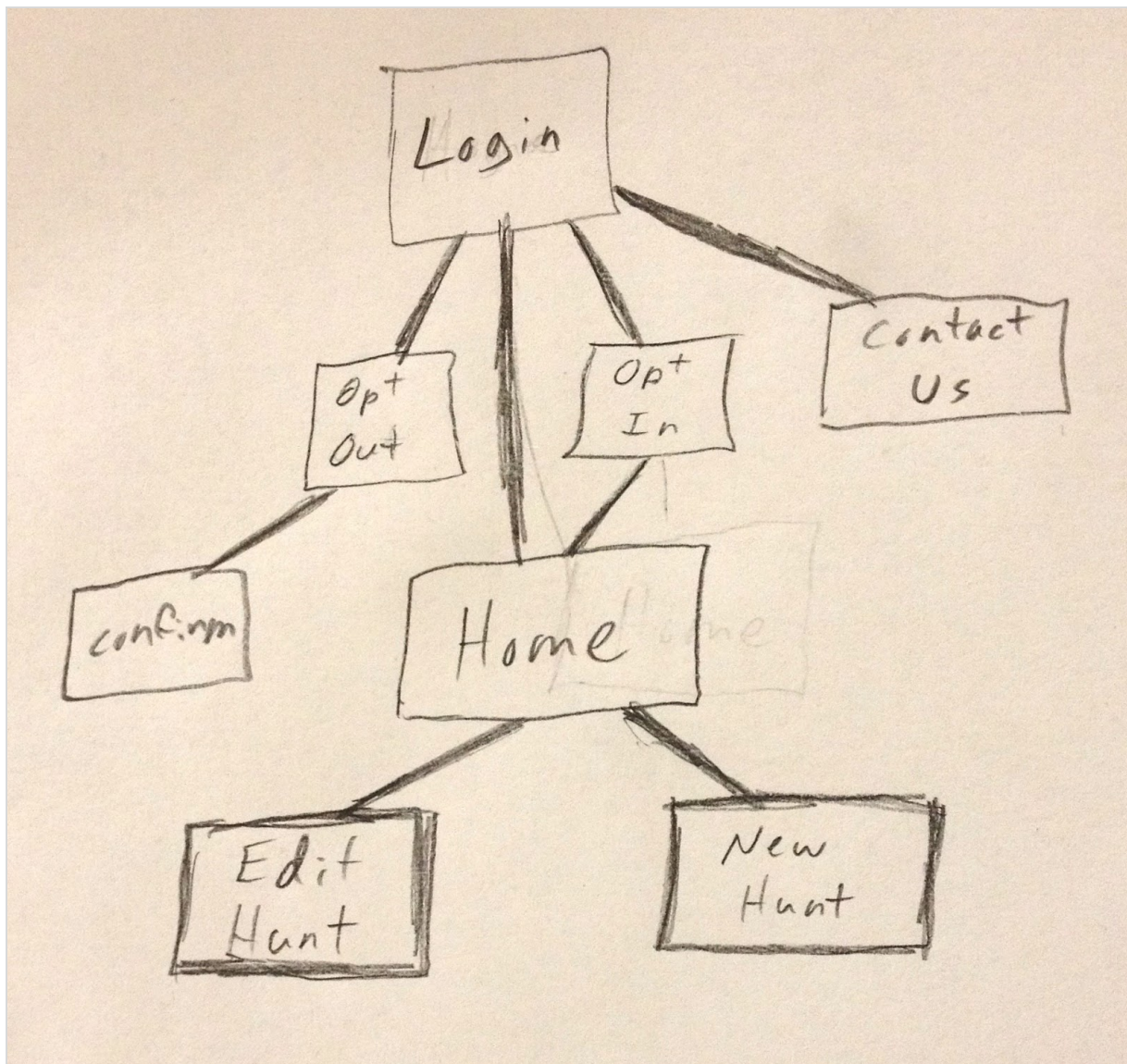


Figure 4. High-level user flow diagram.

MOBILE PROOF OF CONCEPT

These following images depict our initial mobile paper prototype screens, which were developed by one of the researchers. They were created separate, and without influence, from the desktop prototype, which was developed by a second researcher. This was done purposefully to see if the solutions matched the expected outcomes documented in the literature review. These controlled, initial concepts acted as the foundation for further refinement, peer review, and testing.

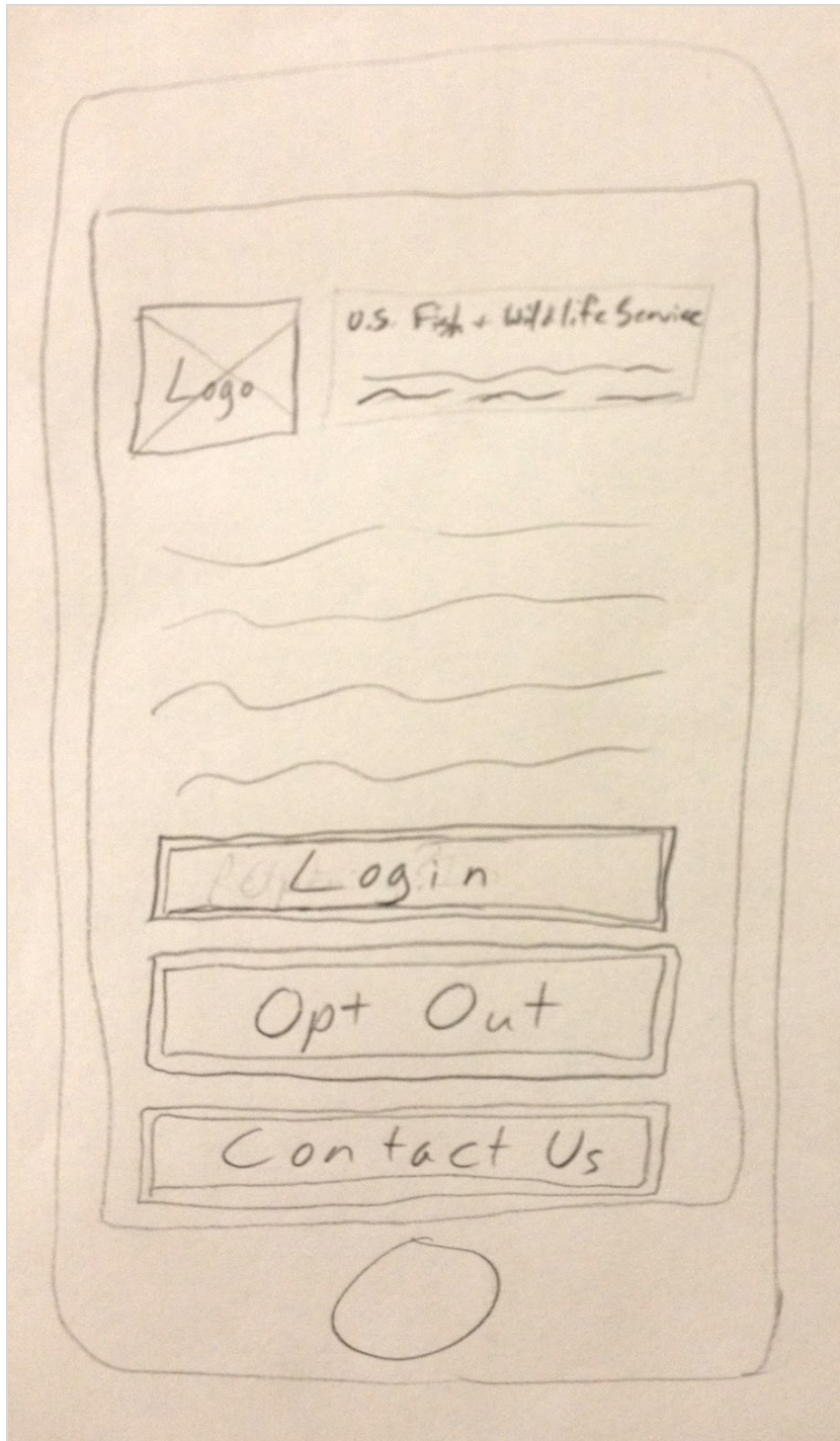


Figure 5.1. An initial HOME screen concept in a logged out user state with main navigation.

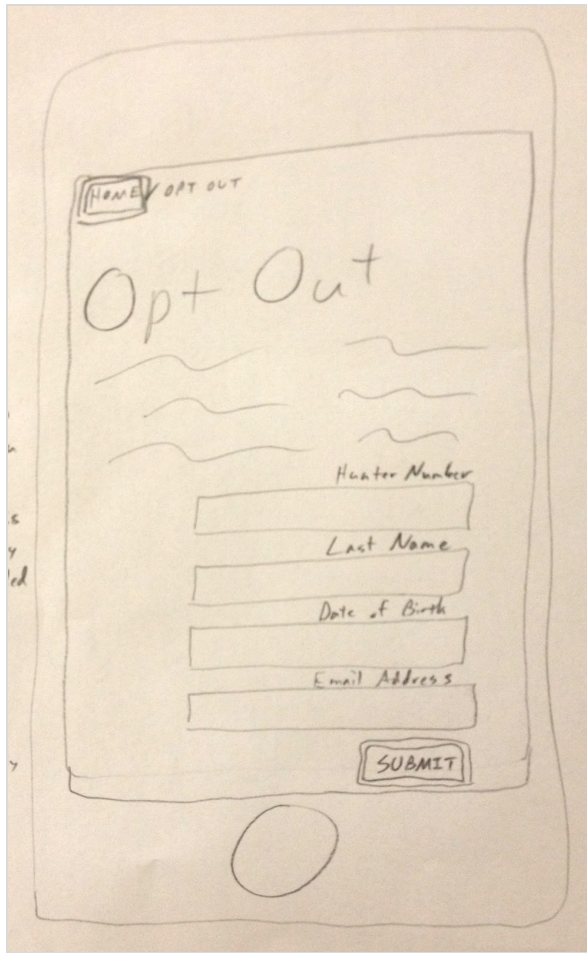


Figure 5.2. OPT OUT concept in the logged out state. The hunter would be required to supply authentication information including Hunter Number, Last Name, Date of Birth and Email Address.

Additionally, breadcrumb navigation is introduced in order to allow the user to easily and successfully return to the home screen.

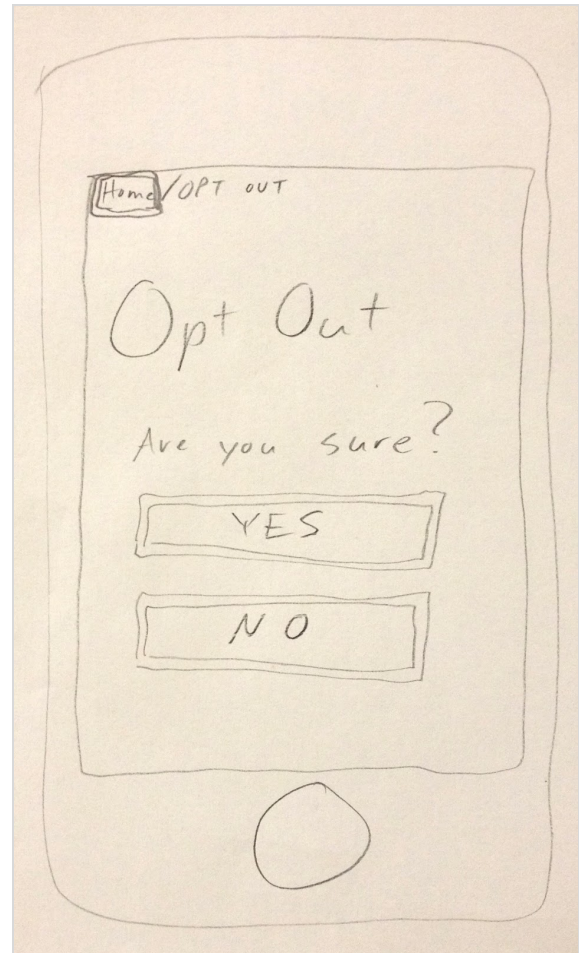


Figure 5.3. OPT OUT: Are You Sure? Here, the user would need to confirm in order to opt out of participating in the survey.

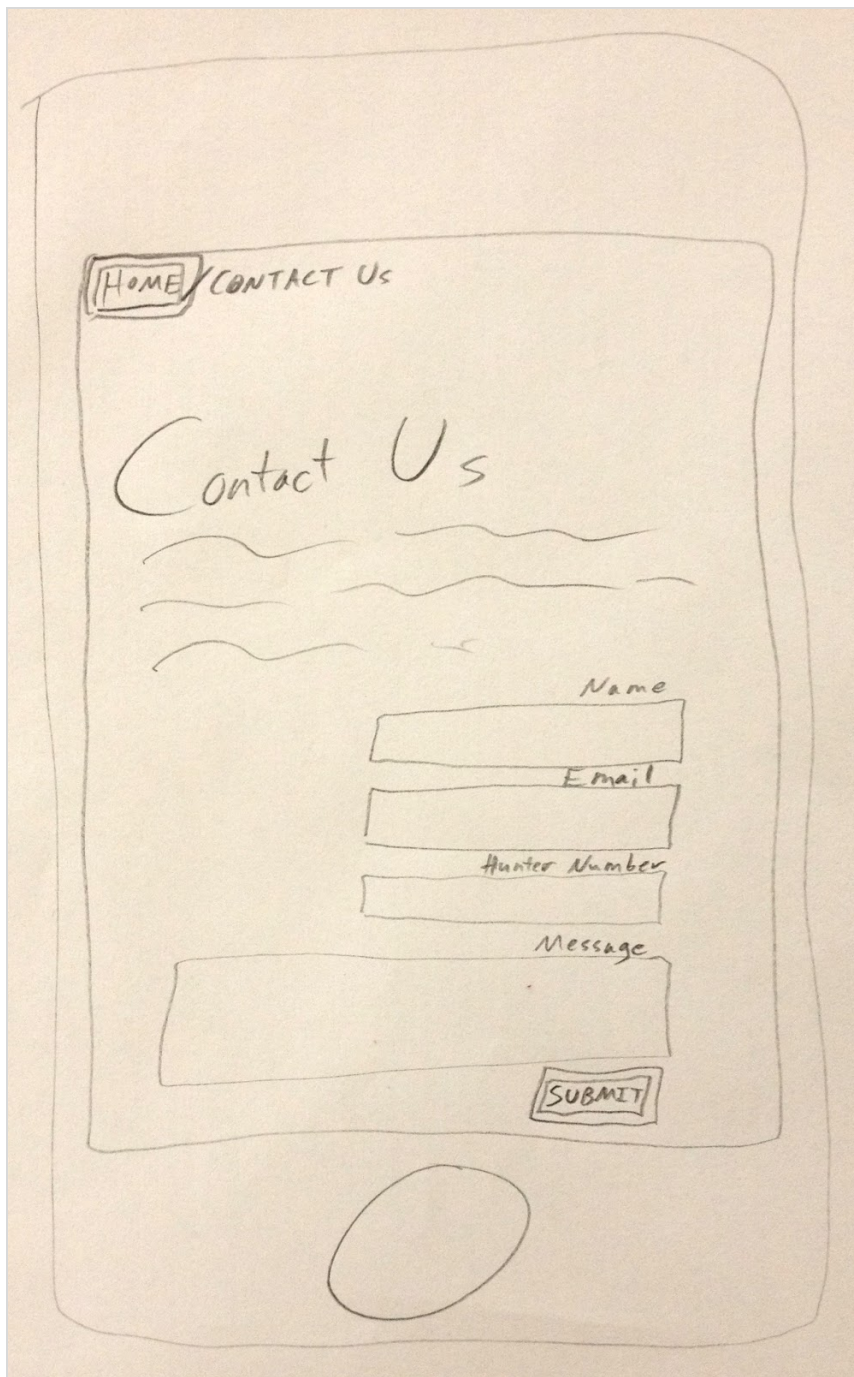


Figure 5.4. CONTACT US screen that can be reached from the HOME screen. The values supplied in order to log in would need to match FWS data sources.

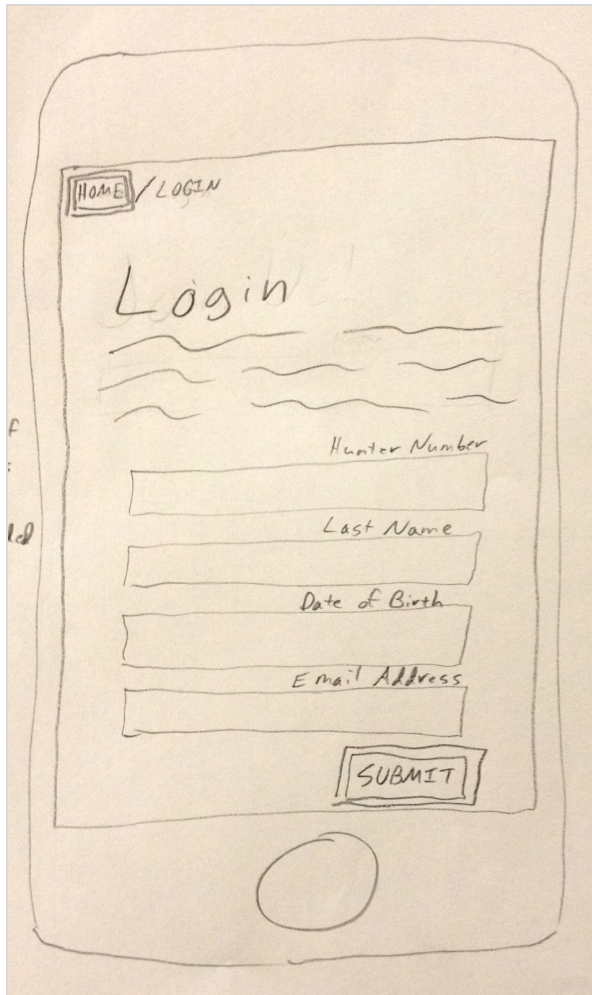


Figure 5.5. SIGN IN screen, which asks for the same hunter information as the OPT OUT screen.

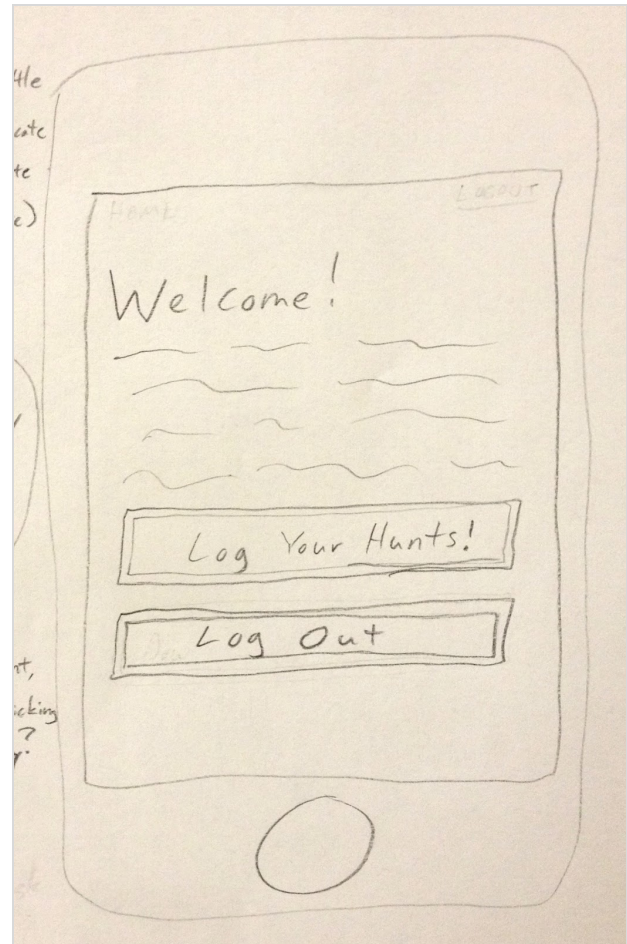


Figure 5.6. HOME screen, post-login. Two main navigation items are displayed for the first time user, including Log Your Hunts and Log Out.

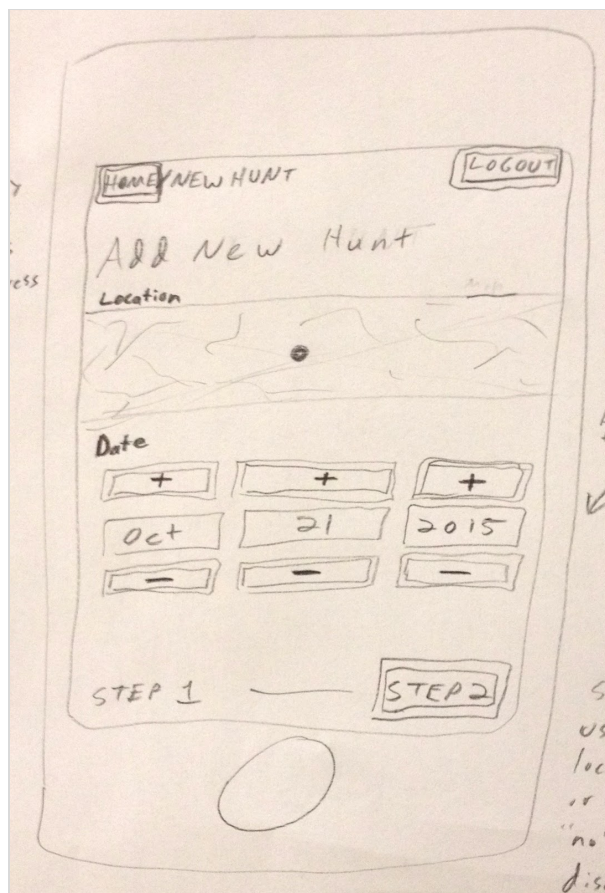


Figure 5.7. ADD NEW HUNT: Step 1: Add location and date. This screen is the first of two steps to log a hunt. Here, hunters establish a location and date of hunt.

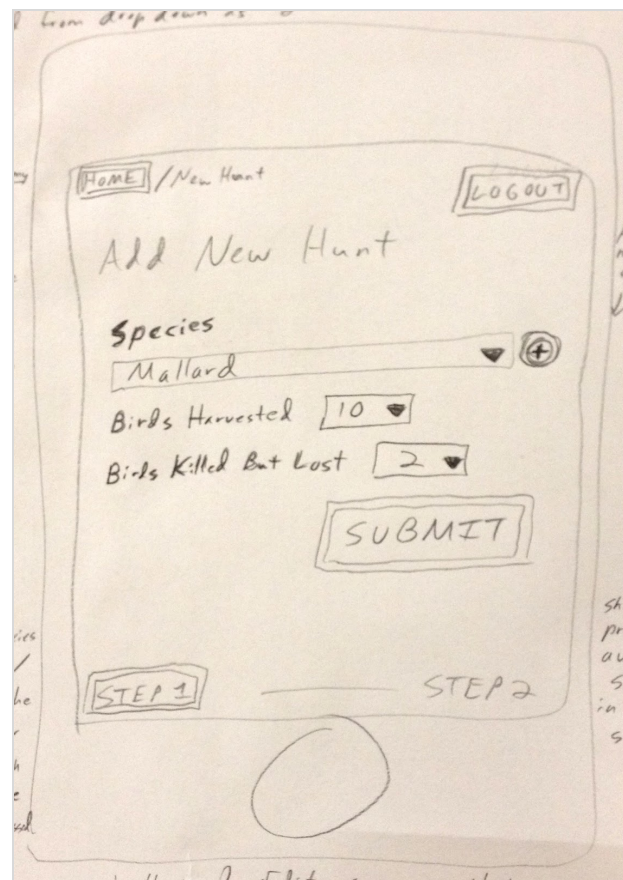


Figure 5.8. ADD NEW HUNT: Step 2: Add species and kill counts. Here, the hunter selects a species, sets the number of birds harvested and declares how many birds were killed but lost.

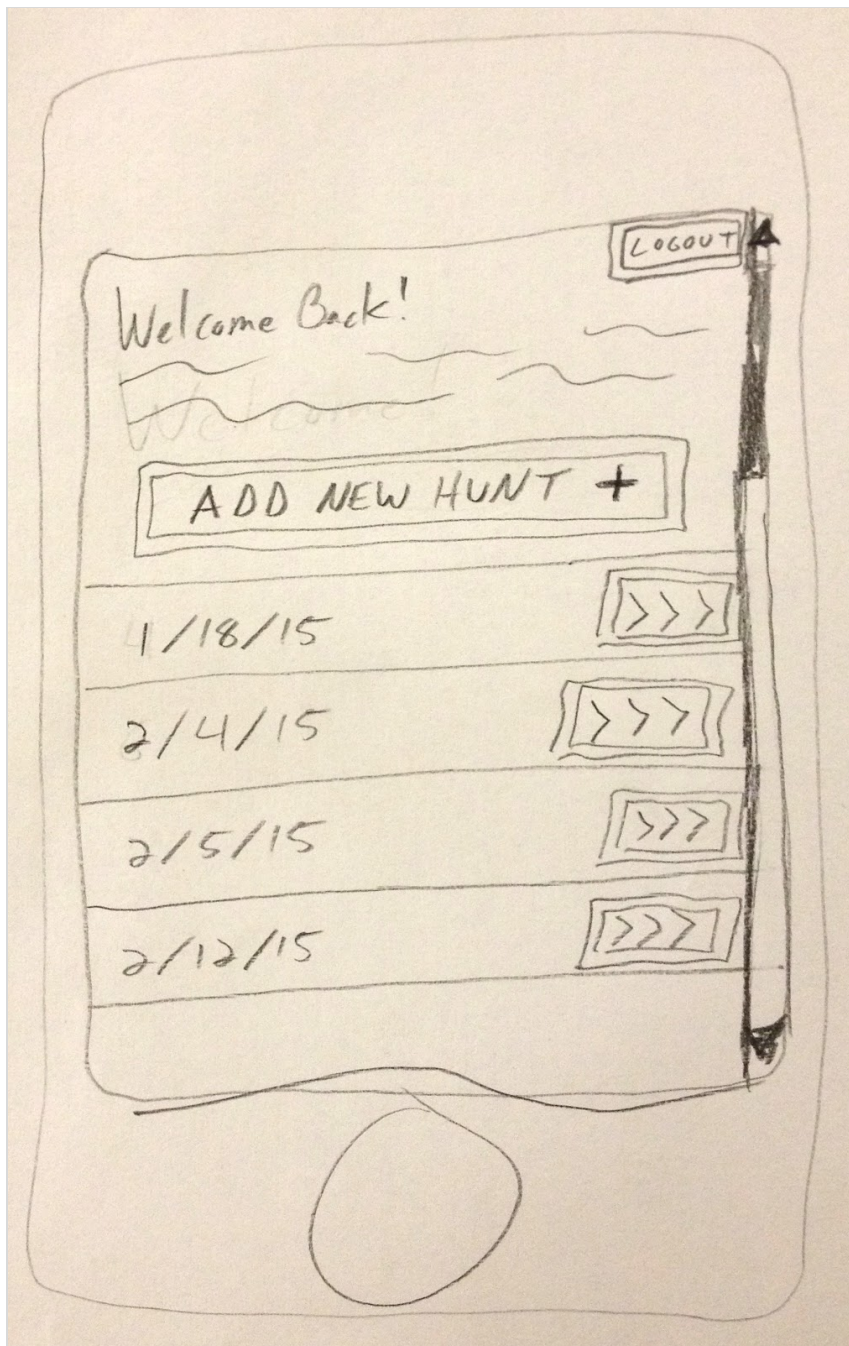


Figure 5.9. A different view of the HOME screen once hunts have been logged. Each hunt can be edited and new hunts can be added. The user can log out from this screen.

DESKTOP PROOF OF CONCEPT

These following images depict our initial desktop paper prototype screens. Again, these were developed by one of the researchers independently and without influence from the mobile prototype. These controlled, initial concepts acted as the foundation for further refinement, peer review, and testing.

The image shows a hand-drawn paper prototype of a desktop application interface. The title is "DIARY SURVEY" with a subtitle "[2014-2015] WATERFAUL HUNTING RECORD". In the top right corner, there is a label "HUNTER ID" above a line for "State". The main content area is titled "Add New Hunt" and "Directions" followed by wavy lines representing a text input area. Below this is a form box with a close button (X) in the top right. Inside the box: "Date" is followed by a text input "MM/DD" and a calendar icon; "County" and "State" are dropdown menus with arrows; "Bird Type" is a dropdown menu; "Killed & Retrieved" and "Downed & Lost" are each followed by a text input with a hash symbol (#); "Add Bird type" and "Add New Hunt" are buttons with plus signs. At the bottom right, outside the main form box, are "Return to Log Records" and a "SAVE" button.

Figure 6.1. ADD NEW HUNT as a one page process.

Figure 6.1 shows a method to Add New Hunt through the desktop browser. It differs from its mobile equivalent in that the hunter can Add an additional Bird Type and a Add New Hunt all from this screen.

DIARY SURVEY
[2014-2015] WATERFOWL HUNTING RECORD
 Hunter ID
 state

Directions for completing this form

Your Season Totals

Ducks	Sea Ducks	Geese	Brant	Total Lost
#	#	#	#	#

edit

Hunting Log

mm/DD	County, St	10/11	details
mm/DD	County, St	5/5	hide details

3 Ducks
 1 lost
 2 Geese
 1 lost

Edit

(+) Add New Hunt

SAVE

Figure 6.2. Populated HUNT LOG showing that two hunts have been logged. One of the two hunts has details expanded, showcasing an expand/collapse functionality concept. The aggregation of Season Totals is editable at the top of the page.

DIARY SURVEY

[2014-2015] WATERFOWL HUNTING RECORD

Hunter ID
State

Your season totals

Caution, modifying your season totals will cause inconsistencies between your season totals and your hunting log. It is recommended

Ducks

Killed & Retrieved

Downed & Lost

Days Hunted

Sea Ducks

Killed & Retrieved

Downed & Lost

Geese

Killed & Retrieved

Downed & Lost

Brant

Killed & Retrieved

Downed & Lost

[Return to log](#)

Figure 6.3. SEASON TOTALS, which can be entered manually within the desktop browser or edited over time.

ROUND 2 DESIGN

Initial concepts were combined and refined into the following paper prototypes used to perform a peer-review session, user testing and a usability assessment performed by user experience design professionals. The peer review occurred with two groups of two students each at the University of Baltimore on Tuesday, October 26th, 2015. The user test occurred with five testers at the University of Baltimore on Tuesday, November 2nd, 2015. The usability assessment took place with two user experience designers in Bethesda, MD on Friday, November 6th, 2015 at the office of Envolve PeopleCare™.

The following test cases were developed and supplied to the users. They represent the main tasks required to make use of the proposed functionality within the prototype. Our first set of user testers attempted to follow these scenarios precisely. These scenarios represent the kind of tasks all testers were asked to comment on.

Scenario 1

You just got done with a two day weekend hunting trip and want to log your hunts. On the first day, you shot and retrieved 5 ducks and shot and lost 1 duck. On the second day you shot and retrieved 3 ducks and shot and lost 3 ducks. You also shot and retrieved 1 additional bird on the second day, but you aren't entirely sure what kind it is. It's your first time to the site, so you may want to explore as you log your two day trip. Sign in and walk us through your process, talking out loud as you do so.

Scenario 2

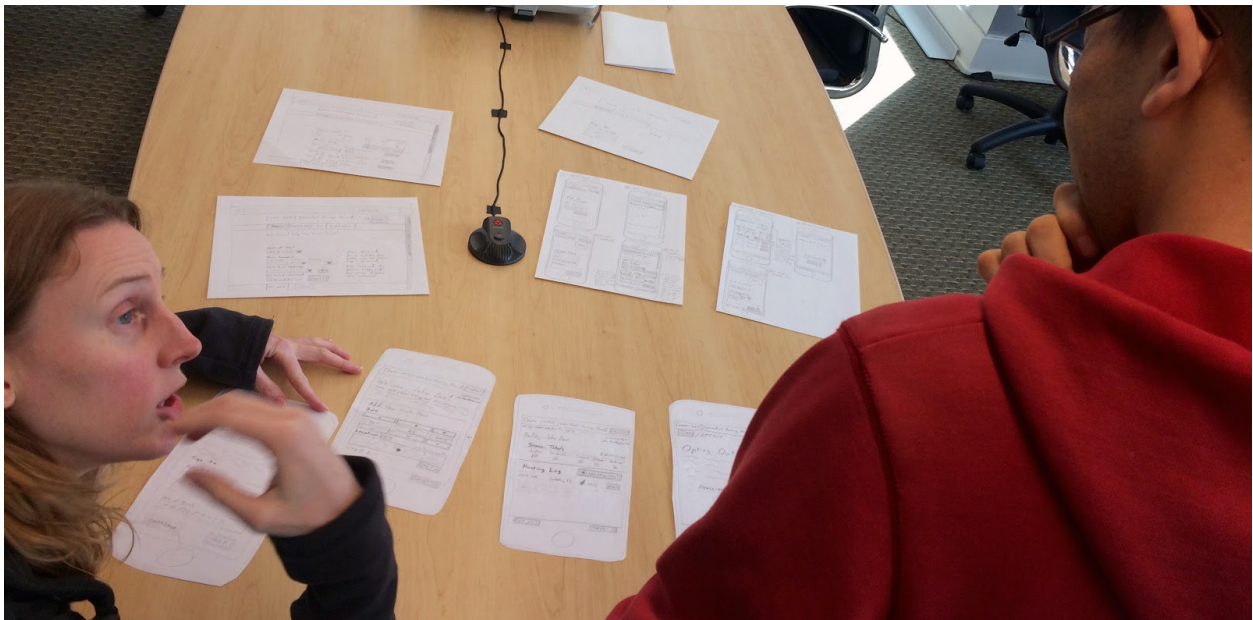
You are adding to your hunting log during the downtime in your duck blind. You just shot and retrieved 5 birds that you are adding to your existing log for the day. You are also using this time to explore the new Fish and Wildlife Services online survey to see what you can do and what services and features are provided. First, sign in and add your recent kills to your log, then explore the site, talking out loud as you do so.

Scenario 3

You just had a successful day of bird hunting and want to log a new hunt. You shot and retrieved 6 birds and shot and lost 1 bird. You also shot and retrieved 2 additional birds of a second bird type. You're new to bird hunting, and while you are confident in your kills, you want to verify the birds as you log them. Sign in and log your hunt, talking out loud as you do so.

Scenario 4

You received notification from Fish and Wildlife Services that you've been selected to participate in their annual migratory bird hunting survey, which is now online. It's your first time being selected, so you decide to log in and check it out. Sign in and explore the site to see what you can do, talking out loud as you do so.



User testing began using these scenarios. Once testing began, and the users began to explore, the scenarios were discarded. Instead, each user walked through a flow based on situational prompting. The typical prompt was bringing the users to the start of the flow and observing how they would sign in, add a new hunt and corresponding details, and approach the overview or summary page.

MOBILE TESTING

A testing session was conducted with school and work colleagues of one of our researchers. The testing occurred at the Bethesda office of Envolv PeopleCare™. It concentrated exclusively on the mobile version of the responsive website paper prototype. Beyond a study of user testing, this session focused on the specific user interface treatment and overall user experience, with the two testers providing expert feedback through their academic and professional experience with executing solutions of this kind. Joel Virothaisakun is a Technical Operations Manager at Envolv PeopleCare™, and a near-graduate of the Master of Science in Interaction Design and Information Architecture graduate program at the University of Baltimore. Shaytu Schwandes is a Business Analyst in the Product Development Department at Envolv PeopleCare™, and a near-graduate of the Master of Fine Art in Integrated Design graduate program at the University of Baltimore.

Before using the prototype, both testers were given an extensive overview of the purpose for the survey, the problems FWS is experiencing, sample paper surveys and participant comments, and an overview of the mobile prototype solution. Time was dedicated to each section. These usability design testers provided the following recommendations to enhance the solution. Their commentary, and the commentary of all of our testers, can be found following each prototype screen.

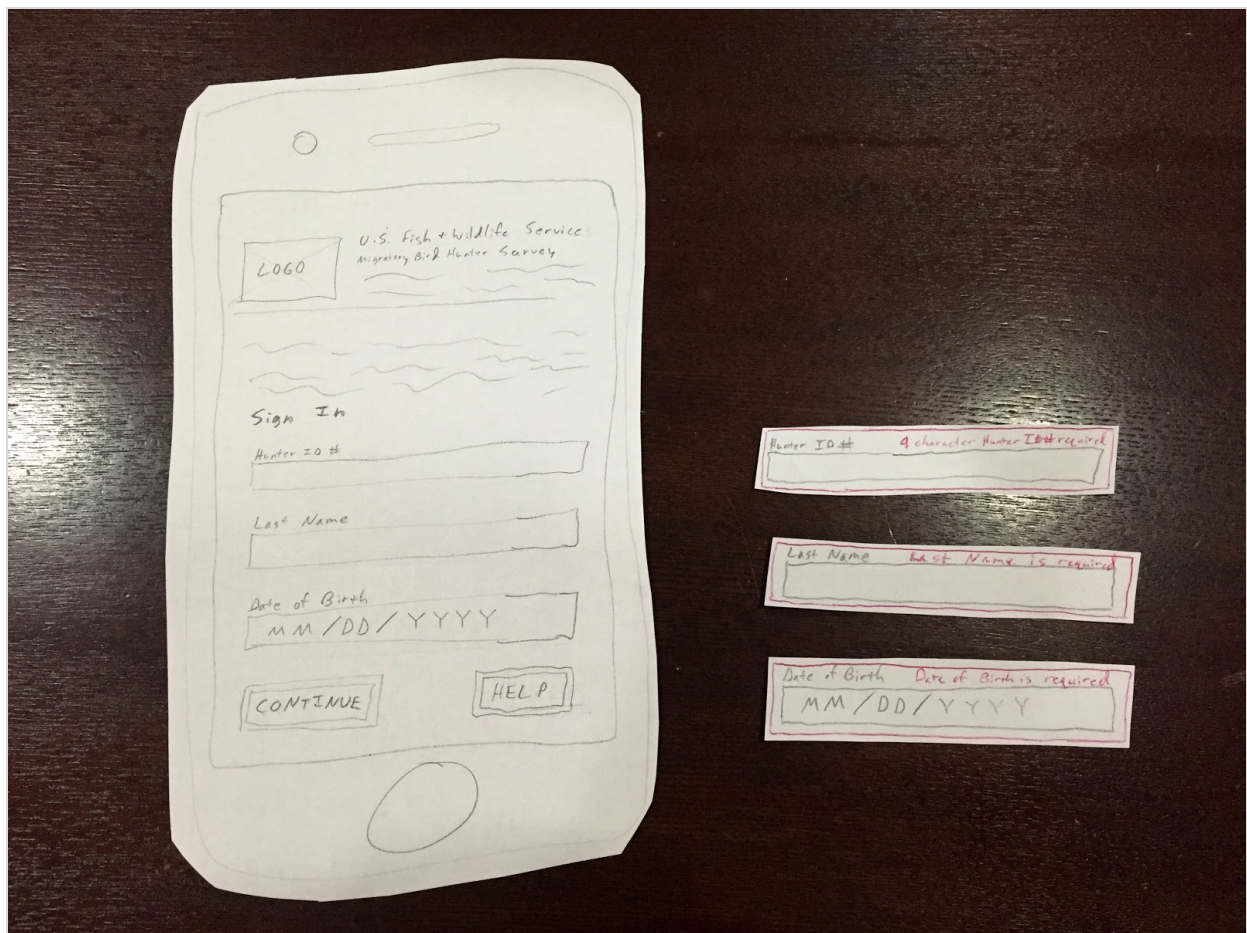


Figure 7.1. SIGN IN with validation.

Peer Review: 10/26/15

With both peer groups, testing began with questions of how to handle the hunter who wants to log hunts in multiple states. Should the hunter only be allowed to enter valid hunts for the state registration sampled for survey participation? Should the hunter be able to create multiple accounts, with one being dedicated to each state registration? Should the hunter be free to enter any hunts, anywhere, and FWS can pull those relevant to the sample data for that selected hunter?

User Test: 11/2/15

User was confused if she had to enter all the information being asked. This was clarified with prompting from the red validation messages defining required fields. All fields are required.

UI/UX Test: 11/6/15

The 'Hunter Number' field needs a tooltip or link to a content page like a section in the FAQ to explain exactly what value is being requested. Since 'Hunter Number' is subject to change year-to-year it would be nice to give the hunter some robust direction on which number to source, and the various areas where it can be located.

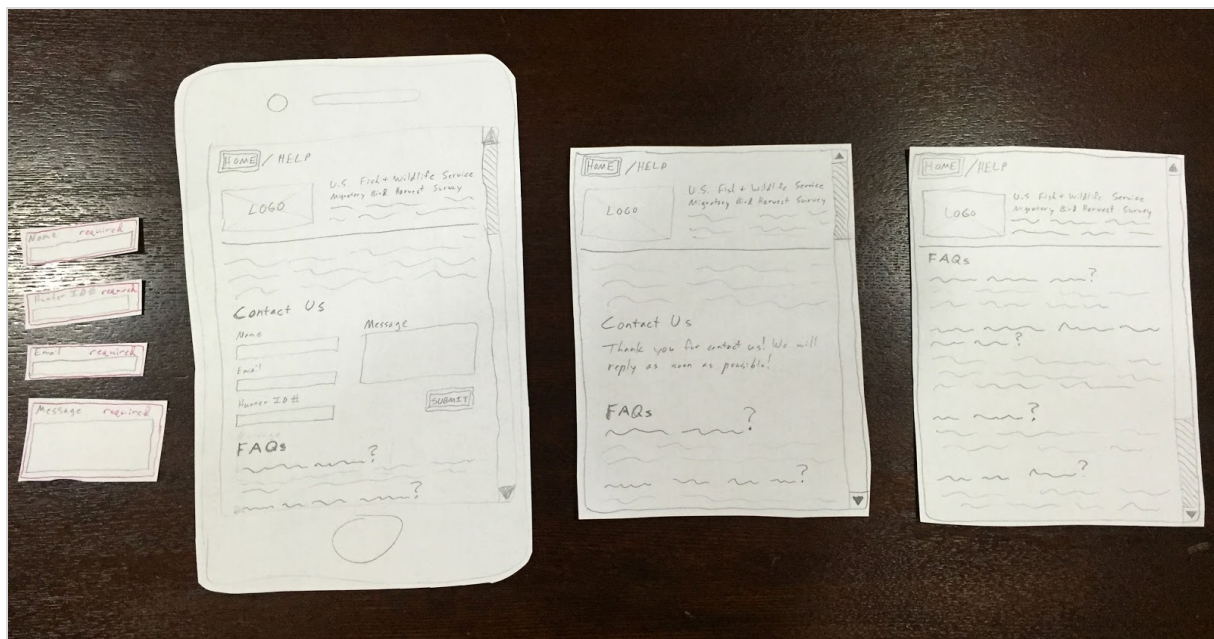


Figure 7.2. HELP with screen scrolling and validation.

UI/UX Test: 11/6/15

A main navigation structure of Home, FAQ, and Contact are necessary in a logged out state. You want to encourage members to answer questions for themselves before reaching out directly to FWS. The current design has the contact form in the lead before the member will ever get to the FAQ text. This will also eliminate the strange change in navigation that current takes place when moving from the "Home" screen (bottom navigation) to the "Help" screen (top navigation, in breadcrumbs). The navigation structure needs to be consistent and reliable.

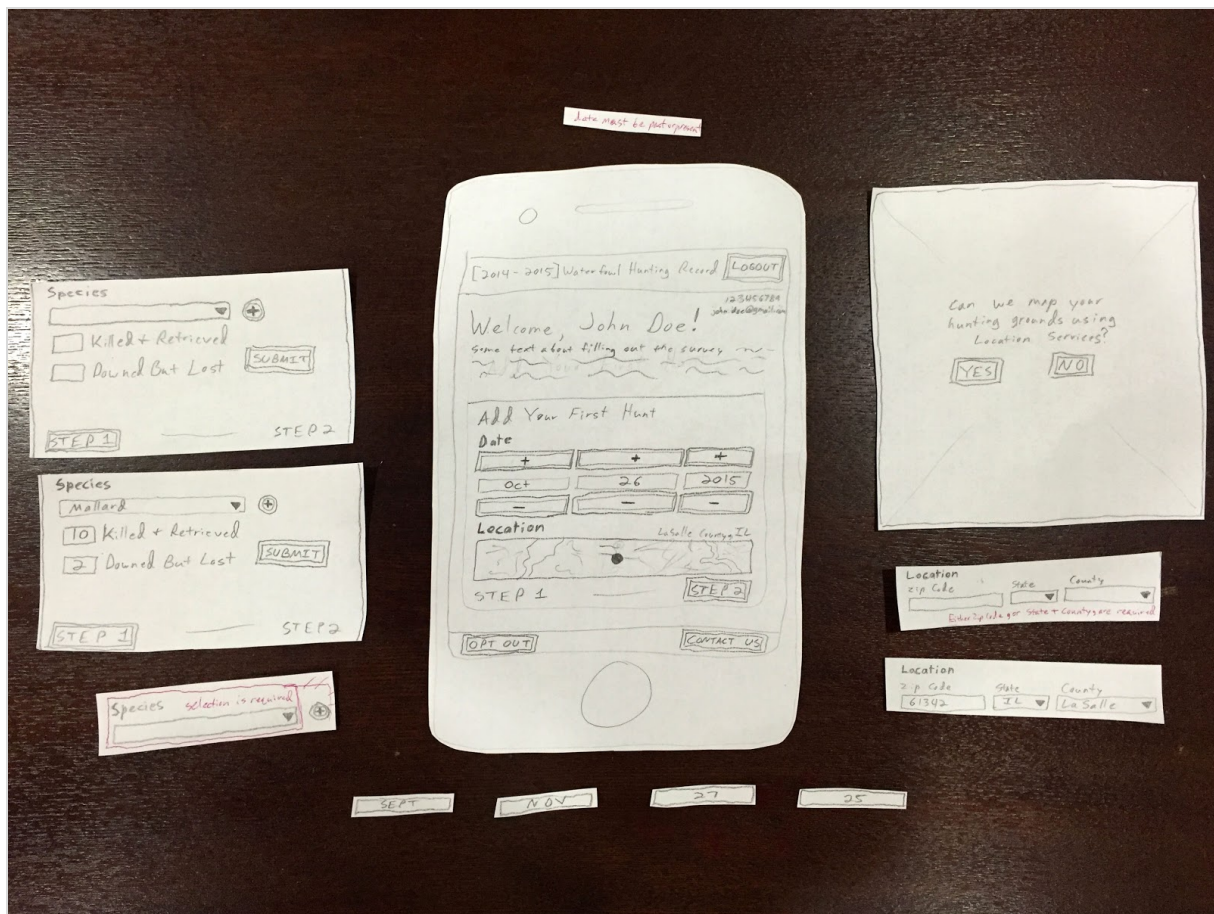


Figure 7.3. ADD NEW HUNT as a two step process, with validation.

Peer Review: 10/26/15

A species picture and description should be offered when selecting a species. A categorized taxonomy of species should display. There was consensus that the hunter should not be prompted to use or deny location services for GPS upon entering the “Add New Hunt” section. They should only be prompted when making modifications of the location specifically.

User Test: 11/2/15

Plus and minus controls on the date entry is a little confusing. User would not want to have to hit minus up 26 times to select the date. The ‘Step 2’ control was hard to find initially. The species description and image fly over was enjoyed.

User was confused if she was being asked for her current location, or the location of her past hunt. She stated that she would not likely know the postal code she is hunting in. She would probably know the state and perhaps the county. The researchers made a note that any users, anywhere, should be able to toggle between GPS and selection fields for setting a location. This user was also confused about the ‘Step 1’ to ‘Step 2’ workflow.

UI/UX Test: 11/6/15

It would be ideal if all the information for a single hunt could be entered on a single screen. If more species need to be added, then that same single page should be made to build vertically. The STEP 1 → STEP 2 progression to Add A Hunt is confusing, and does not offer an opportunity to review the information you have entered during a prior step before submitting.

A species selection prompt should be a “confirm” or “deny” option, rather than just an option to dismiss. Since this will pop up each time a species selection is made, you want to give the hunter the opportunity to go back without the species field filled in if they

selected the wrong bird through user error or genuinely choose the wrong bird and realize it by reading the bird's description.

The image shows a hand-drawn prototype of a mobile application interface for a waterfowl hunting record. The interface is designed to look like a smartphone screen with a dark background and a light-colored app area.

Header Section:

- Title: [2014 - 2015] Waterfowl Hunting Record
- Logout button: [LOGOUT]

Message Area:

- Text: Message about End Date for Logging
- Phone number: 123456789
- Email: john.doe@gmail.com

Greeting:

Hello, John Doe

Season Totals Table:

Season Totals		3 Days(s) Hunted		
Ducks	Sea Ducks	Geese	Brant	Birds Lost
16	#	12	#	6

Hunting Log Table:

Hunting Log					[+ ADD NEW HUNT]
10/26	LaSalle, IL	▲	10/2	[EDIT]	
10/12	Bureau, IL	▲	6/3	[EDIT]	
10/1	Lee, IL	▲	12/1	[EDIT]	

Footer Section:

- Logout button: [LOG OUT]
- Contact Us button: [CONTACT US]

Figure 7.4. HUNT LOG showing three hunts logged.

Peer Review: 10/26/15

A species picture and description should be offered when selecting a species. A categorized taxonomy of species should display. The Retrieved/Lost summary counts to left of the "Edit" buttons confused the users. They look too similar to dates, and perhaps should be eliminated or color coded for clarity.

User Test: 11/2/15

User observed that the Retrieved/Lost summary counts look like a date format.

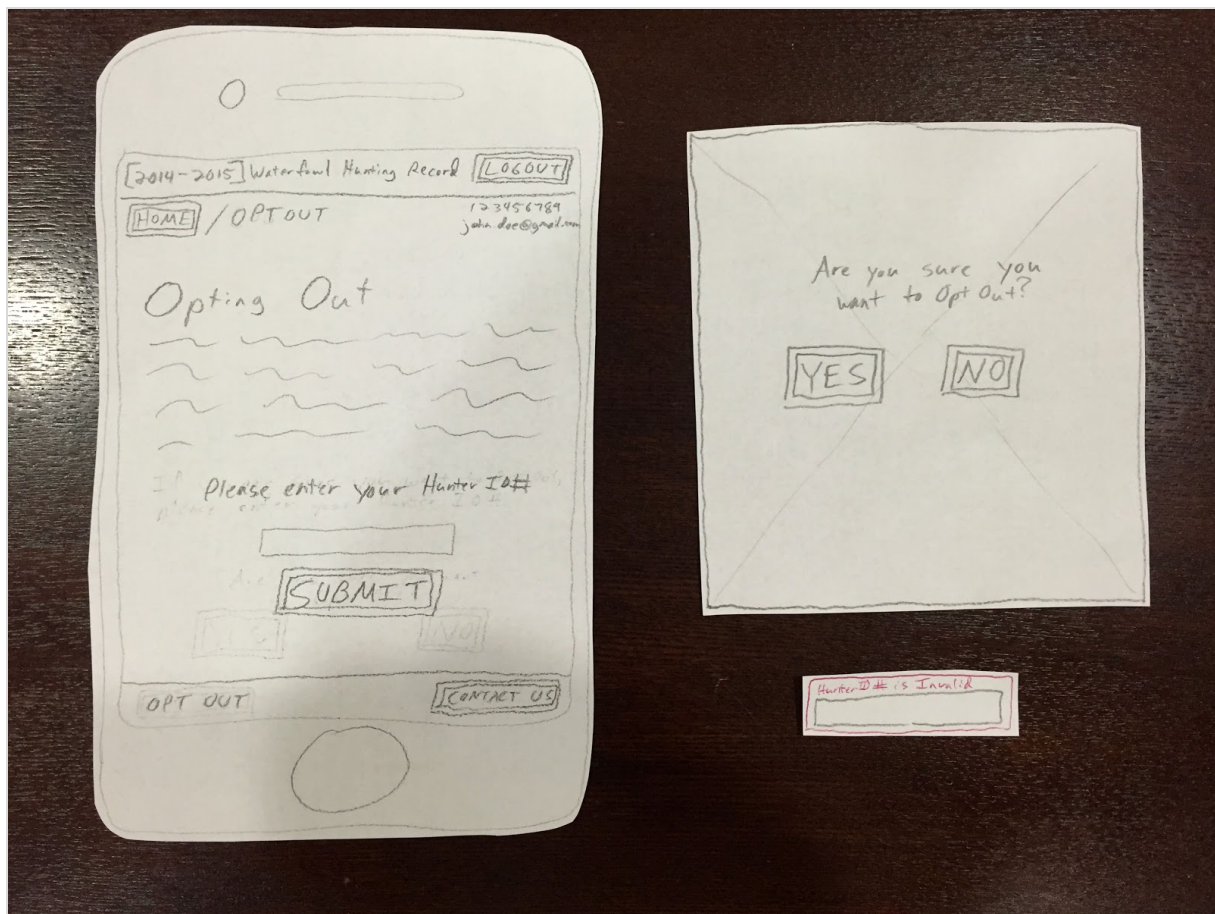


Figure 7.5. OPT OUT with validation and confirmation.

Peer Review: 10/26/15

The first peer group loved the Opt Out feature. The second peer group questioned its necessity.

DESKTOP TESTING


[2014-2015] WATERFOWL HUNTING RECORD

Directions for adding a new hunt ~~~~~

~~~~~

~~~~~

Add New Hunt

Date
MM/DD 

Zip code State County

Species

☐ Killed & Retrieved
☐ Downed but Lost

(+) Add Species

(+) Add New Hunt

Submit

Additional hunting dates may

Figure 8.1. ADD NEW HUNT with Date, Location, Species and kill count. Ability to Add Species and Add New Hunt from this single page.

Peer Review: 10/26/15

There was some confusion about whether one page should be dedicating to adding all information dedicated to a single hunt, or if the experience should be broken up across multiple pages and tabs as demonstrated in this screen.

User Test: 11/2/15

User had some initial difficulty authenticating through the login process, but recovered. He was looking for clearer direction within the prototype. The species dropdown confused the user, prompting him to want to click "Add Species" as a first action believe this was the way to declare what birds he had hunted.

User was confused if the location was supposed to be where she lives, or where she hunted. This user also struggled with the Species selection, moving directly to the "Add Species" area to take this action. She believed that the 'Retrieved' and 'Lost' controls were boolean checkboxes, rather than numeric fields. This actually happened with two desktop testers.

[2014-2015] WATERFOWL HUNTING RECORD

Directions for completing this form

Your Season Totals # Days Hunted

Ducks	Sea Ducks	Geese	Brant	Total Birds lost
#	#	#	#	#

Hunting Log

MM/DD	County, St	# 10/11	details
MM/DD	County, St	# 5/5	details

⊕ Add New Hunt

Key opt out

~~SAVE~~

~~Exit~~
logout

Figure 8.2. HUNT LOG showing collapsed view of two hunts logged. Season Totals would be an aggregation, and cannot be edited.

User Test: 11/2/15

User confused by the Retrieved/Lost count, believing this to be a date. She was also uncertain what to do next from this screen. What happens if one clicks 'Exit' first? Is this a logout control, or does it eliminate the hunt information? What happens if you hit 'Save?'

[2014-2015] WATERFOWL HUNTING RECORD

Directions for completing this form

~~~~~

~~~~~

~~~~~

| Your Season Totals |           |       |       | # Days Hunted    |
|--------------------|-----------|-------|-------|------------------|
| Ducks              | Sea Ducks | Geese | Brant | Total Birds Lost |
| #                  | #         | #     | #     | #                |

Hunting Log

|          |                             |                  |              |
|----------|-----------------------------|------------------|--------------|
| MM/DD    | County, St                  | <del>10</del> 11 | hide details |
| Ducks    | 5 killed & retrieved 0 lost |                  | Edit         |
| Sea Duck | 5 killed & retrieved 1 lost |                  |              |
| MM/DD    | County, St                  | <del>5</del> 5   | hide details |
| Ducks    | 3 killed & retrieved 0 lost |                  | Edit         |
| Geese    | 2 killed & retrieved 0 lost |                  |              |

+ Add New Hunt

way out

~~SAVE~~ ~~EXIT~~

Figure 8.3. HUNT LOG with two hunts logged, with details expanded.

User was confused by the “Season Totals” area primarily due to an absence of data in the prototype. There was some discussion on whether it is a burden for the hunter to have to click twice to edit a hunt; once to expand details, and once to edit.

## **ROUND 3 DESIGN**

Based on the feedback supplied in peer-review, commentary documented during user testing and an assessment of usability and design, final paper prototypes were created for both the desktop and mobile browser. These were created and used as the foundation to begin development of technical prototypes.



## MOBILE

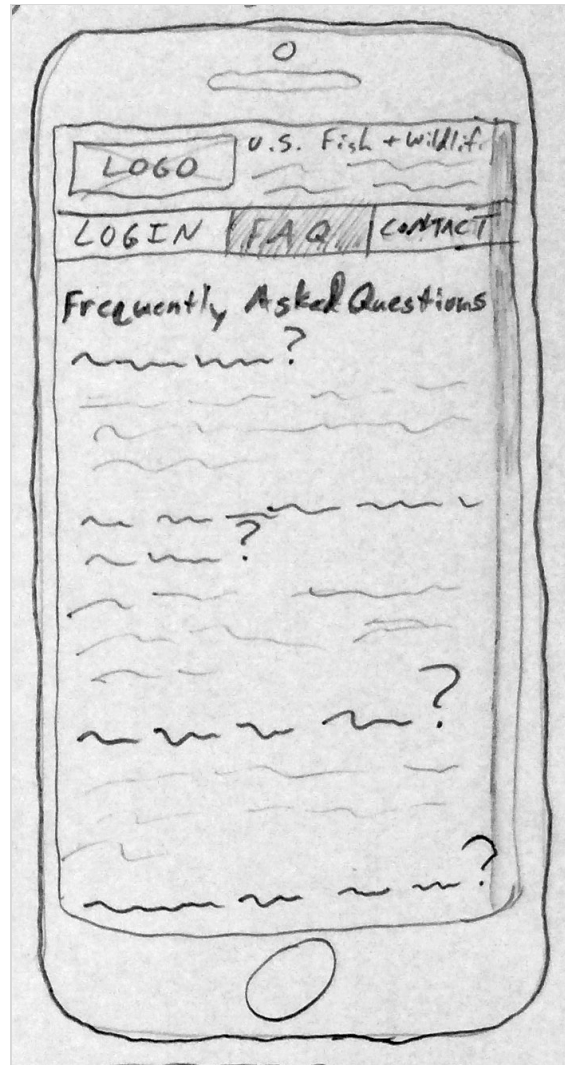
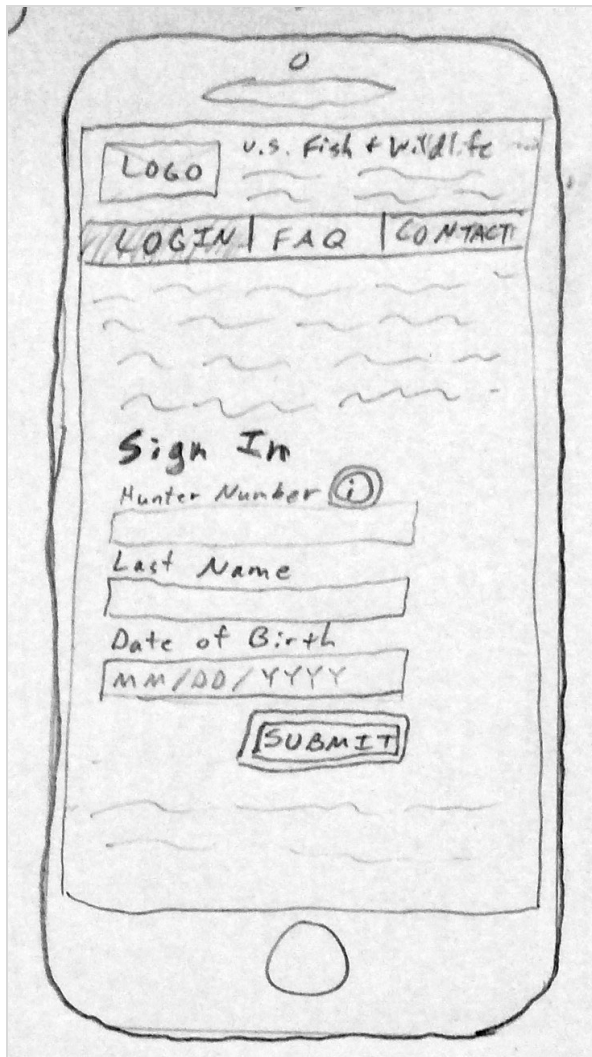


Figure 9.1. SIGN IN and FAQs

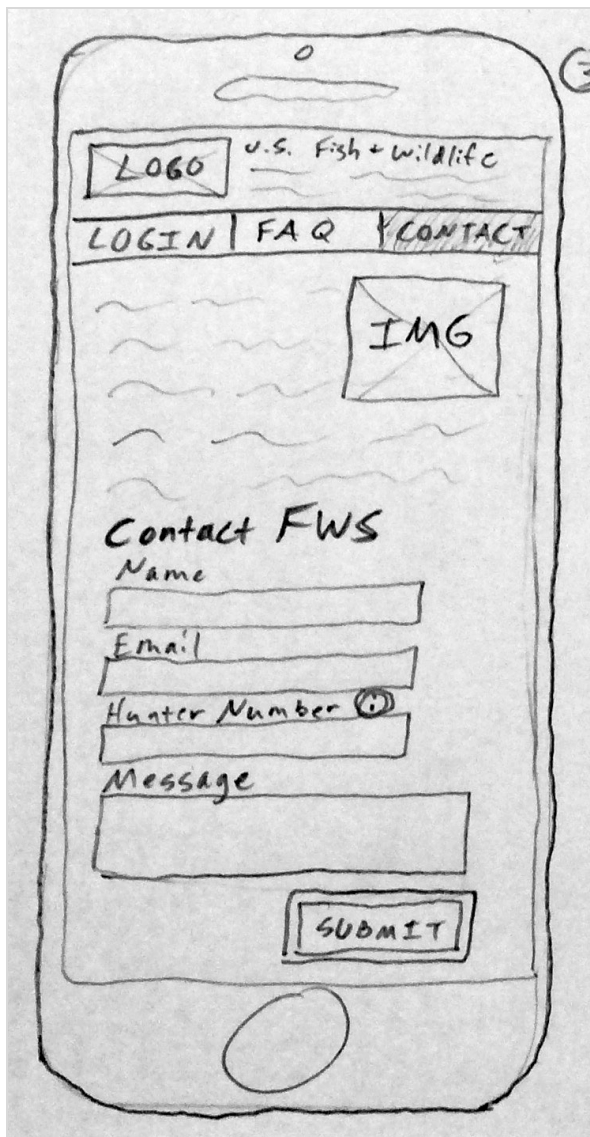


Figure 9.2. CONTACT and ADD NEW HUNT



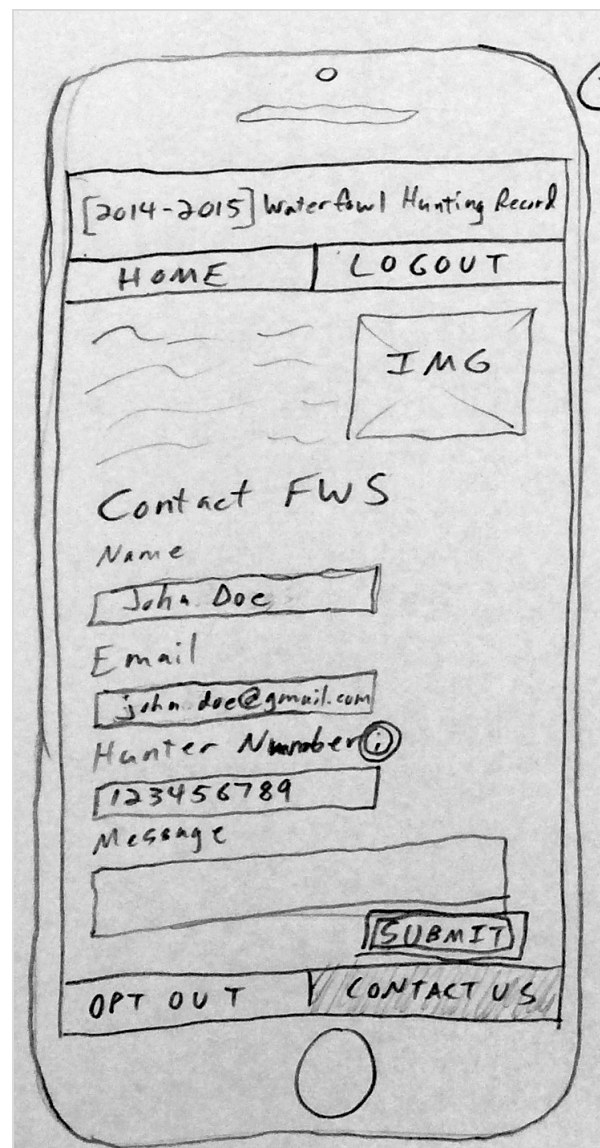


Figure 9.3. HOME logged in with logged hunts and CONTACT while logged in.

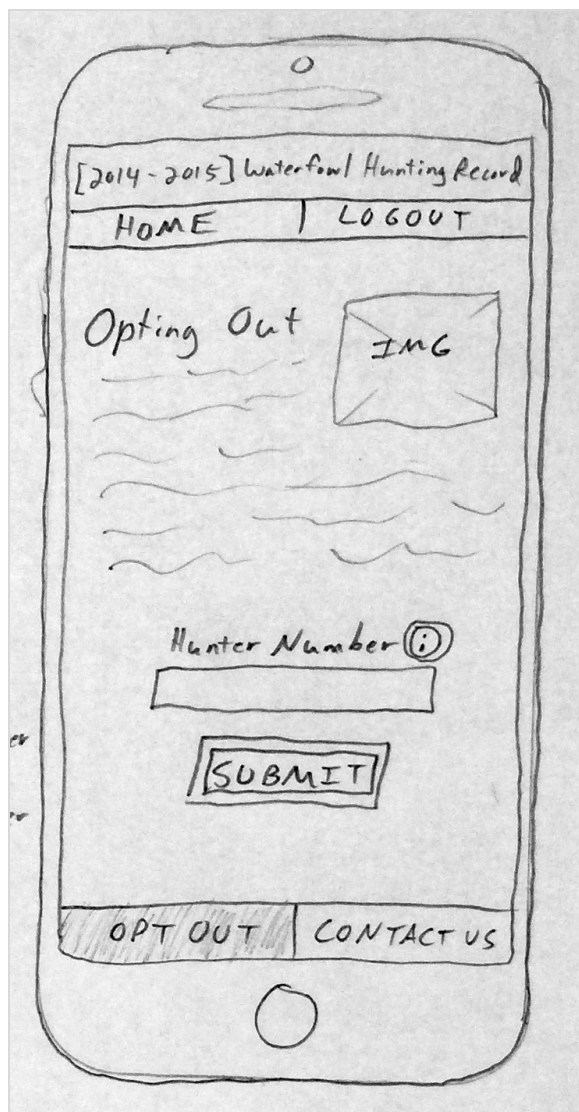


Figure 9.4. OPT OUT



## DESKTOP

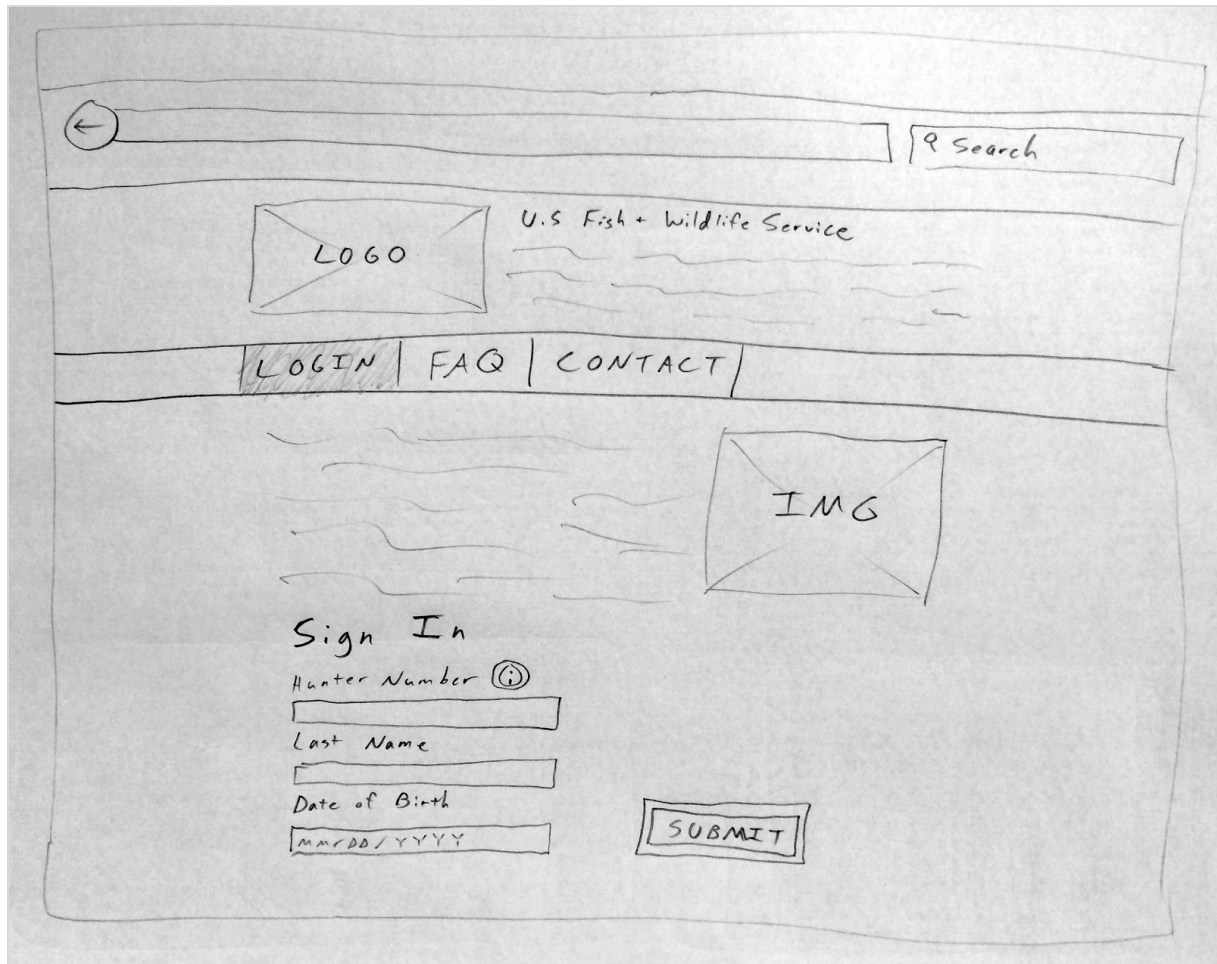


Figure 10.1. SIGN IN

← QSearch

[2014-2015] Waterfowl Hunting Record

John Doe  
ID# 123456789  
john.doe@gmail.com  
[edit profile](#)

HOME | CONTACT US | LOG OUT

Welcome! Log Your First Hunt!

Date of Hunt  
Nov 8 2015 ▼

Hunt Location  
zip code State County  
▼ ▼ ▼

Waterfowl Species  
▼ (+)

☐ Killed + Retrieved

☐ Downed But Lost

SUBMIT

LOGO

Area Reserved  
for a calendar date  
picker when "Date of Hunt"  
drop is pressed.

Also reserved for  
species image and  
description display  
upon selection

Figure 10.2. ADD HUNT

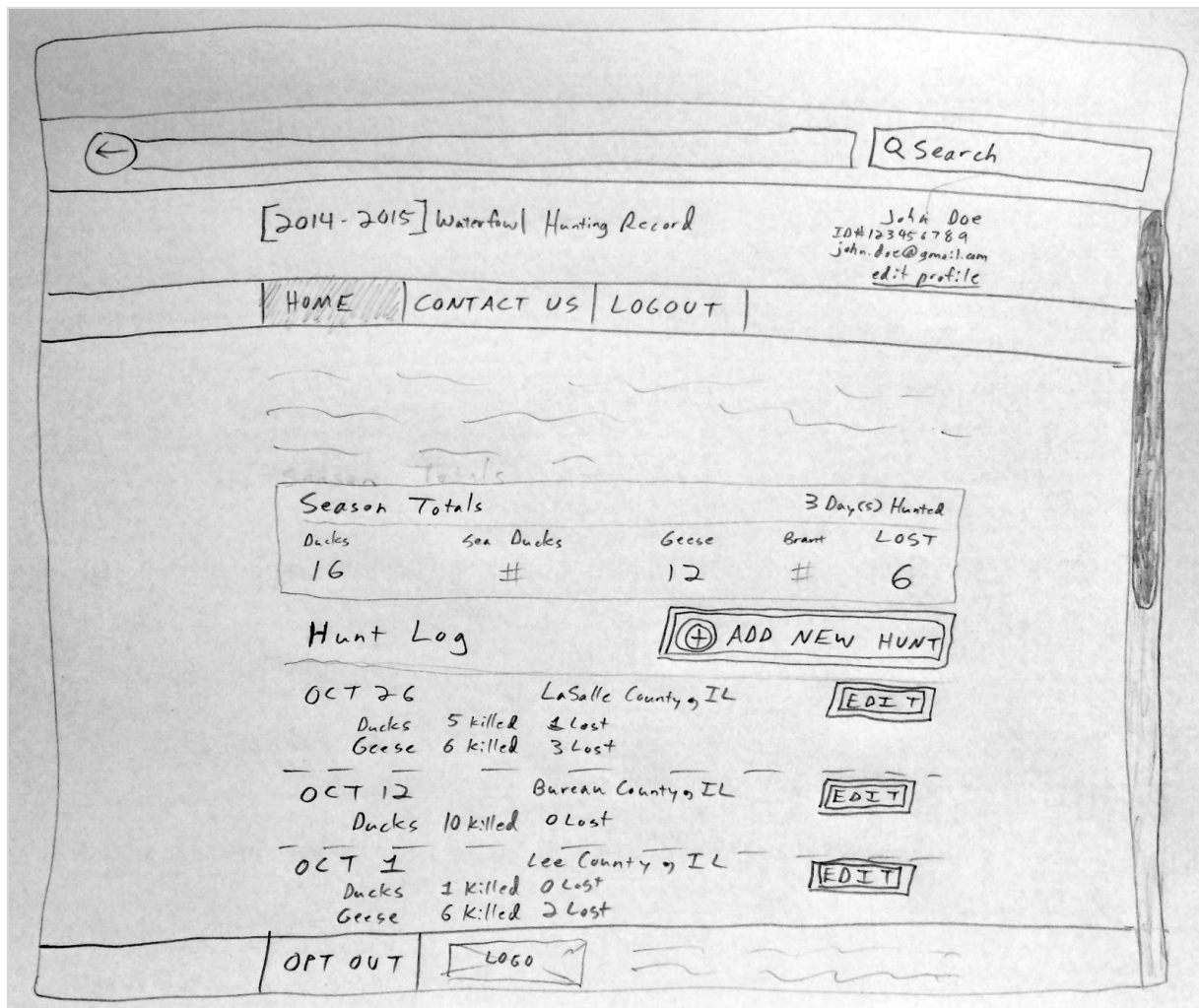


Figure 10.3. HOME with logged hunts.

## TECHNICAL PROTOTYPES

Based on our feedback from paper prototyping and research of the target demographic we created our technical prototypes. The prototype was peer-reviewed by graduate students at University of Baltimore, user-tested, expert tested and refined. This work was conducted over a four week period. The desktop versions of the survey will be displayed in this paper. The focus will be on functionality and structure and the overall evolution to a final technical prototype.

### ROUND 1 Design

**Surveys & Data**

Population Surveys

Diary Surveys ▼

My Hunter Survey

Add a Hunt

FAQ

Opt Out

### Diary Surveys

#### Migratory Bird Hunter Survey (Hunter Survey)

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aenean euismod bibendum laoreet. Proin gravida dolor sit amet lacus accumsan et viverra justo commodo. Proin sodales pulvinar tempor. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Nam fermentum, nulla luctus pharetra vulputate, felis tellus mollis orci, sed rhoncus sapien nunc eget odio.

Please confirm the identifying information we have been supplied through your state hunting registration in order to sign in and start logging your hunts. Once signed in, you will be able to Opt Out should you not want to participate in this season's survey. If you do Sign In and make use of the survey, you are consenting to allow the U.S. Fish & Wildlife Service to make use of the information you enter to help inform our regulatory and conservation efforts.

#### Sign In

Lorem ipsum dolor sit amet, consectetur adipiscing elit.

Hunter Number ?

Last Name

Date of Birth

MM/DD/YYYY

Sign In

**Figure 11.1.** SIGN IN with Hunter Number, Last Name and Date of Birth. Easy to navigate and simple sign in for users.



Diary Surveys

[My Diary Survey](#)  
[Add a Hunt](#)  
[FAQ](#)  
[Opt Out](#)

## Add a Hunt

### [2015] Migratory Bird Hunter Survey (Hunter Survey)

---

**Welcome! Log Your First Hunt**

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aenean euismod bibendum laoreet. Proin gravida dolor sit amet lacus accumsan et viverra justo commodo. Proin sodales pulvinar tempor. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Nam fermentum, nulla luctus pharetra vulputate, felis tellus mollis orci, sed rhoncus sapien nunc eget odio.

**Date of Hunt**

12 / 5 / 15

**Hunt Location**

State

County

**Waterfowl Species**

Ducks

☐ Killed & Retrieved

☐ Downed But Lost

Add

+

Species

Submit

**Figure 11.2.** ADD HUNT with Date, Location, Species and kill count. Ability to add all details for the hunt on a single screen. Here, users establish a location and date of hunt, select a species (or subspecies), sets the number of birds harvested and declares how many birds were killed but lost. The user can also add additional details about another species they may have hunted on this same day.

Surveys & Data

Population Surveys

Diary Surveys

My Hunter Survey

Add a Hunt

FAQ

Opt Out

## My Waterfowl Hunting Diary

### [2015] Migratory Bird Hunter Survey (Hunter Survey)

Welcome!

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aenean euismod bibendum laoreet. Proin gravida dolor sit amet lacus accumsan et viverra justo commodo. Proin sodales pulvinar tempor. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Nam fermentum, nulla luctus pharetra vulputate, felis tellus mollis orci, sed rhoncus sapien nunc eget odio.

| Season Totals |           |       |       |      | 3 | Days(s) Hunted |
|---------------|-----------|-------|-------|------|---|----------------|
| Ducks         | Sea Ducks | Geese | Brant | Lost |   |                |
| 8             |           | 5     | 6     | 8    |   |                |

ADD NEW HUNT

| Hunt Log   |   |        |   |      |  |      |
|------------|---|--------|---|------|--|------|
| October 26 |   |        |   |      |  |      |
| Ducks      | 3 | Killed | 2 | Lost |  | EDIT |
| Geese      | 3 | Killed | 1 | Lost |  |      |
| October 12 |   |        |   |      |  |      |
| Ducks      | 3 | Killed | 0 | Lost |  | EDIT |
| Geese      | 2 | Killed | 1 | Lost |  |      |
| October 1  |   |        |   |      |  |      |
| Ducks      | 2 | Killed | 4 | Lost |  | EDIT |
| Brant      | 6 | Killed | 0 | Lost |  |      |

**Figure 11.3.** HUNT LOG populated with Date, Location, Species and kill count. Ability to see Season Totals which are derived from the Hunt Log entries.

## Testing & Findings

Again, the following test cases were developed and supplied to the users. They represent the main tasks required to make use of the proposed functionality within the prototype.

### Scenario 1

Hunter hunts in Adams, IL on Jan 15, 2015. The hunter kills 3 Ducks and loses 2. The hunter kills 3 Geese and 1 was lost.

#### Scenario 2

Add New Hunt: Hunter hunts in Ashland, IL on Jan 12, 2015. The hunter kills 3 Ducks. The hunter kills 2 Geese and 1 was lost.

#### Scenario 3

Hunter needs to edit hunt on Jan 15, 2015. Hunter remembers 5 Ducks were killed.

#### Scenario 4

Hunter needs to edit hunt on Jan 12, 2015. Hunter remembers 5 Ducks were killed and 1 was lost and 2 Geese were killed and 1 was lost.

#### Scenario

Hunter decides to print survey rather than fill it out online.

#### Scenario 6

Hunter decides to Opt Out of the Survey.

We allowed our users to follow the scenarios. We also asked them to navigate freely around the prototype if they wished to do so. We wanted to see if they were able to navigate through the site intuitively and provide feedback as needed. As a group we were pleased, the usability of our prototype was very strong and the simplistic design was pleasing to the users. Our users provided minor visual recommendations and we incorporated those into our next revision.

Our second round of testing was done with actual hunters. The hunters had been sent the FWS survey in the past and stated they found it confusing to fill out and ended up adding only season totals at the bottom. The hunters confirmed that having the additional date of birth field when the hunter logs in, added further confirmation and clarification. The hunters stated they usually do take their mobile devices with them while hunting and would definitely log their hunts via a mobile application. The hunters mentioned they liked the ability to choose individual species rather than one category in

the “Add Hunt” section. The hunters confirmed our solution and said it was intuitive and something they would certainly use.



## Revised Design

Feedback from the user testing was combined and used to refine the following technical prototypes used to perform a peer-review session and user testing. The peer review occurred at the University of Baltimore on Monday, November 23rd, 2015. The user test occurred on Monday November 30th, 2015.



**Surveys & Data**

- POPULATION SURVEYS
- BIRD BRANDING
- HARVEST SURVEYS
- HARVEST INFORMATION PROGRAM**
- DIARY SURVEYS**
- PARTS COLLECTION SURVEYS
- BIRD & WING ID
- WEBLESS MIGRATORY GAME
- MIGRATORY BIRD DATA CENTER
- AVIATION
- REPORTS & PUBLICATIONS

## Diary Surveys

### Migratory Bird Hunter Survey (Hunter Survey)

The Service receives name, address, and screening question information from about 3,500,000 migratory bird hunters each year via the Harvest Information Program (HIP). Based on answers to the questions asked during the HIP registration process, we select samples of hunters to participate in our 5 Migratory Bird Harvest Surveys. Each survey addresses the harvest of a different species or species group. The 5 surveys are: 1) doves (mourning and white-winged) and band-tailed pigeons; 2) waterfowl (ducks, sea ducks, geese, and brant); 3) American woodcock; 4) webless species (snipe, coots, rails, and gallinules); and 5) sandhill cranes.

Hunters selected to participate in a survey are sent a survey form as close to the beginning of the hunting season as possible, so that can they record their hunting experiences throughout the season. We keep sampling hunters approximately twice each month during the hunting season, as we receive additional HIP registration information.

We need harvest reports from as many survey participants as possible, so after the hunting season is over we send reminders to sampled hunters who have not responded. Currently survey response rates are about 50% for all Migratory Bird Harvest Surveys.

Participation is voluntary and responses from hunters who choose to participate are kept strictly confidential.

Hunters' survey responses are analyzed using standard statistical techniques and are used to estimate the total harvest of migratory bird species, the number of active hunters, the total days hunters spend afield, and the average seasonal bag per active hunter.

For waterfowl, this survey produces estimates for groups of species: ducks, geese, sea ducks. In order to calculate species-specific harvest estimates, results from the MBHS are combined with those from the Parts Collection Survey.

If you are a survey participant and you need more space to record all of your hunting trips, you can order more Migratory Bird Harvest Survey forms by going to HIPWeb.

**Sign In**

Please confirm the identifying information we have been supplied through your state hunting registration in order to sign in and start logging your hunts. Once signed in, you will be able to Opt Out should you not want to participate in this season's survey. If you do Sign In and make use of the survey, you are consenting to allow the U.S. Fish & Wildlife Service to make use of the information you enter to help inform our regulatory and conservation efforts.

Hunter Number

Last Name

Date of Birth

[Sign In](#)

**Figure 12.1.** SIGN IN with Hunter Number, Last Name and Date of Birth. Easy to navigate and simple sign in for users.

Figure 12.1 displays the Login screen, asking for the same Hunter information to access the digital survey. Refinements found from our user testing suggested the Hunter Number, Last Name and Date of Birth commands be displayed above the data entry fields. This clearly communicates to the user where they are to enter their information.

Furthermore, a gray box was placed around the "Sign In" to focus the user's attention to the most important place on the screen.

Diary Surveys

My Diary Survey

[Add a Hunt](#)

FAQ

Opt Out

Download Paper Survey

## Add a Hunt


### [2015] Migratory Bird Hunter Survey (Hunter Survey)

---

#### Log Your Hunt

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aenean euismod bibendum laoreet. Proin gravida dolor sit amet lacus accumsan et viverra justo commodo. Proin sodales pulvinar tempor. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Nam fermentum, nulla luctus pharetra vulputate, felis tellus mollis orci, sed rhoncus sapien nunc eget odio.

**Date of Hunt**



**Hunt Location**

State

County

**Waterfowl Species**

Killed & Retrieved

Downed But Lost

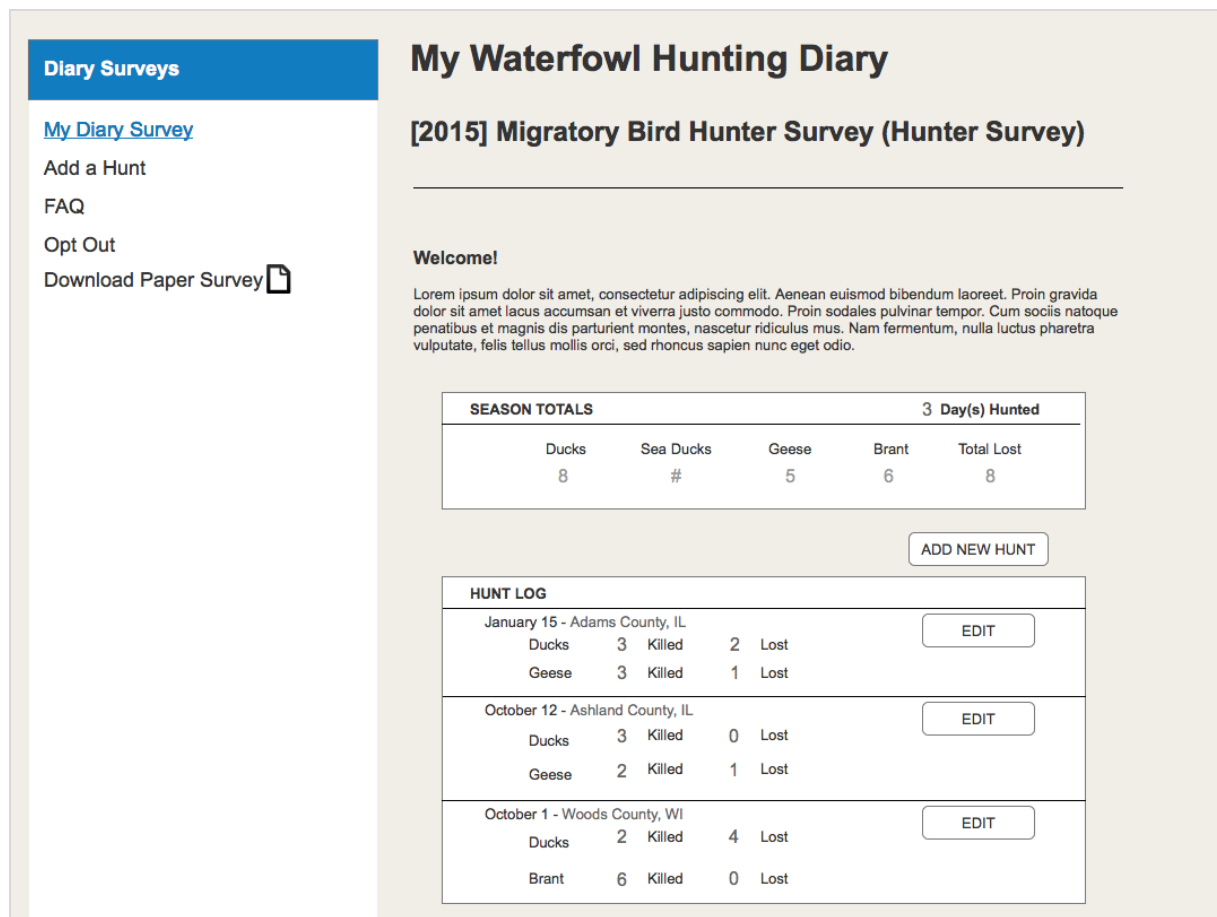
Add

+

Species

Submit


**Figure 12.2.** ADD HUNT with Date, Location, Species and kill count. Ability to add all details for the hunt on a single screen. Here, users establish a location and date of hunt, select a species (or subspecies), sets the number of birds harvested and declares how many birds were killed but lost. The user can also add additional details about another species they may have hunted on this same day.



**Figure 12.3.** HUNT LOG populated with Date, Location, Species and kill count. Ability to see Season Totals which are derived from the Hunt Log entries.

Figure 12.3 demonstrates a populated Hunt Log within the desktop browser. Three hunts have been logged. The aggregation of Season Totals is not editable at the top of the page, this information is being derived from the Hunt Log. Feedback from our testing suggested we remove the boxes around the totals, so that they did not seem editable to the users. The location of the hunt was added to the Hunt Log next to the date.

**Diary Surveys**

- My Diary Survey
- Add a Hunt
- FAQ
- [Opt Out](#)
- Download Paper Survey 

## Opt Out

### Lorem Ipsum

---

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aenean euismod bibendum laoreet. Proin gravida dolor sit amet lacus accumsan et viverra justo commodo. Proin sodales pulvinar tempor. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Nam fermentum, nulla luctus pharetra vulputate, felis tellus mollis orci, sed rhoncus sapien nunc eget odio.

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aenean euismod bibendum laoreet. Proin gravida dolor sit amet lacus accumsan et viverra justo commodo. Proin sodales pulvinar tempor. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Nam fermentum, nulla luctus pharetra vulputate, felis tellus mollis orci, sed rhoncus sapien nunc eget odio.

**Hunter Number**

**Figure 12.4.** Ability to OPT OUT of the survey if the hunter does not want to participate.

Figure 12.4 allows the hunter to “Opt Out” of the survey. The hunter would simply enter their Hunter Number and submit. This is an important addition with the digital survey. This will allow the FWS to add an additional person into the survey population and eliminate redundate contact with hunters who are not going to participate. Currently, FWS spends a great deal of resources and energies reminding hunter to fill out the survey. If a hunter is not going to participate, FWS can collect this data and cease to contact the hunter. Furthermore, if FWS wanted to add another hunter into the survey population they could- this will hopefully help with collecting sufficient amounts of data each year.



Diary Surveys

My Diary Survey

Add a Hunt

FAQ

[Opt Out](#)

Download Paper Survey

Opt Out

Lorem Ipsum

Are you sure?

YESNO

Submit

**Figure 12.5.** OPT OUT: Are you sure? Users are presented with this message to further communicate why the survey is important to FWS and why the data being collect is important.. If the user selects YES they will be removed from the survey and returned to the LOG IN screen. If the user selects NO they will return to MY DIARY SURVEY.

## FINAL RECOMMENDATIONS

With a firm understanding of waterfowl hunter demographics, the following recommendations are meant to be pragmatic and immediately actionable by FWS to fulfill their goals. The aim of this proposal is to minimize cost, complexity, and time to implementation in order to produce the highest possible value and maximize return on investment. A phased approach should be taken to achieve the optimal effect. It is recommended that FWS needs to simplify their paper survey, build an effective online survey, and integrate with successful systems already collecting the information they seek.

### Paper Survey

Contemporary literature relating to data processing argues strongly against paper processing of any kind, for any reason. Christopher Young, a director of industry strategy and marketing for Adobe, says that forcing stakeholders to participate in “paper-based processes increases dissatisfaction, greatly slows service delivery, and can leave customers with a negative view of your organization...” (2014). This can be verified by the minimal satisfaction and gratitude that has been documented in survey participant correspondence supplied to FWS. The majority of participant feedback is centered on how confusing and burdensome the paper survey currently is (Wilkins, 2015). To minimize the burden, the paper form should be focusing on universal design, specifically flexibility in use, and should be designed to “accommodate a wide range of individual preferences and abilities” (Mace, 1997).

The initial survey hunters receive to begin the season should also be enhanced to contain additional language promoting access to a new FWS digital survey at <https://fws.gov/survey>, how a hunter can access the online survey using their federal hunter number, and how a hunter can opt out of survey participation all together at this same web address if they choose. The opt-out option, again using the hunter’s federal hunter number as a primary key, will save FWS valuable printing and shipping resources

that can be used toward the coming season, or to further develop digital resources to move away from paper data processing entirely.

Outright elimination of paper processing should be FWS' long-term and overarching goal. In the immediate, based on the study of over fifty sample completed surveys supplied by FWS, the amount of data required to be entered by the participating hunter can be drastically reduced while retaining the required information the organization needs in order to be successful. The user can only process small amounts of information at a time. By focusing on Progressive Disclosure and providing only the information the user needs at that given moment, the design can help to eliminate user-error.

(Weinschenk, 2011) Where possible, outcomes should be derived systematically rather than requested as user entry. Blank fields should be treated as NULL or "0". NULL values should not be required as entry from the participant. A "State of Hunt" and "County of Hunt" can be derived from a postal zip code. The hunter should be required to supply a postal code to identify each hunt location. "Season Totals", both "Days Hunted" and total birds, can be summed from the per-hunt entries provided by the hunter. The "Season Totals" section should be eliminated outright, as participants too-often contradict the information they supply in their daily hunts. "Birds Downed but Lost" should be captured per-hunt.

With the initial steps of restructuring the paper form it is important to address clear and consistent communication and to illuminate a path to completion. Currently the multiple data entry locations are confusing to the hunters. Making the form as compact as possible will assist with not overloading the user with information. Penzo mentions that most users will scan the form broadly before "they understand its scope, so the smaller the area of a page which the user is forced to navigate, the better" (2006). Figure 4 provides an example of how the information could be more clearly communicated and gathered into one location.

| Date of Hunt         |                      | Location of Hunt     |                      | Number of Birds Killed |                      |                      |                      |                      |
|----------------------|----------------------|----------------------|----------------------|------------------------|----------------------|----------------------|----------------------|----------------------|
| Month                | Day                  | State                | County               | Ducks                  | Sea Ducks            | Geese                | Brant                | Total Lost           |
| <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/>   | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/>   | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/>   | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/>   | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |

**Figure 4.** Paper survey data entry enhancements. This figure illustrates combining information from the paper survey into one clearly communicated design.

Providing mental pauses in the information will help with the user's focus and allow them to mentally digest the information and requests being made (Weinschenk, 2011).

Additionally, something as simple as increasing the size of the text will help increase awareness, readability, and stress importance to the user. Addressing the purpose of the data call in the header of the form will increase awareness and potentially aid in the generation of more accurate responses. It's known from the demographic research that waterfowl hunters take great pride in their hunting. More clearly communicating the objective might motivate better responses. The following page provides our final recommendation for how the layout of the paper form could assist the user with clarity and objective, therefore motivating better and increased responses.





## WATERFOWL HUNTING RECORD

**THE PURPOSE OF THIS SURVEY:** is to collect data on waterfowl hunting in the state in which you have been selected to report. The U.S Fish and Wildlife Service uses this information to track and monitor the waterfowl population. Information generated from this request is used to modify waterfowl hunting laws and regulations.

1. Hunter may complete survey online at [www.FWS.gov/survey](http://www.FWS.gov/survey)
2. Please record hunting record below in the spaces provided.
3. Please record **ONLY** hunts in the state specified in your cover letter.
4. Please **DO NOT** include birds shot by other members of your hunter party.

| Date of Hunt |     | Location of Hunt |        | Number of Birds Killed |           |       |       |            |
|--------------|-----|------------------|--------|------------------------|-----------|-------|-------|------------|
| Month        | Day | State            | County | Ducks                  | Sea Ducks | Geese | Brant | Total Lost |
|              |     |                  |        |                        |           |       |       |            |
|              |     |                  |        |                        |           |       |       |            |
|              |     |                  |        |                        |           |       |       |            |
|              |     |                  |        |                        |           |       |       |            |
|              |     |                  |        |                        |           |       |       |            |
|              |     |                  |        |                        |           |       |       |            |
|              |     |                  |        |                        |           |       |       |            |
|              |     |                  |        |                        |           |       |       |            |
|              |     |                  |        |                        |           |       |       |            |
|              |     |                  |        |                        |           |       |       |            |
|              |     |                  |        |                        |           |       |       |            |
|              |     |                  |        |                        |           |       |       |            |

More space for entries available on back

**We would love to hear from you!** Please leave comments, feedback or additional information for FWS.

If you did not hunt ducks, geese, or brant, please check the box below and mail back the form.

☐

More space for comments available on back



345899107

Maryland

## Digital Survey

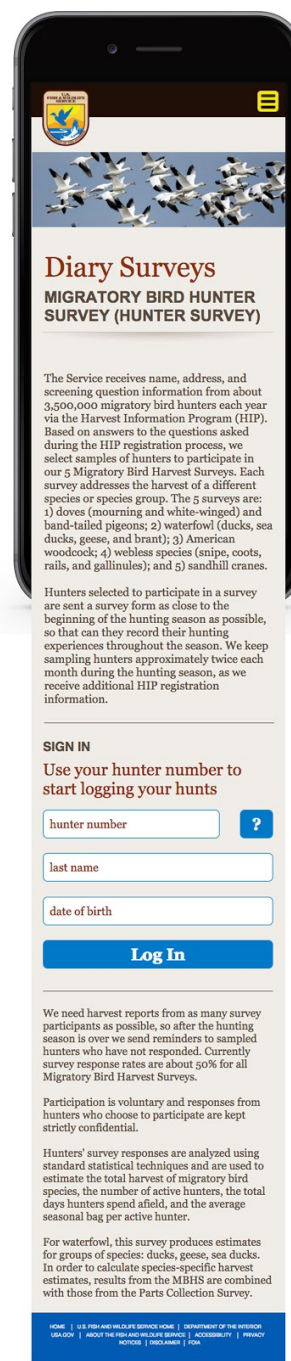
Incredible value in data quality can be gained by allowing hunters to track their harvest in the wild, in real-time. To do this, hunters need the ability to fill out the survey from their duck blinds using the data plans on their mobile phones during breaks in the action. According to Honigman, it is ideal for an organization to have both a native mobile application and a responsive website viewable in a desktop or mobile browser to reach the greatest potential audience (2014). To achieve the farthest mobile reach at the lowest possible cost, developing a responsive website is a much more practical endeavor than producing a native mobile application. It will improve the user experience for both desktop and mobile with a single development effort, and need not adhere to stringent development and approval guidelines required of native mobile applications (Honigman, 2014). FWS should redevelop <https://migbirdapps.fws.gov/hipweb> to be responsive to mobile browser display. An online survey can be developed to validate and properly format the information supplied by hunters, ensuring that it meets the FWS specification and requirements for consumption and processing. Where the hunter makes an error providing data to the form, a well-developed combination of client-side and server-side data validation can communicate precisely how required information needs to be supplied and formatted in order to be treated as valid (Jovanovic, 2009). This can be done quite easily by simply offering an example of the data that is expected for a particular form field and, when errors do occur upon form submission, clearly informing the user that there is a validation error within the form, what field it pertains to, the reason for the error, and how the user can correct it (Turnbull, 2010).

Once a hunter receives the introductory, pre-season paper survey they should be able to visit the website at <https://migbirdapps.fws.gov/hipweb> and authenticate using their federal hunter number in combination with a small set of personally identifiable information, and then either fill out the digital survey online or opt-out of the survey altogether. The opt out feature could produce enormous cost savings for FWS while allowing the organization to filter in participants to replace those that knowingly won't

be participating. Additionally, it is suggested that FWS allow any waterfowl hunter to log their hunting information, regardless of whether or not they have been randomly selected to participate in the survey. This will allow FWS to filter in willing participants to replace those who have chosen to opt out or who have not submitted their paper survey at the end of the season.

Features of the digital survey must include individual hunter log in based on what is known about the individual bound to the federal hunter number, along with the ability to log hunt information in real-time or retroactively. The online survey should offer a wider variety of waterfowl to select, similar to the *Ducks Unlimited Waterfowler Journal*, and aligning with requests for more variety from past FWS survey participants (Wilkins, 2015). The selection of waterfowl species should be presented to the user as a fixed-list drop-down menu automatically categorized into Ducks, Sea Ducks, Geese and Brant to eliminate the potential for user error. The member should be able to submit a final hunt when the season concludes, to commit data for FWS processing. In the long term, the hunter's profile should also retain past hunts, categorized by season.

The following images outline our final recommendation for the digital survey experience. After careful consideration, the proposed design was formatted to fit within the existing framework and design of the FWS website. We did this in an effort to make implementation of the digital survey as easy and seamless as possible, while also ensuring a responsive format for mobile optimization.



**Figure 13.** The SIGN IN functionality for the digital survey fits into the existing DIARY SURVEYS screen. Hunters will get the information they need regarding the reason and importance of the survey and then be directed to SIGN IN to document their own hunts. To SIGN IN, hunters should enter their hunter number, last name, and date of birth. These last two fields are already on record when the hunter obtains their license and adds a sense of security and validity when they log in to the FWS website.

**Note:** Rather than restricting sign in access to only those hunters randomly selected to complete the survey, it is suggested that FWS allows all hunters who happen across this page the ability to sign in and enter their hunting logs.



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**MY HUNTER SURVEY**

- ADD NEW HUNT
- FAQs
- OPT OUT
- MATERIALS REQUEST
- FEEDBACK

## Add a New Hunt

### 2015 MIGRATORY BIRD HUNTER SURVEY (HUNTER SURVEY)

Please complete the form below for each day you hunted. Remember, participation is voluntary and responses from hunters who choose to participate are kept strictly confidential.

Hunters' survey responses are analyzed using standard statistical techniques and are used to estimate the total harvest of migratory bird species, the number of active hunters, the total days hunters spend afield, and the average seasonal bag per active hunter.

**Date of Hunt**

**Location of Hunt**

**Waterfowl Species**

☐ Birds Killed & Retrieved

☐ Birds Downed but Lost

[+ Add Waterfowl Species](#)

**Submit Hunt**

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## Add a New Hunt

### 2015 MIGRATORY BIRD HUNTER SURVEY (HUNTER SURVEY)

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Hunters' survey responses are analyzed using standard statistical techniques and are used to estimate the total harvest of migratory bird species, the number of active hunters, the total days hunters spend afield, and the average seasonal bag per active hunter.

**Date of Hunt**

**Location of Hunt**

**Waterfowl Species**

☐ Birds Killed & Retrieved


☐ Birds Downed but Lost

[+ Add Waterfowl Species](#)

**Submit Hunt**

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**Figure 13.1.** First time users will be brought directly to the ADD A NEW HUNT screen, which helps promote immediate user action. Returning users could potentially be brought to their dashboard, or MY HUNTER SURVEY, instead.



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 ADD NEW HUNT  
 FAQs  
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## Add a New Hunt

### 2015 MIGRATORY BIRD HUNTER SURVEY (HUNTER SURVEY)

Please complete the form below for each day you hunted. Remember, participation is voluntary and responses from hunters who choose to participate are kept strictly confidential.

Hunters' survey responses are analyzed using standard statistical techniques and are used to estimate the total harvest of migratory bird species, the number of active hunters, the total days hunters spend afield, and the average seasonal bag per active hunter.

Date of Hunt  
 00/00/0000
 

December 2015
 

| Sun | Mon | Tue | Wed | Thu | Fri | Sat |
|-----|-----|-----|-----|-----|-----|-----|
| 29  | 30  | 1   | 2   | 3   | 4   | 5   |
| 6   | 7   | 8   | 9   | 10  | 11  | 12  |
| 13  | 14  | 15  | 16  | 17  | 18  | 19  |
| 20  | 21  | 22  | 23  | 24  | 25  | 26  |
| 27  | 28  | 29  | 30  | 31  | 1   | 2   |
| 3   | 4   | 5   | 6   | 7   | 8   | 9   |

Select county

Today Clear

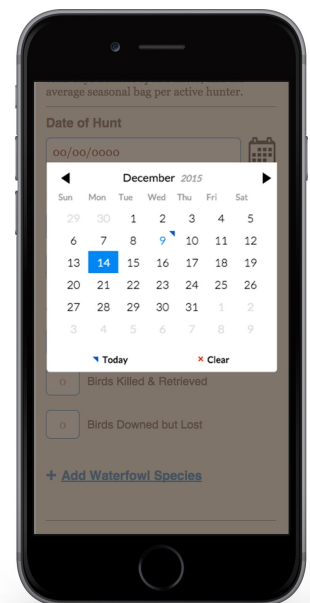
0 Birds Downed but Lost

[+ Add Waterfowl Species](#)

Submit Hunt

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**Figure 13.2.** The **Date of Hunt** field will automatically display the current date. Users will be able to select a date within the past hunting season. However, users will not be allowed to select a date within past hunting seasons, nor will they be allowed to select a date beyond the current date.

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**MY HUNTER SURVEY**

ADD NEW HUNT

FAQs

OPT OUT

MATERIALS REQUEST

FEEDBACK

## Add a New Hunt

### 2015 MIGRATORY BIRD HUNTER SURVEY (HUNTER SURVEY)

Please complete the form below for each day you hunted. Remember, participation is voluntary and responses from hunters who choose to participate are kept strictly confidential.

Hunters' survey responses are analyzed using standard statistical techniques and are used to estimate the total harvest of migratory bird species, the number of active hunters, the total days hunters spend afield, and the average seasonal bag per active hunter.

**Date of Hunt**

12/14/2015

**Location of Hunt**

select state

Alabama

Alaska

Arizona

Arkansas

California

Colorado

Connecticut

Delaware

Florida

Georgia

Hawaii

Idaho

Illinois

select county

[+ Add Waterfowl Species](#)

**Submit Hunt**

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average seasonal bag per active hunter.

**Date of Hunt**

12/14/2015

**Location of Hunt**

select state

Alabama

Alaska

Arizona

Arkansas

California

Colorado

Connecticut

Delaware

Florida

Georgia

Hawaii

Idaho

Illinois

select county

[+ Add Waterfowl Species](#)

**Submit Hunt**

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**Figure 13.3. Location of Hunt** is comprised of the state and county in which the hunt took place. Requiring users to select the State first allows for the Counties to be dynamically representative of the chosen state.

**Note:** It is suggested that FWS allows users to input states and counties outside of those for which they were selected to complete the survey. Instead, the back-end should be configured to tally the specific hunts desired by FWS. Putting the responsibility on FWS and allowing the user to input that which makes the most sense to them helps alleviate confusion on behalf of the user, who may want to input all hunts in which they were a part of.

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## Add a New Hunt

### 2015 MIGRATORY BIRD HUNTER SURVEY (HUNTER SURVEY)

Please complete the form below for each day you hunted. Remember, participation is voluntary and responses from hunters who choose to participate are kept strictly confidential.

Hunters' survey responses are analyzed using standard statistical techniques and are used to estimate the total harvest of migratory bird species, the number of active hunters, the total days hunters spend afield, and the average seasonal bag per active hunter.

**Date of Hunt**  
12/14/2015

**Location of Hunt**  
Arkansas

**Waterfowl Species**  
select species

☐ Birds Killed & Retrieved  
☐ Birds Downed but Lost

[+ Add Waterfowl Species](#)

**Submit Hunt**

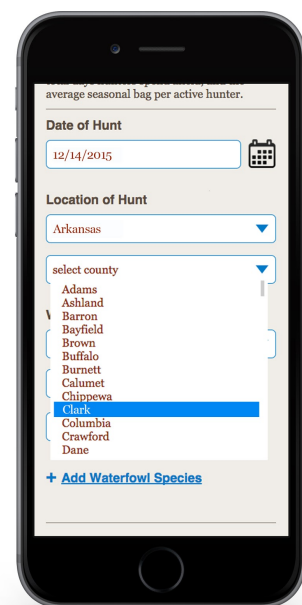
**OPTIONAL SIDEBAR CONTENT**

**MY HUNTER SURVEY**  
ADD NEW HUNT  
FAQs  
OPT OUT  
MATERIALS REQUEST  
FEEDBACK

**select county**  
Adams  
Ashland  
Barron  
Bayfield  
Brown  
Buffalo  
Burnett  
Calumet  
Chippewa  
Clark  
Columbia  
Crawford  
Dane

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**Figure 13.4.** Location of Hunt is comprised of the state and county in which the hunt took place. Requiring users to select the State first allows for the Counties to be dynamically representative of the chosen state.



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## Add a New Hunt

### 2015 MIGRATORY BIRD HUNTER SURVEY (HUNTER SURVEY)

Please complete the form below for each day you hunted. Remember, participation is voluntary and responses from hunters who choose to participate are kept strictly confidential.

Hunters' survey responses are analyzed using standard statistical techniques and are used to estimate the total harvest of migratory bird species, the number of active hunters, the total days hunters spend afield, and the average seasonal bag per active hunter.

**Date of Hunt**  
12/14/2015

**Location of Hunt**  
Arkansas Clark

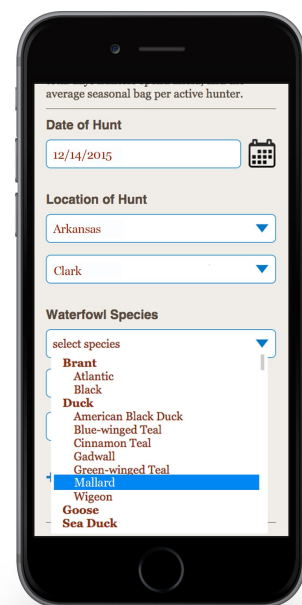
**Waterfowl Species**  
select species  
Brant  
Atlantic  
Black  
Duck  
American Black Duck  
Blue-winged Teal  
Cinnamon Teal  
Gadwall  
Green-winged Teal  
Mallard  
Wigeon  
Goose  
Sea Duck

**Submit Hunt**

OPTIONAL SIDEBAR CONTENT


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**Figure 13.5.** When selecting a Waterfowl Species, users have the option to choose species such as Brant, Duck, Goose or Sea Duck, or they may choose a subspecies, as applicable, from these categories. This gives users a sense of ease and confirmation in knowing that they documented the specific waterfowl type hunted.

**NOTE:** The back-end should be configured to submit back only the main species of any subspecies selected.



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## Add a New Hunt

### 2015 MIGRATORY BIRD HUNTER SURVEY (HUNTER SURVEY)

Please complete the form below for each day you hunted. Remember, participation is voluntary and responses from hunters who choose to participate are kept strictly confidential.

Hunters' survey responses are analyzed using standard statistical techniques and are used to estimate the total harvest of migratory bird species, the number of active hunters, the total days hunters spend afield, and the average seasonal bag per active hunter.

**Date of Hunt**  



**Location of Hunt**  

Arkansas


Clark

**Waterfowl Species**  

Mallard

☐ Birds Killed & Retrieved  
☐ Birds Downed but Lost

[+ Add Waterfowl Species](#)



**Mallard**  
 Latin: *Anas platyrhynchos*  
 Average length: M 24.7", F 23"  
 Average weight: M 2.7 lbs., F 2.4 lbs.  
 Description: The mallard is one of the

Submit Hunt

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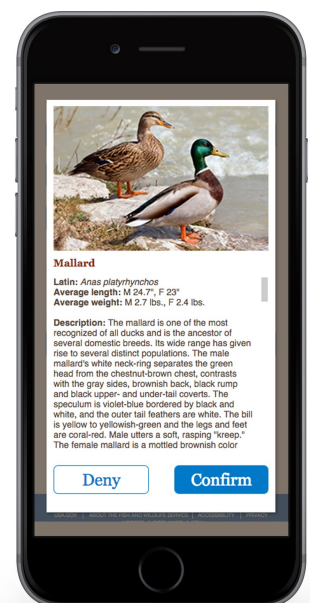



Figure 13.6. A pop-out or flyover of the selected subspecies will include a picture of the subspecies as well as a brief description. This is meant to both provide further confirmation to the user that they are logging the desired waterfowl type, and engage the user by providing quick facts and information.

Note: If the user selects a waterfowl species rather than a subspecies, no pop-out or flyover will appear.



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## Add a New Hunt

### 2015 MIGRATORY BIRD HUNTER SURVEY (HUNTER SURVEY)

Please complete the form below for each day you hunted. Remember, participation is voluntary and responses from hunters who choose to participate are kept strictly confidential.

Hunters' survey responses are analyzed using standard statistical techniques and are used to estimate the total harvest of migratory bird species, the number of active hunters, the total days hunters spend afield, and the average seasonal bag per active hunter.

**Date of Hunt**



**Location of Hunt**


Arkansas
Clark

**Waterfowl Species**

Mallard
☐ Birds Killed & Retrieved
☐ Birds Downed but Lost

American Black Duck
☐ Birds Killed & Retrieved
☐ Birds Downed but Lost

+ Add Waterfowl Species




**America Black Duck**

Latin: *Anas rubripes*  
Average length: M 22", F 21"  
Average weight: M 2.7 lbs., F 2.4 lbs.  
Description: Black ducks are similar to

Submit Hunt

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**Location of Hunt**

Arkansas
Clark

**Waterfowl Species**

Mallard
☐ Birds Killed & Retrieved
☐ Birds Downed but Lost

American Black Duck
☐ Birds Killed & Retrieved
☐ Birds Downed but Lost

Figure 13.7. Rather than submitting separate hunting logs for each species hunted, the option to add a second waterfowl species makes it fast and convenient to record all daily hunt records at one time.

Bend, Kreisel, McCoy | 12/14/2015

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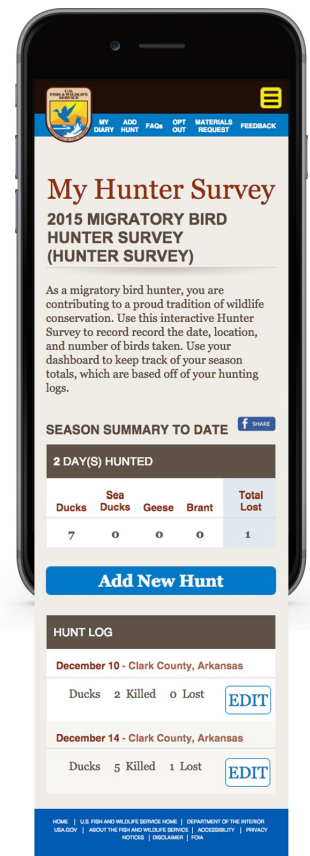
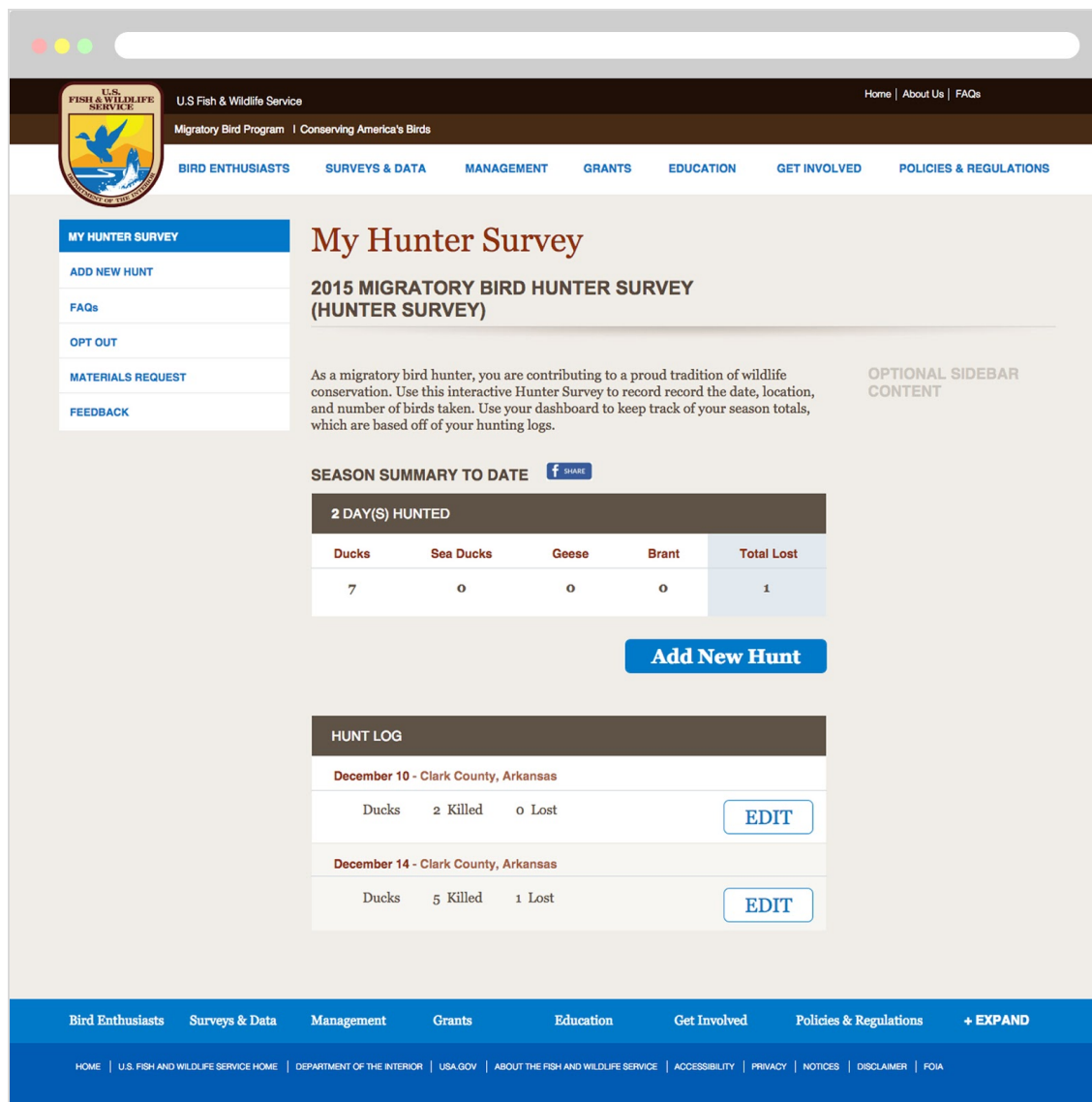


Figure 13.8. Once a user submits their hunt, they will be taken to MY HUNTER SURVEY, which serves as a dashboard displaying back their season totals and a summary of their individual hunt logs. From here, users can Add a New Hunt, Edit past hunts, or share their season totals via social media.



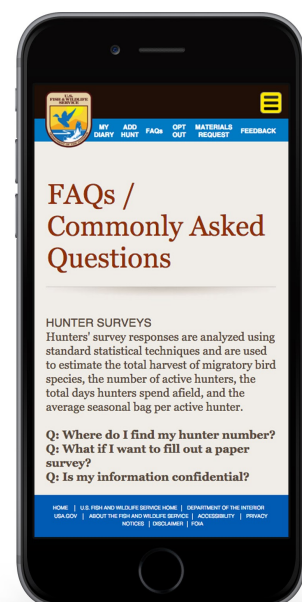
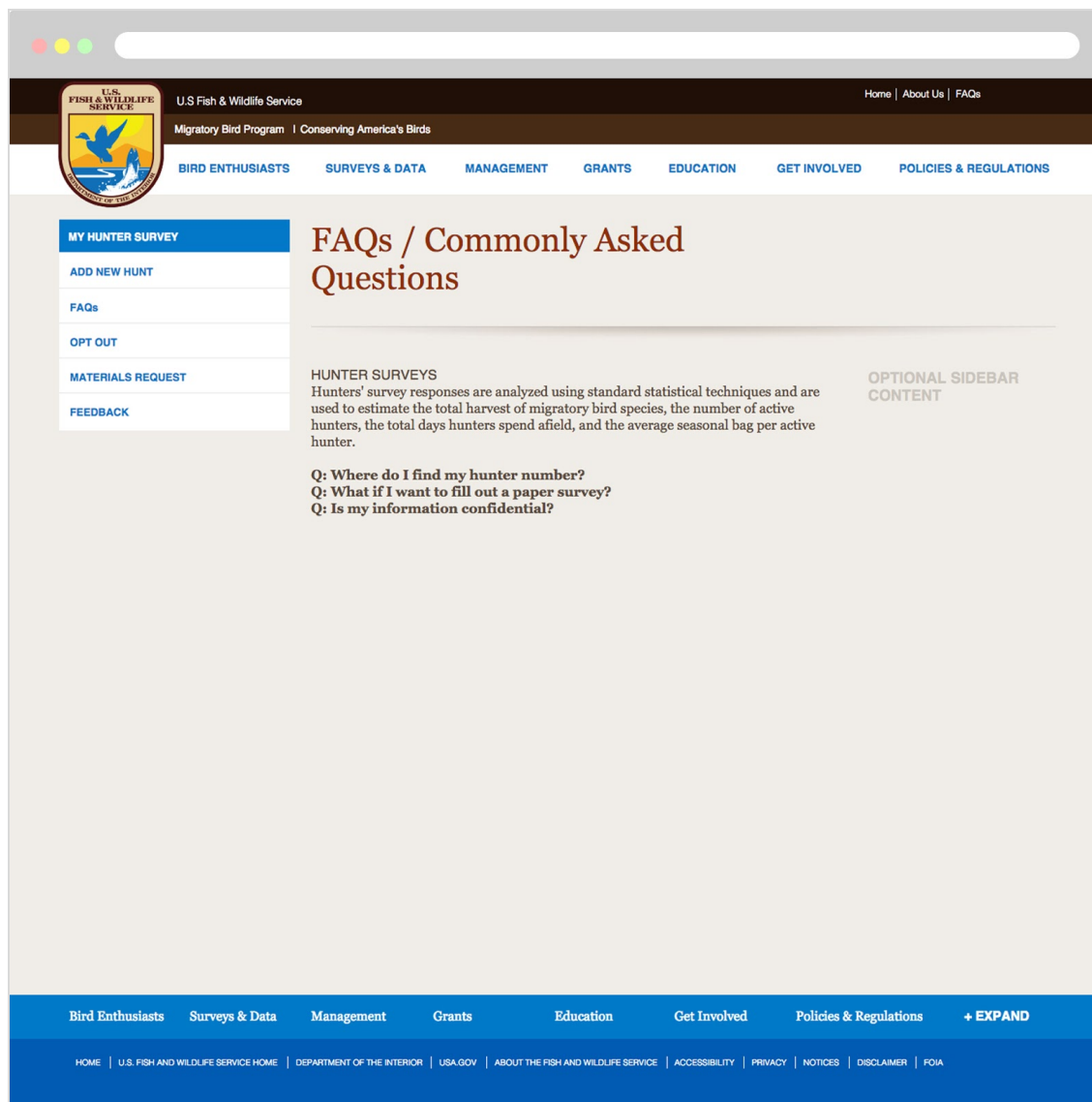


Figure 13.9. Because the experience and functionality of the digital survey is new for many users, including specific questions and answers within the existing FAQs page is imperative to providing self-help and success of the digital survey. When a user selects FAQs from within the digital survey, they should be immediately taken to a sub-section of related digital survey FAQs. This functionality should also be accessible from the SIGN IN screen in order to guide new hunters when logging in for the first time.

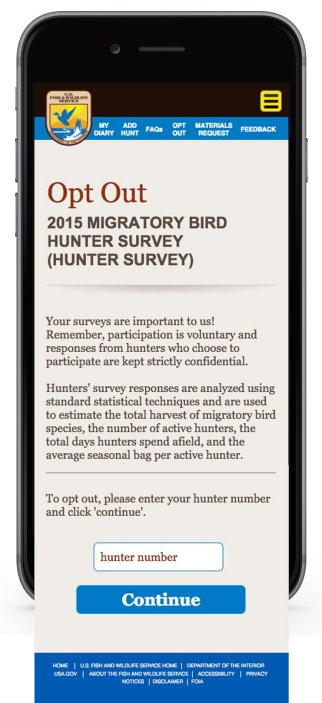
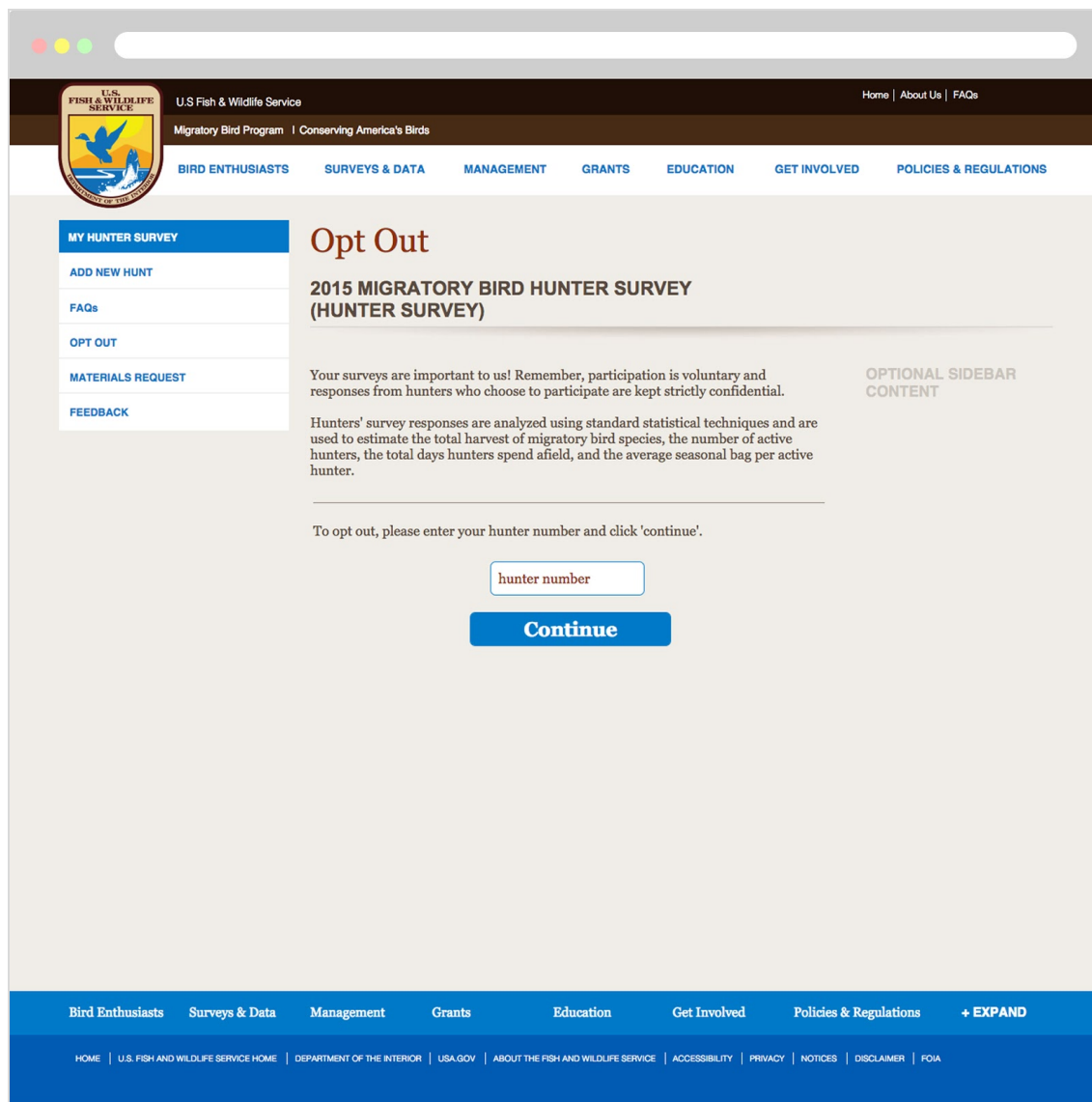


Figure 13.10. Allowing hunters to opt out of the respective annual survey allows FWS to filter in an additional selection of hunters. This will also aid in the elimination for the need to follow up with hunters who have not yet submitted their survey at the end of the hunting season.

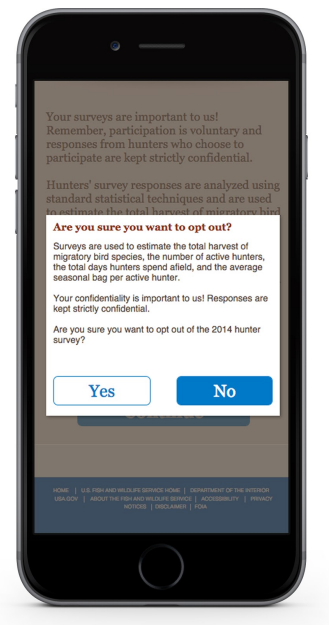
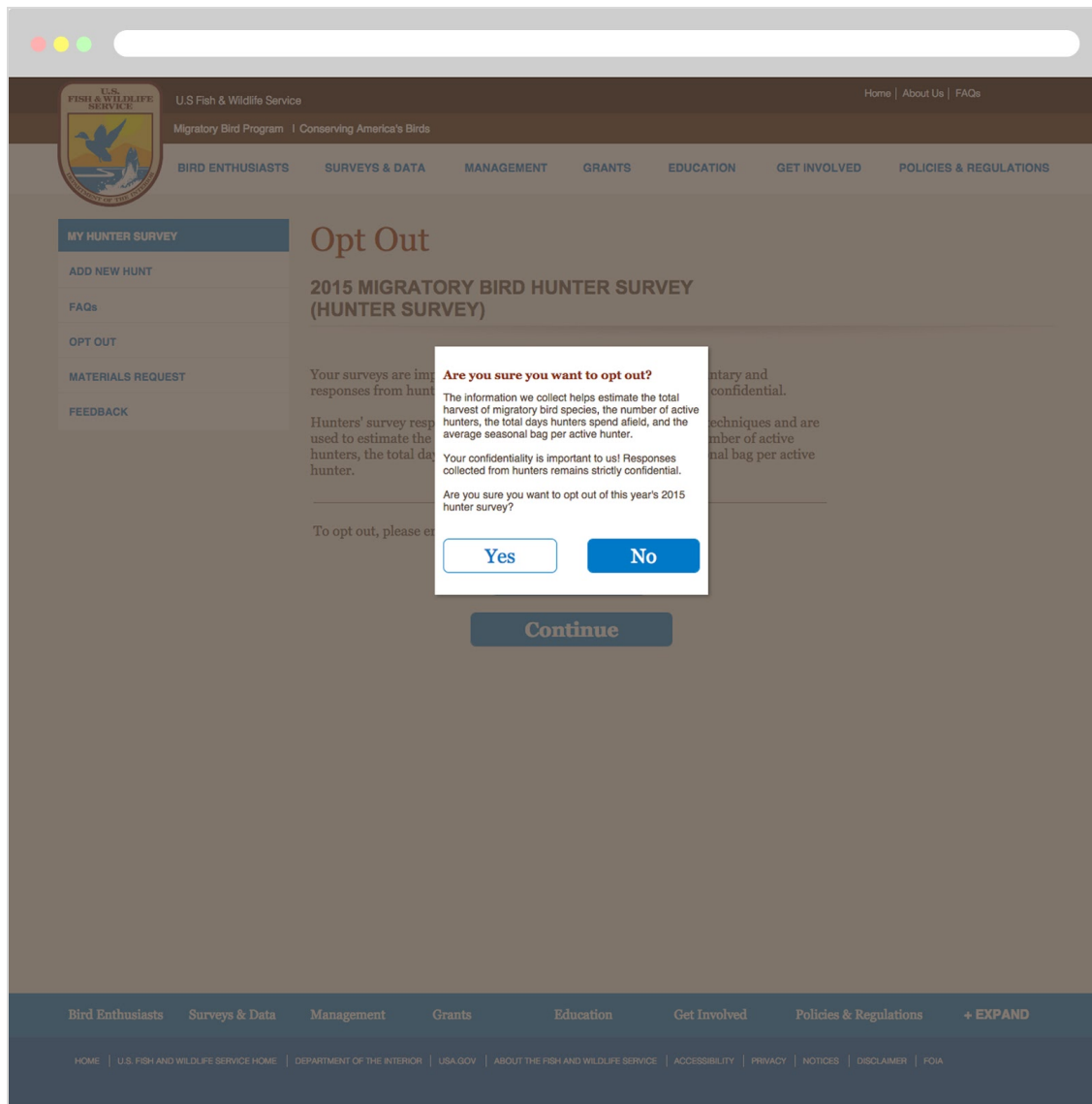


Figure 13.11. Because the survey is beneficial to so many different areas in vastly different ways, it is important to encourage users wishing to opt out to complete the survey by further informing them how important it is.

Note: While not pictured here, it is recommended to include a field for feedback in order to capture why hunters are choosing to opt out.

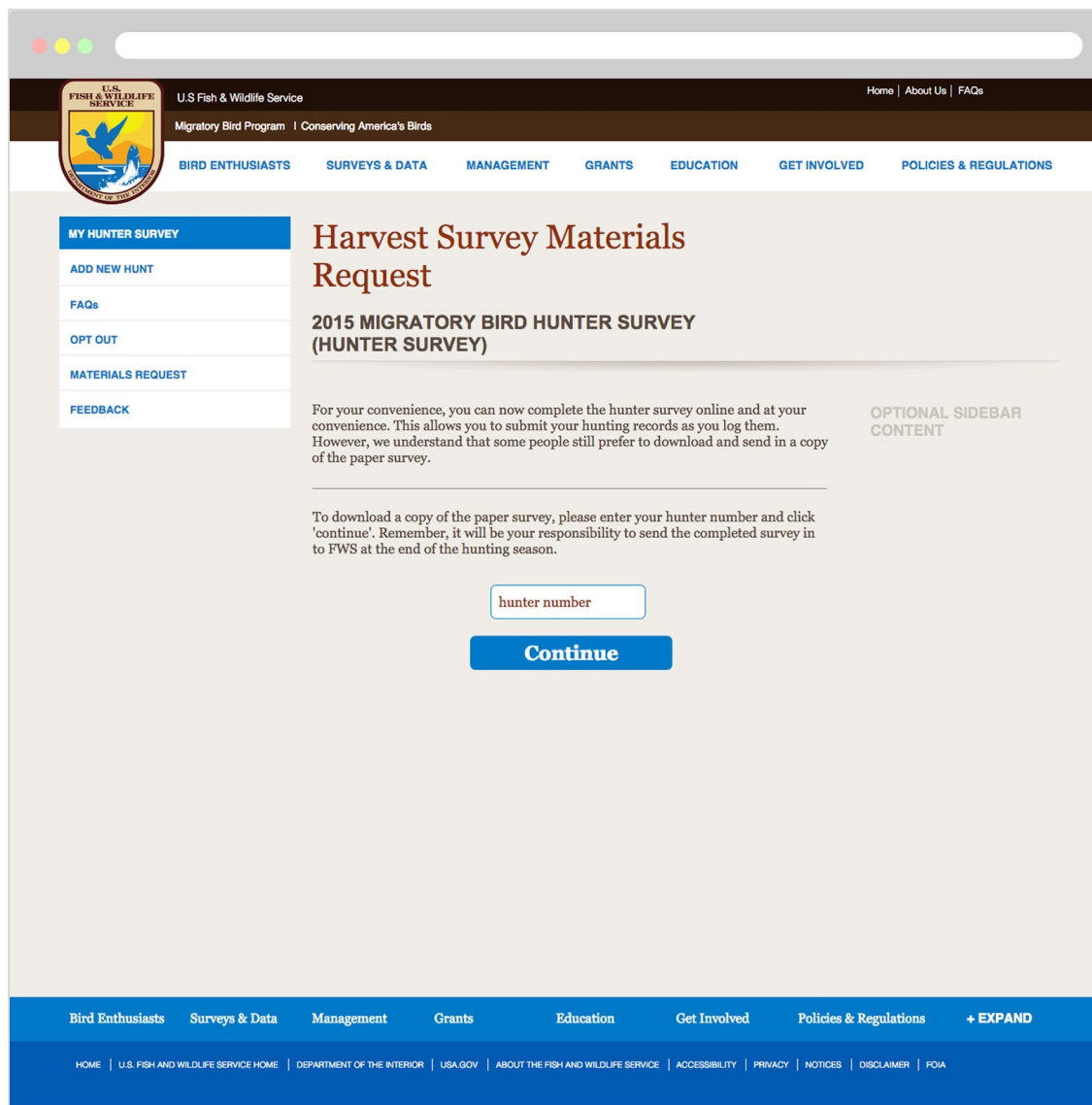


Figure 13.12. Continuing to offer a paper version of the survey allows flexibility for those hunters who don't wish to complete the survey online. It is important to promote the ease of the online survey and to ensure that these users know it is up to them to send in their completed paper survey by the end of the season. Additionally, this page could serve the purpose for requesting Parts Collection Survey envelopes.

## API Integration

The final phase of functional enhancement, with the highest level of complexity and the highest possible return on invest, would be an application programming interface (API) integration with both the *Ducks Unlimited Waterfowler's Journal* and the *Pro Hunting Journal*. According to Kim Lane, this would require an expansion of FWS staffing to include an "API evangelist" within the organization (2014). This full-time web developer would oversee the initial development and integration of a one-way connection to allow users of the *Waterfowler's Journal* and the *Pro Hunting Journal* to push journal entries to FWS using their unique hunter number as a validation key. This staff member would not only oversee the initial development of these points of integration, but also the maintenance of these systematic relationships, including the management of relationships with comparable technical resources at both organizations, and provide issue resolution when the need arises. They would also be the single point-of-contact and principal advocate to explore opportunities for exposing the FWS data set through data.gov and to other external conservation groups that may find it of value (Lane, 2014).

Similar to the use of the FWS digital harvest survey, a hunter would still need to be selected as part of the annual sample and be invited to participate by receiving the pre-season paper form. Allowing each hunter to use a single method of journaling of their choice, while allowing them to additionally participate in the submission of data to the FWS Waterfowl Harvest Diary Survey, will yield the biggest benefit. If a hunter is an existing *Pro Hunting Journal* user, they would not need to authenticate into a separate interface at <https://migbirdapps.fws.gov/hipweb>. Beyond the complexity of developing effective, robust, and scalable connections between systems, an elaborate data mapping exercise will need to be conducted to ensure that the data coming in from both outside applications is normalized and stored as FWS expects. For example, when the hunter using the *Ducks Unlimited Waterfowler's Journal* selects their species as "Pintail" and pushes it to FWS, it will be mapped and stored at rest as simply "Duck". These



mapping considerations would need to be documented and implemented across the spectrum of information being shared between the systems and constantly updated as time goes on. Tremendous effort goes into establishing sophisticated integrations of this kind, but yields massive efficiencies, cost savings and opportunities for valuable expansion through automation once established (Lane, 2014).

## CONCLUSION

As documented throughout this paper, the Waterfowl Harvest Diary Survey is an important resource for FWS and other organizations in that it aids in the evaluation of harvesting trends, hunter demographics, and hunting pressure to establish waterfowl hunting regulations for each upcoming hunting season. However, declining hunter response rates and responses plagued with data errors means FWS is not getting an adequate amount of the information they need from the current format of the survey, such as where hunts took place, how many hunts took place, how many birds were harvested, how many birds were killed and lost, and what kind of birds were harvested.

Because the survey is beneficial to many organizations, it is necessary to move forward with enhancements that focus on increasing response rates, decreasing administrative costs, decreasing workload for the survey participant hunter, as well as increasing data quality. Based on the research findings, it is recommended that FWS first simplify their paper survey, focus on moving towards building an effective and browser responsive online survey, and finally integrating with successful and highly popular systems already collecting the information they seek. These recommendations are meant to realistically and immediately fulfill the goals sought by FWS through the current Waterfowl Harvest Diary Survey while minimizing cost, complexity, and time to implementation in order to produce the highest possible value and maximize return on investment.

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