Waterfowl Travel Project Charter

Prepared by the students of CSC 4610 – Fall 2024

Jacob Sullivan

Tania Perdomo Flores

Revel Etheridge

Kenny Adams

Drew Burkhalter

Breanna Woosley

Under the direction of

Dr. William Eberle (Professor)

Concept:

The Duck Migratory application focuses on analyzing collected migration data to uncover patterns and trends in duck movements. By examining historical flight data, weather patterns, and flock counts provided by TTU's wildlife and biology chief, the application applies predictive algorithms to generate accurate forecasts of future migration paths. This data-driven approach equips hunters, researchers, and conservationists with the insights they need to track duck populations in real time.

Users will engage with an interactive map that visualizes predicted movements. The application offers customizable filters for species, flock size, time, and weather, enabling users to analyze the data from different perspectives. This analytical framework ensures that waterfowl migration is thoroughly understood, easily monitored, and accessible to a diverse range of users.

Elevator Statement:

- **For** Researchers, learners, and educators of the Mississippi Flyway
- **Who** Need to know current and predicted concentrations of waterfowl
- **The** Waterfowl tracker for the Mississippi Flyway
- **That** Will use GPS data and algorithms to predict where ducks are currently located and where they will move next
- **Unlike** the lack of centralized tracking tools and comprehensive migration data available in other applications for the Mississippi Flyway
- **Our Solution** provides accessible insights into real-time and future migratory patterns for better planning and research

Measures of Success:

- **Time:** Deliver a functional MVP by the end of each iteration. Meet SWE assignment deadlines.
- **Scope:** Implement all critical features and user stories identified in the backlog.
- **Quality:** Software meets or exceeds stakeholder expectations with minimal bugs and high usability.
- **Cost:** Project remains manageable within the time, skillset, and resources of the team.

Success Sliders:

Fixed -> Flexible

	1	2	3	4
Time				
Scope				
Quality				
Cost				

Challenges/Roadblocks/Risks:

- Scheduling conflicts among team members.
- Learning new programming languages and environments.
- Gaining an understanding of waterfowl behavior and patterns.
- Communication gaps with the biology department.
- Integrating real-time data with predictive algorithms.
- Understanding how to utilize heat maps and update them with data.

Definition of Done:

- Code has gone through the initial testing phase and passed; must be checked against the user story.
- All story requirements have been finished.
- New features do not negatively affect existing code or features.
- Customer approves feature; Functionality validated by product owner.
- Feature is fully tested, fully integrated, and ready for deployment.
- Prediction algorithm is accurate with a slim margin of error.
- The data can be regularly updated with no errors.
- The map correctly shows the location of ducks and can be updated.
- Documentation is provided for the software and its features.

Stakeholders:

- COMPANY NAME: TTU Wildlife
- TTU Efforts:
  - Development team – software developers working on the project: Kenny Adams, Drew Burkhalter, Tania Perdomo Flores, Jacob Sullivan, Breanna Woosley
  - Research team – TTU Wildlife Faculty
  - Dr. Eberle – TTU Faculty Sponsor of the project
  - Dr. Cohen – TTU Faculty client of the project
- Interested:
  - TTU Wildlife Faculty – will use the map to track and predict waterfowl
  - Birdwatchers
  - Hunters
  - Ornithologist: Bird researchers
  - Mississippi Flyway Citizens
  - End User – user after full deployment

Interest/Influence Matrix:
Matrix showing project stakeholders placed according to level of interest and influence in/on the project.

Keep Satisfied • Research Team/TTU Wildlife • Dr. Cohen	Manage Closely • Development Team
Monitors • Mississippi Flyway Citizens	Keep Informed • Dr. Eberle • Birdwatchers • Hunters • Ornithologist

Users and Personas:

- Project Managers - (Jacob Sullivan, Tania Perdomo Flores, Revel Etheridge, Kenny Adams, Drew Burkhalter, Breanna Woosley)

Long-term Users - (Researchers)

Carol Goldenbloom

Age: **35**
Work: **TTU Wildlife Researcher**
Family: **Single**
Location: **Cookeville, TN**

Introvert — Extrovert
Thinking — Feeling
Sensing — Intuition
Judging — Perceiving

Determined | Intelligent | Empathetic

Goals

- To expand research on the impact of urban development on migratory waterfowl and create actionable guidelines for better habitat preservation.
- To engage more communities in waterfowl conservation efforts by creating accessible, hands-on educational programs for all ages.

Frustrations

- Limited funding for long-term field studies that are critical for understanding shifting migration patterns.
- The slow pace of policy change, despite mounting evidence of environmental degradation affecting

Bio

I'm Carol Goldenbloom, a passionate wildlife researcher specializing in waterfowl conservation. For over a decade, I've been studying the migration patterns, behavior, and habitat needs of various waterfowl species across North America. My work focuses on understanding the ecological impacts of climate change on wetland ecosystems and finding sustainable solutions to protect these vital habitats. In addition to my field research, I collaborate with local communities and conservation organizations to promote awareness and advocate for policy change. When I'm not in the field, you can usually find me sharing my findings through educational programs or contributing to environmental conservation publications.

Incentive
Fear
Growth
Power
Social

Brands & Influencers

Traditional Ads
Online & Social Media
Referral
Guerilla Efforts & PR

Short-term Users - (Hunters)

Bobby Shelton

"The ducks don't owe you a thing, but if you put in the work, they'll give you a show."

Age: **32**
Work: **Hunter**
Family: **Married, kids.**
Location: **Springfield, Illinois**

Introvert — Extrovert
Thinking — Feeling
Sensing — Intuition
Judging — Perceiving

Skilled Hunter | Mindful

Goals

- Become a More Skilled Waterfowl Hunter: One of my main goals is to continually improve my ability to read waterfowl behavior and adapt to changing conditions in the field. Whether it's learning new strategies for decoy placement, perfecting my shot accuracy, or understanding when to switch up my calling techniques

Frustrations

- **Unpredictable Weather:** Nothing drives me more crazy than unpredictable weather during hunting season. A cold front can turn everything around, but a warm spell can send the ducks flying in the wrong direction—making it hard to plan trips.
- **Inconsistent Duck Patterns:** Ducks can be incredibly unpredictable, and when they don't follow the usual migration routes or patterns, it can throw off an entire hunt. Sometimes, despite all the preparation,

Bio

I'm Bobby Shelton, and I'm from Springfield, Illinois. My passion for hunting ducks has taken me all along the Mississippi Flyway, where I spend most of my time chasing waterfowl. Hunting isn't just a hobby for me—it's my full-time job. I guide hunters, sharing tips and helping them bag their limit while making sure they have a great experience. When I'm not in the blind, you'll find me outdoors, practicing my duck calls or swapping stories with fellow hunters.

Incentive
Fear
Growth
Power
Social

Brands & Influencers

carhartt RUGER

Traditional Ads
Online & Social Media
Referral
Guerilla Efforts & PR

System Managers - TTU Wildlife. (Dr. Bradley Cohen)

Bradley Cohen

Age: **35**
Work: **Associate Professor**
Family: **Married**
Location: **Cookeville, TN**

Introvert — Extrovert
Thinking — Feeling
Sensing — Intuition
Judging — Perceiving

Determined | Forward Thinking | Passionate

Goal

- Create a product that allows researchers and educators to see the movement of waterfowl specifically through the Mississippi Flyway through variables and migratory events.

Frustrations

- The want to monetize that should be of public use for people to enjoy and discover.
- There does not need to be many flashy features or complex UI just focusing on the main goal of simplicity

Bio

My lab conducts applied research in the fields of ethology and conservation investigating topics including habitat–species interactions, predator–prey dynamics, and wildlife ecology and management. We research different levels of animal organization, from physiology to meta-population dynamics, allowing us to gain a better understanding of the multi-scale nature of the processes influencing animal populations. Because the development and implementation of solutions to challenging management problems requires an understanding of stakeholder values, our research is paired with a strong outreach component that enhances communication among scientists, policy-makers, and the public. The goal of my lab is to produce objective findings that inform wildlife management issues and leads to more effective policy decisions.

Incentive
Fear
Growth
Power
Social

Brand & Influencer

TENNESSEE TECH

Traditional Ads
Online & Social Media
Referral
Guerilla Efforts & PR

User Stories:

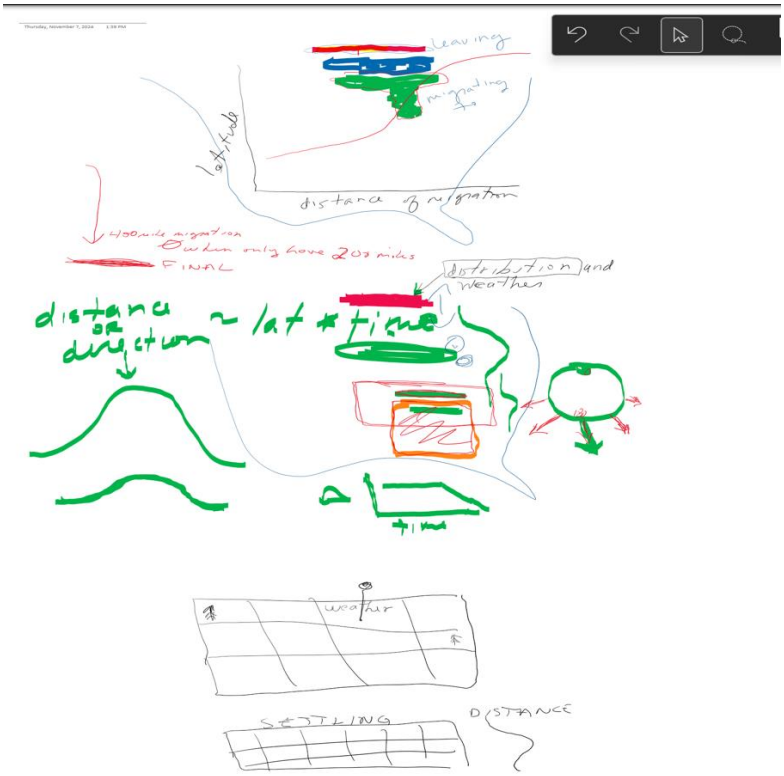
Included at end of charter as well as posted on Kanban Board Github and Github Repository.

https://github.com/users/JakeSul1023/projects/1/views/1 (Kanban Board GitHub)

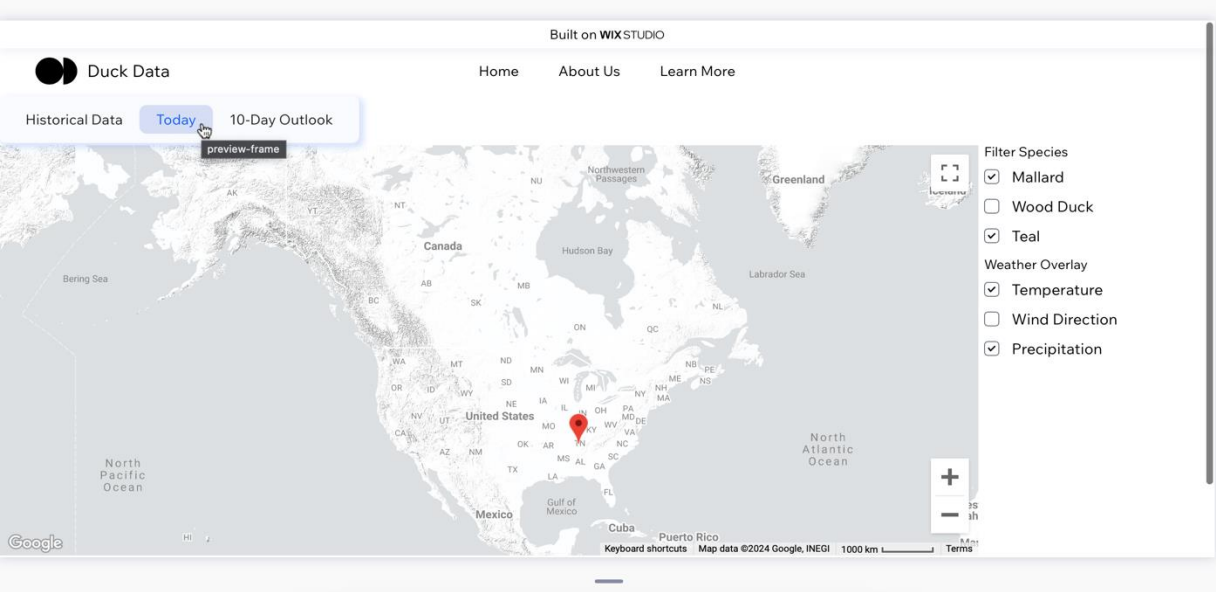
https://github.com/JakeSul1023/Team-7_Waterfowl (Repository GitHub)

Project Mockup:

Dr.Cohen Notes:



Team's Basic WixStudio Design Idea:



Release Plan:

Iteration 00:

- Agreed on concept with the customer.
- Team charter completed.
- Story Backlog created.
- **Spike Climate Change/Weather**
- **Spike Data Science**
- **Spike Wix Mockup**

Iteration 01:

- **Spike Waterfowl Research**
- **Spike Coding Language**
- **Spike Movebank Repository**
- **Spike GitHub**
- **Spike UI Development**

Iteration 02:

- **Map Update**
- **Predictive Tracking**
- **Seasonal Distribution**

Iteration 03:

- **Real-Time Weather Data Integration**
- **Future Flight Predictions**
- **Automated Data Integration**
- **Probability of Departure with Covariance Indicators**

Iteration 04:

- **Last Update Visibility**
- **Access to Historical Data**
- **Prediction Parameter Adjustments**
- **Data Export for Research**

Iteration 05:

- **Data Source Verifications**
- **Help Feature**
- **Prediction Range Adjustment**
- **Heat Map Visualization**
- **Historical vs Predicted**

Iteration 06:

- **Weather Impact Analysis**
- **Social Sharing**
- **Confidence Interval Display**
- **Seasonal Migration Visualization**

Iteration 07:

- **Location Indicator**
- **Light or Dark Mode**
- **Error Notifications**

Iteration 08:

- **Mobile Compatibility**

All User Stories:

Story Number: 01

Subject: Map Update

Description: As a researcher, I want to be able to update the map once I input new data so that I can predict the new flight patterns.

Owner: Kenny

Assigned to:

Status: Iteration 5

Total Points: 3

Tags: Should

Story Number: 02

Subject: Future Flight Predictions

Description: As a user, I want to see future predictions (10-day) of duck flight paths so that I can be prepared for when I will be near a flock.

Owner: Jacob

Assigned to:

Status: Iteration 2

Total Points:

Tags: Must

Story Number: 03

Subject: Data Source Verifications

Description: As a data analyst, I want access to all the data origins so that I can confirm the veracity of the data.

Owner: Kenny

Assigned to:

Status: Iteration 5

Total Points: 3

Tags: Could

Story Number: 04

Subject: Predictive Tracking

Description: As a researcher, I want to view predicted flight paths so I can track waterfowl proactively.

Owner: Kenny

Assigned to:

Status: Iteration 2

Total Points: 5

Tags: Must

Story Number: 05

Subject: Species Filter

Description: As a researcher, I want to filter data by waterfowl species to focus on specific migration patterns.

Owner: Jacob Sullivan

Assigned to:

Status:

Total Points: 8

Tags: Should

Story Number: 06

Subject: Weather Impact Analysis

Description: As a scientist, I want weather overlays on migration predictions to assess weather's effect on waterfowl patterns.

Owner: Kenny Adams

Assigned to:

Status: Iteration 6

Total Points: 2

Tags: Should

Story Number: 07

Subject: Social Sharing

Description: As a user, I want to share migration maps on social media to inform others about migration activity.

Owner: Kenny Adams

Assigned to:

Status: Iteration 6

Total Points: 2

Tags: Should

Story Number: 08

Subject: User Interface Simplicity

Description: As a user, I want an easy-to-use interface that is clear and to the point so that I can navigate the app easily.

Owner: Kenny

Assigned to:

Status: Iteration 3

Total Points: 5

Tags: Should

Story Number: 09

Subject: Help Feature

Description: As a user, I want a help button that gives instructions on how to use the app.

Owner: Kenny

Assigned to:

Status: Iteration 5

Total Points: 4

Tags: Could

Story Number: 10

Subject: Automated Data Integration

Description: As a developer, I need the data to be integrated with my code so that it can update automatically.

Owner: Kenny

Assigned to:

Status: Iteration 3

Total Points: 8

Tags: Must

Story Number: 11

Subject: Location Indicator

Description: As a user, I want to see my current location on the map so that I can compare my location to the flight path predictions around me.

Owner: Jacob

Assigned to:

Status: Iteration 7

Total Points: 13

Tags: Could

Story Number: 12

Subject: Light or Dark Mode

Description: As a user, I want light and dark mode options to adjust my preferred viewing.

Owner: Kenny

Assigned to:

Status: Iteration 7

Total Points: 2

Tags: Could

Story Number: 13

Subject: Real-Time Weather Data Integration

Description: As a developer, I want the system to pull real-time weather data from APIs, so the migration predictions reflect current conditions.

Owner: Breana

Assigned to:

Status: Iteration 3

Total Points: 3

Tags: Real-Time Data, APIs, Must

Story Number: 14

Subject: Prediction Parameter Adjustments

Description: As a user, I want to adjust prediction parameters (e.g., tailwind effect or barometric pressure thresholds) so I can explore how changes impact migration patterns.

Owner: Breanna

Assigned to:

Status: Iteration 4

Total Points: 5

Tags: User Control, Predictions, Should

Story Number: 15

Subject: Heat Map Visualization

Description: As a user, I want to view a heat map of waterfowl congregations to see where large groups gather along the flyways.

Owner: Jacob

Assigned to:

Status: Iteration 5

Total Points: 8

Tags: User control, Must

Story Number: 16

Subject: Confidence Interval Display

Description: As a user, I want confidence intervals on predictions to gauge reliability and variability.

Owner: Breanna

Assigned to:

Status: Iteration 6

Total Points: 3

Tags: Prediction, Could

Story Number: 17

Subject: Seasonal Migration Visualization

Description: As a user, I want to view migration by season to understand timing and intensity variations.

Owner: Breanna

Assigned to:

Status: Iteration 6

Total Points: 5

Tags: User control, Could

Story Number: 18

Subject: Historical vs Predicted

Description: As a user, I want to compare the historical data of migration to the prediction of it so that I will have a reliable frame of reference for the prediction.

Owner: Breanna

Assigned to:

Status: Iteration 5

Total Points: 8

Tags: Prediction, Should

Story Number: 19

Subject: Error Notifications

Description: As a developer, I want an alert system for user notifications in case of system error.

Owner: Kenny

Assigned to:

Status: Iteration 7

Total Points: 5

Tags: Developer, Should

Story Number: 20

Subject: Mobile Compatibility

Description: As a mobile user, I want the app to work smoothly on my iPhone to access migration data on the go.

Owner: Kenny

Assigned to:

Status: Iteration 8

Total Points: 21

Tags: User Interface, Should

Story Number: 21

Subject: Data Export for Research

Description: As a researcher, I want to export migration data so I can analyze it further with external tools.

Owner: Kenny

Assigned to:

Status: Iteration 4

Total Points: 5

Tags: Should

Story Number: 22

Subject: Probability of Departure with Covariance Indicators

Description: As a user, I want to see the probability of ducks leaving specific areas, along with the covariance of environmental factors (e.g., weather, temperature) that influence these departures, to better understand migration triggers.

Owner: Breanna

Assigned to:

Status: Iteration 3

Total Points: 21

Tags: Prediction, Must

Story Number: 23

Subject: Spike Wix Mockup

Description: Project members should familiarize themselves with how to use Wix for the project mockup.

Total Points: 5

Story Number: 24

Subject: Spike Waterfowl Research

Description: Project members should familiarize themselves with waterfowl and their migrations.

Total Points: 13

Story Number: 25

Subject: Spike Coding Language

Description: Project members should start learning Java and be familiar with how to code with Java and with large datasets.

Total Points: 13

Story Number: 26

Subject: Spike Movebank Repository

Description: Project members should be familiar with Movebank and how to pull data to work with the code.

Total Points: 3

Story Number: 27

Subject: Spike UI Development

Description: Project members should familiarize themselves with user interface features and coding on web development.

Total Points: 13

Story Number: 28

Subject: Spike GitHub

Description: Project members should be familiar with how to use GitHub and its features.

Total Points: 1

Story Number: 29

Subject: Spike Climate Change/Weather

Description: Project members should learn and research about how climate change affects the migration patterns of the waterfowl.

Total Points: 5

Story Number: 30

Subject: Spike Data Science

Description: Project members should familiarize themselves with data science and the different machine learning techniques relevant to the project.

Total Points: 5