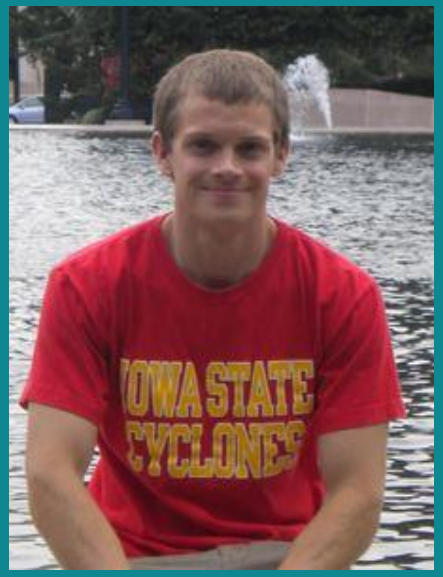
Unified Butterfly Recorder

butterflies.ece.iastate.edu | butterflies@iastate.edu | Dec13-08

Team Butterfly



Cameron Whipple

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Julie Tillman

Ryan Scheel

Seniors, Computer Engineering

Team Butterfly

Nathan Brockman

Anita Westphal

Dr. Diane Rover

REIMAN GARDENS
IOWA STATE UNIVERSITY

IOWA STATE UNIVERSITY
Department of Electrical and Computer Engineering

Background

- Butterflies are a great indicator species
  - Climate change
  - Habitat restoration programs
- Varied surveyor experience
- Different survey protocols

Problems

- Protocols designed to answer specific questions
  - Disparate storage and collection formats
  - No common storage location or method
- Large-scale observations are hard

Goals

- Create an app for data collection during butterfly field surveys
- Streamline and standardize
- Facilitate data centralization

"This app will help standardize the collection of data and has the potential of impacting conservation efforts both nationally and globally."

- Anita Westphal, Reiman Gardens

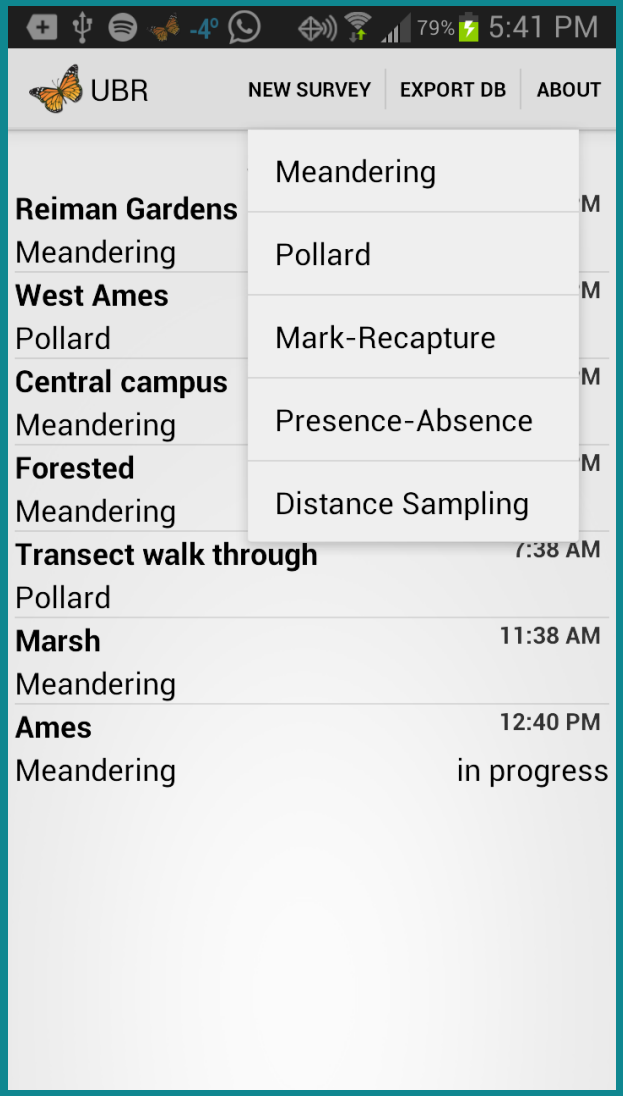
Timeline (All dates are 2013)

Mar 1	Survey responses aggregated & requirements set
Apr 1	Divide tasks among team members; begin prototype
May 10	Finish Android app skeleton
July 31	Complete Android prototype
Aug 15	Review app testing and feedback
Oct 18	Major feature expansion complete
Dec 2	Public release
Dec 10	Poster and presentation finalized

Work Breakdown

- Team
  - Research, planning, requirements
- Lead Roles
  - GPS: Curtis
  - Database: Cameron
  - User interface: Ryan and Julie

Survey Explorer



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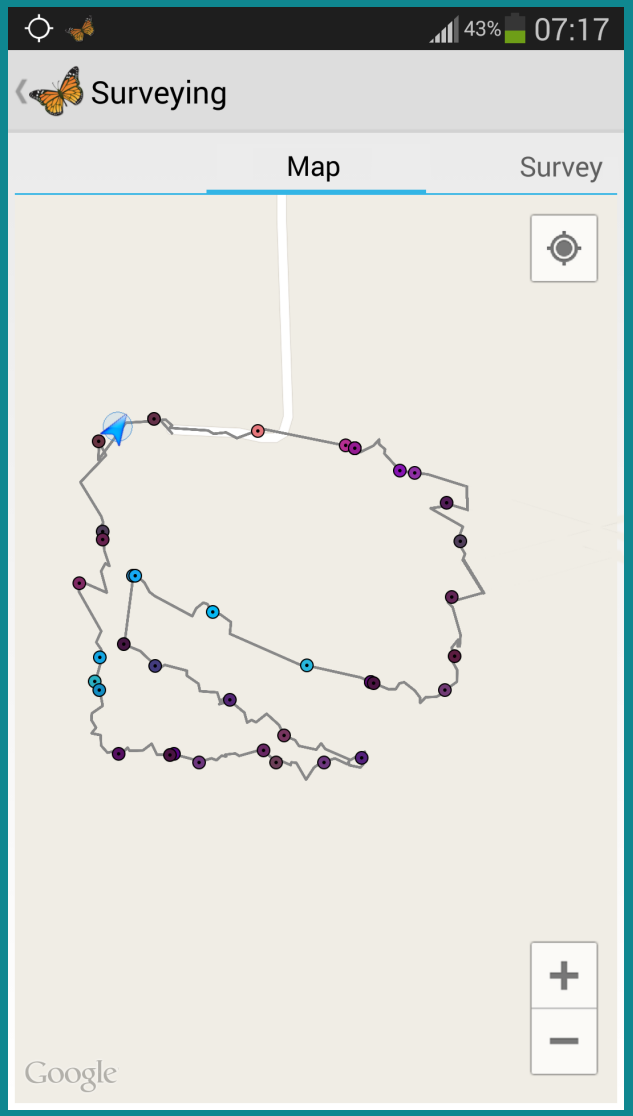
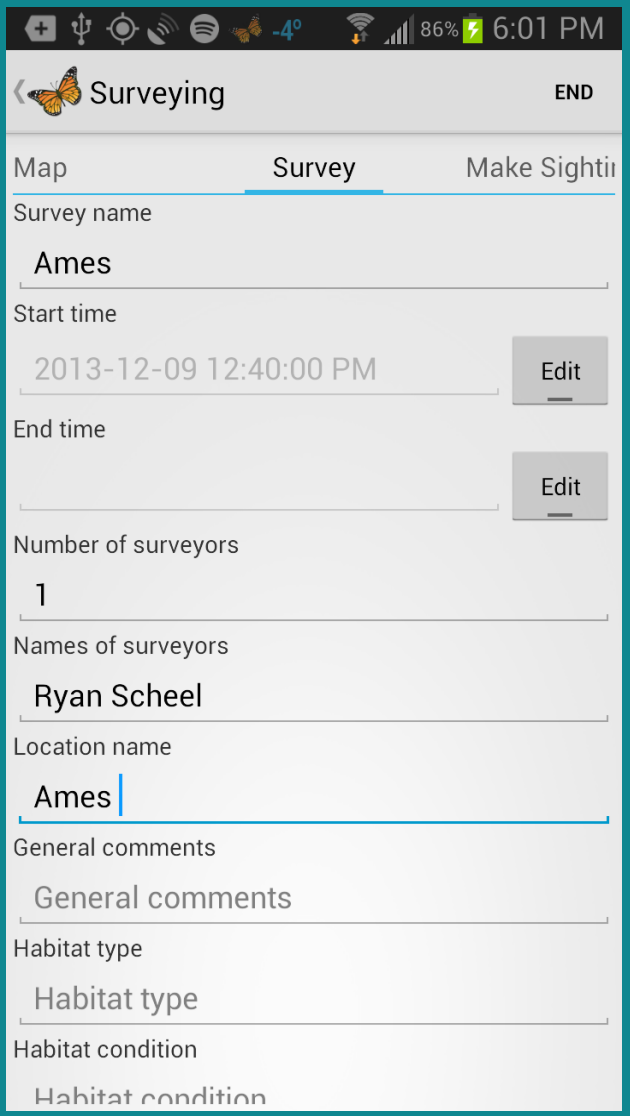
Map

Survey Details





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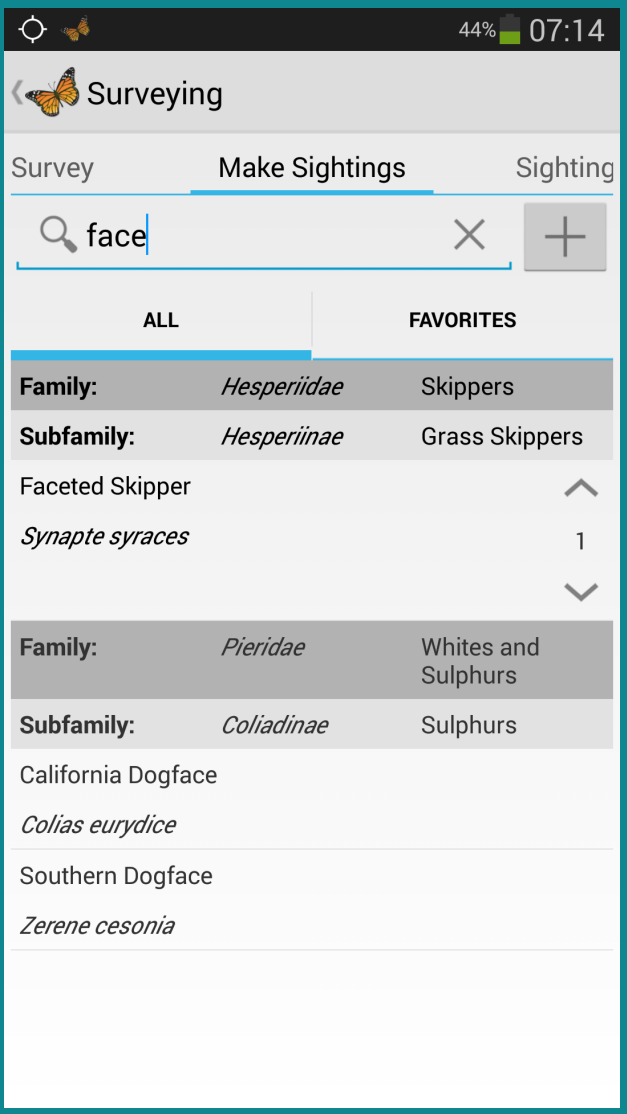
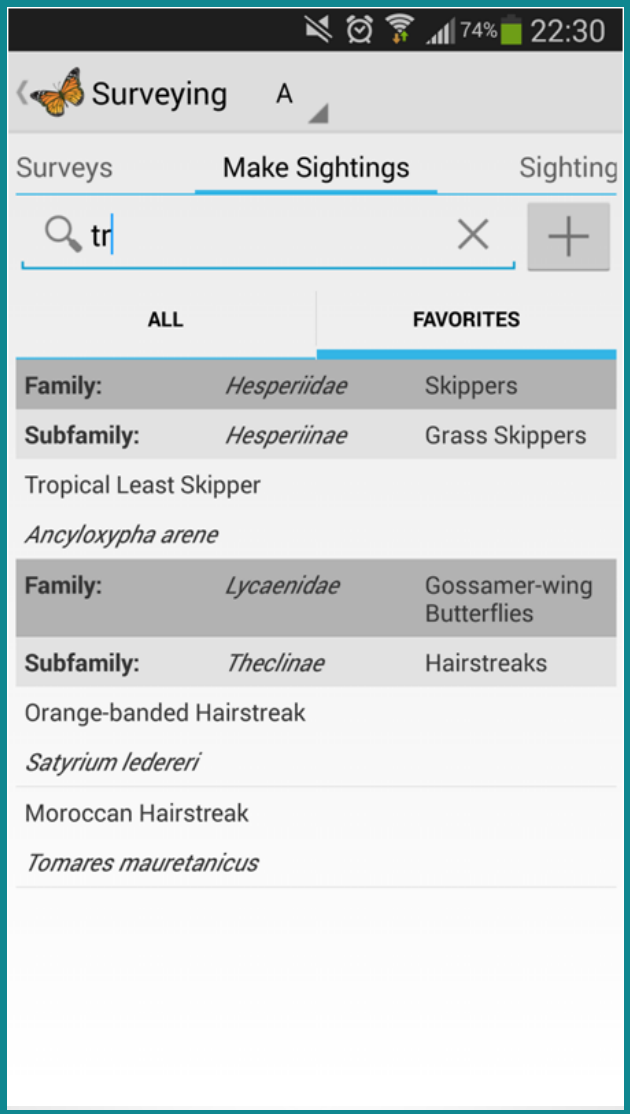
New sighting



Searching



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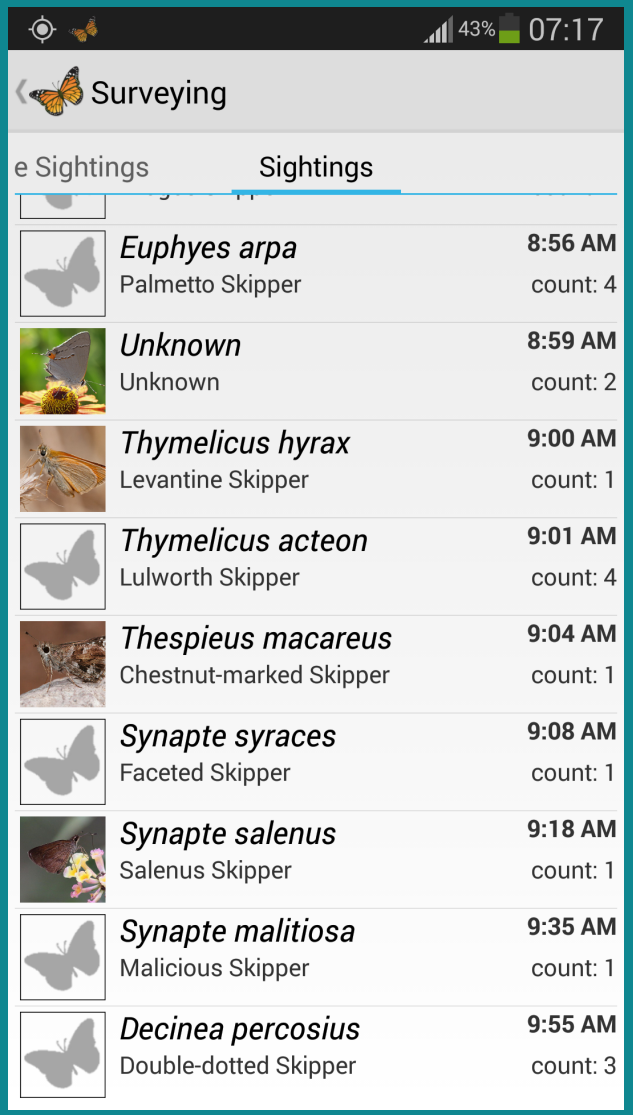
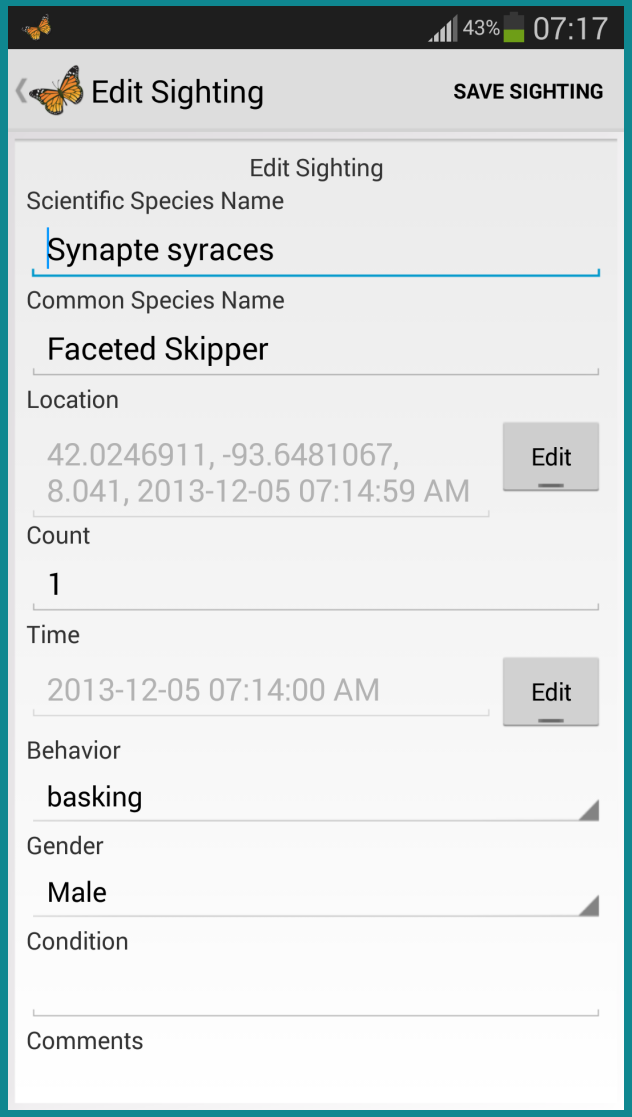
Sightings

Details





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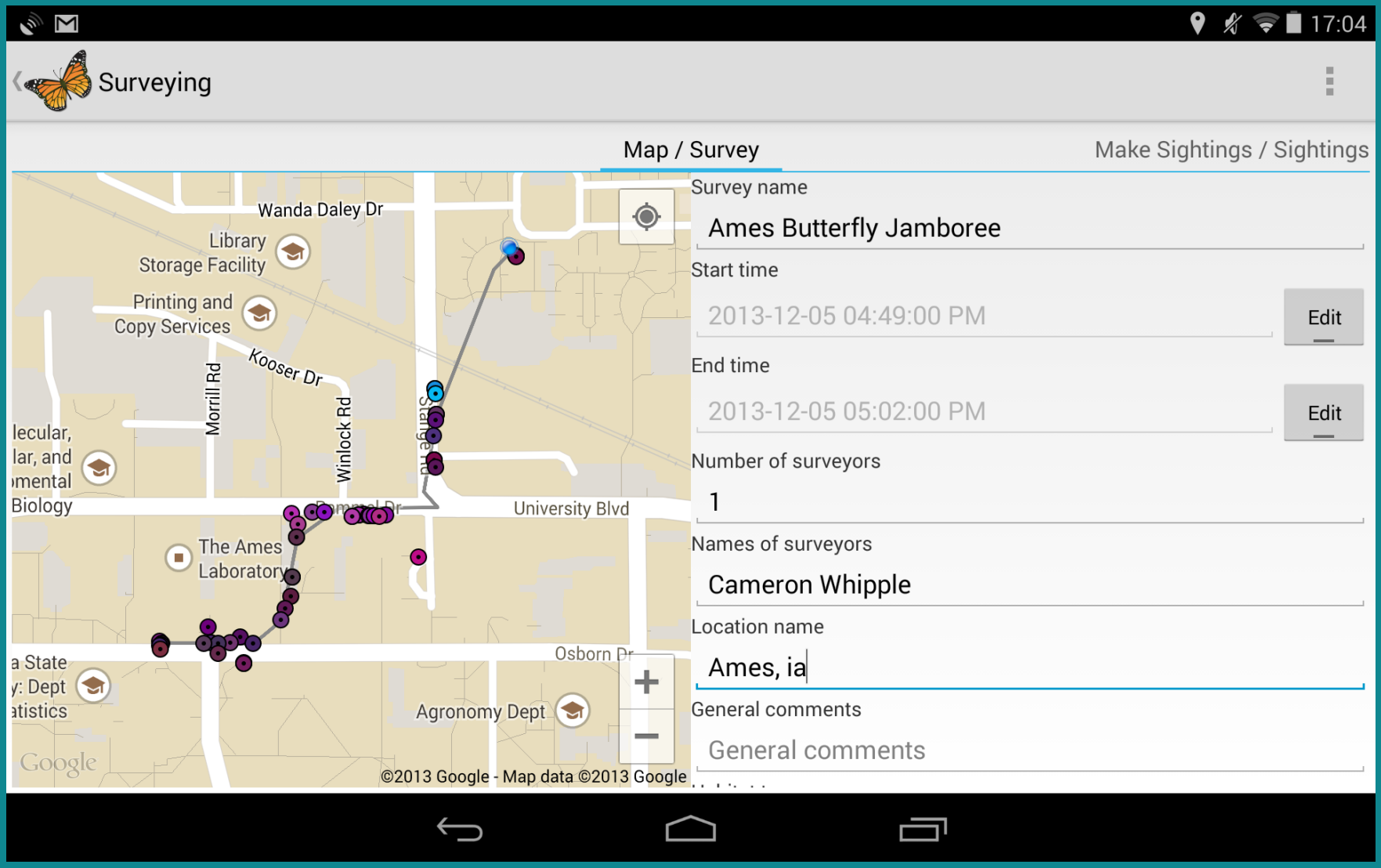
Tablet Layouts



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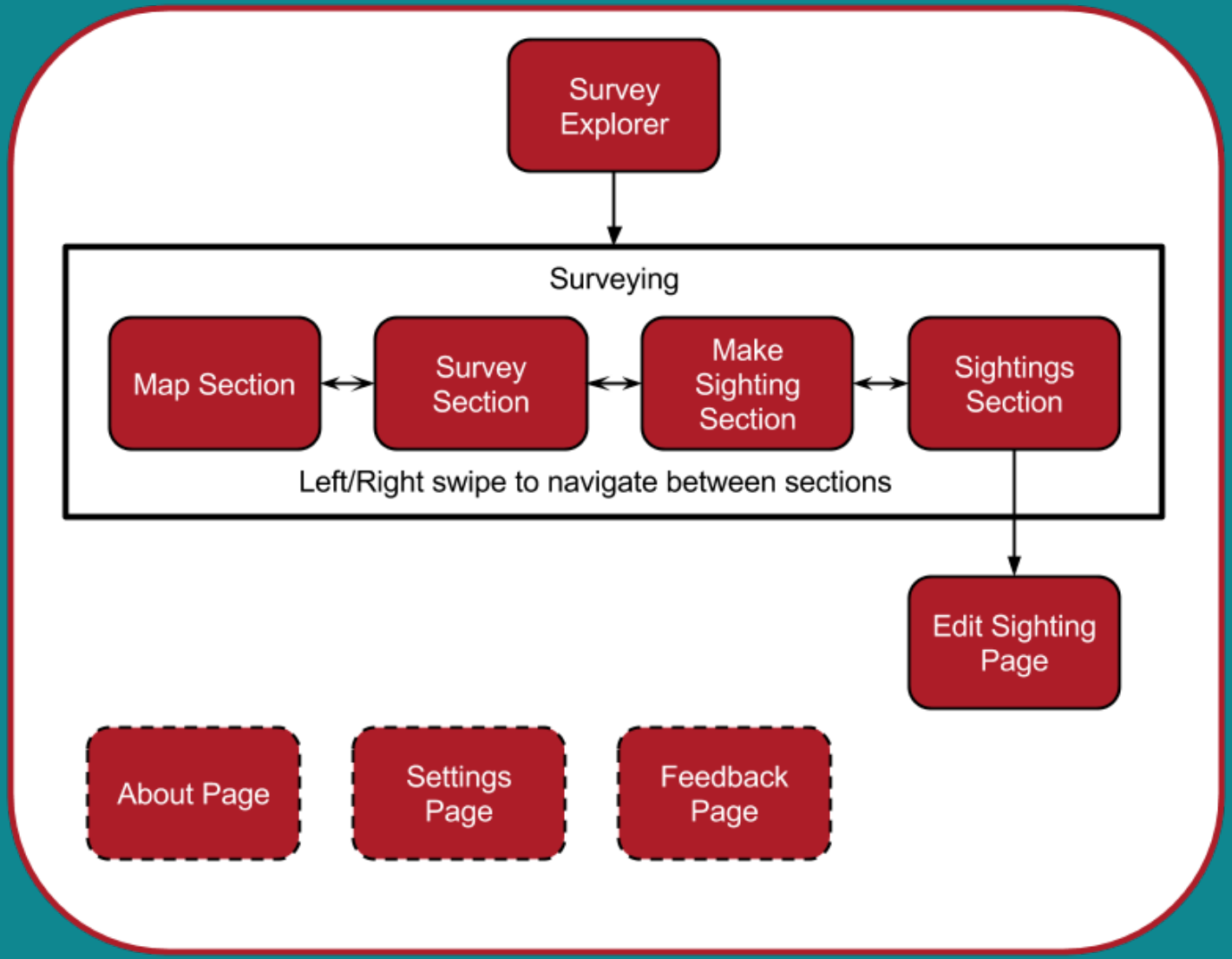
Screen flow


Survey Explorer
Surveying
Map Section
Survey Section
Make Sighting Section
Sightings Section
Left/Right swipe to navigate between sections
Edit Sighting Page
About Page
Settings Page
Feedback Page

Market and Literature Survey

Challenge: Loosely defined original requirements

Butterfly Survey App Questionnaire

Responses to this survey will guide the specification for an Android/iOS app intended to make conducting butterfly surveys in the field easier and more standard. Thank you for your valuable input. Contact butterflies@iastate.edu with any questions.

* Required

Name *

Email *

Organization

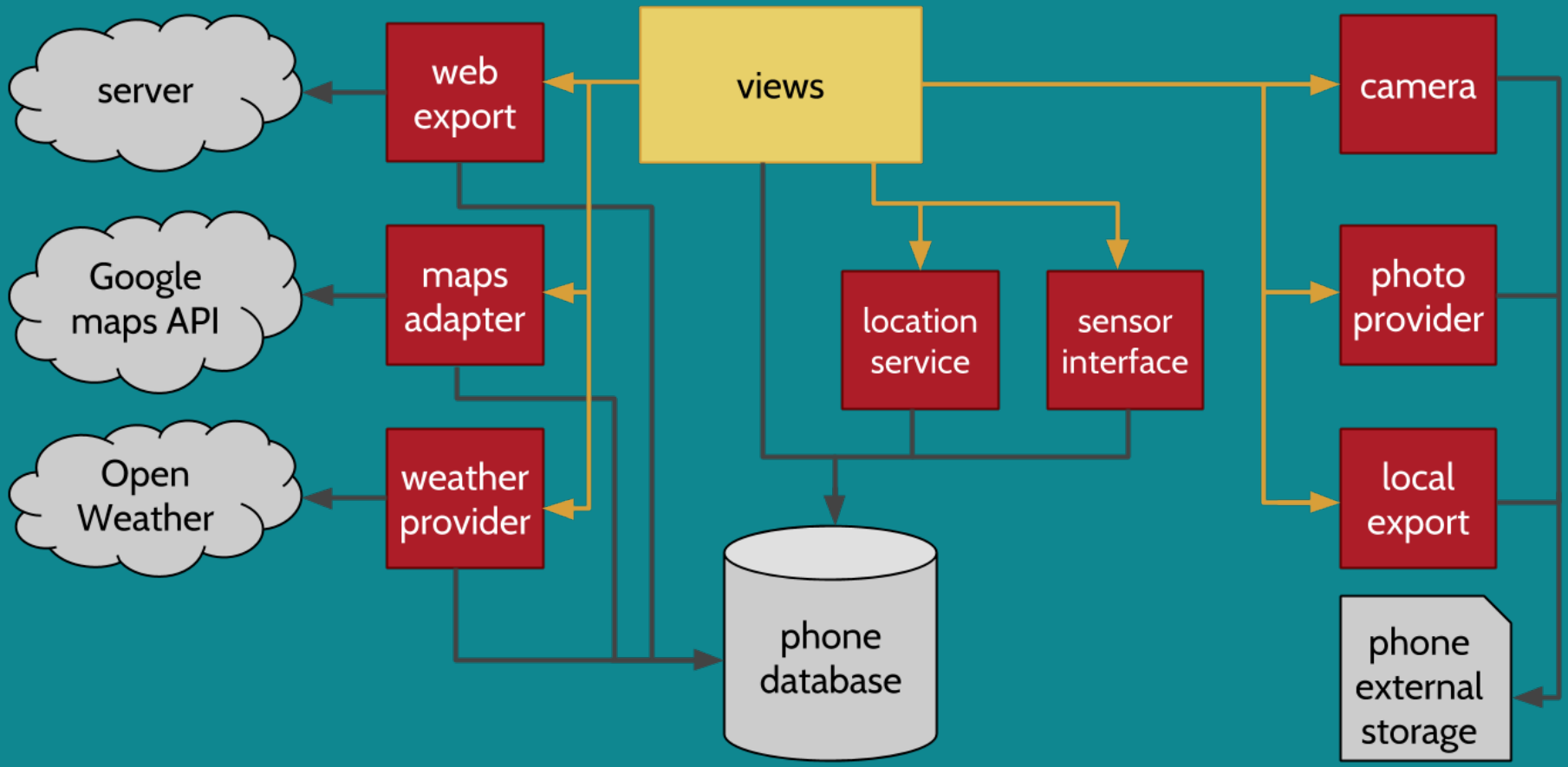
How often do you perform a Pollard survey? *

Examples: never, every week, 3 times per year

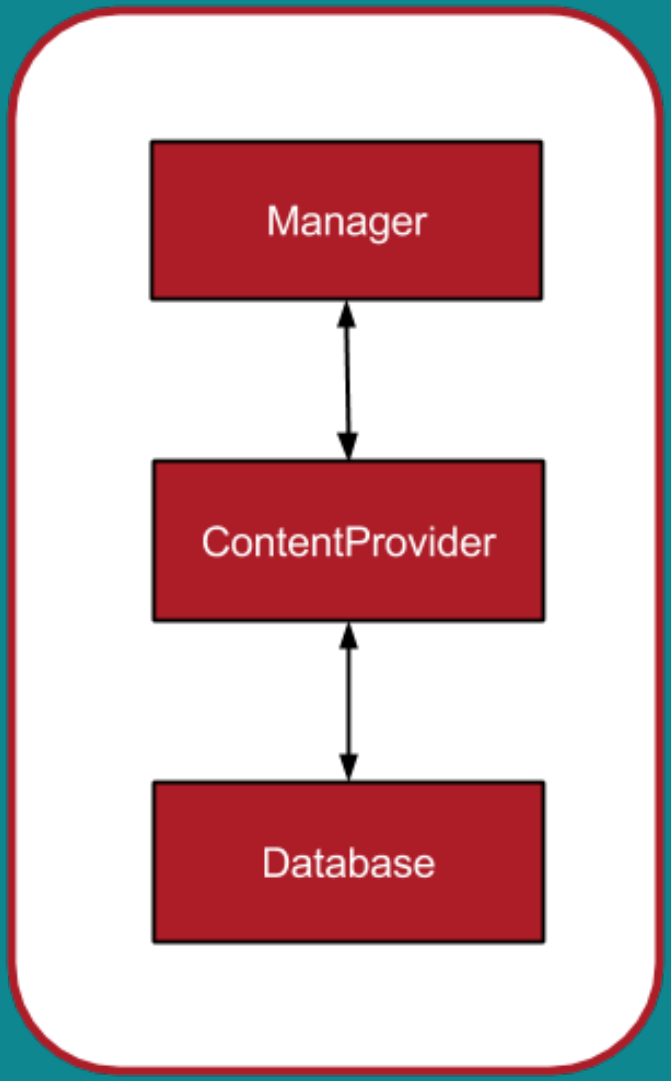
System Requirements

- Functional
  - Input butterfly sightings
  - Track location and environment
  - Export data
- Nonfunctional
  - Performance
  - Usability
  - Maintainability

Architecture - System



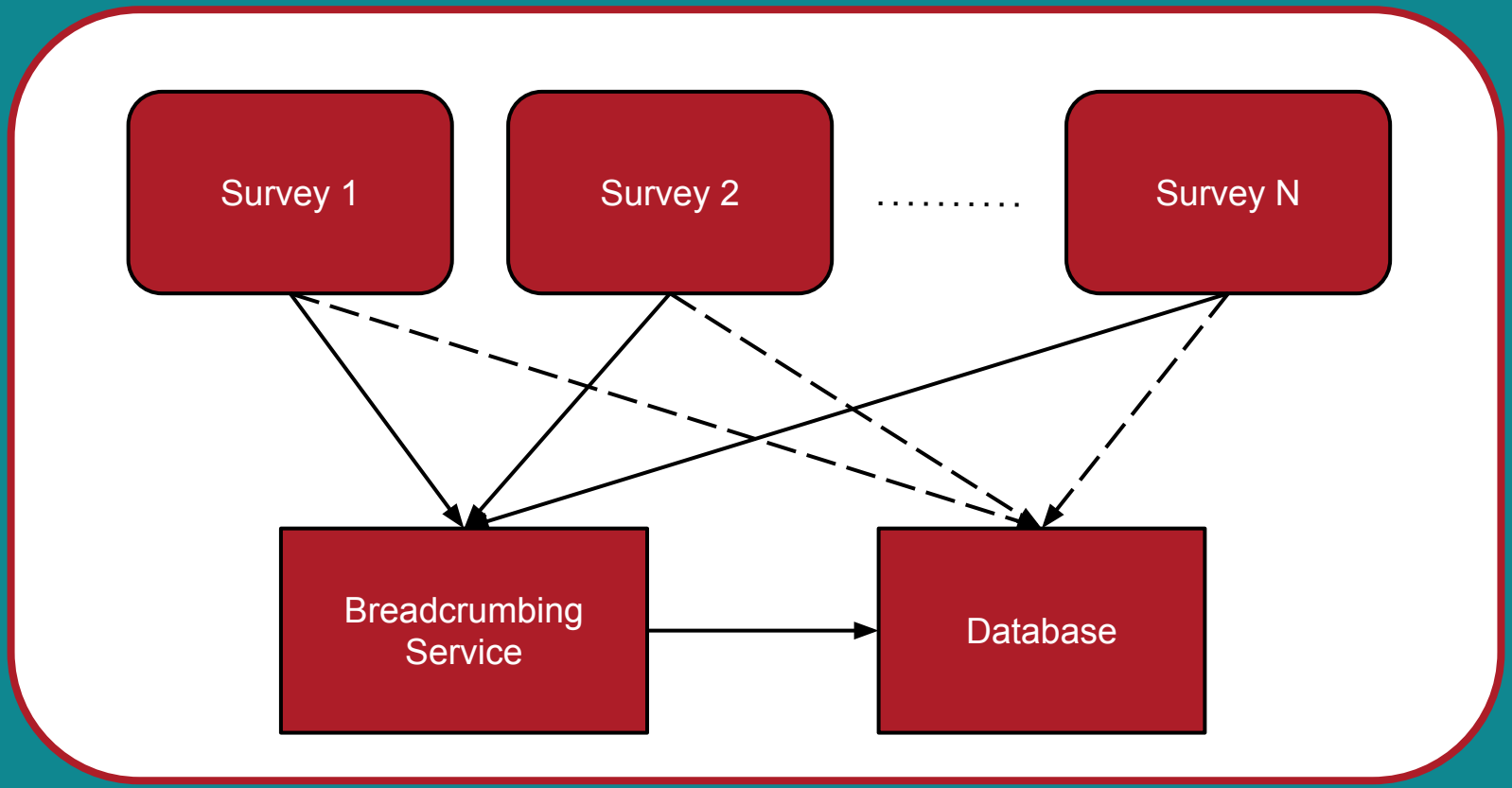
Architecture - Database



- Table per data type
- Abstraction
- Learning from mistakes
  - Upgrading schema
  - Pre-built SQLite file

Architecture - Services

Challenge: Asynchronous location tracking



Web Export

- Data sharing
- Proof-of-concept server
- Data warehouses are interested
  - BAMONA
  - eButterfly
  - Dutch Butterfly Monitoring Scheme

Prototype

- Completed Android UI with one protocol
- Local export
- Alpha release on Google Play Store
- Field testing

Testing

- Two-week sprints
- Scenario validation
  - Dev branch vetted in alpha before pushing to prod

Early Response

- 30+ installs in 3 countries since public release 1 week ago
- Disney scrapped their app after seeing our prototype
- Job offers from New Jersey
- Enthusiastic response at conferences

Future/Maintainability

- Modular code
- Github issue tracker
- Our team's future role
  - Bug fixes
  - Tweaks
- Next team
  - Major features
  - System expansion

Real World Challenges

- We need butterfly conservationists to want to use UBR
  - Polished
  - Attractive
- Android fragmentation

Impact

- Real-world release and benefits
- Help answer conservation questions
- Innovative interface
- Market penetration

Acknowledgements

- Nathan and Anita
- Dr. Rover

Questions or comments?

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Battery usage

Sampling Period (seconds)	battery drain per hour
5	7%
10	5%
15	4%
30	3%
60	2%

Schema

Breadcrumb Table

- key - ID
- Columns
  - Survey_ID
  - Time
  - Latitude
  - Longitude
  - Accuracy
  - Speed

Butterfly Table

- key - ID
- Columns
  - Generic_Name
  - Scientific_Name
  - Generic_Family
  - Scientific_Family
  - Generic_Sub_Family
  - Scientific_Sub_Family
  - region
  - Frequent
  - Custom_List
  - Source

Schema

Survey Table

- key - SurveyID
- Columns
  - ID
  - Survey_Type
  - Name
  - Start_Time
  - End_Time
  - Surveyor_Count
  - Surveyor_Names
  - Location_Name
  - Comment
  - Habitat_Type
  - Habitat_Condition
  - Wind_Speed
  - Cloud_cover
  - Temperature
  - Engagement_Level
  - Radius
  - Uploaded
  - Service_Temperature
  - Service_Humidity
  - Service_WindDirection
  - Service_WindSpeed
  - Service_Time
  - Service_Pressure
  - Service_Sunrise
  - Service_Sunset
  - Service_City
  - Service_Country
  - Service_MaxTemperature
  - Service_MinTemperature
  - Service_CloudCover
  - Service_Rain
  - Service_Snow

Schema

Sighting Table

- key - ID
- Columns
  - Survey_ID
  - Generic_Name
  - Scientific_Name
  - Generic_Family
  - Scientific_Family
  - Generic_Sub_Family
  - Scientific_Sub_Family
  - Location
  - Number
  - Temperature
  - Wind_Speed
  - Wind_Direction
  - Cloud_Cover
  - Time
  - Sex
  - Condition
  - Comment
  - Transect
  - Photo_Name → Links to the associated picture on device
  - Pressure
  - Ambient_Temperature
  - Illuminance
  - Relative_Humidity
  - Wing_Length
  - Mark_Found
  - Mark_Added