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Whale and Dolphin Tracker: A Mobile Platform for Standardized Opportunistic Data Collection, Fluke Matching, and Community Science Engagement

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The Whale and Dolphin Tracker (WDT) smartphone application (app) allows for near real-time, standardized data collection of cetacean sightings from anywhere around the globe. WDT is a free versatile tool designed to offer a user-friendly platform to record cetacean encounters according to their project requirements. The app allows users to record sightings along with GPS location to track spatial and temporal patterns. It integrates photo identification with image media storage, enabling individual-level analyses, with an optional add-on for real-time humpback whale identification via a Happywhale integration. The app also facilitates data collection for distance sampling so researchers can study population density and produce abundance estimates. The associated web portal (log.pacificwhale.org) allows users to easily access, review, and download their data. WDT can be used to support long-term, low-cost monitoring by taking advantage of existing vessel traffic (e.g., tour boats, ferries) as well as enhance educational experiences on ecotourism vessels. To date, more than 11,000 registered users have logged over 32,000 sightings of 23 species since 2017. Data collected using WDT have been used to produce four scientific publications, demonstrating the value of this app toward advancing marine science.

Key words: Wildlife tracking app; Platforms of opportunity; Fluke matching; Citizen science; Whale watching

Introduction

Marine mammal research is logistically challenging due to factors such as the remote nature of many species, the cost of chartering or operating vessels and monitoring equipment, and the difficulty of securing consistent and sustained funding (Kiszka et al., 2004; Kowarski et al., 2020). Today, many research questions relating to marine mammal species, such as population dynamics, range,

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feeding ecology, the effects of climate change, and vulnerability to human impacts, are left unanswered due to limited data (Nelms et al., 2021). For instance, 10% of cetacean species were recently classified as “data deficient” on the International Union for the Conservation of Nature Red List (Braulik et al., 2023), meaning there is insufficient information available to assess their conservation status or population trends. Additionally, funding for long-term monitoring of abundance and distribution is typically restricted to vulnerable species or populations, such as the critically endangered Southern Resident killer whale (*Orcinus orca*) population (Williams et al., 2024) or the North Atlantic right whale (*Eubalaena glacialis*) population (Moore et al., 2021). Populations that are not of immediate conservation concern or management priority often receive minimal funding for monitoring, despite the potential risks they face (Avila et al., 2020; Kaschner et al., 2012; Taig-Johnston et al., 2017). This lack of consistent monitoring makes it difficult to effectively manage threats to these populations (Avila et al., 2018). Today, the number of marine mammal populations worldwide in need of long-term consistent monitoring exceeds the capacity of researchers (Dickinson et al., 2010; Jarić et al., 2015; Nelms et al., 2021), highlighting the critical need for cost-effective, long-term monitoring solutions to support effective conservation and management efforts for all marine mammals (Avila et al., 2018; Nelms et al., 2021). Large-scale monitoring is also essential for detecting and tracking predicted range shifts in cetaceans (Isaac, 2009; Lambert et al., 2011), with climate-driven changes in distribution and habitat use already being documented (Castro et al., 2024; La Manna et al., 2023). However, location-only or species-only apps are insufficient for this purpose, as the absence of vessel track data makes it impossible to distinguish whether an apparent range expansion reflects a true distributional shift or simply new survey effort in an area not previously visited. Incorporating vessel tracklines alongside sightings for all cetacean species is therefore critical for robustly monitoring climate-driven changes in distribution.

Various platforms, such as whale-watching vessels, container ships, ferries, and cruise ships, offer an effective opportunity to overcome the high costs and logistical challenges of traditional marine mammal research. When utilized for data collection, these platforms are referred to as Platforms of Opportunity (POPs). These POPs, which are not dedicated to research but operate on fixed or predictable schedules, can be leveraged to opportunistically gather data on cetacean populations at a fraction of the cost of dedicated research vessels (Stack & Currie, 2022). The growing whale-watching industry, which spans over 100 countries and attracts millions of participants annually (O’Connor et al., 2009), is one such example of how POPs can facilitate long-term, low-cost monitoring of cetaceans. Commercial and recreational fishing fleets, as well as tour boats (e.g., whale watching), provide additional sources of data, offering more random and varied pathways for monitoring. A known limitation of POP data is the potential for species misidentification and/or observer variability, particularly when collected by nonspecialists (Harvey et al., 2018; Oliveira-Rodrigues et al., 2022). These challenges can be mitigated by encouraging photo documentation with each sighting, incorporating emerging tools such as artificial intelligence to improve species recognition (Adebayo, 2025), and applying statistical approaches designed to account for observer bias and misidentification in community science datasets (Bird et al., 2014). POPs can empower a global network of community scientists, equipped with a standardized tool for data collection, to address critical data gaps in cetacean research (Stack & Currie, 2022).

Community science and the crowdsourcing of scientific information have become increasingly powerful sources of additional information on species, especially in cases where traditional monitoring is insufficient. For example, public users of the globally available mobile app eBird have generated an avian sightings dataset featured in over 900 peer-reviewed articles; these data have expanded scientific understanding of avian ecology, as well as informing conservation policy (Cornell Lab of Ornithology, 2024; de Sherbinin et al., 2021; Earp & Liconti, 2020; Thiel et al., 2014). Similarly, the community science website Happywhale has leveraged the efforts of over 20,000 community photographers and research organizations to create a global database of humpback whale tail flukes, and is one of the largest community science datasets that exists (Cheeseman et al., 2022, 2023).

With growing global awareness of community science and advances in statistical methods to address biases, the use of community-sourced and POP-collected data in cetacean research is increasing. (Castro et al., 2020; Cheeseman et al., 2024; Currie, Stack, McCordic, & Roberts, 2018; Earp & Liconti, 2020; Mahaffy et al., 2023; Olson et al., 2022; Self et al., 2021; Stack et al., 2024; Thiel et al., 2014; Tonachella et al., 2012). In addition to contributing data for scientific research, nature-based citizen science fosters community engagement, enhances participant well-being and connectedness to nature, and can promote proconservation behaviors and biocentric values (Pocock et al., 2023).

While several apps and platforms have been developed to support community science and data collection in marine mammal research, no standardized system has emerged to unify these efforts globally (Dickinson et al., 2010; Earp & Liconti, 2020). Platforms such as WhaleReport, Sea Watcher, and Whale Alert illustrate the diversity of approaches within this field. WhaleReport, focused on British Columbia, enables researchers to track cetacean and sea turtle distribution through public sighting reports. Sea Watcher, operating in UK and European waters, allows users to log survey effort, behavioral observations, and environmental data to monitor species distribution and long-term trends. Whale Alert was designed to mitigate vessel strikes by displaying safe zones and alerting operators to the presence of whales in the area. The app displays active whale management areas and recommended routes, while also facilitating near real-time reporting to research and management agencies along the East Coast of the US and Canada. Despite their contributions, these platforms lack standardization, limiting data integration across studies and regions and underscoring the need for a unified global framework for marine mammal monitoring (Feldman et al., 2021; D. A. W. Miller et al., 2019). This article presents Whale and Dolphin Tracker (WDT) as a solution to this gap. WDT was developed as a globally accessible, free, multispecies mobile application designed to harness the power of smartphones for standardized data collection on platforms of opportunity. The app integrates sighting locations with vessel track data, a functionality not offered by existing tools, and supports optional photo submissions within a simple and intuitive workflow. By emphasizing ease of use while generating scientifically robust data, WDT enables long-term monitoring, global comparability, and meaningful engagement of both researchers and community scientists.

WDT began as a mobile web app in 2013, evolved to a native mobile phone app in 2017 (Currie et al., 2016, 2017; Davidson et al., 2014; Kaufman et al., 2011), and received extensive updates in 2025, including a redesigned user interface with permanent navigation tabs, an integrated statistics and map page, expanded data capture options, and the addition of photo linked sightings with optional integration for real-time HappyWhale matching. WDT currently has >11,000 users who have logged over 32,000 global sightings of 23 species on more than 18,000 trips. A data use and consent statement is included within the app's About page, informing users that submitted data may be stored and used for research, conservation, and educational purposes. Since its launch, 83% of WDT sightings have been logged in the US and 7% in Australia, with the remaining submissions contributed by users across nearly 30 additional countries. The high proportion of US sightings reflects the app's early promotion on PacWhale Eco-Adventures, an early adopter and key contributor (Currie, Stack, & Kaufman, 2018). The majority of sightings are coastal, consisting predominantly of humpback whales (75%), with smaller proportions of bottlenose dolphins (7%) and spinner dolphins (7%). Among active users, 65% submitted a single sighting, while 35% contributed multiple sightings, including 7% who submitted more than 10 sightings. Datasets generated with WDT have been used in published scientific research focused on distribution of various whale and dolphin species (Currie, Stack, & Kaufman, 2018; Currie, Stack, McCordic, & Roberts, 2018; Olson et al., 2022; Self et al., 2021). To help ensure the accuracy of data (e.g., behavioral observations), WDT data can be subset between general users and registered research users, the latter being trained scientists, which provides an added layer of confidence to be placed on their observations in subsequent analyses.

Design and Workflow

Whale and Dolphin Tracker is a field-tested mobile app available on both Android and iOS smartphones, designed to enable users to collect standardized sighting data, which can be easily exported and utilized for long-term monitoring. Importantly, each user's sightings are stored under their individual account, and users retain full access to their own data, which can be exported at any time through a user-accessible web interface. Users cannot view or export data submitted by other accounts, ensuring that all data access remains restricted to the individual contributor. When in use, WDT collects a GPS trackline throughout each trip, providing users with a detailed record of their position and movements. In addition to this spatial data, users can enter sighting information, such as the species observed, location, group size, behavior, and associated photographs, allowing researchers to capture project-specific details during each observation.

Data Collection Methods

Sightings data can be collected according to project needs, with all entries standardized through one of the app's three data collection frameworks: (1) sightings with GPS effort (location and track), (2) sightings with GPS effort and photo identification, or (3) distance sampling. Images taken on the mobile device can be linked to the encounter in the field, and/or photos captured on other devices can be added to the encounter data either directly on the mobile device or uploaded later via the web platform. A paid subscription to WhaleID, offered through Happywhale, enables unlimited real-time matching of humpback whale tail flukes through WDT, with prices ranging from $10 to $100 per month (Happywhale, 2025). The subscription cost, which is set and managed by Happywhale, supports the ongoing maintenance of the Happywhale database and goes directly to Happywhale. Importantly, the WDT app itself remains free to download and use, ensuring that data collection and participation are not restricted. This optional feature is useful for learning about the individual whales users are observing in real-time and can also be incorporated into naturalist narrations to enhance the educational experience aboard tour vessels.

Prior to data collection, users can set a filter to display only the relevant species for their region and/or project from a global list of cetacean species via the **Settings Menu**. Purposely omitted species can be reenabled at any time. To collect distance sampling data, users simply select "enable distance sampling" from the Settings Menu. Users can select the *At Home (simulated)* option to explore the app's features without recording actual data, allowing them to practice navigating the workflow, entering sighting information, and reviewing how data are stored and displayed.

Data Collection: Initiating a Trip

To begin, the user selects the *Collect New Data* button on the **Home Screen** (Fig. 1) and then

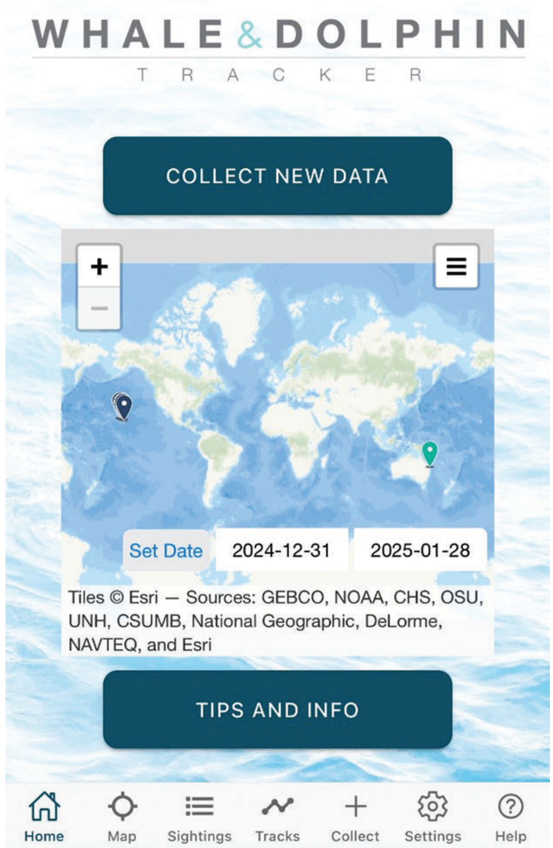

Figure 1. The **Home Screen** of WDT displaying an inset live sightings map as well as buttons to reach the **Data Collection Menu**. Navigation icons across the bottom of the screen allow users to move between the **Home Screen**, the live sightings map with app statistics, their saved sightings record, their saved GPS tracklines, the **Data Collection Menu**, the **Settings Menu**, and the **Help Menu**. These navigation icons remain present on all app displays.

selects *On a Boat.* Once the user selects *Start Trip,* the app begins recording the GPS trackline; this feature requires that location services are enabled on the user's phone to work. The track will only stop when the user selects the *End Trip* button in the **Data Collection Menu** (Fig. 2), allowing users to easily navigate to other pages in the app while the track is being collected. See Appendix Figure A1 for a full app schematic. All data collected using this feature is uploaded to the user's web account, with an option to upload flukes and associated sighting data directly to Happywhale.

Data Collection: Recording Sightings Without Photos

To record sightings throughout the trip, users select *Log Sighting* (Fig. 2) and then navigate to the appropriate species. The app generates the sighting record and automatically fills in the sighting date, time, latitude and longitude from the smartphone's internal clock and GPS. Users then have the option to fill in additional information such as behavior, environmental conditions, sighting notes, and age class composition. After all desired fields have been completed, the user selects *Next*, confirms the sighting's addition to the upload queue, and is returned to the main **Data Collection Menu**.

Data Collection: Recording Sightings With Photos

WDT can associate images with sightings and, as noted above, interface with Happywhale, enabling the real-time matching of humpback whale tail flukes to a global database. To pair an image with a sighting, users select *Log Sighting and photo* from the **Data Collection Menu**. The data fields are the same as in the previous sighting section. However, after selecting the *Next* button, the user can decide if photos should be added in the field or later via the web portal (i.e., at home or from a different device). Selecting the *Add Photo Later* option will complete the sighting with a flag for the user to attach their images to this sighting later. Selecting the *Add Photo Now* option allows users to take images with their mobile device or upload an image from the device's image library to be included with the sighting. Once all desired photos have been attached, the user can complete the sighting by selecting *Done*.

Data Collection: Distance Sampling

WDT can be used to collect data following distance sampling methodology (Buckland et al., 2004), if enabled in the **Settings Menu**, by selecting the *New Distance Sampling* option. The species selection is similar to the other data collection methods, but specific distance sampling fields will need

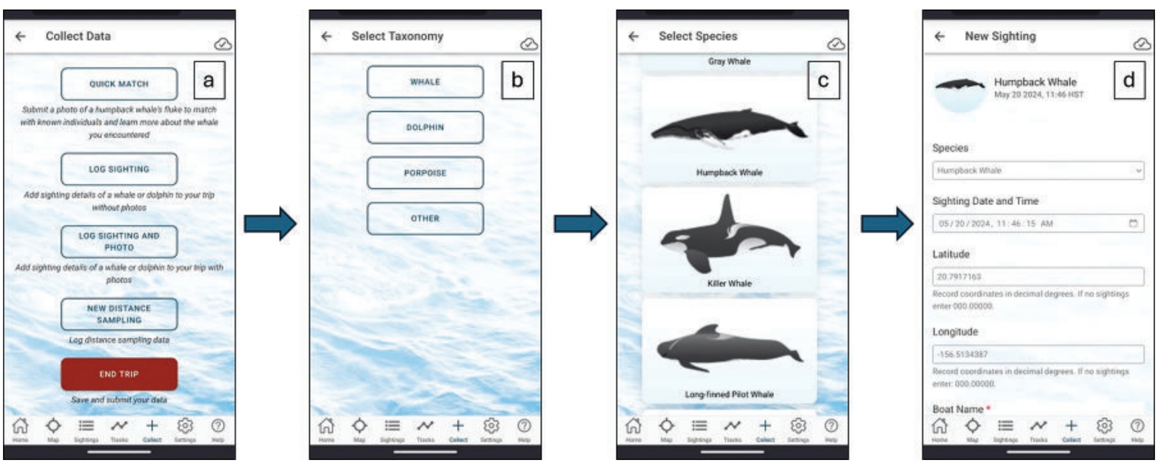

Figure 2. All data collection actions begin at the **Data Collection Menu**; once a type of data is selected (a), the type of animal is then selected from the taxonomy list (b), and then the relevant species is selected from the illustrated species selection list (c). Next, the species, date, time, and latitude and longitude are auto-filled on the sighting data page (d), and the user is prompted to fill in additional fields as directed by the data collection option they chose.

to be completed. These fields are: survey region, transect name/number, observer name(s), sighting distance and units, sighting angle, group size, and the environmental variables of wind speed and swell height. Distance sampling data are stored separately from general sightings data to facilitate data export for distance sampling analysis and association with additional information (e.g. observer height, etc.).

Real-Time Humpback Whale Identification

WDT allows for real-time matching of humpback whale identification photographs taken in the field to the global Happywhale database (Cheeseman et al., 2022), providing the user with details of an individual whale's sighting history. Users that have photographed a humpback whale while on a trip can select the *Quick Match* option in the **Data Collection Menu** to either select an image from their device's internal storage, or to capture a new image (e.g., a fluke displayed on the screen of a DSLR camera). When a user selects an image, they are asked whether they want to submit the fluke photo to Happywhale and to confirm the species to use for the matching algorithm. The algorithm then suggests possible matches with an accuracy of 97–99% (Cheeseman et al., 2023) and the user must choose one of the following options: *Not a Match*, *Possible Match,* or *Confirm Match*. If the user selects the *Confirm Match* option, they receive a link to the Happywhale profile of the whale and the option to add sighting details. Entering sighting data follows the same process as the other data collection pathways. If the user decides not to enter the data, the match will not be sent to Happywhale. If the user adds sighting data, they will be prompted to upload the image to Happywhale via the web portal. Users can also add identification photos to their past sightings at any time by selecting *My Sightings* from the **Home Screen** in the web portal or app.

Web Portal Access and Data Download

When users select the *End Trip* button in the **Data Collection Menu**, all photos and sighting information are uploaded to WDT servers for backup and storage but remain accessible only through the individual account that logged them. This step requires a stable internet connection and upload attempts will run in the background if no connection is available when ending the trip. These data are then available to the user through their WDT web portal (Fig. 3). Users can review and edit their sightings within the portal, as well as export XLSX or GPX files of their sightings and survey effort, respectively. If users have collected both general sightings data and distance sampling data, there are two different XLSX files available to download. The web portal can also be used to finalize submission of photos to Happywhale if the user selected the option to upload a higher resolution image when using the *Quick Match* feature.

Discussion

Community science data collection and its role in ongoing and future biodiversity research are expanding (Callaghan et al., 2021), with standardized methods being essential for ensuring the credibility and reusability of the data (Balázs et al., 2021; de Sherbinin et al., 2021). Currently, no app exists for at-sea data collection that allows unrestricted marine mammal sightings from POPs across regions and species (Cranswick et al., 2022), underscoring the need for a standardized solution. WDT has the potential to engage community scientists and significantly expand global cetacean data collection efforts, a crucial step in the face of climate change and limited funding for studying whale and dolphin populations (Gulland et al., 2022).

Cetacean species are predicted to respond to warming sea surface temperatures by moving towards higher latitudes (von Hammerstein et al., 2022) or changing the timing of their migrations (van Weelden et al., 2021). However, research on these shifts in distribution remains limited, as consistent long-term monitoring programs are unevenly spread across regions and species (Gulland et al., 2022; van Weelden et al., 2021). The potential implications to population dynamics, coupled with limitations in dedicated scientific monitoring programs, underscore the importance of tools like WDT, which offers users a means to track species' distribution and migration timing. For example, opportunistic sightings of humpback whales collected through WDT on daily commercial whale-watching trips have provided valuable insights into their spatial and temporal distribution, at a scale

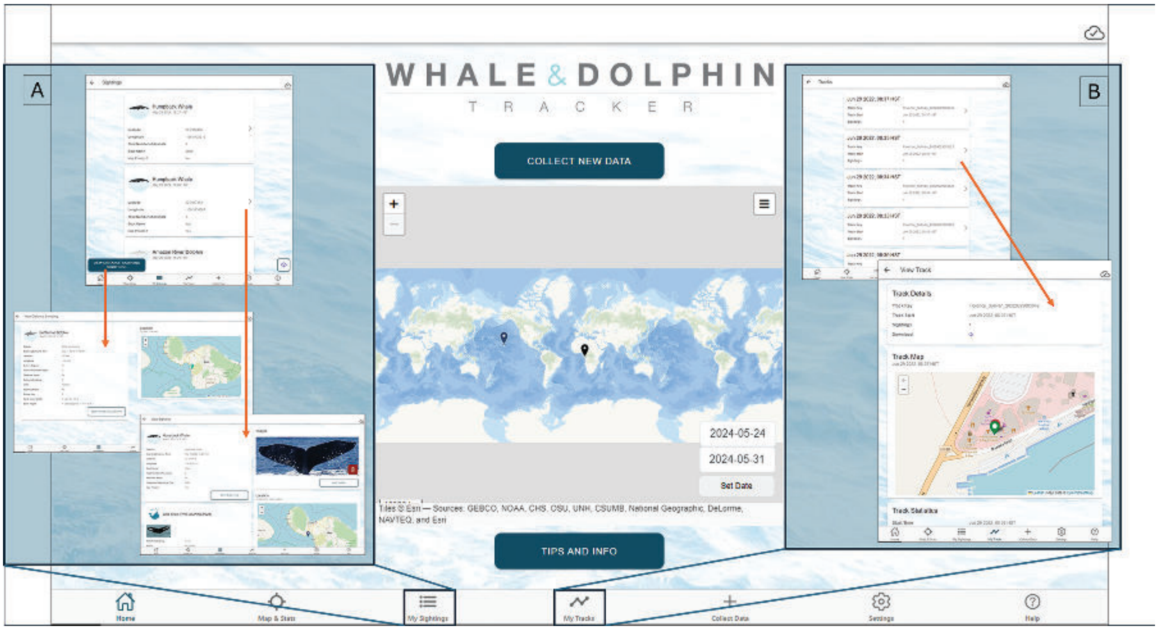

Figure 3. The **Home Screen** of the WDT web portal mirrors the mobile app. Navigation icons across the bottom of the screen allow users to move between the **Home Screen**, the live sightings map, their saved sightings record, their saved GPS tracklines, the **Data Collection Menu**, the **Settings Menu**, and the **Help Menu**. These navigation icons remain present on all app displays. Inset (A) shows the pathway allowing users to view a list of all their sightings, focus on individual sightings, or view their distance sampling sightings. Inset (B) shows the pathway allowing users to view a list of all their recorded tracklines or focus on the details of any individual track. Sightings, distance sampling sightings, and tracklines can be exported using the download icon. A high-resolution version of this figure can be view at: https://pacificwhale.org/wp-content/uploads/2025/11/Figure_3_Webportal-schematic.png

not achievable through traditional research surveys, with monitoring efforts ongoing in Hawai‘i since 2013 (Currie, Stack, & Kaufman, 2018). Data collected through WDT have made important contributions to the scientific literature, including studies on cetacean distribution, habitat use, and vessel interactions, demonstrating the app's utility in long-term monitoring and low-cost research (Currie, Stack, & Kaufman, 2018; Currie, Stack, McCordic, & Roberts, 2018; Self et al., 2021).

The success of WDT has been driven in large part by its early adoption and sustained use by PacWhale Eco-Adventures, whose fleet of vessels has required naturalists and captains to log and track sightings as part of their daily operations. This integration provided the consistent data required for long-term monitoring. The close partnership created both investment in the tool and regular feedback on its functionality, demonstrating its value to staff while ensuring that the system evolved to meet real-world demands. The app framework was intentionally designed to be simple and intuitive, requiring no formal training to use, while limiting analyses to photo-verified records to safeguard data quality. Feedback from PacWhale staff has been essential for refining WDT across three versions, incorporating what is realistically possible in data collection when nonscientists are balancing multiple responsibilities on board. Together, these factors highlight how strategic engagement with tourism operators can drive both scientific output and community involvement, illustrating an innovative approach to sustaining large-scale data collection (Currie, Stack, & Kaufman, 2018).

WDT's capacity to link images with GPS locations enables researchers to study site fidelity (Courtin et al., 2023) and abundance (Hammond et al., 2021). An example of the application of opportunistically obtained photos linked with sighting locations was demonstrated by the first mark–recapture abundance estimate of humpback whales in Irish coastal waters; it was achieved primarily through community science submissions of photos and their corresponding sighting locations (Blázquez et al., 2023).

Community scientists have played a vital role in advancing research in understudied and developing regions, utilizing platforms of opportunity to support local environmental policies and habitat protections, often surpassing contributions made by traditional research efforts (Alessi et al., 2019). Nevertheless, many regions with available POPs (e.g., whale and dolphin tourism) continue to have understudied cetacean populations due to the lack of research efforts (dos Santos & Bessa, 2019), highlighting the need for increased community science monitoring to fill these gaps and support conservation efforts. While WDT has not yet seen widespread adoption in developing regions, expanding its use in these areas remains a key priority for future outreach and engagement.

Community science data, including data collected through WDT, is increasingly being used to supplement research efforts (Badger et al., 2024; Bruce et al., 2014; Cheeseman et al., 2024). For example, Olson et al. (2022) used dedicated research survey effort to determine distribution patterns for two species of odontocetes, and overlaid traffic density patterns from tour vessels collected using WDT to calculate the relative exposure risk of those odontocetes to tour vessel traffic. It is also possible to assess POP data in conjunction with targeted systematic surveys to identify the biases of the opportunistically collected data (e.g., search biases, detection probability, misidentification, etc.) and ensure that research questions and the statistical approach used can account for these limitations (Hauser et al., 2006). Therefore, we recommend that WDT be used to conduct pilot studies aboard POPs to guide future research study designs, including identifying hotspots for future survey efforts (Williams et al., 2006).

The potential biases inherent in POP data collection, and the challenges of analyzing such data, are well documented, and have been summarized previously (Stack & Currie, 2022). However, many of these concerns can be mitigated through proper observer training, the use of pilot projects, advances in statistical techniques, and the use of tools like WDT to standardize data acquisition (Bird et al., 2014). In practice, WDT does not currently provide formal training for users. Instead, the app functions as a standardization platform, ensuring that key information such as date and GPS position is automatically and consistently recorded to reduce user input error. To increase confidence in datasets used for peer-reviewed publication, sightings can be limited either to well-known and commonly sighted taxa (e.g., humpback whales) or to submissions from users with demonstrated experience, such as trained naturalists or individuals independently verified as research users. For example, due to the large sightings dataset created by daily POP trips Currie, Stack, and Kaufman (2018) randomly selected a single representative whale watch trip per harbor per day for inclusion in their analysis to avoid the problem of repeat sampling when tour boats returned to the same group of animals across multiple trips. In larger-scale projects, semiautomated screening tools may be developed to flag potentially erroneous sightings for further review (Bonter & Cooper, 2012). Smaller programs, however, often rely on self-assessments of confidence to validate species identification (Hann et al., 2018; Hauser et al., 2006). To further mitigate errors, the ability to review images associated with each sighting, recently integrated into WDT, provides an additional layer of verification, enabling scientists to confirm species identity and reduce misidentifications (Alessi et al., 2019).

When combined with trained observers and robust survey design protocols, it is possible to use WDT to conduct line transect or distance sampling surveys (Thomas et al., 2010), even with nonrandomly placed transect lines (D. L. Miller et al., 2013) that often occur when using POPs (Johannessen et al., 2022). With model-based estimations of abundance, data do not need to be restricted to the assumption of equal coverage probability of a survey area, so data collected from POPs can be used (Hammond et al., 2021). Further, there are now modeling methods to help researchers determine how many POP surveys are needed to equal the relative survey effort generated by dedicated research vessels and to produce sufficient sightings for accurate species distribution models (Henderson et al., 2023).

The integration of WDT with the Happywhale humpback whale matching algorithm (Cheeseman et al., 2022) creates a valuable tool for both researchers and environmental educators (such as ecotour naturalists and others), and demonstrates the benefits of merging technologies and establishing a single platform for opportunistic data collection. Particularly for those operating in the North Pacific, where over 30,100 individual humpback whales have been documented in Happywhale (Cheeseman et al., 2023), near-instantaneous matching of flukes allows easy access to individual whale identification and life history data. Researchers can use this feature to quickly confirm resights in the field and decide whether further data collection efforts should be pursued. Environmental educators can use such information to create a richer, more impacting educational narrative for their passengers (Andersen & Miller, 2025; Forestell, 1993; Suárez-Rojas et al., 2022). Additionally, tour guides can create a participatory community science experience by inviting passengers to assist with data collection, confirming the match of an individual whale, or even encouraging passengers to download the app and record their own sightings. There is demonstrated power in engaging the public in community science, as it can lead to greater community buy-in and changes in attitudes and behaviors by increasing participant's awareness of environmental issues and validating local anecdotal information (Charles et al., 2020). Furthermore, consumers are increasingly looking for ecofriendly and sustainable tourism options; operators who actively partner with research organizations and provide participatory community science experiences that ultimately help in protecting the targeted species attract customers interested in responsible environmental educational practices (Dionisio et al., 2022; Han, 2021; Kur & Hvenegaard, 2012).

In conclusion, WDT is a user-friendly field-tested mobile app designed for use by researchers, ecotour operators, and community scientists. It streamlines the collection of standardized marine mammal data, supporting species identification, distribution mapping, and distance sampling for abundance estimation. Additionally, the app enhances educational outreach on ecotours, fostering greater public engagement in the conservation of marine resources. WDT empowers diverse user groups to make meaningful contributions to marine research and conservation efforts.

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Biographical Notes

Florence Sullivan is the Science Coordinator for The Coastal Observation and Seabird Survey Team housed at the University of Washington. Previously, as a Research Biologist at Pacific Whale Foundation (PWF), she served as the curator of PWF's long-term photo ID catalog of North Pacific Humpback Whales. She holds a Master of Wildlife Science from Oregon State University. Her research interests include marine spatial ecology, creating innovative solutions for budget-friendly data collection, and expanding knowledge networks through community science.

Dr. Shannon Barber-Meyer is the Senior Research Manager at Pacific Whale Foundation. She holds a Ph.D. in Wildlife Conservation from the University of Minnesota. She is a broadly trained wildlife research biologist having studied species such as tigers in Asia, emperor penguins in Antarctica, gray wolves and their prey in the US, and now focuses on whale and dolphin population monitoring to inform conservation and management. Shannon has served on two IUCN (International Union for Conservation of Nature) Species Survival Commission Specialist Groups and as a representative to the United States Interagency CITES (Convention on International Trade in Endangered Species) Committee. Her diverse background includes working for non-for-profits, state government, business, academia, and the federal government.

Joe Breman serves as the Founder and Director of ChipIn, CEO of GEOINTcom, and President of the Wisdom Center for Autism. He has also played key roles at ESRI and

Akimeka, bringing extensive experience in GIS and oceanography from past work in Hawai‘i and California. His impactful challenges include founding IUE, which was acquired in 2022, and authoring significant publications such as “Ocean Globe” and “Arc Marine: GIS for the Blue Planet.” He holds an M.A. in Marine Sciences from the University of Haifa and a B.A. from UC Santa Cruz, and enjoys time with family and friends in Maui, and on travels.

Raphael Martelles is the primary developer of the Whale and Dolphin Tracker web and mobile applications. He is a software engineer with over 30 years of industry experience in various areas including satellite network management systems, Linux and Windows network drivers, clinical trials management systems, advanced data displays, and embedded software for satellite data collection.

Ted Cheeseman is the cofounder and director of Happywhale, a research collaboration and citizen science web platform that is transforming data science for tracking individual whales. Ted recently completed a Ph.D. studying North Pacific humpback whale populations, a broad collaborative study that leveraged AI technology to identify and track almost every living whale in the North Pacific. Ted is particularly inspired to develop technology that fosters research collaboration, access to previously inaccessible learning, and building community around ocean ecosystems.

Ken Southerland is cofounder and primary developer of Happywhale and its associated WhaleID system. A former Aerospace engineering Ph.D., he is a software engineer with 30 years of experience developing systems as varied as art collection administration and power grid management.

Stephanie Stack is a marine biologist specializing in whale and dolphin research. She earned her B.Sc. in Marine Biology and M.Sc. in Environmental Science from Memorial University of Newfoundland in Canada. Stephanie has led several notable research projects, including research that led to new guidelines for spinner dolphin protection in Hawai‘i, studies to explore the impacts of “swim with whale” tourism in East Australia and Japan, and the first-ever documentation of humpback whale mating. Currently pursuing a PhD at Griffith University in Australia, Stephanie is studying humpback whale migration dynamics in a changing climate. She is a member of the IWC’s Whale Watching Communications Steering Group, which promotes sustainable whale and dolphin watching initiatives, and advises the Australian government on humpback whale protections as a recognized subject matter expert.

Jens Currie is the Chief Scientist at Pacific Whale Foundation and has studied whales and dolphins for over a decade. He holds a B.Sc. and M.Sc. in marine biology from Memorial University of Newfoundland and is currently a Ph.D. student at the University of Hawai‘i. His past work includes developing Hawai‘i state guidelines for the whale-watching industry to minimize their disturbance on humpback whales and leading studies on the ecological risks of marine debris in Hawai‘i to inform targeted conservation strategies and policy improvements. Beyond his research, Currie serves on several advisory councils, including the Hawaiian Islands Humpback Whale National Marine Sanctuary Advisory Council.

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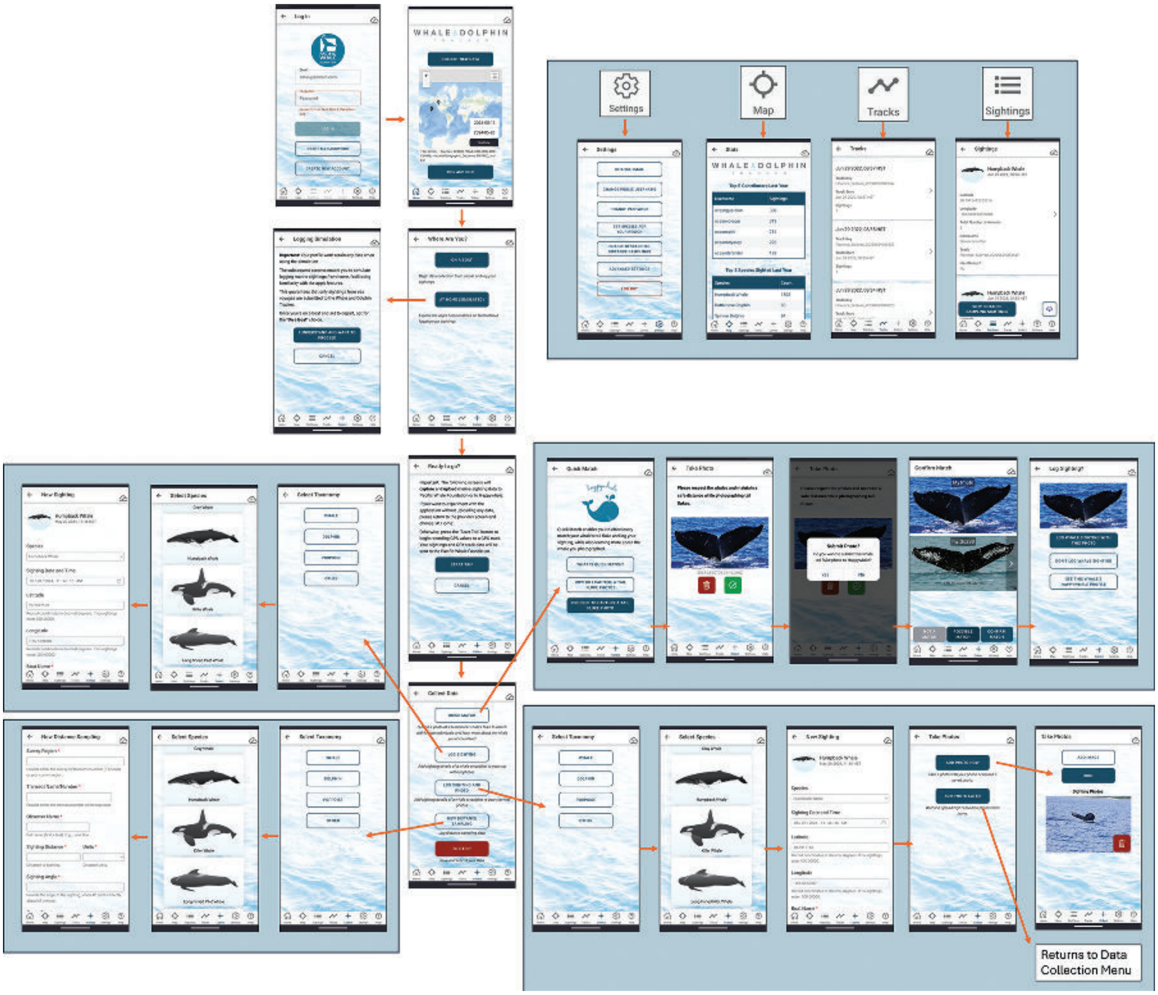

Figure A1. A full schematic of the Whale and Dolphin Tracker mobile app, showing potential use pathways. The login screen leads to the **Home Screen**. The upper right inset details where the Settings, Map, Tracks, and Sightings navigation buttons lead. When *Collect New Data* is selected, the user chooses between data collection on a vessel, or a simulation page. The GPS track begins when the user selects *Start Trip*, and they are redirected to the **Data Collection Menu**. That menu shows the pathways for the Humpback Whale Quick Match feature, as well as the Sighting, Sighting With Photos, and Distance Sampling data collection options. A high-resolution version of this figure can be view at: https://pacificwhale.org/wp-content/uploads/2025/11/Figure_A1_App-schematic.png

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