

**Environment and Natural Resources Trust Fund  
2015 Request for Proposals (RFP)**

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**Project Title:**

**ENRTF ID: 015-A**

Using Angler Smartphone Data to Benefit Aquatic Resources

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**Category:** A. Foundational Natural Resource Data and Information

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**Total Project Budget:** \$ 322,633

**Proposed Project Time Period for the Funding Requested:** 3 years, July 2015 - June 2018

**Summary:**

We will distribute a popular angler app and show that subsequent data are a cost-effective way to obtain state-wide fishing and movement information that benefits aquatic resource management and protection.

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**Sponsoring Organization:** U of MN

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**Location**

**Region:** Statewide

**County Name:** Statewide

**City / Township:**

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**Alternate Text for Visual:**

Visual summary of proposed project

_____ Funding Priorities	_____ Multiple Benefits	_____ Outcomes	_____ Knowledge Base
_____ Extent of Impact	_____ Innovation	_____ Scientific/Tech Basis	_____ Urgency
_____ Capacity Readiness	_____ Leverage	_____ TOTAL	



**PROJECT TITLE: Using angler smartphone data to benefit aquatic resources**

**I. PROJECT STATEMENT**

**The goal of this project is to improve the management and protection of Minnesota’s aquatic resources by using a smartphone app that is popular among anglers to collect important data.** Almost 70% of Americans age 13 or older own a smartphone and most of Minnesota has cellular coverage. Fishing apps are popular because they provide anglers with instant access to lake-specific information (e.g., access points, regulations, conditions), allow anglers to log their catch at a specific location and time, and create community through features that allow anglers to chat, share photos and information, and brag about their catch.

**When anglers use fishing apps, they create a data stream that can be leveraged to the benefit of MN’s aquatic resources.** For example, nearly 75,000 anglers in Alberta and Ontario, Canada, have downloaded the iFish™ app. Our analysis of these data shows which lakes anglers like to fish and when, and has identified likely pathways of aquatic invasion and disease. Specific benefits of these kinds of data to Minnesota include

- More effective fisheries management through information about angler movement, effort and catch;
- Improved invasive species and disease control by using angler movement information to prioritize resources (e.g., inspections, enforcement, public awareness);
- A better understanding of how anglers respond to regulation changes (e.g., the redistribution of angler-generated revenue associated with regulatory changes on Mille Lacs); and
- The identification of new patterns/trends (e.g., species preference, catch-and-release, ice hut proliferation).

App data are unique because they are fine-scale, state-wide, and real-time. Conventional methods for collecting angler data (e.g., surveys, interviews, diaries) are relatively difficult, limited in space or time, and increasingly expensive (e.g., \$45,000/lake/year. **Because conventional data collection methods are limiting, we know precious little about angler movement, effort and catch in MN beyond our 10 large lakes.**

**The first step in using app data to benefit MN’s aquatic resources is to determine how they compare to and compliment conventional data.** To this end, we will distribute ~40,000 iFish MN™ apps to MN anglers and then compare app and conventional data in terms of demographics (Activity 1), movement (Activity 2), and effort and catch (Activity 3). To our knowledge, this analysis will be the first of its kind. The DNR is very enthusiastic about this project because it scopes the benefits and limitations of app data as an extremely cost-effective way to support long-term and state-wide management, engages resource users and stimulates the two-way flow of information (citizen science), and sets the stage for a diversity of applications in and beyond aquatics.

**II. DESCRIPTION OF PROJECT ACTIVITIES**

**Activity 1: Distribute apps and determine which segment of the MN angler population is using them**      **Budget: \$96,760**

- We will randomly distribute ~40,000 iFish™ apps to MN anglers via a mail-out of project information and download instructions. We will use regular, in-app reminders to encourage participation in the project.
- As part of the app download, we will collect demographic data (e.g., gender, age, ethnicity, and zip code) but not personal data and will not be able to relate demographic data to an individual.
- We will randomly survey ~5,000 MN anglers via mail to determine demographics and survey app users via mail and the app itself to determine how/when/why anglers are using the app.
- Demographic analyses will tell us which segment of the angler population the app data describe, and app use information will tell us the frequency of unlogged trips (or fish) and how we can improve data capture.

<b>Outcome</b>	<b>Completion Date</b>
<i>1. Apps distributed and demographic data collected</i>	<i>Dec 2015</i>
<i>2. Survey of ~2000 MN anglers and app users</i>	<i>Jul 2016</i>



<i>3. Demographic profiles of MN anglers and app users; app use information</i>	<i>May 2018</i>
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**Activity 2: Determine fine-scale, state-wide patterns of angler movement, compare to low-resolution patterns, identify invasive/disease pathways.** **Budget: \$112,959**

- High-resolution movement data will show how anglers (and therefore revenue, aquatic invasive species, diseases) move through the state and over time (3 winter seasons and 2 summer seasons).
- We will gain insight and assess complementarity by comparing high-resolution movement patterns to low-resolution patterns gleaned from our angler survey (Activity 1) and DNR data (e.g., boat inspections).
- We will use app data to identify pathways through which aquatic invasive species and diseases are likely to spread and when. This information will benefit MN’s aquatic resources by allowing managers to better allocating resources in space and time or by angler group (e.g., public awareness, enforcement).

<b>Outcome</b>	<b>Completion Date</b>
<i>1. Determination of high-resolution, state-wide patterns of angler movement</i>	<i>May 2018</i>
<i>2. Comparison of Outcome 2.1 to patterns in conventional, low-resolution data</i>	<i>May 2018</i>
<i>3. Identification of risk pathways for the spread of invasives and disease</i>	<i>May 2018</i>

**Activity 3: Determine app user effort and catch on Red Lakes, Mille Lacs Lake, and other lakes, compare to data from conventional angler interviews** **Budget: \$112,914**

- Effort and catch data help to estimate fishing pressure and fish population health on a given lake. The DNR is interested in app data as a supplement to expensive angler interviews.
- We will compare catch and effort data from the app to data from standard DNR angler interviews on Red Lakes and Mille Lacs Lake (the only two MN lakes that are sampled annually) and on at least 3 other lakes/year on the DNR’s regular rotation.
- Our analysis will reveal the extent to which high-resolution app data are consistent with low-resolution angler interview data, but also reveal patterns that aren’t apparent in low-resolution data.

<b>Outcome</b>	<b>Completion</b>
<i>1. Determination of high-resolution patterns of effort and catch on study lakes</i>	<i>May 2018</i>
<i>2. Comparison of Outcome 3.1 to patterns in conventional, low-resolution data</i>	<i>May 2018</i>
<i>3. Recommendations for use of app data to supplement angler interviews</i>	<i>May 2018</i>

**III. PROJECT STRATEGY**

**A. Project Team/Partners:** The **project team to be funded** by the ENRTF consists of one graduate student, principal Investigator (PI) Paul Venturelli (University of Minnesota; Activity 3) and Nick Phelps (UMN; Activity 2). The **project team not to be funded** by the ENRTF consists of co-PI David Fulton (Minnesota Cooperative Fish and Wildlife Research Unit; Activity 1). The **project partner not to be funded** by the ENRTF is the MN DNR Division of Fish and Wildlife (primary contact Missy Drake, Research Manager).

**B. Timeline Requirements (3 years):** Three years is the minimum time to distribute the app, collect/analyze 2.5 years of data (2 summer and 3 winter seasons) and report. The project will be completed in the allotted period.

**C. Long-Term Strategy and Future Funding Needs:** This project will establish smartphone apps as an exciting new tool for understanding and managing MN’s fisheries and aquatic resources. Anglers will benefit from a two-way flow of information that puts relevant material at their fingertips (e.g., regulations, conditions, updates) and supports the DNR in making objective and informed decisions that affect aquatic resources. This project will establish MN as a leader in applying new technologies to resource management (a race that is currently being won by Texas). We will disseminate findings by presenting at state conferences and meetings, and by publishing our analyses in scientific journals and lay publications. We do not anticipate future funding needs; long-term monitoring of app data by the DNR will reveal unforeseen trends that will improve management, stimulate future research, and increase public-private partnership.

## 2014 Detailed Project Budget

**Project Title:** Using angler smartphone data to benefit aquatic resources

### IV. TOTAL ENRTF REQUEST BUDGET 3 years

BUDGET ITEM	AMOUNT
<b>Personnel (Phelps):</b> \$12,098 salary, \$4,101 fringe @ 33.3% fringe (equal to 4% effort)	\$ 16,199
<b>Personnel (Venturelli):</b> \$12,064 salary, \$4,090 fringe @ 33.3% fringe (equal to 4% effort)	\$ 16,153
<b>Personnel (graduate student):</b> one at 50% time for 3 full years to oversee the project. Salary \$62,713 plus \$53,818 benefits (16.8% health insurance, plus tuition)	\$ 116,531
<b>Contract:</b> With the company that owns the iFishMN™ app (The App Door) for in-app notifications to encourage users to participate in the project (5 @ \$1,000 ea.), app development to improve data capture (projected at \$4,000), data brokering (40,000 @ 0.025 for 3 years), and an in-app, post-project app use survey (\$2,000). All prices are competitive.	\$ 14,000
<b>Equipment/tools/supplies:</b> 40,000 iFishMN™ smartphone apps (\$1.25 ea.); supplies to mail out app download and general project info (40,000 @ \$1.00 ea.); MN angler survey (30,000 @ \$1.65 ea.); post-project app use mail survey (5,000 @ \$1.65 ea.)	\$ 147,750
<b>Travel:</b> in-state travel to meet with DNR and stakeholders, attend conferences. \$1000/person/yr (includes transportation, food and lodging)	\$ 12,000
<b>TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =</b>	<b>\$ 322,633</b>

### V. OTHER FUNDS

<b>Other Non-State \$ Being Applied to Project During Project Period</b>	\$ -	
<b>Other State \$ Being Applied to Project During Project Period</b>	\$ -	
<b>In-kind Services During Project Period:</b> \$152,000 from The App Door, which is losing \$3.75/app (usually \$4.99 ea) on 40,000 apps and also comping the first in-app survey (\$2,000 value); <u>\$525,000</u> from the MN DNR, which is conducting the 25 (or more) single-season creel surveys that are essential to this study (\$21,000 ea.) and providing us with web/media support and assisting with mail-out surveys (value unknown); <u>\$167,769 from the UMN</u> because the project is overhead-free (normally charged @ 52%) and we are leveraging UMN resources to promote the project.	\$844,769	<i>in-kind support secured; UMN overhead estimated</i>
<b>Remaining \$ from Current ENRTF Appropriation (if applicable)</b>	\$ -	
<b>Funding History</b>	\$ -	



Conventional angler surveys are expensive, take considerable time and manpower, and are specific to a time or place.

As a result, we know little about the state-wide distribution and movement of harvest, invasive species, diseases, and revenue

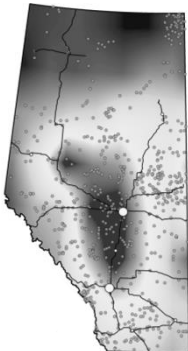
## We will use smartphone app data to improve the management and protection of Minnesota's aquatic resources



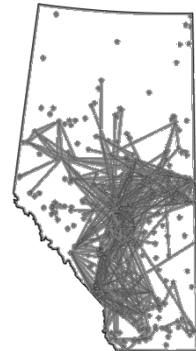
- Smartphones are popular and cellular coverage is broad.
- More and more anglers use fishing apps to access, store, and share information



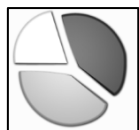
**App use creates an extremely cost-effective data stream that can be leveraged to the benefit of Minnesota's aquatic resources**



For example, our analysis of app data from Alberta, Canada shows which lakes anglers like to fish (left) and has identified likely pathways of aquatic invasion and disease (right)



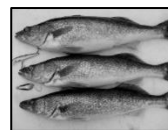
As an important first step, we will distribute a popular fishing app to Minnesota anglers and then compare app and conventional data in terms of



Demographics (Act. 1)



Movement (Act. 2)



Effort & catch (Act. 3)

Our project will benefit Minnesota's aquatic resources by

- Demonstrating state-wide and real-time patterns of effort and catch (useful for fish management)
- Demonstrating state-wide and real-time patterns of movement (useful for invasion/disease control)
- Identifying new patterns and trends (e.g., species preference, catch-and-release)
- Engaging Minnesota's aquatic resource users (citizen science)
- Initiating long-term, state-wide data collection and diverse applications in and beyond aquatics

## PROJECT MANAGER QUALIFICATIONS AND RESPONSIBILITIES

### Dr. Paul Venturelli

Assistant Professor, Department of Fisheries, Wildlife and Conservation Biology, University of Minnesota, Twin Cities (2011 to present)

B.S.	York University	Environmental Science	2000
M.S.	University of Alberta	Environmental Biology and Ecology	2003
Ph.D.	University of Toronto	Ecology and Evolutionary Biology	2009

Paul Venturelli will be responsible for overall project coordination (developing and planning the project, hiring personnel, liaising with project partners, ensuring that the project is on-time and on-budget, assisting in the preparation of progress reports and final reports, etc.). Paul has coordinated ~16 projects and dozens of personnel to date. He has gained expertise in fish ecology, population dynamics, and management through 14 years of research.

**Dr. David Fulton** (Minnesota Cooperative Fish and Wildlife Research Unit) is an expert in human dimensions of fish and wildlife and benefits-based resource management. His research focuses on understanding and improving human decision processes in fish and wildlife management.

**Dr. Nick Phelps** (UMN) leads the fisheries research and extension activities for the College of Veterinary Medicine. For the last six years, Nick has studied the threats and management opportunities that lie at the intersection of humans, animals, and the environment.

## ORGANIZATION DESCRIPTION

The University of Minnesota is one of the largest and most recognized public research universities in the United States. Its mission is to 1) “**conduct high-quality research**, scholarship, and artistic activity that benefit students, scholars, and communities **across the state**, the nation, and the world”; 2) “share that knowledge, understanding, and creativity by providing a broad range of educational programs ... and **prepare graduate, professional, and undergraduate students**...for active roles in a multiracial and multicultural world”; and 3) extend, apply, and **exchange knowledge between the University and society** by applying scholarly expertise to community problems, by helping organizations and individuals respond to their changing environments, and by making the knowledge and resources created and preserved at the University accessible to the citizens of the state, the nation, and the world.