RECREATIONAL ANGLER SITE CHOICE AND BEHAVIOR WITHIN MIDWESTERN RESERVOIRS

by

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Anglers are the dominant predator in most inland fisheries. Although anglers make decisions across multiple scales, most research targets larger spatial and temporal scales of angler behavior, and thus little is known regarding angler behavior within a fishing trip. Outcomes of within-trip behavior affect larger spatial and temporal scales and are thus important to the management of recreational fisheries. Bank angler site choice was recorded at four reservoirs in the Salt Valley system across the open-water season of 2016. Previous research indicated that angler distribution did not match the distribution of fish, so another approach was taken. Counts of anglers were aggregated into 50-m sections of shoreline and compared to physical habitat features using a competing-models approach. Waterbody-choice, travel distance from parking, and non-catch-related factors constrained anglers' catch-related habitat choices. An online survey of 2015 Nebraska fishing license purchasers was compared to realized site choice. Factors from stated preferences (online survey) and realized preferences (angler locations) were not consistent. Bank angler behavior was recorded for entire, individual, fishing trips, and behavior was compared to angler-perceived fishing objectives. Anglers were surveyed for a stated primary objective at the beginning and end of their trip as either "to catch the largest fish possible", "to catch the most fish possible", or "Neither,

just enjoying the experience." Anglers' stated trip objective and specialization had little influence on within-trip fishing behavior. However, anglers that failed to capture a fish were more likely to shift to a stated primary non-catch-related objective during their fishing trip. Within-waterbody angler site choice and behavior reflect non-catch-motivations that may have significant bottom-up effects on across-trip angler behavior.

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Chapter 1: Introduction

Introduction

Humans dominate most of Earth's ecosystems (Vitousek et al 1997), and their role in inland fisheries has long been recognized (Jackson et al. 2001). Most inland fishing in the developed world is recreational fishing (Arlinghaus et al. 2002), where fish cannot be sold for profit. In the United States of America, states manage recreational fishermen, or anglers, through regulations and a "pay-to-play" model, where anglers must purchase a fishing license to go fishing. State conservation agencies often aim to improve angler participation by reducing churn or recruiting new anglers (Fedler and Ditton 2001) because anglers, and other sportspersons, provide substantial funding for conservation and science (Larson et al. 2014). However, managers also face numerous data challenges to managing angler behavior, which can lead to large-scale patterns of over-fishing (Post et al. 2008, Hunt et al. 2011). Angler behavior can lead to unexpected outcomes. For example, anglers do not appear to match the distribution of fish within a waterbody (Matthias et al. 2014, Weimer et al. 2014, Harmon unpublished) even though anglers seek waterbodies with quality fishing (Post et al. 2008; Chizinski et al. 2014). Angling is primarily a recreational activity, in which the purpose of the trip is to gain satisfaction, which is not always predicated on the capture of fish (Arlinghaus et al. 2006), thus if anglers act to maximize satisfaction then angler populations will not match the distribution of fish.

Recreational fisheries exhibit emergent properties because interactions act across time scales to produce unintuitive results (Gunderson and Holling 2002; Arlinghaus et al.

2017). Thus, outcomes of within-trip behavior, such as anglers choosing a site to fish, can affect larger scale processes of overharvest, license renewal, and waterbody choice (Post et al. 2008, Hunt et al. 2011). Motivation theory has long been applied to recreational anglers to describe the range of behaviors and choices anglers make during and across fishing trips. Angler behavior is well-studied at more aggregated scales, but less is known regarding how anglers behave within a fishing trip. For example, travel cost (Hunt et al. 2005) and fishing quality (Chizinski et al. 2014) influence angler selection of a waterbody, but factors that are important for site selection within a waterbody are unknown. Angler perceptions are important for angler outreach and management (e.g., Schramm et al. 1998) and angler actions are important for the management of anglers and fish, (Schramm et al. 1998, Arlinghaus et al. 2006). An improved understanding of the connection between perception and behavior within a waterbody will provide fishery managers with information to influence within trip angler satisfaction and trip outcome, thereby benefitting larger-scale processed such as license renewal.

This thesis attempts to address the gap of knowledge of within-waterbody behavior of anglers by providing insights into fishing behavior and site choice. Chapter 2 seeks to measure angler site choice within a waterbody using a two-pronged approach to address both stated and realized preferences. Stated preferences of anglers were collected through a series of survey questions and compared to measurements of where anglers fished within four reservoirs near Lincoln, Nebraska. Chapter 3 addresses whether self-identified perceptions of categorized motivation correlate with behavior within a fishing trip. To understand angler perceptions, we surveyed anglers regarding perceived angling

specialization, day-of objective, and species sought to compare with a series of behavioral metrics and fishing outcome. Chapter 4 outlines future research opportunities and summarizes research presented in Chapters 2 and 3.

Goal

The goal of my research is to elucidate outcomes of within-trip angler behavior

Objectives

Objective 1. Examine fishing behavior among anglers

Objective 2. Examine the effect of habitat features on within-waterbody angler site choice

Study Sites

We surveyed 4 waterbodies to quantify angler site choice for Chapter 2: Branched Oak Lake (728 ha), Pawnee Lake (254 ha), Meadowlark Lake (19 ha), and Wildwood Lake (46 ha). These waterbodies are a selection from among 19 reservoirs in the Salt Valley watershed that are managed for flood-control and public recreation, and include a diverse range in size and angler usage patterns (Martin 2013). The Salt Valley watershed includes the city of Lincoln (2013 population: 268,738), but is otherwise rural. Rural landuse in the Salt Valley watershed is dominated by corn and soybean agriculture. Salt Creek, the primary stream system in the Salt Valley, is a tributary to the Platte River.

We measured within-trip angler behavior in two waterbodies for Chapter 3: Bowling Lake, located near Lincoln, NE, and Halleck Lake, in Papillion NE. Both lakes are small (11 ha and 2 ha respectively), easily accessible reservoirs open to public fishing. Bowling Lake is dominated numerically by bank-fishing anglers, and Halleck Lake only allows angling from the shore. Neither reservoir allows camping, thus trips tend to be day trips from anglers nearby. Fishing opportunities primarily include largemouth bass (*Micropterus salmoides*), channel catfish (*Ictalurus punctatus*), panfish, and biannually stocked rainbow trout (*Oncorhynchus mykiss*). Bowling Lake has two primary access points, and two additional areas occasionally accessed by anglers. Halleck Lake has two primary access points and a paved path that encircles the reservoir.

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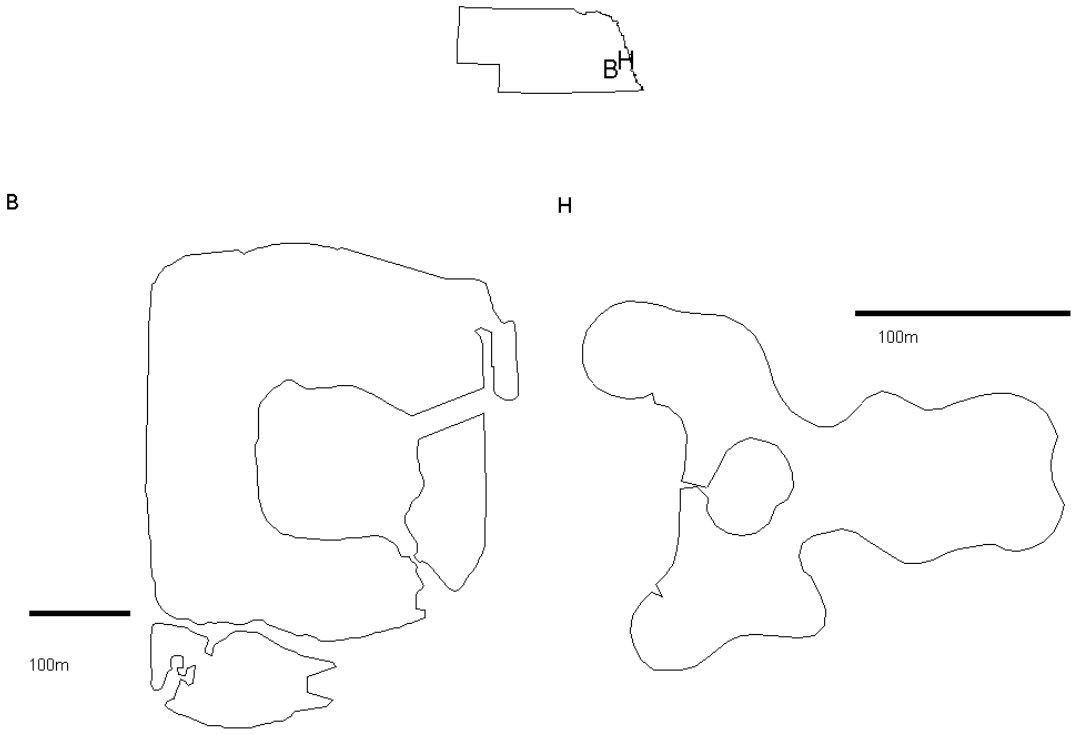

Figure 1-1. Locations of Bowling Lake (B) and Halleck Lake (H) within Nebraska. Anglers at Bowling and Halleck Lake were observed to quantify relationships between angler perceptions, fishing behavior, and trip outcome.

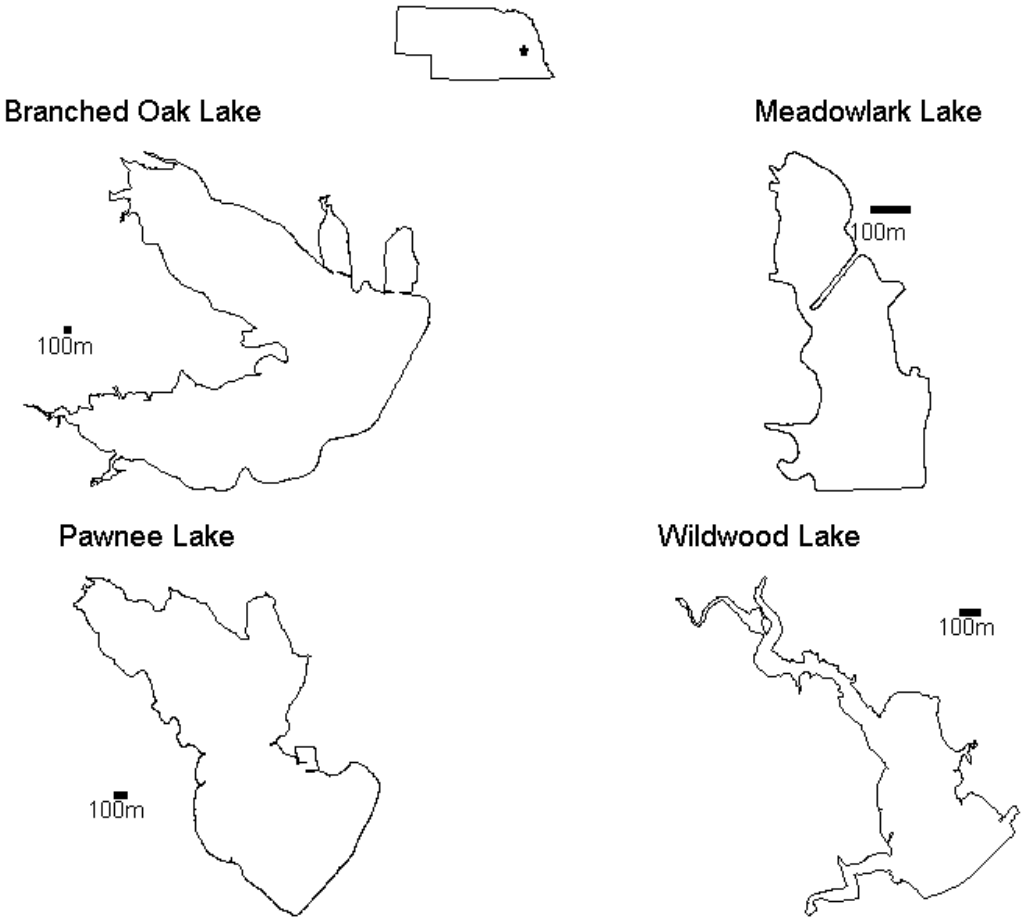

Figure 1-2. Four Salt Valley reservoirs in which rangefinder surveys were conducted to assess the realized preferences of bank angler site choice.

Chapter 2: Within-waterbody Angler Site Choice

Introduction

Although fishery researchers commonly study the effect of habitat on fish, less is known about the relationship between habitat and anglers within a waterbody. Angler site selection is a hierarchical process that encompasses multiple spatial scales and decisions. Where anglers choose to fish within a waterbody directly influences their perceptions of a fishing trip because anglers encounter fish, other anglers, and other recreators at this spatial scale. Managers can influence systems to produce favorable results by redistributing anglers to control negative effects of angling (e.g., Lewin et al. 2006) or altering angler success (Butler and Borgeson 1965), and these techniques can be improved by considering angler distribution within a waterbody and the factors that predict angler site selection.

Within a waterbody, anglers should distribute themselves to match the distribution of fish, or catch rates, if the purpose of the fishing trip is to capture fish (i.e. Ideal Free Distribution, Fretwell and Lucas 1970; Fretwell 1972). However, many sportfish are highly mobile, and the fish distribution is generally unknown to fishermen (Abernethy et al. 2007). Commercial fishing effort tracked changes in the abundance of aquatic organisms (Gillis and Frank 2001; Swain and Wade 2003), but commercial fishermen, who presumably seek to maximize revenue or profit, do not match fish distribution (Gillis and van der Lee 2012; Abernethy et al. 2007).

Anglers do not spatially conform to largemouth bass distribution, though differences in catch appeared to be attributable to skill rather than a spatial mismatch (Matthias et al. 2014). Even in systems where anglers have additional information on

fish distribution, some anglers select sites that are unlikely to produce targeted fish (Harmon unpublished; Weimer et al. 2014). Anglers do match the distribution of fish because angling is primarily an activity for gaining satisfaction and satisfaction is not necessarily related to catch (Holland and Ditton 1992; Spencer 1993; Arlinghaus 2006; Williston 2008). Anglers gain satisfaction from environmental (Hunt 2005) and social factors (Arlinghaus 2006). If anglers seek to maximize satisfaction, then anglers should select for sites based on factors other than the distribution of fish.

Although little published research has focused on the influence of fish habitat structures on anglers within a waterbody, in one study, a breakwater appeared to not have a significant effect on angler distribution (Creque et al. 2006), however another study found a positive association between reef structures and angler use (Walter 1989). Artificial structures installed for fish habitat, which could improve catch rates can be perceived negatively by anglers who are motivated to fish in aesthetically pleasing environments (Bolding et al. 2004), and thus may not lead to increases in angler use. Non-catch related recreational infrastructure could also be a primary factor for some anglers. For example, anglers may be more likely to fish near their camp sites and may create a social barrier for other anglers even though the land remains physically accessible (Hendee et al. 1977; Hunt 2005). On larger spatial scale, toilets and other park infrastructure influence anglers and other recreators (Priskin 2001; Hunt 2005), and may influence within-waterbody site choice.

In addition to infrastructure, the distance anglers must travel from an access point may affect angler use. Distance predicts angler effort at a waterbody level (Hunt 2005; Post et al. 2008; Papenfuss et al. 2015) and may determine angler site choice within a

waterbody (Walter 1989). In one study, visitors within a park were greatly influenced by road access and did not move far from their hotel locations within a park (Smallwood et al. 2012). The accessibility of shoreline anglers encounter may alter use as well. Accessibility of park infrastructure was classified in ease-of-access for recreational visitors (Priskin 2001), though was not quantitatively demonstrated to improve visitation.

Angler site choice at larger spatial scales is affected by a range of physical features. Despite numerous studies to assess the waterbody choice, little is known regarding angler site choice within a waterbody. Knowing what factors influence angler use could be used to manage angler use, and potentially match anglers with locations with better fishing opportunities. Four competing models tested what factors affect within-waterbody angler site choice. A stated-preference survey was compared to realized preference results to further inform angler site choice.

Objective

Examine the effect of habitat features on within-waterbody angler site choice

Research Questions

1. Which habitat model best explains within-waterbody angler density?

   H_1 Waterbody Sale Variation: Variation in angler density is due to differences between waterbody-scale variables that drive large-scale patterns of fishing pressure (Post and VanPoorten 2008; Papenfuss et al. 2015). These large-patterns of fishing pressure directly influence within-waterbody fishing pressure, leading to waterbody-choice better describing angler density.

   H_2 Within-waterbody Travel Cost: Although anglers select for waterbody-scale variables when selecting a waterbody in which to fish, travel cost within a waterbody best describes angler density. Distance, a variable known to influence waterbody-choice (Hunt 2005) is independently assessed by anglers within a waterbody, leading to a strong relationship between distance from roads and angler density.

   H_3 Non-catch-related Factors: Angling is a recreational activity, in which the purpose of the activity is to gain satisfaction, which is not necessarily related to catch (Arlinghaus 2006). Non-catch related factors, such as ease-of-access and recreational infrastructure lead anglers to primarily select sites based on non-catch related factors, leading a disconnect between angler distribution and fish distribution (e.g. Matthias et al. 2014).

   H_4 Catch-related Factors: Waterbody selection is influenced by catch-rates (e.g. Chizinski et al. 2014), which translates into within-waterbody site selection of catch-related factors because anglers have more information on habitat than fish location (Matthias et al. 2014).

2. What is the relationship between stated preferences of environmental features and realized preferences in intra-waterbody angler site choice for a population of anglers?

   H_0: Stated preferences do not predict realized preferences

   H_a: Stated preferences predict realized preferences

Methods

Geospatial Surveys

The Salt Valley watershed is located within and around the city of Lincoln, Nebraska, and contains 19 publicly accessible flood-control reservoirs. Four reservoirs were surveyed in the Salt Valley system: Branched Oak Lake (713 ha), Meadowlark Lake (19 ha), Pawnee Lake (254 ha), and Wildwood Lake (46 ha) (Figure 1-2). These reservoirs encompassed wide ranges in physical size and angler-usage patterns (Martin 2013).

Geo-spatial surveys were conducted during 1 April - 31 October 2016. Within each month, a circuit of the reservoirs was sampled 12 times: six circuits on weekends and six circuits on weekdays. Each day was randomly assigned a morning or afternoon circuit. Circuit times were adjusted during the year to account for changes in daylight (Table 2-1). During a sampling period, the four reservoirs were surveyed with a randomly assigned clockwise or counterclockwise survey pattern between waterbodies to efficiently survey all four reservoirs. The clockwise pattern surveyed in order: Pawnee Lake, Branched Oak Lake, Meadowlark Lake, and Wildwood Lake, and the counterclockwise pattern surveyed the waterbodies in opposite order.

A single visual sweep was conducted within each reservoir to geo-locate all bank anglers. Bank anglers were individually recording from a distance using a Trupulse© 360 laser rangefinder. Although each angler had a unique set of coordinates recorded for their location (Appendix 2-F), data were summarized into a count of the number of anglers in 50-m segments of shoreline per month. The decision to summarize to a 50-m length was subjective. Observed anglers in chapter 2 moved 150 (±0.75) m. 150 meters was

deemed so large as to irreparably reduce the precision of the data, so a 50-m compromise was decided on to increase precision and classify locations appropriately. Anglers recorded at greater than 50 m from the shoreline were removed from analysis. A mid-point (hereby referred to as "shore point") of each shoreline segment was used for analyses (Figure 2-1)

The Trupulse© 360 rangefinder automatically recorded vertical angle and total distance to calculate horizontal distance to an object, and then communicated via bluetooth technology (shortwave UHF radio) to program ARCPAD v. 10.2.3 (ESRI) run on a handheld Trimble GeoXT 2008 series device. Using GPS location of the Trimble, and angle and distance to the angler, ARCPAD extension LASERGIS (Laser Technology Inc) recorded an estimate of angler location. LASERGIS software is purported to be accurate to within several meters distance and less than 1º when used properly and regularly calibrated. A test of LASERGIS with the Trupulse 360 laser rangefinder on a fixed object with a measurement taken at 25 m intervals resulted in little deviance from the actual position of an object until 350 m ($r^2 = 0.88$). Thus, whenever possible, anglers were "ranged" from less than 300 m. The Trupulse rangefinder was calibrated every other week. Additional calibrations were performed when indicated necessary by the rangefinder screen.

Habitat Features

Shapefiles used for site-choice analysis were derived from public and governmental sources, or else created from those shapefiles (Table 2-2). Shapefiles obtained from public sources include waterbody spatial lines, a digital elevation model of Lancaster County, aerial imagery of Lancaster County, and depth contours for each

waterbody. Shapefiles created from publicly available sources and ground-truthed include parking areas, campsites, breakwaters, bathrooms, covered picnic tables, park entrances, roads inside the State Recreation Areas, type of shoreline, slope, depth, and points along the shoreline used for analysis. Parking areas were areas specifically designated for parking. A similar variable to parking areas also incorporated roads within the park because many anglers were observed parking along the road. Campsites were determined to be areas specifically designated for overnight camping, but excluded areas where campers illegally camped. Breakwaters were considered as intentional permanent armored extensions into the reservoir. Roads leading into the park were drawn as line shapefiles, and entrances to the park were recorded as a point shapefile that was snapped onto the road shapefile. The shoreline of each lake was categorized into five different types of shoreline: "armored", "unarmored but developed", "beach", "undeveloped", and "wooded". The order presented represents an assumed continuum of ease-of-access. In cases where two or more designations might be appropriate (i.e. an armored shoreline with trees and brush up to the edge of the water) the more conservative (further to right of the five listed shore types) estimate was used. Flooded timber above the waterline was recorded with the laser rangefinder in April, 2016.

Slope was derived from the Lancaster County digital elevation model using the terrain function (R package "raster"), (Appendix 2-A, 187-191). The shoreline of the waterbody was used to buffer the slope, thus only slopes outside the shoreline (above the water) were considered. Slopes were calculated using an eight-neighbor rule. A depth raster was derived from depth contours via kriging with the gstat function (R package

"gstat" https://cran.r-project.org/web/packages/gstat/index.html) (Appendix 2-A, 143-145).

Distances to the nearest parking area, campsite, bathroom, and covered picnic tables were calculated as the shortest distance without crossing water using a cost raster of shoreline around the lake (Appendix 2-A, 63-64). Distance along road was calculated as the distance from the nearest parking lot to the nearest park entrance along the road. Shore points within 50 m of a breakwater were considered to include the breakwater. Shore points within 50 m of flooded timber were considered to include flooded timber. The greatest and the mean value of depth for a 50-m buffer around each shore point was selected. The greatest slope value within 50 m was selected for each shore point. Road distance was calculated as the distance from the nearest parking area of a shore point to the nearest entrance of the park, along the road.

General Linear Mixed Modeling Analysis

Data were compiled into a single data frame for analysis (Appendix 2-B). Data were z-scored to account for differences in magnitude of the numerical ranges of the independent variables. To minimize the number of models, only negative binomial models without a zero-inflation term were analyzed because in preliminary analyses (Appendix 2-B) with this dataset, these models outcompeted zero-inflated models and Poisson models.

Models were run using the "glmer" function with a negative binomial link in R package lme4 (Bates et al. 2015). Although "glmer" does not test for zero-inflation, models with a zero-inflation term in a preliminary analysis with package GLMMADMB (Bolker et al. 2012) did not outperform simpler models. Preliminary analysis (Appendix

2-B) also revealed better fit by negative binomial models than Poisson models. General Linear Mixed Models (GLMM's) were determined to be the most appropriate analysis because GLMM's have greater interpretability and extrapolative ability than many other model types (Figure 2-2). Model terms were fit as polynomials to ensure non-linearity could be captured, and a best-fit was determined for each term with ΔAICc. Covered picnic tables were excluded from the final analysis because only two of four waterbodies contained such sites but the variable was outlined above because it was included in the forced choice questions below. Distance to the nearest bathroom was excluded because only three of four waterbodies contained bathrooms and because it was strongly correlated with parking areas. Both variables were included in the ensemble modeling described below.

Month was held as a random effect in all models because of the seasonality in fishing pressure. A preliminary run of negative-binomial GLMM's (for H_1 through H_4) were compared using ΔAIC. Next, waterbody and distance from nearest available parking variables were incorporated as hierarchical random effects, with distance from nearest road quartiled, rather than run continuously, to facilitate model convergence. A non-catch-related model, containing shoreline slope and shoreline type (ease of access) and distance to campsite (recreational infrastructure) was compared to a catch-related model containing presence/absence of breakwaters and emergent wood. Single-term models comprising these variables, and a null model was included to inform the analysis. All models' (single variable, non-catch-related, catch-related, null) AICc scores were compared to determine which hypothesis was best supported by the data.

Forced-Choice Online Survey

Ensemble Modeling

To create informed question sets for the forced choice survey, we selected variables from an ensemble model with data built and tested from two waterbodies (Branched Oak Lake and Pawnee Lake), in which onsite creel surveys were conducted in 2014 and 2015 by the NCFWRU. Incomplete bank angler trips from the creel surveys (Appendix 2-C) were used rather than the counts described above to build stated preference questions because survey-building preceded the completion of angler-density data collection and creel surveys during these two years included GPS coordinates. Four families of models were run using the data from Branched Oak Lake: a General Linear Model (GLM), General Additive Model (GAM), Boosted Regression Tree (BRT), and a Random Forest (RF) (Appendix 2-D). The GLM was run using R package GLMMADMB (Bolker 2012) and simplified to the most parsimonious model using the "drop1" (program R stats package) function. The GAM was run with package gam (Hastie 2016) with each continuous variable allowed 1 (linear), 3, or 5 degrees of freedom, and the most parsimonious model was accepted. The BRT was run with packages gbm (Ridgeway 2015) and dismo (Hijmans 2016). The stepwise procedure was run with a learning rate of 0.1 and 50 trees (Appendix 2-D). The RF model was run with package randomForest (Liaw and Wiener 2002). The importance of variables was ranked for each model. Variables in the GLM and GAM models were ranked by significance of their associated p-value, with lower p-values deemed more significant. The BRT and RF models output variable significance, and these ranking were used. The locations of interviews were compared to geospatial survey locations to quantify the relationship

between location of interviews and anglers. Models were externally validated by applying each model to Pawnee Lake data. Each model was given equal (1/4) weight and the top five variables were selected for use in the forced choice survey.

Results

Spatial Distribution

After removing anglers recorded at distances greater than 50 m from a shoreline, 1786 anglers were recorded at Branched Oak Lake, 93 anglers were recorded at Meadowlark Lake, 1020 anglers were recorded at Pawnee Lake, and 430 anglers were recorded at Wildwood Lake. Compared with bank angler trips estimated from the NCFWRU statewide creel, 11.9% of bank angler trips were recorded at Branched Oak Lake and 5.55% of bank angler trips were recorded at Pawnee Lake. No anglers were observed in most 50 m sections (574 of 946), but a small proportion of sections were heavily used (max = 69) (Figure 2-3). The distribution of anglers did not appear random because areas with many anglers were often near one another, and in large sections of contiguous shoreline no anglers were detected (Figure 2-4).

General Linear Mixed Modeling Analysis

In the initial model run, Distance-to nearest available parking proved to be the best model (Table 2-3) for describing within-waterbody density of anglers (ΔAICc = 78), and both models were better than a null model (ΔAICc = 1380). Ten models (seven single-term, two-multi-term, one null model) were run after including waterbody and distance to nearest road as hierarchical terms (Table 2-4). The best model was the non-catch-related model, which outperformed the next top model (ΔAICc = 105), and

outcompeted the catch-related model (ΔAICc = 116). All single term models performed worse than the multi-variable models except the type-of-shoreline model (ΔAICc = 105). All models outcompeted the null model (ΔAICc = 498), except for the distance-to-nearest entrance model (ΔAICc =498).

Survey Design

An online-only survey (Appendix 2-E) was created using program Snap Survey and program R and was maintained on a NCFWRU webhost. Participants were selected from individuals who purchased Nebraska fishing license or hunt-fish combination license in 2015 and provided and email address. A total of 7500 emails were selected and emailed during a three-day period beginning 3 October 2016. A follow up email was sent 17-19 October 2016 to individuals who had not responded. The survey was kept open until 3 November 2016, two weeks following the completion of reminder emails.

The forced choice question sets were built in program R using package "support.CEs" (Aizaki 2012). The forced choice sets were limited to five variables because humans have trouble visually processing more than four or five variables at a given time (Owen 2004). Each of the five attributes were given two levels. Continuous variable levels were selected at the 10th and 90th percentile of their range, converted from meters to yards, and rounded to the nearest 25. Breakwater was treated as discrete and assigned as present or absent. Type of shoreline was treated as discrete and assigned the two most extreme levels: "armored" and "wooded". The question sets were built using an SB (Street and Burgess Method) array **(**Street and Burgess 2007**)** with main effects only because exploratory analysis with the GLM of interview data did not indicate presence of interactions in the data. The most efficient number of sets needed to test for

all main effects was eight. A full replicate needed four participants because each participant was randomly assigned a block containing two of the eight question sets.

The online survey consisted of three sections. In Section 1, anglers were first asked to identify their fishing style from "I always or nearly always fish from the shore" to "I always or nearly always fish from a boat". Participants that selected "I always or nearly always fish from a boat" did not receive the rest of Section 1 or the forced-choice question sets in Section 2. Participants that did not select "I always or nearly always fish from a boat" were eligible for the forced-choice questions in Section 2, and were next asked to describe their fishing activity in the rest of Section 1. Those that did not select "I am always or nearly always stationary" were then asked to describe how far they typically traveled along the shoreline. Section 2 consisted of two forced-choice question sets, where participants selected from one of two sites with varying levels of five attributes. Section 3 consisted of six questions to better understand the participant. Five of the six questions were to collect socio-economic data and one was geared to better understand the angling specialization of the participant.

Although anglers could skip any question in the survey, anglers were not given an explicit “Neither” option to opt-out of the forced-choice question sets. Opt-out options are often used because they can reduce uncertainty about a variable by removing frivolous answers (Anderson and Wiley, 1992; Louviere et al., 2000); however, the view held in making these question sets was that anglers should have a preference between the two sites, however small, based on one or more of the variables listed. The binary data were analyzed with a conditional logit model. Conditional logit modeling has an extensive history of use in studies of human behavior (e.g. Boskin 1974; Davies et al.

2001; Kim and Kwon 2003), and is appropriate for modeling forced choice sets when the features of the variable are of interest (Hoffman and Duncan 1988). Conditional logit modeling is thus better for modeling behavior because the assumptions of the model rely on the environment of the individuals modeled rather than only on the individuals. Conditional logit models were run separately for each specialization group [casual, active, advanced, and committed anglers, (Beardmore 2013)] because the sample size of committed anglers was small enough (n = 42, functional sample size due to blocking = 10) that a model with specialization as an interaction term was not able to converge.

Ensemble Modeling

Locations of angler interviews and anglers recorded in the rangefinder survey were compared in Branched Oak Lake ($r^2 = 0.44$) and Pawnee Lake ($r^2 = 0.35$), where both datasets were available. Angler interviews from 2016 were also compared to Branched Oak Lake ($r^2 = 0.75$) and Pawnee Lake ($r^2 = 0.87$). Interview data was tested with an ensemble of models because rangefinder surveys had not yet been completed. The randomForest model performed the worst on external data ($r^2 = 0.03$) and the best with internal data ($r^2 = 0.92$). The GLM performed the best on external data ($r^2 = 0.78$) and worst on internal data ($r^2 = 0.42$), (Table 2-5). Given ratings of 1 (most significant) to 9 (least significant) type of shoreline (1.75) distance form parking lot (2) structure (3.25) distance from covered picnic tables (3.25) and distance from campsite (4.5) were ranked the most significant and were selected for use in the forced choice survey.

Forced-Choice Online Survey

By time-of-closing of the survey, 805 participants had opened the survey, of which 66 had partially answered the survey and 739 had completed all asked questions in the survey. After subtracting 700 undeliverable surveys, the response rate of the initial survey was 10.3% and the response rate for the reminder survey was 1.5%, for a combined 11.8%. 87.3% of respondents responded to the initial survey, and 12.7% responded to the reminder (Figure 2-5). Of those participants that finished the survey, most did so quickly, although a few respondents had survey times greater than a day (median = 4.4 minutes, mean = 36.3 minutes). Seventy-seven participants were female and 672 were male. Most individuals that answered had a household income exceeding 75,000 USD. Forty-eight percent of participants had completed 4 years of college or

more. Few participants were 18-24 years of age (16 of 805). Participants differed from Nebraska anglers (USFWS 2013), (Table 2-6) in some notable respects. A smaller percentage of age 25-34 (12% versus 26%) and a larger percentage of age 75+ (21% versus 10%) participants took the online survey than the USFWS survey. A larger percentage of participants lived in households with household incomes greater than 100,000 USD (28% versus 18%), and a larger percentage of participants had 4 years or more of college education (48% versus 26%).

A conditional logit model was run for all respondents. Of the five top variables from the preliminary analysis that were selected for the forced-choice online survey, two (shore type and distance from parking) were represented in the top GLMM. Combined, respondents stated a preference for sites with breakwaters ($p < 0.0001$, $z = -3.91$) and closer to campsites ($p = 0.046$, $z = -1.99$) in the conditional logit model of all respondents. Respondents had no stated preferences for type of shoreline, distance from parking lots, or distance from covered tables (Table 2-7).

Conditional logit models were also run for anglers with different stated specializations (Beardmore et al 2013). Casual anglers stated preferences for shorter distances from parking ($p = 0.010$, $z = -2.58$) and campsites ($p = 0.006$, $z = -2.7$). Active and advanced anglers stated nearly equal ($p = 0.009$, $z = -2.62$, $p = 0.020$, $z = -2.33$) preferences for areas with breakwaters, but had opposite responses to type of shoreline with active anglers preferring forested shoreline and advanced anglers preferring armored shoreline. Committed anglers stated a slight preference for breakwaters ($p = 0.057$, $z = -1.90$). A model was run for the subset of conditional logit models that included only zip codes of anglers that corresponded to the zip codes of anglers in the area-of-influence

(Martin 2013) of Branched Oak Lake (n = 389), (Figure 2-6). Anglers stated a preference only for breakwaters ($z = -3.14$, $p = 0.002$).

Discussion

Although angler use of waterbody varies due to distance (Papenfuss et al. 2015), environmental variables (Hunt 2005), and catch (Chizinski et al. 2014), waterbody was less important than distance from parking in describing within-waterbody angler density. However, both terms were significant ($p < 0.05$) in describing angler density. Angler site choice is first constrained by waterbody selection, then access points (Figure 2-7) as seen by variable importance (Table 2-3). Both waterbody-level variables and distance from access points (i.e. parking) restrict angler density; whatever the quality of a fishing location, anglers are unlikely to use a location at a generally low-density waterbody or a distant location within a waterbody.

The non-catch related model outpaced the other competing models and was accepted as the single top model for describing within-waterbody angler use, after accounting for waterbody and distance from parking. The next best model included only type of shoreline (ease of access) as a fixed term. These results align with vision of angling as a sport to gain satisfaction, not to gain catch (Holland and Ditton 1992; Spencer 1993; Arlinghaus 2006; Williston 2008). By selecting first for areas near parking, anglers restrict available choices, which further constrict after selecting for recreational infrastructure and ease of access. Although catch-related habitat is important for anglers, anglers select for these habitat features nested under a series of other habitat choices.

The survey results were not in agreement with results from the rangefinder survey. Broadly, anglers stated positive preferences for breakwaters (e.g. Creque et al. 2006) and proximity to campsites (e.g. Hunt 2005), while stating no preference for distance to parking lot, type of shoreline encountered, or distance to covered picnic tables. Distance-from-parking was a significant constraint to angler density, with 50% of anglers documented fishing 120 m or closer to the nearest parking. Breakwaters at Branched Oak Lake and Pawnee Lake are in areas with large densities of anglers and were positively selected for by survey participants, yet paradoxically were not in the top model of realized behavior. The effect of breakwaters is nested within distance and other non-catch-related factors. For example, while some breakwaters were often occupied by anglers, breakwater use was variable, as other breakwaters were rarely observed to be fished.

Distances in the online survey were built from ranges at Branched Oak Lake and Pawnee Lake, which are not necessarily representative distances for the entire state. Alternatively, anglers may not perceive that distance is a variable they positively select for. Reflecting optimal foraging theory (Charnov 1976), anglers may choose the first site that they come across that meets their requirements. This selection pattern would result in a realized preference of distance, but not necessarily a perception of distance as a preferred variable. We also measured all sites at a waterbody, but angler knowledge of available sites may be limited to sites observed while driving, which would remove distant locations. Although different networks of waterbodies are used by anglers within the Salt Valley system (Martin 2013) the Salt Valley presents a limited scope of available public waterbodies. Anglers that frequent these systems would represent a larger

proportion of anglers counted, and the low travel-cost of these systems would produce a subset of all Nebraska anglers that have a low threshold for travel-cost on larger spatial scales.

Due to a low response rate (11.8%), it is especially important to address non-response bias in the survey. Respondents were older, better educated, and had more financial resources than the average Nebraska angler (Table 2-6). These additional resources reduce the restricting effects of travel-cost and over-represent individuals with greater ability to invest resources into fishing. Anglers with greater resources may choose to travel elsewhere for different fishing conditions because the Salt Valley system is not a fishing destination for distant anglers (Martin 2013). If a large proportion of anglers that invested in fishing more distant locations held different site choice preferences, these preferences would be under-represented in the rangefinder survey.

The non-uniform, non-random distribution of bank anglers creates de facto protected areas within waterbodies dominated by bank anglers. No bank anglers were recorded in 207 of 528 sites at Branched Oak Lake, or about 10.4 km of 26.4 km of shoreline, and only 112 sites had greater than 5 anglers recorded throughout the season. Creel surveys from 2016 indicate that bank anglers comprised 70.2% of fishing effort in Branched Oak Lake (Kaemingk 2017). Although boat anglers were not considered in this study, it is unlikely that boat anglers are randomly distributed across the waterbody (Gillis and van der Lee 2012). Locations with very low fishing pressure may benefit fish populations that are targeted by anglers during spawning. Marine protected areas benefit catch and yield (Guenette et al. 1998) and a similar system could be adapted for use within recreationally fished inland waterbodies to improve catch rates. The value

provided by marine protected areas is difficult to measure (Hoagland et al. 1995), however, an un-fished location requires increased travel cost, not enforcement or closure, thus the only cost would be any added fish structure or habitat improvements. Marine protected areas buffer stochastic recruitment failure (Guenette et al 1998) and may provide population stability for some Nebraska fishes, especially in the face of climate change (McLeod et al. 2009). Effectiveness of marine protected areas does not appear to scale proportionally with size, therefore even small un-fished areas can provide substantial benefit (Halpern 2003). Locations with little fishing pressure already provide additional biomass and yield of sportfish, and conservation agencies could further improve production by enhancing these locations without restricting or advertising use.

Within a waterbody, site choice limits the possible outcomes of a fishing trip and directly affects anglers' fishing experiences (Arlinghaus 2006; Beardmore et al. 2015). Accessibility appears to be the main effect influencing angler use within the Salt Valley watershed (e.g. Walter 1989), but other non-catch related variables also influence angler density. Future planning can incorporate concepts described above to improve angler experiences or reduce public use to enhance natural resources (Bohnsack 1993). Alteration of habitat to affect the distribution of recreation may provide a tool for fishery managers that avoids controversial and often unpopular regulation. Specifically, opening or closing road access may lead to dramatically different patterns of bank fishing (Hunt and Lester 2009), which fishery managers could take advantage of to meet fishery objectives.

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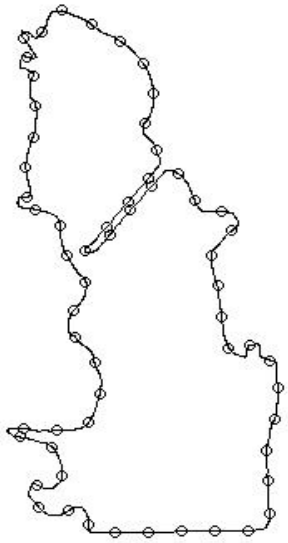

Figure 2-1. Points every 50 m along the shoreline of a waterbody. Points were assigned distance values and a type of shoreline, which were used in analyses.

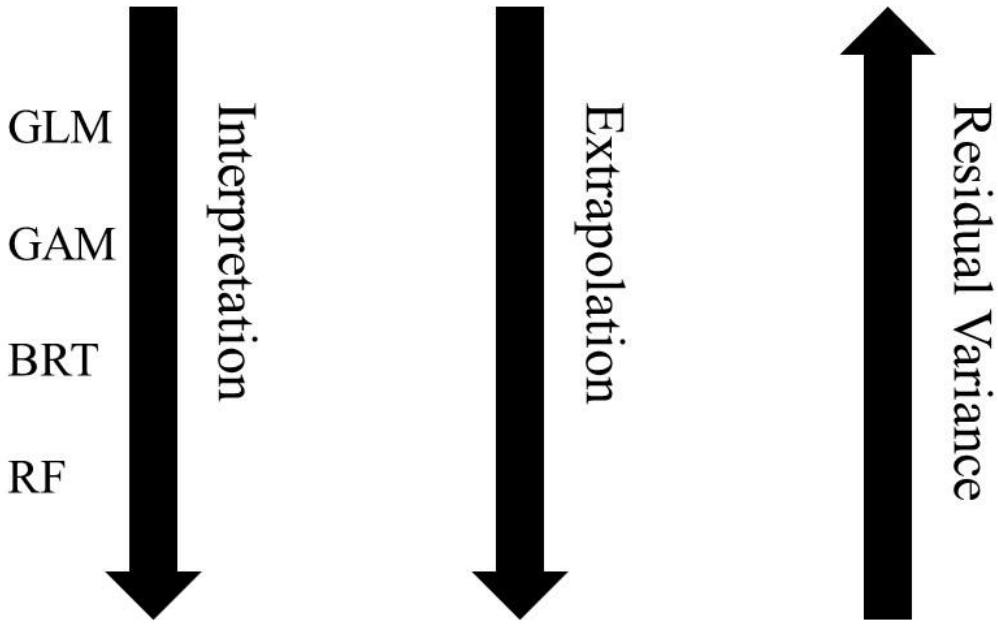

Figure 2-2. Conceptual figure of the trade-offs between general linear models (GLM), general additive models (GAM), boosted regression trees (BRT), and random forests (RF).

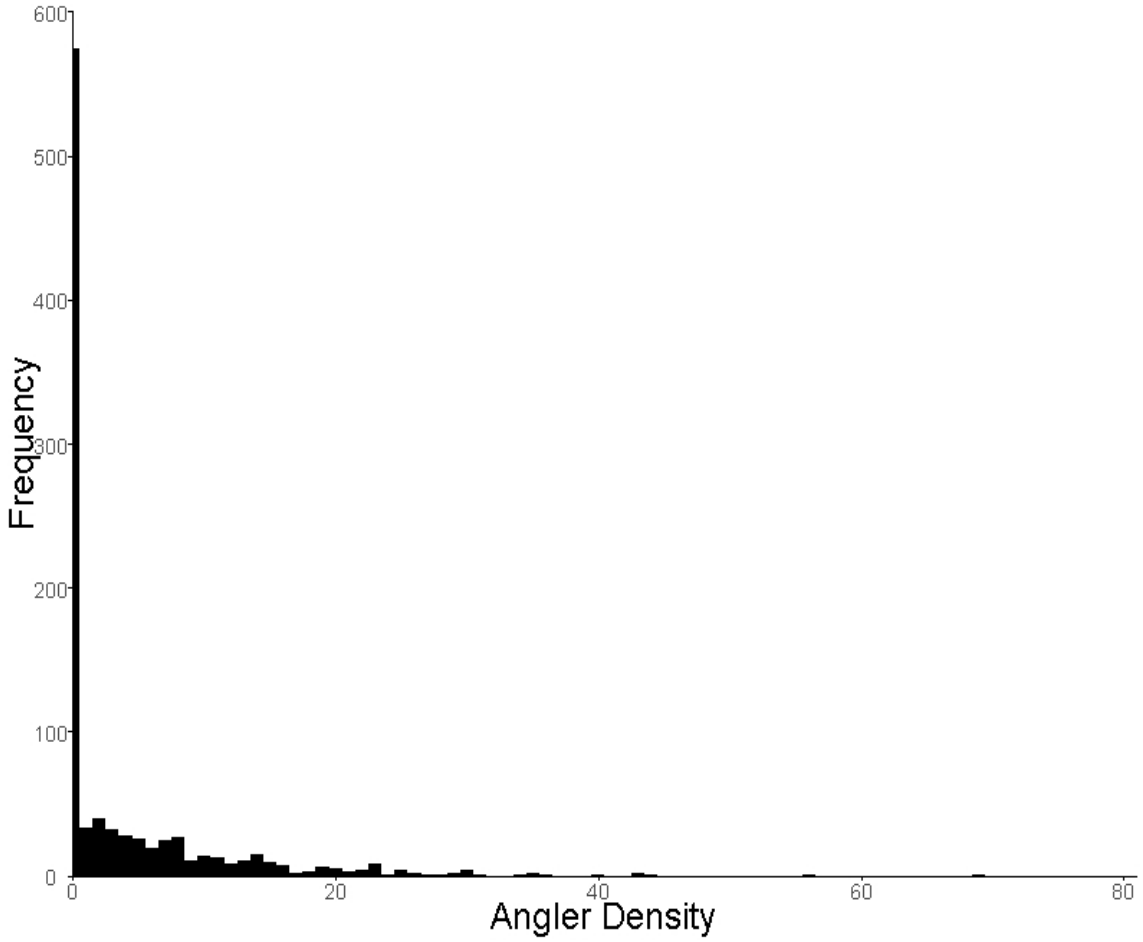

Figure 2-3. A histogram of the number of anglers in each 50-m portion of shoreline across four waterbodies: Branched Oak Lake, Meadowlark Lake, Pawnee Lake, and Wildwood Lake, across the open-water season. No anglers were observed in most areas, whereas a small proportion of locations had large densities of anglers.

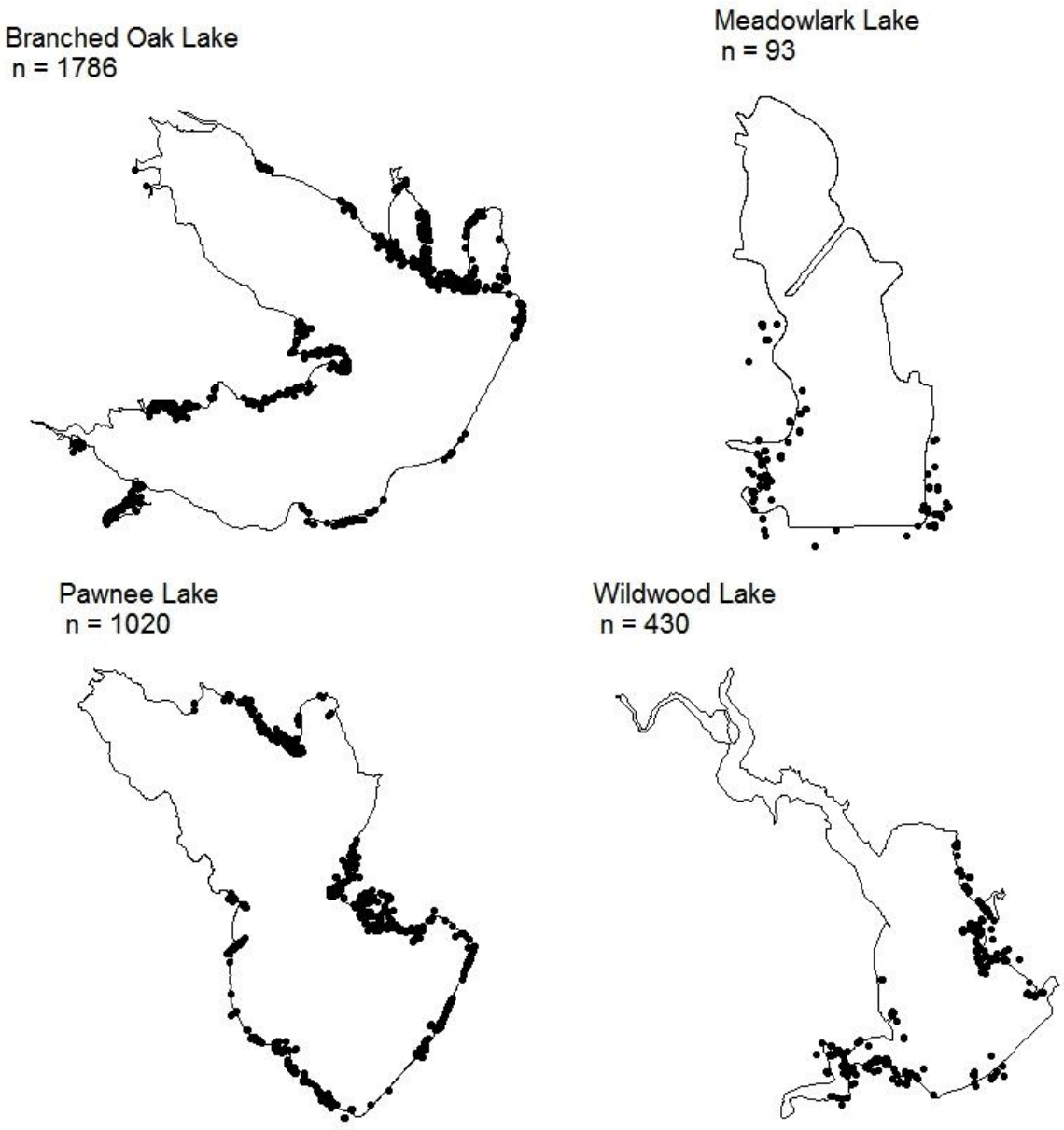

Figure 2-4 Locations of anglers recorded at Branched Oak Lake, Meadowlark Lake, Pawnee Lake, and Wildwood Lake during 1 April- 31 October, 2016.

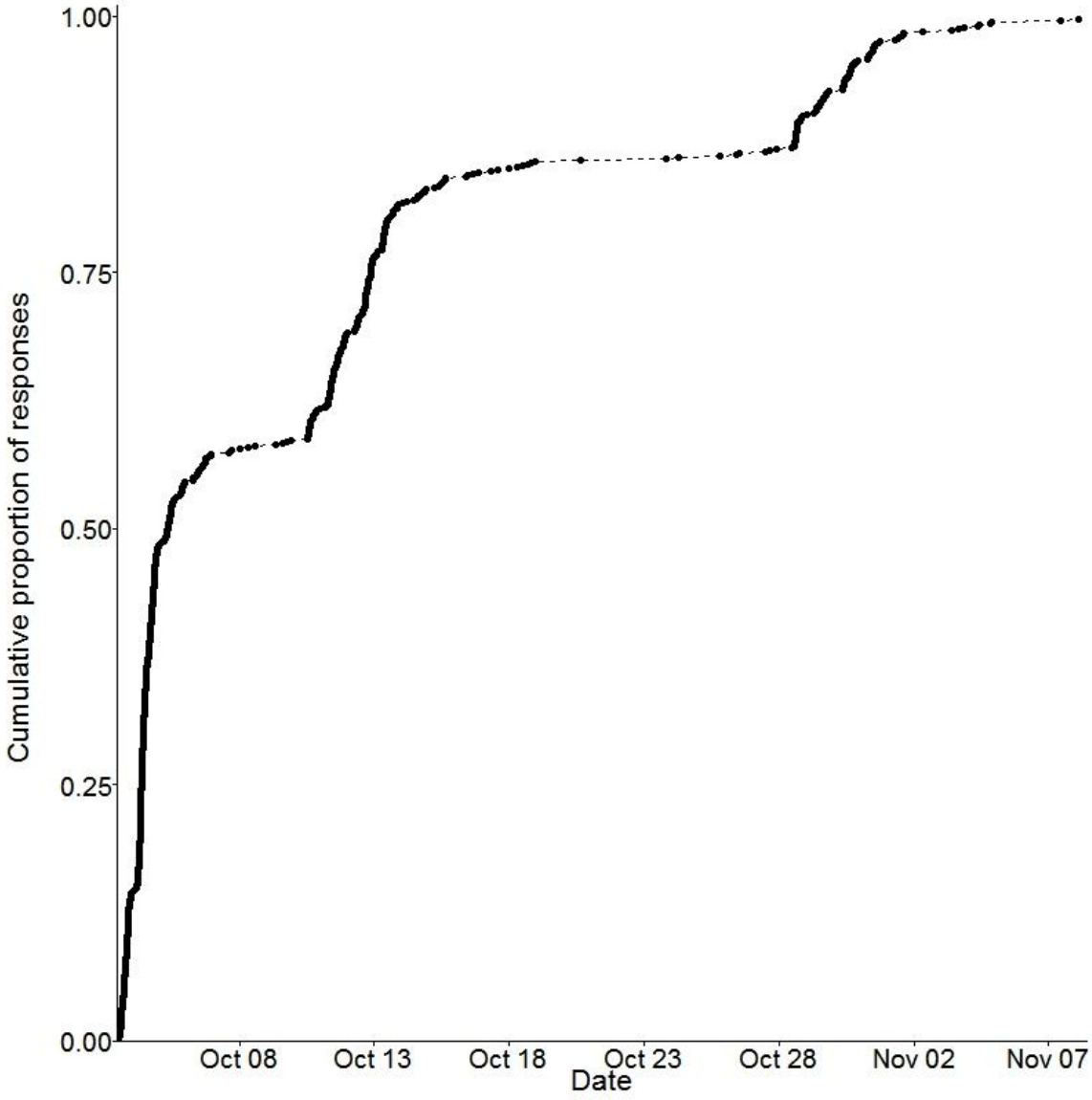

Figure 2-5. Proportion of respondents to online site-preference survey that responded through time.

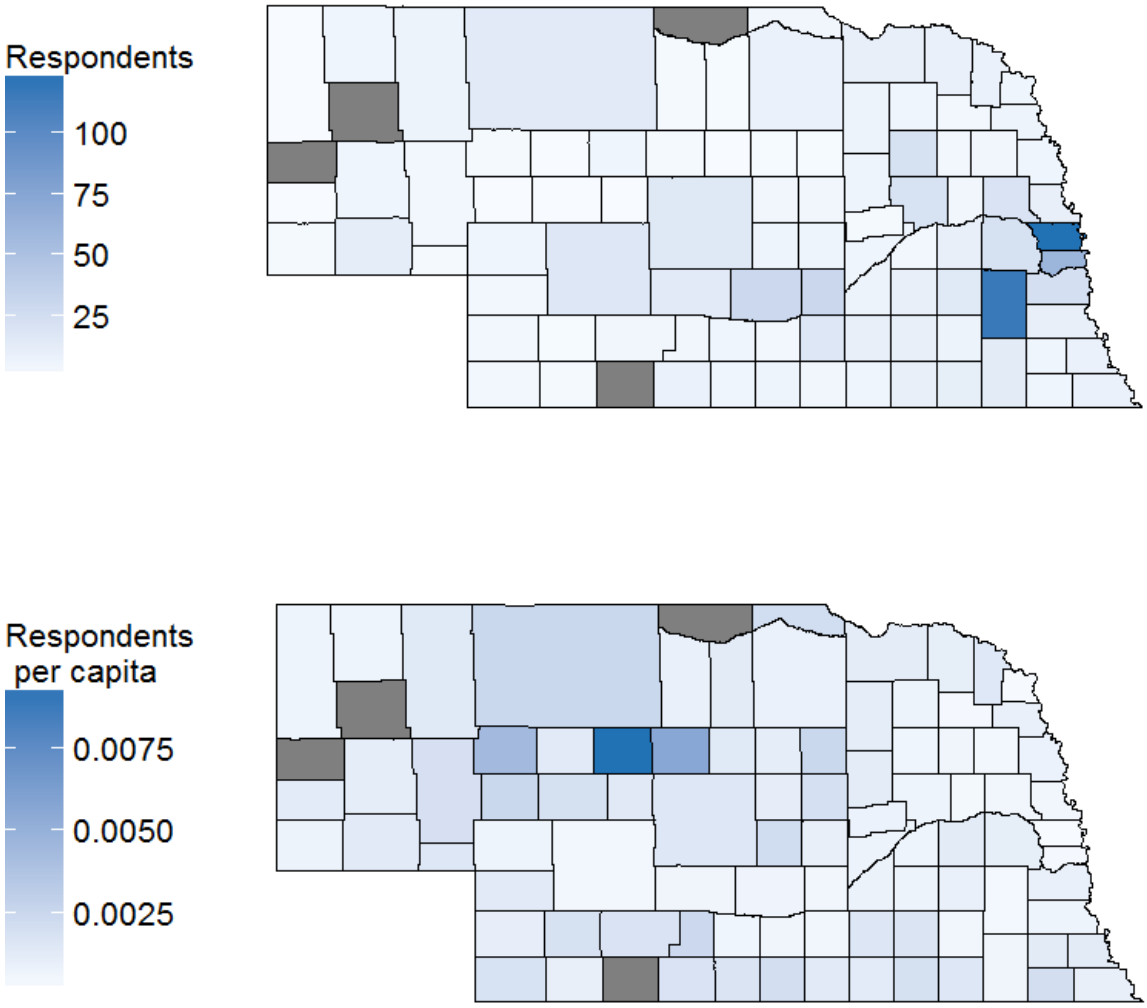

Figure 2-6. Self-reported locations of participants in the online survey by county. Respondents reported zip codes, which were aggregated to a county-level for visual interpretation.

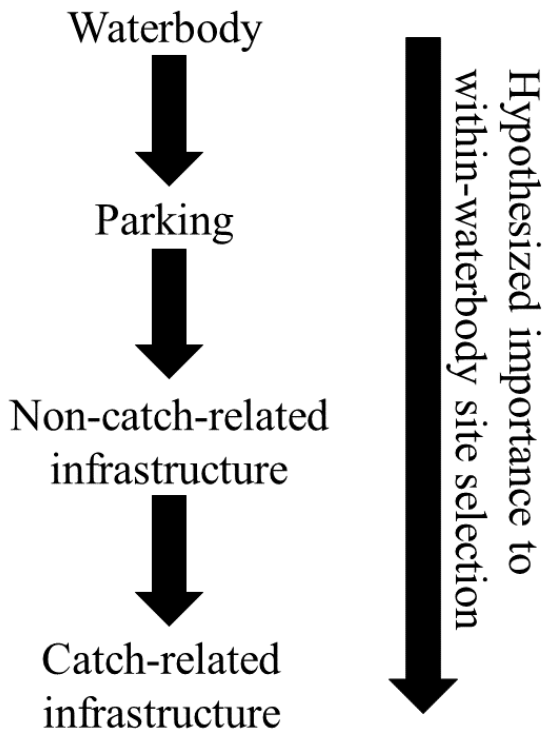

Figure 2-7. Hypothesized conceptual figure of order-of-importance of variables to within-waterbody angler density.

Table 2-1. Start times for rangefinder surveys.

Month	Morning	Afternoon
April	930	1600
May	900	1600
June	830	1600
July	830	1600
August	900	1600
September	930	1600
October	1000	1600

Table 2-2. Descriptions of each shapefile for the rangefinder survey and ensemble modeling with source.

Shapefile	Type	Source
shoreline of public waterbody	line	Nebraska Game and Parks Commission
digital elevation model	raster	http://snr.unl.edu/data/geographygis/NEDSdownload.aspx
aerial imagery	image	http://www.dnr.ne.gov
depth contours	line	http://data.outdoornebraska.gov/datasets
parking areas	polygon	aerial imagery
RV and undeveloped campsites	polygon	aerial imagery
breakwater	polygon	aerial imagery
submerged wood	polygon	rangefinder
bathroom	point	aerial imagery
covered picnic tables	point	aerial imagery
park entrance	point	aerial imagery
roads	line	aerial imagery
type of shoreline	point	aerial imagery
slope	raster	digital elevation model
depth	raster	depth contours
shore points	points	shoreline

Table 2-3. Outcome of candidate GLMM models with month as a random variable.

Variables (Polynomial)	df	AICc	ΔAICc
Slope (4) + Shoretype + Camp (3)	16	9122	0
Breakwater + wood + Maxdepth (4)	10	9200	78.2
Distance to Parking (4)	7	9429	307.7
Waterbody	7	9510	1358.0
Null	3	10501	1380.0

Table 2-4. Outcome of candidate GLMM models including hierarchical month, waterbody, and access distance variables.

Variables (Polynomial)	df	AICc	ΔAICc
Slope (4) + Shoretype + Camp (3)	17	9023	0
Shoretype	10	9128	105
Breakwater + Wood + MaxDepth (4)	11	9139	116
Breakwater	6	9280	257
MaxDepth (4)	9	9288	265
Camp (3)	8	9459	436
Slope (4)	9	9462	439
Wood	6	9500	477
Null	5	9521	498
Entrance Distance (3)	8	9521	498

Table 2-5. Correlation coefficients (r^2) for a series of models created with data from 2014 and 2015 interviews of incomplete bank angler trips at Branched Oak Lake. An internal validation was tested with the data used to create the model. The external validation was performed with data collected from Pawnee Lake. These results agree with conceptual model (Figure 2-2).

Model	Internal Validation	External Validation
GLM	0.42	0.78
GAM	0.90	0.67
BRT	0.48	0.17
RF	0.92	0.03

Table 2-6. Comparison of U.S. Fish and Wildlife Service 2011 and site choice surveys.

	USFWS	Survey
n	424	805
Age		
18-24	--	0.02
25-34	0.26	0.12
35-44	0.19	0.18
45-54	0.16	0.21
55-64	0.17	0.23
65-74	0.10	0.21
75+	--	0.03
Prefer not to answer	Not asked	0.00
Zipcode		
Urban	0.59	0.38
Rural	0.41	0.62
Sex		
Male	0.78	0.90
Female	0.22	0.10
Annual Household Income (USD)		
<20000	--	0.03
20000-29999	0.12	0.05
30000-39999	--	0.07
40000-49999	0.21	0.08
50000-74999	0.21	0.14
75000-99999	0.16	0.21
100000-149999	0.18	0.19
150000+	--	0.09
Prefer not to answer	0.13	0.14
Education		
11 or less	--	0.01
12+	0.28	0.18
1-3 years college	0.39	0.34
4 + years of college	0.26	0.48

Table 2-7. Outputs of stated preference clogit modeling. Park, camp, and picnic table were continuous, and breakwater and shoretype were discrete. ASC contains unexplained variance.

Angler Group	Variables	Coefficient	SE	z	p	n
Full model						805
	ASC	0.00	0.06	-0.08	0.94	
	Breakwater absent	-0.25	0.06	-3.91	0.00	
	Wooded shoretype	0.04	0.06	0.63	0.53	
	Parking	-0.05	0.06	-0.83	0.41	
	Campsite	-0.13	0.06	-1.99	0.05	
	Picnic Table	-0.05	0.06	-0.86	0.39	
Casual anglers						186
	ASC	-0.01	0.12	-0.11	0.91	
	Breakwater absent	-0.20	0.13	-1.60	0.11	
	Wooded shoretype	0.06	0.13	0.44	0.66	
	Parking	-0.32	0.13	-2.58	0.01	
	Campsite	-0.35	0.13	-2.76	0.01	
	Picnic Table	-0.12	0.12	-1.05	0.29	
Active anglers						295
	ASC	0.02	0.09	0.22	0.83	
	Breakwater absent	-0.27	0.10	-2.62	0.01	
	Wooded shoretype	0.22	0.10	2.11	0.03	
	Parking	-0.02	0.10	-0.21	0.84	
	Campsite	-0.13	0.10	-1.25	0.21	
	Picnic Table	0.00	0.09	0.01	0.99	
Advanced anglers						223
	ASC	-0.02	0.12	-0.22	0.83	
	Breakwater absent	-0.28	0.12	-2.33	0.02	
	Wooded shoretype	-0.25	0.12	-2.12	0.03	
	Parking	0.10	0.12	0.85	0.40	
	Campsite	0.07	0.12	0.58	0.56	
	Picnic Table	-0.03	0.12	-0.25	0.80	
Committed anglers						42
	ASC	0.48	0.37	1.31	0.19	
	Breakwater absent	-0.67	0.35	-1.90	0.06	
	Wooded shoretype	0.17	0.34	0.50	0.62	
	Parking	0.40	0.34	1.17	0.24	
	Campsite	0.09	0.35	0.26	0.80	
	Picnic Table	-0.13	0.37	-0.34	0.73	

Chapter 3: Angler Behavior

Introduction

Within a waterbody, anglers exhibit a spatial mismatch with fish (Matthias et al. 2014; Weimer et al. 2014). Anglers makes choices about how to fish based on non-catch related factors because recreational fishing is primarily an activity to gain satisfaction, which is not necessarily related to catch (Arlinghaus et al. 2006). Despite ongoing research into angler behavior at large spatial scales, (e.g. Chizinski et al. 2014), the relationship between angler perceptions, fishing behavior, and trip outcome remains unquantified within a trip. Within-trip angler behavior affects across-trip behavior (Post et al. 2008; Hunt et al. 2011) and across-season behavior (Post et al. 2008; Dabrowska et al. 2014). Larger scale fishery management processes are directly influenced by small-scale, within-trip behavior and outcomes (Gunderson and Holling 2002; Arlinghaus et al. 2017), but until within-trip behavior is quantified, the effect of within-trip angler perceptions on fishery management remains unknown.

Anglers self-perceptions of a fishing trip include fishing specialization and trip motivation. Angler specialization was originally conceived as a one-way continuum with four levels of specialization (occasional anglers, generalists, technique specialists, and technique-setting specialists (Bryan 1977), and was developed to help explain angler activities and motivation. More recently, however, specialization has been considered a non-linear process in which anglers can transition both forwards and backwards at variable rates, that depend on influences outside the activity (Backlund and Kuentzel

2013). Although multiple categorizations of specialization are currently used by researchers, (e.g. Fisher 1997; Oh and Ditton 2006; Beardmore et al. 2013; Ward et al. 2013), the self-identifying specialization categories used by Beardmore et al. (2013) were adopted for this study for simplicity and because the specialization characteristics were built on centrality-of-lifestyle rather than the catch-specific motivations on which other specialization metrics were built (e.g., Fisher 1997). Although a useful method for categorizing different types of anglers, specialization has not clearly been shown to affect angler behavior at a waterbody. Some examples in the literature suggest that anglers with different skill levels do act differently (Ward et al. 2013; Matthias et al. 2014). Even so, whether anglers with differing specializations consistently act in a different manner within a waterbody remains unstudied.

Angler motivations are believed to change at a faster scale than angler specialization, and may be more directly applicable to within-trip behavior. Much research has focused on defining the broad range of angler motivations within a recreational fishery (Holland and Ditton 1992; Fedler and Ditton 1994; Hunt et al. 2011). Angler motivations are often categoried as trophy-seeking, non-trophy, challenge-seeking, nature-oriented, meal-sharing, and social (Beardmore et al. 2011), though there is no universally accepted categorization. Anglers with similar motivations are expected to exhibit similar fishing behavior (Hunt et al. 2013), although within a waterbody, the effect of motivation on fishing behavior has not been investigated.

We used an observational approach to assess within-trip angler behavior. We grouped anglers according to the self-identifying metrics used by Beardmore et al. (2013), and classified day-of motivation into day-of fishing objective and species sought.

Angler behavior was categorized as distance traveled, number of casts, and shoreline covered. Behavior was compared across self-identified groups of day-of objective, species-sought, and specialization. Anglers were then assessed by testing the connections between self-identifying metrics and fishing behavior, behavior and fishing outcome, and fishing outcome and objectives.

Objective

Examine fishing behavior among anglers

Research Questions

1. What is the effect of specialization on fishing behavior?

    Anglers with greater specialization are more invested in fishing, and specialization is likely correlated with angler skill. I predict that greater specialization will lead to more angling activity, and more committed anglers will cover more of the waterbody.

2. What is the effect of day-of objective on fishing behavior?

    Anglers have both catch-related and non-catch-related fishing objectives from which they can select to optimize satisfaction. I predict that anglers with primarily catch-related objectives will exhibit greater activity then anglers with primarily non-catch-related objectives. Additionally, anglers seeking to catch the largest fish possible will exhibit more movement than anglers seeking to catch the most fish possible. Not-primarily catch-motivated anglers will cover less of the waterbody than other anglers.

3. What is the effect of species-sought objective on fishing behavior?

    Anglers seeking different fish species will maximize catch through different strategies based on the life history of the fish sought. I predict that anglers seeking largemouth bass will be more mobile and more active than anglers seeking channel catfish. Bass anglers will cover more of the waterbody than catfish anglers.

4. What is the effect of specialization on fishing outcome?

   Catch is non-uniform among anglers (Baccante 1995). I predict that anglers with greater specialization will have a higher catch rate than less specialized anglers.

5. What is the effect of day-of objective on fishing outcome?

   If anglers behave differently to match their day-of objective then anglers seeking to catch the most fish possible will catch more fish than anglers seeking to catch the largest fish possible, who will catch more fish than anglers seeking to just enjoy the experience.

6. What is the effect of fishing outcome on fishing objective?

   Angler motivations are dynamic and thought to change more rapidly than angler specialization. In the absence of successful fish capture, anglers may respond by shifting their objective from catch-related to non-catch related to gain satisfaction from a fishing trip (Stryker and Burke 2000; Burke and Stets 2009).

Methods

Angler Observations

Anglers were surveyed (Appendix 3-A) at two small waterbodies, Bowling Lake (11 ha), located in the city of Lincoln, NE, and Halleck Lake (2 ha), located in Papillion. Both waterbodies have multiple access points and are dominated by bank anglers. Boat anglers are not allowed at Halleck Lake, and boat anglers are generally rare at Bowling Lake (only 4 boats were observed at Bowling Lake). Surveys were conducted on 30 days (13 days at Halleck Lake and 17 days at Bowling Lake) between 26 July and 13 October 2016. We selected a range of different days (weekdays and weekends) and time-of-day to capture a variety of anglers.

Anglers were approached any time between exiting their vehicle to up to five minutes after beginning actively fishing if they were still in their original location and had not captured a fish. Anglers that were willing to volunteer were equipped with a Garmin Virb XE camera that recorded video of the fishing reel (Figure 3-1), and GPS location during the fishing trip. In parties larger than one angler, only one angler in the party was given a camera, and individuals were only eligible to participate once. At the completion of their fishing, or at 2.5 hours, whichever came first, anglers completed a short (mean = 3.7 ± 0.9 minutes) survey (Appendix 3-B) on a handheld tablet. Cameras were retrieved at 2.5 hours if the angler had not returned because of limitations with battery life, and these anglers were surveyed immediately so that survey questions better corresponded to the trip data that were recorded. Anglers were asked to record the primary fish species sought, specialization, stated primary objective at the beginning, middle, end of trip, and for the whole trip (complete or incomplete), and satisfaction with

trip outcome. Stated primary objective options were limited to "catch the largest fish", "catch the most fish", and "neither, just enjoying the experience." Trip satisfaction was presented as a five-point scale ranging from "Very dissatisfied" to "Very satisfied". Surveys were created using Snap Survey software, and responses were uploaded to a Nebraska Cooperative Fish and Wildlife Research Unit webhost as soon as possible, typically the same day.

Video Analysis

Video data were analyzed with Behavioral Observation Research Interactive Software (BORIS), a freely available program built for video analysis. Angler casts, capture of fish, tackle changes, and hook baiting were recorded as discrete events.

Data Analysis

Timestamps of angler behavior were rounded to the nearest 60 seconds and assigned spatial coordinates by joining cast data and anglers' path by timestamp. Interview data were joined by matching the unique identifier for each angler. Angler movement, cast rate, and shoreline covered were analyzed as angler behavior.

I analyzed all data in program R (R Core Team 2016), (Appendix 3-C). As most anglers primarily sought either catfish (n = 23 of 73) or bass (n = 37 of 73), anglers not seeking these two species-seeking groups were removed from the analysis due to small sample size. Trip length was standardized among anglers by removing time before the first cast, and time after the last cast, and then standardizing trip length by dividing time by trip length for each angler so that each anglers' trip time was a proportion where 0 was the beginning of the trip and 1 the end of the trip. Behavior was compared through time across anglers of differing specialization, day-of objective, and species-seeking objective.

Models were run with waterbody and individuals as random effects. To compare trip outcome, catch was compared through time across anglers of differing specialization, day-of objective, and species-seeking objective. Data were fit with polynomial time relationships to allow for more complex temporal relationships. Best models were determined by fitting additional polynomial terms to time until additional variables were non-significant ($p < 0.05$).

To determine the shoreline anglers fished, the waterbody shorelines were split into 10-meter segments. Angler casts were assigned to one of these portions, or cells, by geospatial coordinates. Each angler's effort was examined, and the number of cells anglers fished was compared to anglers' stated specialization, day-of objective, and species sought.

Stated objectives were compared between the beginning of the trip and the trip overall to determine whether anglers stated preference shifted during the trip. Anglers selected one of the three following descriptions as most descriptive of their primary fishing objective: "catch the largest fish possible", "catch the most fish possible", or "neither, just enjoying the experience." Data were analyzed with a Bernard's Exact Test to determine whether there was a difference in the proportion of anglers that would select a stated primary objective based on whether that angler caught at least one fish. Anglers' stated satisfaction was analyzed with an ANOVA that included whether anglers captured fish and whether anglers' stated objective shifted.

Results

One hundred and fifteen anglers were asked to participate (Table 3-2), 36% declined to participate, and 73 anglers agreed to be recorded with video cameras.

Completed angler fishing trips ranged from 19 to 151 minutes. Seven anglers continued fishing after the camera was retrieved. Forty-three anglers were recorded at Bowling Lake and 30 anglers at Halleck Lake. Angler trips (Figure 3-2) were recorded and compiled for each waterbody (Figure 3-3).

Anglers had a greater movement rate at the beginning and end of their fishing trips ($p < 0.001$), but specialization ($p = 0.34$) and day-of objective ($p = 0.27$) did not have a significant effect on this relationship. Anglers primarily seeking catfish had a lower movement rate than anglers primarily seeking bass ($p = 0.01$), (Table 3-3), (Figure 3-4).

Cast rate exhibited a similar pattern, with greater casting at the beginning and end of the fishing trip ($p < 0.001$). Specialization ($p = 0.33$) and day-of objective ($p = 0.21$) did not affect cast rate, but anglers seeking catfish had a lower cast rate then anglers seeking bass ($p = 0.002$), (Figure 3-5).

Catfish anglers covered less of the waterbody than bass anglers ($p < 0.001$). Day-of objective did not affect the amount of area anglers covered ($p = 0.27$), and although anglers with different specializations varied in the amount of waterbody covered ($p = 0.04$), there was not a trend from casual to committed anglers (Figure 3-6).

Catch rate was not affected by trip time ($p = 0.4$). Anglers identifying as committed anglers (greatest degree of specialization) may have caught fewer fish ($p = 0.06$) than casual anglers. Anglers seeking to catch the most fish possible had a greater catch rate than other anglers ($p = 0.03$), (Figure 3-7).

Most anglers' stated preferences remained consistently catch or non-catch throughout the fishing trip. Initial objective did not differ between anglers that caught fish and anglers that did not (Barnard's Exact Test, $p = 0.99$). However, we detected a

marginal effect of a greater proportion of stated objectives shifted from catch to non-catch in anglers that did not catch fish than in anglers that did catch fish (Barnard's Exact Test, $p = 0.069$, Table 3-4). Anglers that caught a fish did not report a greater satisfaction likert score than anglers that did not catch a fish (3.9 ± 0.09 vs. 3.6 ± 0.03) (ANOVA, $F_{1,58} = 0.70$, $p = 0.41$)

Discussion

I failed to detect a relationship between specialization and behavior and between day-of objective and behavior following the three measured behavioral metrics. Although more specialized anglers cite different behavioral preferences (Chipman and Helfrich 1988), specialization is generally regarded as hierarchically distant from behavior (Bryan 1977), and thus plays a less direct role in behavior. I detected differences in movement, cast rates, and shoreline covered between anglers seeking catfish and anglers seeking bass, which was expected because catfish and bass exhibit significantly different life histories (Hrabick et al. 2015).

The polynomial relationship between movement and time, and casts and time was unexpected. Anglers moved greater distances and cast more at the beginning and end of their trip, with a lull of activity during the center of their fishing trip. This pattern of behavior suggests anglers value time across their fishing trip differently, with a brief burst of activity at the beginning of their trip (perhaps in hope of capturing a fish) and a brief burst of activity at the end of their trip (perhaps in hope of ending on a good note). I expected that movement and casts would be negatively correlated because anglers would need to trade one activity for another (Mangel 1982). That I did not see this pattern suggests anglers' movement and casts were not frequent enough to cause this tradeoff.

This quadratic pattern of effort versus time supports the view of motivation as a continuous and complex process (e.g. Arlinghaus 2006), but adds to the difficulty of measuring CPUE. A clear across-trip trend in behavior despite motivation and specialization defines fishing effort (e.g. Pollocket al. 1997; Lockwood et al. 1999) as unequal within a trip. Despite different rates of activity, catch did not share the same relationship with time.

The relationship between angler skill and catch is uncertain due to the large variance of catch among anglers (Baccante 1995), but within the scope of this study, anglers that identified as being the most committed may have caught fewer fish than casual anglers. Despite this, catch did not show a significant positive trend across the four specialization categories. As anglers self-identified their specialization category, anglers may have had trouble differentiating the specialization categories. Casual and committed, the two extremes of the specialization spectrum, (Beardmore et al. 2013) would then have been easier for anglers to differentiate between, leading to less error. Anglers seeking to catch the most fish possible caught more fish than the other two day-of objectives, which demonstrated a clear link between objective and outcome, despite variance in catch. Logistics (cameras pointed towards the angler, not the fish) constrained my ability to measure a relationship between anglers seeking the largest fish possible and fish size, but this group of anglers did not perform better at capturing fish than anglers not primarily seeking to catch fish.

As more specialized and number-seeking anglers caught more fish than other anglers, behavior (Matthias 2014; Weimar 2014), not chance (Baccante 1995), led to greater catch. Broad-scale measurements of movement, shoreline covered, and catch did

not account for the variance in catch. Lure style, color, and presentation were too varied to account for, but advanced knowledge of lures and precision may have benefitted committed anglers and led to greater catch (Orsi et al. 1993; Arterburn and Berry Jr. 2001). Further examination of the relationship between lure type and catch is warranted, though complicated by the larger number of lure variables.

Anglers that did not catch fish were more likely to shift from a catch-related objective to a non-catch-related objective during their fishing trip to align the trip outcome with expectations (e.g. Hunt 2005; Arlingahus et al. 2006). Data were limited by sample size (n = 76), but there was a marginally significant statistical relationship between likelihood of changing to a non-catch related objective and whether at least one fish was captured, (e.g. Stryker and Burke 2000; Burke and Stets 2009). Anglers interpret their environment through a series of individual and group-based perceptions of self, categorized as specialization (higher level, indirect connection to behavior) or motivation (lower level, direction connection to behavior) that inform behavioral feedbacks.

Fishery managers often seek to improve angler satisfaction, and anglers that are unable to obtain their primary day-of objective may be less satisfied with their fishing trip. However, anglers that caught fish and were primarily seeking to catch fish did not report a greater level of satisfaction than other groups. Trip-satisfaction was constant across groups, highlighting, perhaps, the inability of stated preferences to quantify what anglers gained from a trip, or that much of the decision-making process (and thus level of satisfaction) is completed ahead of time, (Hunt 2005). The perceived disconnect between angler motivation and satisfaction has been noted before (Arlinghaus 2006). The short-

term consequence of a failure to realize an objective is a subsequent shift in day-of objective, but the long-term consequence of failing to meet a preferred objective is unknown. Anglers draw from a network of waterbodies (Martin 2013; Chizinski et al. 2014) and repeated un-satisfactory trips may cause anglers to shift effort to different waterbodies within their network. If managers improve the likelihood anglers meet their preferred fishing objectives, then anglers may reduce spatial patterns of overfishing (Hunt et al. 2011; Post and Parkinson 2012) and more optimally use waterbodies.

Fishery management is moving toward the management of resources at larger spatial and temporal scales. Human behavior at larger spatial scales is affected from bottom-up micro-scale behavioral processes (Arlinghaus et al. 2017). To elucidate macro-scale human behavior (e.g. license renewal), the full measure of faster-moving processes needs to be understood (Gunderson and Holling 2002). Future research into angler behavior could address this tantalizing area of research.

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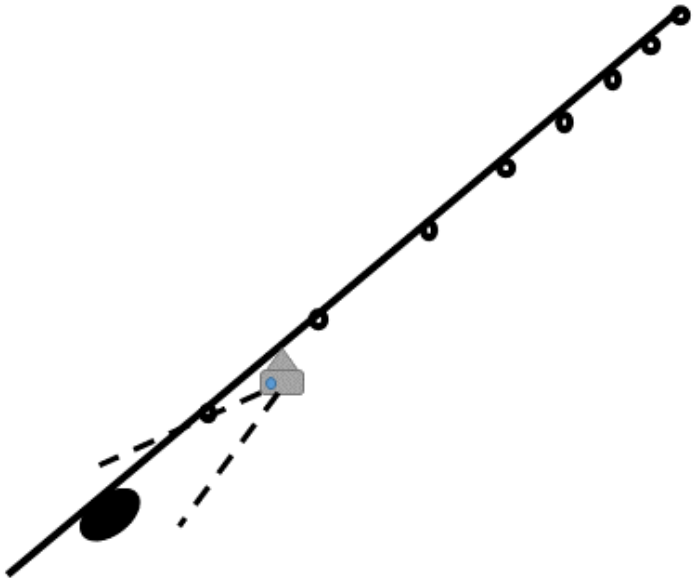

Figure 3-1. Diagram of camera (grey box), fishing rod set up. Cameras were mounted on the same side of the rod as the fishing reel. Cameras were angled to view back towards the reel (black, dashed lines).

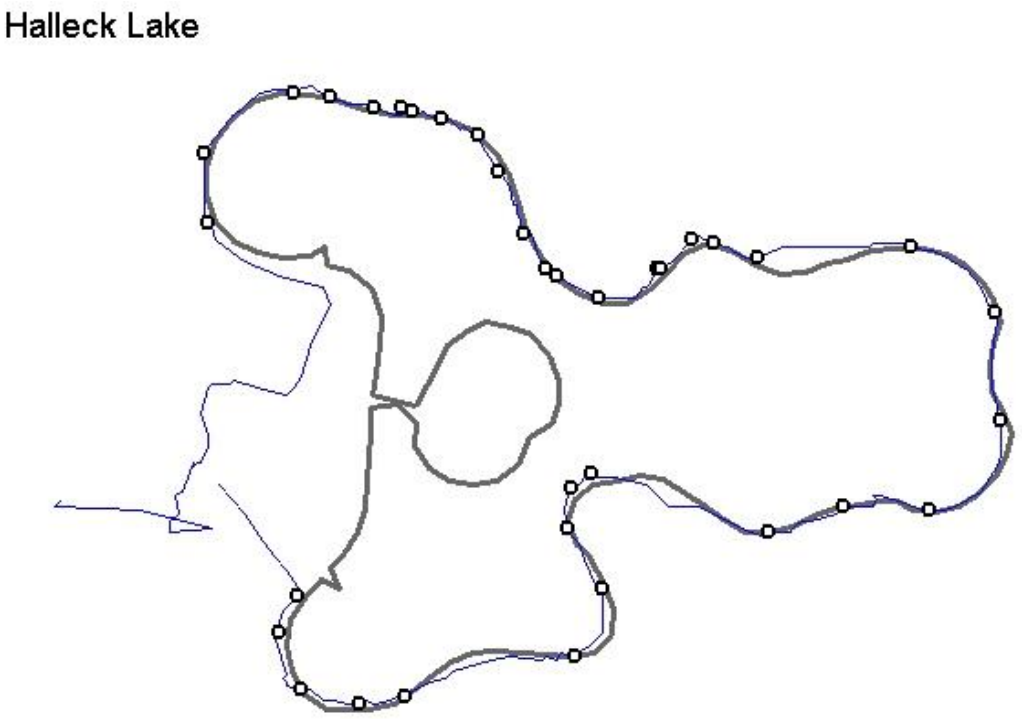

Figure 3-2. A single fishing trip from one angler observed at Halleck Lake. Behavioral metrics were calculated for individuals from information on anglers travel distance (blue line) and angler casts (open circles).

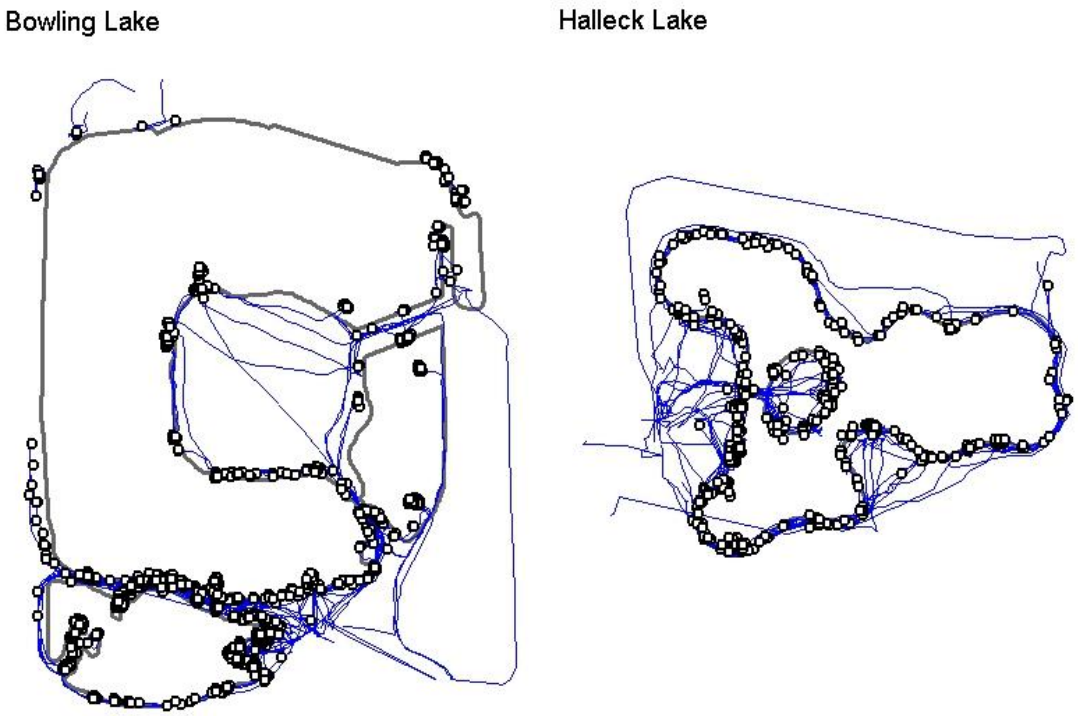

Figure 3-3. Angler paths (blue lines) and casts (open circles) were recorded for all anglers observed at Bowling Lake and Halleck Lake during the 2016 sampling season.

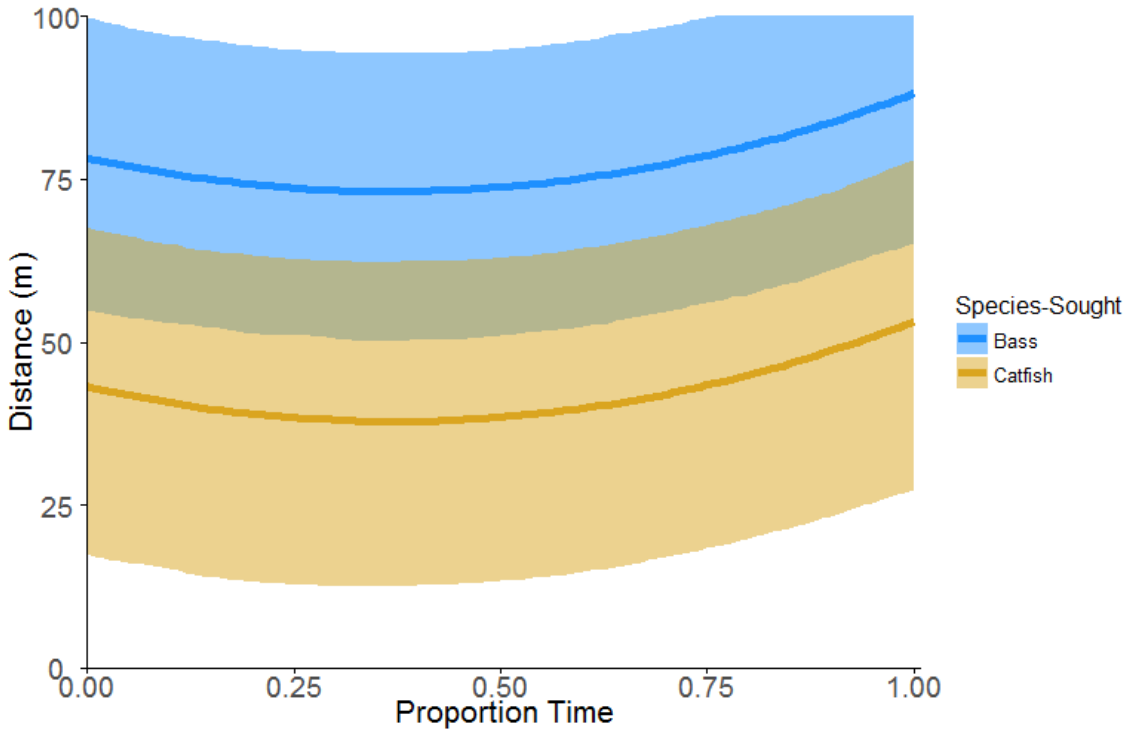

Figure 3-4. Modeled angler movement through time for anglers seeking bass and catfish with 95% confidence interval.

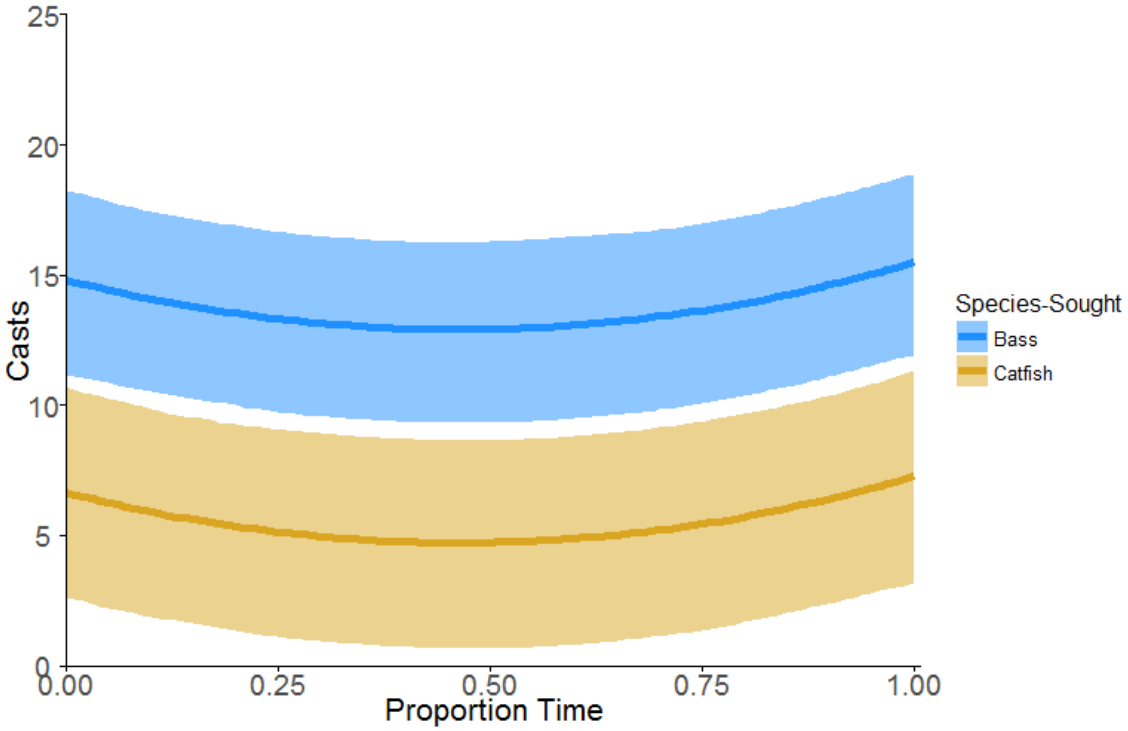

Figure 3-5. Modeled casts through a fishing trip for anglers seeking bass and catfish with 95% confidence interval.

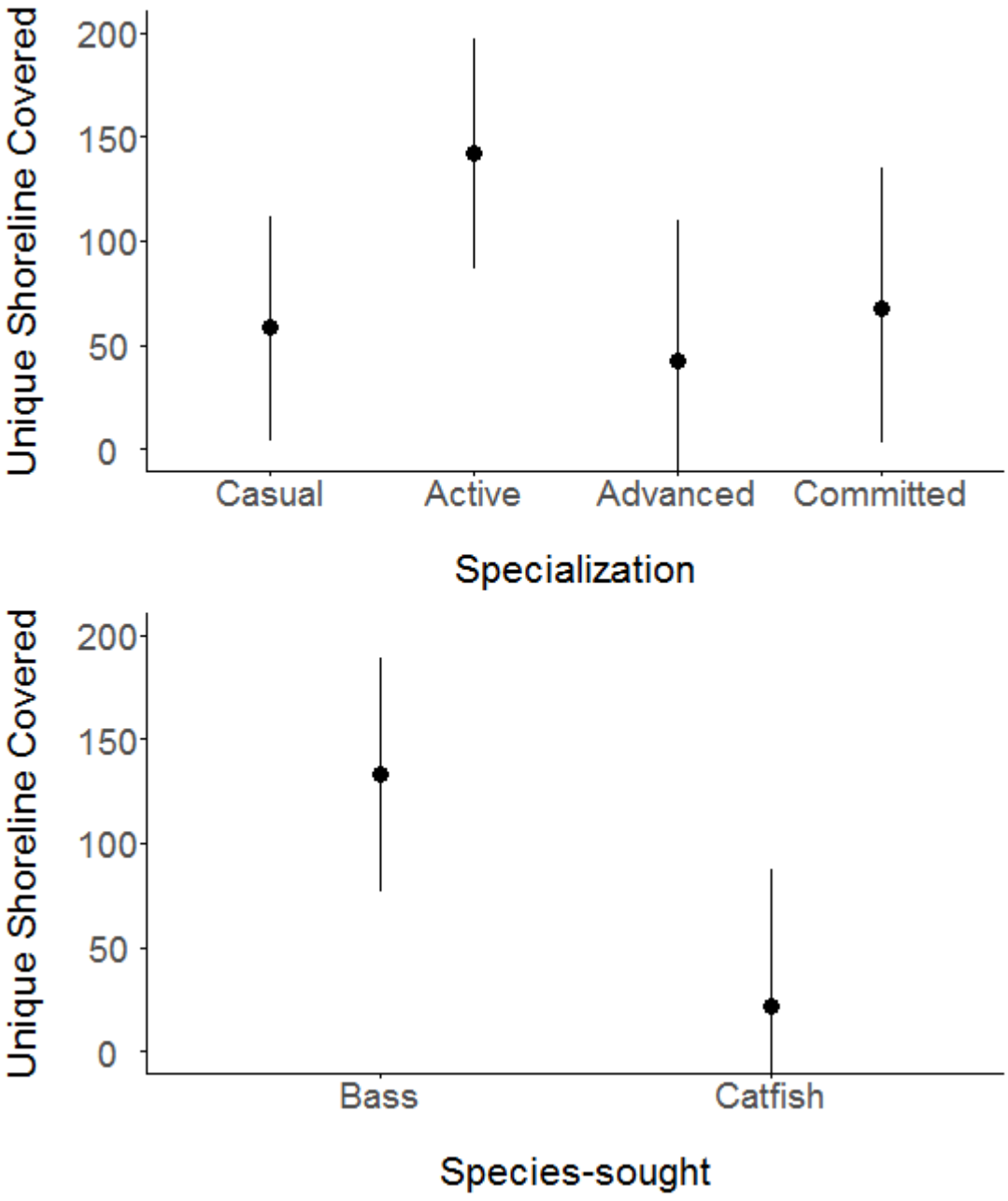

Figure 3-6. Modeled unique meters of shoreline covered by anglers with different specializations and different species sought, with 95% confidence interval.

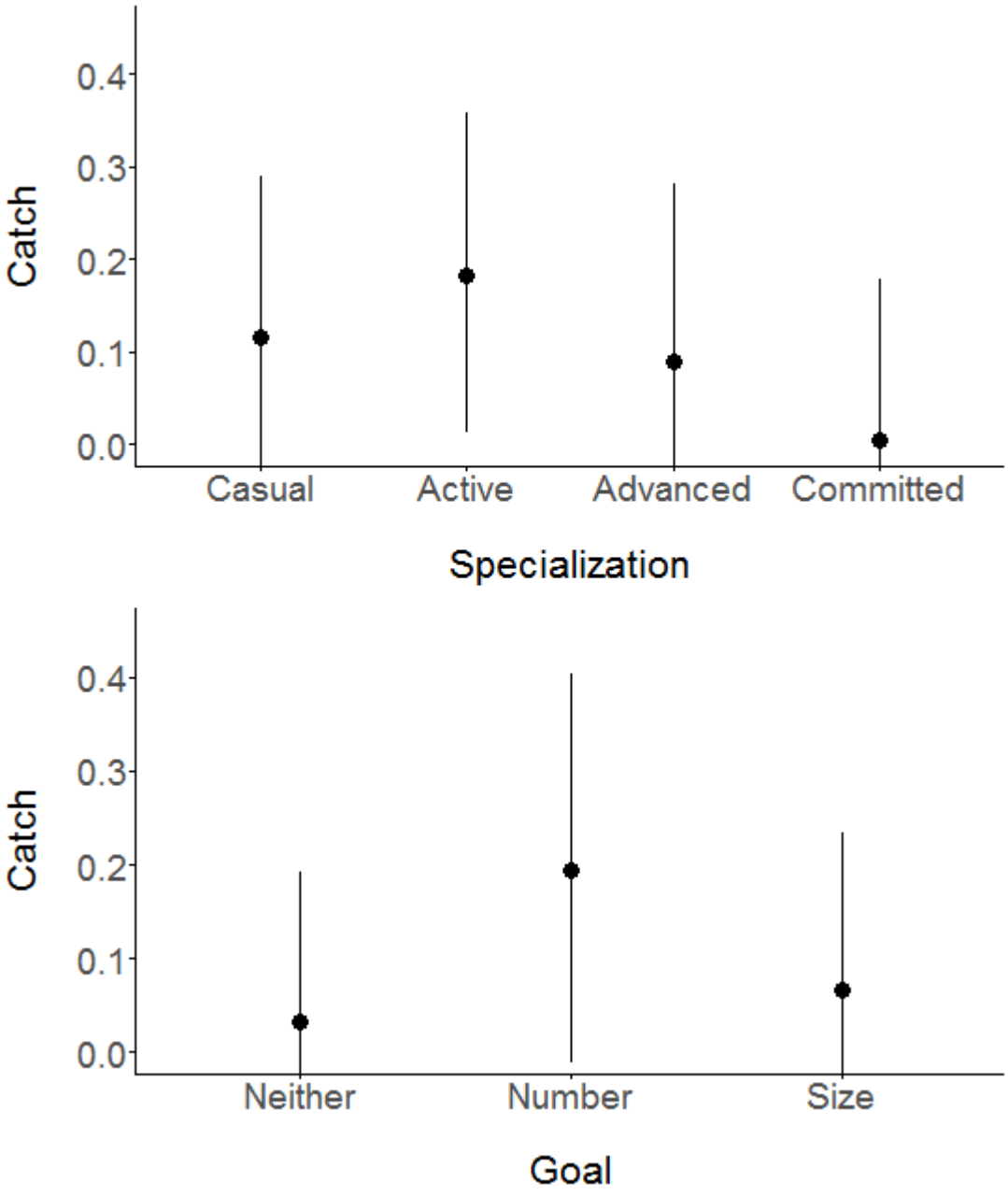

Figure 3-7. Modeled fish captured by anglers with different specializations and different goals with 95% confidence interval.

Table 3-1. Metrics used in analysis of angler perceptions of fishing behavior and outcomes.

Specialization	Day-of Objective	Species-objective	Behavior metric/ outcome	Behavior metric definition
Casual	To catch the most fish possible	Open-ended	Casts	Number of casts during each 1/100 of trip
Active	To catch the largest fish possible		Movement	Meters traveled during each 1/100 of trip
Advanced	Neither, just enjoying the experience		Area covered	Number of 10-m portions of shoreline the angler traveled
Committed			Fish Captured	Number of captures during each 1/100 of trip

Table 3-2. Survey responses of anglers in observation and experiment.

	Observation	
Participants	n	Proportion
Participation	76	
Specialization		
Casual	24	0.32
Active	18	0.24
Advanced	19	0.25
Committed	14	0.19
Did not report	--	0.00
Whole-trip objective		
"catch the largest fish possible"	18	0.24
"catch the most fish possible	13	0.17
"neither, just enjoying the experience"	43	0.57
Did not report	2	0.03
Species sought		
Largemouth bass	37	0.49
Channel catfish	23	0.30
All else	16	0.21

Table 3-3. Top model outputs testing specialization, day-of objective, and species-objective against movement, casts, catch, and area covered. All models accounted for subjects and waterbody as random effects.

Movement Model

Term (polynomial)	Estimate	t-value	P
Intercept	50±8	6.3	0.01
Time(1)	153±45	3.4	0.0007
Time(2)	155±45	3.4	0.0006
Catfish	-35±13	-2.8	0.008

Cast Model

Term (polynomial)	Estimate	t-value	P
Intercept	10±1	7.2	<0.0001
Time(1)	10±6	1.5	0.1
Time(2)	36±6	5.5	<0.0001
Catfish	-8±2	-3.6	0.0008

Area-covered Model

Term (polynomial)	Estimate	t-value	P
Intercept	20±3	6.7	<0.0001
Advanced	-11±3	-3.7	0.0005
Casual	-7±3	-2.1	0.05
Committed	-10±4	-2.7	0.01
Number	8±3	-2.6	0.01
Size	-7±4	-1.9	0.06

Capture Model

Term (polynomial)	Estimate	t-value	P
Intercept	0.1±0.04	2.9	0.007
Advanced	-0.09±0.06	-1.5	0.1
Casual	-0.07±0.05	-1.4	0.1
Committed	-0.2±0.06	-2.9	0.006
Number	0.2±0.08	2.1	0.04
Size	-0.03±0.04	0.8	0.4

Table 3-4. Beginning to end-of -trip stated fishing objectives, reported by anglers at the end of their fishing trip.

Caught Fish	Catch to catch	Catch to non-catch	Non-catch to catch	Non-catch to non-catch
Yes	7	1	0	9
No	13	9	1	22

Chapter 4: Review of Research and Management Implications

Site Choice Synopsis

Factors that affect angler waterbody choice are well known and primarily include travel cost and fish species present (Hunt 2005; Papenfuss et al 2015). However, within a waterbody, anglers are not distributed uniformly or randomly and anglers do not match the distribution of fish (Matthias et al. 2014; Weimer et al. 2014). To examine the effect of habitat features on bank angler site choice, bank angler locations were recorded at four reservoirs across the open-water season. In most locations, no anglers were detected, and a very few locations were used extensively. I developed four competing models to explain angler density: waterbody-level differences, within-waterbody travel cost, non-catch-related factors, and catch-related factors. In an initial run of these four models, non-catch-related factors outperformed other models. However, anglers are constrained by waterbody-choice and travel (e.g. Hunt 2005), so these two variables were added as hierarchical random effects. Non-catch-related factors still outcompeted catch-related factors, and all single-variable models, which suggests non-catch-related factors are the next constraining level, and that anglers make catch-related choices at a heavily constrained spatial scale.

A subset of 7,500 individuals that purchased a 2015 Nebraska annual fishing license or Fish/Hunt combination license and provided an email address were emailed an online forced-choice survey. Participants were asked to choose between two locations consisting of different levels of five habitat variables. Participants stated preferences for breakwaters and proximity to camping sites. Stated preferences from this group differed from realized preferences of Salt Valley anglers. Although distance from parking was

not selected for in the stated-preference survey, distance from parking was the most important single variable in angler use in the Salt Valley.

Angler Behavior Synopsis

I examined the effects of angler specialization, day-of objective, and species-sought on angler behavior and outcome with an observational approach. Volunteers were recruited from anglers that had not yet begun fishing and perceptions of fishing objective were recorded following the trip. Anglers stated a single species-sought for the length of the trip and recorded whether their day-of objective was to "catch the largest fish possible", "the most fish possible", or "neither, just enjoying the experience" for the beginning, middle, end, and the whole trip. Meters traveled, number of casts, portion of shoreline covered were analyzed as behavioral metrics, and fish capture was considered as fishing outcome. Anglers traveled and cast more at the beginning and end of their trip than in the middle of their trip, suggesting an inconsistent relationship of effort to within-trip behavior. Anglers seeking bass moved more, covered more shoreline, and cast more frequently than anglers seeking catfish. Specialization and day-of objective were not influential factors to movement, shoreline covered, or number of casts. However, committed anglers captured more fish than other anglers, and anglers seeking to catch the most fish possible captured more fish than other anglers.

Anglers that failed to capture fish were more likely to shift from a catch-related objective to "neither, just enjoying the experience", (e.g. Stryker and Burke 2000; Burke and Stets 2009) Because anglers changed their perceptions of trip purpose to match reality. Angling is a recreational activity in which anglers seek to derive satisfaction from participating in the activity (Arlinghaus 2006). Although anglers acted to change

their objective to gain satisfaction within a trip, the effect of failing to meet the original day-of objective on future trips is unknown. Failure to meet original objectives may result in anglers selecting different waterbodies (Martin 2013; Arlinghaus et al. 2017) for future trips and may be of concern to management.

Management Implications

Altering parking areas and non-catch related habitat features may alter angler use. Most anglers fish less than 120 m from the nearest available parking, though many anglers parked off-road, further shortening the distance traveled on foot. Managers could temporarily close roads to reduce fishing pressure on spawning aggregations of fish. Managers could also provide access points to match anglers with locations likely to produce high catch rates of fish. Habitat improvements without nearby access points are unlikely to result in use by most bank anglers, but locations could be enhanced to attract more fishing pressure by producing more accessible shoreline or adding camp sites.

Generally, additional fishing regulations are negatively perceived by a substantial fraction of anglers. Waterbody-specific regulations can confuse or be overlooked by anglers, which may lead to a greater incidence of infractions. Managers often seek to balance regulations that aim to improve or maintain fish quality with simplicity aimed to reduce non-compliance. Altering structure to reduce angler take in specific locations can achieve one of the main objectives of regulations and avoid the challenges associated with additional regulations.

In waterbodies dominated by bank anglers, most areas may receive little or no fishing pressure. In larger waterbodies, such as Branched Oak Lake, these un-fished

locations may act synonymously to marine protected areas. Although not explicitly managed for, proxy marine protected areas could provide many of the benefits associated with protected areas and avoid the costs of enforcement. Even relatively small protected areas benefit fish populations by providing safe locations for spawning and juvenile fish. Managers could take advantage of un-fished locations to benefit fisheries without enforcing protected areas. Improvement of spawning habitat in un-fished locations could boost production of fisheries, and alterations to fish structure could provide benefits for juvenile fish. If managers alter less accessible locations without advertising improvements, un-fished locations may improve fishery production.

Within a trip, anglers alter their objectives to meet the situation, which will result in a satisfactory trip. Although anglers may leave satisfied by changing from a catch-related to non-catch related objective, the long-term effect of repeated objective change is unknown. Within-trip outcomes result in across-trip choices (Arlinghaus et al. 2017), and can lead to undesirable outcomes (e.g. Post et al. 2008). Anglers use multiple waterbodies to meet their objectives, and repeated failure may lead anglers to discontinue use of under-performing waterbodies. Shifts in angler pressure may be of concern to management agencies. We found no link between trip satisfaction and trip outcome, in part this disconnect is due to anglers deriving much of their satisfaction from following through on their plan to fish (Hunt 2005), and because non-catch related factors can be more important than catch-related factors to angler satisfaction (Arlinghaus 2006). To enhance angler experiences, anglers could be better matched with locations likely to produce satisfaction from non-catch infrastructure (e.g. Chapter 2) that would encourage future use.

Future Directions

The effect of catching fish on angler behavior is likely much smaller than the effect of being caught on fish behavior. Although anglers do not match the distribution of fish, and appear to seek locations based on non-catch-related variables, fish seek locations that maximize resources and minimize risk. New fisheries may provide interesting opportunities to test feedbacks between fish and anglers.

- What is the effect of angling on the spatial distribution of a naive fish population?
- What is the effect of reduced catch rates on repeat angler site choice?

Anglers participate in recreation to gain satisfaction, which can be derived without capturing fish. Anglers act dynamically to alter fishing objectives to meet environmental reality. However, shifting objectives may reduce angler's willingness to return to a fishery.

- What is the relationship between angling objective and waterbody choice?
- What is the effect of repeated failure to meet day-of objective on angler waterbody choice?

Interactions between anglers and the presence of other anglers and other recreators on anglers is not known. Anglers were studied without controlling for the number of other recreators present. Repeated selection for locations proximate to a parking lot may result in loss of desirability for preferred locations.

- What is the effect of other anglers on bank angler use?
- What is the effect of other recreators on bank angler use?

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Appendix 2-A. Program R code for function to convert raw point data into 50-m segments of shoreline, and assign habitat variables to each segment.

```
##Brian Harmon
##03/10/17
##Function to convert raw point data into data for modeling

.libPaths("P:/RLibrary2")
setwd("P:/Thesis/Objective 2")
library(raster)
library(maptools)
library(rgeos)
library(sp)
library(dplyr)
library(rgdal)
library(gdistance)
library(spatstat)
library(gstat)
set.seed(1234)


outerBuffer<-function(x){
  buff<-buffer(x, width = 300, dissolve = T)
  e<-erase(buff,x)
  return(e)

}BiggerFunction3<-function(angler,line, shore_type, bathroom=NULL, dayuse=NULL,
camp, park, contour, breakwater, wood, road.raster, road, entrance, slope){ #
require(tidyverse)
  require(raster)
  require(maptools)
  require(rgeos)
  require(sp)
  require(dplyr)
  require(rgdal)
  require(gdistance)
  require(spatstat)
  require(gstat)
```

```
  #sample every x meters along the shoreline
  cells<-spsample(line, round(gLength(line)/50, digits=0), type="regular")
  #which anglers are closest to which cells
  anglers.p<-as.ppp(angler)
  cells.p<-as.ppp(cells)
  angler.cells<-nncross(anglers.p, cells.p)
  angler.cells<-angler.cells%>%
    count(which)%>%
    mutate(ARCID=which-1)
  #create dataframe with all 0-angler cells as well
  expansion<-expand.grid(ARCID=seq(0, length(cells)-1,by=1))
  angler.cells<-right_join(angler.cells, expansion, by="ARCID")
  #Any cells that were NA are set at 0 as a precaution
  angler.cells$n<-ifelse(is.na(angler.cells$n),0,angler.cells$n)
  ##assign the cells a type of representative shoreline
  cells.p<-as.ppp(cells)
  shore.p<-as.ppp(shore_type)

  shore.points<-nncross(cells.p, shore.p)
  shore.points$ARCID<-seq(0, length(cells)-1,by=1)
  shore.points$type<-shore.points$which

  shore.dataframe<-as.data.frame(shore_type)
  shore.dataframe$which<-seq(0, length(shore_type)-1,by=1)

  shore_type.dat<-left_join(shore.points, shore.dataframe, by="which")
  #####create cost raster#####
  e <- extent(line)+400
  r2 <- raster(e, resolution=c(10,10), vals=1)
  ##Create a raster of the shoreline along lake to make least-cost distance between two
points non-euclidean
  cost.raster<-transition(r2, transitionFunction=mean, directions=8)
  #####bathrooms#####
  if(is.null(bathroom)) {
    bathroom.dat=data.frame(nrow=seq(0, length(cells)-1,by=1), dist=NA)
  } else {
    bathroom.dat<-costDistance(cost.raster, cells, bathroom)
    bathroom.dat<-as.data.frame(bathroom.dat)

    bathroom.dat<-apply(bathroom.dat, 1, min)
```

```
  bathroom.dat<-as.data.frame(bathroom.dat)
  bathroom.dat$dist<-(bathroom.dat$bathroom.dat*10)
 }
 ##### dayuse = covered picnice tables ######
 if(is.null(dayuse)) {
  dayuse=data.frame(nrow=seq(0, length(cells)-1,by=1), dist=NA)
 } else {
  dayuse<-costDistance(cost.raster, cells, dayuse)
  dayuse<-as.data.frame(dayuse)
  dayuse<-apply(dayuse, 1, min)
  dayuse<-as.data.frame(dayuse)
  dayuse$dist<-(dayuse$dayuse*10)
 }
 ##### distance from outside of park ######

 cost.road<-transition(road.raster, transitionFunction=mean, directions=8)

 ##series of points along the roads
 road2<-spsample(road, 1000, type="regular")
 ##then we create a dataframe where we have cells that go to the nearest point along the
road.
 road.dat<-costDistance(cost.raster,cells, road2)
 road.dat<-as.data.frame(road.dat)
 road.dat$min<-colnames(road.dat)[apply(road.dat,1,which.min)]
 road.Roadcells<-as.data.frame(road.dat$min)
 road.Roadcells$ARCID<-seq(0, length(cells)-1,by=1)
 road.Roadcells$row.names.1<-road.dat$min

 ###now we have a dataframe of which cells go to which points. then we need to ask
what distance is each point from an entrance. Then join the 2 togethe by point ID

 road.dist<-costDistance(cost.road, entrance,  road2)
 road.dat<-as.data.frame(road.dist)
 road.dat2<-apply(road.dat, 2, min)
 road.dat2<-as.data.frame(road.dat2)
 road.dat2$row.names.1<-row.names(road.dat2)
 road.distance<-right_join(road.dat2, road.Roadcells, by="row.names.1")
 ##### Campsites######
 ##distance to nearest campsite
 camping<-spsample(camp, 1000, type="regular")
```

```
  camping.dat<-costDistance(cost.raster, cells, camping)
  camping.dat<-as.data.frame(camping.dat)

  camping.dat<-apply(camping.dat, 1, min)
  camping.dat<-as.data.frame(camping.dat)
  camping.dat$dist<-(camping.dat$camping.dat*10)

  ###### distance to nearest parking area ######
  ##create centroids in parking areas to calculate distance to
  parkingcentroids = gCentroid(park,byid=TRUE)
  parking.dat<-costDistance(cost.raster, cells, parkingcentroids)
  parking.dat<-as.data.frame(parking.dat)

  parking.dat<-apply(parking.dat, 1, min)
  parking.dat<-as.data.frame(parking.dat)
  parking.dat$dist<-(parking.dat$parking.dat*10)

  ##### Depth######
  ##create a raster bounded by the size of the waterbody
  contourBBox <- bbox(contour)
  contourRaster <- raster(xmn=contourBBox[1,1],
                      xmx=ceiling(contourBBox[1,2]),
                      ymn=contourBBox[2,1],
                      ymx=ceiling(contourBBox[2,2]),
                      crs = CRS("+init=epsg:32614"),
                      resolution = c(10,10))
  p <- as(contour, 'SpatialPointsDataFrame')
  ##kriging to make the contours into a depth raster
  g <- gstat(id="Depth", formula = Depth~1, data=p,
           nmax=100,set=list(idp = .5))
  depth<- interpolate(contourRaster, g, ext=line)
  ##calculate max depth-per-cell
  maxdepth.per.cell<-extract(depth, cells, method="simple", buffer=30, fun=max,
df=TRUE)
  maxdepth.per.cell$ARCID<-seq(0, length(cells)-1,by=1)
  maxdepth.per.cell[is.na(maxdepth.per.cell)] <- 0.5
  ##calculate mean depth-per-cell
  meandepth.per.cell<-extract(depth, cells, method="simple", buffer=30, fun=mean,
df=TRUE)
  meandepth.per.cell$ARCID<-seq(0, length(cells)-1,by=1)
```

```
meandepth.per.cell[is.na(meandepth.per.cell)] <- 0.5

######Distance to breakwater#####
breakwater.p<-as.psp(breakwater)
breakwater.cells<-nncross(cells.p, breakwater.p)
breakwater.cells$ARCID<-seq(0, length(cells)-1,by=1)
breakwater.cells$bw=""
##if closer than 25m from a breakwater, label as breakwater
breakwater.cells$bw<-ifelse(breakwater.cells$dist<25,1,0)
######Emergent/submerged wood######
wood.p<-as.psp(wood)
wood.cells<-nncross(cells.p, wood.p)
wood.cells$ARCID<-seq(0, length(cells)-1,by=1)
wood.cells$wood=""
##if closer than 50m from wood, label as wood
wood.cells$wood<-ifelse(wood.cells$dist<50,1,0)
#####Slope######
##turn spatialline into a spatialpolygon
#
# df1 <- coordinates(line[1,])
# p1 = Polygon(df1)
# sps = SpatialPolygons(p1)
# proj4string(sps) = CRS("+init=epsg:32614")

  df <- coordinates(line)
  p = Polygon(df)
ps = Polygons(list(p),1)
  sps = SpatialPolygons(list(ps))
  proj4string(sps) = CRS("+init=epsg:32614")
#
##take the outer buffer of the polygon and crop the elevation raster to the buffer
large.buf<-buffer(sps, width=100, dissolve=T)
bo.elev2<-crop(slope, large.buf)
##create a slope raster from depth raster
slope.raster<-terrain(bo.elev2, opt='slope', unit='degrees', neighbors=8)
shoreslope.per.cell<-extract(slope.raster, cells, method="simple", buffer=50, fun=max,
df=TRUE)
shoreslope.per.cell$ARCID<-seq(0, length(cells)-1,by=1)
shoreslope.per.cell[is.na(shoreslope.per.cell)] <- 0
```

```
 road.park<-spsample(road, 5000, type="regular")
 road.park.dat<-costDistance(cost.raster, cells, road.park)
 road.park.dat<-as.data.frame(road.park.dat)

 road.park.dat<-apply(road.park.dat, 1, min)
 road.park.dat<-as.data.frame(road.park.dat)
 road.park.dat$dist<-(road.park.dat$road.park.dat*10)

 month<-substr(angler$DATE, 6,7)
 # month2<-data.frame(matrix(NA, nrow = seq(0, length(cells)-1,by=1), ncol = 1))
 month<-data.frame(month=month[1], nrow = seq(0, length(cells)-1,by=1))

full.data<-data.frame(ACRID=angler.cells$ARCID,
                      n=angler.cells$n ,
                      type.y=shore_type.dat$type.y,
                      bathroom.dist=bathroom.dat$dist,
                      dayuse.dist=dayuse$dist,
                      camping.dist=camping.dat$dist,
                      parking.dist=parking.dat$dist,
                      road.distance=road.distance$road.dat2,
                      road.park=road.park.dat$dist,
                      max.depth.per.cell=maxdepth.per.cell$Depth.pred,
                      mean.depth.per.cell=meandepth.per.cell$Depth.pred,
                      breakwater.cell=breakwater.cells$bw,
                      wood.cells=wood.cells$wood,
                      slope=shoreslope.per.cell$slope,
                      month=month$month)

 full.stor = rbind(full.data, full.stor)


 return(full.stor)
}
```

Appendix 2-B. Program R code for GLMM modeling of the effect of habitat features on angler use.

```
###Brian Harmon
##07-12-2017
###GLMM of angler density
library(tidyverse)
library(lme4)
library(MuMIn)
bo<-read.csv("~/bo.final.month.csv")
bo$lake<-"Branched Oak Lake"
bo<-na.omit(bo)
ml<-read.csv("~/ml.final.month.csv")
ml$lake<-"Meadowlark Lake"
pa<-read.csv("~/pawn.final.month.csv")
pa$lake<-"Pawnee Lake"
ww<-read.csv("~/ww.final.month.csv")
ww$lake<-"Wildwood Lake"

ww$type.y[is.na(ww$type.y)]<-5
pa$type.y[is.na(pa$type.y)]<-1
ml$type.y[is.na(ml$type.y)]<-5

full.list<-list(bo,ml,pa,ww)
full.dat<-do.call(rbind, full.list)
full.dat$wood.cells<-as.factor(full.dat$wood.cells)
full.dat$breakwater.cell<-as.factor(full.dat$breakwater.cell)
full.dat$lake<-as.factor(full.dat$lake)
full.dat$type.y<-as.factor(full.dat$type.y)
full.dat$lake<-as.factor(full.dat$lake)
full.dat$month<-as.factor(full.dat$month)

z.dat<-full.dat%>%
  mutate(shore.type=(type.y),
         bath.z=(bathroom.dist-mean(bathroom.dist, na.rm=TRUE))/sd(bathroom.dist,
na.rm=TRUE),
         dayuse.z=(dayuse.dist-mean(dayuse.dist, na.rm=TRUE))/sd(dayuse.dist,
na.rm=TRUE),
         camp.z=(camping.dist-mean(camping.dist, na.rm=TRUE))/sd(camping.dist,
na.rm=TRUE),
         park.z=(parking.dist-mean(parking.dist, na.rm=TRUE))/sd(parking.dist,
na.rm=TRUE),
         road.z=(road.distance-mean(road.distance, na.rm=TRUE))/sd(road.distance,
na.rm=TRUE),
```

```
        road.park.z=(road.park-mean(road.park, na.rm=TRUE))/sd(road.park,
na.rm=TRUE),
        max.depth.z=(max.depth.per.cell-mean(max.depth.per.cell,
na.rm=TRUE))/sd(max.depth.per.cell, na.rm=TRUE),
        mean.depth.z=(mean.depth.per.cell-mean(mean.depth.per.cell,
na.rm=TRUE))/sd(mean.depth.per.cell, na.rm=TRUE),
        breakwater=breakwater.cell,
        wood=wood.cells,
        slope.z=(slope-mean(slope, na.rm=TRUE))/sd(slope, na.rm=TRUE))

z.data.final<-data.frame(n=z.dat$n, shore.type=z.dat$shore.type, bath=z.dat$bath.z,
dayuse=z.dat$dayuse.z, camp=z.dat$camp.z,
                park=z.dat$park.z, road=z.dat$road.z, road.park=z.dat$road.park.z,
maxdepth=z.dat$max.depth.z, meandepth=z.dat$mean.depth.z,
                breakwater=z.dat$breakwater, wood=z.dat$wood, slope=z.dat$slope.z,
lake=z.dat$lake, month=z.dat$month, mean.n=0.5151)

z.data.final <- within(z.data.final, quartile <- as.integer(cut(road.park, quantile(road.park,
probs=0:4/4), include.lowest=TRUE)))

z.data.final$quartile<-as.factor(z.data.final$quartile)
# road.park.mod.2<-glmmadmb(n~(road.park)+(1|lake) +(1|month),
#                 data=z.data.final,
#                 zeroInflation=FALSE,
#                 family = "poisson")
# road.park.mod.quad<-glmmadmb(n~(road.park+road.park^2)+(1|lake) +(1|month),
#                 data=z.data.final,
#                 zeroInflation=FALSE,
#                 family = "nbinom1")
# road.park.mod.cube<-glmmadmb(n~(road.park+road.park^2+road.park^3)+(1|lake)
+(1|month),
#                 data=z.data.final,
#                 zeroInflation=FALSE,
#                 family = "nbinom1")
##original models, used as preliminary analysis for which polynomial was best fit
road.park.nb <- glmer.nb(n ~ road.park + (1|lake) +(1|month), data=z.data.final,
verbose=TRUE) ##top
road.park.nb.2 <- glmer.nb(n ~ poly(road.park,2)+ (1|lake) +(1|month), data=z.data.final,
verbose=TRUE)
road.park.nb.3 <- glmer.nb(n ~ poly(road.park,3)+ (1|lake) +(1|month), data=z.data.final,
verbose=TRUE)
road.park.nb.4 <- glmer.nb(n ~ poly(road.park,4)+ (1|lake) +(1|month), data=z.data.final,
verbose=TRUE, control=glmerControl(optimizer="bobyqa")) ##could not converge
properly
AICc(road.park.nb, road.park.nb.2, road.park.nb.3,road.park.nb.4)  #4-3-2-1 AND better
descriptor than park
```

```
park.nb<-glmer.nb(n ~ park+ (1|lake) +(1|month), data=z.data.final, verbose=TRUE)
park.nb2<-glmer.nb(n ~ poly(park,2)+ (1|lake) +(1|month), data=z.data.final,
verbose=TRUE)
park.nb3<-glmer.nb(n ~ poly(park,3)+ (1|lake) +(1|month), data=z.data.final,
verbose=TRUE) ##top
park.nb4<-glmer.nb(n ~ poly(park,4)+ (1|lake) +(1|month), data=z.data.final,
verbose=TRUE)
AICc(park.nb, park.nb2, park.nb3,park.nb4) #3,4,2,1 AND worse descripter than
road.park

shore.nb<-glmer.nb(n ~ shore.type+ (1|lake) +(1|month), data=z.data.final,
verbose=TRUE, control=glmerControl(optimizer="bobyqa"))
wood.nb<-glmer.nb(n ~ wood+ (1|lake) +(1|month), data=z.data.final, verbose=TRUE)
breakwater.nb<-glmer.nb(n ~ breakwater+ (1|lake) +(1|month), data=z.data.final,
verbose=TRUE)

camp.nb <- glmer.nb(n ~ camp + (1|lake) +(1|month), data=z.data.final, verbose=TRUE)
camp.nb.2 <- glmer.nb(n ~ poly(camp,2)+ (1|lake) +(1|month), data=z.data.final,
verbose=TRUE)
camp.nb.3 <- glmer.nb(n ~ poly(camp,3)+ (1|lake) +(1|month), data=z.data.final,
verbose=TRUE)
camp.nb.4 <- glmer.nb(n ~ poly(camp,4)+ (1|lake) +(1|month), data=z.data.final,
verbose=TRUE)
AICc(camp.nb, camp.nb.2, camp.nb.3,camp.nb.4)  #3,4,2,1

road.dist.nb <- glmer.nb(n ~ road + (1|lake) +(1|month), data=z.data.final,
verbose=TRUE)
road.dist.nb.2 <- glmer.nb(n ~ poly(road,2)+ (1|lake) +(1|month), data=z.data.final,
verbose=TRUE)
road.dist.nb.3 <- glmer.nb(n ~ poly(road,3)+ (1|lake) +(1|month), data=z.data.final,
verbose=TRUE)
road.dist.nb.4 <- glmer.nb(n ~ poly(road,4)+ (1|lake) +(1|month), data=z.data.final,
verbose=TRUE)
AICc(road.dist.nb,road.dist.nb.2,road.dist.nb.3,road.dist.nb.4) #3,4,1,2

maxdepth.nb <- glmer.nb(n ~ maxdepth + (1|lake) +(1|month), data=z.data.final,
verbose=TRUE)
maxdepth.nb.2 <- glmer.nb(n ~ poly(maxdepth,2)+ (1|lake) +(1|month), data=z.data.final,
verbose=TRUE)
maxdepth.nb.3 <- glmer.nb(n ~ poly(maxdepth,3)+ (1|lake) +(1|month), data=z.data.final,
verbose=TRUE)
maxdepth.nb.4 <- glmer.nb(n ~ poly(maxdepth,4)+ (1|lake) +(1|month), data=z.data.final,
verbose=TRUE)
maxdepth.nb.5 <- glmer.nb(n ~ poly(maxdepth,5)+ (1|lake) +(1|month), data=z.data.final,
verbose=TRUE)
```

```
AICc(maxdepth.nb, maxdepth.nb.2,maxdepth.nb.3,maxdepth.nb.4) #4,2,3,1 #AND better
than mean depth

meandepth.nb <- glmer.nb(n ~ meandepth + (1|lake) +(1|month), data=z.data.final,
verbose=TRUE)
meandepth.nb.2 <- glmer.nb(n ~ poly(meandepth,2)+ (1|lake) +(1|month),
data=z.data.final, verbose=TRUE)
meandepth.nb.3 <- glmer.nb(n ~ poly(meandepth,3)+ (1|lake) +(1|month),
data=z.data.final, verbose=TRUE)
meandepth.nb.4 <- glmer.nb(n ~ poly(meandepth,4)+ (1|lake) +(1|month),
data=z.data.final, verbose=TRUE)
meandepth.nb.5 <- glmer.nb(n ~ poly(meandepth,4)+ (1|lake) +(1|month),
data=z.data.final, verbose=TRUE)
AICc(meandepth.nb, meandepth.nb.2,meandepth.nb.3,meandepth.nb.4) #4,3,2,1 AND
worse than max depth

slope.nb <- glmer.nb(n ~ slope + (1|lake) +(1|month), data=z.data.final, verbose=TRUE)
slope.nb.2 <- glmer.nb(n ~ poly(slope,2)+ (1|lake) +(1|month), data=z.data.final,
verbose=TRUE)
slope.nb.3 <- glmer.nb(n ~ poly(slope,3)+ (1|lake) +(1|month), data=z.data.final,
verbose=TRUE)
slope.nb.4 <- glmer.nb(n ~ poly(slope,4)+ (1|lake) +(1|month), data=z.data.final,
verbose=TRUE)
AICc(slope.nb, slope.nb.2, slope.nb.3, slope.nb.4) # 4,2,3,1

#####new models, test each hypothesis

waterbody.mod<-glmer.nb(n ~ lake+ (1|month), data=z.data.final, verbose=TRUE)
road.park.nb.4 <- glmer.nb(n ~ poly(road.park,4)+(1|month), data=z.data.final,
verbose=TRUE, control=glmerControl(optimizer="bobyqa")) ##could not converge
properly
null.simple<-glmer.nb(n~(1) +(1|month), data=z.data.final, verbose=TRUE,
control=glmerControl(optimizer="bobyqa"))
fish.hab.nb.1<-glmer.nb(n~ poly(maxdepth, 4) +breakwater +wood
+(1|month)+(1|quartile), data=z.data.final, verbose=TRUE,
control=glmerControl(optimizer="bobyqa"))
non.fish.nb.1<-glmer.nb(n~ poly(camp, 3)  +shore.type+ poly(slope,4)
+(1|month)+(1|quartile), data=z.data.final, verbose=TRUE,
control=glmerControl(optimizer="bobyqa"))

first.nb.aic<-AICc(waterbody.mod, road.park.nb.4, fish.hab.nb.1, non.fish.nb.1,
null.simple)
first.nb.aic<-first.nb.aic[order(first.nb.aic$AICc),]

first.nb.aic$delta.aicc<-first.nb.aic$AICc-min(first.nb.aic$AICc)
######################## top model was parking, now to the next level
```

```
shore.nb<-glmer.nb(n ~ shore.type + (1|lake)+(1|month)+(1|quartile), data=z.data.final,
verbose=TRUE, control=glmerControl(optimizer="bobyqa"))
wood.nb<-glmer.nb(n ~ wood +(1|lake)+(1|month)+(1|quartile), data=z.data.final,
verbose=TRUE)
breakwater.nb<-glmer.nb(n ~ breakwater+(1|lake)+ (1|month)+(1|quartile),
data=z.data.final, verbose=TRUE)
camp.nb.3 <- glmer.nb(n ~ poly(camp,3)+(1|lake)+(1|month)+(1|quartile),
data=z.data.final, verbose=TRUE)
road.dist.nb.3 <- glmer.nb(n ~ poly(road,3)+ (1|lake)+(1|month)+(1|quartile),
data=z.data.final, verbose=TRUE)
maxdepth.nb.4 <- glmer.nb(n ~ poly(maxdepth,4)+(1|lake)+(1|month)+(1|quartile),
data=z.data.final, verbose=TRUE)
slope.nb.4 <- glmer.nb(n ~ poly(slope,4) +(1|lake)+(1|month)+(1|quartile),
data=z.data.final, verbose=TRUE)

fish.hab.nb.1<-glmer.nb(n~ poly(maxdepth, 4) +breakwater +wood+ (1|lake)
+(1|month)+(1|quartile), data=z.data.final, verbose=TRUE,
control=glmerControl(optimizer="bobyqa"))
non.fish.nb.1<-glmer.nb(n~ poly(camp, 3)  +shore.type+ poly(slope,4)+ (1|lake)
+(1|month)+(1|quartile), data=z.data.final, verbose=TRUE,
control=glmerControl(optimizer="bobyqa"))
simple.nb.1<-glmer.nb(n~(1)+ (1|lake) +(1|month)+(1|quartile), data=z.data.final,
verbose=TRUE, control=glmerControl(optimizer="bobyqa"))

glm.nb.aic<-
AICc(shore.nb,wood.nb,breakwater.nb,camp.nb.3,road.dist.nb.3,maxdepth.nb.4,slope.nb.
4, fish.hab.nb.1, non.fish.nb.1, simple.nb.1)
glm.nb.aic<-glm.nb.aic[order(glm.nb.aic$AICc),]
glm.nb.aic$delta.aicc<-glm.nb.aic$AICc-min(glm.nb.aic$AICc)
```

Appendix 2-C. Raw data of incomplete bank angler trips collected from creel surveys in 2014 and 2015 used for ensemble modeling.

Easting	Northing	waterbody	year
679015	4536492	BranchedOak	2015
677399	4536760	BranchedOak	2015
677386	4536683	BranchedOak	2015
677287	4536550	BranchedOak	2015
677332	4536611	BranchedOak	2015
677356	4536699	BranchedOak	2015
680415	4538597	BranchedOak	2015
680425	4538559	BranchedOak	2015
680477	4538551	BranchedOak	2015
680464	4538552	BranchedOak	2015
680448	4538554	BranchedOak	2015
680397	4538550	BranchedOak	2015
677550	4537436	BranchedOak	2015
677177	4536498	BranchedOak	2015
677299	4536559	BranchedOak	2015
680447	4538556	BranchedOak	2015
677356	4536699	BranchedOak	2015
680081	4538732	BranchedOak	2015
680014	4538737	BranchedOak	2015
680939	4538278	BranchedOak	2015
678929	4538144	BranchedOak	2015
680415	4538600	BranchedOak	2015
677344	4536615	BranchedOak	2015
677373	4536627	BranchedOak	2015
679803	4539433	BranchedOak	2015
680322	4537076	BranchedOak	2015
680420	4538566	BranchedOak	2015
680070	4538725	BranchedOak	2015
680386	4538569	BranchedOak	2015
680017	4539018	BranchedOak	2015
680035	4539080	BranchedOak	2015
680386	4538574	BranchedOak	2015
680452	4538554	BranchedOak	2015
680452	4538554	BranchedOak	2015
678541	4539605	BranchedOak	2015
680414	4538601	BranchedOak	2015
680457	4538554	BranchedOak	2015
680451	4538553	BranchedOak	2015
680445	4538553	BranchedOak	2015
680432	4538557	BranchedOak	2015
682427	4538557	BranchedOak	2015
680425	4538559	BranchedOak	2015
679989	4538747	BranchedOak	2015
680025	4539212	BranchedOak	2015
679812	4538794	BranchedOak	2015
679802	4538801	BranchedOak	2015
679797	4538808	BranchedOak	2015
679784	4538815	BranchedOak	2015
678549	4539599	BranchedOak	2015
680426	4538559	BranchedOak	2015
677313	4536586	BranchedOak	2015
677289	4536551	BranchedOak	2015
679378	4539171	BranchedOak	2015
679440	4539099	BranchedOak	2015
679855	4538768	BranchedOak	2015
680001	4539039	BranchedOak	2015
680018	4539019	BranchedOak	2015
679928	4538770	BranchedOak	2015
679928	4538768	BranchedOak	2015
680908	4538277	BranchedOak	2015
677820	4537398	BranchedOak	2015
680434	4538612	BranchedOak	2015
680603	4538539	BranchedOak	2015
680000	4539049	BranchedOak	2015
680006	4539219	BranchedOak	2015
679950	4538761	BranchedOak	2015
679985	4538747	BranchedOak	2015
676931	4537130	BranchedOak	2015
677343	4536622	BranchedOak	2015
676920	4537154	BranchedOak	2015
678564	4539605	BranchedOak	2015
678564	4539605	BranchedOak	2015
679824	4539442	BranchedOak	2015
679855	4539483	BranchedOak	2015
680035	4539157	BranchedOak	2015
680030	4539132	BranchedOak	2015
680028	4539120	BranchedOak	2015
680010	4539076	BranchedOak	2015

Easting	Northing	waterbody	year
680021	4539028	BranchedOak	2015
680061	4539019	BranchedOak	2015
680001	4538741	BranchedOak	2015
680025	4538736	BranchedOak	2015
680484	4538547	BranchedOak	2015
680413	4538572	BranchedOak	2015
680412	4538578	BranchedOak	2015
680458	4538551	BranchedOak	2015
680430	4538556	BranchedOak	2015
680454	4538553	BranchedOak	2015
680462	4538550	BranchedOak	2015
680477	4538545	BranchedOak	2015
679965	4538752	BranchedOak	2015
679977	4538749	BranchedOak	2015
679989	4538745	BranchedOak	2015
680004	4538742	BranchedOak	2015
680005	4538740	BranchedOak	2015
680391	4538552	BranchedOak	2015
680443	4538551	BranchedOak	2015
680473	4538544	BranchedOak	2015
680474	4538552	BranchedOak	2015
680438	4538554	BranchedOak	2015
680436	4538555	BranchedOak	2015
680432	4538556	BranchedOak	2015
680426	4538556	BranchedOak	2015
680026	4539014	BranchedOak	2015
680009	4539014	BranchedOak	2015
678789	4537975	BranchedOak	2015
680443	4539105	BranchedOak	2015
680434	4538555	BranchedOak	2015
680444	4538552	BranchedOak	2015
677346	4536616	BranchedOak	2015
680442	4538556	BranchedOak	2015
680901	4538222	BranchedOak	2015
677805	4537397	BranchedOak	2015
677832	4537425	BranchedOak	2015
677832	4537425	BranchedOak	2015
678545	4539612	BranchedOak	2015
677338	4536615	BranchedOak	2015
680064	4539016	BranchedOak	2015
680410	4538545	BranchedOak	2015
680440	4538552	BranchedOak	2015
677379	4536667	BranchedOak	2015
680436	4538556	BranchedOak	2015
680436	4538555	BranchedOak	2015
680426	4538555	BranchedOak	2015
679970	4538754	BranchedOak	2015
679755	4538835	BranchedOak	2015
680443	4538528	BranchedOak	2015
680066	4538725	BranchedOak	2015
679982	4538748	BranchedOak	2015
679935	4538766	BranchedOak	2015
679975	4538752	BranchedOak	2015
680006	4539015	BranchedOak	2015
679859	4539467	BranchedOak	2015
679813	4539437	BranchedOak	2015
680907	4538262	BranchedOak	2015
677338	4536631	BranchedOak	2015
677391	4536754	BranchedOak	2015
677889	4537492	BranchedOak	2015
679988	4538748	BranchedOak	2015
679998	4538743	BranchedOak	2015
680257	4538637	BranchedOak	2015
680338	4538573	BranchedOak	2015
680443	4538564	BranchedOak	2015
679766	4538828	BranchedOak	2015
679759	4538836	BranchedOak	2015
679746	4538861	BranchedOak	2015
678967	4538158	BranchedOak	2015
677356	4536615	BranchedOak	2015
677374	4536632	BranchedOak	2015
677380	4536672	BranchedOak	2015
680400	4538582	BranchedOak	2015
680397	4538551	BranchedOak	2015
680492	4538544	BranchedOak	2015
680485	4538542	BranchedOak	2015
680436	4538554	BranchedOak	2015
680424	4538557	BranchedOak	2015
680069	4538725	BranchedOak	2015
679997	4538746	BranchedOak	2015
680022	4538736	BranchedOak	2015
680028	4539121	BranchedOak	2015
679997	4539073	BranchedOak	2015
680005	4539074	BranchedOak	2015
678603	4539635	BranchedOak	2015
680459	4538553	BranchedOak	2015

Easting	Northing	waterbody	year
680439	4538554	BranchedOak	2015
680012	4539016	BranchedOak	2015
679770	4538828	BranchedOak	2015
679769	4538829	BranchedOak	2015
679758	4538837	BranchedOak	2015
678608	4539597	BranchedOak	2015
677439	4536794	BranchedOak	2015
679862	4539464	BranchedOak	2015
679816	4539433	BranchedOak	2015
680480	4538546	BranchedOak	2015
680471	4538549	BranchedOak	2015
680411	4538911	BranchedOak	2015
680496	4538549	BranchedOak	2015
680474	4538550	BranchedOak	2015
680023	4538737	BranchedOak	2015
677366	4536667	BranchedOak	2015
677389	4536758	BranchedOak	2015
679763	4538830	BranchedOak	2015
679740	4538897	BranchedOak	2015
680018	4538739	BranchedOak	2015
680073	4538734	BranchedOak	2015
680365	4538581	BranchedOak	2015
680365	4538580	BranchedOak	2015
680368	4538582	BranchedOak	2015
677351	4536628	BranchedOak	2015
680096	4538737	BranchedOak	2015
680005	4539015	BranchedOak	2015
680088	4538934	BranchedOak	2015
679997	4538741	BranchedOak	2015
677344	4536615	BranchedOak	2015
677304	4536576	BranchedOak	2015
677174	4536492	BranchedOak	2015
680906	4538270	BranchedOak	2015
677250	4536542	BranchedOak	2015
677260	4536544	BranchedOak	2015
680003	4538742	BranchedOak	2015
677300	4536596	BranchedOak	2015
680477	4538549	BranchedOak	2015
680428	4538557	BranchedOak	2015
677278	4536590	BranchedOak	2015
677250	4536542	BranchedOak	2015
677175	4536500	BranchedOak	2015
680476	4538551	BranchedOak	2015

Easting	Northing	waterbody	year
677310	4536580	BranchedOak	2015
677575	4537474	BranchedOak	2015
679699	4538897	BranchedOak	2015
680427	4538556	BranchedOak	2015
677281	4536594	BranchedOak	2015
680413	4538543	BranchedOak	2015
678543	4539612	BranchedOak	2015
677598	4537478	BranchedOak	2015
677672	4537474	BranchedOak	2015
677264	4536550	BranchedOak	2015
679951	4538759	BranchedOak	2015
679999	4538738	BranchedOak	2015
677584	4539704	BranchedOak	2015
677400	4539687	BranchedOak	2015
680845	4538108	BranchedOak	2015
680919	4538194	BranchedOak	2015
680961	4538381	BranchedOak	2015
680005	4539018	BranchedOak	2015
679776	4539415	BranchedOak	2015
679720	4538867	BranchedOak	2015
679715	4538883	BranchedOak	2015
680413	4538542	BranchedOak	2014
680433	4539099	BranchedOak	2014
677851	4537447	BranchedOak	2014
677787	4537396	BranchedOak	2014
679295	4537851	BranchedOak	2014
680400	4538547	BranchedOak	2014
680431	4538997	BranchedOak	2014
677375	4536627	BranchedOak	2014
680063	4538722	BranchedOak	2014
680428	4538613	BranchedOak	2014
680002	4538739	BranchedOak	2014
679975	4538749	BranchedOak	2014
680408	4538619	BranchedOak	2014
680473	4538546	BranchedOak	2014
680428	4538705	BranchedOak	2014
680433	4539099	BranchedOak	2014
677851	4537447	BranchedOak	2014
677787	4537396	BranchedOak	2014
679295	4537851	BranchedOak	2014
680400	4538547	BranchedOak	2014
680130	4538591	BranchedOak	2014
679697	4538920	BranchedOak	2014

Easting	Northing	waterbody	year
680046	4539019	BranchedOak	2014
680389	4538585	BranchedOak	2014
680435	4538612	BranchedOak	2014
680315	4537128	BranchedOak	2014
676916	4537174	BranchedOak	2014
680260	4537069	BranchedOak	2014
680430	4538614	BranchedOak	2014
680398	4538607	BranchedOak	2014
680066	4538728	BranchedOak	2014
680404	4538616	BranchedOak	2014
680446	4538609	BranchedOak	2014
680453	4538606	BranchedOak	2014
678983	4538173	BranchedOak	2014
677307	4536589	BranchedOak	2014
679296	4537817	BranchedOak	2015
680750	4538937	BranchedOak	2015
680374	4538573	BranchedOak	2015
680074	4538687	BranchedOak	2015
680456	4539112	BranchedOak	2015
678856	4537980	BranchedOak	2015
679695	4538922	BranchedOak	2015
679266	4537870	BranchedOak	2015
679528	4537868	BranchedOak	2015
680299	4537112	BranchedOak	2015
680318	4537132	BranchedOak	2015
678959	4538183	BranchedOak	2015
678591	4537548	BranchedOak	2015
680986	4538600	BranchedOak	2015
680019	4539080	BranchedOak	2015
680073	4538724	BranchedOak	2015
677151	4536497	BranchedOak	2015
677389	4536688	BranchedOak	2015
678906	4538231	BranchedOak	2015
680476	4538549	BranchedOak	2015
679696	4538920	BranchedOak	2015
680710	4537836	BranchedOak	2015
680404	4538989	BranchedOak	2015
680404	4538989	BranchedOak	2015
677223	4536549	BranchedOak	2015
679814	4539445	BranchedOak	2015
680560	4537539	BranchedOak	2015
678576	4539601	BranchedOak	2015
680799	4538000	BranchedOak	2015

Easting	Northing	waterbody	year
680503	4537433	BranchedOak	2015
680794	4537994	BranchedOak	2015
680302	4537122	BranchedOak	2015
680481	4538549	BranchedOak	2015
680399	4538580	BranchedOak	2015
680433	4538552	BranchedOak	2015
680324	4537068	BranchedOak	2015
679336	4539327	BranchedOak	2015
680921	4538267	BranchedOak	2015
679999	4538741	BranchedOak	2015
680474	4538546	BranchedOak	2015
680435	4538553	BranchedOak	2015
677788	4537395	BranchedOak	2015
680791	4537977	BranchedOak	2015
680283	4538607	BranchedOak	2015
678935	4538138	BranchedOak	2015
680474	4538547	BranchedOak	2015
679964	4538751	BranchedOak	2015
680902	4538233	BranchedOak	2015
678921	4537949	BranchedOak	2015
680415	4538538	BranchedOak	2015
680471	4538548	BranchedOak	2015
680075	4538660	BranchedOak	2015
680463	4538548	BranchedOak	2015
680500	4538542	BranchedOak	2015
680460	4539114	BranchedOak	2015
680478	4538547	BranchedOak	2015
679827	4539440	BranchedOak	2015
678487	4537522	BranchedOak	2015
678579	4539602	BranchedOak	2015
680910	4538263	BranchedOak	2015
679610	4537190	BranchedOak	2015
679321	4537859	BranchedOak	2015
678862	4538073	BranchedOak	2015
678911	4538142	BranchedOak	2015
680295	4538590	BranchedOak	2015
680085	4538653	BranchedOak	2015
679030	4537965	BranchedOak	2015
678945	4537956	BranchedOak	2015
679327	4537818	BranchedOak	2015
679236	4537852	BranchedOak	2015
680445	4539116	BranchedOak	2015
680460	4539117	BranchedOak	2015

Easting	Northing	waterbody	year
679775	4538816	BranchedOak	2015
679948	4538757	BranchedOak	2015
680908	4538263	BranchedOak	2015
680070	4538720	BranchedOak	2015
678889	4538254	BranchedOak	2015
678932	4538138	BranchedOak	2015
677644	4537499	BranchedOak	2015
677646	4537499	BranchedOak	2015
680076	4538726	BranchedOak	2015
680447	4538553	BranchedOak	2015
678878	4538227	BranchedOak	2015
677143	4536490	BranchedOak	2015
680127	4538602	BranchedOak	2015
677166	4536489	BranchedOak	2015
677260	4536542	BranchedOak	2015
677199	4536555	BranchedOak	2015
678927	4538212	BranchedOak	2015
680465	4539122	BranchedOak	2015
680535	4539187	BranchedOak	2015
680475	4538547	BranchedOak	2015
678936	4538213	BranchedOak	2015
680476	4538547	BranchedOak	2015
680399	4538565	BranchedOak	2015
680409	4538592	BranchedOak	2015
680460	4539121	BranchedOak	2015
679855	4539487	BranchedOak	2015
678878	4538255	BranchedOak	2015
677374	4536672	BranchedOak	2015
680123	4538650	BranchedOak	2015
680094	4538568	BranchedOak	2015
679029	4536480	BranchedOak	2015
680405	4538618	BranchedOak	2015
677295	4536602	BranchedOak	2015
678942	4538138	BranchedOak	2015
677706	4537483	BranchedOak	2015
678926	4538140	BranchedOak	2015
680371	4538572	BranchedOak	2015
680088	4538655	BranchedOak	2015
680012	4539014	BranchedOak	2015
680418	4538543	BranchedOak	2015
680205	4538666	BranchedOak	2015
680910	4538287	BranchedOak	2015
677743	4537484	BranchedOak	2015

Easting	Northing	waterbody	year
680394	4538599	BranchedOak	2015
680477	4538540	BranchedOak	2015
680002	4539021	BranchedOak	2015
679995	4539073	BranchedOak	2015
680051	4539189	BranchedOak	2015
677295	4536597	BranchedOak	2015
678973	4538179	BranchedOak	2015
678545	4539605	BranchedOak	2015
680113	4538570	BranchedOak	2015
680071	4539164	BranchedOak	2015
679851	4538764	BranchedOak	2015
677709	4537485	BranchedOak	2015
677721	4537515	BranchedOak	2015
677297	4536564	BranchedOak	2015
680142	4538566	BranchedOak	2015
680436	4538553	BranchedOak	2015
680013	4539085	BranchedOak	2015
680512	4538542	BranchedOak	2015
680496	4538544	BranchedOak	2015
680024	4539015	BranchedOak	2015
680024	4539015	BranchedOak	2015
679982	4538743	BranchedOak	2015
679962	4538750	BranchedOak	2015
677545	4537428	BranchedOak	2015
677353	4536627	BranchedOak	2015
677386	4536679	BranchedOak	2015
678584	4539593	BranchedOak	2015
678538	4539605	BranchedOak	2015
680031	4538731	BranchedOak	2015
680062	4538766	BranchedOak	2015
680906	4538258	BranchedOak	2015
678973	4538183	BranchedOak	2015
677773	4537483	BranchedOak	2015
677330	4536605	BranchedOak	2015
680456	4538549	BranchedOak	2015
677358	4536624	BranchedOak	2015
680346	4538568	BranchedOak	2015
680432	4538555	BranchedOak	2015
678929	4538140	BranchedOak	2015
678540	4539605	BranchedOak	2015
677721	4537504	BranchedOak	2015
677927	4537495	BranchedOak	2015
677625	4537476	BranchedOak	2015

Easting	Northing	waterbody	year
678610	4539596	BranchedOak	2015
680420	4538540	BranchedOak	2015
677241	4536576	BranchedOak	2015
680441	4539094	BranchedOak	2015
680389	4538572	BranchedOak	2015
677836	4537426	BranchedOak	2015
679008	4538177	BranchedOak	2015
680433	4538555	BranchedOak	2015
680413	4538536	BranchedOak	2015
680899	4538221	BranchedOak	2015
680447	4538609	BranchedOak	2015
680436	4538554	BranchedOak	2015
680468	4538699	BranchedOak	2015
680431	4538613	BranchedOak	2015
680505	4539185	BranchedOak	2015
677344	4536620	BranchedOak	2015
680413	4538536	BranchedOak	2015
680439	4538553	BranchedOak	2015
680445	4538608	BranchedOak	2015
680002	4538732	BranchedOak	2015
680441	4538610	BranchedOak	2015
680436	4538558	BranchedOak	2015
680419	4538958	BranchedOak	2015
680422	4538992	BranchedOak	2015
679358	4536502	BranchedOak	2015
677707	4537479	BranchedOak	2015
680465	4538548	BranchedOak	2015
680502	4538543	BranchedOak	2015
677573	4537465	BranchedOak	2015
677770	4537496	BranchedOak	2015
679334	4537811	BranchedOak	2015
677648	4537494	BranchedOak	2015
677835	4537403	BranchedOak	2015
678569	4539588	BranchedOak	2015
677368	4536632	BranchedOak	2015
677709	4537487	BranchedOak	2015
677675	4537475	BranchedOak	2015
680433	4538553	BranchedOak	2015
679762	4538832	BranchedOak	2015
680475	4538547	BranchedOak	2015
680510	4538541	BranchedOak	2015
680015	4539075	BranchedOak	2015
678972	4538178	BranchedOak	2015

Easting	Northing	waterbody	year
677329	4536608	BranchedOak	2015
677652	4537491	BranchedOak	2015
680389	4538570	BranchedOak	2015
680416	4538540	BranchedOak	2015
680009	4538736	BranchedOak	2015
680914	4538372	BranchedOak	2015
680488	4539142	BranchedOak	2015
680407	4538543	BranchedOak	2015
680476	4538546	BranchedOak	2015
680045	4539205	BranchedOak	2015
678831	4537627	BranchedOak	2015
676914	4537177	BranchedOak	2015
677935	4537488	BranchedOak	2015
677898	4537487	BranchedOak	2015
678571	4539582	BranchedOak	2015
680240	4538666	BranchedOak	2015
680406	4538588	BranchedOak	2015
680735	4537873	BranchedOak	2015
680911	4538242	BranchedOak	2015
678608	4539591	BranchedOak	2015
677261	4536594	BranchedOak	2015
680043	4539029	BranchedOak	2015
680463	4539116	BranchedOak	2015
680845	4538109	BranchedOak	2015
679919	4538767	BranchedOak	2015
677345	4536658	BranchedOak	2015
678887	4538140	BranchedOak	2015
677617	4537496	BranchedOak	2015
677717	4537490	BranchedOak	2015
679750	4538852	BranchedOak	2015
680398	4538939	BranchedOak	2015
678999	4537959	BranchedOak	2015
679026	4537966	BranchedOak	2015
679068	4537964	BranchedOak	2015
679074	4537970	BranchedOak	2015
679120	4537983	BranchedOak	2015
679147	4537987	BranchedOak	2015
679219	4537996	BranchedOak	2015
679186	4537996	BranchedOak	2015
680433	4538914	BranchedOak	2015
680389	4538574	BranchedOak	2015
680055	4538877	BranchedOak	2015
677691	4537483	BranchedOak	2015

Easting	Northing	waterbody	year
679748	4538850	BranchedOak	2015
680056	4538753	BranchedOak	2015
680942	4538299	BranchedOak	2015
677734	4537501	BranchedOak	2015
678562	4539601	BranchedOak	2015
677319	4536613	BranchedOak	2015
677314	4536596	BranchedOak	2015
680457	4538549	BranchedOak	2015
680506	4538544	BranchedOak	2015
699952	4538545	BranchedOak	2015
680135	4538564	BranchedOak	2015
680408	4538939	BranchedOak	2015
680478	4538551	BranchedOak	2015
680868	4538090	BranchedOak	2015
677550	4537529	BranchedOak	2015
679065	4537942	BranchedOak	2015
680540	4539184	BranchedOak	2015
680947	4538274	BranchedOak	2015
679972	4539223	BranchedOak	2015
679849	4538764	BranchedOak	2015
677753	4537497	BranchedOak	2015
679314	4537865	BranchedOak	2015
680019	4538738	BranchedOak	2015
670378	4536507	BranchedOak	2015
677376	4536631	BranchedOak	2015
679015	4536495	BranchedOak	2015
679032	4536489	BranchedOak	2015
678899	4538152	BranchedOak	2015
680465	4538548	BranchedOak	2015
678905	4537663	BranchedOak	2015
677907	4537498	BranchedOak	2015
680423	4538554	BranchedOak	2015
680490	4538546	BranchedOak	2015
680475	4538544	BranchedOak	2015
680440	4538550	BranchedOak	2015
680462	4538553	BranchedOak	2015
680442	4538553	BranchedOak	2015
680467	4539122	BranchedOak	2015
677831	4537402	BranchedOak	2015
678867	4538067	BranchedOak	2015
679056	4537967	BranchedOak	2015
679078	4537967	BranchedOak	2015
679095	4537965	BranchedOak	2015

Easting	Northing	waterbody	year
680021	4539212	BranchedOak	2015
680132	4538576	BranchedOak	2015
680091	4538575	BranchedOak	2015
679256	4537983	BranchedOak	2015
680489	4538544	BranchedOak	2015
680004	4538741	BranchedOak	2015
680506	4539166	BranchedOak	2015
680462	4539138	BranchedOak	2015
678573	4539584	BranchedOak	2015
679203	4537943	BranchedOak	2015
680036	4539178	BranchedOak	2015
679012	4536484	BranchedOak	2015
680001	4539025	BranchedOak	2015
680314	4538579	BranchedOak	2015
680375	4538575	BranchedOak	2015
680444	4538551	BranchedOak	2015
680089	4538570	BranchedOak	2015
679985	4538744	BranchedOak	2015
677648	4537477	BranchedOak	2015
677826	4537434	BranchedOak	2015
676925	4537174	BranchedOak	2015
680264	4537059	BranchedOak	2015
677753	4537513	BranchedOak	2015
680456	4538600	BranchedOak	2015
680445	4538608	BranchedOak	2015
680509	4538545	BranchedOak	2015
677823	4537495	BranchedOak	2015
680147	4537014	BranchedOak	2015
679951	4538757	BranchedOak	2015
679988	4538747	BranchedOak	2015
678056	4537476	BranchedOak	2015
678568	4539580	BranchedOak	2015
680295	4538597	BranchedOak	2015
745225	4564393	BranchedOak	2014
680499	4538546	BranchedOak	2014
677819	4537445	BranchedOak	2014
677912	4537487	BranchedOak	2014
111111	1111111	BranchedOak	2014
111111	1111111	BranchedOak	2014
111111	1111111	BranchedOak	2014
680383	4538573	BranchedOak	2014
679783	4538815	BranchedOak	2014
677819	4537442	BranchedOak	2014

Easting	Northing	waterbody	year
677784	4537393	BranchedOak	2014
680409	4538543	BranchedOak	2014
678823	4537944	BranchedOak	2014
678909	4538141	BranchedOak	2014
679751	4538872	BranchedOak	2014
679747	4538904	BranchedOak	2014
680427	4538987	BranchedOak	2014
679219	4537997	BranchedOak	2014
680386	4538578	BranchedOak	2014
679985	4538745	BranchedOak	2014
679998	4538742	BranchedOak	2014
111111	1111111	BranchedOak	2014
680324	4537088	BranchedOak	2014
679994	4538742	BranchedOak	2014
679993	4538742	BranchedOak	2014
680386	4538576	BranchedOak	2014
677354	4536713	BranchedOak	2014
677375	4536627	BranchedOak	2014
679763	4538829	BranchedOak	2014
679774	4538824	BranchedOak	2014
679712	4538928	BranchedOak	2014
679775	4538822	BranchedOak	2014
680440	4538555	BranchedOak	2014
680046	4538724	BranchedOak	2014
680065	4538218	BranchedOak	2014
680514	4538542	BranchedOak	2014
680247	4537069	BranchedOak	2014
680212	4537045	BranchedOak	2014
677885	4537491	BranchedOak	2014
678905	4538177	BranchedOak	2014
680443	4538556	BranchedOak	2014
680474	4538547	BranchedOak	2014
680511	4538544	BranchedOak	2014
679706	4538923	BranchedOak	2014
677817	4537391	BranchedOak	2014
680069	4538718	BranchedOak	2014
679981	4538750	BranchedOak	2014
679942	4538767	BranchedOak	2014
680294	4538590	BranchedOak	2014
679805	4538798	BranchedOak	2014
678980	4538169	BranchedOak	2014
679772	4538823	BranchedOak	2014
679791	4538808	BranchedOak	2014
679793	4538808	BranchedOak	2014
679792	4538807	BranchedOak	2014
679995	4538744	BranchedOak	2014
679962	4538753	BranchedOak	2014
678961	4538136	BranchedOak	2014
678931	4538226	BranchedOak	2014
677786	4537400	BranchedOak	2014
680437	4538558	BranchedOak	2014
680467	4538552	BranchedOak	2014
680480	4538552	BranchedOak	2014
679952	4538761	BranchedOak	2014
680069	4538725	BranchedOak	2014
680003	4538743	BranchedOak	2014
679714	4538892	BranchedOak	2014
679771	4538825	BranchedOak	2014
679780	4538818	BranchedOak	2014
679794	4538807	BranchedOak	2014
680335	4538570	BranchedOak	2014
680435	4538561	BranchedOak	2014
680451	4538556	BranchedOak	2014
680477	4538551	BranchedOak	2014
680365	4538580	BranchedOak	2014
678933	4538133	BranchedOak	2014
678970	4538177	BranchedOak	2014
678984	4538170	BranchedOak	2014
680429	4538555	BranchedOak	2014
680423	4538603	BranchedOak	2014
680007	4539014	BranchedOak	2014
677176	4536512	BranchedOak	2014
679765	4538830	BranchedOak	2014
679791	4538810	BranchedOak	2014
680477	4538549	BranchedOak	2014
680021	4539013	BranchedOak	2014
678895	4538142	BranchedOak	2014
680439	4538553	BranchedOak	2014
679754	4538790	BranchedOak	2014
679800	4538803	BranchedOak	2014
679809	4538798	BranchedOak	2014
679826	4538783	BranchedOak	2014
679992	4538745	BranchedOak	2014
679967	4538752	BranchedOak	2014
678976	4538151	BranchedOak	2014
680411	4538582	BranchedOak	2014

Easting	Northing	waterbody	year
680432	4538557	BranchedOak	2014
680459	4538552	BranchedOak	2014
680477	4538548	BranchedOak	2014
680503	4538546	BranchedOak	2014
680330	4538571	BranchedOak	2014
680059	4538771	BranchedOak	2014
680017	4539077	BranchedOak	2014
679796	4539413	BranchedOak	2014
679747	4538907	BranchedOak	2014
677224	4536555	BranchedOak	2014
680448	4538551	BranchedOak	2014
680437	4538554	BranchedOak	2014
679796	4538806	BranchedOak	2014
679758	4538835	BranchedOak	2014
680070	4538734	BranchedOak	2014
679997	4538741	BranchedOak	2014
679993	4538742	BranchedOak	2014
679988	4538744	BranchedOak	2014
679981	4538748	BranchedOak	2014
679964	4538754	BranchedOak	2014
680385	4538568	BranchedOak	2014
680428	4538555	BranchedOak	2014
680081	4538730	BranchedOak	2014
680033	4538729	BranchedOak	2014
680003	4539073	BranchedOak	2014
678939	4538132	BranchedOak	2014
679317	4537946	BranchedOak	2014
680432	4538556	BranchedOak	2014
680448	4538552	BranchedOak	2014
680006	4538741	BranchedOak	2014
679961	4538756	BranchedOak	2014
680026	4539212	BranchedOak	2014
679786	4538812	BranchedOak	2014
679806	4538798	BranchedOak	2014
679846	4538769	BranchedOak	2014
679317	4537945	BranchedOak	2014
678904	4538143	BranchedOak	2014
678930	4538132	BranchedOak	2014
680408	4538582	BranchedOak	2014
680466	4538551	BranchedOak	2014
680442	4538555	BranchedOak	2014
680433	4539001	BranchedOak	2014
680464	4539123	BranchedOak	2014

Easting	Northing	waterbody	year
679996	4539076	BranchedOak	2014
680412	4538576	BranchedOak	2014
680476	4538548	BranchedOak	2014
678893	4538142	BranchedOak	2014
677822	4537433	BranchedOak	2014
677819	4537397	BranchedOak	2014
679961	4538756	BranchedOak	2014
679967	4538751	BranchedOak	2014
677382	4536671	BranchedOak	2014
677374	4536628	BranchedOak	2014
677358	4536619	BranchedOak	2014
678974	4538155	BranchedOak	2014
680965	4538380	BranchedOak	2014
679996	4539021	BranchedOak	2014
679776	4538822	BranchedOak	2014
678841	4537969	BranchedOak	2014
679962	4538754	BranchedOak	2014
680006	4538741	BranchedOak	2014
680414	4538575	BranchedOak	2014
680429	4538558	BranchedOak	2014
680441	4538556	BranchedOak	2014
680451	4538556	BranchedOak	2014
680473	4538550	BranchedOak	2014
680274	4538608	BranchedOak	2014
678920	4538143	BranchedOak	2014
680436	4538560	BranchedOak	2014
680466	4538550	BranchedOak	2014
677382	4536674	BranchedOak	2014
677375	4536635	BranchedOak	2014
677348	4536618	BranchedOak	2014
680428	4538556	BranchedOak	2014
680440	4538553	BranchedOak	2014
680464	4538551	BranchedOak	2014
680440	4538555	BranchedOak	2014
679999	4538741	BranchedOak	2014
679984	4538746	BranchedOak	2014
679964	4538752	BranchedOak	2014
679713	4538928	BranchedOak	2014
679799	4538802	BranchedOak	2014
679806	4538798	BranchedOak	2014
677830	4537405	BranchedOak	2014
677819	4537398	BranchedOak	2014
677886	4537487	BranchedOak	2014

Easting	Northing	waterbody	year
680434	4538557	BranchedOak	2014
680448	4538551	BranchedOak	2014
680477	4538550	BranchedOak	2014
680459	4538551	BranchedOak	2014
680035	4539186	BranchedOak	2014
680000	4539048	BranchedOak	2014
680388	4538580	BranchedOak	2014
680459	4538551	BranchedOak	2014
680442	4538552	BranchedOak	2014
680480	4538547	BranchedOak	2014
680443	4538556	BranchedOak	2014
680046	4539030	BranchedOak	2014
678876	4538238	BranchedOak	2014
680018	4539016	BranchedOak	2014
680002	4539033	BranchedOak	2014
680035	4539057	BranchedOak	2014
679996	4539075	BranchedOak	2014
680025	4539118	BranchedOak	2014
680015	4538737	BranchedOak	2014
679759	4538836	BranchedOak	2014
680002	4539022	BranchedOak	2014
679708	4538926	BranchedOak	2014
680019	4538736	BranchedOak	2014
680437	4538555	BranchedOak	2014
679656	4538924	BranchedOak	2014
680021	4538735	BranchedOak	2014
677796	4537399	BranchedOak	2014
680037	4539048	BranchedOak	2014
680000	4538742	BranchedOak	2014
679988	4538744	BranchedOak	2014
680432	4538556	BranchedOak	2014
680442	4538556	BranchedOak	2014
680022	4538733	BranchedOak	2014
677824	4537443	BranchedOak	2014
679783	4538815	BranchedOak	2014
680004	4539016	BranchedOak	2014
679980	4538749	BranchedOak	2014
678897	4538253	BranchedOak	2014
680907	4538263	BranchedOak	2014
680039	4539040	BranchedOak	2014
680029	4538730	BranchedOak	2014
679768	4538828	BranchedOak	2014
680461	4538549	BranchedOak	2014
679975	4538749	BranchedOak	2014
679999	4538741	BranchedOak	2014
680028	4538733	BranchedOak	2014
680016	4538737	BranchedOak	2014
678897	4538143	BranchedOak	2014
680066	4538711	BranchedOak	2014
680022	4538736	BranchedOak	2014
679810	4538797	BranchedOak	2014
680009	4539017	BranchedOak	2014
677844	4537469	BranchedOak	2014
678992	4538172	BranchedOak	2014
680009	4539015	BranchedOak	2014
680475	4538552	BranchedOak	2014
680332	4538568	BranchedOak	2014
680070	4538727	BranchedOak	2014
679995	4539075	BranchedOak	2014
680002	4539036	BranchedOak	2014
680441	4538553	BranchedOak	2014
679257	4537996	BranchedOak	2014
678854	4537985	BranchedOak	2014
680438	4539030	BranchedOak	2014
680006	4538740	BranchedOak	2014
680475	4538546	BranchedOak	2014
680058	4538742	BranchedOak	2014
679953	4538757	BranchedOak	2014
679823	4538785	BranchedOak	2014
679748	4538844	BranchedOak	2014
680065	4538701	BranchedOak	2014
679018	4538177	BranchedOak	2014
677375	4536731	BranchedOak	2014
680514	4539185	BranchedOak	2014
680321	4538574	BranchedOak	2014
680480	4538551	BranchedOak	2014
680491	4538547	BranchedOak	2014
680439	4538554	BranchedOak	2014
680445	4538551	BranchedOak	2014
680361	4538566	BranchedOak	2014
680039	4538725	BranchedOak	2014
679979	4538748	BranchedOak	2014
679949	4538758	BranchedOak	2014
680028	4539013	BranchedOak	2014
680407	4538578	BranchedOak	2014
678903	4538237	BranchedOak	2014

Easting	Northing	waterbody	year
679084	4537976	BranchedOak	2014
679181	4537992	BranchedOak	2014
678773	4537658	BranchedOak	2014
680906	4538267	BranchedOak	2014
680913	4538380	BranchedOak	2014
680315	4538573	BranchedOak	2014
680039	4539047	BranchedOak	2014
680029	4539015	BranchedOak	2014
680474	4538547	BranchedOak	2014
677832	4537426	BranchedOak	2014
677831	4537435	BranchedOak	2014
680450	4538546	BranchedOak	2014
680308	4537129	BranchedOak	2014
677789	4537395	BranchedOak	2014
677834	4537434	BranchedOak	2014
680006	4539016	BranchedOak	2014
680035	4539172	BranchedOak	2014
680474	4538546	BranchedOak	2014
679998	4538742	BranchedOak	2014
679950	4538759	BranchedOak	2014
680005	4539015	BranchedOak	2014
678860	4538033	BranchedOak	2014
680357	4538578	BranchedOak	2014
679154	4537981	BranchedOak	2014
680431	4538552	BranchedOak	2014
680446	4538554	BranchedOak	2014
680063	4538725	BranchedOak	2014
680938	4538281	BranchedOak	2014
680445	4538553	BranchedOak	2014
680501	4538545	BranchedOak	2014
680476	4538550	BranchedOak	2014
680448	4539121	BranchedOak	2014
680439	4538554	BranchedOak	2014
680334	4538572	BranchedOak	2014
680064	4538706	BranchedOak	2014
680058	4538770	BranchedOak	2014
679014	4538173	BranchedOak	2014
677833	4537427	BranchedOak	2014
678444	4537547	BranchedOak	2014
678860	4538035	BranchedOak	2014
678867	4538085	BranchedOak	2014
678902	4538243	BranchedOak	2014
678865	4538265	BranchedOak	2014

Easting	Northing	waterbody	year
680390	4538585	BranchedOak	2014
680444	4538550	BranchedOak	2014
679187	4537992	BranchedOak	2014
680394	4538548	BranchedOak	2014
680443	4538558	BranchedOak	2014
680475	4538552	BranchedOak	2014
680471	4538551	BranchedOak	2014
680478	4538544	BranchedOak	2014
679659	4538913	BranchedOak	2014
679776	4538820	BranchedOak	2014
679750	4538853	BranchedOak	2014
678526	4539616	BranchedOak	2014
678568	4539579	BranchedOak	2014
679119	4537983	BranchedOak	2014
679294	4537820	BranchedOak	2014
680060	4538704	BranchedOak	2014
680003	4538739	BranchedOak	2014
680476	4538545	BranchedOak	2014
680353	4538569	BranchedOak	2014
678878	4537657	BranchedOak	2014
677830	4537399	BranchedOak	2014
679809	4538796	BranchedOak	2014
679790	4538805	BranchedOak	2014
680031	4539182	BranchedOak	2014
678972	4538173	BranchedOak	2014
678878	4538254	BranchedOak	2014
676905	4537204	BranchedOak	2014
680068	4538725	BranchedOak	2014
677793	4537397	BranchedOak	2014
677915	4537488	BranchedOak	2014
680071	4538660	BranchedOak	2014
680451	4538551	BranchedOak	2014
680480	4538547	BranchedOak	2014
680938	4538288	BranchedOak	2014
680308	4538581	BranchedOak	2014
680070	4538609	BranchedOak	2014
680007	4539016	BranchedOak	2014
680390	4538581	BranchedOak	2014
677363	4536644	BranchedOak	2014
677372	4536677	BranchedOak	2014
680043	4539198	BranchedOak	2014
680039	4539080	BranchedOak	2014
680444	4538551	BranchedOak	2014

Easting	Northing	waterbody	year
680477	4538549	BranchedOak	2014
678864	4538261	BranchedOak	2014
679191	4537986	BranchedOak	2014
680408	4538586	BranchedOak	2014
680003	4538740	BranchedOak	2014
679837	4538777	BranchedOak	2014
679688	4538925	BranchedOak	2014
679688	4538925	BranchedOak	2014
678885	4538250	BranchedOak	2014
678864	4538095	BranchedOak	2014
678956	4538197	BranchedOak	2014
678933	4538137	BranchedOak	2014
680432	4538559	BranchedOak	2014
680346	4538592	BranchedOak	2014
680393	4538574	BranchedOak	2014
680510	4538544	BranchedOak	2014
680409	4538541	BranchedOak	2014
679996	4539073	BranchedOak	2014
678927	4538221	BranchedOak	2014
678908	4538141	BranchedOak	2014
678849	4538076	BranchedOak	2014
680007	4539015	BranchedOak	2014
680063	4538769	BranchedOak	2014
679311	4537947	BranchedOak	2014
679029	4537959	BranchedOak	2014
680477	4538552	BranchedOak	2014
679214	4537930	BranchedOak	2014
677654	4537477	BranchedOak	2014
677631	4537509	BranchedOak	2014
678581	4539585	BranchedOak	2014
679749	4538845	BranchedOak	2014
677862	4537480	BranchedOak	2014
680386	4538578	BranchedOak	2014
680005	4539017	BranchedOak	2014
680441	4538553	BranchedOak	2014
677654	4537489	BranchedOak	2014
677635	4537494	BranchedOak	2014
677556	4537439	BranchedOak	2014
678970	4538181	BranchedOak	2014
678947	4538205	BranchedOak	2014
680064	4538696	BranchedOak	2014
679956	4538757	BranchedOak	2014
678943	4538204	BranchedOak	2014

Easting	Northing	waterbody	year
679323	4537931	BranchedOak	2014
679053	4537962	BranchedOak	2014
678997	4537950	BranchedOak	2014
678911	4538143	BranchedOak	2014
678884	4537655	BranchedOak	2014
678448	4537543	BranchedOak	2014
678761	4537596	BranchedOak	2014
679948	4538761	BranchedOak	2014
680459	4538549	BranchedOak	2014
680480	4538547	BranchedOak	2014
680510	4538547	BranchedOak	2014
676912	4537186	BranchedOak	2014
677346	4536619	BranchedOak	2014
677368	4536631	BranchedOak	2014
677380	4536669	BranchedOak	2014
679303	4537799	BranchedOak	2014
679171	4537985	BranchedOak	2014
678946	4537954	BranchedOak	2014
678858	4537972	BranchedOak	2014
678878	4537962	BranchedOak	2014
680909	4538278	BranchedOak	2014
680469	4538548	BranchedOak	2014
680394	4538559	BranchedOak	2014
680289	4537097	BranchedOak	2014
678891	4538160	BranchedOak	2014
679124	4537978	BranchedOak	2014
680003	4538738	BranchedOak	2014
677375	4536630	BranchedOak	2014
680906	4538266	BranchedOak	2014
678849	4537989	BranchedOak	2014
679322	4537854	BranchedOak	2014
680211	4537037	BranchedOak	2014
679082	4537982	BranchedOak	2014
679203	4537997	BranchedOak	2014
679255	4537993	BranchedOak	2014
680392	4538589	BranchedOak	2014
680437	4538552	BranchedOak	2014
680499	4538544	BranchedOak	2014
680512	4538543	BranchedOak	2014
677378	4536633	BranchedOak	2015
677304	4536593	BranchedOak	2015
677375	4536633	BranchedOak	2015
677402	4536770	BranchedOak	2015

Easting	Northing	waterbody	year
677396	4536760	BranchedOak	2015
680382	4538577	BranchedOak	2015
680046	4539157	BranchedOak	2015
679404	4536466	BranchedOak	2015
679975	4538750	BranchedOak	2015
680456	4538555	BranchedOak	2015
680903	4538220	BranchedOak	2015
680002	4539032	BranchedOak	2015
680024	4539016	BranchedOak	2015
680121	4538634	BranchedOak	2015
680163	4538638	BranchedOak	2015
677818	4537476	BranchedOak	2015
677618	4537510	BranchedOak	2015
677678	4531485	BranchedOak	2015
677536	4537461	BranchedOak	2015
676931	4537138	BranchedOak	2015
677361	4536656	BranchedOak	2015
677377	4536674	BranchedOak	2015
680430	4538557	BranchedOak	2015
680398	4538547	BranchedOak	2015
680333	4538578	BranchedOak	2015
679960	4538756	BranchedOak	2015
680000	4538744	BranchedOak	2015
680010	4539016	BranchedOak	2015
680009	4539017	BranchedOak	2015
679867	4539483	BranchedOak	2015
679773	4538821	BranchedOak	2015
679733	4538851	BranchedOak	2015
677329	4536605	BranchedOak	2015
680434	4538555	BranchedOak	2015
680476	4538550	BranchedOak	2015
680441	4538552	BranchedOak	2015
677829	4537403	BranchedOak	2015
680444	4538552	BranchedOak	2015
680477	4538547	BranchedOak	2015
680442	4538555	BranchedOak	2015
680403	4538581	BranchedOak	2015
679957	4538755	BranchedOak	2015
679774	4538820	BranchedOak	2015
680475	4538547	BranchedOak	2015
680471	4538550	BranchedOak	2015
680449	4538551	BranchedOak	2015
679996	4539074	BranchedOak	2015

Easting	Northing	waterbody	year
680390	4538583	BranchedOak	2015
680907	4538262	BranchedOak	2015
680878	4538139	BranchedOak	2015
680838	4538078	BranchedOak	2015
680441	4538554	BranchedOak	2015
679781	4539417	BranchedOak	2015
680039	4539195	BranchedOak	2015
680847	4538106	BranchedOak	2015
677742	4537493	BranchedOak	2015
677841	4537398	BranchedOak	2015
680485	4539143	BranchedOak	2015
680410	4538909	BranchedOak	2015
680410	4538909	BranchedOak	2015
680047	4539103	BranchedOak	2015
677832	4537402	BranchedOak	2015
679794	4538805	BranchedOak	2015
680448	4538552	BranchedOak	2015
680079	4538682	BranchedOak	2015
680249	4538676	BranchedOak	2015
680311	4538577	BranchedOak	2015
680359	4538588	BranchedOak	2015
678917	4537674	BranchedOak	2015
678604	4539599	BranchedOak	2015
677813	4537432	BranchedOak	2015
680008	4539013	BranchedOak	2015
680027	4538724	BranchedOak	2015
677307	4536587	BranchedOak	2015
677357	4536718	BranchedOak	2015
677718	4537515	BranchedOak	2015
679713	4538930	BranchedOak	2015
380384	4538994	BranchedOak	2015
678900	4538160	BranchedOak	2015
680075	4538733	BranchedOak	2015
678914	4538175	BranchedOak	2015
678853	4537977	BranchedOak	2015
677825	4537397	BranchedOak	2015
678929	4538138	BranchedOak	2015
680513	4538543	BranchedOak	2015
680451	4538550	BranchedOak	2015
678570	4539598	BranchedOak	2015
678568	4539580	BranchedOak	2015
680391	4538575	BranchedOak	2015
677330	4536619	BranchedOak	2015

Easting	Northing	waterbody	year
677374	4536639	BranchedOak	2015
678933	4538135	BranchedOak	2015
680516	4539203	BranchedOak	2015
680506	4538547	BranchedOak	2015
680531	4539872	BranchedOak	2015
678622	4539593	BranchedOak	2015
679293	4539301	BranchedOak	2015
679324	4537818	BranchedOak	2015
679211	4537943	BranchedOak	2015
678783	4537610	BranchedOak	2015
680009	4539076	BranchedOak	2015
680475	4538547	BranchedOak	2015
680417	4538816	BranchedOak	2015
678915	4538225	BranchedOak	2015
680364	4538584	BranchedOak	2015
680364	4538584	BranchedOak	2015
679233	4537847	BranchedOak	2015
679259	4537827	BranchedOak	2015
679291	4537800	BranchedOak	2015
679332	4537814	BranchedOak	2015
679331	4537855	BranchedOak	2015
679332	4537862	BranchedOak	2015
679315	4537931	BranchedOak	2015
679306	4537948	BranchedOak	2015
679292	4537956	BranchedOak	2015
679215	4537991	BranchedOak	2015
679195	4537991	BranchedOak	2015
679183	4537986	BranchedOak	2015
679164	4537977	BranchedOak	2015
679153	4537976	BranchedOak	2015
679124	4537975	BranchedOak	2015
679094	4537968	BranchedOak	2015
679071	4537963	BranchedOak	2015
679031	4537954	BranchedOak	2015
679009	4537953	BranchedOak	2015
678893	4538143	BranchedOak	2015
678909	4538144	BranchedOak	2015
678920	4538144	BranchedOak	2015
678969	4538173	BranchedOak	2015
678909	4538165	BranchedOak	2015
679186	4537984	BranchedOak	2015
679127	4537983	BranchedOak	2015
679114	4537971	BranchedOak	2015
679063	4537967	BranchedOak	2015
679030	4537963	BranchedOak	2015
679025	4537961	BranchedOak	2015
679023	4537961	BranchedOak	2015
679049	4537961	BranchedOak	2015
678981	4537961	BranchedOak	2015
678893	4538231	BranchedOak	2015
678880	4537951	BranchedOak	2015
678868	4537973	BranchedOak	2015
678849	4537987	BranchedOak	2015
678568	4539580	BranchedOak	2015
679980	4539221	BranchedOak	2015
680038	4539017	BranchedOak	2015
680904	4538261	BranchedOak	2015
680435	4538556	BranchedOak	2015
680400	4538585	BranchedOak	2015
680481	4538549	BranchedOak	2015
680508	4538547	BranchedOak	2015
680508	4538547	BranchedOak	2015
680450	4538548	BranchedOak	2015
680472	4538547	BranchedOak	2015
680448	4538553	BranchedOak	2015
679768	4538822	BranchedOak	2015
680063	4538653	BranchedOak	2015
679981	4538750	BranchedOak	2015
680334	4538565	BranchedOak	2015
680464	4539122	BranchedOak	2015
680395	4538549	BranchedOak	2015
679783	4539416	BranchedOak	2015
680444	4538554	BranchedOak	2015
678884	4537673	BranchedOak	2015
680440	4538558	BranchedOak	2015
678979	4537723	BranchedOak	2015
679326	4537807	BranchedOak	2015
678947	4537951	BranchedOak	2015
679078	4537972	BranchedOak	2015
678935	4538199	BranchedOak	2015
680489	4538546	BranchedOak	2015
680506	4538547	BranchedOak	2015
679781	4538819	BranchedOak	2015
679342	4539280	BranchedOak	2015
677375	4536628	BranchedOak	2015
677809	4537447	BranchedOak	2015

Easting	Northing	waterbody	year
679238	4537988	BranchedOak	2015
679715	4538927	BranchedOak	2015
680390	4538576	BranchedOak	2015
680466	4538550	BranchedOak	2015
680436	4538553	BranchedOak	2015
680913	4538413	BranchedOak	2015
680809	4538434	BranchedOak	2015
680908	4538261	BranchedOak	2015
679871	4539400	BranchedOak	2014
680397	4538548	BranchedOak	2014
679326	4537940	BranchedOak	2014
679332	4537908	BranchedOak	2014
680469	4538549	BranchedOak	2014
680110	4538589	BranchedOak	2014
680145	4538569	BranchedOak	2014
679053	4537971	BranchedOak	2014
680444	4538557	BranchedOak	2014
680439	4538554	BranchedOak	2014
680398	4538552	BranchedOak	2014
680128	4538563	BranchedOak	2014
678856	4537983	BranchedOak	2014
678946	4538203	BranchedOak	2014
679048	4537965	BranchedOak	2014
680411	4538542	BranchedOak	2014
680471	4538547	BranchedOak	2014
680473	4538545	BranchedOak	2014
680350	4538565	BranchedOak	2014
680391	4538549	BranchedOak	2014
679031	4537961	BranchedOak	2014
676944	4537159	BranchedOak	2014
680392	4538558	BranchedOak	2014
680043	4538722	BranchedOak	2014
680337	4538572	BranchedOak	2014
680396	4538545	BranchedOak	2014
680026	4539202	BranchedOak	2014
678867	4538067	BranchedOak	2014
679995	4538743	BranchedOak	2014
680533	4539189	BranchedOak	2014
680464	4539121	BranchedOak	2014
680904	4538262	BranchedOak	2014
679021	4537957	BranchedOak	2014
679222	4537932	BranchedOak	2014
679273	4537899	BranchedOak	2014

Easting	Northing	waterbody	year
679218	4537935	BranchedOak	2014
680089	4538581	BranchedOak	2014
679748	4538876	BranchedOak	2014
679738	4538852	BranchedOak	2014
679727	4538867	BranchedOak	2014
679018	4537956	BranchedOak	2014
680514	4538542	BranchedOak	2014
680139	4538564	BranchedOak	2014
680061	4538724	BranchedOak	2014
680400	4538555	BranchedOak	2014
679749	4538881	BranchedOak	2014
679654	4538922	BranchedOak	2014
680465	4539122	BranchedOak	2014
679110	4537935	BranchedOak	2014
679291	4537882	BranchedOak	2014
678941	4537958	BranchedOak	2014
680066	4538652	BranchedOak	2014
680469	4539119	BranchedOak	2014
679001	4538171	BranchedOak	2014
680361	4538564	BranchedOak	2014
680390	4538578	BranchedOak	2014
680000	4538739	BranchedOak	2014
679986	4538746	BranchedOak	2014
678852	4537987	BranchedOak	2014
680390	4538583	BranchedOak	2014
680341	4537102	BranchedOak	2014
678562	4537504	BranchedOak	2014
679747	4538892	BranchedOak	2014
679006	4538171	BranchedOak	2014
679750	4538880	BranchedOak	2014
679795	4539413	BranchedOak	2014
679818	4539443	BranchedOak	2014
680060	4538646	BranchedOak	2014
680082	4538737	BranchedOak	2014
680084	4538739	BranchedOak	2014
680409	4538541	BranchedOak	2014
679733	4538848	BranchedOak	2014
677383	4536681	BranchedOak	2014
680442	4538550	BranchedOak	2014
680330	4538578	BranchedOak	2014
680480	4538544	BranchedOak	2014
676916	4537175	BranchedOak	2014
680469	4538548	BranchedOak	2014

Easting	Northing	waterbody	year
680012	4539014	BranchedOak	2014
677363	4536631	BranchedOak	2014
677361	4536621	BranchedOak	2014
678850	4537988	BranchedOak	2014
680916	4538375	BranchedOak	2014
680469	4538547	BranchedOak	2014
678889	4538156	BranchedOak	2014
678887	4538256	BranchedOak	2014
680476	4538548	BranchedOak	2014
680476	4538546	BranchedOak	2014
679315	4537952	BranchedOak	2014
679977	4538747	BranchedOak	2014
680073	4538682	BranchedOak	2014
680392	4538590	BranchedOak	2014
680410	4538540	BranchedOak	2014
680368	4538581	BranchedOak	2014
679015	4538175	BranchedOak	2014
680440	4538550	BranchedOak	2014
680396	4538544	BranchedOak	2014
678889	4538252	BranchedOak	2014
678876	4538264	BranchedOak	2014
679199	4537990	BranchedOak	2014
679226	4537998	BranchedOak	2014
677393	4536753	BranchedOak	2014
677792	4537394	BranchedOak	2014
679766	4538814	BranchedOak	2014
679782	4538814	BranchedOak	2014
679852	4538761	BranchedOak	2014
679839	4538772	BranchedOak	2014
680074	4538698	BranchedOak	2014
680473	4538547	BranchedOak	2015
680472	4538546	BranchedOak	2015
680002	4538740	BranchedOak	2015
677940	4537484	BranchedOak	2015
679079	4537962	BranchedOak	2015
679334	4537842	BranchedOak	2015
678891	4538228	BranchedOak	2015
680316	4538574	BranchedOak	2015
680056	4538756	BranchedOak	2015
677745	4537505	BranchedOak	2015
677694	4537494	BranchedOak	2015
678933	4538135	BranchedOak	2015
678900	4538142	BranchedOak	2015

Easting	Northing	waterbody	year
680125	4538569	BranchedOak	2015
680069	4538652	BranchedOak	2015
678561	4539599	BranchedOak	2015
680908	4538264	BranchedOak	2015
680836	4538112	BranchedOak	2015
678579	4539576	BranchedOak	2015
678942	4538137	BranchedOak	2015
679218	4538001	BranchedOak	2015
679050	4537968	BranchedOak	2015
678606	4539590	BranchedOak	2015
679962	4538753	BranchedOak	2015
680003	4538741	BranchedOak	2015
680458	4538550	BranchedOak	2015
678656	4537574	BranchedOak	2015
678906	4538226	BranchedOak	2015
680524	4534221	BranchedOak	2015
678854	4537709	BranchedOak	2015
678487	4537523	BranchedOak	2015
679335	4537857	BranchedOak	2015
680053	4539026	BranchedOak	2015
680909	4538245	BranchedOak	2015
680453	4539124	BranchedOak	2015
678534	4539599	BranchedOak	2015
679070	4537970	BranchedOak	2015
677346	4536625	BranchedOak	2015
676932	4537142	BranchedOak	2015
680397	4538547	BranchedOak	2015
680845	4538083	BranchedOak	2015
680899	4538411	BranchedOak	2015
678901	4538139	BranchedOak	2015
679210	4537996	BranchedOak	2015
680536	4539185	BranchedOak	2015
678957	4538169	BranchedOak	2015
677385	4536671	BranchedOak	2015
678868	4538084	BranchedOak	2015
678645	4537575	BranchedOak	2015
680512	4539175	BranchedOak	2015
679330	4537860	BranchedOak	2015
680031	4539142	BranchedOak	2015
680054	4539148	BranchedOak	2015
680291	4538586	BranchedOak	2015
676924	4537158	BranchedOak	2015
678470	4537483	BranchedOak	2015

Easting	Northing	waterbody	year
678859	4538041	BranchedOak	2015
679333	4537859	BranchedOak	2015
680945	4538278	BranchedOak	2014
680067	4539019	BranchedOak	2014
680006	4539013	BranchedOak	2014
680384	4538579	BranchedOak	2014
680339	4537087	BranchedOak	2014
677848	4537449	BranchedOak	2014
680964	4538385	BranchedOak	2014
680514	4539186	BranchedOak	2014
680445	4538554	BranchedOak	2014
680127	4538567	BranchedOak	2014
680514	4538543	BranchedOak	2014
679668	4538910	BranchedOak	2014
680402	4538547	BranchedOak	2014
680451	4538554	BranchedOak	2014
680460	4538552	BranchedOak	2014
680443	4538554	BranchedOak	2014
680124	4538566	BranchedOak	2014
679977	4538749	BranchedOak	2014
679958	4538754	BranchedOak	2014
679927	4538774	BranchedOak	2014
680307	4537127	BranchedOak	2014
680393	4538571	BranchedOak	2014
680399	4538545	BranchedOak	2014
680486	4538549	BranchedOak	2014
680440	4538552	BranchedOak	2014
680163	4537018	BranchedOak	2014
680292	4537104	BranchedOak	2014
111111	1111111	BranchedOak	2014
680440	4538555	BranchedOak	2014
677371	4536633	BranchedOak	2014
680383	4538575	BranchedOak	2014
680341	4538576	BranchedOak	2014
679999	4538740	BranchedOak	2014
679258	4537993	BranchedOak	2014
680906	4538261	BranchedOak	2014
680914	4538310	BranchedOak	2014
680435	4538555	BranchedOak	2014
680026	4539212	BranchedOak	2014
678855	4537987	BranchedOak	2014
680482	4539136	BranchedOak	2014
680144	4538575	BranchedOak	2014
680048	4539023	BranchedOak	2014
680392	4538556	BranchedOak	2014
680326	4538574	BranchedOak	2014
679950	4538761	BranchedOak	2014
680377	4538577	BranchedOak	2014
680068	4538716	BranchedOak	2014
680039	4538727	BranchedOak	2014
678887	4538146	BranchedOak	2014
680042	4538726	BranchedOak	2014
679698	4538908	BranchedOak	2014
680420	4538666	BranchedOak	2014
680515	4538542	BranchedOak	2014
680411	4538542	BranchedOak	2014
679949	4538760	BranchedOak	2014
680397	4538564	BranchedOak	2014
680152	4538609	BranchedOak	2014
680031	4538730	BranchedOak	2014
679949	4538760	BranchedOak	2014
680061	4538786	BranchedOak	2014
680034	4538724	BranchedOak	2014
679844	4538771	BranchedOak	2014
680394	4538548	BranchedOak	2014
680431	4538554	BranchedOak	2014
680063	4538715	BranchedOak	2014
680077	4538730	BranchedOak	2014
680040	4539058	BranchedOak	2014
679257	4537989	BranchedOak	2014
680067	4538736	BranchedOak	2014
680060	4538719	BranchedOak	2014
679951	4538757	BranchedOak	2014
680472	4538546	BranchedOak	2014
679015	4538174	BranchedOak	2014
678880	4538253	BranchedOak	2014
678975	4538152	BranchedOak	2014
680472	4538544	BranchedOak	2014
678973	4538165	BranchedOak	2014
679630	4538950	BranchedOak	2014
679855	4538763	BranchedOak	2014
680146	4538575	BranchedOak	2014
679670	4538952	BranchedOak	2014
680409	4538544	BranchedOak	2014
678947	4538202	BranchedOak	2014
678895	4538242	BranchedOak	2014

Easting	Northing	waterbody	year
677831	4537445	BranchedOak	2014
677376	4536631	BranchedOak	2014
680512	4538544	BranchedOak	2014
680329	4538570	BranchedOak	2014
677346	4536622	BranchedOak	2014
680381	4538573	BranchedOak	2014
680478	4538550	BranchedOak	2014
680390	4538577	BranchedOak	2014
680367	4538582	BranchedOak	2014
678953	4538146	BranchedOak	2014
678943	4537958	BranchedOak	2014
679837	4538777	BranchedOak	2014
678577	4537584	BranchedOak	2014
680143	4538572	BranchedOak	2014
680020	4539015	BranchedOak	2014
680472	4538546	BranchedOak	2014
680528	4539186	BranchedOak	2014
680517	4539209	BranchedOak	2014
680496	4538546	BranchedOak	2014
680027	4539117	BranchedOak	2014
680478	4538546	BranchedOak	2014
680107	4538563	BranchedOak	2014
680443	4539087	BranchedOak	2014
676946	4537154	BranchedOak	2014
680038	4539113	BranchedOak	2014
680428	4539041	BranchedOak	2014
680006	4539014	BranchedOak	2014
680904	4538239	BranchedOak	2014
677832	4537404	BranchedOak	2014
679738	4539312	BranchedOak	2014
680038	4539103	BranchedOak	2014
680136	4538581	BranchedOak	2014
677834	4537419	BranchedOak	2014
680382	4538581	BranchedOak	2014
678992	4538172	BranchedOak	2014
680426	4538952	BranchedOak	2014
680417	4538915	BranchedOak	2014
680018	4539075	BranchedOak	2014
680480	4538547	BranchedOak	2014
680413	4538541	BranchedOak	2014
679973	4538745	BranchedOak	2014
680436	4538554	BranchedOak	2014
679756	4538837	BranchedOak	2014
680908	4538263	BranchedOak	2014
680439	4538555	BranchedOak	2014
680472	4538646	BranchedOak	2014
679796	4538808	BranchedOak	2014
680019	4538736	BranchedOak	2014
680315	4538577	BranchedOak	2014
680447	4538552	BranchedOak	2014
679628	4538948	BranchedOak	2014
679745	4538885	BranchedOak	2014
680733	4539128	BranchedOak	2014
680528	4539186	BranchedOak	2014
679241	4537998	BranchedOak	2014
680456	4538552	BranchedOak	2014
679661	4538919	BranchedOak	2014
680452	4539119	BranchedOak	2014
680504	4538546	BranchedOak	2014
680446	4538966	BranchedOak	2014
679310	4537802	BranchedOak	2014

Appendix 2-D. Program R ensemble modeling code used to model incomplete-trip Branched Oak Lake anglers from data collected in 2014 and 2015 creel surveys.

```
##Brian Harmon
##03/10/17
##ensembling with 4 models- GLM, GAM, BRT, RF. Internal and external validation


.libPaths("P:/RLibrary")

library(glmmADMB)
library(gam)
library(randomForest)
library(gbm)
library(dismo)


#Importing and cleaning data
BO.data <- read.csv("P:/Thesis/Objective 2/Ensemble.Modeling/BO.data.02.18.16.csv")
BO.data$wood<-as.factor(BO.data$wood)
BO.data$shoretype<-as.factor(BO.data$shoretype)
levels(BO.data$shoretype)[c(6)]<-c(5)
levels(BO.data$shoretype)[c(1:5)]<-c("Riprap", "Developed", "Beach", "Undeveloped",
"Forest")
BO.data$structure<-as.factor(BO.data$structure)

mod.full<-glmmadmb(n~shoretype+ camp.dist+ RV.dist +dayuse.dist+SRA.dist
              +access.dist+mean.depth+structure+wood,
               data=BO.data,
                zeroInflation=TRUE,
               family = "nbinom")

####as mean depth, max depth, and depth.slope are all correlated only one could be
selected. None of the 3 were significant, but depth.slope was closest, so it was left in

mod.full.1<-glmmadmb(n~shoretype+ camp.dist+ RV.dist +dayuse.dist+SRA.dist
               +access.dist+structure+wood+mean.depth,
               data=BO.data,
```

```
            zeroInflation=FALSE,
            family = "nbinom")

mod.full.2<-glmmadmb(n~shoretype+ camp.dist+ RV.dist +dayuse.dist+SRA.dist
            +access.dist+structure+wood+mean.depth,
            data=BO.data,
            zeroInflation=TRUE,
            family = "nbinom")

mod.full.3<-glmmadmb(n~shoretype+ camp.dist+ RV.dist +dayuse.dist+SRA.dist
             +access.dist+structure+wood+mean.depth,
             data=BO.data,
             zeroInflation=FALSE,
             family = "poisson")

mod.full.4<-glmmadmb(n~shoretype+ camp.dist+ RV.dist +dayuse.dist+SRA.dist
             +access.dist+structure+wood+mean.depth,
             data=BO.data,
             zeroInflation=TRUE,
             family = "poisson")
####AIC mod.full.1 by far the lowest


mod.full<-mod.full.1


drop1(mod.full, test="Chisq")
drop1(mod.full, ~. -SRA.dist -mean.depth -wood, test="Chisq")

mod.new<-glmmadmb(n~shoretype+ camp.dist+ RV.dist +dayuse.dist
            +access.dist+structure,
            data=BO.data,
            zeroInflation=FALSE,
            family = "nbinom")


summary(mod.new)


predictions<-predict(mod.new, BO.data, type="response")
```

```
mapping.output<-cbind(predictions, BO.data)
cor(mapping.output$predictions, mapping.output$n)^2

##GAM
.
mod.gam<-gam(n~shoretype + s(camp.dist, 5) +s(RV.dist, 5) +
              s(dayuse.dist, 5)+ s(SRA.dist, 5)+ s(access.dist, 5)+
              s(mean.depth, 5)+ structure+ wood,
            family = poisson, data=BO.data)
summary(mod.gam)

mod2.gam<-step.gam(mod.gam, scope=list(
  "shoretype"= ~1 +shoretype,
  "camp.dist"=~1 +camp.dist +s(camp.dist, 3)+s(camp.dist, 5),
  "RV.dist"=~1 +RV.dist +s(RV.dist, 3)+s(RV.dist, 5),
  "dayuse.dist"= ~1 +dayuse.dist +s(dayuse.dist, 3)+s(dayuse.dist, 5),
  "SRA.dist"=~1 +SRA.dist +s(SRA.dist, 3)+s(SRA.dist, 5),
  "access.dist"= ~1 +access.dist +s(access.dist, 3)+s(access.dist, 5),
  "mean.depth"= ~1 +mean.depth +s(mean.depth, 3)+s(mean.depth, 5),
  "structure"= ~1+ structure,
  "wood"= ~1 + wood), trace=F)
summary(mod2.gam)

names(mod2.gam$coefficients)
summary.glm(mod2.gam)$coefficients[c(1, 11:12),]
plot(mod2.gam)



gam.predictions<-predict(mod2.gam, BO.data, type="response")
gam.mapping.output<-cbind(gam.predictions, BO.data)
cor(gam.mapping.output$gam.predictions, gam.mapping.output$n)^2

##RF

mod.form<-function(dat, r.col, p.col){
  n.col<-ncol(dat)
  resp<-colnames(dat[r.col])
  resp<-paste("as.factor(",colnames(dat[r.col]), ")", sep="")
  pred<-colnames(dat[c(p.col:n.col)])
```

```
  mod.formula<-as.formula(paste(resp, "~", paste(pred, collapse = "+")))
}


set.seed(1234)
BO.for.RF<-data.frame(BO.data[,2:6],BO.data[,8:10], mean.depth=BO.data[,12],
structure=BO.data[,14],
                  wood=BO.data[,16])

RF.model<-randomForest(mod.form(BO.for.RF,2,3), importance=T, keep.forest=T,
data=BO.for.RF)
#plot.randomForest(mod.form(BO.for.RF,2,3), importance=T, keep.forest=T,
data=BO.for.RF, ntree=10)

getTree(RF.model, k=1, labelVar=TRUE)
varImpPlot(RF.model)

mod1.RF.pred<-predict(RF.model, BO.data,type="response")
RF.mapping.output<-cbind(mod1.RF.pred, BO.data)
cor(as.numeric(RF.mapping.output$mod1.RF.pred), RF.mapping.output$n)^2

##BRT

resp<-paste("as.factor(",colnames(BO.for.RF[2]),")",sep="")
n.col<-ncol(BO.for.RF)
pred<-3:n.col
set.seed(1234)
mod1.BRT<-gbm.step(data=BO.for.RF, gbm.x=pred, gbm.y=2, family="poisson",
                tree.complexity=3, learning.rate=0.1, bag.fraction=0.75,
                n.folds=10, n.trees=50, plot.main=TRUE, keep.fold.fit=TRUE)
head(mod1.BRT$fitted)
mod1.BRT$contributions


mod1.int<-gbm.interactions(mod1.BRT)
mod1.int$rank.list

mod1.BRT.pred<-predict(mod1.BRT, BO.data,type="response", n.trees=50)
BRT.mapping.output<-cbind(mod1.BRT.pred, BO.data)
cor(as.numeric(BRT.mapping.output$mod1.BRT.pred), BRT.mapping.output$n)^2
```

```
BO.preds<-data.frame(BO.data, glm.preds=mapping.output,
gam.preds=gam.mapping.output$gam.predictions,
                RF.preds=RF.mapping.output$mod1.RF.pred,
                BRT.preds=BRT.mapping.output$mod1.BRT.pred)

##External validation
pawn.data <- read.csv("P:/Thesis/Objective
2/Ensemble.Modeling/pawn.mapping.output.02.18.16.csv")
pawn.data$wood<-as.factor(pawn.data$wood)
pawn.data$shoretype<-as.factor(pawn.data$shoretype)
pawn.data$structure<-as.factor(pawn.data$structure)
levels(pawn.data$shoretype)[c(1:5)]<-c("Riprap", "Developed", "Beach",
"Undeveloped", "Forest")

p.glm.predictions<-predict(mod.new, pawn.data, type="response")
p.glm.mapping.output<-cbind(p.glm.predictions, pawn.data)
cor(p.glm.mapping.output$p.glm.predictions, p.glm.mapping.output$n)^2

p.gam.predictions<-predict(mod2.gam, pawn.data, type="response")
p.gam.mapping.output<-cbind(p.gam.predictions, pawn.data)
cor(p.gam.mapping.output$p.gam.predictions, p.gam.mapping.output$n)^2

p.RF.pred<-predict(RF.model, pawn.data,type="response")
p.RF.mapping.output<-cbind(p.RF.pred, pawn.data)
p.RF.mapping.output$p.RF.pred<-as.numeric(p.RF.mapping.output$p.RF.pred)
cor(p.RF.mapping.output$p.RF.pred, p.RF.mapping.output$n)^2

p.BRT.pred<-predict(mod1.BRT, pawn.data,type="response", n.trees=50)
p.BRT.mapping.output<-cbind(p.BRT.pred, pawn.data)
cor(p.BRT.mapping.output$p.BRT.pred, p.BRT.mapping.output$n)^2

pawn.preds<-data.frame(pawn.data,
gam.preds=p.gam.mapping.output$p.gam.predictions,
                RF.preds=p.RF.mapping.output$p.RF.pred,
                BRT.preds=p.BRT.mapping.output$p.BRT.pred)
```

Appendix 2-E. Online survey for individuals that volunteered an email address when purchasing a 2015 Nebraska fishing license or Fish-Hunt combination. For brevity, two of eight forced choice question sets are presented as an example. All combinations are listed at the bottom of this appendix. Levels for Q3-Q22 are listed at the bottom of this appendix. Participants received a random block of two forced choice questions and random levels of Q3-Q22.

Section 1. Please tell us about how you fish

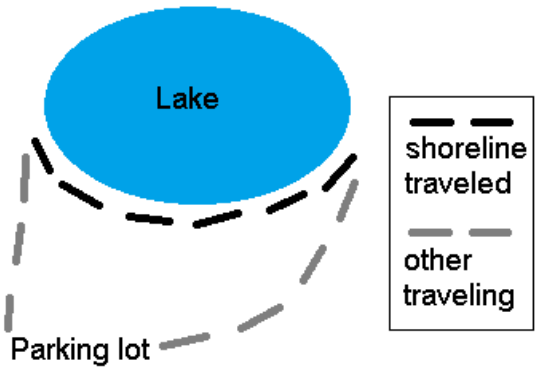
Which of the following best describes your fishing?

- ❑ **I always** or nearly always fish from the **shore**
- ❑ I **mostly** fish from the **shore**, **sometimes** I fish from a **boat**
- ❑ I **mostly** fish from a **boat**, **sometimes** I fish from the **shore**
- ❑ I **always** or nearly always fish from a **boat**
- ❑ I have **never** fished before

Which of the following best describes your activity while fishing from the shore?

- ❑ I am **always or nearly always** stationary (i.e. sitting in a chair)
- ❑ I am **mostly** stationary (i.e. sitting in a chair), **sometimes** I actively walk along the shoreline
- ❑ I **mostly** actively walk along the shoreline, **sometimes** I am stationary (i.e. sitting in a chair)
- ❑ I am **always or nearly always** actively walking

How far along the shoreline (in one direction) do you travel while fishing?



(Yards) _____

Section 2. Please tell us where you prefer to fish

For the following two questions, imagine you were to go on a typical fishing trip.

On your next bank fishing trip, which of the following two hypothetical locations within the waterbody would you **prefer** to fish? No other anglers are present in either location. (select site A or site B)

Site A			Site B
100 yards from nearest parking lot	❑	❑	**325 yards** from nearest parking lot
Breakwater **present**			Breakwater **absent**
Primarily **riprap** shoreline			Primarily **wooded** shoreline
125 yards from nearest campsite			**825 yards** from nearest campsite
225 yards from nearest covered table			**1600 yards** from nearest covered table

On your next bank fishing trip, which of the following two hypothetical locations within the waterbody would you **prefer** to fish? No other anglers are present in either location. (select site A or site B)

Site A			Site B
100 yards from nearest parking lot	❑	❑	**325 yards** from nearest parking lot
Breakwater **present**			Breakwater **absent**
Primarily **wooded** shoreline			Primarily **riprap** shoreline
825 yards from nearest campsite			**125 yards** from nearest campsite
1600 yards from nearest covered table			**225 yards** from nearest covered table

Section 2. Please tell us where you prefer to fish

Would you choose to fish an area {**Q6**} with **{Q3} {Q20}** already present?
- ❑ Yes
- ❑ No

Would you choose to fish the same area {**Q6**} with **{Q13} {Q21}** already present?
- ❑ Yes
- ❑ No

Would you choose to fish the same area {**Q6**} with **{Q16} {Q22}** already present?
- ❑ Yes
- ❑ No

Would you choose to fish in a **1500 acre** lake with **{Q5} {Q7}** already present? (1500 acres is roughly the size of Branched Oak Lake, Lake Maloney, or Box Butte Reservoir)
- ❑ Yes
- ❑ No

Would you choose to fish in a **1500 acre** lake with **{Q14} {Q9}** already present? (1500 acres is roughly the size of Branched Oak Lake, Lake Maloney, or Box Butte Reservoir)
- ❑ Yes
- ❑ No

Would you choose to fish in a **1500 acre** lake if **{Q17} {Q11}** were already present? (1500 acres is roughly the size of Branched Oak Lake, Lake Maloney, or Box Butte Reservoir)
- ❑ Yes
- ❑ No

Would you choose to fish in a **1500 acre** lake with **{Q19} {Q8}** already present? (1500 acres is roughly the size of Branched Oak Lake, Lake Maloney, or Box Butte Reservoir)
- ❑ Yes
- ❑ No

Would you choose to fish in a **1500 acre** lake with **{Q15} {Q10}** already present? (1500 acres is roughly the size of Branched Oak Lake, Lake Maloney, or Box Butte Reservoir)
- ❑ Yes
- ❑ No

Would you choose to fish in a **1500 acre** lake with **{Q18} {Q12}** already present? (1500 acres is roughly the size of Branched Oak Lake, Lake Maloney, or Box Butte Reservoir)
- ❑ Yes
- ❑ No

Section 3. Please tell us about yourself

What is your current age?
- ❑ 18-24 years
- ❑ 25-34 years
- ❑ 35-44 years
- ❑ 45-54 years
- ❑ 55-64 years
- ❑ 65-74 years
- ❑ 75 years or older
- ❑ I would prefer not to answer

What is your level of education?
- ❑ Less than high school
- ❑ High school
- ❑ 1-3 years of college
- ❑ 4 years or more of college
- ❑ I would prefer not to answer

What is your annual household income?
- ❑ Less than 20,000 USD
- ❑ 20,000-29,999 USD
- ❑ 30,000-39,999 USD
- ❑ 40,000-49,999 USD
- ❑ 50,000-59,999 USD
- ❑ 75,000-99,999 USD
- ❑ 100,000-149,999 USD
- ❑ 150,000 or more USD
- ❑ I would prefer not to answer

What is your gender?
- ❑ Male
- ❑ Female
- ❑ Other

What is the zipcode of your primary residence?

_____

Section 3. Please tell us about yourself

There are many different types of anglers. Which of the four angler descriptions below is most similar to yourself? Please note that not every criterium must be met, but select the description that generally describes you best. (Please choose only one)

❑

Casual Angler

Someone for whom fishing is not an important leisure activity and whose social life does not revolve around angling. The casual angler fishes only occasionally and spends much available leisure time pursuing other activities.

Some characteristics of a ***casual angler*** may include:

- Almost always select fishing waters based on convenience and easy access
- Prefers common techniques and proven tackle and is not aware of the latest innovations in techniques and equipment: has a small amount of general fishing tackle
- Primarily targets whatever species is biting on a given trip, and harvests all fish that are legal to keep
- Often loses interest when the fish are not biting well
- Very rarely uses information in the public domain about fishing

Active Angler

Someone for whom fishing is one leisure activity among many, and who occasionally goes fishing with a few friends. The active angler fishes regularly but also invests considerable time in other leisure activities.

Some characteristics of an ***active angler*** may include:

- Usually selects fishing sites that are relatively easy to access, often close to home
- Prefers common techniques and proven fishing tackle, and has some knowledge of the latest innovations in fishing techniques and equipment: has a moderate amount of fishing equipment, primarily consisting of general-purpose tackle
- Often targets a particular species of fish on a given day, and usually takes home any legal fish that are caught
- Occasionally loses interest when the fish do not appear to be biting
- May use easily available general angling media and buy the occasional issue of an angling magazine

Advanced Angler

Someone for whom fishing is the most important leisure activity and whose circle of friends includes many anglers. The advanced angler fishes often, devoting a substantial fraction of leisure time to fishing.

Some characteristics of the ***advanced angler*** may include:

- Usually selects fishing waters according to fishing quality and may travel long distances to particularly good waters
- Prefers high quality fishing tackle and is aware of the latest innovations in fishing techniques and equipment: may have a considerable amount of fishing equipment, including some specialized equipment to target certain species
- Usually targets a particular species and often releases fish back into the water
- Rarely loses interest even when the fish are not biting
- Uses various information sources and may subscribe to a general angling magazine

Committed Angler

Someone for whom fishing is the central focus of life and whose social life revolves around angling. The committed angler fishes as often as possible, devoting most available free time to angling related activities.

Some characteristics of the ***committed angler*** may include:

- Usually selects fishing waters based on their premium fishing quality even if they are distant
- Uses high-quality, species specific fishing tackle and applies the latest innovations in fishing techniques and equipment: has an impressive collection of specialized fishing tackle.
- Always targets a particular species on a given trip and tends to release any fish that are caught
- Typically continues to fish even when the fish do not appear to be biting
- Uses many sources of information about fishing and may subscribe to angling magazines devoted to certain species or fishing styles

Thank you for your time, please press "submit" to finish.

Forced choice question sets:

Block 1
Question 1

	alt.1	alt.2
Parking	100 yards	325 yards
Breakwater	Present	Absent
shoretype	Armored	Wooded
Campsite	125 yards	825 yards
Covered.Table	225 yards	1600 yards

Question 2

	alt.1	alt.2
Parking	100 yards	325 yards
Breakwater	Present	Absent
shoretype	Wooded	Armored
Campsite	825 yards	125 yards
Covered.Table	1600 yards	225 yards

Block 2
Question 1

	alt.1	alt.2
Parking	100 yards	325 yards
Breakwater	Absent	Present
shoretype	Armored	Wooded
Campsite	825 yards	125 yards
Covered.Table	225 yards	1600 yards

Question 2

	alt.1	alt.2
Parking	100 yards	325 yards
Breakwater	Absent	Present
shoretype	Wooded	Armored
Campsite	125 yards	825 yards
Covered.Table	1600 yards	225 yards

Block 3
Question 1

	alt.1	alt.2
Parking	325 yards	100 yards
Breakwater	Present	Absent
shoretype	Wooded	Armored
Campsite	125 yards	825 yards
Covered.Table	225 yards	1600 yards

Question 2

	alt.1	alt.2
Parking	325 yards	100 yards
Breakwater	Present	Absent
shoretype	Armored	Wooded
Campsite	825 yards	125 yards
Covered.Table	1600 yards	225 yards

Block 4
Question 1

	alt.1	alt.2
Parking	325 yards	100 yards
Breakwater	Absent	Present
shoretype	Wooded	Armored
Campsite	825 yards	125 yards
Covered.Table	225 yards	1600 yards

Question 2

	alt.1	alt.2
Parking	325 yards	100 yards
Breakwater	Absent	Present
shoretype	Armored	Wooded
Campsite	125 yards	825 yards
Covered.Table	1600 yards	225 yards

Q6:	"with a breakwater (jetty) present", "with no breakwater (jetty) present",
	"that was 100 yards from the nearest parking lot",
	"that was 325 yards from the nearest parking lot",
	"that was 125 yards from the nearest campsite", "that was 825 yards from the nearest campsite",
	"that was 225 yards from the nearest covered picnic table", "that was 1600 yards from the nearest covered picnic table",
	"with primarily armored shoreline", "with primarily forested shoreline"
Q20, Q21, Q22:	"bank-fishing anglers",
	"bank-fishing angler"
Q7, Q9, Q11:	"fishing boats",
	"fishing boat"
Q8, Q10, Q12:	"recreational (not-fishing) boats",
	" recreational (not-fishing) boat"
Q5, Q19:	"0", "1", "2", "3", "4", "5"
Q17, Q15:	"10", "20", "30", "40", "50"
Q19, Q18:	"100", "150", "200"
Q20:	"3", "4", "5"
Q13:	"0", "1", "2"
Q16:	"10", "20"

Appendix 2-F. Raw data collected from rangefinder surveys from 1 April to 31 October 2016.

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
4/3/2016	1	1	branched.oak	677503.81	4539443.00
4/3/2016	2	2	branched.oak	677620.90	4537448.08
4/3/2016	2	2	branched.oak	677616.20	4537454.62
4/3/2016	1	3	branched.oak	676912.92	4537120.46
4/3/2016	2	4	branched.oak	676876.98	4537133.67
4/3/2016	2	4	branched.oak	676878.43	4537132.79
4/3/2016	2	5	branched.oak	677430.25	4536551.65
4/3/2016	2	5	branched.oak	677429.07	4536550.99
4/3/2016	2	6	branched.oak	677463.13	4536626.40
4/3/2016	2	6	branched.oak	677391.56	4536625.56
4/3/2016	1	7	branched.oak	677256.34	4536562.32
4/3/2016	2	8	branched.oak	677295.68	4536565.68
4/3/2016	2	8	branched.oak	677294.99	4536578.70
4/3/2016	1	9	branched.oak	677252.19	4536554.05
4/3/2016	1	10	branched.oak	677169.68	4536521.00
4/3/2016	3	11	branched.oak	680920.93	4538285.40
4/3/2016	3	11	branched.oak	680920.84	4538281.81
4/3/2016	3	11	branched.oak	680921.09	4538253.11
4/3/2016	2	12	branched.oak	680403.34	4538889.91
4/3/2016	2	12	branched.oak	680401.64	4538891.44
4/3/2016	2	20	branched.oak	680435.79	4538526.73
4/3/2016	2	20	branched.oak	680437.09	4538526.01
4/3/2016	2	21	branched.oak	680407.81	4538545.97
4/3/2016	2	21	branched.oak	680406.27	4538546.92
4/3/2016	1	25	branched.oak	678584.98	4539600.97
4/3/2016	2	101	branched.oak	677626.85	4537498.39
4/3/2016	2	101	branched.oak	677626.23	4537499.28
4/3/2016	3	105	branched.oak	679241.78	4537902.94
4/3/2016	3	105	branched.oak	679243.00	4537901.75
4/3/2016	3	105	branched.oak	679243.09	4537901.97
4/3/2016	1	110	branched.oak	679292.59	4537873.07
4/3/2016	2	111	branched.oak	678872.01	4538197.58
4/3/2016	2	111	branched.oak	678877.36	4538200.23
4/3/2016	3	112	branched.oak	678935.15	4538115.13
4/3/2016	3	112	branched.oak	678928.73	4538108.76
4/3/2016	3	112	branched.oak	678934.77	4538113.11
4/3/2016	2	115	branched.oak	678827.43	4537688.15
4/3/2016	2	115	branched.oak	678826.89	4537685.81
4/3/2016	1	116	branched.oak	677509.38	4539440.46
4/3/2016	2	120	branched.oak	677378.38	4536707.83
4/3/2016	2	120	branched.oak	677378.16	4536707.72
4/3/2016	1	121	branched.oak	677371.20	4536682.16
4/3/2016	3	125	branched.oak	677359.32	4536661.90
4/3/2016	3	125	branched.oak	677360.85	4536658.65
4/3/2016	3	125	branched.oak	677360.93	4536658.61
4/3/2016	2	127	branched.oak	677332.67	4536627.92
4/3/2016	2	127	branched.oak	677325.54	4536617.23
4/3/2016	2	129	branched.oak	677287.01	4536595.69
4/3/2016	2	129	branched.oak	677286.43	4536596.28
4/3/2016	3	130	branched.oak	677245.66	4536575.31
4/3/2016	3	130	branched.oak	677241.93	4536574.66
4/3/2016	3	130	branched.oak	677240.97	4536573.66
4/3/2016	2	135	branched.oak	677170.41	4536525.17
4/3/2016	2	135	branched.oak	677170.52	4536521.90
4/3/2016	3	140	branched.oak	680496.99	4539174.02
4/3/2016	3	140	branched.oak	680496.71	4539173.34

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
4/3/2016	3	140	branched.oak	680495.65	4539174.10
4/3/2016	3	141	branched.oak	680456.71	4539140.71
4/3/2016	3	141	branched.oak	680458.26	4539140.84
4/3/2016	3	141	branched.oak	680458.07	4539140.87
4/3/2016	2	145	branched.oak	680427.89	4539108.47
4/3/2016	2	145	branched.oak	680425.96	4539099.56
4/3/2016	2	150	branched.oak	680457.52	4538506.24
4/3/2016	2	150	branched.oak	680440.07	4538515.44
4/3/2016	2	151	branched.oak	680415.26	4538535.14
4/3/2016	2	151	branched.oak	680415.71	4538534.96
4/3/2016	3	152	branched.oak	680393.66	4538599.06
4/3/2016	3	152	branched.oak	680393.71	4538599.02
4/3/2016	3	152	branched.oak	680393.71	4538599.01
4/3/2016	2	155	branched.oak	680361.13	4538603.39
4/3/2016	2	155	branched.oak	680360.98	4538602.97
4/3/2016	2	156	branched.oak	680164.86	4538525.34
4/3/2016	2	156	branched.oak	680160.02	4538528.37
4/3/2016	1	160	branched.oak	679740.91	4538861.16
4/3/2016	1	160	branched.oak	679970.97	4538745.41
4/3/2016	1	171	branched.oak	679796.02	4539427.60
4/3/2016	1	172	branched.oak	679757.48	4539399.03
4/3/2016	2	180	branched.oak	678572.48	4539602.62
4/3/2016	2	180	branched.oak	678566.67	4539602.63
4/9/2016	2	1	branched.oak	677739.19	4537505.70
4/9/2016	2	1	branched.oak	677739.00	4537505.49
4/9/2016	2	2	branched.oak	677380.85	4536697.43
4/9/2016	2	2	branched.oak	677378.17	4536695.56
4/9/2016	1	3	branched.oak	677161.17	4536513.09
4/9/2016	1	4	branched.oak	677152.40	4536502.46
4/9/2016	2	5	branched.oak	679438.44	4536480.88
4/9/2016	2	5	branched.oak	679437.13	4536480.11

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
4/9/2016	1	6	branched.oak	680912.23	4538383.38
4/9/2016	3	7	branched.oak	680142.43	4538556.87
4/9/2016	3	7	branched.oak	680143.20	4538553.76
4/9/2016	3	7	branched.oak	680142.77	4538555.48
4/9/2016	2	101	branched.oak	677843.22	4537472.81
4/9/2016	2	101	branched.oak	677843.21	4537479.72
4/9/2016	2	102	branched.oak	677740.52	4537504.23
4/9/2016	2	102	branched.oak	677740.21	4537504.34
4/9/2016	2	203	branched.oak	677716.96	4537508.36
4/9/2016	2	203	branched.oak	677714.48	4537506.66
4/9/2016	2	105	branched.oak	677338.73	4536634.10
4/9/2016	2	105	branched.oak	677338.14	4536631.75
4/9/2016	4	106	branched.oak	677296.59	4536601.50
4/9/2016	4	106	branched.oak	677296.07	4536600.85
4/9/2016	4	106	branched.oak	677296.42	4536600.75
4/9/2016	4	106	branched.oak	677296.58	4536600.72
4/9/2016	2	107	branched.oak	677271.68	4536589.18
4/9/2016	2	107	branched.oak	677270.35	4536588.64
4/9/2016	2	108	branched.oak	677243.39	4536573.05
4/9/2016	2	108	branched.oak	677243.75	4536575.33
4/9/2016	1	109	branched.oak	677201.69	4536551.27
4/9/2016	2	210	branched.oak	679436.16	4536480.64
4/9/2016	2	210	branched.oak	679437.73	4536480.60
4/9/2016	1	111	branched.oak	679370.80	4536468.56
4/9/2016	1	112	branched.oak	679214.07	4536424.04
4/10/2016	3	1	branched.oak	680555.60	4539205.40
4/10/2016	3	1	branched.oak	680555.66	4539205.40
4/10/2016	3	1	branched.oak	680555.72	4539205.50
4/10/2016	2	2	branched.oak	680137.21	4538574.27
4/10/2016	2	2	branched.oak	680139.22	4538573.99
4/10/2016	2	3	branched.oak	680384.61	4538552.47

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
4/10/2016	2	3	branched.oak	680381.71	4538544.17
4/10/2016	2	4	branched.oak	680049.93	4538701.85
4/10/2016	2	4	branched.oak	680049.06	4538702.81
4/10/2016	1	5	branched.oak	678571.66	4539599.46
4/10/2016	4	6	branched.oak	678547.94	4539596.70
4/10/2016	4	6	branched.oak	678547.41	4539596.62
4/10/2016	4	6	branched.oak	678547.46	4539596.59
4/10/2016	4	6	branched.oak	678547.59	4539596.61
4/10/2016	2	10	branched.oak	679864.04	4539458.98
4/10/2016	2	10	branched.oak	679863.75	4539456.77
4/10/2016	1	20	branched.oak	677224.49	4536561.48
4/10/2016	2	21	branched.oak	677158.37	4536505.96
4/10/2016	2	21	branched.oak	677158.60	4536506.20
4/10/2016	2	22	branched.oak	677367.29	4536622.83
4/10/2016	2	22	branched.oak	677369.28	4536624.84
4/10/2016	1	23	branched.oak	677351.83	4536618.95
4/10/2016	1	24	branched.oak	677336.78	4536617.20
4/10/2016	2	25	branched.oak	677318.94	4536610.37
4/10/2016	2	25	branched.oak	677319.68	4536611.14
4/10/2016	2	30	branched.oak	678927.38	4538133.43
4/10/2016	2	30	branched.oak	678933.04	4538130.70
4/10/2016	2	31	branched.oak	678874.01	4537656.47
4/10/2016	2	31	branched.oak	678868.72	4537659.05
4/10/2016	1	32	branched.oak	678910.83	4537655.17
4/10/2016	1	40	branched.oak	677686.00	4537507.55
4/10/2016	1	42	branched.oak	677735.43	4537505.95
4/10/2016	1	43	branched.oak	677755.43	4537504.13
4/10/2016	1	101	branched.oak	680515.83	4539210.16
4/10/2016	2	102	branched.oak	680366.57	4538579.78
4/10/2016	2	102	branched.oak	680366.66	4538580.19
4/10/2016	2	110	branched.oak	679779.53	4539416.67
4/10/2016	2	110	branched.oak	679780.31	4539417.43
4/10/2016	2	145	branched.oak	680857.58	4538256.37
4/10/2016	2	145	branched.oak	680854.41	4538252.46
4/10/2016	2	146	branched.oak	680335.93	4537086.92
4/10/2016	2	146	branched.oak	680336.10	4537087.31
4/10/2016	1	150	branched.oak	677408.00	4536798.10
4/10/2016	1	151	branched.oak	677363.74	4536654.58
4/10/2016	1	152	branched.oak	677412.54	4536564.63
4/10/2016	1	153	branched.oak	677158.91	4536508.93
4/10/2016	2	154	branched.oak	677156.51	4536505.15
4/10/2016	2	154	branched.oak	677156.42	4536505.07
4/10/2016	2	160	branched.oak	678750.75	4537891.85
4/10/2016	2	160	branched.oak	678751.51	4537883.08
4/10/2016	2	161	branched.oak	678726.45	4537884.21
4/10/2016	2	161	branched.oak	678738.00	4537920.88
4/10/2016	1	162	branched.oak	679229.66	4537974.95
4/11/2016	3	1	branched.oak	677199.73	4536552.00
4/11/2016	3	1	branched.oak	677199.88	4536551.58
4/11/2016	3	1	branched.oak	677198.04	4536550.21
4/11/2016	1	2	branched.oak	677174.93	4536529.87
4/11/2016	1	3	branched.oak	677157.06	4536504.26
4/11/2016	1	5	branched.oak	679865.92	4539486.81
4/14/2016	1	1	branched.oak	677637.69	4537506.69
4/14/2016	1	5	branched.oak	677367.54	4536674.70
4/14/2016	1	6	branched.oak	680343.49	4538559.89
4/14/2016	1	7	branched.oak	680041.13	4539201.98
4/14/2016	1	8	branched.oak	680048.64	4539131.60
4/14/2016	4	10	branched.oak	679611.19	4539484.53
4/14/2016	4	10	branched.oak	679622.63	4539504.97
4/14/2016	4	10	branched.oak	679633.97	4539530.88
4/14/2016	4	10	branched.oak	679635.46	4539533.06

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
4/14/2016	1	101	branched.oak	677450.89	4536635.38
4/14/2016	4	102	branched.oak	677445.88	4536773.50
4/14/2016	4	102	branched.oak	677425.88	4536766.85
4/14/2016	4	102	branched.oak	677459.86	4536794.73
4/14/2016	4	102	branched.oak	677457.14	4536780.90
4/14/2016	1	103	branched.oak	677369.04	4536630.76
4/14/2016	2	104	branched.oak	677358.71	4536618.13
4/14/2016	2	104	branched.oak	677365.68	4536629.55
4/14/2016	3	105	branched.oak	677341.18	4536623.66
4/14/2016	3	105	branched.oak	677333.69	4536610.49
4/14/2016	3	105	branched.oak	677334.85	4536610.02
4/14/2016	1	110	branched.oak	677286.80	4536595.01
4/14/2016	2	120	branched.oak	680361.00	4538539.31
4/14/2016	2	120	branched.oak	680362.45	4538538.99
4/14/2016	1	121	branched.oak	680350.10	4538549.80
4/14/2016	2	122	branched.oak	680332.01	4538568.00
4/14/2016	2	122	branched.oak	680330.13	4538566.69
4/14/2016	1	123	branched.oak	680339.89	4538557.77
4/14/2016	1	125	branched.oak	680706.71	4538972.40
4/15/2016	1	1	branched.oak	679169.56	4537950.93
4/15/2016	2	5	branched.oak	677407.69	4536562.87
4/15/2016	2	5	branched.oak	677408.64	4536564.43
4/15/2016	1	6	branched.oak	677211.77	4536557.01
4/15/2016	1	7	branched.oak	679332.70	4536466.54
4/15/2016	1	8	branched.oak	679343.78	4536472.14
4/15/2016	1	9	branched.oak	679361.63	4536474.26
4/15/2016	2	9	branched.oak	679246.21	4536440.83
4/15/2016	2	9	branched.oak	679247.85	4536441.63
4/15/2016	1	10	branched.oak	680134.73	4538604.98
4/15/2016	1	11	branched.oak	680444.09	4538538.95
4/15/2016	1	12	branched.oak	680092.81	4538694.97

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
4/15/2016	1	101	branched.oak	677336.62	4536630.71
4/22/2016	1	1	branched.oak	677875.23	4537511.19
4/22/2016	3	2	branched.oak	677831.27	4537402.53
4/22/2016	3	2	branched.oak	677831.65	4537403.45
4/22/2016	3	2	branched.oak	677831.79	4537403.75
4/22/2016	1	3	branched.oak	677809.89	4537394.68
4/22/2016	2	4	branched.oak	677536.91	4537464.53
4/22/2016	2	4	branched.oak	677540.98	4537467.26
4/22/2016	2	10	branched.oak	678816.29	4537958.27
4/22/2016	2	10	branched.oak	678816.14	4537958.95
4/22/2016	1	11	branched.oak	678440.67	4537509.47
4/22/2016	1	12	branched.oak	678921.74	4538145.47
4/22/2016	1	20	branched.oak	677459.56	4536685.31
4/22/2016	1	21	branched.oak	677456.91	4536661.23
4/22/2016	2	22	branched.oak	677383.85	4536646.31
4/22/2016	2	22	branched.oak	677383.60	4536644.50
4/22/2016	1	23	branched.oak	677374.56	4536631.64
4/22/2016	2	24	branched.oak	677297.44	4536601.57
4/22/2016	2	24	branched.oak	677297.44	4536601.40
4/22/2016	1	25	branched.oak	677272.50	4536590.48
4/22/2016	1	26	branched.oak	677253.85	4536579.39
4/22/2016	2	27	branched.oak	677226.88	4536564.06
4/22/2016	2	27	branched.oak	677224.80	4536563.82
4/22/2016	1	30	branched.oak	679327.03	4536465.62
4/22/2016	1	31	branched.oak	679251.28	4536442.11
4/22/2016	2	32	branched.oak	679232.40	4536431.90
4/22/2016	2	32	branched.oak	679230.64	4536432.48
4/22/2016	2	33	branched.oak	679028.18	4536440.64
4/22/2016	2	33	branched.oak	679029.02	4536441.42
4/22/2016	2	40	branched.oak	680724.77	4538217.66
4/22/2016	2	40	branched.oak	680716.87	4538232.06

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
4/22/2016	1	41	branched.oak	680456.80	4539137.59
4/22/2016	2	42	branched.oak	680391.59	4538582.56
4/22/2016	2	42	branched.oak	680391.61	4538582.71
4/22/2016	3	43	branched.oak	680391.51	4538582.89
4/22/2016	3	43	branched.oak	680391.54	4538582.97
4/22/2016	3	43	branched.oak	680391.79	4538582.88
4/22/2016	1	44	branched.oak	679995.11	4538750.59
4/22/2016	1	45	branched.oak	679971.03	4538760.93
4/22/2016	2	46	branched.oak	679958.26	4538764.18
4/22/2016	2	46	branched.oak	679946.78	4538769.60
4/22/2016	2	47	branched.oak	680024.34	4538738.34
4/22/2016	2	47	branched.oak	680022.86	4538739.03
4/22/2016	2	48	branched.oak	680082.54	4538950.82
4/22/2016	2	48	branched.oak	680082.56	4538950.48
4/22/2016	1	49	branched.oak	680067.69	4539002.89
4/22/2016	1	50	branched.oak	680053.97	4539067.76
4/22/2016	2	51	branched.oak	680050.09	4539154.02
4/22/2016	2	51	branched.oak	680046.81	4539159.72
4/22/2016	1	53	branched.oak	680041.69	4539189.87
4/23/2016	2	1	branched.oak	677450.71	4536789.08
4/23/2016	2	1	branched.oak	677383.68	4536740.32
4/23/2016	1	2	branched.oak	677382.59	4536675.07
4/23/2016	2	3	branched.oak	677342.08	4536645.49
4/23/2016	2	3	branched.oak	677341.40	4536646.47
4/23/2016	1	4	branched.oak	677338.10	4536638.32
4/23/2016	1	5	branched.oak	677299.53	4536601.83
4/23/2016	2	6	branched.oak	677278.24	4536593.87
4/23/2016	2	6	branched.oak	677277.35	4536593.15
4/23/2016	1	7	branched.oak	677264.97	4536585.90
4/23/2016	1	8	branched.oak	677229.36	4536562.64
4/23/2016	2	9	branched.oak	677182.00	4536538.81
4/23/2016	2	9	branched.oak	677181.88	4536536.40
4/23/2016	1	10	branched.oak	677192.39	4536491.70
4/23/2016	2	11	branched.oak	677164.93	4536499.32
4/23/2016	2	11	branched.oak	677164.03	4536498.85
4/23/2016	1	12	branched.oak	679270.13	4536448.34
4/23/2016	2	13	branched.oak	679297.81	4536455.56
4/23/2016	2	13	branched.oak	679297.82	4536456.58
4/23/2016	1	14	branched.oak	679323.02	4536460.85
4/23/2016	1	15	branched.oak	679426.48	4536476.69
4/23/2016	2	15	branched.oak	680785.83	4538611.22
4/23/2016	2	15	branched.oak	680787.17	4538612.10
4/23/2016	1	16	branched.oak	680375.26	4538546.54
4/23/2016	1	17	branched.oak	680392.38	4538540.33
4/23/2016	1	18	branched.oak	680413.79	4538612.98
4/23/2016	1	19	branched.oak	680178.06	4538708.67
4/23/2016	1	20	branched.oak	680007.77	4538785.71
4/23/2016	3	21	branched.oak	680036.09	4538967.33
4/23/2016	3	21	branched.oak	680035.42	4538966.18
4/23/2016	3	21	branched.oak	680053.29	4538954.92
4/23/2016	2	22	branched.oak	680041.21	4539097.64
4/23/2016	2	22	branched.oak	680039.61	4539098.16
4/23/2016	2	25	branched.oak	680014.31	4539168.34
4/23/2016	2	25	branched.oak	680020.91	4539166.21
4/23/2016	2	26	branched.oak	678539.24	4539621.14
4/23/2016	2	26	branched.oak	678520.26	4539650.08
4/23/2016	3	27	branched.oak	679808.84	4539434.54
4/23/2016	3	27	branched.oak	679808.78	4539433.50
4/23/2016	3	27	branched.oak	679808.88	4539432.45
4/23/2016	2	28	branched.oak	679818.32	4539440.61
4/23/2016	2	28	branched.oak	679822.81	4539443.95
4/23/2016	1	30	branched.oak	677472.59	4539435.58

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
4/23/2016	2	31	branched.oak	678830.02	4537960.77
4/23/2016	2	31	branched.oak	678834.09	4537954.84
4/23/2016	4	32	branched.oak	679014.62	4537954.73
4/23/2016	4	32	branched.oak	679007.05	4537952.22
4/23/2016	4	32	branched.oak	679019.34	4537953.58
4/23/2016	4	32	branched.oak	679017.46	4537958.60
4/23/2016	2	33	branched.oak	678877.57	4537651.76
4/23/2016	2	33	branched.oak	678879.65	4537652.75
4/23/2016	3	101	branched.oak	680522.77	4538599.56
4/23/2016	3	101	branched.oak	680511.87	4538588.61
4/23/2016	3	101	branched.oak	680523.91	4538600.80
4/23/2016	1	102	branched.oak	680386.80	4538587.64
4/23/2016	1	103	branched.oak	679966.93	4538778.85
4/23/2016	2	104	branched.oak	679933.67	4538800.32
4/23/2016	2	104	branched.oak	679934.81	4538798.83
4/23/2016	1	105	branched.oak	679771.05	4538909.54
4/23/2016	4	150	branched.oak	679138.96	4537946.27
4/23/2016	4	150	branched.oak	679137.76	4537945.67
4/23/2016	4	150	branched.oak	679137.68	4537945.67
4/23/2016	4	150	branched.oak	679137.71	4537945.70
4/23/2016	1	151	branched.oak	679193.33	4538008.92
4/23/2016	1	152	branched.oak	679173.39	4537986.89
4/23/2016	1	153	branched.oak	679284.35	4537850.83
4/23/2016	1	161	branched.oak	676918.22	4537153.84
4/23/2016	2	162	branched.oak	676930.33	4537150.20
4/23/2016	2	162	branched.oak	676931.15	4537150.21
4/23/2016	1	163	branched.oak	677341.70	4536644.86
4/23/2016	6	164	branched.oak	677328.14	4536613.85
4/23/2016	6	164	branched.oak	677330.58	4536618.97
4/23/2016	6	164	branched.oak	677330.34	4536619.13
4/23/2016	6	164	branched.oak	677330.24	4536619.11
4/23/2016	6	164	branched.oak	677330.35	4536619.11
4/23/2016	1	164	branched.oak	677329.12	4536620.36
4/23/2016	2	165	branched.oak	677238.12	4536565.49
4/23/2016	2	165	branched.oak	677236.18	4536569.84
4/23/2016	3	166	branched.oak	677227.18	4536564.44
4/23/2016	3	166	branched.oak	677225.97	4536562.92
4/23/2016	3	166	branched.oak	677226.00	4536562.92
4/23/2016	2	167	branched.oak	677205.62	4536558.07
4/23/2016	2	167	branched.oak	677197.80	4536550.28
4/23/2016	1	167	branched.oak	677149.79	4536471.19
4/23/2016	1	168	branched.oak	677144.31	4536488.27
4/24/2016	1	1	branched.oak	679282.57	4536454.19
4/24/2016	1	2	branched.oak	679359.79	4536463.12
4/24/2016	1	3	branched.oak	679470.04	4536480.08
4/24/2016	1	10	branched.oak	680441.19	4539117.29
4/24/2016	1	11	branched.oak	680390.48	4538580.46
4/24/2016	1	12	branched.oak	680151.05	4538714.23
4/24/2016	2	13	branched.oak	680014.58	4538747.07
4/24/2016	2	13	branched.oak	680013.67	4538747.94
4/24/2016	2	14	branched.oak	680005.63	4538752.29
4/24/2016	2	14	branched.oak	680001.37	4538756.45
4/24/2016	1	15	branched.oak	679993.42	4538759.97
4/24/2016	3	16	branched.oak	679989.33	4538758.74
4/24/2016	3	16	branched.oak	679988.84	4538759.39
4/24/2016	3	16	branched.oak	679991.10	4538758.00
4/24/2016	2	17	branched.oak	679991.44	4539060.68
4/24/2016	2	17	branched.oak	679992.89	4539059.14
4/24/2016	1	18	branched.oak	680004.42	4539020.06
4/24/2016	2	19	branched.oak	680005.36	4539015.36
4/24/2016	2	19	branched.oak	680005.90	4539015.57
4/24/2016	2	20	branched.oak	680005.60	4539215.33

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
4/24/2016	2	20	branched.oak	680007.78	4539216.21
4/24/2016	1	30	branched.oak	678829.72	4538184.65
4/24/2016	1	31	branched.oak	678914.81	4538206.55
4/24/2016	2	32	branched.oak	677768.93	4537415.78
4/24/2016	2	32	branched.oak	677772.09	4537414.52
4/24/2016	1	33	branched.oak	677820.68	4537432.79
4/24/2016	4	40	branched.oak	677339.61	4536640.57
4/24/2016	4	40	branched.oak	677339.29	4536640.43
4/24/2016	4	40	branched.oak	677339.11	4536640.39
4/24/2016	4	40	branched.oak	677338.91	4536640.36
4/24/2016	3	41	branched.oak	677302.80	4536604.37
4/24/2016	3	41	branched.oak	677303.35	4536604.14
4/24/2016	3	41	branched.oak	677302.00	4536603.99
4/24/2016	2	42	branched.oak	677251.11	4536577.98
4/24/2016	2	42	branched.oak	677250.13	4536577.78
4/24/2016	1	43	branched.oak	677229.90	4536564.05
4/24/2016	3	44	branched.oak	677165.65	4536517.10
4/24/2016	3	44	branched.oak	677165.23	4536515.22
4/24/2016	3	44	branched.oak	677165.18	4536514.83
4/24/2016	1	101	branched.oak	678578.58	4539598.93
4/24/2016	2	102	branched.oak	679819.10	4538856.67
4/24/2016	2	102	branched.oak	679817.79	4538856.57
4/24/2016	1	103	branched.oak	680034.18	4538992.08
4/24/2016	1	104	branched.oak	680003.19	4539051.22
4/24/2016	1	105	branched.oak	680008.74	4539071.10
4/24/2016	1	106	branched.oak	680005.93	4539065.03
4/24/2016	2	107	branched.oak	680024.72	4539102.05
4/24/2016	2	107	branched.oak	680029.63	4539104.79
4/24/2016	1	108	branched.oak	680070.59	4538672.74
4/24/2016	1	109	branched.oak	680487.89	4538719.84
4/24/2016	1	110	branched.oak	680496.43	4538715.42

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
4/24/2016	1	111	branched.oak	680484.89	4538702.86
4/24/2016	1	112	branched.oak	680492.35	4538700.21
4/24/2016	1	113	branched.oak	680488.16	4538687.37
4/24/2016	1	113	branched.oak	680490.03	4538694.04
4/24/2016	2	114	branched.oak	680457.08	4538602.10
4/24/2016	2	114	branched.oak	680457.57	4538603.67
4/24/2016	1	115	branched.oak	680594.13	4538547.17
4/24/2016	2	116	branched.oak	680478.41	4538552.66
4/24/2016	2	116	branched.oak	680484.19	4538551.76
4/24/2016	1	117	branched.oak	680445.99	4538556.95
4/24/2016	1	112	branched.oak	680395.80	4537245.83
4/24/2016	2	120	branched.oak	680276.62	4537078.47
4/24/2016	2	120	branched.oak	680280.19	4537080.42
4/24/2016	1	121	branched.oak	677379.31	4536712.98
4/24/2016	1	122	branched.oak	677371.99	4536683.46
4/24/2016	2	123	branched.oak	677432.71	4536660.53
4/24/2016	2	123	branched.oak	677359.48	4536660.52
4/24/2016	2	124	branched.oak	677216.85	4536502.77
4/24/2016	2	124	branched.oak	677216.77	4536506.68
4/24/2016	3	130	branched.oak	678977.39	4537944.65
4/24/2016	3	130	branched.oak	678970.54	4537944.77
4/24/2016	3	130	branched.oak	678970.64	4537948.89
4/27/2016	2	1	branched.oak	679372.59	4536467.72
4/27/2016	2	1	branched.oak	679353.64	4536467.06
4/27/2016	2	2	branched.oak	680787.45	4538624.95
4/27/2016	2	2	branched.oak	680760.09	4538639.24
4/27/2016	1	3	branched.oak	680327.68	4538585.76
4/27/2016	1	3	branched.oak	680757.85	4538719.14
4/27/2016	1	4	branched.oak	680467.35	4538794.32
4/27/2016	1	5	branched.oak	680479.78	4538651.23
4/27/2016	1	6	branched.oak	680475.80	4538652.97

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
4/27/2016	1	7	branched.oak	680457.61	4538640.18
4/27/2016	1	8	branched.oak	680448.60	4538635.93
4/27/2016	1	9	branched.oak	680144.20	4538606.27
4/27/2016	1	10	branched.oak	679989.22	4538742.81
4/27/2016	1	11	branched.oak	679944.63	4538756.53
4/27/2016	1	15	branched.oak	680004.70	4539082.59
4/27/2016	1	20	branched.oak	678749.56	4538115.01
4/27/2016	1	21	branched.oak	677778.38	4537377.61
4/27/2016	3	101	branched.oak	678953.69	4538138.69
4/27/2016	3	101	branched.oak	678954.01	4538135.10
4/27/2016	3	101	branched.oak	678953.37	4538133.67
4/27/2016	2	102	branched.oak	677378.37	4536724.97
4/27/2016	2	102	branched.oak	677378.42	4536725.96
4/27/2016	2	103	branched.oak	677297.98	4536600.46
4/27/2016	2	103	branched.oak	677298.01	4536599.77
4/27/2016	1	104	branched.oak	677167.23	4536496.65
4/27/2016	1	105	branched.oak	677172.72	4536479.45
4/27/2016	2	110	branched.oak	680629.22	4538452.89
4/27/2016	2	110	branched.oak	680626.33	4538447.96
4/27/2016	2	111	branched.oak	680464.66	4538674.22
4/27/2016	2	111	branched.oak	680472.62	4538669.80
4/27/2016	2	112	branched.oak	680395.07	4538556.86
4/27/2016	2	112	branched.oak	680393.21	4538550.41
4/27/2016	1	113	branched.oak	680418.45	4538599.61
4/27/2016	1	114	branched.oak	680413.17	4538587.59
4/27/2016	1	115	branched.oak	680423.73	4538552.12
4/27/2016	2	116	branched.oak	680436.75	4538545.53
4/27/2016	2	116	branched.oak	680436.80	4538545.47
4/27/2016	2	117	branched.oak	679967.71	4538739.78
4/27/2016	2	117	branched.oak	679968.74	4538740.05
4/27/2016	1	118	branched.oak	679931.31	4538834.37
4/27/2016	1	119	branched.oak	679915.58	4539177.99
4/27/2016	1	121	branched.oak	679989.89	4539038.59
4/27/2016	2	122	branched.oak	679995.52	4539032.56
4/27/2016	2	122	branched.oak	680005.76	4539018.62
4/27/2016	1	123	branched.oak	680018.06	4539003.25
5/3/2016	1	1	branched.oak	678790.87	4538156.30
5/3/2016	1	2	branched.oak	677622.63	4537506.88
5/3/2016	1	3	branched.oak	677317.24	4536612.05
5/3/2016	1	4	branched.oak	677402.90	4536745.17
5/3/2016	2	5	branched.oak	677366.97	4536653.00
5/3/2016	2	5	branched.oak	677362.95	4536648.30
5/3/2016	1	7	branched.oak	677159.22	4536470.11
5/3/2016	1	8	branched.oak	677212.06	4536554.04
5/3/2016	1	9	branched.oak	677205.22	4536551.27
5/3/2016	1	20	branched.oak	680267.06	4537058.16
5/3/2016	3	21	branched.oak	680408.74	4538578.07
5/3/2016	3	21	branched.oak	680408.03	4538575.74
5/3/2016	3	21	branched.oak	680405.97	4538578.92
5/3/2016	1	22	branched.oak	680411.59	4538628.86
5/3/2016	2	23	branched.oak	680397.65	4538600.76
5/3/2016	2	23	branched.oak	680397.43	4538600.73
5/3/2016	2	24	branched.oak	680101.10	4538700.91
5/3/2016	2	24	branched.oak	680101.32	4538700.88
5/3/2016	1	25	branched.oak	680076.91	4538691.44
5/3/2016	4	26	branched.oak	680030.51	4538674.11
5/3/2016	4	26	branched.oak	680028.48	4538671.73
5/3/2016	4	26	branched.oak	680024.71	4538666.98
5/3/2016	4	26	branched.oak	680015.53	4538663.08
5/3/2016	1	27	branched.oak	679751.05	4538877.05
5/3/2016	1	28	branched.oak	680051.44	4538970.08
5/3/2016	1	29	branched.oak	680015.90	4538975.59

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
5/3/2016	1	30	branched.oak	680002.85	4538984.47
5/3/2016	2	30	branched.oak	679985.02	4539161.19
5/3/2016	2	30	branched.oak	679955.85	4539162.07
5/3/2016	1	101	branched.oak	676926.23	4537137.49
5/3/2016	2	102	branched.oak	677340.16	4536636.29
5/3/2016	2	102	branched.oak	677336.81	4536634.09
5/3/2016	3	103	branched.oak	677273.05	4536590.05
5/3/2016	3	103	branched.oak	677272.88	4536589.89
5/3/2016	3	103	branched.oak	677272.90	4536589.74
5/3/2016	1	105	branched.oak	677162.02	4536446.13
5/3/2016	1	106	branched.oak	677158.88	4536475.92
5/3/2016	1	121	branched.oak	680886.62	4538395.19
5/3/2016	2	122	branched.oak	680496.04	4538510.31
5/3/2016	2	122	branched.oak	680496.58	4538505.29
5/3/2016	2	122	branched.oak	680707.90	4538632.43
5/3/2016	2	122	branched.oak	680708.34	4538632.93
5/3/2016	2	123	branched.oak	680371.54	4538520.92
5/3/2016	1	124	branched.oak	680346.57	4538553.84
5/3/2016	2	123	branched.oak	680380.09	4538519.34
5/3/2016	1	125	branched.oak	679938.88	4538831.89
5/3/2016	1	130	branched.oak	679873.70	4539057.23
5/3/2016	1	131	branched.oak	679782.50	4539385.94
5/7/2016	1	1	branched.oak	678582.13	4539599.87
5/7/2016	2	2	branched.oak	678554.32	4539595.29
5/7/2016	2	2	branched.oak	678554.61	4539595.62
5/7/2016	1	3	branched.oak	679386.85	4539223.65
5/7/2016	2	4	branched.oak	680032.66	4538880.19
5/7/2016	2	4	branched.oak	680036.40	4538885.35
5/7/2016	2	5	branched.oak	680027.66	4538888.10
5/7/2016	2	5	branched.oak	680038.17	4538883.41
5/7/2016	1	6	branched.oak	679719.04	4538867.57

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
5/7/2016	2	7	branched.oak	679720.88	4538801.17
5/7/2016	2	7	branched.oak	679720.20	4538801.94
5/7/2016	2	8	branched.oak	679946.20	4538642.70
5/7/2016	2	8	branched.oak	679942.07	4538645.79
5/7/2016	2	9	branched.oak	679932.18	4538653.24
5/7/2016	2	9	branched.oak	679933.75	4538653.22
5/7/2016	1	10	branched.oak	679885.33	4538693.05
5/7/2016	3	11	branched.oak	679872.44	4538701.07
5/7/2016	3	11	branched.oak	679870.24	4538706.57
5/7/2016	3	11	branched.oak	679874.44	4538704.60
5/7/2016	3	12	branched.oak	680047.39	4539012.41
5/7/2016	3	12	branched.oak	680042.48	4539018.99
5/7/2016	3	12	branched.oak	680047.92	4539018.10
5/7/2016	3	13	branched.oak	679727.86	4538939.10
5/7/2016	3	13	branched.oak	679728.02	4538938.99
5/7/2016	3	13	branched.oak	679727.84	4538938.51
5/7/2016	3	14	branched.oak	680333.94	4538571.15
5/7/2016	2	14	branched.oak	680320.78	4538577.03
5/7/2016	1	15	branched.oak	680440.53	4538528.41
5/7/2016	1	16	branched.oak	680372.69	4538550.05
5/7/2016	1	18	branched.oak	680088.42	4538561.40
5/7/2016	4	20	branched.oak	678473.78	4537528.65
5/7/2016	4	20	branched.oak	678471.59	4537530.37
5/7/2016	4	20	branched.oak	678520.60	4537590.82
5/7/2016	4	20	branched.oak	678482.86	4537524.00
5/7/2016	1	21	branched.oak	678717.99	4537606.32
5/7/2016	2	22	branched.oak	678796.79	4537626.16
5/7/2016	2	22	branched.oak	678796.84	4537626.48
5/7/2016	2	23	branched.oak	678668.93	4537965.27
5/7/2016	2	23	branched.oak	678667.84	4537962.55
5/7/2016	2	25	branched.oak	679192.64	4537782.42

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
5/7/2016	2	25	branched.oak	679173.79	4537820.88
5/7/2016	1	25	branched.oak	677762.84	4537483.93
5/7/2016	2	26	branched.oak	677742.51	4537486.29
5/7/2016	2	26	branched.oak	677746.42	4537485.39
5/7/2016	2	27	branched.oak	677553.50	4537459.08
5/7/2016	2	27	branched.oak	677553.52	4537458.63
5/7/2016	1	28	branched.oak	677711.76	4537487.03
5/7/2016	3	29	branched.oak	677634.26	4537490.93
5/7/2016	3	29	branched.oak	677634.27	4537490.93
5/7/2016	3	29	branched.oak	677635.48	4537492.34
5/7/2016	3	30	branched.oak	677796.69	4537397.88
5/7/2016	3	30	branched.oak	677800.16	4537396.99
5/7/2016	3	30	branched.oak	677801.10	4537446.54
5/7/2016	1	31	branched.oak	677616.00	4537515.75
5/7/2016	2	32	branched.oak	676936.74	4537151.88
5/7/2016	2	32	branched.oak	676931.89	4537152.74
5/7/2016	2	33	branched.oak	676879.82	4537164.94
5/7/2016	2	33	branched.oak	676901.68	4537160.53
5/7/2016	3	34	branched.oak	677344.68	4536648.15
5/7/2016	3	34	branched.oak	677344.55	4536648.61
5/7/2016	3	34	branched.oak	677344.57	4536648.94
5/7/2016	6	35	branched.oak	677340.48	4536633.29
5/7/2016	6	35	branched.oak	677338.70	4536631.93
5/7/2016	6	35	branched.oak	677338.73	4536631.65
5/7/2016	6	35	branched.oak	677338.74	4536631.59
5/7/2016	6	35	branched.oak	677338.79	4536631.49
5/7/2016	6	35	branched.oak	677338.90	4536631.35
5/7/2016	1	36	branched.oak	677311.78	4536610.53
5/7/2016	2	37	branched.oak	677176.74	4536498.03
5/7/2016	2	37	branched.oak	677187.78	4536492.01
5/7/2016	1	38	branched.oak	679340.88	4536464.52

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
5/7/2016	1	101	branched.oak	678572.31	4539602.02
5/7/2016	1	102	branched.oak	678534.77	4539626.39
5/7/2016	1	103	branched.oak	680032.91	4539021.36
5/7/2016	2	104	branched.oak	680042.55	4539024.01
5/7/2016	2	104	branched.oak	680037.96	4539017.92
5/7/2016	2	105	branched.oak	680035.67	4538861.06
5/7/2016	2	105	branched.oak	680035.31	4538859.41
5/7/2016	2	106	branched.oak	680021.61	4538845.65
5/7/2016	2	106	branched.oak	680019.29	4538841.21
5/7/2016	1	107	branched.oak	679925.37	4538634.35
5/7/2016	2	108	branched.oak	679897.52	4538666.16
5/7/2016	2	108	branched.oak	679898.33	4538667.92
5/7/2016	2	109	branched.oak	679885.30	4538678.45
5/7/2016	2	109	branched.oak	679880.37	4538676.40
5/7/2016	2	110	branched.oak	679856.00	4538697.78
5/7/2016	2	110	branched.oak	679728.75	4538876.90
5/7/2016	2	112	branched.oak	679759.27	4538653.09
5/7/2016	2	112	branched.oak	679746.68	4538655.52
5/7/2016	2	113	branched.oak	679775.66	4539423.92
5/7/2016	2	113	branched.oak	679783.14	4539425.50
5/7/2016	1	114	branched.oak	679802.80	4539434.98
5/7/2016	1	115	branched.oak	680119.94	4538842.38
5/7/2016	2	116	branched.oak	680118.21	4538816.43
5/7/2016	2	116	branched.oak	680117.34	4538812.35
5/7/2016	3	117	branched.oak	680234.37	4538617.66
5/7/2016	3	117	branched.oak	680241.14	4538594.05
5/7/2016	3	117	branched.oak	680245.75	4538584.54
5/7/2016	2	118	branched.oak	680246.14	4538557.33
5/7/2016	1	119	branched.oak	680248.57	4538546.64
5/7/2016	2	120	branched.oak	680044.50	4538685.74
5/7/2016	2	120	branched.oak	680045.94	4538685.83

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
5/7/2016	1	121	branched.oak	680063.37	4538692.96
5/7/2016	1	122	branched.oak	680398.36	4538506.61
5/7/2016	3	123	branched.oak	680398.19	4538504.56
5/7/2016	3	123	branched.oak	680395.45	4538506.43
5/7/2016	3	123	branched.oak	680397.25	4538505.52
5/7/2016	2	124	branched.oak	680385.19	4538517.05
5/7/2016	2	124	branched.oak	680382.98	4538516.11
5/7/2016	2	125	branched.oak	680385.74	4538517.92
5/7/2016	2	125	branched.oak	680391.87	4538510.94
5/7/2016	1	126	branched.oak	680388.89	4538585.96
5/7/2016	2	127	branched.oak	680506.36	4538363.75
5/8/2016	1	1	branched.oak	678964.81	4536471.91
5/8/2016	1	2	branched.oak	677344.84	4536643.07
5/8/2016	2	3	branched.oak	677338.22	4536626.55
5/8/2016	2	3	branched.oak	677337.79	4536629.15
5/8/2016	1	4	branched.oak	677177.49	4536489.38
5/8/2016	2	5	branched.oak	677788.10	4537407.28
5/8/2016	2	5	branched.oak	677789.08	4537406.92
5/8/2016	1	50	branched.oak	679822.44	4539444.22
5/8/2016	3	51	branched.oak	678545.42	4539606.53
5/8/2016	3	51	branched.oak	678545.00	4539605.51
5/8/2016	3	51	branched.oak	678545.97	4539605.46
5/8/2016	2	52	branched.oak	680019.09	4538714.25
5/8/2016	2	52	branched.oak	680019.69	4538711.38
5/8/2016	1	53	branched.oak	679987.65	4538716.34
5/8/2016	1	54	branched.oak	680001.05	4538716.91
5/8/2016	1	55	branched.oak	680061.22	4538669.33
5/8/2016	1	56	branched.oak	680048.03	4538964.11
5/8/2016	1	57	branched.oak	680007.62	4539011.66
5/8/2016	1	58	branched.oak	680009.14	4539011.50
5/8/2016	2	59	branched.oak	680029.41	4539060.14
5/8/2016	2	59	branched.oak	680029.41	4539060.80
5/8/2016	4	60	branched.oak	679984.20	4539199.40
5/8/2016	4	60	branched.oak	679984.92	4539198.56
5/8/2016	4	60	branched.oak	679987.60	4539199.15
5/8/2016	4	60	branched.oak	679989.64	4539198.53
5/8/2016	1	61	branched.oak	680030.47	4539123.10
5/8/2016	1	62	branched.oak	680623.19	4538460.88
5/8/2016	1	63	branched.oak	680641.60	4538454.60
5/8/2016	1	64	branched.oak	680673.72	4538444.25
5/8/2016	4	65	branched.oak	680768.96	4538601.64
5/8/2016	4	65	branched.oak	680770.02	4538599.15
5/8/2016	4	65	branched.oak	680773.99	4538600.51
5/8/2016	4	65	branched.oak	680774.04	4538597.32
5/8/2016	2	66	branched.oak	680389.09	4538541.19
5/8/2016	2	66	branched.oak	680390.00	4538553.09
5/8/2016	2	67	branched.oak	680339.15	4538559.22
5/8/2016	2	67	branched.oak	680367.00	4538572.66
5/8/2016	2	68	branched.oak	680560.63	4539172.77
5/8/2016	2	68	branched.oak	680562.25	4539172.59
5/8/2016	1	69	branched.oak	680898.81	4538239.38
5/8/2016	2	70	branched.oak	680888.52	4538413.37
5/8/2016	2	70	branched.oak	680893.71	4538402.36
5/8/2016	1	71	branched.oak	680259.54	4537059.79
5/8/2016	2	72	branched.oak	680207.91	4537010.44
5/8/2016	2	72	branched.oak	680208.97	4537011.84
5/8/2016	2	73	branched.oak	680858.24	4538130.67
5/8/2016	2	73	branched.oak	680859.30	4538131.19
5/9/2016	1	1	branched.oak	680428.95	4538597.25
5/9/2016	1	2	branched.oak	680429.54	4538596.72
5/9/2016	1	3	branched.oak	680003.46	4539024.58
5/9/2016	1	4	branched.oak	680005.21	4539023.39

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
5/9/2016	1	5	branched.oak	680005.13	4539024.43
5/9/2016	2	6	branched.oak	680004.97	4539026.10
5/9/2016	2	6	branched.oak	680006.01	4539019.77
5/9/2016	1	7	branched.oak	679818.12	4539441.79
5/9/2016	1	10	branched.oak	678966.85	4537613.98
5/9/2016	4	101	branched.oak	679947.68	4539131.31
5/9/2016	4	101	branched.oak	679946.13	4539131.37
5/9/2016	4	101	branched.oak	679943.20	4539134.17
5/9/2016	4	101	branched.oak	679946.43	4539132.90
5/9/2016	2	102	branched.oak	680469.23	4538517.34
5/9/2016	2	102	branched.oak	680467.77	4538518.87
5/9/2016	2	103	branched.oak	680426.46	4538539.61
5/9/2016	2	103	branched.oak	680424.76	4538540.07
5/9/2016	1	104	branched.oak	680424.39	4538540.50
5/9/2016	2	105	branched.oak	680421.98	4538599.96
5/9/2016	2	105	branched.oak	680425.05	4538598.36
5/9/2016	1	106	branched.oak	680426.04	4538597.72
5/9/2016	1	107	branched.oak	680425.62	4538597.50
5/9/2016	1	108	branched.oak	680425.45	4538597.48
5/9/2016	1	109	branched.oak	680422.93	4538599.30
5/9/2016	2	110	branched.oak	680620.84	4538444.05
5/9/2016	2	110	branched.oak	680623.13	4538445.02
5/9/2016	3	111	branched.oak	680445.53	4538533.36
5/9/2016	3	111	branched.oak	680445.78	4538533.51
5/9/2016	3	111	branched.oak	680445.54	4538534.44
5/9/2016	1	112	branched.oak	680444.67	4538534.51
5/9/2016	1	113	branched.oak	679975.15	4538736.36
5/9/2016	1	114	branched.oak	680034.11	4539009.00
5/9/2016	1	115	branched.oak	680008.59	4539003.87
5/9/2016	1	115	branched.oak	680008.37	4539003.60
5/9/2016	3	117	branched.oak	680846.85	4538108.80
5/9/2016	3	117	branched.oak	680847.69	4538108.28
5/9/2016	3	117	branched.oak	680847.13	4538108.62
5/14/2016	1	1	branched.oak	680795.81	4538479.61
5/14/2016	2	2	branched.oak	680526.80	4539182.99
5/14/2016	2	2	branched.oak	680511.35	4539173.78
5/14/2016	2	3	branched.oak	680485.98	4539143.91
5/14/2016	2	3	branched.oak	680485.87	4539143.53
5/14/2016	3	4	branched.oak	680463.11	4539122.32
5/14/2016	3	4	branched.oak	680462.71	4539121.49
5/14/2016	3	4	branched.oak	680462.40	4539121.64
5/14/2016	1	5	branched.oak	680515.71	4539196.64
5/14/2016	1	6	branched.oak	680412.61	4538515.43
5/14/2016	2	7	branched.oak	680406.97	4538528.70
5/14/2016	2	7	branched.oak	680407.39	4538528.42
5/14/2016	2	8	branched.oak	680402.15	4538543.26
5/14/2016	2	8	branched.oak	680402.34	4538543.96
5/14/2016	3	9	branched.oak	680401.80	4538585.56
5/14/2016	3	9	branched.oak	680401.59	4538586.54
5/14/2016	3	9	branched.oak	680401.30	4538584.49
5/14/2016	2	10	branched.oak	680173.23	4538660.37
5/14/2016	2	10	branched.oak	680173.42	4538662.00
5/14/2016	2	11	branched.oak	680022.58	4538697.85
5/14/2016	2	11	branched.oak	680022.24	4538697.05
5/14/2016	1	12	branched.oak	680014.15	4538694.98
5/14/2016	2	13	branched.oak	679298.16	4539232.43
5/14/2016	2	13	branched.oak	679298.87	4539230.67
5/14/2016	2	14	branched.oak	679713.25	4538801.72
5/14/2016	2	14	branched.oak	679712.86	4538802.94
5/14/2016	1	15	branched.oak	679608.83	4538893.43
5/14/2016	1	25	branched.oak	678429.55	4537540.58
5/14/2016	3	26	branched.oak	678862.65	4537573.32

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
5/14/2016	3	26	branched.oak	678862.57	4537575.05
5/14/2016	3	26	branched.oak	678860.78	4537576.08
5/14/2016	1	27	branched.oak	679217.55	4537841.76
5/14/2016	1	28	branched.oak	679279.21	4537788.78
5/14/2016	3	29	branched.oak	678768.80	4537900.68
5/14/2016	3	29	branched.oak	678771.73	4537899.76
5/14/2016	3	29	branched.oak	678769.78	4537900.26
5/14/2016	3	30	branched.oak	677678.79	4537402.72
5/14/2016	3	30	branched.oak	677690.60	4537408.25
5/14/2016	3	30	branched.oak	677686.71	4537406.93
5/14/2016	1	31	branched.oak	677727.56	4537431.25
5/14/2016	1	32	branched.oak	677808.09	4537432.34
5/14/2016	3	33	branched.oak	677792.96	4537397.26
5/14/2016	3	33	branched.oak	677791.90	4537397.74
5/14/2016	3	33	branched.oak	677791.91	4537398.17
5/14/2016	1	34	branched.oak	677879.26	4537385.92
5/14/2016	2	35	branched.oak	677933.52	4537263.72
5/14/2016	2	35	branched.oak	677934.19	4537264.11
5/14/2016	2	36	branched.oak	678109.33	4537563.84
5/14/2016	2	36	branched.oak	678088.60	4537562.18
5/14/2016	2	37	branched.oak	676848.09	4537081.08
5/14/2016	2	37	branched.oak	676846.29	4537080.23
5/14/2016	2	38	branched.oak	677377.98	4536719.07
5/14/2016	2	38	branched.oak	677378.79	4536710.04
5/14/2016	1	39	branched.oak	677363.00	4536666.63
5/14/2016	2	40	branched.oak	677150.79	4536475.21
5/14/2016	2	40	branched.oak	677152.39	4536475.00
5/15/2016	2	1	branched.oak	680398.80	4538546.84
5/15/2016	2	1	branched.oak	680398.72	4538547.14
5/15/2016	1	2	branched.oak	680398.61	4538547.28
5/15/2016	2	3	branched.oak	680414.97	4538551.62
5/15/2016	2	3	branched.oak	680414.73	4538552.18
5/15/2016	2	4	branched.oak	680192.57	4538573.53
5/15/2016	2	4	branched.oak	680192.41	4538574.30
5/15/2016	2	5	branched.oak	680043.79	4538691.59
5/15/2016	2	5	branched.oak	680043.87	4538691.36
5/15/2016	1	6	branched.oak	680098.55	4538607.82
5/15/2016	2	7	branched.oak	680067.67	4539018.74
5/15/2016	2	7	branched.oak	680065.66	4539024.63
5/15/2016	2	8	branched.oak	678619.29	4539587.92
5/15/2016	2	9	branched.oak	678573.93	4539601.54
5/15/2016	2	9	branched.oak	678535.65	4539612.06
5/15/2016	2	8	branched.oak	678601.03	4539598.53
5/15/2016	2	10	branched.oak	679721.05	4538817.23
5/15/2016	2	10	branched.oak	679720.94	4538821.47
5/15/2016	1	11	branched.oak	679721.01	4538822.36
5/15/2016	1	12	branched.oak	679721.00	4538822.25
5/15/2016	1	13	branched.oak	679727.51	4538786.61
5/15/2016	1	14	branched.oak	679727.89	4538781.51
5/15/2016	1	15	branched.oak	679727.66	4538781.01
5/15/2016	1	16	branched.oak	679728.54	4538778.30
5/15/2016	2	17	branched.oak	679706.21	4538885.11
5/15/2016	2	17	branched.oak	679705.50	4538884.40
5/15/2016	1	18	branched.oak	679747.57	4538911.51
5/15/2016	7	19	branched.oak	680918.38	4538336.70
5/15/2016	7	19	branched.oak	680919.04	4538334.14
5/15/2016	7	19	branched.oak	680917.57	4538332.31
5/15/2016	7	19	branched.oak	680917.82	4538332.33
5/15/2016	7	19	branched.oak	680917.38	4538330.10
5/15/2016	7	19	branched.oak	680916.41	4538329.08
5/15/2016	7	19	branched.oak	680916.22	4538324.84
5/15/2016	4	20	branched.oak	680650.61	4538312.67

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
5/15/2016	4	20	branched.oak	680649.60	4538312.51
5/15/2016	4	20	branched.oak	680647.61	4538312.21
5/15/2016	4	20	branched.oak	680651.39	4538314.38
5/15/2016	2	21	branched.oak	680899.50	4538266.64
5/15/2016	2	21	branched.oak	680889.10	4538248.37
5/15/2016	2	30	branched.oak	679202.52	4537869.69
5/15/2016	2	30	branched.oak	679205.69	4537869.03
5/15/2016	2	31	branched.oak	679288.63	4537802.90
5/15/2016	2	31	branched.oak	679287.72	4537802.64
5/15/2016	1	32	branched.oak	679319.11	4537937.13
5/15/2016	2	33	branched.oak	679240.91	4537995.96
5/15/2016	2	33	branched.oak	679241.38	4537996.28
5/15/2016	2	34	branched.oak	678884.44	4538065.33
5/15/2016	2	34	branched.oak	678885.09	4538065.51
5/15/2016	1	35	branched.oak	678955.87	4538132.70
5/15/2016	1	36	branched.oak	678948.65	4538133.49
5/15/2016	2	37	branched.oak	678932.37	4538193.33
5/15/2016	2	37	branched.oak	678941.13	4538191.83
5/15/2016	1	38	branched.oak	677687.05	4537484.91
5/15/2016	1	39	branched.oak	677735.28	4537486.46
5/15/2016	1	40	branched.oak	677795.10	4537396.56
5/15/2016	2	41	branched.oak	677825.84	4537440.63
5/15/2016	2	41	branched.oak	677854.78	4537443.91
5/15/2016	1	43	branched.oak	677808.14	4537458.18
5/15/2016	2	44	branched.oak	677341.51	4536645.85
5/15/2016	2	44	branched.oak	677341.04	4536646.41
5/15/2016	2	45	branched.oak	680713.21	4538553.62
5/15/2016	2	45	branched.oak	680715.45	4538553.19
5/15/2016	3	46	branched.oak	680674.31	4538560.29
5/15/2016	3	46	branched.oak	680672.99	4538563.47
5/15/2016	3	46	branched.oak	680678.63	4538564.56

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
5/19/2016	1	1	branched.oak	679224.77	4536426.68
5/19/2016	1	2	branched.oak	679253.04	4536441.23
5/19/2016	1	3	branched.oak	679300.12	4536456.16
5/19/2016	1	4	branched.oak	679344.97	4537840.84
5/19/2016	2	5	branched.oak	677690.30	4537507.11
5/19/2016	2	5	branched.oak	677691.55	4537508.99
5/19/2016	1	6	branched.oak	677768.08	4537504.89
5/19/2016	1	50	branched.oak	678576.56	4539600.38
5/19/2016	1	51	branched.oak	680031.06	4539079.89
5/19/2016	1	52	branched.oak	680031.06	4539079.89
5/19/2016	2	53	branched.oak	680015.87	4538744.53
5/19/2016	2	53	branched.oak	680016.87	4538742.42
5/19/2016	1	54	branched.oak	679808.69	4538802.02
5/19/2016	1	55	branched.oak	679803.96	4538805.26
5/19/2016	1	56	branched.oak	679782.47	4538821.10
5/19/2016	2	57	branched.oak	679748.87	4538884.09
5/19/2016	2	57	branched.oak	679751.02	4538880.69
5/19/2016	2	58	branched.oak	680087.80	4538568.32
5/19/2016	2	58	branched.oak	680087.01	4538570.50
5/19/2016	3	59	branched.oak	680337.37	4538608.20
5/19/2016	3	59	branched.oak	680337.54	4538608.11
5/19/2016	3	59	branched.oak	680337.46	4538608.19
5/19/2016	1	60	branched.oak	680665.78	4538529.09
5/19/2016	2	61	branched.oak	680472.16	4538548.56
5/19/2016	2	61	branched.oak	680471.83	4538549.13
5/19/2016	1	62	branched.oak	680446.78	4538552.91
5/19/2016	1	63	branched.oak	680444.12	4538605.47
5/19/2016	2	64	branched.oak	680443.60	4538605.10
5/19/2016	2	64	branched.oak	680447.01	4538607.47
5/19/2016	1	65	branched.oak	680397.85	4538595.27
5/19/2016	1	66	branched.oak	680482.85	4539162.15

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
5/19/2016	1	101	branched.oak	678956.04	4538129.55
5/19/2016	2	102	branched.oak	678919.51	4538147.98
5/19/2016	2	102	branched.oak	678884.06	4538155.82
5/19/2016	2	103	branched.oak	676925.50	4537153.82
5/19/2016	2	103	branched.oak	676920.36	4537149.83
5/19/2016	1	104	branched.oak	677331.28	4536623.95
5/19/2016	1	105	branched.oak	680367.71	4537195.54
5/19/2016	2	106	branched.oak	680866.15	4538116.55
5/19/2016	2	106	branched.oak	680856.26	4538102.14
5/19/2016	2	107	branched.oak	680699.48	4538528.05
5/19/2016	2	107	branched.oak	680695.21	4538532.45
5/19/2016	2	108	branched.oak	680684.80	4538531.57
5/19/2016	2	108	branched.oak	680683.26	4538534.69
5/19/2016	2	109	branched.oak	680913.11	4538370.89
5/19/2016	2	109	branched.oak	680913.57	4538380.59
5/19/2016	1	110	branched.oak	680406.88	4538998.83
6/2/2016	1	1	branched.oak	679990.03	4539087.43
6/2/2016	2	2	branched.oak	679784.10	4538835.13
6/2/2016	2	2	branched.oak	679760.72	4538872.30
6/2/2016	2	3	branched.oak	679727.74	4538862.45
6/2/2016	2	3	branched.oak	679722.01	4538865.97
6/2/2016	2	4	branched.oak	679652.30	4538922.76
6/2/2016	2	4	branched.oak	679652.49	4538922.32
6/2/2016	1	5	branched.oak	679823.47	4538817.57
6/2/2016	2	6	branched.oak	680347.01	4538593.13
6/2/2016	2	6	branched.oak	680344.74	4538592.61
6/2/2016	2	7	branched.oak	680239.03	4538667.60
6/2/2016	2	7	branched.oak	680216.52	4538670.67
6/2/2016	2	8	branched.oak	680155.51	4538601.51
6/2/2016	2	8	branched.oak	680156.99	4538599.98
6/2/2016	4	9	branched.oak	680069.57	4538591.46
6/2/2016	4	9	branched.oak	680070.24	4538591.86
6/2/2016	4	9	branched.oak	680069.22	4538591.23
6/2/2016	4	9	branched.oak	680063.62	4538620.29
6/2/2016	1	10	branched.oak	680251.56	4538680.50
6/2/2016	2	11	branched.oak	680475.85	4538559.01
6/2/2016	2	11	branched.oak	680476.38	4538557.76
6/2/2016	1	12	branched.oak	680280.53	4537072.99
6/2/2016	2	13	branched.oak	679523.59	4536537.30
6/2/2016	2	13	branched.oak	679524.93	4536537.26
6/2/2016	1	14	branched.oak	678937.44	4536707.60
6/2/2016	2	15	branched.oak	677424.97	4536776.25
6/2/2016	2	15	branched.oak	677425.95	4536775.53
6/2/2016	3	16	branched.oak	677709.19	4537501.34
6/2/2016	3	16	branched.oak	677700.19	4537501.24
6/2/2016	3	16	branched.oak	677701.68	4537501.55
6/2/2016	6	17	branched.oak	677662.80	4537498.63
6/2/2016	6	17	branched.oak	677664.08	4537498.32
6/2/2016	6	17	branched.oak	677651.16	4537509.33
6/2/2016	6	17	branched.oak	677651.82	4537507.97
6/2/2016	6	17	branched.oak	677650.70	4537507.70
6/2/2016	6	17	branched.oak	677650.92	4537507.34
6/2/2016	1	18	branched.oak	677853.18	4537460.13
6/2/2016	1	19	branched.oak	679205.06	4537850.38
6/2/2016	1	20	branched.oak	678912.49	4538208.51
6/5/2016	1	1	branched.oak	678465.07	4537532.84
6/5/2016	4	2	branched.oak	678899.85	4537657.52
6/5/2016	4	2	branched.oak	678893.33	4537657.54
6/5/2016	4	2	branched.oak	678892.15	4537654.42
6/5/2016	4	2	branched.oak	678892.70	4537653.39
6/5/2016	4	3	branched.oak	678871.39	4537645.39
6/5/2016	4	3	branched.oak	678872.81	4537645.67

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
6/5/2016	4	3	branched.oak	678867.06	4537640.55
6/5/2016	4	3	branched.oak	678867.13	4537640.21
6/5/2016	4	4	branched.oak	678977.98	4537691.40
6/5/2016	4	4	branched.oak	678978.07	4537694.16
6/5/2016	4	4	branched.oak	678978.12	4537692.11
6/5/2016	4	4	branched.oak	678979.07	4537690.84
6/5/2016	4	4	branched.oak	678978.63	4537690.11
6/5/2016	2	5	branched.oak	679233.43	4537837.33
6/5/2016	2	5	branched.oak	679227.36	4537845.22
6/5/2016	1	6	branched.oak	678900.94	4538240.69
6/5/2016	2	7	branched.oak	677834.46	4537430.64
6/5/2016	2	7	branched.oak	677835.32	4537429.71
6/5/2016	2	8	branched.oak	677337.14	4536633.88
6/5/2016	2	8	branched.oak	677337.32	4536634.45
6/5/2016	2	9	branched.oak	677249.22	4536548.29
6/5/2016	2	9	branched.oak	677251.79	4536551.01
6/5/2016	1	10	branched.oak	679408.97	4536480.11
6/5/2016	4	11	branched.oak	679346.18	4536470.82
6/5/2016	4	11	branched.oak	679346.31	4536470.51
6/5/2016	4	11	branched.oak	679346.34	4536470.44
6/5/2016	4	11	branched.oak	679346.23	4536470.40
6/5/2016	1	12	branched.oak	680832.38	4538116.42
6/5/2016	2	13	branched.oak	680915.35	4538366.72
6/5/2016	2	13	branched.oak	680915.27	4538366.01
6/5/2016	2	14	branched.oak	680484.79	4539163.29
6/5/2016	2	14	branched.oak	680451.52	4539125.36
6/5/2016	1	15	branched.oak	680496.78	4538536.61
6/5/2016	2	16	branched.oak	680466.22	4538541.31
6/5/2016	2	16	branched.oak	680461.63	4538541.88
6/5/2016	1	17	branched.oak	680443.61	4538547.83
6/5/2016	2	18	branched.oak	680408.08	4538537.62
6/5/2016	2	18	branched.oak	680398.21	4538539.56
6/5/2016	2	19	branched.oak	679775.86	4538835.70
6/5/2016	2	19	branched.oak	679774.71	4538832.81
6/5/2016	4	20	branched.oak	679768.94	4538837.32
6/5/2016	4	20	branched.oak	679757.31	4538843.04
6/5/2016	4	20	branched.oak	679767.91	4538836.78
6/5/2016	4	20	branched.oak	679757.37	4538843.66
6/5/2016	1	21	branched.oak	679753.19	4538875.19
6/5/2016	2	22	branched.oak	679744.31	4538914.36
6/5/2016	2	22	branched.oak	679738.47	4538933.64
6/5/2016	2	23	branched.oak	680062.33	4538832.12
6/5/2016	2	23	branched.oak	680061.48	4538854.10
6/5/2016	3	24	branched.oak	680052.70	4539119.77
6/5/2016	3	24	branched.oak	680050.49	4539167.37
6/5/2016	3	24	branched.oak	680046.58	4539187.78
6/5/2016	2	25	branched.oak	679999.67	4539028.66
6/5/2016	2	25	branched.oak	680004.25	4539019.41
6/5/2016	1	26	branched.oak	680004.32	4539019.73
6/5/2016	2	27	branched.oak	679863.62	4539464.12
6/5/2016	2	27	branched.oak	679862.27	4539464.60
6/5/2016	1	28	branched.oak	679842.91	4539456.04
6/5/2016	1	28	branched.oak	679810.02	4539437.71
6/5/2016	1	28	branched.oak	679806.92	4539435.79
6/5/2016	2	29	branched.oak	679617.57	4538950.37
6/5/2016	2	29	branched.oak	679620.17	4538958.34
6/5/2016	4	30	branched.oak	678549.63	4539599.95
6/5/2016	4	30	branched.oak	678549.06	4539599.88
6/5/2016	4	30	branched.oak	678547.30	4539601.22
6/5/2016	4	30	branched.oak	678561.04	4539603.51
6/5/2016	2	31	branched.oak	679321.60	4539272.26
6/5/2016	2	31	branched.oak	679315.86	4539277.06

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
6/12/2016	2	1	branched.oak	677820.17	4537418.39
6/12/2016	2	1	branched.oak	677821.13	4537417.67
6/12/2016	3	2	branched.oak	679339.56	4537844.72
6/12/2016	3	2	branched.oak	679336.64	4537805.71
6/12/2016	3	2	branched.oak	679330.96	4537800.58
6/12/2016	2	3	branched.oak	679248.74	4537994.12
6/12/2016	2	3	branched.oak	679247.90	4537993.84
6/12/2016	2	4	branched.oak	678928.95	4538196.85
6/12/2016	2	4	branched.oak	678928.84	4538196.83
6/12/2016	2	5	branched.oak	677315.12	4536609.71
6/12/2016	2	5	branched.oak	677300.31	4536605.34
6/12/2016	3	6	branched.oak	677258.23	4536580.30
6/12/2016	3	6	branched.oak	677257.76	4536582.69
6/12/2016	3	6	branched.oak	677258.05	4536581.69
6/12/2016	2	7	branched.oak	677156.76	4536506.56
6/12/2016	2	7	branched.oak	677157.21	4536502.77
6/12/2016	4	8	branched.oak	679658.70	4536658.88
6/12/2016	4	8	branched.oak	679658.85	4536657.94
6/12/2016	4	8	branched.oak	679660.58	4536660.41
6/12/2016	4	8	branched.oak	679660.29	4536661.22
6/12/2016	1	9	branched.oak	679278.49	4536452.05
6/12/2016	3	50	branched.oak	680696.54	4538530.74
6/12/2016	3	50	branched.oak	680697.11	4538533.13
6/12/2016	3	50	branched.oak	680698.22	4538532.96
6/12/2016	2	51	branched.oak	678542.28	4539612.45
6/12/2016	2	51	branched.oak	678543.35	4539612.18
6/12/2016	2	52	branched.oak	679305.70	4539341.80
6/12/2016	2	52	branched.oak	679306.65	4539340.86
6/12/2016	1	53	branched.oak	680053.91	4539163.98
6/12/2016	3	54	branched.oak	680002.24	4539027.16
6/12/2016	3	54	branched.oak	680002.11	4539025.95
6/12/2016	3	54	branched.oak	680001.96	4539026.88
6/12/2016	4	55	branched.oak	680071.98	4538687.02
6/12/2016	4	55	branched.oak	680074.54	4538683.77
6/12/2016	4	55	branched.oak	680075.28	4538685.08
6/12/2016	4	55	branched.oak	680075.74	4538685.25
6/12/2016	1	56	branched.oak	680501.09	4538539.47
6/12/2016	1	57	branched.oak	680465.54	4539150.47
6/15/2016	1	1	branched.oak	678896.23	4538157.40
6/15/2016	2	2	branched.oak	679389.12	4536474.64
6/15/2016	2	2	branched.oak	679374.19	4536473.15
6/15/2016	2	5	branched.oak	680136.55	4538556.03
6/15/2016	2	5	branched.oak	680126.62	4538554.87
6/15/2016	2	101	branched.oak	678569.31	4539599.01
6/15/2016	2	101	branched.oak	678565.73	4539596.84
6/15/2016	1	102	branched.oak	679309.89	4539280.02
6/18/2016	1	1	branched.oak	680140.14	4538550.59
6/18/2016	1	2	branched.oak	680006.32	4538705.52
6/18/2016	1	3	branched.oak	680045.25	4539180.52
6/18/2016	4	5	branched.oak	678912.32	4537655.37
6/18/2016	4	5	branched.oak	678922.31	4537656.46
6/18/2016	4	5	branched.oak	678912.99	4537656.28
6/18/2016	4	5	branched.oak	678922.85	4537654.82
6/18/2016	1	6	branched.oak	677578.85	4537517.17
6/18/2016	2	9	branched.oak	677333.23	4536636.55
6/18/2016	2	9	branched.oak	677337.44	4536633.14
6/20/2016	1	1	branched.oak	680165.22	4538457.18
6/20/2016	1	1	branched.oak	680136.83	4538567.75
6/20/2016	1	2	branched.oak	680409.73	4538538.24
6/20/2016	4	3	branched.oak	680305.30	4538577.49
6/20/2016	4	3	branched.oak	680324.29	4538569.89
6/20/2016	4	3	branched.oak	680324.55	4538569.26

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
6/20/2016	4	3	branched.oak	680329.54	4538568.82
6/20/2016	2	4	branched.oak	680020.99	4538736.16
6/20/2016	2	4	branched.oak	680018.84	4538735.87
6/20/2016	1	5	branched.oak	679842.48	4538781.23
6/20/2016	3	6	branched.oak	678580.77	4539600.98
6/20/2016	3	6	branched.oak	678548.32	4539600.36
6/20/2016	3	6	branched.oak	678548.32	4539600.36
6/20/2016	2	7	branched.oak	679281.45	4539304.45
6/20/2016	2	7	branched.oak	679282.97	4539300.10
6/20/2016	2	8	branched.oak	680896.87	4538261.38
6/20/2016	2	8	branched.oak	680897.58	4538267.34
6/20/2016	2	15	branched.oak	678868.48	4538079.36
6/20/2016	2	15	branched.oak	678868.67	4538079.77
6/20/2016	1	16	branched.oak	678892.25	4538149.31
6/20/2016	3	17	branched.oak	678943.28	4538138.14
6/20/2016	3	17	branched.oak	678939.57	4538136.11
6/20/2016	3	17	branched.oak	678938.14	4538138.88
6/20/2016	1	18	branched.oak	677783.50	4537399.30
6/24/2016	2	1	branched.oak	680888.34	4538271.24
6/24/2016	2	1	branched.oak	680889.60	4538272.56
6/24/2016	1	2	branched.oak	679993.22	4538732.40
6/24/2016	1	3	branched.oak	679677.69	4538938.71
6/24/2016	2	4	branched.oak	679327.93	4539282.19
6/24/2016	2	4	branched.oak	679326.10	4539276.59
6/24/2016	2	10	branched.oak	677812.29	4537393.59
6/24/2016	2	10	branched.oak	677812.82	4537393.47
6/24/2016	4	11	branched.oak	677827.63	4537436.75
6/24/2016	4	11	branched.oak	677828.19	4537438.30
6/24/2016	4	11	branched.oak	677830.31	4537437.66
6/24/2016	4	11	branched.oak	677828.71	4537438.37
6/24/2016	2	12	branched.oak	677893.55	4537482.10
6/24/2016	2	12	branched.oak	677892.05	4537482.26
6/24/2016	1	13	branched.oak	677607.43	4537478.45
6/25/2016	2	1	branched.oak	677595.04	4537516.48
6/25/2016	2	1	branched.oak	677595.05	4537516.87
6/25/2016	3	2	branched.oak	677630.27	4537510.95
6/25/2016	3	2	branched.oak	677646.95	4537510.10
6/25/2016	3	2	branched.oak	677649.65	4537510.44
6/25/2016	1	3	branched.oak	677801.19	4537395.01
6/25/2016	2	4	branched.oak	678141.74	4537642.44
6/25/2016	2	4	branched.oak	678140.61	4537651.59
6/25/2016	2	5	branched.oak	678897.87	4537654.32
6/25/2016	2	5	branched.oak	678898.80	4537655.59
6/25/2016	2	6	branched.oak	678818.02	4537625.12
6/25/2016	2	6	branched.oak	678814.15	4537618.61
6/25/2016	1	7	branched.oak	679258.98	4537822.10
6/25/2016	4	8	branched.oak	679260.12	4537984.19
6/25/2016	4	8	branched.oak	679263.62	4537987.07
6/25/2016	4	8	branched.oak	679257.27	4537984.12
6/25/2016	4	8	branched.oak	679248.20	4537992.80
6/25/2016	3	9	branched.oak	679185.34	4537983.05
6/25/2016	3	9	branched.oak	679191.00	4537983.10
6/25/2016	3	9	branched.oak	679191.92	4537981.33
6/25/2016	2	10	branched.oak	676902.40	4537148.68
6/25/2016	2	10	branched.oak	676928.90	4537146.30
6/25/2016	1	11	branched.oak	680481.70	4539158.17
6/25/2016	2	12	branched.oak	680453.05	4539128.93
6/25/2016	2	12	branched.oak	680453.90	4539128.25
6/25/2016	2	13	branched.oak	680664.81	4538521.66
6/25/2016	2	13	branched.oak	680662.27	4538519.83
6/25/2016	1	14	branched.oak	680594.71	4538530.68
6/25/2016	3	15	branched.oak	680428.12	4538556.75

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
6/25/2016	3	15	branched.oak	680428.68	4538556.50
6/25/2016	3	15	branched.oak	680427.91	4538556.51
6/25/2016	2	16	branched.oak	680447.04	4538553.29
6/25/2016	2	16	branched.oak	680447.27	4538553.24
6/25/2016	4	17	branched.oak	679963.92	4538760.45
6/25/2016	4	17	branched.oak	679962.11	4538759.31
6/25/2016	4	17	branched.oak	679961.95	4538759.84
6/25/2016	4	17	branched.oak	679961.78	4538760.36
6/25/2016	2	18	branched.oak	680055.58	4538776.31
6/25/2016	2	18	branched.oak	680062.69	4538775.91
6/25/2016	2	19	branched.oak	680072.59	4538808.14
6/25/2016	2	19	branched.oak	680071.29	4538860.08
6/25/2016	2	20	branched.oak	680059.04	4538875.88
6/25/2016	2	20	branched.oak	680057.28	4538882.84
6/25/2016	2	21	branched.oak	680055.15	4539144.29
6/25/2016	2	21	branched.oak	680053.80	4539139.56
6/25/2016	2	22	branched.oak	678639.97	4539585.65
6/25/2016	2	22	branched.oak	678544.85	4539601.93
6/25/2016	1	23	branched.oak	679369.38	4539320.94
6/26/2016	2	1	branched.oak	679802.13	4538802.86
6/26/2016	2	1	branched.oak	679791.88	4538812.14
6/26/2016	1	2	branched.oak	679791.68	4538812.02
6/26/2016	2	3	branched.oak	679656.18	4538918.44
6/26/2016	2	3	branched.oak	679656.24	4538918.24
6/26/2016	1	4	branched.oak	680054.73	4538766.02
6/26/2016	3	5	branched.oak	680473.21	4539122.64
6/26/2016	3	5	branched.oak	680472.21	4539121.96
6/26/2016	3	5	branched.oak	680472.75	4539122.26
6/26/2016	1	6	branched.oak	680545.56	4539207.98
6/26/2016	2	7	branched.oak	680905.65	4538288.39
6/26/2016	2	7	branched.oak	680905.37	4538290.57

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
6/26/2016	1	8	branched.oak	676932.20	4537137.17
6/26/2016	2	9	branched.oak	677468.78	4536780.01
6/26/2016	2	9	branched.oak	677469.96	4536778.88
6/26/2016	1	10	branched.oak	677336.02	4536633.70
6/26/2016	2	11	branched.oak	677587.30	4537516.23
6/26/2016	2	11	branched.oak	677587.24	4537515.35
6/26/2016	2	12	branched.oak	677638.97	4537510.07
6/26/2016	2	12	branched.oak	677638.90	4537511.09
6/26/2016	1	13	branched.oak	679346.53	4537887.02
6/26/2016	4	14	branched.oak	679067.72	4537954.88
6/26/2016	4	14	branched.oak	679065.49	4537956.97
6/26/2016	4	14	branched.oak	679067.26	4537955.24
6/26/2016	4	14	branched.oak	679065.06	4537960.29
6/26/2016	1	15	branched.oak	678950.65	4537960.73
6/26/2016	5	101	branched.oak	676935.54	4537136.61
6/26/2016	5	101	branched.oak	676935.72	4537136.34
6/26/2016	5	101	branched.oak	676935.73	4537136.28
6/26/2016	5	101	branched.oak	676935.47	4537135.41
6/26/2016	5	101	branched.oak	676935.45	4537135.43
6/26/2016	4	102	branched.oak	679254.98	4537991.32
6/26/2016	4	102	branched.oak	679252.94	4537992.67
6/26/2016	4	102	branched.oak	679251.61	4537993.05
6/26/2016	4	102	branched.oak	679253.90	4537992.84
6/26/2016	3	103	branched.oak	679337.68	4537884.38
6/26/2016	3	103	branched.oak	679338.52	4537874.44
6/26/2016	3	103	branched.oak	679339.24	4537872.72
6/26/2016	3	104	branched.oak	679083.05	4537985.58
6/26/2016	3	104	branched.oak	679079.72	4537983.34
6/26/2016	3	104	branched.oak	679077.78	4537981.73
6/26/2016	2	105	branched.oak	679146.96	4537988.63
6/26/2016	2	105	branched.oak	679148.46	4537987.59

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
6/26/2016	3	106	branched.oak	679210.32	4537996.47
6/26/2016	3	106	branched.oak	679210.14	4537995.86
6/26/2016	3	106	branched.oak	679209.27	4537993.44
6/26/2016	3	150	branched.oak	678569.52	4539600.95
6/26/2016	3	150	branched.oak	678573.49	4539599.53
6/26/2016	3	150	branched.oak	678573.45	4539599.55
6/26/2016	2	151	branched.oak	678596.30	4539600.82
6/26/2016	2	151	branched.oak	678596.30	4539600.82
6/26/2016	2	152	branched.oak	680433.63	4538557.65
6/26/2016	2	152	branched.oak	680432.88	4538557.74
6/26/2016	2	153	branched.oak	680419.60	4539059.11
6/26/2016	2	153	branched.oak	680419.10	4539059.04
6/26/2016	1	154	branched.oak	680448.47	4539120.80
6/26/2016	2	155	branched.oak	680490.12	4539134.74
6/26/2016	2	155	branched.oak	680489.54	4539134.65
6/26/2016	2	156	branched.oak	680515.91	4539179.53
6/26/2016	2	156	branched.oak	680515.90	4539179.64
6/26/2016	6	157	branched.oak	680918.15	4538378.98
6/26/2016	6	157	branched.oak	680919.45	4538380.28
6/26/2016	6	157	branched.oak	680920.11	4538382.32
6/26/2016	6	157	branched.oak	680918.74	4538384.31
6/26/2016	6	157	branched.oak	680918.67	4538384.11
6/26/2016	6	157	branched.oak	680917.59	4538371.80
6/28/2016	1	1	branched.oak	679347.76	4536468.29
6/28/2016	1	2	branched.oak	679359.37	4536474.45
6/28/2016	1	3	branched.oak	677328.35	4536621.27
6/28/2016	2	4	branched.oak	677907.33	4537481.60
6/28/2016	2	4	branched.oak	677913.60	4537480.07
6/28/2016	2	5	branched.oak	678950.98	4538146.47
6/28/2016	2	5	branched.oak	678953.41	4538142.09
6/28/2016	2	6	branched.oak	679009.39	4537958.54
6/28/2016	2	6	branched.oak	679006.93	4537958.55
7/6/2016	2	1	branched.oak	680705.74	4538538.66
7/6/2016	2	1	branched.oak	680703.14	4538540.26
7/6/2016	2	2	branched.oak	680897.88	4538239.64
7/6/2016	2	2	branched.oak	680899.12	4538239.65
7/6/2016	1	3	branched.oak	680434.12	4538549.24
7/6/2016	2	4	branched.oak	679343.54	4539263.72
7/6/2016	2	4	branched.oak	679342.29	4539261.00
7/6/2016	2	5	branched.oak	678590.14	4539599.01
7/6/2016	2	5	branched.oak	678571.98	4539600.86
7/6/2016	2	6	branched.oak	679744.53	4538886.52
7/6/2016	2	6	branched.oak	679748.22	4538884.15
7/6/2016	2	10	branched.oak	678101.39	4537549.66
7/6/2016	2	10	branched.oak	678100.91	4537556.81
7/6/2016	1	11	branched.oak	678832.97	4537616.33
7/6/2016	1	12	branched.oak	678907.47	4538143.19
7/6/2016	2	13	branched.oak	677614.58	4537513.65
7/6/2016	2	13	branched.oak	677615.03	4537513.80
7/6/2016	3	14	branched.oak	678927.55	4536576.59
7/6/2016	3	14	branched.oak	678933.29	4536577.09
7/6/2016	3	14	branched.oak	678934.20	4536576.67
7/6/2016	1	101	branched.oak	680915.92	4538389.81
7/6/2016	1	102	branched.oak	680468.01	4539144.86
7/6/2016	1	103	branched.oak	680393.58	4538594.28
7/6/2016	1	104	branched.oak	680397.14	4538606.99
7/6/2016	2	105	branched.oak	678576.79	4539609.61
7/6/2016	2	105	branched.oak	678587.77	4539608.24
7/6/2016	3	106	branched.oak	679707.98	4538872.92
7/6/2016	3	106	branched.oak	679707.06	4538872.45
7/6/2016	3	106	branched.oak	679705.92	4538873.61
7/6/2016	1	107	branched.oak	679674.02	4538928.43

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
7/9/2016	1	1	branched.oak	679352.73	4536466.46
7/9/2016	1	2	branched.oak	679382.50	4536469.97
7/9/2016	2	3	branched.oak	677303.47	4536605.10
7/9/2016	2	3	branched.oak	677304.10	4536605.88
7/9/2016	1	4	branched.oak	677259.38	4536583.61
7/9/2016	3	5	branched.oak	677416.15	4539580.99
7/9/2016	3	5	branched.oak	677415.77	4539581.62
7/9/2016	3	5	branched.oak	677416.98	4539581.59
7/9/2016	3	6	branched.oak	677618.52	4537515.08
7/9/2016	3	6	branched.oak	677618.75	4537514.97
7/9/2016	3	6	branched.oak	677618.87	4537514.97
7/9/2016	1	7	branched.oak	677755.47	4537507.28
7/9/2016	2	8	branched.oak	677975.85	4537482.08
7/9/2016	2	8	branched.oak	677973.86	4537484.72
7/9/2016	1	9	branched.oak	677541.16	4537400.40
7/9/2016	2	10	branched.oak	677574.65	4537454.64
7/9/2016	2	10	branched.oak	677576.68	4537453.47
7/9/2016	2	11	branched.oak	677805.17	4537397.37
7/9/2016	2	11	branched.oak	677805.37	4537397.22
7/9/2016	2	12	branched.oak	677822.69	4537403.19
7/9/2016	2	12	branched.oak	677822.41	4537405.50
7/9/2016	1	13	branched.oak	678129.61	4537566.28
7/9/2016	1	14	branched.oak	679056.73	4537946.36
7/9/2016	3	15	branched.oak	678969.30	4538171.19
7/9/2016	3	15	branched.oak	678937.81	4538207.54
7/9/2016	3	15	branched.oak	678966.94	4538171.88
7/9/2016	1	25	branched.oak	680807.59	4538130.83
7/9/2016	3	26	branched.oak	680667.07	4538789.85
7/9/2016	3	26	branched.oak	680674.86	4538753.35
7/9/2016	3	26	branched.oak	680674.53	4538754.29
7/9/2016	3	27	branched.oak	680474.44	4539145.84
7/9/2016	3	27	branched.oak	680473.35	4539144.16
7/9/2016	3	27	branched.oak	680476.12	4539148.08
7/9/2016	2	28	branched.oak	680463.79	4539145.11
7/9/2016	2	28	branched.oak	680459.61	4539142.58
7/9/2016	4	29	branched.oak	680418.23	4538523.37
7/9/2016	4	29	branched.oak	680415.87	4538523.95
7/9/2016	4	29	branched.oak	680412.69	4538522.40
7/9/2016	4	29	branched.oak	680414.05	4538522.79
7/9/2016	2	30	branched.oak	680290.86	4538634.76
7/9/2016	2	30	branched.oak	680283.26	4538641.58
7/9/2016	4	31	branched.oak	679958.55	4538747.59
7/9/2016	4	31	branched.oak	679955.29	4538748.23
7/9/2016	4	31	branched.oak	679952.05	4538747.95
7/9/2016	4	31	branched.oak	679947.82	4538749.40
7/9/2016	5	32	branched.oak	680053.55	4538788.42
7/9/2016	1	33	branched.oak	680080.34	4538671.84
7/9/2016	1	34	branched.oak	679684.95	4538937.46
7/9/2016	1	35	branched.oak	679690.20	4538919.53
7/9/2016	2	36	branched.oak	679282.51	4539298.16
7/9/2016	2	36	branched.oak	679279.32	4539300.82
7/9/2016	3	37	branched.oak	678535.91	4539606.99
7/9/2016	3	37	branched.oak	678535.54	4539608.08
7/9/2016	3	37	branched.oak	678535.33	4539608.53
7/16/2016	2	1	branched.oak	678534.78	4539613.97
7/16/2016	2	1	branched.oak	678535.36	4539614.59
7/16/2016	2	2	branched.oak	678570.44	4539602.85
7/16/2016	2	2	branched.oak	678571.83	4539603.88
7/16/2016	1	3	branched.oak	679352.20	4539260.88
7/16/2016	2	4	branched.oak	679667.97	4538936.35
7/16/2016	2	4	branched.oak	679667.42	4538935.26
7/16/2016	1	5	branched.oak	680062.26	4539037.12

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
7/16/2016	1	6	branched.oak	680065.08	4538650.99
7/16/2016	1	7	branched.oak	680074.24	4538599.92
7/16/2016	2	8	branched.oak	680294.60	4538526.37
7/16/2016	2	8	branched.oak	680299.18	4538527.12
7/16/2016	1	9	branched.oak	680079.57	4538577.56
7/16/2016	1	10	branched.oak	680306.19	4538624.96
7/16/2016	2	11	branched.oak	680498.36	4538525.12
7/16/2016	2	11	branched.oak	680487.11	4538527.86
7/16/2016	2	12	branched.oak	680465.15	4538535.78
7/16/2016	2	12	branched.oak	680468.33	4538531.34
7/16/2016	2	13	branched.oak	680425.75	4538553.08
7/16/2016	2	13	branched.oak	680425.45	4538552.86
7/16/2016	1	14	branched.oak	680454.46	4538541.60
7/16/2016	1	15	branched.oak	680338.41	4538536.62
7/16/2016	1	16	branched.oak	677342.00	4536653.39
7/16/2016	2	17	branched.oak	677343.63	4536650.38
7/16/2016	2	17	branched.oak	677343.65	4536650.78
7/16/2016	4	18	branched.oak	677332.70	4536626.06
7/16/2016	4	18	branched.oak	677332.24	4536626.56
7/16/2016	4	18	branched.oak	677331.89	4536626.88
7/16/2016	4	18	branched.oak	677332.04	4536626.41
7/16/2016	2	19	branched.oak	678911.12	4537637.42
7/16/2016	2	19	branched.oak	678912.87	4537638.66
7/16/2016	2	20	branched.oak	678944.93	4537914.74
7/16/2016	2	20	branched.oak	678944.43	4537914.04
7/16/2016	3	21	branched.oak	679013.14	4537943.60
7/16/2016	3	21	branched.oak	679011.95	4537945.50
7/16/2016	3	21	branched.oak	679006.44	4537943.28
7/16/2016	1	22	branched.oak	679073.20	4537968.66
7/16/2016	1	23	branched.oak	677892.27	4537517.45
7/16/2016	2	24	branched.oak	677686.78	4537508.94

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
7/16/2016	2	24	branched.oak	677680.80	4537509.87
7/16/2016	2	101	branched.oak	676930.45	4537142.13
7/16/2016	2	101	branched.oak	676931.55	4537141.79
7/16/2016	2	102	branched.oak	677287.74	4536594.90
7/16/2016	2	102	branched.oak	677285.31	4536595.02
7/16/2016	1	103	branched.oak	677239.19	4536571.30
7/16/2016	4	104	branched.oak	678708.98	4537584.76
7/16/2016	4	104	branched.oak	678663.71	4537554.29
7/16/2016	4	104	branched.oak	678683.20	4537571.59
7/16/2016	4	104	branched.oak	678707.36	4537590.24
7/16/2016	2	105	branched.oak	678876.60	4538078.29
7/16/2016	2	105	branched.oak	678876.33	4538073.89
7/16/2016	3	106	branched.oak	678939.07	4538139.57
7/16/2016	3	106	branched.oak	678940.15	4538137.42
7/16/2016	3	106	branched.oak	678940.09	4538137.43
7/16/2016	1	125	branched.oak	680922.00	4538263.80
7/16/2016	1	126	branched.oak	680159.58	4538530.63
7/16/2016	3	127	branched.oak	679813.67	4538745.71
7/16/2016	3	127	branched.oak	679821.67	4538737.98
7/16/2016	2	128	branched.oak	679384.19	4539240.52
7/16/2016	2	128	branched.oak	679384.20	4539240.82
7/16/2016	2	129	branched.oak	678569.28	4539599.22
7/16/2016	2	129	branched.oak	678570.45	4539599.90
7/16/2016	2	130	branched.oak	678559.49	4539595.69
7/22/2016	1	1	branched.oak	679382.14	4536468.16
7/22/2016	1	1	branched.oak	677654.47	4537509.95
7/23/2016	2	1	branched.oak	679382.69	4539228.10
7/23/2016	2	1	branched.oak	679382.93	4539228.27
7/23/2016	2	2	branched.oak	680021.29	4538716.97
7/23/2016	2	2	branched.oak	680020.52	4538717.27
7/23/2016	1	3	branched.oak	679991.19	4538719.91

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
7/23/2016	3	4	branched.oak	679952.89	4538724.81
7/23/2016	3	4	branched.oak	679950.24	4538724.35
7/23/2016	3	4	branched.oak	679929.36	4538729.67
7/23/2016	2	5	branched.oak	680059.88	4538646.31
7/23/2016	2	5	branched.oak	680070.49	4538627.96
7/23/2016	4	6	branched.oak	680464.93	4538543.49
7/23/2016	4	6	branched.oak	680464.75	4538541.73
7/23/2016	4	6	branched.oak	680468.19	4538542.20
7/23/2016	4	6	branched.oak	680467.58	4538542.17
7/23/2016	2	7	branched.oak	680446.67	4539123.92
7/23/2016	2	7	branched.oak	680446.66	4539122.86
7/23/2016	1	8	branched.oak	679258.05	4536446.80
7/23/2016	2	9	branched.oak	676923.49	4537155.38
7/23/2016	2	9	branched.oak	676923.48	4537150.71
7/23/2016	2	10	branched.oak	677634.05	4537512.12
7/23/2016	2	10	branched.oak	677644.20	4537514.65
7/23/2016	2	11	branched.oak	677659.15	4537527.41
7/23/2016	2	11	branched.oak	677659.15	4537527.41
7/23/2016	1	12	branched.oak	677751.70	4537506.38
7/23/2016	1	13	branched.oak	679197.15	4537978.93
7/23/2016	2	101	branched.oak	678570.05	4539607.65
7/23/2016	2	101	branched.oak	678573.49	4539606.75
7/23/2016	8	102	branched.oak	679387.42	4539173.19
7/23/2016	8	102	branched.oak	679387.88	4539173.43
7/23/2016	8	102	branched.oak	679387.82	4539173.63
7/23/2016	8	102	branched.oak	679388.95	4539174.27
7/23/2016	8	102	branched.oak	679393.34	4539180.84
7/23/2016	8	102	branched.oak	679391.99	4539178.70
7/23/2016	8	102	branched.oak	679392.55	4539180.88
7/23/2016	8	102	branched.oak	679387.05	4539174.46
7/23/2016	1	103	branched.oak	679653.22	4538975.61
7/23/2016	1	104	branched.oak	679797.22	4539424.67
7/23/2016	3	105	branched.oak	679807.35	4539432.44
7/23/2016	3	105	branched.oak	679816.49	4539439.98
7/23/2016	3	105	branched.oak	679816.47	4539440.96
7/23/2016	1	106	branched.oak	680447.06	4539122.29
7/24/2016	2	1	branched.oak	677286.62	4536597.72
7/24/2016	2	1	branched.oak	677283.04	4536596.35
7/24/2016	3	2	branched.oak	678776.92	4537590.85
7/24/2016	3	2	branched.oak	678774.26	4537593.04
7/24/2016	3	2	branched.oak	678775.72	4537591.68
7/24/2016	4	3	branched.oak	679150.33	4537975.04
7/24/2016	4	3	branched.oak	679149.96	4537974.32
7/24/2016	4	3	branched.oak	679150.42	4537974.99
7/24/2016	4	3	branched.oak	679150.03	4537973.37
7/24/2016	2	4	branched.oak	679284.73	4537980.30
7/24/2016	2	4	branched.oak	679272.30	4537965.70
7/24/2016	1	5	branched.oak	678941.37	4537938.88
7/24/2016	2	6	branched.oak	679034.06	4537965.72
7/24/2016	2	6	branched.oak	679042.71	4537966.26
7/24/2016	2	7	branched.oak	677637.79	4537506.24
7/24/2016	2	7	branched.oak	677637.41	4537505.80
7/24/2016	2	25	branched.oak	678576.61	4539604.17
7/24/2016	2	25	branched.oak	678603.80	4539597.43
7/24/2016	2	26	branched.oak	679828.42	4538754.54
7/24/2016	2	26	branched.oak	679821.73	4538762.12
7/24/2016	1	27	branched.oak	679837.85	4539455.45
7/24/2016	1	28	branched.oak	679957.52	4538742.18
7/24/2016	1	29	branched.oak	680069.00	4538752.58
7/24/2016	2	30	branched.oak	680063.15	4538631.49
7/24/2016	2	30	branched.oak	680062.47	4538631.01
7/24/2016	3	31	branched.oak	680090.53	4538577.75

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
7/24/2016	3	31	branched.oak	680090.05	4538578.89
7/24/2016	3	31	branched.oak	680090.39	4538578.97
7/25/2016	1	1	branched.oak	677626.16	4537513.91
7/25/2016	2	2	branched.oak	677634.21	4537513.87
7/25/2016	2	2	branched.oak	677641.64	4537508.57
7/25/2016	3	1	branched.oak	677656.55	4537508.95
7/25/2016	4	1	branched.oak	677874.84	4537510.50
8/13/2016	1	1	branched.oak	680667.75	4538525.47
8/13/2016	1	2	branched.oak	680906.11	4538281.14
8/13/2016	2	3	branched.oak	680467.36	4539142.97
8/13/2016	2	3	branched.oak	680467.12	4539143.27
8/13/2016	1	4	branched.oak	680483.19	4538539.46
8/13/2016	1	5	branched.oak	680481.41	4538539.56
8/13/2016	1	6	branched.oak	680438.15	4538549.80
8/13/2016	3	7	branched.oak	680129.26	4538559.15
8/13/2016	3	7	branched.oak	680129.61	4538560.01
8/13/2016	3	7	branched.oak	680148.35	4538571.81
8/13/2016	2	8	branched.oak	680070.68	4538584.27
8/13/2016	2	8	branched.oak	680071.03	4538585.27
8/13/2016	1	9	branched.oak	678616.43	4539588.94
8/13/2016	1	10	branched.oak	679269.80	4539312.90
8/13/2016	1	11	branched.oak	679786.29	4538806.99
8/13/2016	1	12	branched.oak	679743.48	4538910.88
8/13/2016	3	15	branched.oak	677418.27	4539585.28
8/13/2016	3	15	branched.oak	677417.55	4539588.50
8/13/2016	3	15	branched.oak	677418.35	4539580.97
8/13/2016	2	16	branched.oak	678099.30	4537556.98
8/13/2016	1	17	branched.oak	678952.84	4537950.46
8/13/2016	3	18	branched.oak	678877.63	4538234.58
8/13/2016	3	18	branched.oak	678879.78	4538230.49
8/13/2016	3	18	branched.oak	678879.81	4538230.68
8/13/2016	1	19	branched.oak	677885.27	4537506.11
8/13/2016	2	20	branched.oak	677731.46	4537494.67
8/13/2016	2	20	branched.oak	677731.86	4537497.30
8/13/2016	4	21	branched.oak	677790.80	4537401.30
8/13/2016	4	21	branched.oak	677791.91	4537400.04
8/13/2016	4	21	branched.oak	677793.08	4537400.03
8/13/2016	4	21	branched.oak	677794.27	4537401.25
8/13/2016	3	22	branched.oak	677442.37	4536784.09
8/13/2016	3	22	branched.oak	677447.04	4536788.72
8/13/2016	3	22	branched.oak	677448.16	4536788.31
8/13/2016	2	23	branched.oak	677261.97	4536584.99
8/13/2016	2	23	branched.oak	677262.37	4536584.19
8/13/2016	1	24	branched.oak	679319.49	4536462.43
8/13/2016	2	25	branched.oak	679589.37	4536564.28
8/13/2016	2	25	branched.oak	679589.95	4536564.03
8/13/2016	1	26	branched.oak	679543.21	4536541.42
8/13/2016	1	101	branched.oak	680900.79	4538220.08
8/13/2016	2	102	branched.oak	680487.78	4539162.84
8/13/2016	2	102	branched.oak	680463.32	4539138.44
8/13/2016	3	103	branched.oak	680444.05	4539102.29
8/13/2016	3	103	branched.oak	680444.33	4539101.96
8/13/2016	3	103	branched.oak	680444.44	4539101.81
8/13/2016	2	104	branched.oak	679951.35	4538758.07
8/13/2016	2	104	branched.oak	679950.69	4538757.85
8/13/2016	1	105	branched.oak	678583.76	4539599.57
8/13/2016	1	106	branched.oak	678575.32	4539600.02
8/13/2016	1	107	branched.oak	678545.51	4539606.80
8/13/2016	1	108	branched.oak	678540.87	4539615.11
8/13/2016	4	150	branched.oak	678650.76	4537558.67
8/13/2016	4	150	branched.oak	678652.23	4537560.14
8/13/2016	4	150	branched.oak	678656.95	4537560.54

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
8/13/2016	4	150	branched.oak	678656.79	4537560.41
8/13/2016	1	151	branched.oak	678835.82	4537969.18
8/14/2016	1	1	branched.oak	679312.05	4536460.90
8/14/2016	2	2	branched.oak	679332.51	4536464.84
8/14/2016	2	2	branched.oak	679334.75	4536465.00
8/14/2016	2	3	branched.oak	677437.88	4536792.07
8/14/2016	2	3	branched.oak	677438.00	4536792.42
8/14/2016	2	4	branched.oak	678916.54	4537661.89
8/14/2016	2	4	branched.oak	678915.25	4537661.38
8/14/2016	2	5	branched.oak	678945.28	4537956.45
8/14/2016	2	5	branched.oak	678945.47	4537956.94
8/14/2016	1	6	branched.oak	679310.92	4537940.52
8/14/2016	3	7	branched.oak	678849.72	4537975.26
8/14/2016	3	7	branched.oak	678847.62	4537980.23
8/14/2016	3	7	branched.oak	678848.50	4537979.79
8/14/2016	1	8	branched.oak	677723.63	4537506.46
8/14/2016	2	9	branched.oak	677810.71	4537438.79
8/14/2016	2	9	branched.oak	677810.31	4537438.58
8/14/2016	2	10	branched.oak	677551.33	4537446.64
8/14/2016	2	10	branched.oak	677551.42	4537449.35
8/14/2016	2	20	branched.oak	679362.68	4539236.41
8/14/2016	2	20	branched.oak	679361.69	4539236.91
8/14/2016	1	21	branched.oak	679652.07	4538965.27
8/15/2016	1	1	branched.oak	678556.34	4539599.14
8/18/2016	1	1	branched.oak	677874.18	4537512.57
8/18/2016	3	2	branched.oak	677376.35	4536706.57
8/18/2016	3	2	branched.oak	677376.03	4536712.86
8/18/2016	3	2	branched.oak	677375.81	4536713.20
8/18/2016	1	3	branched.oak	679304.44	4536446.16
8/18/2016	1	4	branched.oak	679933.96	4538767.10
8/18/2016	2	5	branched.oak	679283.22	4539303.63
8/18/2016	2	5	branched.oak	679284.21	4539302.78
8/18/2016	1	101	branched.oak	679153.20	4536458.06
8/18/2016	1	105	branched.oak	680504.41	4538533.69
8/18/2016	6	106	branched.oak	680144.49	4538566.01
8/18/2016	6	106	branched.oak	680144.71	4538569.05
8/18/2016	6	106	branched.oak	680148.37	4538575.71
8/18/2016	6	106	branched.oak	680139.07	4538563.75
8/18/2016	6	106	branched.oak	680148.26	4538587.96
8/18/2016	6	106	branched.oak	680157.63	4538618.64
8/18/2016	3	110	branched.oak	680054.87	4539091.87
8/18/2016	3	110	branched.oak	680047.95	4539122.01
8/18/2016	3	110	branched.oak	680058.98	4539175.50
8/19/2016	1	1	branched.oak	679311.66	4536459.87
8/19/2016	1	2	branched.oak	676917.95	4537144.72
8/19/2016	1	3	branched.oak	678600.90	4537529.09
8/19/2016	2	4	branched.oak	677704.40	4537482.12
8/19/2016	2	4	branched.oak	677697.95	4537502.77
8/19/2016	1	5	branched.oak	677669.20	4537503.55
8/19/2016	1	10	branched.oak	678551.38	4539603.17
8/19/2016	1	11	branched.oak	679801.13	4539427.80
8/27/2016	1	1	branched.oak	679264.27	4536453.74
8/27/2016	2	1	branched.oak	679306.57	4536460.16
8/27/2016	3	1	branched.oak	679309.98	4536462.70
8/27/2016	4	1	branched.oak	679332.05	4537857.61
8/27/2016	5	7	branched.oak	679185.33	4537961.75
8/27/2016	5	7	branched.oak	679198.93	4537971.32
8/27/2016	5	7	branched.oak	679198.98	4537973.05
8/27/2016	5	7	branched.oak	679198.66	4537973.95
8/27/2016	5	7	branched.oak	679198.52	4537972.83
8/27/2016	5	7	branched.oak	679198.62	4537990.25
8/27/2016	5	7	branched.oak	679191.22	4537988.36

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
8/27/2016	5	7	branched.oak	679224.52	4537993.03
8/27/2016	6	1	branched.oak	679146.75	4537983.72
8/27/2016	7	1	branched.oak	679187.07	4537859.59
8/27/2016	8	1	branched.oak	678552.30	4537462.94
8/27/2016	9	1	branched.oak	678602.02	4537524.23
8/27/2016	10	2	branched.oak	677554.07	4537451.75
8/27/2016	10	2	branched.oak	677677.48	4537479.85
8/27/2016	11	2	branched.oak	677674.84	4537480.48
8/27/2016	11	2	branched.oak	677554.29	4537454.87
8/27/2016	12	1	branched.oak	677823.91	4537453.03
8/27/2016	20	1	branched.oak	678585.65	4539600.64
8/27/2016	1	21	branched.oak	679673.47	4538933.82
8/27/2016	1	22	branched.oak	679650.00	4538968.78
8/27/2016	2	23	branched.oak	679639.28	4538983.26
8/27/2016	2	23	branched.oak	679633.50	4538990.88
8/27/2016	1	24	branched.oak	680062.37	4539043.64
8/27/2016	3	25	branched.oak	680163.84	4538613.46
8/27/2016	3	25	branched.oak	680157.04	4538601.22
8/27/2016	3	25	branched.oak	680152.54	4538587.81
8/27/2016	3	26	branched.oak	680150.53	4538571.06
8/27/2016	3	26	branched.oak	680139.24	4538560.28
8/27/2016	3	26	branched.oak	680141.28	4538559.98
8/27/2016	2	27	branched.oak	680309.07	4538569.99
8/27/2016	2	27	branched.oak	680308.79	4538570.10
8/27/2016	2	28	branched.oak	680473.54	4538540.76
8/27/2016	2	28	branched.oak	680475.31	4538540.14
8/27/2016	1	29	branched.oak	680418.30	4539024.14
8/27/2016	2	30	branched.oak	680447.54	4539122.94
8/27/2016	2	30	branched.oak	680448.56	4539125.01
8/27/2016	2	30	branched.oak	680448.59	4539125.32
8/27/2016	3	101	branched.oak	677947.45	4537489.80
8/27/2016	3	101	branched.oak	677947.98	4537489.47
8/27/2016	2	102	branched.oak	679312.50	4537795.10
8/27/2016	2	102	branched.oak	679305.23	4537791.20
8/27/2016	1	103	branched.oak	679314.01	4537929.87
8/27/2016	2	104	branched.oak	679256.45	4537988.69
8/27/2016	2	104	branched.oak	679237.64	4537975.49
8/27/2016	3	105	branched.oak	679218.16	4537995.60
8/27/2016	3	105	branched.oak	679238.24	4537987.70
8/27/2016	3	105	branched.oak	679235.55	4537987.72
8/27/2016	3	106	branched.oak	676914.00	4537163.44
8/27/2016	3	106	branched.oak	676914.31	4537162.32
8/27/2016	3	106	branched.oak	676913.86	4537160.67
8/27/2016	2	107	branched.oak	677232.26	4536570.02
8/27/2016	2	107	branched.oak	677223.05	4536564.97
8/27/2016	1	108	branched.oak	680906.12	4538272.71
8/27/2016	2	109	branched.oak	678568.83	4539599.76
8/27/2016	2	109	branched.oak	678568.84	4539599.57
8/27/2016	1	110	branched.oak	679282.58	4539302.84
8/27/2016	2	111	branched.oak	679317.80	4539277.46
8/27/2016	2	111	branched.oak	679319.54	4539271.22
8/27/2016	3	112	branched.oak	680419.35	4538997.82
8/27/2016	3	112	branched.oak	680418.13	4538997.71
8/27/2016	3	112	branched.oak	680418.05	4538997.76
8/27/2016	2	113	branched.oak	680453.13	4539135.82
8/27/2016	2	113	branched.oak	680453.86	4539139.39
8/28/2016	2	1	branched.oak	677553.22	4537439.40
8/28/2016	2	1	branched.oak	677544.61	4537430.03
8/28/2016	1	2	branched.oak	677695.41	4537480.20
8/28/2016	1	3	branched.oak	677401.58	4536746.94
8/28/2016	1	4	branched.oak	677369.68	4536622.16
8/28/2016	1	5	branched.oak	679342.16	4536465.61

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
8/28/2016	1	6	branched.oak	679361.93	4536469.41
8/28/2016	2	7	branched.oak	680884.16	4538167.89
8/28/2016	2	7	branched.oak	680877.39	4538155.94
8/28/2016	2	8	branched.oak	680902.73	4538264.30
8/28/2016	2	8	branched.oak	680900.16	4538259.99
8/28/2016	2	9	branched.oak	679843.56	4538765.73
8/28/2016	2	9	branched.oak	679847.61	4538765.12
8/28/2016	2	10	branched.oak	679578.49	4538995.39
8/28/2016	2	10	branched.oak	679578.79	4538996.62
8/28/2016	2	11	branched.oak	680064.93	4538879.82
8/28/2016	2	11	branched.oak	680061.96	4538880.99
8/28/2016	3	12	branched.oak	680000.57	4538744.91
8/28/2016	3	12	branched.oak	679998.16	4538746.84
8/28/2016	3	12	branched.oak	680002.48	4538744.61
8/28/2016	2	13	branched.oak	680256.84	4538673.78
8/28/2016	2	13	branched.oak	680274.40	4538657.05
8/28/2016	2	14	branched.oak	680137.80	4538571.39
8/28/2016	2	14	branched.oak	680132.30	4538566.12
8/28/2016	1	15	branched.oak	680478.81	4538542.22
8/29/2016	1	1	branched.oak	678599.15	4539590.74
8/29/2016	2	2	branched.oak	680063.72	4538880.22
8/29/2016	2	2	branched.oak	680062.16	4538878.83
8/29/2016	1	3	branched.oak	680117.06	4538564.13
8/29/2016	1	4	branched.oak	679343.73	4536466.79
8/29/2016	1	5	branched.oak	679364.29	4536470.73
8/31/2016	1	1	branched.oak	678458.24	4537531.53
8/31/2016	1	2	branched.oak	677688.11	4537503.63
8/31/2016	2	3	branched.oak	677329.77	4536620.34
8/31/2016	2	3	branched.oak	677330.33	4536620.56
8/31/2016	1	4	branched.oak	679360.32	4536465.86
8/31/2016	2	10	branched.oak	680902.87	4538258.28
8/31/2016	2	10	branched.oak	680902.79	4538258.42
8/31/2016	2	11	branched.oak	680052.61	4538760.25
8/31/2016	2	11	branched.oak	680052.93	4538760.20
8/31/2016	2	12	branched.oak	680136.67	4538568.45
8/31/2016	2	12	branched.oak	680110.59	4538566.52
9/4/2016	5	1	branched.oak	678914.74	4538160.16
9/4/2016	NA	NA	branched.oak	678907.99	4538163.80
9/4/2016	5	1	branched.oak	678907.66	4538164.39
9/4/2016	5	1	branched.oak	678907.66	4538163.88
9/4/2016	5	1	branched.oak	678907.66	4538163.88
9/4/2016	2	2	branched.oak	677636.80	4537514.28
9/4/2016	2	2	branched.oak	677637.81	4537514.97
9/4/2016	3	2	branched.oak	677670.87	4537510.81
9/4/2016	3	2	branched.oak	677697.83	4537507.69
9/4/2016	2	3	branched.oak	677924.34	4537484.02
9/4/2016	2	3	branched.oak	677922.17	4537485.83
9/4/2016	2	4	branched.oak	677899.24	4537487.01
9/4/2016	2	4	branched.oak	677900.33	4537486.57
9/4/2016	2	5	branched.oak	677840.85	4537464.52
9/4/2016	2	5	branched.oak	677841.40	4537464.52
9/4/2016	4	6	branched.oak	677829.89	4537396.10
9/4/2016	4	6	branched.oak	677829.88	4537395.99
9/4/2016	4	6	branched.oak	677828.73	4537395.93
9/4/2016	4	6	branched.oak	677826.34	4537395.23
9/4/2016	3	7	branched.oak	677326.79	4536648.93
9/4/2016	3	7	branched.oak	677317.47	4536609.10
9/4/2016	3	7	branched.oak	677317.59	4536609.00
9/4/2016	1	8	branched.oak	677280.47	4536593.77
9/4/2016	3	9	branched.oak	680909.70	4538382.01
9/4/2016	3	9	branched.oak	680912.20	4538353.12
9/4/2016	3	9	branched.oak	680912.23	4538353.04

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
9/4/2016	2	10	branched.oak	680501.08	4538536.47
9/4/2016	2	10	branched.oak	680498.90	4538538.68
9/4/2016	2	11	branched.oak	680366.41	4538589.53
9/4/2016	2	11	branched.oak	680366.41	4538589.53
9/4/2016	1	12	branched.oak	680145.74	4538613.25
9/4/2016	1	13	branched.oak	680266.14	4538628.00
9/4/2016	2	14	branched.oak	680062.07	4538713.71
9/4/2016	2	14	branched.oak	680062.43	4538717.40
9/4/2016	2	15	branched.oak	680059.17	4538753.75
9/4/2016	2	15	branched.oak	680058.94	4538753.74
9/4/2016	2	16	branched.oak	678568.17	4539595.89
9/4/2016	2	16	branched.oak	678567.78	4539595.61
9/6/2016	1	1	branched.oak	678581.92	4539605.65
9/6/2016	1	2	branched.oak	677831.96	4537424.72
9/10/2016	3	1	branched.oak	678606.86	4539586.48
9/10/2016	3	1	branched.oak	678609.24	4539587.86
9/10/2016	3	1	branched.oak	678609.36	4539587.97
9/10/2016	1	2	branched.oak	678584.32	4539597.11
9/10/2016	1	3	branched.oak	679912.45	4538769.56
9/10/2016	2	4	branched.oak	679823.64	4538788.11
9/10/2016	2	4	branched.oak	679824.06	4538789.64
9/10/2016	2	5	branched.oak	680272.39	4538660.36
9/10/2016	2	5	branched.oak	680273.82	4538659.29
9/10/2016	2	6	branched.oak	680506.74	4538542.25
9/10/2016	2	6	branched.oak	680506.14	4538543.32
9/10/2016	3	7	branched.oak	680910.47	4538267.39
9/10/2016	3	7	branched.oak	680910.44	4538272.00
9/10/2016	3	7	branched.oak	680910.18	4538271.55
9/10/2016	1	8	branched.oak	679484.94	4536483.31
9/10/2016	2	10	branched.oak	677446.49	4536789.24
9/10/2016	2	10	branched.oak	677447.61	4536788.11

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
9/10/2016	4	11	branched.oak	677351.72	4536620.14
9/10/2016	4	11	branched.oak	677350.92	4536618.45
9/10/2016	4	11	branched.oak	677348.30	4536617.43
9/10/2016	4	11	branched.oak	677347.53	4536617.66
9/10/2016	1	12	branched.oak	677305.25	4536606.23
9/10/2016	2	13	branched.oak	677546.37	4537458.44
9/10/2016	2	13	branched.oak	677563.20	4537487.91
9/10/2016	2	14	branched.oak	677568.17	4537487.25
9/10/2016	2	14	branched.oak	677565.38	4537483.83
9/10/2016	6	15	branched.oak	677664.26	4537496.12
9/10/2016	6	15	branched.oak	677665.93	4537501.52
9/10/2016	6	15	branched.oak	677665.34	4537498.09
9/10/2016	6	15	branched.oak	677665.07	4537498.21
9/10/2016	6	15	branched.oak	677665.84	4537498.47
9/10/2016	6	15	branched.oak	677665.62	4537499.19
9/10/2016	1	16	branched.oak	677758.56	4537486.91
9/10/2016	3	17	branched.oak	677795.35	4537393.58
9/10/2016	3	17	branched.oak	677794.94	4537393.74
9/10/2016	3	17	branched.oak	677794.27	4537394.25
9/10/2016	3	18	branched.oak	677810.37	4537434.42
9/10/2016	3	18	branched.oak	677810.29	4537434.43
9/10/2016	3	18	branched.oak	677810.29	4537434.43
9/10/2016	5	19	branched.oak	678128.68	4537633.02
9/10/2016	5	19	branched.oak	678128.72	4537633.67
9/10/2016	5	19	branched.oak	678130.93	4537636.09
9/10/2016	5	19	branched.oak	678130.88	4537635.45
9/10/2016	5	19	branched.oak	678129.45	4537629.72
9/10/2016	1	21	branched.oak	678512.10	4537515.51
9/10/2016	1	20	branched.oak	678587.44	4537562.76
9/10/2016	1	22	branched.oak	678775.12	4537598.06
9/10/2016	2	23	branched.oak	678871.10	4537647.76

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
9/10/2016	2	23	branched.oak	678869.67	4537646.09
9/10/2016	1	24	branched.oak	679047.20	4537977.54
9/10/2016	2	25	branched.oak	678887.94	4538226.07
9/10/2016	2	25	branched.oak	678888.53	4538229.93
9/10/2016	2	26	branched.oak	678912.64	4538219.79
9/10/2016	2	26	branched.oak	678910.24	4538229.54
9/10/2016	1	27	branched.oak	678980.09	4538174.67
9/10/2016	2	28	branched.oak	679009.14	4538171.67
9/10/2016	2	28	branched.oak	679008.64	4538171.68
9/10/2016	2	29	branched.oak	678932.25	4538128.87
9/10/2016	2	29	branched.oak	678932.48	4538128.85
9/10/2016	2	30	branched.oak	678932.34	4538128.82
9/10/2016	2	30	branched.oak	678932.24	4538128.87
9/17/2016	2	1	branched.oak	678872.75	4538041.48
9/17/2016	2	1	branched.oak	678872.76	4538041.13
9/17/2016	1	2	branched.oak	678886.06	4538219.81
9/17/2016	1	3	branched.oak	677868.79	4537512.23
9/17/2016	1	4	branched.oak	677685.10	4537492.42
9/17/2016	1	5	branched.oak	677717.12	4537494.61
9/17/2016	2	6	branched.oak	677617.94	4537513.39
9/17/2016	2	6	branched.oak	677619.93	4537513.09
9/17/2016	3	7	branched.oak	677544.55	4537466.36
9/17/2016	3	7	branched.oak	677552.93	4537467.15
9/17/2016	3	7	branched.oak	677562.60	4537482.62
9/17/2016	2	8	branched.oak	677834.46	4537430.77
9/17/2016	2	8	branched.oak	677834.43	4537431.23
9/17/2016	1	9	branched.oak	677915.36	4537484.22
9/17/2016	1	10	branched.oak	677901.05	4537485.33
9/17/2016	3	11	branched.oak	677327.56	4536623.05
9/17/2016	3	11	branched.oak	677326.42	4536622.26
9/17/2016	3	11	branched.oak	677326.25	4536622.24

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
9/17/2016	1	15	branched.oak	679536.49	4536540.96
9/17/2016	1	17	branched.oak	679347.45	4536468.00
9/17/2016	1	18	branched.oak	679261.27	4536443.80
9/17/2016	1	19	branched.oak	680902.01	4538222.43
9/17/2016	2	20	branched.oak	680899.45	4538257.25
9/17/2016	2	20	branched.oak	680901.63	4538266.38
9/17/2016	3	21	branched.oak	680474.54	4538543.87
9/17/2016	3	21	branched.oak	680473.16	4538542.94
9/17/2016	3	21	branched.oak	680472.98	4538543.77
9/17/2016	2	22	branched.oak	679999.56	4539016.36
9/17/2016	2	22	branched.oak	679998.28	4539020.25
9/17/2016	1	23	branched.oak	678623.67	4539587.60
9/18/2016	1	1	branched.oak	680459.64	4539139.33
9/18/2016	2	2	branched.oak	680485.06	4538552.37
9/18/2016	2	2	branched.oak	680486.72	4538552.44
9/18/2016	1	3	branched.oak	680152.23	4538578.05
9/18/2016	3	4	branched.oak	679770.66	4538942.15
9/18/2016	3	4	branched.oak	679772.74	4538946.80
9/18/2016	3	4	branched.oak	679771.54	4538941.75
9/18/2016	1	5	branched.oak	680022.47	4538737.72
9/18/2016	1	6	branched.oak	680069.82	4538768.72
9/18/2016	1	7	branched.oak	676932.89	4537140.68
9/18/2016	1	8	branched.oak	678483.35	4537499.45
9/18/2016	1	9	branched.oak	679071.49	4537937.35
9/18/2016	1	10	branched.oak	679132.02	4537951.41
9/18/2016	2	11	branched.oak	677536.66	4537437.48
9/18/2016	2	11	branched.oak	677537.77	4537435.35
9/20/2016	1	1	branched.oak	680897.80	4538218.02
9/20/2016	2	2	branched.oak	680516.20	4538550.64
9/20/2016	2	2	branched.oak	680502.02	4538552.51
9/22/2016	1	1	branched.oak	678592.15	4539610.71

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
9/22/2016	3	2	branched.oak	678589.31	4539599.86
9/22/2016	3	2	branched.oak	678589.26	4539599.17
9/22/2016	3	2	branched.oak	678589.25	4539599.23
9/22/2016	1	3	branched.oak	680301.48	4538622.82
9/22/2016	1	4	branched.oak	680548.88	4539182.95
9/22/2016	1	5	branched.oak	677744.63	4537507.37
9/22/2016	1	6	branched.oak	678949.16	4538164.12
9/24/2016	1	1	branched.oak	677751.93	4537503.75
9/24/2016	1	2	branched.oak	677732.89	4537504.30
9/24/2016	2	3	branched.oak	678563.13	4537513.42
9/24/2016	2	3	branched.oak	678563.29	4537517.06
9/24/2016	1	4	branched.oak	679322.39	4537808.79
9/24/2016	2	5	branched.oak	678984.72	4538176.22
9/24/2016	2	5	branched.oak	678977.90	4538174.29
9/24/2016	1	6	branched.oak	678981.27	4536537.20
9/24/2016	2	7	branched.oak	678542.81	4539623.37
9/24/2016	2	7	branched.oak	678543.13	4539623.30
9/24/2016	1	8	branched.oak	678542.61	4539617.38
9/24/2016	2	9	branched.oak	679278.75	4539311.67
9/24/2016	2	9	branched.oak	679281.20	4539312.73
9/24/2016	5	10	branched.oak	679779.95	4539413.57
9/24/2016	5	10	branched.oak	679780.34	4539416.76
9/24/2016	5	10	branched.oak	679780.37	4539416.74
9/24/2016	5	10	branched.oak	679780.41	4539416.24
9/24/2016	5	10	branched.oak	679780.41	4539416.08
9/24/2016	2	11	branched.oak	680001.56	4538747.89
9/24/2016	1	12	branched.oak	679995.78	4538752.55
9/24/2016	2	11	branched.oak	679973.14	4538769.99
9/29/2016	1	1	branched.oak	678960.08	4538175.87
9/29/2016	1	2	branched.oak	678960.79	4538178.67
9/29/2016	1	3	branched.oak	678943.71	4538182.77
9/29/2016	1	4	branched.oak	678887.22	4538215.64
9/29/2016	2	5	branched.oak	679258.55	4537802.81
9/29/2016	2	5	branched.oak	679256.90	4537802.41
9/29/2016	1	6	branched.oak	679199.34	4537987.43
9/29/2016	2	7	branched.oak	678950.93	4537955.72
9/29/2016	2	7	branched.oak	678950.71	4537954.07
9/29/2016	2	8	branched.oak	678828.57	4537628.84
9/29/2016	2	8	branched.oak	678827.80	4537622.11
9/29/2016	3	9	branched.oak	678655.48	4537558.00
9/29/2016	3	9	branched.oak	678656.06	4537556.66
9/29/2016	3	9	branched.oak	678402.27	4537559.11
9/29/2016	1	10	branched.oak	677573.98	4537519.94
9/29/2016	1	11	branched.oak	677651.60	4537509.72
9/29/2016	1	12	branched.oak	677722.43	4537505.58
9/29/2016	2	13	branched.oak	676912.71	4537151.59
9/29/2016	2	13	branched.oak	676912.92	4537154.59
9/29/2016	1	14	branched.oak	679270.96	4536450.08
9/29/2016	1	15	branched.oak	680413.04	4538548.19
9/29/2016	1	16	branched.oak	680502.62	4538531.09
9/29/2016	2	17	branched.oak	680445.80	4538600.17
9/29/2016	2	17	branched.oak	680435.00	4538601.68
10/2/2016	1	1	branched.oak	680018.17	4538863.08
10/2/2016	1	2	branched.oak	680171.84	4538627.54
10/2/2016	4	3	branched.oak	680485.01	4538540.12
10/2/2016	4	3	branched.oak	680482.76	4538540.92
10/2/2016	4	3	branched.oak	680481.11	4538540.66
10/2/2016	4	3	branched.oak	680489.29	4538538.88
10/2/2016	2	4	branched.oak	680403.89	4538539.17
10/2/2016	2	4	branched.oak	680403.41	4538539.72
10/2/2016	1	5	branched.oak	680327.33	4538567.05
10/2/2016	1	6	branched.oak	679278.32	4536456.22

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
10/2/2016	1	7	branched.oak	678920.10	4536600.56
10/2/2016	2	8	branched.oak	677159.69	4536508.14
10/2/2016	2	8	branched.oak	677157.26	4536504.26
10/2/2016	2	9	branched.oak	679327.63	4537846.65
10/2/2016	2	9	branched.oak	679327.94	4537847.27
10/2/2016	1	10	branched.oak	677596.22	4537517.63
10/2/2016	1	11	branched.oak	677847.17	4537464.52
10/5/2016	1	1	branched.oak	678993.84	4537642.84
10/5/2016	1	2	branched.oak	680420.04	4539024.07
10/5/2016	1	3	branched.oak	680073.45	4538728.53
10/11/2016	1	1	branched.oak	677677.44	4537507.73
10/11/2016	2	2	branched.oak	680834.89	4538115.99
10/11/2016	2	2	branched.oak	680834.90	4538116.01
10/11/2016	2	3	branched.oak	680483.24	4538516.70
10/11/2016	2	3	branched.oak	680489.57	4538518.49
10/16/2016	2	1	branched.oak	680057.63	4539089.11
10/16/2016	2	1	branched.oak	680063.45	4539064.30
10/16/2016	1	2	branched.oak	678906.75	4538154.63
10/16/2016	3	3	branched.oak	677825.33	4537443.02
10/16/2016	3	3	branched.oak	677824.92	4537443.17
10/16/2016	3	3	branched.oak	677825.25	4537442.75
10/16/2016	1	4	branched.oak	679387.49	4536475.44
10/28/2016	1	1	branched.oak	680448.95	4538535.89
10/28/2016	1	2	branched.oak	680459.00	4538535.92
10/28/2016	1	3	branched.oak	680457.75	4538534.42
10/28/2016	1	4	branched.oak	680583.34	4538516.53
10/29/2016	2	1	branched.oak	679311.16	4537836.61
10/29/2016	2	1	branched.oak	679310.91	4537840.52
10/29/2016	2	2	branched.oak	679251.29	4537986.84
10/29/2016	2	2	branched.oak	679251.53	4537986.63
10/29/2016	2	3	branched.oak	678929.14	4538118.93
10/29/2016	2	3	branched.oak	678931.11	4538118.36
10/29/2016	2	4	branched.oak	677318.97	4536612.73
10/29/2016	2	4	branched.oak	677281.50	4536593.58
10/29/2016	1	5	branched.oak	680429.54	4538520.83
4/3/2016	2	1	pawnee	679957.94	4523061.99
4/3/2016	2	1	pawnee	679955.48	4523063.21
4/3/2016	1	2	pawnee	679578.69	4523949.34
4/3/2016	1	3	pawnee	679596.52	4523894.82
4/3/2016	1	10	pawnee	679194.43	4524835.38
4/3/2016	2	101	pawnee	679887.87	4523551.06
4/3/2016	2	101	pawnee	679889.37	4523547.76
4/3/2016	2	105	pawnee	679712.69	4523798.33
4/3/2016	2	105	pawnee	679708.03	4523798.31
4/3/2016	2	106	pawnee	679604.41	4523930.73
4/3/2016	1	107	pawnee	679603.05	4523884.62
4/3/2016	2	106	pawnee	679603.94	4523923.74
4/3/2016	2	110	pawnee	679409.88	4525026.37
4/3/2016	2	110	pawnee	679425.96	4525040.78
4/3/2016	3	111	pawnee	679220.79	4524892.67
4/3/2016	3	111	pawnee	679219.51	4524891.09
4/3/2016	3	111	pawnee	679214.99	4524893.21
4/3/2016	1	112	pawnee	679132.73	4524888.41
4/3/2016	2	113	pawnee	679092.70	4524896.67
4/3/2016	2	113	pawnee	679094.94	4524907.61
4/3/2016	3	115	pawnee	678919.43	4523930.90
4/3/2016	3	115	pawnee	678921.70	4523924.79
4/3/2016	3	115	pawnee	678924.73	4523925.86
4/3/2016	1	116	pawnee	678867.77	4523699.66
4/3/2016	1	117	pawnee	678893.35	4523717.49
4/3/2016	2	117	pawnee	678882.14	4523706.25
4/3/2016	2	118	pawnee	679095.89	4523116.13

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
4/3/2016	2	118	pawnee	679095.95	4523115.60
4/3/2016	1	119	pawnee	678948.02	4523166.92
4/3/2016	1	119	pawnee	679419.94	4522779.53
4/3/2016	1	120	pawnee	679351.91	4522855.96
4/9/2016	1	1	pawnee	679644.63	4523763.63
4/9/2016	3	2	pawnee	679466.78	4524031.32
4/9/2016	3	2	pawnee	679462.41	4524018.79
4/9/2016	3	2	pawnee	679449.13	4524011.39
4/9/2016	2	10	pawnee	678815.47	4523670.89
4/9/2016	2	10	pawnee	678826.46	4523673.44
4/9/2016	1	101	pawnee	680238.84	4523623.68
4/9/2016	2	102	pawnee	680251.00	4523672.47
4/9/2016	2	102	pawnee	680252.74	4523673.56
4/9/2016	2	103	pawnee	679448.63	4524100.85
4/9/2016	2	103	pawnee	679458.07	4524097.23
4/10/2016	2	1	pawnee	679879.57	4523699.05
4/10/2016	2	1	pawnee	679882.08	4523704.72
4/10/2016	1	2	pawnee	680232.77	4523625.94
4/10/2016	2	3	pawnee	680250.68	4523674.80
4/10/2016	2	3	pawnee	680249.83	4523674.56
4/10/2016	1	4	pawnee	679633.29	4523783.30
4/10/2016	2	5	pawnee	679638.16	4523776.84
4/10/2016	2	5	pawnee	679641.41	4523777.30
4/10/2016	2	6	pawnee	679600.23	4523863.99
4/10/2016	1	7	pawnee	679710.37	4523883.64
4/10/2016	1	8	pawnee	679693.63	4523953.84
4/10/2016	2	7	pawnee	679580.75	4523943.89
4/10/2016	1	9	pawnee	679656.49	4523956.13
4/10/2016	1	15	pawnee	679133.15	4524915.77
4/10/2016	2	16	pawnee	679067.65	4524998.72
4/10/2016	2	16	pawnee	679068.18	4524998.06
4/10/2016	3	101	pawnee	680025.44	4523765.40
4/10/2016	3	101	pawnee	680029.53	4523765.47
4/10/2016	3	101	pawnee	680026.08	4523765.59
4/10/2016	1	102	pawnee	680131.50	4523594.85
4/10/2016	2	103	pawnee	680116.68	4523623.75
4/10/2016	2	103	pawnee	680117.35	4523649.80
4/10/2016	1	110	pawnee	679796.02	4523820.45
4/10/2016	1	120	pawnee	679671.38	4523821.34
4/10/2016	1	122	pawnee	679607.81	4523793.40
4/10/2016	1	123	pawnee	679602.43	4523796.92
4/10/2016	1	124	pawnee	679594.70	4523871.99
4/10/2016	1	125	pawnee	679602.51	4523878.67
4/10/2016	1	126	pawnee	679618.03	4523998.75
4/10/2016	2	127	pawnee	679596.40	4524250.54
4/10/2016	2	127	pawnee	679596.56	4524249.94
4/10/2016	2	150	pawnee	679172.67	4524888.43
4/10/2016	2	150	pawnee	679172.16	4524887.77
4/10/2016	2	151	pawnee	679172.35	4524893.65
4/10/2016	2	151	pawnee	679160.20	4524896.19
4/10/2016	1	152	pawnee	679148.61	4524906.90
4/10/2016	1	153	pawnee	679096.85	4524953.10
4/10/2016	3	154	pawnee	679069.93	4524999.81
4/10/2016	3	154	pawnee	679066.52	4524999.80
4/10/2016	3	154	pawnee	679063.05	4525002.03
4/10/2016	1	156	pawnee	678904.55	4525098.49
4/10/2016	2	157	pawnee	678904.28	4525099.13
4/10/2016	2	157	pawnee	678904.05	4525099.09
4/10/2016	1	158	pawnee	678933.94	4525101.25
4/11/2016	1	1	pawnee	679589.52	4524097.31
4/14/2016	1	1	pawnee	679710.05	4523861.43
4/14/2016	1	2	pawnee	679584.39	4523798.54

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
4/14/2016	1	101	pawnee	680089.57	4523848.04
4/15/2016	1	1	pawnee	680244.45	4523649.48
4/15/2016	2	2	pawnee	678821.09	4523656.19
4/15/2016	2	2	pawnee	678823.24	4523656.47
4/15/2016	3	1	pawnee	678806.82	4523661.79
4/15/2016	2	4	pawnee	679106.63	4523117.39
4/15/2016	2	4	pawnee	679105.89	4523117.05
4/15/2016	1	101	pawnee	680002.26	4523248.95
4/15/2016	1	102	pawnee	679695.59	4523792.26
4/22/2016	1	1	pawnee	679630.00	4523874.72
4/22/2016	1	2	pawnee	679490.84	4524194.86
4/22/2016	2	5	pawnee	679231.75	4525026.17
4/22/2016	2	5	pawnee	679231.09	4524978.46
4/22/2016	1	6	pawnee	678947.46	4525112.46
4/22/2016	1	7	pawnee	678908.49	4525105.00
4/22/2016	2	10	pawnee	679188.43	4522991.07
4/22/2016	2	10	pawnee	679187.24	4522991.56
4/22/2016	2	11	pawnee	679179.80	4523007.21
4/22/2016	2	11	pawnee	679171.93	4523022.20
4/23/2016	1	1	pawnee	680093.27	4523313.59
4/23/2016	2	2	pawnee	680214.99	4523583.24
4/23/2016	2	2	pawnee	680235.32	4523622.56
4/23/2016	4	3	pawnee	680251.97	4523664.50
4/23/2016	4	3	pawnee	680252.06	4523664.79
4/23/2016	4	3	pawnee	680252.04	4523664.86
4/23/2016	4	3	pawnee	680252.09	4523664.85
4/23/2016	2	4	pawnee	679498.16	4524066.68
4/23/2016	2	4	pawnee	679497.45	4524067.53
4/23/2016	2	5	pawnee	679468.48	4524047.30
4/23/2016	2	5	pawnee	679468.38	4524047.29
4/23/2016	1	6	pawnee	679600.17	4523876.55
4/23/2016	3	7	pawnee	679708.16	4523847.88
4/23/2016	3	7	pawnee	679711.17	4523843.85
4/23/2016	3	7	pawnee	679709.84	4523847.74
4/23/2016	1	8	pawnee	679765.49	4523973.09
4/23/2016	2	10	pawnee	679284.61	4525195.30
4/23/2016	2	10	pawnee	679296.98	4525187.17
4/23/2016	2	11	pawnee	679076.75	4524977.99
4/23/2016	2	11	pawnee	679076.75	4524977.99
4/23/2016	2	12	pawnee	678935.11	4525107.92
4/23/2016	3	20	pawnee	679354.37	4522849.06
4/23/2016	3	20	pawnee	679326.71	4522836.71
4/23/2016	3	20	pawnee	679365.45	4522818.02
4/23/2016	2	31	pawnee	679549.49	4522768.91
4/23/2016	2	31	pawnee	679538.48	4522768.40
4/23/2016	2	32	pawnee	678927.66	4523224.07
4/23/2016	2	32	pawnee	678931.00	4523218.56
4/23/2016	2	33	pawnee	679093.03	4523113.14
4/23/2016	2	33	pawnee	679095.47	4523115.28
4/23/2016	2	101	pawnee	680028.80	4523906.78
4/23/2016	2	101	pawnee	680028.00	4523906.01
4/23/2016	2	102	pawnee	679597.55	4523880.54
4/23/2016	2	102	pawnee	679586.77	4523882.16
4/23/2016	2	103	pawnee	679728.73	4523809.25
4/23/2016	2	103	pawnee	679683.67	4523809.31
4/23/2016	2	104	pawnee	679707.87	4523807.39
4/23/2016	2	104	pawnee	679711.44	4523809.10
4/23/2016	1	110	pawnee	679545.07	4524247.59
4/23/2016	2	111	pawnee	679545.32	4524267.46
4/23/2016	2	111	pawnee	679549.88	4524260.78
4/24/2016	1	1	pawnee	680085.23	4523291.30
4/24/2016	1	2	pawnee	680227.11	4523612.50

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
4/24/2016	2	3	pawnee	679246.21	4524836.39
4/24/2016	2	3	pawnee	679246.64	4524837.49
4/24/2016	1	4	pawnee	678915.48	4525125.56
4/24/2016	1	6	pawnee	678895.07	4525109.29
4/24/2016	1	10	pawnee	679068.23	4523202.23
4/24/2016	1	11	pawnee	679102.34	4523099.64
4/24/2016	2	101	pawnee	679609.30	4523877.76
4/24/2016	2	101	pawnee	679620.90	4523878.32
4/24/2016	2	102	pawnee	679099.97	4523077.87
4/24/2016	2	102	pawnee	679089.09	4523065.07
4/24/2016	2	103	pawnee	679203.22	4523001.33
4/24/2016	2	103	pawnee	679198.59	4523006.73
4/27/2016	1	1	pawnee	680063.36	4523262.41
4/27/2016	3	2	pawnee	680118.00	4523365.88
4/27/2016	3	2	pawnee	680118.26	4523367.29
4/27/2016	3	2	pawnee	680118.83	4523365.92
4/27/2016	1	3	pawnee	679449.50	4524035.24
4/27/2016	2	5	pawnee	678837.01	4523991.61
4/27/2016	2	5	pawnee	678832.22	4524003.34
4/27/2016	3	101	pawnee	679959.57	4523789.82
4/27/2016	3	101	pawnee	679957.06	4523791.56
4/27/2016	3	101	pawnee	679957.09	4523789.18
4/27/2016	1	102	pawnee	679472.74	4524042.10
5/3/2016	1	1	pawnee	679638.86	4523950.11
5/3/2016	2	2	pawnee	679473.97	4524065.25
5/3/2016	2	2	pawnee	679474.06	4524065.49
5/3/2016	2	5	pawnee	678951.28	4525105.93
5/3/2016	2	5	pawnee	678900.56	4525101.95
5/3/2016	3	6	pawnee	678834.57	4523678.64
5/3/2016	3	6	pawnee	678833.83	4523677.21
5/3/2016	3	6	pawnee	678853.22	4523683.87

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
5/3/2016	1	100	pawnee	678843.88	4523953.29
5/7/2016	2	1	pawnee	680102.41	4523332.43
5/7/2016	2	1	pawnee	680096.39	4523317.18
5/7/2016	2	2	pawnee	680080.70	4523282.78
5/7/2016	2	2	pawnee	680073.97	4523265.79
5/7/2016	1	3	pawnee	680064.33	4523244.71
5/7/2016	2	4	pawnee	679899.26	4523726.16
5/7/2016	2	4	pawnee	679902.50	4523729.42
5/7/2016	3	5	pawnee	679917.24	4523745.55
5/7/2016	3	5	pawnee	679919.98	4523746.88
5/7/2016	3	5	pawnee	679917.24	4523745.55
5/7/2016	2	6	pawnee	680222.84	4523618.74
5/7/2016	2	6	pawnee	680221.09	4523618.52
5/7/2016	1	7	pawnee	680153.97	4523758.63
5/7/2016	1	8	pawnee	679707.40	4523864.22
5/7/2016	4	9	pawnee	679716.04	4523811.12
5/7/2016	4	9	pawnee	679716.18	4523808.97
5/7/2016	4	9	pawnee	679712.30	4523803.90
5/7/2016	4	9	pawnee	679712.42	4523799.57
5/7/2016	1	10	pawnee	679598.74	4523878.46
5/7/2016	1	11	pawnee	679594.18	4523976.15
5/7/2016	2	12	pawnee	679679.43	4523792.51
5/7/2016	2	12	pawnee	679676.14	4523795.80
5/7/2016	2	13	pawnee	679734.44	4523933.16
5/7/2016	2	13	pawnee	679667.19	4523978.15
5/7/2016	3	14	pawnee	679657.87	4523980.78
5/7/2016	3	14	pawnee	679644.32	4523987.59
5/7/2016	3	14	pawnee	679626.20	4523994.51
5/7/2016	2	15	pawnee	679519.21	4524179.85
5/7/2016	2	15	pawnee	679517.94	4524176.78
5/7/2016	2	16	pawnee	679434.08	4524017.21

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
5/7/2016	2	16	pawnee	679434.27	4524016.81
5/7/2016	2	17	pawnee	679435.73	4524018.50
5/7/2016	2	17	pawnee	679436.88	4524019.86
5/7/2016	1	18	pawnee	679077.10	4524889.02
5/7/2016	1	19	pawnee	679117.46	4524882.67
5/7/2016	2	20	pawnee	679164.54	4524892.58
5/7/2016	2	20	pawnee	679164.47	4524892.57
5/7/2016	1	21	pawnee	679096.38	4524956.21
5/7/2016	2	22	pawnee	678952.63	4525116.91
5/7/2016	2	22	pawnee	678911.14	4525107.97
5/7/2016	1	23	pawnee	678669.38	4523760.19
5/7/2016	1	24	pawnee	679165.72	4523022.41
5/8/2016	1	1	pawnee	680252.18	4523674.13
5/8/2016	1	2	pawnee	680202.19	4523550.50
5/8/2016	1	3	pawnee	680034.89	4523236.87
5/8/2016	2	4	pawnee	679977.78	4523160.38
5/8/2016	2	4	pawnee	679979.98	4523156.65
5/8/2016	1	5	pawnee	679990.08	4523169.23
5/8/2016	2	1	pawnee	680241.80	4523643.46
5/8/2016	1	10	pawnee	679704.81	4523840.26
5/8/2016	2	11	pawnee	679468.51	4524034.29
5/8/2016	2	11	pawnee	679469.50	4524034.40
5/8/2016	3	12	pawnee	679227.51	4525007.90
5/8/2016	3	12	pawnee	679231.22	4525006.10
5/8/2016	3	12	pawnee	679228.30	4525009.33
5/8/2016	1	13	pawnee	679353.40	4525141.77
5/8/2016	2	14	pawnee	679100.90	4524946.95
5/8/2016	2	14	pawnee	679101.07	4524946.71
5/8/2016	1	15	pawnee	679060.08	4524999.87
5/8/2016	2	16	pawnee	678623.82	4525054.31
5/8/2016	2	16	pawnee	678624.07	4525052.95
5/8/2016	2	17	pawnee	678830.53	4525113.42
5/8/2016	2	17	pawnee	678824.85	4525115.74
5/8/2016	3	18	pawnee	678932.64	4525071.21
5/8/2016	3	18	pawnee	678932.13	4525071.95
5/8/2016	3	18	pawnee	678932.53	4525071.83
5/8/2016	1	19	pawnee	679092.67	4523146.18
5/8/2016	1	20	pawnee	679195.82	4522983.43
5/8/2016	2	101	pawnee	680258.59	4523689.05
5/8/2016	2	101	pawnee	680252.16	4523671.33
5/8/2016	4	102	pawnee	680239.72	4523640.14
5/8/2016	4	102	pawnee	680236.26	4523636.20
5/8/2016	4	102	pawnee	680236.28	4523636.17
5/8/2016	4	102	pawnee	680236.27	4523636.15
5/8/2016	1	103	pawnee	680232.13	4523627.22
5/8/2016	1	104	pawnee	680127.25	4523392.98
5/8/2016	1	105	pawnee	680111.50	4523359.00
5/8/2016	2	106	pawnee	679931.22	4523074.03
5/8/2016	2	106	pawnee	679931.39	4523072.68
5/8/2016	1	107	pawnee	680044.20	4523230.60
5/8/2016	1	108	pawnee	680067.30	4523810.73
5/8/2016	3	109	pawnee	679945.75	4523749.18
5/8/2016	3	109	pawnee	679947.45	4523746.74
5/8/2016	3	109	pawnee	679947.45	4523746.74
5/8/2016	3	110	pawnee	679641.08	4523989.28
5/8/2016	3	110	pawnee	679640.71	4523989.26
5/8/2016	3	110	pawnee	679640.71	4523989.25
5/8/2016	3	111	pawnee	679617.92	4524000.58
5/8/2016	3	111	pawnee	679618.02	4524001.39
5/8/2016	3	111	pawnee	679618.56	4524003.43
5/8/2016	1	112	pawnee	679593.31	4523966.45
5/8/2016	2	113	pawnee	679468.71	4524171.69

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
5/8/2016	1	114	pawnee	679483.40	4524166.52
5/8/2016	2	113	pawnee	679477.24	4524179.90
5/8/2016	1	115	pawnee	679506.39	4524163.02
5/8/2016	3	116	pawnee	679519.82	4524147.04
5/8/2016	3	116	pawnee	679523.54	4524124.83
5/8/2016	3	116	pawnee	679528.46	4524112.36
5/8/2016	1	117	pawnee	679444.66	4524007.32
5/8/2016	2	118	pawnee	679539.52	4524237.75
5/8/2016	2	118	pawnee	679540.65	4524236.34
5/8/2016	1	119	pawnee	679560.96	4524287.66
5/8/2016	2	120	pawnee	679232.72	4524827.50
5/8/2016	2	120	pawnee	679233.00	4524823.76
5/8/2016	2	121	pawnee	678863.46	4523697.42
5/8/2016	2	121	pawnee	678854.36	4523697.49
5/8/2016	1	122	pawnee	679177.28	4523106.10
5/8/2016	2	123	pawnee	679500.49	4522715.49
5/8/2016	2	123	pawnee	679504.38	4522713.90
5/8/2016	3	124	pawnee	679366.11	4522849.06
5/8/2016	3	124	pawnee	679363.93	4522853.58
5/8/2016	3	124	pawnee	679364.02	4522852.55
5/9/2016	1	1	pawnee	679696.66	4523789.59
5/9/2016	1	2	pawnee	679415.95	4523985.70
5/9/2016	1	3	pawnee	679231.03	4525017.32
5/9/2016	1	4	pawnee	679053.31	4524939.09
5/9/2016	1	101	pawnee	680098.18	4523331.47
5/14/2016	2	1	pawnee	680264.32	4523702.93
5/14/2016	2	1	pawnee	680255.16	4523681.07
5/14/2016	1	2	pawnee	680252.44	4523665.53
5/14/2016	1	3	pawnee	680102.96	4523337.82
5/14/2016	1	4	pawnee	679830.37	4523503.72
5/14/2016	1	5	pawnee	679865.57	4523525.81

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
5/14/2016	2	6	pawnee	679875.66	4523539.82
5/14/2016	2	6	pawnee	679875.47	4523541.00
5/14/2016	1	7	pawnee	679877.96	4523594.69
5/14/2016	2	8	pawnee	680226.44	4523604.13
5/14/2016	2	8	pawnee	680237.16	4523632.05
5/14/2016	1	9	pawnee	679955.33	4523794.50
5/14/2016	2	10	pawnee	679929.65	4523797.73
5/14/2016	2	10	pawnee	679919.40	4523799.48
5/14/2016	3	11	pawnee	679911.16	4523799.32
5/14/2016	3	11	pawnee	679910.36	4523799.45
5/14/2016	3	11	pawnee	679910.22	4523799.35
5/14/2016	3	11	pawnee	679910.23	4523799.44
5/14/2016	1	12	pawnee	679869.92	4523794.95
5/14/2016	2	13	pawnee	679679.77	4523812.43
5/14/2016	2	13	pawnee	679679.05	4523812.00
5/14/2016	2	14	pawnee	679639.98	4523791.92
5/14/2016	2	14	pawnee	679639.52	4523793.13
5/14/2016	2	15	pawnee	679738.03	4523809.75
5/14/2016	2	15	pawnee	679737.52	4523808.94
5/14/2016	1	16	pawnee	679555.28	4523811.09
5/14/2016	1	16	pawnee	679593.61	4523974.13
5/14/2016	3	17	pawnee	679615.75	4523996.41
5/14/2016	3	17	pawnee	679615.66	4523997.85
5/14/2016	3	17	pawnee	679615.57	4523995.33
5/14/2016	2	18	pawnee	679589.17	4523958.99
5/14/2016	2	18	pawnee	679590.02	4523962.33
5/14/2016	1	19	pawnee	679632.55	4523964.94
5/14/2016	3	20	pawnee	679443.33	4523993.25
5/14/2016	3	20	pawnee	679480.15	4524019.30
5/14/2016	3	20	pawnee	679452.35	4523998.18
5/14/2016	1	21	pawnee	679423.37	4524115.52

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
5/14/2016	3	22	pawnee	679542.84	4524254.49
5/14/2016	3	22	pawnee	679543.04	4524255.49
5/14/2016	3	22	pawnee	679544.20	4524252.96
5/14/2016	1	23	pawnee	679107.14	4524877.99
5/14/2016	1	24	pawnee	678937.50	4525070.97
5/14/2016	2	25	pawnee	678934.29	4525110.42
5/14/2016	2	25	pawnee	678926.34	4525106.07
5/15/2016	2	1	pawnee	679412.60	4522831.40
5/15/2016	2	1	pawnee	679411.63	4522829.61
5/15/2016	1	2	pawnee	679164.35	4523049.30
5/15/2016	1	3	pawnee	679167.07	4523030.48
5/15/2016	1	4	pawnee	679190.32	4522989.45
5/15/2016	3	5	pawnee	679135.96	4523084.65
5/15/2016	3	5	pawnee	679135.54	4523088.98
5/15/2016	3	5	pawnee	679135.40	4523089.22
5/15/2016	1	6	pawnee	678839.07	4523429.84
5/15/2016	2	7	pawnee	678972.11	4523180.06
5/15/2016	2	7	pawnee	678972.02	4523180.35
5/15/2016	1	8	pawnee	679019.81	4523148.65
5/15/2016	2	9	pawnee	679099.42	4523143.65
5/15/2016	2	9	pawnee	679101.61	4523147.78
5/15/2016	1	10	pawnee	678834.31	4524004.63
5/15/2016	3	11	pawnee	678821.97	4523976.09
5/15/2016	3	11	pawnee	678834.84	4523990.34
5/15/2016	3	11	pawnee	678835.72	4523989.54
5/15/2016	2	12	pawnee	678902.36	4523943.07
5/15/2016	2	12	pawnee	678900.17	4523942.79
5/15/2016	2	13	pawnee	678915.90	4523746.47
5/15/2016	2	13	pawnee	678900.12	4523721.99
5/15/2016	4	14	pawnee	678880.49	4523716.89
5/15/2016	4	14	pawnee	678881.72	4523722.41
5/15/2016	4	14	pawnee	678878.89	4523714.91
5/15/2016	4	14	pawnee	678878.17	4523715.65
5/15/2016	1	15	pawnee	680256.48	4523685.21
5/15/2016	1	16	pawnee	680239.31	4523641.48
5/15/2016	1	17	pawnee	680235.06	4523632.62
5/15/2016	1	18	pawnee	680226.85	4523611.55
5/15/2016	1	19	pawnee	680127.96	4523389.19
5/15/2016	2	20	pawnee	680114.89	4523364.26
5/15/2016	2	20	pawnee	680104.11	4523343.74
5/15/2016	1	21	pawnee	680080.12	4523288.76
5/15/2016	5	22	pawnee	679962.00	4523113.77
5/15/2016	5	22	pawnee	679922.16	4523081.82
5/15/2016	5	22	pawnee	679922.43	4523081.62
5/15/2016	5	22	pawnee	679921.93	4523083.08
5/15/2016	5	22	pawnee	679922.74	4523081.48
5/15/2016	3	23	pawnee	680204.12	4523773.68
5/15/2016	3	23	pawnee	680206.90	4523770.52
5/15/2016	3	23	pawnee	680229.56	4523738.13
5/15/2016	3	24	pawnee	680008.51	4523856.84
5/15/2016	3	24	pawnee	680006.30	4523852.76
5/15/2016	3	24	pawnee	680019.94	4523863.50
5/15/2016	1	25	pawnee	679903.74	4523801.90
5/15/2016	2	26	pawnee	679895.75	4523801.11
5/15/2016	2	26	pawnee	679893.28	4523804.54
5/15/2016	3	27	pawnee	680207.22	4523569.49
5/15/2016	3	27	pawnee	680207.12	4523569.73
5/15/2016	3	27	pawnee	680207.11	4523569.84
5/15/2016	2	28	pawnee	679755.50	4523966.36
5/15/2016	2	28	pawnee	679751.36	4523976.96
5/15/2016	1	29	pawnee	679615.88	4523991.91
5/15/2016	4	30	pawnee	679658.54	4523877.48

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
5/15/2016	4	30	pawnee	679657.66	4523878.19
5/15/2016	4	30	pawnee	679662.40	4523876.90
5/15/2016	4	30	pawnee	679661.26	4523877.52
5/15/2016	4	31	pawnee	679615.91	4523884.60
5/15/2016	4	31	pawnee	679616.50	4523888.60
5/15/2016	4	31	pawnee	679620.64	4523882.34
5/15/2016	4	31	pawnee	679618.06	4523875.62
5/15/2016	3	32	pawnee	679598.11	4523958.61
5/15/2016	3	32	pawnee	679599.12	4523960.71
5/15/2016	3	32	pawnee	679599.01	4523960.72
5/15/2016	2	33	pawnee	679606.43	4523939.84
5/15/2016	2	33	pawnee	679606.18	4523940.15
5/15/2016	3	34	pawnee	679595.47	4523972.91
5/15/2016	3	34	pawnee	679596.35	4523972.97
5/15/2016	3	34	pawnee	679595.92	4523972.96
5/15/2016	4	35	pawnee	679413.79	4524018.84
5/15/2016	4	35	pawnee	679414.61	4524018.34
5/15/2016	4	35	pawnee	679413.69	4524018.98
5/15/2016	4	35	pawnee	679412.90	4524015.89
5/15/2016	3	36	pawnee	679412.27	4524015.23
5/15/2016	3	36	pawnee	679560.04	4524145.19
5/15/2016	3	36	pawnee	679559.44	4524144.26
5/15/2016	2	37	pawnee	679552.87	4524248.51
5/15/2016	2	37	pawnee	679555.00	4524248.86
5/15/2016	2	38	pawnee	679231.78	4525012.32
5/15/2016	2	38	pawnee	679232.73	4525005.74
5/15/2016	1	39	pawnee	679247.64	4524827.78
5/15/2016	1	40	pawnee	679146.46	4524906.46
5/15/2016	2	41	pawnee	679100.22	4524949.57
5/15/2016	2	41	pawnee	679094.69	4524956.32
5/15/2016	3	42	pawnee	679058.64	4525006.62
5/15/2016	3	42	pawnee	679058.43	4525009.41
5/15/2016	3	42	pawnee	679058.43	4525009.22
5/15/2016	2	43	pawnee	678951.60	4525067.13
5/15/2016	2	43	pawnee	678950.24	4525071.67
5/15/2016	1	44	pawnee	678938.89	4525106.81
5/15/2016	1	45	pawnee	678906.24	4525099.44
5/15/2016	1	46	pawnee	678902.97	4525098.30
5/19/2016	1	1	pawnee	680256.08	4523681.60
5/19/2016	1	2	pawnee	680240.71	4523640.00
5/19/2016	1	3	pawnee	680057.41	4523245.60
5/19/2016	1	4	pawnee	679995.41	4523849.11
5/19/2016	1	6	pawnee	679956.42	4523819.55
5/19/2016	1	7	pawnee	680246.64	4523656.33
5/19/2016	3	8	pawnee	679770.47	4523822.05
5/19/2016	3	8	pawnee	679770.47	4523822.04
5/19/2016	3	8	pawnee	679771.15	4523822.57
5/19/2016	2	9	pawnee	679596.94	4523978.29
5/19/2016	2	9	pawnee	679597.06	4523978.34
5/19/2016	2	10	pawnee	679549.61	4524197.88
5/19/2016	2	10	pawnee	679549.89	4524198.35
5/19/2016	2	11	pawnee	679466.08	4524054.26
5/19/2016	2	11	pawnee	679449.07	4524041.68
5/19/2016	2	12	pawnee	679106.44	4523152.46
5/19/2016	2	12	pawnee	679106.76	4523157.86
5/19/2016	1	101	pawnee	679369.10	4525127.01
5/19/2016	1	102	pawnee	678978.45	4525130.24
5/19/2016	2	103	pawnee	680198.29	4523548.32
5/19/2016	2	103	pawnee	680198.45	4523547.99
5/19/2016	1	104	pawnee	680135.49	4523405.36
5/19/2016	3	105	pawnee	679922.49	4523082.00
5/19/2016	3	105	pawnee	679922.34	4523080.89

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
5/19/2016	3	105	pawnee	679925.02	4523080.28
5/19/2016	1	106	pawnee	680041.48	4523223.20
5/19/2016	4	107	pawnee	679910.28	4523795.49
5/19/2016	4	107	pawnee	679912.76	4523796.42
5/19/2016	4	107	pawnee	679906.99	4523794.24
5/19/2016	4	107	pawnee	679910.28	4523795.50
5/19/2016	1	108	pawnee	679693.72	4523814.67
5/19/2016	1	109	pawnee	679754.60	4523901.16
5/19/2016	2	110	pawnee	679560.77	4524200.88
5/19/2016	2	110	pawnee	679558.80	4524199.27
5/19/2016	1	111	pawnee	679413.05	4524017.03
5/29/2016	1	1	pawnee	680244.70	4523651.65
5/29/2016	3	2	pawnee	680221.56	4523596.62
5/29/2016	3	2	pawnee	680207.25	4523566.59
5/29/2016	3	2	pawnee	680207.27	4523566.53
5/29/2016	1	3	pawnee	680101.21	4523332.55
5/29/2016	3	4	pawnee	680058.37	4523254.84
5/29/2016	3	4	pawnee	680058.00	4523254.40
5/29/2016	3	4	pawnee	680057.96	4523254.32
5/29/2016	1	5	pawnee	680227.52	4523612.12
5/29/2016	2	6	pawnee	679931.33	4523805.15
5/29/2016	2	6	pawnee	679930.92	4523804.98
5/29/2016	3	7	pawnee	679864.51	4523786.22
5/29/2016	3	7	pawnee	679864.53	4523786.36
5/29/2016	3	7	pawnee	679864.60	4523786.28
5/29/2016	2	8	pawnee	679833.82	4523799.14
5/29/2016	2	8	pawnee	679832.16	4523800.78
5/29/2016	1	9	pawnee	679796.07	4523808.65
5/29/2016	2	10	pawnee	679648.86	4523899.22
5/29/2016	2	10	pawnee	679651.23	4523902.78
5/29/2016	2	11	pawnee	679630.32	4523945.40
5/29/2016	2	11	pawnee	679628.96	4523946.96
5/29/2016	4	12	pawnee	679621.31	4523975.93
5/29/2016	4	12	pawnee	679622.73	4523976.11
5/29/2016	4	12	pawnee	679621.46	4523979.32
5/29/2016	4	12	pawnee	679619.09	4523974.64
5/29/2016	2	13	pawnee	679621.54	4523991.72
5/29/2016	2	13	pawnee	679620.87	4523989.45
5/29/2016	2	14	pawnee	679658.81	4524021.97
5/29/2016	2	14	pawnee	679661.13	4524022.34
5/29/2016	3	15	pawnee	679778.90	4523845.46
5/29/2016	3	15	pawnee	679779.01	4523840.72
5/29/2016	3	15	pawnee	679779.05	4523840.89
5/29/2016	1	16	pawnee	679528.28	4524225.17
5/29/2016	2	17	pawnee	679410.56	4524025.34
5/29/2016	2	17	pawnee	679418.36	4524027.17
5/29/2016	2	18	pawnee	679444.16	4524034.20
5/29/2016	2	18	pawnee	679445.57	4524034.35
5/29/2016	1	19	pawnee	679572.66	4524310.57
5/29/2016	1	20	pawnee	679248.33	4524832.24
5/29/2016	1	21	pawnee	679213.75	4524881.35
5/29/2016	1	22	pawnee	679192.90	4524878.02
5/29/2016	1	23	pawnee	679154.85	4524902.69
5/29/2016	1	24	pawnee	679128.96	4524926.95
5/29/2016	3	25	pawnee	678987.79	4525002.23
5/29/2016	3	25	pawnee	678988.75	4525001.81
5/29/2016	3	25	pawnee	678988.86	4525001.80
5/29/2016	4	26	pawnee	678951.13	4525050.89
5/29/2016	4	26	pawnee	678950.44	4525051.64
5/29/2016	4	26	pawnee	678950.94	4525050.96
5/29/2016	4	26	pawnee	678950.45	4525051.79
5/29/2016	1	27	pawnee	678836.20	4525139.94

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
5/29/2016	2	28	pawnee	678901.77	4523729.68
5/29/2016	2	28	pawnee	678904.73	4523732.81
5/29/2016	2	29	pawnee	678904.60	4523732.60
5/29/2016	2	29	pawnee	678904.40	4523732.43
5/29/2016	2	30	pawnee	678969.25	4523182.63
5/29/2016	2	30	pawnee	678969.47	4523183.05
5/29/2016	2	31	pawnee	679652.99	4522789.36
5/29/2016	2	31	pawnee	679652.01	4522788.10
5/29/2016	1	32	pawnee	679405.87	4522851.97
5/29/2016	2	33	pawnee	679428.91	4522810.01
5/29/2016	2	33	pawnee	679429.33	4522808.57
6/2/2016	1	1	pawnee	680039.50	4523225.26
6/2/2016	2	2	pawnee	679769.72	4523835.20
6/2/2016	2	2	pawnee	679772.44	4523832.50
6/2/2016	1	3	pawnee	678997.31	4524989.67
6/2/2016	2	4	pawnee	679016.78	4524975.62
6/2/2016	2	4	pawnee	679017.57	4524974.40
6/2/2016	2	5	pawnee	678960.73	4525033.46
6/2/2016	2	5	pawnee	678958.88	4525032.98
6/2/2016	1	6	pawnee	678890.93	4523724.37
6/2/2016	2	7	pawnee	678913.72	4523943.57
6/2/2016	2	7	pawnee	678914.96	4523942.45
6/2/2016	1	8	pawnee	679119.07	4523156.44
6/2/2016	1	101	pawnee	680109.47	4523351.96
6/2/2016	2	102	pawnee	679782.96	4523910.20
6/2/2016	2	102	pawnee	679783.14	4523910.48
6/2/2016	2	103	pawnee	679613.11	4523944.18
6/2/2016	2	103	pawnee	679614.34	4523943.44
6/2/2016	1	104	pawnee	679545.22	4524108.38
6/2/2016	2	105	pawnee	679578.35	4524214.21
6/2/2016	2	105	pawnee	679577.32	4524214.02

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
6/2/2016	3	106	pawnee	679077.77	4524909.03
6/2/2016	3	106	pawnee	679084.79	4524906.38
6/2/2016	3	106	pawnee	679068.74	4524918.45
6/5/2016	2	1	pawnee	679209.06	4524807.13
6/5/2016	2	1	pawnee	679214.52	4524811.07
6/5/2016	4	2	pawnee	679171.38	4524833.25
6/5/2016	4	2	pawnee	679171.25	4524833.18
6/5/2016	4	2	pawnee	679171.54	4524833.35
6/5/2016	4	2	pawnee	679171.65	4524833.58
6/5/2016	1	3	pawnee	679231.98	4524975.33
6/5/2016	1	4	pawnee	679232.92	4525010.44
6/5/2016	1	5	pawnee	679233.79	4525011.18
6/5/2016	4	6	pawnee	679420.07	4524018.54
6/5/2016	4	6	pawnee	679420.52	4524017.91
6/5/2016	4	6	pawnee	679420.69	4524017.78
6/5/2016	4	6	pawnee	679420.25	4524017.77
6/5/2016	3	7	pawnee	679709.56	4523826.59
6/5/2016	3	7	pawnee	679710.12	4523824.77
6/5/2016	3	7	pawnee	679709.09	4523826.30
6/5/2016	2	8	pawnee	680077.79	4523285.96
6/5/2016	2	8	pawnee	680066.71	4523262.74
6/5/2016	1	9	pawnee	680064.61	4523256.80
6/5/2016	2	10	pawnee	680106.83	4523338.88
6/5/2016	2	10	pawnee	680107.61	4523340.23
6/12/2016	1	1	pawnee	678844.83	4523695.33
6/12/2016	2	2	pawnee	678973.81	4523164.71
6/12/2016	2	2	pawnee	678963.38	4523182.70
6/12/2016	1	3	pawnee	679095.14	4523116.34
6/12/2016	1	4	pawnee	679354.48	4522847.78
6/12/2016	1	5	pawnee	679765.73	4523810.11
6/12/2016	1	6	pawnee	679718.51	4523805.44

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
6/12/2016	1	7	pawnee	679667.46	4523871.33
6/12/2016	1	8	pawnee	679593.92	4523961.87
6/15/2016	1	1	pawnee	678831.34	4523608.95
6/15/2016	3	101	pawnee	679677.38	4523803.12
6/15/2016	3	101	pawnee	679676.36	4523802.59
6/15/2016	3	101	pawnee	679677.50	4523803.99
6/15/2016	3	102	pawnee	678932.68	4525106.21
6/15/2016	3	102	pawnee	678932.68	4525106.21
6/15/2016	3	102	pawnee	678932.68	4525106.21
6/18/2016	1	1	pawnee	678870.72	4523330.16
6/18/2016	1	2	pawnee	678899.57	4523724.30
6/18/2016	2	3	pawnee	679004.59	4524957.45
6/18/2016	2	3	pawnee	679006.32	4524952.45
6/18/2016	1	4	pawnee	678892.20	4525107.63
6/18/2016	2	5	pawnee	680250.93	4523665.31
6/18/2016	1	6	pawnee	680224.49	4523603.62
6/18/2016	1	7	pawnee	680125.58	4523387.99
6/18/2016	2	8	pawnee	680070.13	4523260.22
6/18/2016	2	8	pawnee	680051.87	4523233.74
6/18/2016	2	5	pawnee	680242.78	4523649.03
6/18/2016	2	9	pawnee	679417.19	4524016.54
6/18/2016	2	9	pawnee	679422.07	4524020.76
6/18/2016	1	101	pawnee	678867.94	4523709.92
6/18/2016	1	102	pawnee	679917.50	4523084.17
6/20/2016	2	1	pawnee	679211.47	4523003.14
6/20/2016	2	1	pawnee	679210.90	4523004.05
6/20/2016	1	2	pawnee	680253.67	4523670.37
6/20/2016	2	3	pawnee	680012.63	4523254.52
6/20/2016	2	3	pawnee	680008.76	4523250.86
6/24/2016	1	1	pawnee	678887.66	4523713.42
6/24/2016	1	2	pawnee	678845.67	4523980.23
6/24/2016	2	3	pawnee	679007.37	4524928.46
6/24/2016	2	3	pawnee	679007.17	4524928.99
6/24/2016	3	4	pawnee	679948.97	4523808.44
6/24/2016	3	4	pawnee	679951.26	4523808.71
6/24/2016	3	4	pawnee	679950.41	4523808.45
6/25/2016	2	1	pawnee	679232.93	4525002.35
6/25/2016	2	1	pawnee	679233.03	4525001.61
6/25/2016	2	2	pawnee	678620.91	4525092.40
6/25/2016	2	2	pawnee	678620.84	4525094.23
6/25/2016	2	3	pawnee	680236.85	4523627.74
6/25/2016	2	3	pawnee	680237.49	4523627.50
6/25/2016	2	4	pawnee	679757.91	4523816.37
6/25/2016	2	4	pawnee	679749.01	4523816.14
6/25/2016	2	5	pawnee	679644.87	4523877.19
6/25/2016	2	5	pawnee	679642.36	4523875.56
6/25/2016	2	6	pawnee	679544.66	4524201.87
6/25/2016	2	6	pawnee	679546.24	4524197.76
6/25/2016	2	7	pawnee	679562.90	4524143.17
6/25/2016	3	8	pawnee	679423.15	4524017.80
6/25/2016	3	8	pawnee	679423.34	4524017.32
6/25/2016	3	8	pawnee	679423.07	4524017.75
6/26/2016	2	1	pawnee	679429.25	4522800.02
6/26/2016	2	1	pawnee	679429.02	4522800.00
6/26/2016	1	2	pawnee	679390.82	4522848.47
6/26/2016	2	3	pawnee	679301.54	4522916.78
6/26/2016	2	3	pawnee	679301.32	4522916.84
6/26/2016	1	4	pawnee	678899.31	4523729.42
6/26/2016	1	5	pawnee	679028.55	4524964.38
6/26/2016	2	6	pawnee	678989.33	4524997.56
6/26/2016	2	6	pawnee	678996.02	4524995.93
6/26/2016	2	7	pawnee	680197.58	4523533.52

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
6/26/2016	2	7	pawnee	680192.40	4523513.11
6/26/2016	2	8	pawnee	680073.19	4523271.55
6/26/2016	2	8	pawnee	680059.57	4523234.05
6/26/2016	2	8	pawnee	680061.71	4523244.81
6/26/2016	1	9	pawnee	680135.88	4523815.88
6/26/2016	1	10	pawnee	679728.96	4523816.56
6/26/2016	1	11	pawnee	679654.80	4523877.46
6/26/2016	2	12	pawnee	679629.49	4523876.75
6/26/2016	2	12	pawnee	679630.98	4523876.23
6/26/2016	1	13	pawnee	679628.39	4524000.25
6/26/2016	2	14	pawnee	679709.66	4524002.96
6/26/2016	2	14	pawnee	679709.61	4524003.14
6/26/2016	1	15	pawnee	679764.13	4523970.37
6/28/2016	2	1	pawnee	680105.42	4523338.06
6/28/2016	1	2	pawnee	679963.82	4523107.39
6/28/2016	2	1	pawnee	680094.09	4523316.38
6/28/2016	3	3	pawnee	680239.01	4523631.59
6/28/2016	3	3	pawnee	680239.07	4523632.56
6/28/2016	3	3	pawnee	680239.10	4523632.56
6/28/2016	2	4	pawnee	679559.42	4524172.86
6/28/2016	2	4	pawnee	679550.11	4524202.84
6/28/2016	1	5	pawnee	678900.34	4523730.71
6/28/2016	1	6	pawnee	678897.91	4523728.53
7/6/2016	1	1	pawnee	680254.13	4523673.71
7/6/2016	1	2	pawnee	679947.48	4523116.17
7/6/2016	1	3	pawnee	679668.74	4523807.51
7/6/2016	1	4	pawnee	679011.36	4524966.38
7/9/2016	1	1	pawnee	680253.57	4523674.76
7/9/2016	1	2	pawnee	680089.64	4523311.77
7/9/2016	2	3	pawnee	679968.20	4523149.65
7/9/2016	2	3	pawnee	679967.73	4523148.73

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
7/9/2016	4	4	pawnee	680033.54	4523220.07
7/9/2016	4	4	pawnee	680031.91	4523218.29
7/9/2016	4	4	pawnee	680032.34	4523219.80
7/9/2016	4	4	pawnee	680032.77	4523219.40
7/9/2016	2	5	pawnee	680224.56	4523693.99
7/9/2016	2	5	pawnee	680181.64	4523773.27
7/9/2016	3	6	pawnee	679810.11	4523817.83
7/9/2016	3	6	pawnee	679822.84	4523792.58
7/9/2016	3	6	pawnee	679823.89	4523801.56
7/9/2016	3	6	pawnee	679769.50	4523834.75
7/9/2016	3	6	pawnee	679769.50	4523834.81
7/9/2016	3	6	pawnee	679770.00	4523837.22
7/9/2016	1	7	pawnee	679594.60	4523989.07
7/9/2016	3	8	pawnee	679639.05	4524002.12
7/9/2016	3	8	pawnee	679640.69	4523998.05
7/9/2016	3	8	pawnee	679641.06	4524004.12
7/9/2016	4	9	pawnee	679724.29	4523998.29
7/9/2016	4	9	pawnee	679722.86	4523998.48
7/9/2016	4	9	pawnee	679723.64	4523998.52
7/9/2016	4	9	pawnee	679724.81	4523996.65
7/9/2016	1	10	pawnee	679677.82	4523874.08
7/9/2016	2	11	pawnee	679770.57	4523833.16
7/9/2016	2	11	pawnee	679770.49	4523832.75
7/9/2016	1	12	pawnee	679442.45	4524020.57
7/9/2016	1	13	pawnee	679470.79	4524037.90
7/9/2016	1	14	pawnee	679556.28	4524163.40
7/9/2016	4	15	pawnee	679531.59	4524097.62
7/9/2016	4	15	pawnee	679522.04	4524083.63
7/9/2016	4	15	pawnee	679496.56	4524075.84
7/9/2016	4	15	pawnee	679492.33	4524054.56
7/9/2016	2	16	pawnee	679236.86	4524804.40

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
7/9/2016	2	16	pawnee	679208.87	4524860.04
7/9/2016	2	16	pawnee	679230.16	4524805.48
7/9/2016	4	17	pawnee	679172.10	4524834.63
7/9/2016	4	17	pawnee	679168.79	4524840.33
7/9/2016	4	17	pawnee	679166.46	4524851.21
7/9/2016	4	17	pawnee	679156.55	4524855.74
7/9/2016	5	18	pawnee	679103.91	4524889.66
7/9/2016	5	18	pawnee	679103.84	4524889.68
7/9/2016	5	18	pawnee	679087.26	4524896.23
7/9/2016	5	18	pawnee	679061.26	4524912.75
7/9/2016	5	18	pawnee	679046.17	4524924.57
7/9/2016	2	19	pawnee	679028.98	4524952.33
7/9/2016	2	19	pawnee	679030.89	4524951.15
7/9/2016	2	20	pawnee	678957.95	4525038.92
7/9/2016	2	20	pawnee	678963.01	4525039.85
7/9/2016	4	21	pawnee	678885.10	4525101.66
7/9/2016	4	21	pawnee	678885.10	4525101.68
7/9/2016	4	21	pawnee	678885.13	4525101.65
7/9/2016	4	21	pawnee	678885.20	4525101.57
7/16/2016	2	1	pawnee	678838.04	4523303.30
7/16/2016	2	1	pawnee	678842.42	4523311.17
7/16/2016	2	2	pawnee	679179.73	4523009.84
7/16/2016	2	2	pawnee	679179.59	4523009.80
7/16/2016	2	3	pawnee	679255.43	4522927.04
7/16/2016	2	3	pawnee	679257.98	4522926.84
7/16/2016	2	4	pawnee	680256.52	4523684.20
7/16/2016	2	4	pawnee	680254.74	4523679.27
7/16/2016	2	5	pawnee	680253.83	4523676.19
7/16/2016	2	5	pawnee	680248.07	4523663.38
7/16/2016	1	6	pawnee	680093.69	4523316.03
7/16/2016	2	7	pawnee	679952.36	4523061.49

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
7/16/2016	2	7	pawnee	679950.55	4523061.32
7/16/2016	3	8	pawnee	679915.42	4523785.28
7/16/2016	3	8	pawnee	679915.02	4523785.08
7/16/2016	3	8	pawnee	679915.45	4523784.19
7/16/2016	1	9	pawnee	679839.45	4523793.36
7/16/2016	1	10	pawnee	679631.34	4523834.76
7/16/2016	1	11	pawnee	679622.54	4523829.62
7/16/2016	3	12	pawnee	679700.55	4523788.33
7/16/2016	3	12	pawnee	679706.28	4523792.52
7/16/2016	3	12	pawnee	679707.42	4523791.69
7/16/2016	2	13	pawnee	679597.16	4523938.59
7/16/2016	2	13	pawnee	679597.42	4523937.85
7/16/2016	2	14	pawnee	679472.10	4524042.16
7/16/2016	2	14	pawnee	679468.71	4524043.87
7/16/2016	2	15	pawnee	679025.55	4524930.49
7/16/2016	2	15	pawnee	679034.11	4524931.25
7/16/2016	2	16	pawnee	679079.71	4524903.78
7/16/2016	2	16	pawnee	679079.08	4524903.00
7/16/2016	2	17	pawnee	678932.97	4525109.19
7/16/2016	2	17	pawnee	678934.54	4525109.48
7/16/2016	1	18	pawnee	678921.32	4525108.40
7/16/2016	2	19	pawnee	678884.07	4525105.40
7/16/2016	2	19	pawnee	678884.15	4525105.26
7/22/2016	2	1	pawnee	680064.14	4523247.19
7/22/2016	2	1	pawnee	680055.84	4523233.38
7/22/2016	1	2	pawnee	679977.43	4523102.69
7/22/2016	1	3	pawnee	680245.86	4523657.42
7/22/2016	1	4	pawnee	679563.43	4523926.68
7/22/2016	1	5	pawnee	678812.34	4525134.68
7/22/2016	1	6	pawnee	678898.25	4525107.50
7/22/2016	1	7	pawnee	679391.89	4522805.94

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
7/23/2016	2	1	pawnee	679227.85	4524821.12
7/23/2016	2	1	pawnee	679227.73	4524821.21
7/23/2016	3	2	pawnee	680233.02	4523625.75
7/23/2016	3	2	pawnee	680235.11	4523627.60
7/23/2016	3	2	pawnee	680235.29	4523626.90
7/23/2016	1	3	pawnee	679928.36	4523752.12
7/23/2016	1	4	pawnee	679948.70	4523788.53
7/23/2016	3	5	pawnee	679903.57	4523718.06
7/23/2016	3	5	pawnee	679906.14	4523715.22
7/23/2016	2	6	pawnee	679749.86	4523805.89
7/23/2016	2	6	pawnee	679751.65	4523806.14
7/23/2016	1	7	pawnee	679751.34	4523801.80
7/23/2016	1	8	pawnee	679785.54	4523811.20
7/23/2016	1	9	pawnee	679762.16	4523862.21
7/24/2016	1	1	pawnee	679951.14	4523062.51
7/24/2016	3	2	pawnee	679808.31	4523805.97
7/24/2016	3	2	pawnee	679808.47	4523805.36
7/24/2016	3	2	pawnee	679809.71	4523805.41
7/24/2016	1	3	pawnee	679794.22	4523808.77
7/24/2016	2	4	pawnee	679424.63	4524002.52
7/24/2016	2	4	pawnee	679427.31	4524002.81
7/24/2016	2	5	pawnee	679551.94	4524101.36
7/24/2016	2	5	pawnee	679552.54	4524101.54
7/24/2016	2	6	pawnee	678849.62	4523974.41
7/24/2016	2	6	pawnee	678853.64	4523979.68
7/24/2016	2	7	pawnee	679204.05	4522974.59
7/24/2016	2	7	pawnee	679215.03	4522974.61
7/24/2016	2	8	pawnee	679774.69	4522787.72
7/24/2016	2	8	pawnee	679785.74	4522796.72
7/25/2016	2	1	pawnee	680247.05	4523660.35
7/25/2016	2	1	pawnee	680258.33	4523696.49

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
7/25/2016	1	2	pawnee	679426.74	4523997.73
7/25/2016	1	3	pawnee	679570.56	4524173.28
7/25/2016	1	4	pawnee	678794.63	4525117.23
7/25/2016	1	8	pawnee	678960.76	4525039.85
8/13/2016	1	1	pawnee	679203.43	4522981.03
8/13/2016	2	2	pawnee	679187.38	4522995.51
8/13/2016	2	2	pawnee	679186.92	4522997.93
8/13/2016	1	3	pawnee	679007.79	4524974.87
8/13/2016	1	4	pawnee	679065.52	4524912.09
8/13/2016	3	5	pawnee	678826.21	4525134.37
8/13/2016	3	5	pawnee	678826.81	4525134.57
8/13/2016	3	5	pawnee	678833.36	4525129.77
8/13/2016	1	6	pawnee	680107.33	4523345.91
8/13/2016	1	7	pawnee	680248.49	4523664.21
8/13/2016	2	8	pawnee	679691.70	4523809.86
8/13/2016	2	8	pawnee	679693.47	4523810.48
8/13/2016	1	9	pawnee	679763.14	4523832.83
8/14/2016	2	1	pawnee	679416.76	4524023.18
8/14/2016	2	1	pawnee	679416.77	4524020.21
8/14/2016	1	2	pawnee	679011.14	4524976.85
8/14/2016	1	3	pawnee	679069.37	4524912.81
8/14/2016	2	4	pawnee	678992.42	4525005.72
8/14/2016	2	4	pawnee	678993.81	4525005.50
8/14/2016	2	5	pawnee	678955.22	4525062.70
8/14/2016	2	5	pawnee	678952.36	4525064.07
8/14/2016	1	6	pawnee	678862.93	4523976.89
8/14/2016	2	7	pawnee	679456.92	4522787.61
8/14/2016	2	7	pawnee	679456.74	4522787.14
8/14/2016	1	8	pawnee	679266.24	4522926.43
8/14/2016	2	9	pawnee	679188.90	4523000.25
8/14/2016	2	9	pawnee	679191.08	4522999.92

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
8/14/2016	1	101	pawnee	679463.16	4524036.38
8/14/2016	2	102	pawnee	679162.68	4524894.82
8/14/2016	2	102	pawnee	679161.27	4524894.86
8/14/2016	1	103	pawnee	679761.99	4522875.60
8/14/2016	1	104	pawnee	679332.01	4522894.08
8/15/2016	2	1	pawnee	680093.25	4523322.69
8/15/2016	2	1	pawnee	679972.56	4523126.69
8/15/2016	1	2	pawnee	680224.34	4523608.33
8/15/2016	1	3	pawnee	679560.49	4524146.69
8/15/2016	2	4	pawnee	679112.10	4524885.37
8/15/2016	2	4	pawnee	679112.47	4524885.26
8/15/2016	2	5	pawnee	678923.62	4525112.89
8/15/2016	2	5	pawnee	678916.77	4525104.67
8/15/2016	1	6	pawnee	678906.16	4523734.67
8/15/2016	2	7	pawnee	679188.13	4523006.46
8/15/2016	2	7	pawnee	679187.91	4523007.08
8/15/2016	1	8	pawnee	678971.10	4523181.22
8/15/2016	1	9	pawnee	679276.95	4522928.83
8/18/2016	2	101	pawnee	679423.29	4524023.37
8/18/2016	2	101	pawnee	679412.16	4524013.20
8/18/2016	2	101	pawnee	679413.68	4524012.97
8/18/2016	1	102	pawnee	678889.99	4525102.34
8/18/2016	2	103	pawnee	678905.47	4523940.68
8/18/2016	2	103	pawnee	678914.27	4523935.73
8/19/2016	2	1	pawnee	680252.94	4523672.66
8/19/2016	2	1	pawnee	680244.01	4523653.91
8/19/2016	1	2	pawnee	679686.31	4523810.22
8/19/2016	1	3	pawnee	679414.61	4524012.23
8/19/2016	2	4	pawnee	678908.98	4523738.35
8/19/2016	2	4	pawnee	678907.07	4523736.45
8/19/2016	1	101	pawnee	680246.61	4523667.49

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
8/27/2016	1	1	pawnee	680236.36	4523626.53
8/27/2016	2	2	pawnee	680122.78	4523376.93
8/27/2016	3	1	pawnee	680071.18	4523254.70
8/27/2016	2	2	pawnee	680109.01	4523349.51
8/27/2016	3	101	pawnee	680061.64	4523233.49
8/27/2016	3	101	pawnee	680061.40	4523233.82
8/27/2016	3	101	pawnee	680061.39	4523233.85
8/27/2016	1	102	pawnee	680241.71	4523646.39
8/27/2016	1	103	pawnee	679638.15	4523879.15
8/27/2016	2	104	pawnee	679417.24	4524019.93
8/27/2016	2	104	pawnee	679418.24	4524020.79
8/27/2016	1	105	pawnee	679538.92	4524204.79
8/27/2016	1	106	pawnee	678950.57	4525057.43
8/27/2016	1	107	pawnee	679119.65	4523102.58
8/28/2016	1	1	pawnee	680058.92	4523255.19
8/28/2016	1	2	pawnee	679706.06	4523811.90
8/28/2016	1	3	pawnee	679678.06	4523874.05
8/28/2016	1	4	pawnee	679612.83	4523871.98
8/28/2016	1	5	pawnee	679426.81	4524026.10
8/28/2016	1	6	pawnee	679152.83	4524861.32
8/28/2016	1	7	pawnee	679059.96	4524921.23
8/28/2016	1	8	pawnee	679152.14	4523097.90
8/28/2016	1	9	pawnee	679107.26	4523136.44
8/28/2016	1	10	pawnee	678895.52	4523722.10
8/29/2016	2	1	pawnee	679961.49	4523108.83
8/29/2016	2	1	pawnee	679974.20	4523124.50
8/29/2016	2	2	pawnee	679002.18	4523160.88
8/29/2016	2	2	pawnee	679002.00	4523159.79
8/29/2016	2	3	pawnee	679146.11	4523110.39
8/29/2016	2	3	pawnee	679113.20	4523154.70
8/31/2016	2	1	pawnee	678885.71	4525103.63

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
8/31/2016	2	1	pawnee	678884.24	4525104.33
9/4/2016	2	1	pawnee	680231.56	4523625.04
9/4/2016	2	1	pawnee	680219.68	4523598.47
9/4/2016	2	2	pawnee	680125.59	4523383.31
9/4/2016	2	3	pawnee	680058.28	4523247.92
9/4/2016	2	3	pawnee	680057.83	4523248.65
9/4/2016	2	2	pawnee	680113.25	4523355.73
9/4/2016	4	4	pawnee	679429.94	4524032.84
9/4/2016	4	4	pawnee	679443.07	4524038.29
9/4/2016	4	4	pawnee	679451.71	4524039.71
9/4/2016	4	4	pawnee	679450.36	4524039.52
9/4/2016	6	5	pawnee	679422.21	4524023.88
9/4/2016	6	5	pawnee	679421.74	4524024.67
9/4/2016	6	5	pawnee	679428.68	4524027.52
9/4/2016	6	5	pawnee	679449.31	4524037.49
9/4/2016	6	5	pawnee	679422.94	4524025.63
9/4/2016	6	5	pawnee	679421.73	4524025.87
9/4/2016	2	6	pawnee	679703.44	4523813.93
9/4/2016	2	6	pawnee	679709.89	4523817.03
9/4/2016	1	7	pawnee	679230.25	4524833.61
9/4/2016	2	8	pawnee	679165.18	4524853.21
9/4/2016	2	8	pawnee	679162.78	4524853.80
9/4/2016	1	9	pawnee	679113.72	4524888.36
9/4/2016	1	10	pawnee	679062.80	4524922.40
9/4/2016	3	11	pawnee	679267.01	4522926.44
9/4/2016	3	11	pawnee	679267.24	4522926.93
9/4/2016	3	11	pawnee	679267.05	4522926.74
9/10/2016	1	1	pawnee	680109.99	4523348.53
9/10/2016	2	2	pawnee	680076.78	4523267.35
9/10/2016	2	2	pawnee	680076.50	4523267.66
9/10/2016	1	3	pawnee	680242.56	4523646.00

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
9/10/2016	4	4	pawnee	679619.92	4523874.94
9/10/2016	4	4	pawnee	679616.66	4523873.06
9/10/2016	4	4	pawnee	679612.64	4523905.46
9/10/2016	4	4	pawnee	679621.93	4523873.78
9/10/2016	1	5	pawnee	679098.50	4524895.29
9/10/2016	1	6	pawnee	678961.10	4525046.21
9/10/2016	2	7	pawnee	678819.63	4525143.89
9/10/2016	2	7	pawnee	678819.55	4525143.75
9/10/2016	1	8	pawnee	679408.47	4522855.67
9/10/2016	1	9	pawnee	679265.80	4522968.03
9/10/2016	3	10	pawnee	678976.74	4523181.24
9/10/2016	3	10	pawnee	678994.10	4523156.40
9/10/2016	3	10	pawnee	678994.37	4523156.18
9/10/2016	2	101	pawnee	679004.88	4524985.40
9/10/2016	2	101	pawnee	679010.26	4524973.34
9/10/2016	1	102	pawnee	680253.70	4523675.19
9/10/2016	2	103	pawnee	680125.25	4523376.62
9/10/2016	2	104	pawnee	680092.96	4523304.95
9/10/2016	2	104	pawnee	680093.05	4523304.86
9/10/2016	2	103	pawnee	680120.22	4523374.75
9/10/2016	2	105	pawnee	680229.58	4523609.12
9/10/2016	2	105	pawnee	680232.57	4523615.89
9/10/2016	2	106	pawnee	679411.59	4524017.31
9/10/2016	2	106	pawnee	679413.40	4524017.98
9/10/2016	3	107	pawnee	679772.98	4523977.15
9/10/2016	3	107	pawnee	679758.61	4523985.00
9/10/2016	3	107	pawnee	679759.71	4523986.36
9/10/2016	10	108	pawnee	679628.80	4523877.67
9/10/2016	5	108	pawnee	679628.80	4523877.68
9/10/2016	5	108	pawnee	679624.90	4523876.40
9/10/2016	5	108	pawnee	679628.54	4523875.64

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
9/10/2016	5	108	pawnee	679625.97	4523877.80
9/10/2016	3	109	pawnee	679602.99	4523954.82
9/10/2016	3	109	pawnee	679602.32	4523955.07
9/10/2016	3	109	pawnee	679602.61	4523955.00
9/17/2016	1	1	pawnee	679341.30	4522869.50
9/17/2016	1	2	pawnee	680230.95	4523620.61
9/17/2016	1	3	pawnee	680245.51	4523654.06
9/17/2016	1	4	pawnee	679710.59	4523819.74
9/17/2016	1	5	pawnee	679625.46	4523877.10
9/17/2016	3	6	pawnee	679766.62	4523983.64
9/17/2016	3	6	pawnee	679767.01	4523983.56
9/17/2016	3	6	pawnee	679770.48	4523980.74
9/17/2016	4	7	pawnee	679135.68	4524910.55
9/17/2016	4	7	pawnee	679139.51	4524912.62
9/17/2016	4	7	pawnee	679139.45	4524912.57
9/17/2016	4	7	pawnee	679139.41	4524912.58
9/17/2016	1	8	pawnee	678895.81	4525100.64
9/17/2016	1	9	pawnee	678898.26	4525098.18
9/18/2016	1	1	pawnee	680258.06	4523678.88
9/18/2016	2	2	pawnee	680082.38	4523286.13
9/18/2016	2	2	pawnee	680074.03	4523263.70
9/18/2016	1	3	pawnee	680092.52	4523312.01
9/18/2016	1	4	pawnee	679466.56	4524046.56
9/18/2016	2	5	pawnee	679226.89	4524997.29
9/18/2016	2	5	pawnee	679226.89	4524997.29
9/18/2016	2	6	pawnee	679257.90	4524813.38
9/18/2016	2	6	pawnee	679257.39	4524813.47
9/18/2016	1	7	pawnee	679172.40	4524833.80
9/18/2016	1	8	pawnee	679170.73	4524847.88
9/18/2016	1	9	pawnee	679111.44	4523135.19
9/18/2016	1	10	pawnee	679262.74	4522971.57

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
9/20/2016	1	1	pawnee	679701.74	4523816.57
9/20/2016	1	2	pawnee	679498.84	4523973.60
9/20/2016	2	3	pawnee	679427.35	4524018.73
9/20/2016	2	3	pawnee	679433.67	4524022.12
9/20/2016	1	4	pawnee	678918.50	4525108.68
9/22/2016	1	1	pawnee	679110.73	4523138.43
9/22/2016	1	2	pawnee	678965.22	4525056.00
9/24/2016	1	1	pawnee	680064.34	4523237.71
9/24/2016	1	2	pawnee	680099.00	4523329.68
9/24/2016	2	3	pawnee	680243.87	4523648.82
9/24/2016	2	3	pawnee	680246.93	4523656.32
9/24/2016	1	4	pawnee	679416.58	4524034.63
9/24/2016	1	5	pawnee	679496.68	4523976.28
9/24/2016	1	6	pawnee	679230.38	4524980.17
9/24/2016	1	7	pawnee	679001.27	4525019.66
9/24/2016	1	8	pawnee	678901.08	4525100.43
9/24/2016	1	9	pawnee	678919.08	4525109.45
9/24/2016	1	10	pawnee	679419.83	4522775.77
9/24/2016	1	11	pawnee	679164.64	4523047.22
9/29/2016	1	1	pawnee	679364.36	4522827.31
9/29/2016	1	2	pawnee	679158.76	4523153.34
9/29/2016	4	3	pawnee	679205.43	4523107.39
9/29/2016	4	3	pawnee	679214.24	4523112.16
9/29/2016	4	3	pawnee	679242.73	4523126.76
9/29/2016	4	3	pawnee	679214.26	4523112.55
9/29/2016	2	4	pawnee	679158.94	4524996.53
9/29/2016	2	4	pawnee	679169.38	4525001.84
9/29/2016	1	5	pawnee	678939.09	4525108.51
9/29/2016	1	6	pawnee	678883.45	4525107.68
9/29/2016	1	7	pawnee	680254.37	4523692.51
10/2/2016	2	1	pawnee	680061.51	4523235.55

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
10/2/2016	NA	NA	pawnee	680061.48	4523234.75
10/2/2016	2	1	pawnee	680061.43	4523234.79
10/2/2016	1	2	pawnee	680057.09	4523246.65
10/2/2016	1	3	pawnee	680059.81	4523248.38
10/2/2016	1	4	pawnee	679691.62	4523805.37
10/2/2016	1	5	pawnee	679415.25	4524010.33
10/2/2016	1	6	pawnee	679229.36	4524804.97
10/2/2016	1	7	pawnee	679188.07	4524820.52
10/5/2016	2	1	pawnee	680057.02	4523250.46
10/5/2016	2	1	pawnee	680054.81	4523248.78
10/5/2016	2	2	pawnee	679415.47	4524011.90
10/5/2016	2	2	pawnee	679499.49	4523984.98
10/5/2016	3	3	pawnee	679556.10	4523938.07
10/5/2016	3	3	pawnee	679604.97	4523927.44
10/5/2016	3	3	pawnee	679596.20	4523958.28
10/5/2016	1	4	pawnee	679235.47	4524805.44
10/11/2016	1	1	pawnee	680050.35	4523230.72
10/11/2016	1	2	pawnee	679426.33	4524014.20
10/11/2016	3	3	pawnee	679605.87	4523877.31
10/11/2016	3	3	pawnee	679601.95	4523903.88
10/11/2016	3	3	pawnee	679605.50	4523897.53
10/16/2016	1	1	pawnee	679472.30	4524040.21
10/16/2016	1	2	pawnee	679800.37	4523823.58
10/16/2016	2	3	pawnee	679777.48	4523825.19
10/16/2016	2	3	pawnee	679777.01	4523824.60
10/16/2016	1	4	pawnee	679138.02	4524913.10
10/16/2016	1	5	pawnee	679396.71	4522798.32
10/25/2016	1	1	pawnee	680233.29	4523626.30
10/25/2016	1	2	pawnee	679732.79	4523902.23
10/25/2016	2	3	pawnee	679430.80	4524025.08
10/25/2016	2	3	pawnee	679431.71	4524025.62

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
10/28/2016	1	1	pawnee	680124.46	4523380.45
10/28/2016	1	2	pawnee	680091.71	4523309.66
10/28/2016	2	3	pawnee	680061.29	4523232.72
10/28/2016	2	3	pawnee	680061.05	4523231.20
10/28/2016	2	4	pawnee	679670.97	4523804.46
10/28/2016	2	4	pawnee	679673.37	4523805.30
10/28/2016	1	5	pawnee	679693.96	4523802.70
10/28/2016	2	6	pawnee	679468.83	4524045.79
10/28/2016	2	6	pawnee	679468.81	4524045.59
10/28/2016	1	7	pawnee	679260.99	4522925.07
10/28/2016	2	8	pawnee	678905.71	4523726.80
10/28/2016	2	8	pawnee	678903.08	4523723.95
10/29/2016	1	1	pawnee	680224.75	4523601.84
10/29/2016	1	2	pawnee	680233.59	4523631.88
10/29/2016	1	3	pawnee	679979.04	4523145.61
10/29/2016	2	4	pawnee	679665.14	4523807.07
10/29/2016	2	4	pawnee	679665.14	4523807.06
10/29/2016	5	5	pawnee	679614.15	4523875.60
10/29/2016	5	5	pawnee	679615.96	4523874.63
10/29/2016	5	5	pawnee	679612.95	4523878.59
10/29/2016	5	5	pawnee	679611.45	4523876.12
10/29/2016	5	5	pawnee	679598.36	4523874.06
10/29/2016	5	5	pawnee	679598.38	4523874.26
10/29/2016	2	6	pawnee	679414.77	4524015.71
10/29/2016	2	6	pawnee	679435.80	4524028.06
10/29/2016	3	7	pawnee	679135.49	4524912.05
10/29/2016	3	7	pawnee	679136.04	4524913.56
10/29/2016	3	7	pawnee	679135.71	4524914.66
10/29/2016	1	8	pawnee	679076.57	4524982.72
10/29/2016	1	9	pawnee	678951.23	4525108.14
10/29/2016	1	10	pawnee	679111.41	4523111.30

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
4/3/2016	1	1	meadowlark	675291.70	4544323.27
4/3/2016	1	2	meadowlark	675173.69	4544426.57
4/3/2016	2	3	meadowlark	675226.89	4544496.72
4/3/2016	2	3	meadowlark	675240.75	4544521.22
4/3/2016	2	4	meadowlark	675164.37	4544674.67
4/3/2016	2	4	meadowlark	675155.90	4544680.04
4/3/2016	2	101	meadowlark	675222.97	4544494.03
4/3/2016	2	101	meadowlark	675226.07	4544490.71
4/3/2016	2	202	meadowlark	675123.16	4544630.71
4/3/2016	2	202	meadowlark	675117.84	4544623.61
4/3/2016	2	203	meadowlark	675195.40	4544342.16
4/3/2016	2	203	meadowlark	675194.06	4544351.14
4/10/2016	2	1	meadowlark	675208.46	4544411.18
4/10/2016	2	1	meadowlark	675173.56	4544391.57
4/10/2016	1	2	meadowlark	675206.67	4544309.99
4/10/2016	1	3	meadowlark	675117.43	4544610.95
4/10/2016	1	101	meadowlark	675267.35	4544621.16
4/14/2016	2	101	meadowlark	675202.37	4544716.67
4/14/2016	2	101	meadowlark	675196.29	4544715.49
4/22/2016	1	1	meadowlark	675188.08	4544748.10
4/23/2016	4	1	meadowlark	675187.21	4544451.76
4/23/2016	4	1	meadowlark	675185.20	4544455.22
4/23/2016	4	1	meadowlark	675188.08	4544477.59
4/23/2016	4	1	meadowlark	675192.21	4544456.32
4/23/2016	2	2	meadowlark	675495.00	4544361.03
4/23/2016	2	2	meadowlark	675512.55	4544386.17
4/23/2016	1	101	meadowlark	675197.89	4544488.85
4/23/2016	2	102	meadowlark	675506.60	4544400.00
4/23/2016	2	102	meadowlark	675503.77	4544392.47
4/27/2016	2	1	meadowlark	675180.98	4544497.72
4/27/2016	2	1	meadowlark	675181.48	4544495.71

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
5/3/2016	1	1	meadowlark	675191.81	4544742.41
5/8/2016	2	1	meadowlark	675171.93	4544461.08
5/8/2016	2	1	meadowlark	675163.60	4544467.57
5/8/2016	1	2	meadowlark	675515.95	4544312.49
5/8/2016	1	3	meadowlark	675532.07	4544435.84
5/8/2016	1	3	meadowlark	675531.60	4544430.73
5/15/2016	2	1	meadowlark	675194.43	4544505.13
5/15/2016	NA	NA	meadowlark	675194.99	4544505.57
5/29/2016	1	1	meadowlark	675517.55	4544433.16
5/29/2016	1	1	meadowlark	675516.97	4544434.44
6/5/2016	1	1	meadowlark	675191.47	4544374.12
6/5/2016	1	1	meadowlark	675197.25	4544457.82
6/5/2016	1	1	meadowlark	675199.39	4544457.32
6/5/2016	1	2	meadowlark	675183.34	4544526.09
6/5/2016	4	3	meadowlark	675262.23	4544575.68
6/5/2016	4	3	meadowlark	675262.93	4544541.45
6/5/2016	4	3	meadowlark	675262.93	4544541.44
6/5/2016	4	3	meadowlark	675261.28	4544542.62
6/12/2016	2	1	meadowlark	675198.17	4544439.98
6/12/2016	2	1	meadowlark	675199.99	4544435.89
6/18/2016	2	1	meadowlark	675201.60	4544447.24
6/18/2016	2	1	meadowlark	675200.84	4544449.25
6/18/2016	1	2	meadowlark	675334.12	4544353.82
6/24/2016	2	1	meadowlark	675558.71	4544454.83
6/24/2016	2	1	meadowlark	675570.46	4544453.39
6/24/2016	1	2	meadowlark	675198.76	4544441.36
6/24/2016	1	3	meadowlark	675218.23	4544747.29
6/25/2016	1	1	meadowlark	675526.67	4544474.16
6/25/2016	1	2	meadowlark	675203.68	4544448.10
6/25/2016	1	3	meadowlark	675524.21	4544524.22
6/26/2016	1	1	meadowlark	675208.45	4544446.20

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
7/6/2016	1	1	meadowlark	675263.86	4544574.62
7/9/2016	2	1	meadowlark	675191.78	4544483.22
7/9/2016	2	1	meadowlark	675188.74	4544486.25
7/9/2016	2	2	meadowlark	675526.79	4544356.84
7/9/2016	2	2	meadowlark	675516.53	4544360.92
7/16/2016	1	1	meadowlark	675549.67	4544393.67
7/16/2016	2	2	meadowlark	675184.61	4544436.88
7/16/2016	2	2	meadowlark	675184.25	4544436.71
7/23/2016	6	1	meadowlark	675173.37	4544423.67
7/23/2016	6	1	meadowlark	675169.86	4544428.17
7/23/2016	6	1	meadowlark	675172.04	4544423.36
7/23/2016	6	1	meadowlark	675174.31	4544412.09
7/23/2016	6	1	meadowlark	675172.37	4544406.97
7/23/2016	6	1	meadowlark	675173.16	4544412.68
7/24/2016	1	1	meadowlark	675172.73	4544421.33
7/24/2016	5	2	meadowlark	675528.08	4544383.88
7/24/2016	5	2	meadowlark	675532.35	4544382.34
7/24/2016	5	2	meadowlark	675526.77	4544362.52
7/24/2016	5	2	meadowlark	675526.17	4544360.73
7/24/2016	5	2	meadowlark	675525.86	4544363.75
7/25/2016	2	1	meadowlark	675513.70	4544394.74
7/25/2016	2	1	meadowlark	675537.87	4544384.03
8/13/2016	1	3	meadowlark	675203.59	4544446.21
8/13/2016	1	3	meadowlark	675201.07	4544444.51
8/13/2016	1	3	meadowlark	675201.18	4544445.23
8/27/2016	1	1	meadowlark	675198.74	4544447.07
8/27/2016	2	101	meadowlark	675274.81	4544585.41
8/27/2016	2	101	meadowlark	675276.04	4544584.23
8/29/2016	1	1	meadowlark	675191.82	4544747.40
9/17/2016	1	1	meadowlark	675530.11	4544527.44
9/17/2016	2	2	meadowlark	675243.10	4544561.85
9/17/2016	2	2	meadowlark	675242.47	4544558.88
9/24/2016	1	1	meadowlark	675472.97	4544342.68
10/5/2016	1	1	meadowlark	675540.42	4544376.60
10/16/2016	3	1	meadowlark	675550.66	4544404.49
10/16/2016	NA	NA	meadowlark	675554.87	4544396.18
10/16/2016	3	1	meadowlark	675555.11	4544395.96
10/16/2016	3	1	meadowlark	675555.35	4544395.65
10/25/2016	1	1	meadowlark	675514.86	4544459.63
4/3/2016	1	1	wildwood	681428.16	4544721.01
4/3/2016	1	2	wildwood	681760.66	4544717.91
4/3/2016	1	3	wildwood	681763.04	4544701.09
4/3/2016	1	4	wildwood	681708.72	4545262.86
4/3/2016	4	101	wildwood	681253.88	4544723.43
4/3/2016	4	101	wildwood	681253.44	4544723.69
4/3/2016	4	101	wildwood	681253.33	4544723.66
4/3/2016	4	101	wildwood	681253.32	4544723.77
4/3/2016	2	102	wildwood	681290.15	4544747.79
4/3/2016	2	102	wildwood	681291.45	4544747.82
4/3/2016	1	105	wildwood	681330.50	4544735.66
4/3/2016	2	106	wildwood	681461.61	4544712.55
4/3/2016	2	106	wildwood	681423.83	4544616.84
4/3/2016	2	110	wildwood	681689.92	4545079.48
4/3/2016	2	110	wildwood	681691.36	4545075.46
4/3/2016	1	111	wildwood	681707.37	4545265.02
4/3/2016	2	112	wildwood	681605.45	4545454.45
4/3/2016	2	112	wildwood	681603.47	4545499.41
4/9/2016	2	1	wildwood	681672.35	4545206.02
4/9/2016	2	1	wildwood	681671.86	4545200.18
4/9/2016	3	101	wildwood	681221.75	4544725.68
4/9/2016	3	101	wildwood	681214.54	4544739.66
4/9/2016	3	101	wildwood	681239.29	4544690.03

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
4/9/2016	2	202	wildwood	681666.13	4545167.63
4/9/2016	2	202	wildwood	681664.14	4545168.63
4/10/2016	2	1	wildwood	681268.20	4544832.85
4/10/2016	2	1	wildwood	681269.16	4544833.87
4/10/2016	1	2	wildwood	681250.52	4544692.90
4/10/2016	2	3	wildwood	681164.20	4544788.24
4/10/2016	2	3	wildwood	681172.50	4544784.01
4/10/2016	1	4	wildwood	681201.92	4544798.82
4/10/2016	2	5	wildwood	681224.64	4544743.81
4/10/2016	2	5	wildwood	681237.41	4544734.11
4/10/2016	2	10	wildwood	681645.73	4545219.42
4/10/2016	2	10	wildwood	681648.31	4545218.81
4/10/2016	1	11	wildwood	681684.86	4545084.00
4/10/2016	2	101	wildwood	681196.25	4544875.57
4/10/2016	2	101	wildwood	681199.52	4544878.43
4/10/2016	1	102	wildwood	681258.04	4544828.66
4/10/2016	1	103	wildwood	681213.03	4544728.51
4/10/2016	3	105	wildwood	681251.99	4544728.50
4/10/2016	3	105	wildwood	681250.64	4544727.15
4/10/2016	3	105	wildwood	681250.10	4544726.81
4/10/2016	2	106	wildwood	681177.34	4544787.92
4/10/2016	2	106	wildwood	681177.18	4544787.91
4/10/2016	2	107	wildwood	681139.10	4544827.83
4/10/2016	2	107	wildwood	681138.56	4544829.53
4/10/2016	1	120	wildwood	681259.79	4544829.45
4/10/2016	1	121	wildwood	681269.01	4544838.04
4/10/2016	2	130	wildwood	681815.95	4545106.60
4/10/2016	2	130	wildwood	681815.32	4545107.51
4/10/2016	2	131	wildwood	681690.94	4545073.83
4/10/2016	2	131	wildwood	681688.10	4545075.43
4/10/2016	1	132	wildwood	681774.88	4545140.03
4/10/2016	1	133	wildwood	681736.78	4545129.50
4/10/2016	1	135	wildwood	681724.14	4545176.87
4/10/2016	2	136	wildwood	681727.51	4545238.30
4/10/2016	2	136	wildwood	681705.06	4545267.88
4/11/2016	2	1	wildwood	681230.29	4544743.21
4/11/2016	2	1	wildwood	681230.28	4544743.10
4/11/2016	1	101	wildwood	681166.76	4544647.17
4/14/2016	1	1	wildwood	681647.66	4545218.95
4/14/2016	2	2	wildwood	681643.15	4545210.83
4/14/2016	2	2	wildwood	681644.66	4545209.99
4/14/2016	1	101	wildwood	681206.01	4544638.53
4/14/2016	2	102	wildwood	681228.28	4544743.68
4/14/2016	2	102	wildwood	681229.87	4544742.26
4/14/2016	2	105	wildwood	681621.22	4544881.63
4/14/2016	2	110	wildwood	681728.13	4544718.79
4/14/2016	2	110	wildwood	681737.36	4544730.18
4/14/2016	1	111	wildwood	681760.05	4544750.19
4/14/2016	1	112	wildwood	681705.31	4545265.89
4/15/2016	2	1	wildwood	681225.63	4544642.18
4/15/2016	2	1	wildwood	681224.71	4544644.13
4/15/2016	2	2	wildwood	681431.59	4544706.31
4/15/2016	2	2	wildwood	681382.19	4544708.99
4/15/2016	1	101	wildwood	681666.90	4544683.39
4/22/2016	1	1	wildwood	681178.82	4544650.09
4/22/2016	1	2	wildwood	681244.27	4544738.78
4/22/2016	1	3	wildwood	681317.65	4544730.80
4/22/2016	1	4	wildwood	681304.45	4544704.78
4/22/2016	2	5	wildwood	681686.09	4545109.73
4/22/2016	2	5	wildwood	681684.27	4545113.28
4/22/2016	1	6	wildwood	681661.37	4545218.78
4/22/2016	2	7	wildwood	681680.60	4545296.01

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
4/22/2016	2	7	wildwood	681701.97	4545272.11
4/22/2016	1	101	wildwood	681766.10	4545136.77
4/23/2016	1	1	wildwood	681213.59	4544757.74
4/23/2016	1	2	wildwood	681324.01	4544770.77
4/23/2016	2	3	wildwood	681889.50	4544997.34
4/23/2016	2	3	wildwood	681898.41	4544996.90
4/23/2016	1	5	wildwood	681712.71	4545255.54
4/23/2016	1	101	wildwood	681221.31	4544756.27
4/23/2016	2	102	wildwood	681218.88	4544755.47
4/23/2016	2	102	wildwood	681218.91	4544755.30
4/23/2016	1	103	wildwood	681224.23	4544800.99
4/23/2016	2	104	wildwood	681301.82	4544754.67
4/23/2016	2	104	wildwood	681302.28	4544753.79
4/23/2016	2	105	wildwood	681224.60	4544741.08
4/23/2016	2	105	wildwood	681225.40	4544739.89
4/23/2016	2	106	wildwood	681232.07	4544741.83
4/23/2016	2	106	wildwood	681232.19	4544742.53
4/23/2016	2	107	wildwood	681720.12	4545210.41
4/23/2016	2	107	wildwood	681720.06	4545210.22
4/24/2016	1	1	wildwood	681242.86	4544729.67
4/24/2016	1	2	wildwood	681216.59	4544753.57
4/24/2016	2	5	wildwood	681667.99	4545222.92
4/24/2016	2	5	wildwood	681666.60	4545222.22
4/24/2016	1	101	wildwood	681485.77	4544740.27
4/27/2016	2	1	wildwood	681660.19	4544729.05
4/27/2016	2	1	wildwood	681656.86	4544722.36
4/27/2016	2	2	wildwood	681720.03	4544784.13
4/27/2016	2	2	wildwood	681719.27	4544785.47
4/27/2016	1	3	wildwood	681676.76	4545153.55
4/27/2016	1	101	wildwood	681323.71	4544767.92
4/27/2016	3	102	wildwood	681666.90	4545221.89
4/27/2016	3	102	wildwood	681668.27	4545209.87
4/27/2016	3	102	wildwood	681665.77	4545222.59
5/3/2016	1	1	wildwood	681600.87	4545485.16
5/3/2016	3	2	wildwood	681620.88	4545208.15
5/3/2016	3	2	wildwood	681620.47	4545200.13
5/3/2016	3	2	wildwood	681618.81	4545206.07
5/3/2016	2	3	wildwood	681621.15	4545210.17
5/3/2016	2	3	wildwood	681621.01	4545205.16
5/3/2016	2	4	wildwood	681620.49	4545209.14
5/3/2016	2	4	wildwood	681621.86	4545210.20
5/7/2016	1	1	wildwood	681192.65	4544643.45
5/7/2016	2	2	wildwood	681364.22	4544756.66
5/7/2016	2	2	wildwood	681364.81	4544757.71
5/7/2016	3	3	wildwood	681844.89	4544991.42
5/7/2016	3	3	wildwood	681848.04	4544989.68
5/7/2016	3	3	wildwood	681848.53	4544990.55
5/7/2016	3	4	wildwood	681631.72	4545056.72
5/7/2016	3	4	wildwood	681631.45	4545058.74
5/7/2016	3	4	wildwood	681634.92	4545057.16
5/7/2016	1	5	wildwood	681706.66	4545119.34
5/7/2016	2	6	wildwood	681602.02	4545083.00
5/7/2016	2	6	wildwood	681600.06	4545085.61
5/7/2016	2	10	wildwood	681672.17	4545199.37
5/7/2016	2	10	wildwood	681672.05	4545199.81
5/7/2016	1	11	wildwood	681689.51	4545240.16
5/7/2016	2	101	wildwood	681239.46	4544747.94
5/7/2016	1	102	wildwood	681198.03	4544797.28
5/7/2016	2	103	wildwood	681678.66	4545301.58
5/7/2016	3	104	wildwood	681637.98	4545339.56
5/7/2016	2	105	wildwood	681616.80	4545389.10
5/7/2016	2	105	wildwood	681613.57	4545400.38

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
5/7/2016	2	105	wildwood	681612.29	4545408.44
5/7/2016	3	104	wildwood	681627.70	4545353.91
5/7/2016	3	104	wildwood	681632.24	4545345.69
5/7/2016	3	104	wildwood	681635.27	4545342.30
5/7/2016	2	103	wildwood	681675.23	4545305.86
5/8/2016	4	1	wildwood	681167.97	4544783.81
5/8/2016	4	1	wildwood	681181.67	4544788.22
5/8/2016	4	1	wildwood	681208.86	4544751.13
5/8/2016	4	1	wildwood	681231.30	4544741.14
5/8/2016	4	2	wildwood	681401.06	4544693.42
5/8/2016	4	2	wildwood	681421.25	4544694.46
5/8/2016	4	2	wildwood	681406.93	4544697.11
5/8/2016	4	2	wildwood	681406.98	4544696.23
5/8/2016	2	3	wildwood	681648.98	4544605.65
5/8/2016	2	3	wildwood	681645.95	4544605.94
5/8/2016	2	4	wildwood	681673.10	4545196.40
5/8/2016	2	4	wildwood	681673.75	4545197.27
5/8/2016	2	5	wildwood	681680.16	4545302.73
5/8/2016	2	5	wildwood	681675.92	4545304.78
5/8/2016	3	6	wildwood	681708.05	4545266.19
5/8/2016	3	6	wildwood	681708.35	4545265.68
5/8/2016	3	6	wildwood	681708.34	4545265.60
5/14/2016	1	1	wildwood	681153.31	4544733.16
5/14/2016	5	2	wildwood	681156.86	4544729.33
5/14/2016	5	2	wildwood	681156.04	4544729.19
5/14/2016	5	2	wildwood	681156.66	4544729.62
5/14/2016	5	2	wildwood	681156.25	4544728.61
5/14/2016	5	2	wildwood	681156.35	4544728.76
5/14/2016	2	3	wildwood	681842.23	4544994.54
5/14/2016	2	3	wildwood	681844.25	4544995.77
5/14/2016	2	4	wildwood	681727.44	4545002.14
5/14/2016	2	4	wildwood	681727.42	4545002.13
5/14/2016	2	5	wildwood	681773.13	4545103.41
5/14/2016	2	5	wildwood	681772.66	4545102.79
5/14/2016	2	4	wildwood	681703.54	4545086.54
5/14/2016	2	4	wildwood	681702.79	4545085.86
5/14/2016	1	6	wildwood	681675.85	4545104.35
5/14/2016	1	7	wildwood	681711.50	4545114.40
5/14/2016	2	8	wildwood	681419.73	4544844.29
5/14/2016	2	8	wildwood	681418.88	4544845.21
5/14/2016	2	9	wildwood	681705.63	4545267.12
5/14/2016	2	9	wildwood	681703.51	4545269.69
5/15/2016	4	1	wildwood	681357.45	4544767.61
5/15/2016	4	1	wildwood	681359.84	4544771.40
5/15/2016	4	1	wildwood	681360.08	4544768.80
5/15/2016	4	1	wildwood	681340.46	4544769.72
5/15/2016	4	1	wildwood	681356.49	4544773.71
5/15/2016	4	1	wildwood	681362.78	4544775.18
5/15/2016	4	1	wildwood	681381.75	4544926.37
5/15/2016	4	1	wildwood	681384.54	4544929.89
5/15/2016	4	1	wildwood	681379.27	4544919.83
5/15/2016	4	1	wildwood	681381.47	4544919.76
5/15/2016	2	3	wildwood	681171.96	4544819.79
5/15/2016	2	3	wildwood	681170.44	4544818.42
5/15/2016	2	4	wildwood	681721.29	4544710.16
5/15/2016	2	4	wildwood	681717.32	4544709.42
5/15/2016	1	5	wildwood	681855.27	4544985.87
5/15/2016	1	6	wildwood	681768.93	4545105.33
5/15/2016	3	7	wildwood	681671.40	4545223.92
5/15/2016	3	7	wildwood	681672.63	4545219.74
5/15/2016	3	7	wildwood	681672.60	4545219.14
5/15/2016	2	8	wildwood	681671.83	4545206.43

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
5/15/2016	2	8	wildwood	681673.32	4545205.08
5/15/2016	1	9	wildwood	681705.44	4545267.65
5/15/2016	1	10	wildwood	681687.70	4545289.28
5/19/2016	1	1	wildwood	681315.75	4544772.19
5/19/2016	1	2	wildwood	681194.85	4544795.13
5/19/2016	2	3	wildwood	681221.73	4544752.16
5/19/2016	2	3	wildwood	681229.45	4544739.55
5/19/2016	1	4	wildwood	681866.00	4544988.67
5/19/2016	2	5	wildwood	681668.22	4545221.16
5/19/2016	2	5	wildwood	681666.33	4545221.22
5/29/2016	1	1	wildwood	681246.63	4544747.45
5/29/2016	2	2	wildwood	681301.94	4544759.24
5/29/2016	2	2	wildwood	681302.21	4544759.69
5/29/2016	3	1	wildwood	681317.52	4544767.19
5/29/2016	2	4	wildwood	681187.23	4544802.86
5/29/2016	2	4	wildwood	681187.53	4544802.95
5/29/2016	2	4	wildwood	681187.47	4544803.04
5/29/2016	1	5	wildwood	681351.17	4544764.10
5/29/2016	4	6	wildwood	681772.21	4544653.28
5/29/2016	4	6	wildwood	681768.79	4544654.85
5/29/2016	4	6	wildwood	681770.32	4544647.98
5/29/2016	4	6	wildwood	681778.20	4544629.89
5/29/2016	2	7	wildwood	681436.47	4544717.60
5/29/2016	2	7	wildwood	681469.35	4544708.12
5/29/2016	2	8	wildwood	681869.97	4544984.25
5/29/2016	2	8	wildwood	681870.49	4544983.83
5/29/2016	2	9	wildwood	681691.52	4545074.88
5/29/2016	2	9	wildwood	681692.01	4545073.67
5/29/2016	2	10	wildwood	681679.31	4545301.87
5/29/2016	2	10	wildwood	681675.53	4545306.11
5/29/2016	4	11	wildwood	681640.27	4545337.80

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
5/29/2016	4	11	wildwood	681634.98	4545342.55
5/29/2016	4	11	wildwood	681632.10	4545345.72
5/29/2016	4	11	wildwood	681630.51	4545348.52
5/29/2016	4	12	wildwood	681615.31	4545395.61
5/29/2016	4	12	wildwood	681613.07	4545402.71
5/29/2016	4	12	wildwood	681613.00	4545406.74
5/29/2016	4	12	wildwood	681612.56	4545409.05
5/29/2016	1	13	wildwood	681593.85	4545489.65
5/29/2016	2	14	wildwood	681704.20	4545276.91
5/29/2016	2	14	wildwood	681704.80	4545276.54
5/29/2016	3	15	wildwood	681648.29	4545229.09
5/29/2016	3	15	wildwood	681650.07	4545228.63
5/29/2016	3	15	wildwood	681649.05	4545228.64
5/29/2016	2	16	wildwood	681684.77	4545243.00
5/29/2016	2	16	wildwood	681684.00	4545242.62
6/2/2016	3	1	wildwood	681861.18	4544988.99
6/2/2016	3	1	wildwood	681863.21	4544986.96
6/2/2016	3	1	wildwood	681861.97	4544987.52
6/2/2016	1	2	wildwood	681694.88	4545139.09
6/5/2016	5	1	wildwood	681382.11	4544935.81
6/5/2016	5	1	wildwood	681379.13	4544927.71
6/5/2016	5	1	wildwood	681378.12	4544923.89
6/5/2016	5	1	wildwood	681380.05	4544928.17
6/5/2016	5	1	wildwood	681380.88	4544932.82
6/5/2016	2	2	wildwood	681195.47	4544803.63
6/5/2016	2	2	wildwood	681194.31	4544805.50
6/5/2016	1	3	wildwood	681319.26	4544768.84
6/5/2016	3	4	wildwood	681226.08	4544719.35
6/5/2016	3	4	wildwood	681226.44	4544714.96
6/5/2016	3	4	wildwood	681226.28	4544715.25
6/5/2016	1	5	wildwood	681867.99	4544985.40

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
6/5/2016	2	6	wildwood	681661.19	4544692.73
6/5/2016	2	6	wildwood	681661.46	4544692.55
6/5/2016	3	7	wildwood	681700.33	4545274.36
6/5/2016	3	7	wildwood	681704.31	4545268.48
6/5/2016	3	7	wildwood	681706.70	4545265.74
6/5/2016	2	8	wildwood	681684.37	4545063.81
6/5/2016	2	8	wildwood	681683.98	4545063.39
6/12/2016	1	1	wildwood	681442.64	4544725.01
6/15/2016	2	1	wildwood	681234.77	4544731.45
6/15/2016	2	1	wildwood	681236.51	4544730.65
6/15/2016	1	101	wildwood	681684.65	4545298.41
6/18/2016	2	1	wildwood	681518.63	4544654.03
6/18/2016	2	1	wildwood	681519.79	4544653.17
6/18/2016	1	2	wildwood	681679.95	4545147.19
6/18/2016	2	3	wildwood	681670.27	4545202.78
6/18/2016	2	3	wildwood	681669.60	4545203.27
6/18/2016	3	4	wildwood	681669.68	4545203.33
6/18/2016	3	4	wildwood	681669.75	4545203.39
6/18/2016	2	101	wildwood	681670.97	4545222.28
6/18/2016	2	101	wildwood	681669.94	4545222.44
6/18/2016	1	102	wildwood	681677.17	4545100.57
6/20/2016	1	1	wildwood	681759.95	4545106.38
6/24/2016	1	1	wildwood	681320.86	4544771.93
6/24/2016	2	2	wildwood	681667.86	4545137.19
6/24/2016	2	2	wildwood	681668.13	4545137.29
6/24/2016	1	3	wildwood	681666.17	4545210.24
6/25/2016	1	1	wildwood	681220.66	4544754.41
6/25/2016	1	2	wildwood	681185.75	4544797.64
6/25/2016	1	3	wildwood	681209.38	4544784.54
6/25/2016	2	4	wildwood	681243.16	4544745.03
6/25/2016	2	4	wildwood	681244.14	4544745.88

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
6/25/2016	6	5	wildwood	681224.69	4544735.59
6/25/2016	6	5	wildwood	681225.49	4544733.84
6/25/2016	6	5	wildwood	681225.63	4544732.23
6/25/2016	6	5	wildwood	681226.40	4544731.07
6/25/2016	6	5	wildwood	681226.49	4544731.03
6/25/2016	6	5	wildwood	681226.54	4544730.89
6/25/2016	2	6	wildwood	681356.84	4544760.34
6/25/2016	2	6	wildwood	681357.18	4544761.10
6/25/2016	3	7	wildwood	681695.15	4545066.15
6/25/2016	3	7	wildwood	681693.60	4545066.38
6/25/2016	3	7	wildwood	681695.75	4545066.30
6/25/2016	1	8	wildwood	681672.25	4545140.99
6/26/2016	3	1	wildwood	681215.49	4544763.63
6/26/2016	3	1	wildwood	681218.73	4544757.40
6/26/2016	3	1	wildwood	681193.78	4544795.42
6/26/2016	2	2	wildwood	681226.33	4544741.78
6/26/2016	2	2	wildwood	681226.40	4544741.63
6/26/2016	1	3	wildwood	681426.04	4544725.00
6/28/2016	1	1	wildwood	681191.32	4544800.62
6/28/2016	2	2	wildwood	681230.89	4544736.54
6/28/2016	2	2	wildwood	681231.72	4544732.42
6/28/2016	2	3	wildwood	681382.37	4544709.39
6/28/2016	2	3	wildwood	681378.86	4544708.95
6/28/2016	3	4	wildwood	681700.86	4545060.83
6/28/2016	3	4	wildwood	681701.36	4545059.76
6/28/2016	3	4	wildwood	681702.14	4545083.88
7/6/2016	1	1	wildwood	681228.93	4544732.14
7/6/2016	4	2	wildwood	681669.47	4545203.55
7/6/2016	4	2	wildwood	681669.65	4545203.96
7/6/2016	4	2	wildwood	681669.59	4545204.05
7/6/2016	4	2	wildwood	681669.07	4545203.26

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
7/6/2016	4	3	wildwood	681757.05	4545127.97
7/6/2016	4	3	wildwood	681764.97	4545104.17
7/6/2016	4	3	wildwood	681756.37	4545126.79
7/6/2016	4	3	wildwood	681762.96	4545105.74
7/9/2016	1	1	wildwood	681602.73	4545402.71
7/16/2016	1	1	wildwood	681395.72	4544901.32
7/16/2016	1	2	wildwood	681119.04	4544787.04
7/16/2016	1	2	wildwood	681298.51	4544740.03
7/16/2016	2	3	wildwood	681299.82	4544818.43
7/16/2016	2	3	wildwood	681299.48	4544818.84
7/16/2016	2	4	wildwood	681674.80	4545306.81
7/16/2016	2	4	wildwood	681676.53	4545304.35
7/16/2016	2	5	wildwood	681676.38	4545196.18
7/16/2016	2	5	wildwood	681676.25	4545196.45
7/16/2016	1	6	wildwood	681722.03	4545110.66
7/16/2016	2	101	wildwood	681218.39	4544761.57
7/16/2016	2	101	wildwood	681218.46	4544761.40
7/16/2016	1	102	wildwood	681208.85	4544621.32
7/16/2016	2	103	wildwood	681428.18	4544688.54
7/16/2016	2	103	wildwood	681427.52	4544686.32
7/22/2016	1	1	wildwood	681773.16	4544490.56
7/22/2016	1	1	wildwood	681684.49	4544640.31
7/23/2016	3	1	wildwood	681231.98	4544725.71
7/23/2016	3	1	wildwood	681231.80	4544725.83
7/23/2016	3	1	wildwood	681231.40	4544725.28
7/24/2016	2	1	wildwood	681679.25	4545192.53
7/24/2016	2	1	wildwood	681679.14	4545192.74
7/25/2016	1	1	wildwood	681326.21	4544767.70
8/13/2016	1	1	wildwood	681319.84	4544763.39
8/13/2016	2	2	wildwood	681764.73	4545112.24
8/13/2016	2	2	wildwood	681764.22	4545112.19

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
8/13/2016	1	3	wildwood	681714.21	4545104.00
8/13/2016	2	4	wildwood	681848.58	4545030.89
8/13/2016	2	4	wildwood	681849.45	4545032.06
8/13/2016	2	101	wildwood	681641.60	4545335.50
8/13/2016	2	101	wildwood	681633.97	4545344.02
8/13/2016	2	102	wildwood	681666.47	4545219.02
8/13/2016	2	102	wildwood	681667.44	4545219.41
8/14/2016	1	1	wildwood	681320.14	4544764.07
8/14/2016	3	2	wildwood	681668.70	4545205.34
8/14/2016	3	2	wildwood	681668.70	4545205.34
8/14/2016	3	2	wildwood	681668.57	4545205.12
8/15/2016	2	1	wildwood	681628.85	4545350.66
8/15/2016	2	1	wildwood	681628.77	4545350.86
8/15/2016	2	2	wildwood	681665.05	4545221.72
8/15/2016	2	2	wildwood	681664.59	4545221.77
8/15/2016	1	11	wildwood	681696.83	4545084.24
8/18/2016	1	1	wildwood	681424.20	4544729.26
8/18/2016	2	2	wildwood	681326.76	4544767.20
8/18/2016	2	2	wildwood	681327.05	4544767.64
8/18/2016	1	3	wildwood	681670.46	4545206.19
8/18/2016	2	101	wildwood	681676.48	4545138.32
8/18/2016	2	101	wildwood	681675.34	4545137.66
8/18/2016	1	102	wildwood	681670.82	4545205.47
8/19/2016	1	1	wildwood	681323.03	4544767.94
8/27/2016	2	1	wildwood	681318.40	4544768.06
8/27/2016	2	1	wildwood	681318.80	4544768.15
8/27/2016	3	2	wildwood	681695.16	4545063.34
8/27/2016	3	2	wildwood	681699.21	4545086.40
8/27/2016	3	2	wildwood	681694.28	4545063.93
8/27/2016	2	101	wildwood	681763.31	4545109.99
8/27/2016	2	101	wildwood	681763.05	4545109.59

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
8/28/2016	3	1	wildwood	681631.59	4545352.52
8/28/2016	3	1	wildwood	681631.21	4545352.16
8/28/2016	3	1	wildwood	681631.37	4545352.45
8/28/2016	2	2	wildwood	681662.71	4545214.16
8/28/2016	2	2	wildwood	681664.71	4545214.14
8/28/2016	2	3	wildwood	681718.05	4545104.71
8/28/2016	2	3	wildwood	681720.69	4545103.97
8/29/2016	1	1	wildwood	681325.40	4544770.56
8/29/2016	2	2	wildwood	681699.89	4545083.94
8/29/2016	2	2	wildwood	681699.66	4545084.18
8/31/2016	2	1	wildwood	681666.64	4545224.85
8/31/2016	2	1	wildwood	681668.16	4545224.49
8/31/2016	3	2	wildwood	681670.33	4545112.67
8/31/2016	3	2	wildwood	681670.75	4545111.41
8/31/2016	3	2	wildwood	681680.20	4545094.32
9/4/2016	1	1	wildwood	681223.88	4544752.11
9/6/2016	3	1	wildwood	681668.52	4545213.95
9/6/2016	3	1	wildwood	681667.09	4545213.56
9/6/2016	3	1	wildwood	681668.28	4545213.89
9/6/2016	1	2	wildwood	681325.78	4544772.37
9/10/2016	1	1	wildwood	681324.18	4544772.52
9/10/2016	1	2	wildwood	681867.06	4544984.24
9/17/2016	1	1	wildwood	681436.20	4544713.67
9/18/2016	2	1	wildwood	681662.74	4544717.15
9/18/2016	2	1	wildwood	681662.85	4544718.16
9/18/2016	2	2	wildwood	681394.19	4544722.85
9/18/2016	2	2	wildwood	681394.25	4544723.52
9/18/2016	2	3	wildwood	681325.80	4544772.70
9/18/2016	2	3	wildwood	681326.50	4544773.18
9/18/2016	2	4	wildwood	681644.89	4545382.95
9/18/2016	2	4	wildwood	681643.63	4545383.40

DATE	Psize	P.ID	waterbody	coords.x1	coords.x2
9/20/2016	1	1	wildwood	681330.55	4544773.99
9/22/2016	1	1	wildwood	681736.73	4545107.37
9/24/2016	2	1	wildwood	681675.86	4545220.34
9/24/2016	2	1	wildwood	681675.27	4545221.72
9/24/2016	2	2	wildwood	681674.94	4545219.82
9/24/2016	2	2	wildwood	681675.33	4545221.53
9/24/2016	2	3	wildwood	681461.69	4544716.97
9/24/2016	2	3	wildwood	681463.21	4544717.80
10/2/2016	3	1	wildwood	681342.77	4545040.00
10/2/2016	3	1	wildwood	681344.97	4545041.06
10/2/2016	3	1	wildwood	681341.54	4545039.78
10/2/2016	2	2	wildwood	681361.38	4544760.09
10/2/2016	2	2	wildwood	681361.11	4544758.77
10/2/2016	1	3	wildwood	681686.70	4545206.94
10/2/2016	1	4	wildwood	681687.04	4545207.17
10/2/2016	2	5	wildwood	681690.75	4545287.21
10/2/2016	2	5	wildwood	681692.00	4545284.16
10/5/2016	2	1	wildwood	681654.86	4545207.10
10/5/2016	2	1	wildwood	681655.39	4545207.68
10/11/2016	2	1	wildwood	681383.38	4544742.62
10/11/2016	2	1	wildwood	681383.59	4544742.47
10/25/2016	2	1	wildwood	681227.67	4544732.68
10/25/2016	2	1	wildwood	681235.50	4544733.65
10/25/2016	2	2	wildwood	681358.52	4544756.42
10/25/2016	2	2	wildwood	681358.52	4544756.42

Appendix 3-A. Survey responses from observed anglers.

date	start.time	end.time	duaration	interview.id	uid	waterbody	spp.1	spp.2
7/26/2016	10:54:32	10:58:07	3.58	6	0726-6	Halleck	360	
7/26/2016	10:41:52	10:43:36	1.73	10	0726-10	Halleck	360	
7/28/2016	9:38:39	9:41:03	2.4	1	0728-1	Halleck	770	
7/26/2016	8:06:19	8:10:02	3.72	2	0726-2	Halleck	770	
7/30/2016	10:50:03	10:52:01	1.97	5	0730-5	Bowling	999	
7/30/2016	11:12:39	11:14:26	1.78	6	0730-6	Bowling	999	
7/30/2016	10:40:41	10:43:06	2.42	1	0730-1	Bowling	360	
7/26/2016	8:03:27	8:05:12	1.75	1	0726-1	Halleck	770	
7/26/2016	10:02:11	10:04:51	2.67	4	0726-4	Halleck	360	
7/26/2016	9:27:56	9:33:42	5.77	7	0726-7	Halleck	770	
8/3/2016	8:21:10	8:23:20	2.17	1	0803-1	Halleck	770	
8/3/2016	10:55:44	10:59:13	3.48	3	0803-3	Halleck	360	
8/3/2016	10:46:18	10:47:46	1.47	5	0803-5	Halleck	770	
8/3/2016	9:08:37	9:10:24	1.78	2	0803-2	Halleck	360	
8/6/2016	19:38:03	19:40:11	2.13	3	0806-3	Bowling	360	
8/6/2016	18:25:44	18:27:44	2	2	0806-2	Bowling	770	
8/6/2016	19:04:37	19:06:25	1.8	4	0806-4	Bowling	770	
8/6/2016	20:05:16	20:08:30	3.23	5	0806-5	Bowling	770	
8/6/2016	16:36:03	16:37:44	1.68	1	0806-1	Bowling	999	
8/11/2016	18:53:23	18:55:54	2.52	1	0811-1	Halleck	770	
8/11/2016	19:34:58	19:36:11	1.22	2	0811-2	Bowling	770	
8/19/2016	15:38:38	15:41:55	3.28	1	0819-1	Bowling	770	
8/20/2016	11:02:44	11:05:24	2.67	1	0820-1	Halleck	770	
8/20/2016	13:02:39	13:06:23	3.73	5	0820-5	Bowling	999	
8/20/2016	12:35:53	12:39:08	3.25	2	0820-2	Halleck	360	
9/9/2016	20:33:42	20:40:40	6.97	2	0909-2	Bowling	730	
9/10/2016	18:48:20	18:51:45	3.42	1	0910-1	Bowling	770	
9/3/2016	12:30:59	12:34:14	3.25	5	0903-5	Bowling	360	
9/9/2016	19:35:23	19:39:07	3.73	1	0909-1	Bowling	999	
9/3/2016	11:16:37	11:18:27	1.83	2	0903-2	Halleck	360	
9/2/2016	17:30:12	17:32:03	1.85	2	0902-2	Bowling	360	
9/10/2016	20:19:20	20:22:04	2.73	3	0910-3	Bowling	360	
9/10/2016	19:20:23	19:26:09	5.77	2	0910-2	Bowling	770	
9/2/2016	20:04:31	20:06:32	2.02	7	0902-7	Bowling	770	
9/3/2016	10:41:16	10:45:52	4.6	2	0903-2	Halleck	999	
9/12/2016	18:22:31	18:23:59	1.47	1	0912-1	Bowling	999	
9/11/2016	11:02:50	11:05:27	2.62	2	0911-2	Bowling	360	
9/14/2016	18:31:24	18:35:27	4.05	3	0914-3	Halleck	770	
9/14/2016	18:14:49	18:19:19	4.5	1	0914-1	Halleck	770	
9/12/2016	19:50:56	19:57:18	6.37	5	0912-5	Bowling	770	
9/14/2016	18:21:21	18:24:26	3.08	2	0914-2	Halleck	770	
9/12/2016	19:19:12	19:21:51	2.65	4	0912-4	Bowling	999	
9/12/2016	18:10:09	18:12:06	1.95	3	0912-3	Bowling	770	

9/18/2016	11:20:15	11:22:16	2.02	8	0918-8	Halleck	360	

date	start.time	end.time	duaration	interview.id	uid	waterbody	spp.1	spp.2
9/16/2016	20:01:36	20:06:09	4.55	5	0916-5	Bowling	360	
9/16/2016	20:08:58	20:11:00	2.03	2	0916-2	Bowling	770	
9/16/2016	20:15:20	20:18:29	3.15	3	0916-3	Bowling	770	
9/16/2016	18:58:00	19:00:54	2.9	4	0916-4	Bowling	770	
9/18/2016	9:46:11	10:59:26	73.25	6	0918-6	Halleck	730	
9/16/2016	20:20:22	20:20:39	0.28	5	0916-5	Bowling	360	
9/18/2016	11:13:07	11:16:14	3.12	2	0918-2	Halleck	360	
9/18/2016	9:42:31	9:45:27	2.93	1	0918-1	Halleck	360	
9/20/2016	19:11:10	19:12:59	1.82	1	0920-1	Bowling	730	
9/22/2016	19:34:09	19:39:14	5.08	2	0922-2	Bowling	360	
9/22/2016	17:20:33	17:22:55	2.37	1	0922-1	Bowling	770	
9/22/2016	19:42:08	19:46:04	3.93	3	0922-3	Bowling	360	
9/28/2016	18:34:54	18:36:23	1.48	3	0928-3	Halleck	770	
9/28/2016	18:37:40	18:39:26	1.77	2	0928-2	Bowling	770	
9/28/2016	17:54:12	17:55:59	1.78	1	0928-1	Bowling	360	
9/29/2016	18:43:42	18:47:39	3.95	3	0929-3	Bowling	770	
9/29/2016	19:50:39	19:52:37	1.97	1	0929-1	Bowling	360	
9/29/2016	18:38:18	18:41:16	2.97	4	0929-4	Bowling	770	
9/29/2016	20:03:08	20:05:27	2.32	5	0929-5	Bowling	360	
9/30/2016	19:49:04	19:51:03	1.98	1	0930-1	Bowling	785	
10/3/2016	19:00:32	19:03:31	2.98	1	1003-1	Bowling	770	
9/30/2016	19:25:52	19:30:47	4.92	3	0930-3	Bowling	770	
9/30/2016	19:42:15	19:43:39	1.4	4	0930-4	Bowling	770	
10/5/2016	19:15:20	19:17:22	2.03	6	1005-6	Halleck	770	
10/5/2016	20:01:36	20:03:30	1.9	7	1005-7	Halleck	770	
10/5/2016	18:54:22	18:57:04	2.7	2	1005-2	Halleck	770	
10/8/2016	10:15:44	10:18:15	2.52	1	1008-1	Halleck	770	
10/9/2016	19:22:09	19:24:38	2.48	3	1009-3	Bowling	770	
10/9/2016	19:42:43	19:44:08	1.42	5	1009-5	Bowling	999	
10/9/2016	17:52:26	17:54:38	2.2	2	1009-2	Bowling	730	
10/13/2016	17:55:33	17:57:56	2.38	6	1013-6	Bowling	Other	520
10/13/2016	17:07:34	17:10:32	2.97	1	1013-1	Bowling	650	

uid	angler.effect.1	angler.effect.2	start.choice
0726-6	No		Previous experience
0726-10	No		Near deep water
0728-1	No		Likes breakwaters
0726-2	No		
0730-5	No		Runs pump
0730-6	No		Close to car
0730-1	No		Past experiences
0726-1	No		
0726-4	No		Shade
0726-7	No		Previous experience
0803-1	No		Normal hot spot
0803-3	No		Past experiences
0803-5	No		Deeper closer to shore
0803-2	No		Cove
0806-3	No		People told me it was a good spot
0806-2	Yes	Didn't want to crowd people in our spots	People in spot
0806-4	No		Past experiences
0806-5	Yes	People in spot	Past experience
0806-1	No		Point with cove
0811-1	Yes	Too close	Most shade
0811-2	Yes	Avoided a spot where saw no fish caught	Cover
0819-1	No		Used to be a really good spot
0820-1	No		Wind
0820-5	No		No reason
0820-2	No		Past experiences
0909-2	No		Closer spot not crowded
0910-1	No		Other friends and good plant life
0903-5	No		Buddy picked site
0909-1	No		Go with the wind
0903-2	No		Buddy wanted to fish there
0902-2	No		Trying new spot
0910-3	No		Closeby
0910-2	No		No particular reason
0902-7	No		Looked good habitat
0903-2	No		Shade
0912-1	Yes	Spot taken	Spot taken
0911-2	No		Past experience
0914-3	No		Routine
0914-1	No		Close to car
0912-5	No		Past experience
0914-2	No		Cover
0912-4	No		Litter in my spot
0912-3	No		Close

uid	angler.effect.1	angler.effect.2	start.choice
0918-8	No		Previous experience
0916-5	No		Past experience
0916-2	No		Previous experience
0916-3	No		Past experiences
0916-4	No		Bridge
0918-6	No		Shade
0916-5	No		Past experiences
0918-2	No		Seen other people fish there
0918-1	No		Shade
0920-1	No		Father wanted to start there
0922-2	No		We have come here before and caught a big one
0922-1	No		Picked something close
0922-3	Yes	Lake is kinda dirty...	Usually fish here
0928-3	No		New area
0928-2	No		Previous experience
0928-1	No		New spot
0929-3	No		Wind blowing into me
0929-1	No		It's his honey hole
0929-4	Yes	People were in his favorite spot	Quickest spot to get to the water
0929-5	No		Close
0930-1	No		Point, breakwater
1003-1	No		Calm water
0930-3	No		Previous experience
0930-4	No		Buddy there
1005-6	No		Previous experience
1005-7	Yes	Few people in spots	Near parked car
1005-2	No		Past experience
1008-1	No		Previous experience
1009-3	No		Looked at a contour map
1009-5	No		Comes here a lot
1009-2	No		Fished here a lot
1013-6	No		Closest to the truck
1013-1	No		Wind at his back

uid	angler.specialization	angler.crowd.1	angler.crowd.2	angler.crowd.3
0726-6	code 2	Not at all crowded	Not at all crowded	Not at all crowded
0726-10	code 1	Not at all crowded	Not at all crowded	Not at all crowded
0728-1	code 3	Not at all crowded	Not at all crowded	Not at all crowded
0726-2	code 4	Not at all crowded	Not at all crowded	Not at all crowded
0730-5	code 3	Not at all crowded	Not at all crowded	Not at all crowded
0730-6	code 3	Not at all crowded	Not at all crowded	Not at all crowded
0730-1	code 2	Not at all crowded	Not at all crowded	Not at all crowded
0726-1	code 2	Not at all crowded	Not at all crowded	Not at all crowded
0726-4	code 1	Not at all crowded	A little crowded	Moderately crowded
0726-7	code 2	Not at all crowded	Not at all crowded	Not at all crowded
0803-1	code 4	Not at all crowded	Not at all crowded	A little crowded
0803-3	code 2	Not at all crowded	Not at all crowded	Not at all crowded
0803-5	code 2	Not at all crowded	Not at all crowded	Not at all crowded
0803-2	code 3	Not at all crowded	Not at all crowded	Not at all crowded
0806-3	code 1	Moderately crowded	Moderately crowded	Moderately crowded
0806-2	code 1	A little crowded	A little crowded	A little crowded
0806-4	code 3	Not at all crowded	Not at all crowded	Not at all crowded
0806-5	code 2	Moderately crowded	Moderately crowded	Not at all crowded
0806-1	code 1	Not at all crowded	Not at all crowded	Not at all crowded
0811-1	code 1	Not at all crowded	Not at all crowded	Not at all crowded
0811-2	code 1	Not at all crowded	Not at all crowded	Not at all crowded
0819-1	code 4	Not at all crowded	Not at all crowded	Not at all crowded
0820-1	code 3	A little crowded	A little crowded	A little crowded
0820-5	code 3	A little crowded	A little crowded	A little crowded
0820-2	code 2	Not at all crowded	Not at all crowded	Not at all crowded
0909-2	code 1	Crowded	Moderately crowded	A little crowded
0910-1	code 4	Not at all crowded	Not at all crowded	A little crowded
0903-5	code 1	Not at all crowded	Not at all crowded	Not at all crowded
0909-1	code 3	Moderately crowded	A little crowded	Crowded
0903-2	code 1	Not at all crowded	Moderately crowded	Crowded
0902-2	code 4			
0910-3	code 1	Not at all crowded	Not at all crowded	Not at all crowded
0910-2	code 4	Not at all crowded	Not at all crowded	Not at all crowded
0902-7	code 2	Not at all crowded	Not at all crowded	A little crowded
0903-2	code 3	Not at all crowded	A little crowded	A little crowded
0912-1	code 3	Moderately crowded	A little crowded	Not at all crowded
0911-2	code 2	Not at all crowded	Not at all crowded	Not at all crowded
0914-3	code 1	A little crowded	Not at all crowded	Not at all crowded
0914-1	code 1	Not at all crowded	A little crowded	A little crowded
0912-5	code 3	Not at all crowded	Not at all crowded	Not at all crowded
0914-2	code 2	Not at all crowded	A little crowded	Moderately crowded

uid	angler.specialization	angler.crowd.1	angler.crowd.2	angler.crowd.3
0912-4	code 2	Moderately crowded	Moderately crowded	
0912-3	code 3	Not at all crowded	Not at all crowded	Not at all crowded
0918-8	code 4	Moderately crowded	Moderately crowded	Moderately crowded
0916-5	code 4	A little crowded	A little crowded	A little crowded
0916-2	code 4	A little crowded	A little crowded	A little crowded
0916-3	code 4	A little crowded	A little crowded	Not at all crowded
0916-4	code 3	Not at all crowded	Not at all crowded	Not at all crowded
0918-6	code 3	Not at all crowded	A little crowded	Moderately crowded
0916-5	code 4	A little crowded	A little crowded	A little crowded
0918-2	code 1	A little crowded	A little crowded	A little crowded
0918-1		A little crowded	Moderately crowded	Moderately crowded
0920-1	code 3	Not at all crowded	Not at all crowded	Not at all crowded
0922-2	code 2	Crowded	Crowded	Crowded
0922-1	code 1	Not at all crowded	Not at all crowded	Not at all crowded
0922-3	code 2	Crowded	Not at all crowded	Moderately crowded
0928-3	code 3	Not at all crowded	Not at all crowded	Not at all crowded
0928-2	code 1	Not at all crowded	Not at all crowded	Not at all crowded
0928-1	code 3	Not at all crowded	Not at all crowded	Not at all crowded
0929-3	code 4	Not at all crowded	Not at all crowded	Not at all crowded
0929-1	code 2	A little crowded		
0929-4	code 4	Not at all crowded	Not at all crowded	Not at all crowded
0929-5	code 2	Moderately crowded	Moderately crowded	Moderately crowded
0930-1	code 1	Not at all crowded	Not at all crowded	Not at all crowded
1003-1	code 1	Not at all crowded	Not at all crowded	Not at all crowded
0930-3	code 1	Not at all crowded	Not at all crowded	Not at all crowded
0930-4	code 3	Not at all crowded	Not at all crowded	Not at all crowded
1005-6	code 2	Not at all crowded	Not at all crowded	Not at all crowded
1005-7	code 1	A little crowded	A little crowded	Not at all crowded
1005-2	code 1	Not at all crowded	Not at all crowded	Not at all crowded
1008-1	code 1	Not at all crowded	A little crowded	Not at all crowded
1009-3	code 1	Not at all crowded	Not at all crowded	Not at all crowded
1009-5	code 3	Not at all crowded	Not at all crowded	Not at all crowded
1009-2	code 4	Not at all crowded	Not at all crowded	Not at all crowded
1013-6	code 2	Moderately crowded	Moderately crowded	Moderately crowded
1013-1	code 1	Not at all crowded	A little crowded	A little crowded

uid	angler.crowd.4	rec.crowd.1	rec.crowd.2	rec.crowd.3
0726-6	Not at all crowded	Crowded	Crowded	Crowded
0726-10	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
0728-1	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
0726-2	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
0730-5	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
0730-6	Not at all crowded	A little crowded	Not at all crowded	Not at all crowded
0730-1	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
0726-1	Not at all crowded	A little crowded	A little crowded	A little crowded
0726-4	A little crowded	Moderately crowded	Moderately crowded	Moderately crowded
0726-7	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
0803-1	A little crowded	Not at all crowded	Not at all crowded	Not at all crowded
0803-3	Not at all crowded	Moderately crowded	Moderately crowded	Moderately crowded
0803-5	Not at all crowded	A little crowded	A little crowded	A little crowded
0803-2	Not at all crowded	Moderately crowded	Moderately crowded	Moderately crowded
0806-3	Moderately crowded	A little crowded	A little crowded	A little crowded
0806-2	A little crowded	Not at all crowded	Not at all crowded	Not at all crowded
0806-4	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
0806-5	Moderately crowded	Not at all crowded	Not at all crowded	Not at all crowded
0806-1	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
0811-1	Not at all crowded	Moderately crowded	Crowded	A little crowded
0811-2	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
0819-1	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
0820-1	A little crowded	Not at all crowded	Not at all crowded	Not at all crowded
0820-5	A little crowded	Moderately crowded	Moderately crowded	A little crowded
0820-2	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
0909-2	Crowded	A little crowded	A little crowded	Not at all crowded
0910-1	Not at all crowded	A little crowded	A little crowded	A little crowded
0903-5	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
0909-1	Moderately crowded	Moderately crowded	A little crowded	Crowded
0903-2	Moderately crowded	Moderately crowded	A little crowded	A little crowded
0902-2	Not at all crowded			
0910-3	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
0910-2	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
0902-7	Not at all crowded	Not at all crowded	Not at all crowded	A little crowded
0903-2	A little crowded	Not at all crowded	A little crowded	A little crowded
0912-1		Not at all crowded	Not at all crowded	Not at all crowded
0911-2	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
0914-3	Not at all crowded	A little crowded	A little crowded	Not at all crowded
0914-1	A little crowded	Not at all crowded	A little crowded	Moderately crowded
0912-5	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
0914-2	A little crowded	Not at all crowded	A little crowded	Moderately crowded
0912-4		Not at all crowded	A little crowded	Not at all crowded
0912-3	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded

uid	angler.crowd.4	rec.crowd.1	rec.crowd.2	rec.crowd.3
0918-8	Moderately crowded	Not at all crowded	Not at all crowded	Not at all crowded
0916-5	A little crowded	A little crowded		A little crowded
0916-2	A little crowded	Not at all crowded	Not at all crowded	Not at all crowded
0916-3	A little crowded	Not at all crowded	Not at all crowded	A little crowded
0916-4	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
0918-6	A little crowded	Not at all crowded	Not at all crowded	Not at all crowded
0916-5	A little crowded	A little crowded	A little crowded	A little crowded
0918-2	A little crowded	A little crowded	A little crowded	A little crowded
0918-1	A little crowded	Not at all crowded	A little crowded	Moderately crowded
0920-1	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
0922-2	Crowded	Not at all crowded	Not at all crowded	Not at all crowded
0922-1	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
0922-3	Moderately crowded	Not at all crowded	Moderately crowded	Moderately crowded
0928-3	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
0928-2	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
0928-1	Not at all crowded	A little crowded	A little crowded	A little crowded
0929-3	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
0929-1		Moderately crowded		
0929-4	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
0929-5	Moderately crowded	A little crowded	A little crowded	A little crowded
0930-1	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
1003-1	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
0930-3	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
0930-4	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
1005-6	Not at all crowded	A little crowded	A little crowded	Not at all crowded
1005-7	A little crowded	A little crowded	A little crowded	Not at all crowded
1005-2	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
1008-1	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
1009-3	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
1009-5		Not at all crowded	Not at all crowded	Not at all crowded
1009-2	Not at all crowded	Not at all crowded	Not at all crowded	Not at all crowded
1013-6	Moderately crowded	Not at all crowded	Not at all crowded	Not at all crowded
1013-1	A little crowded	Not at all crowded	Not at all crowded	Not at all crowded

uid	rec.crowd.4	goal.1	goal.2
0726-6	Crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
0726-10	Not at all crowded	Catch the largest fish possible	Catch the most fish possible
0728-1	Not at all crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
0726-2	Not at all crowded	Catch the largest fish possible	Catch the largest fish possible
0730-5	Not at all crowded	Catch the largest fish possible	Catch the largest fish possible
0730-6	Not at all crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
0730-1	Not at all crowded	Catch the largest fish possible	Catch the largest fish possible
0726-1	A little crowded	Catch the largest fish possible	Catch the largest fish possible
0726-4	Moderately crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
0726-7	Not at all crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
0803-1	Not at all crowded	Catch the largest fish possible	Catch the largest fish possible
0803-3	Moderately crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
0803-5	A little crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
0803-2	Moderately crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
0806-3	A little crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
0806-2	Not at all crowded	Catch the largest fish possible	Catch the largest fish possible
0806-4	Not at all crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
0806-5	Not at all crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
0806-1	Not at all crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
0811-1	Moderately crowded	Catch the largest fish possible	Catch the largest fish possible
0811-2	Not at all crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
0819-1	Not at all crowded	Catch the most fish possible	Catch the most fish possible
0820-1	Not at all crowded	Catch the largest fish possible	Neither, just enjoying the experience
0820-5	A little crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
0820-2	Not at all crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
0909-2	A little crowded	Catch the most fish possible	Catch the most fish possible
0910-1	A little crowded	Catch the most fish possible	Catch the largest fish possible

uid	rec.crowd.4	goal.1	goal.2
0903-5	Not at all crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
0909-1	Moderately crowded	Catch the most fish possible	Catch the largest fish possible
0903-2	A little crowded	Catch the largest fish possible	Catch the largest fish possible
0902-2	Not at all crowded		
0910-3	Not at all crowded	Catch the largest fish possible	Catch the largest fish possible
0910-2	Not at all crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
0902-7	Not at all crowded	Catch the largest fish possible	Catch the largest fish possible
0903-2	A little crowded	Catch the largest fish possible	Neither, just enjoying the experience
0912-1		Catch the most fish possible	Catch the most fish possible
0911-2	Not at all crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
0914-3	Not at all crowded	Catch the largest fish possible	Catch the largest fish possible
0914-1	A little crowded	Catch the largest fish possible	Catch the largest fish possible
0912-5	Not at all crowded	Catch the most fish possible	Catch the largest fish possible
0914-2	Moderately crowded	Catch the largest fish possible	Catch the most fish possible
0912-4	Not at all crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
0912-3	Not at all crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
0918-8	Not at all crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
0916-5	A little crowded	Catch the most fish possible	Catch the most fish possible
0916-2	Not at all crowded	Catch the most fish possible	Catch the most fish possible
0916-3	Not at all crowded	Catch the most fish possible	Catch the largest fish possible
0916-4	Not at all crowded	Neither, just enjoying the experience	Catch the most fish possible
0918-6	Not at all crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
0916-5	A little crowded	Catch the most fish possible	Catch the most fish possible
0918-2	A little crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
0918-1	Moderately crowded	Catch the largest fish possible	Catch the largest fish possible
0920-1	Not at all crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
0922-2	Not at all crowded	Catch the largest fish possible	Neither, just enjoying the experience

uid	rec.crowd.4	goal.1	goal.2
0922-1	Not at all crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
0922-3	Moderately crowded	Catch the largest fish possible	Neither, just enjoying the experience
0928-3	Not at all crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
0928-2	Not at all crowded	Catch the most fish possible	Catch the most fish possible
0928-1	A little crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
0929-3	Not at all crowded	Catch the largest fish possible	Catch the largest fish possible
0929-1		Catch the largest fish possible	Catch the largest fish possible
0929-4	Not at all crowded	Catch the most fish possible	Catch the most fish possible
0929-5	A little crowded	Catch the largest fish possible	Catch the largest fish possible
0930-1	Not at all crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
1003-1	Not at all crowded	Catch the largest fish possible	Catch the most fish possible
0930-3	Not at all crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
0930-4	Not at all crowded	Catch the most fish possible	Catch the most fish possible
1005-6	A little crowded	Catch the most fish possible	Catch the most fish possible
1005-7	A little crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
1005-2	Not at all crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
1008-1	Not at all crowded	Catch the largest fish possible	Catch the largest fish possible
1009-3	Not at all crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
1009-5		Catch the most fish possible	Catch the most fish possible
1009-2	Not at all crowded	Catch the most fish possible	Catch the most fish possible
1013-6	Not at all crowded	Neither, just enjoying the experience	Neither, just enjoying the experience
1013-1	Not at all crowded	Neither, just enjoying the experience	Neither, just enjoying the experience

uid	goal.3	goal.4
0726-6	Neither, just enjoying the experience	Neither, just enjoying the experience
0726-10	Catch the most fish possible	Catch the most fish possible
0728-1	Neither, just enjoying the experience	Neither, just enjoying the experience
0726-2	Catch the largest fish possible	Catch the largest fish possible
0730-5	Catch the largest fish possible	Catch the largest fish possible
0730-6	Neither, just enjoying the experience	Neither, just enjoying the experience
0730-1	Catch the most fish possible	Catch the largest fish possible
0726-1	Catch the largest fish possible	Catch the largest fish possible
0726-4	Neither, just enjoying the experience	Neither, just enjoying the experience
0726-7	Neither, just enjoying the experience	Neither, just enjoying the experience
0803-1	Neither, just enjoying the experience	Neither, just enjoying the experience
0803-3	Neither, just enjoying the experience	Neither, just enjoying the experience
0803-5	Neither, just enjoying the experience	Neither, just enjoying the experience
0803-2	Neither, just enjoying the experience	Neither, just enjoying the experience
0806-3	Neither, just enjoying the experience	Neither, just enjoying the experience
0806-2	Neither, just enjoying the experience	Neither, just enjoying the experience
0806-4	Neither, just enjoying the experience	Neither, just enjoying the experience
0806-5	Neither, just enjoying the experience	Neither, just enjoying the experience
0806-1	Neither, just enjoying the experience	Neither, just enjoying the experience
0811-1	Catch the largest fish possible	Catch the largest fish possible
0811-2	Neither, just enjoying the experience	Neither, just enjoying the experience
0819-1	Catch the most fish possible	Catch the most fish possible
0820-1	Neither, just enjoying the experience	Neither, just enjoying the experience
0820-5	Neither, just enjoying the experience	Neither, just enjoying the experience
0820-2	Neither, just enjoying the experience	Neither, just enjoying the experience
0909-2	Catch the most fish possible	Catch the most fish possible
0910-1	Catch the most fish possible	Catch the most fish possible
0903-5	Neither, just enjoying the experience	Neither, just enjoying the experience
0909-1	Catch the largest fish possible	Neither, just enjoying the experience
0903-2	Catch the largest fish possible	Catch the largest fish possible
0902-2		Neither, just enjoying the experience
0910-3	Catch the largest fish possible	
0910-2	Neither, just enjoying the experience	Neither, just enjoying the experience
0902-7	Catch the most fish possible	Catch the largest fish possible
0903-2	Catch the largest fish possible	Neither, just enjoying the experience
0912-1	Catch the most fish possible	
0911-2	Neither, just enjoying the experience	Neither, just enjoying the experience
0914-3	Catch the largest fish possible	Catch the largest fish possible
0914-1	Catch the largest fish possible	Catch the largest fish possible
0912-5	Catch the largest fish possible	Neither, just enjoying the experience
0914-2	Catch the most fish possible	Catch the largest fish possible
0912-4	Catch the most fish possible	Catch the most fish possible
0912-3	Neither, just enjoying the experience	Neither, just enjoying the experience
0918-8	Neither, just enjoying the experience	Neither, just enjoying the experience
0916-5	Catch the most fish possible	Catch the most fish possible
0916-2	Catch the most fish possible	Catch the most fish possible
0916-3	Catch the most fish possible	Catch the most fish possible

uid	goal.3	goal.4
0916-4	Neither, just enjoying the experience	Neither, just enjoying the experience
0918-6	Neither, just enjoying the experience	Neither, just enjoying the experience
0916-5	Catch the most fish possible	Catch the most fish possible
0918-2	Neither, just enjoying the experience	Neither, just enjoying the experience
0918-1	Catch the largest fish possible	Catch the largest fish possible
0920-1	Neither, just enjoying the experience	Neither, just enjoying the experience
0922-2	Neither, just enjoying the experience	Neither, just enjoying the experience
0922-1	Neither, just enjoying the experience	Neither, just enjoying the experience
0922-3	Neither, just enjoying the experience	Neither, just enjoying the experience
0928-3	Neither, just enjoying the experience	Neither, just enjoying the experience
0928-2	Catch the most fish possible	Catch the most fish possible
0928-1	Neither, just enjoying the experience	Neither, just enjoying the experience
0929-3	Catch the largest fish possible	Catch the largest fish possible
0929-1	Catch the largest fish possible	Catch the largest fish possible
0929-4	Catch the most fish possible	Catch the most fish possible
0929-5	Catch the largest fish possible	Catch the largest fish possible
0930-1	Neither, just enjoying the experience	Neither, just enjoying the experience
1003-1	Catch the most fish possible	Catch the most fish possible
0930-3	Neither, just enjoying the experience	Neither, just enjoying the experience
0930-4	Neither, just enjoying the experience	Neither, just enjoying the experience
1005-6	Catch the most fish possible	Neither, just enjoying the experience
1005-7	Neither, just enjoying the experience	Neither, just enjoying the experience
1005-2	Neither, just enjoying the experience	Neither, just enjoying the experience
1008-1	Catch the largest fish possible	Catch the largest fish possible
1009-3	Neither, just enjoying the experience	Neither, just enjoying the experience
1009-5	Neither, just enjoying the experience	Neither, just enjoying the experience
1009-2	Catch the most fish possible	Catch the most fish possible
1013-6	Neither, just enjoying the experience	Neither, just enjoying the experience
1013-1	Neither, just enjoying the experience	Neither, just enjoying the experience

uid	satisfied.1	satisfied.2	satisfied.3	satisfied.4
0726-6	Very Satisfied	Very Satisfied	Very Satisfied	Very Satisfied
0726-10	Very Unsatisfied	Very Unsatisfied	Very Unsatisfied	Very Unsatisfied
0728-1	Very Unsatisfied	Very Unsatisfied	Very Unsatisfied	Very Unsatisfied
0726-2	Neutral	Neutral	Neutral	Neutral
0730-5	Neutral	Neutral	Neutral	Neutral
0730-6	Very Satisfied	Very Satisfied	Very Satisfied	Very Satisfied
0730-1	Very Satisfied	Very Satisfied	Very Satisfied	Very Satisfied
0726-1	Neutral	Neutral	Neutral	Neutral
0726-4	Satisfied	Satisfied	Satisfied	Satisfied
0726-7	Very Satisfied	Very Satisfied	Very Satisfied	Very Satisfied
0803-1	Satisfied	Satisfied	Satisfied	Satisfied
0803-3	Unsatisfied	Unsatisfied	Unsatisfied	Unsatisfied
0803-5	Satisfied	Satisfied	Satisfied	Satisfied
0803-2	Neutral	Neutral	Neutral	Neutral
0806-3	Satisfied	Satisfied	Satisfied	Satisfied
0806-2	Unsatisfied	Unsatisfied	Unsatisfied	Unsatisfied
0806-4	Satisfied	Satisfied	Satisfied	Satisfied
0806-5	Satisfied	Satisfied	Satisfied	Satisfied
0806-1	Satisfied	Satisfied	Satisfied	Satisfied
0811-1	Very Satisfied	Satisfied	Neutral	Satisfied
0811-2	Neutral	Satisfied	Neutral	Neutral
0819-1	Neutral	Neutral	Neutral	Neutral
0820-1	Neutral	Neutral	Neutral	Neutral
0820-5	Very Satisfied	Very Satisfied	Very Satisfied	Very Satisfied
0820-2	Very Satisfied	Very Satisfied	Very Satisfied	Very Satisfied
0909-2	Satisfied	Satisfied	Satisfied	Satisfied
0910-1	Very Unsatisfied	Very Unsatisfied	Very Unsatisfied	Very Unsatisfied
0903-5	Very Satisfied	Very Satisfied	Very Satisfied	Very Satisfied
0909-1	Unsatisfied	Unsatisfied	Unsatisfied	Very Unsatisfied
0903-2	Very Satisfied	Very Satisfied	Very Satisfied	Very Satisfied
0902-2				Neutral
0910-3	Unsatisfied	Unsatisfied	Unsatisfied	Unsatisfied
0910-2	Satisfied	Satisfied	Satisfied	Satisfied
0902-7	Satisfied	Neutral	Neutral	Satisfied
0903-2	Satisfied	Satisfied	Very Satisfied	Very Satisfied
0912-1	Very Unsatisfied	Very Unsatisfied	Very Unsatisfied	Very Unsatisfied
0911-2	Very Satisfied	Very Satisfied	Very Satisfied	Very Satisfied
0914-3	Very Unsatisfied	Very Unsatisfied	Very Unsatisfied	Very Unsatisfied
0914-1	Neutral	Satisfied	Satisfied	Satisfied
0912-5	Neutral	Neutral	Neutral	Neutral
0914-2	Neutral	Satisfied	Satisfied	Satisfied
0912-4	Neutral	Neutral	Satisfied	
0912-3	Neutral	Neutral	Neutral	Neutral

uid	satisfied.1	satisfied.2	satisfied.3	satisfied.4
0918-8				Satisfied
0916-5	Satisfied	Satisfied	Satisfied	Satisfied
0916-2	Unsatisfied	Unsatisfied	Satisfied	Satisfied
0916-3	Very Satisfied	Very Satisfied	Satisfied	Very Satisfied
0916-4	Satisfied	Very Satisfied	Very Satisfied	Satisfied
0918-6	Satisfied	Satisfied	Satisfied	Satisfied
0916-5	Satisfied	Satisfied	Satisfied	Satisfied
0918-2	Satisfied	Satisfied	Satisfied	Satisfied
0918-1	Satisfied	Satisfied	Satisfied	Satisfied
0920-1	Satisfied	Satisfied	Satisfied	Satisfied
0922-2	Neutral	Very Satisfied	Very Satisfied	Very Satisfied
0922-1	Satisfied	Satisfied	Satisfied	Satisfied
0922-3	Neutral	Very Satisfied	Very Satisfied	Very Satisfied
0928-3	Unsatisfied	Neutral	Neutral	
0928-2	Very Satisfied	Very Satisfied	Very Satisfied	Very Satisfied
0928-1	Satisfied	Satisfied	Satisfied	Satisfied
0929-3	Neutral	Neutral	Satisfied	Neutral
0929-1	Neutral	Neutral	Neutral	Neutral
0929-4	Very Unsatisfied	Satisfied	Satisfied	
0929-5	Satisfied	Satisfied	Satisfied	Satisfied
0930-1	Satisfied	Satisfied	Satisfied	Satisfied
1003-1	Neutral	Neutral	Satisfied	Neutral
0930-3	Very Satisfied	Very Satisfied	Very Satisfied	Very Satisfied
0930-4	Satisfied	Satisfied	Satisfied	Satisfied
1005-6	Very Satisfied	Very Satisfied	Satisfied	Neutral
1005-7	Satisfied	Satisfied	Satisfied	Satisfied
1005-2	Very Unsatisfied	Very Unsatisfied	Very Unsatisfied	Very Unsatisfied
1008-1	Very Satisfied	Very Satisfied	Very Satisfied	Very Satisfied
1009-3	Neutral	Satisfied	Neutral	Neutral
1009-5	Satisfied	Satisfied	Satisfied	Satisfied
1009-2	Neutral	Neutral	Neutral	Neutral
1013-6	Very Satisfied	Very Satisfied	Very Satisfied	Very Satisfied
1013-1	Very Satisfied	Very Satisfied	Very Satisfied	Very Satisfied

Appendix 3-B. Survey completed by anglers observed fishing at Bowling Lake and Halleck Lake.

Spatial distribution of angler effort survey

InterviewID
_____

PartyID
_____

Waterbody
- ❑ Bowling Lake
- ❑ Halleck Lake
- ❑ BranchedOak
- ❑ Pawnee
- ❑ Wildwood
- ❑ Meadowlark

What species were you primarily fishing for during today's trip?
- ❑ 178
- ❑ 360
- ❑ 730
- ❑ 770
- ❑ 785
- ❑ 999
- ❑ 650
- ❑ Other

Spp-other
_____

Did other anglers on the waterbody affect where you chose to fish today? If so, how?
- ❑ Yes
- ❑ No

If so, how?
_____
_____
_____
_____

Why did you decide to start fishing in the location that you began with?
_____
_____
_____
_____

There are many different types of anglers. Which of the four angler descriptions below is most similar to yourself? Please note that not every criterium must be me, but select the description that generally describes you best. (Please choose only one)

❑

Casual Angler

Someone for whom fishing is not an important leisure activity and whose social life does not revolve around angling. The casual angler fishes only occasionally and spends much available leisure time pursuing other activities.

Some characteristics of a ***casual angler*** may include:

- Almost always select fishing waters based on convenience and easy access
- Prefers common techniques and proven tackle and is not aware of the latest innovations in techniques and equipment: has a small amount of general fishing tackle
- Primarily targets whatever species is biting on a given trip, and harvests all fish that are legal to keep
- Often loses interest when the fish are not biting well
- Very rarely uses information in the public domain about fishing

❑

Active Angler

Someone for whom fishing is one leisure activity among many, and who occasionally goes fishing with a few friends. The active angler fishes regularly but also invests considerable time in other leisure activities.

Some characteristics of an ***active angler*** may include:

- Usually selects fishing sites that are relatively easy to access, often close to home
- Prefers common techniques and proven fishing tackle, and has some knowledge of the latest innovations in fishing techniques and equipment: has a moderate amount of fishing equipment, primarily consisting of general-purpose tackle
- Often targets a particular species of fish on a given day, and usually takes home any legal fish that are caught
- Occasionally loses interest when the fish do not appear to be biting
- May use easily available general angling media and buy the occasional issue of an angling magazine

Advanced Angler

Someone for whom fishing is the most important leisure activity and whose circle of friends includes many anglers. The advanced angler fishes often, devoting a substantial fraction of leisure time to fishing.

Some characteristics of the ***advanced angler*** may include:

- Usually selects fishing waters according to fishing quality and may travel long distances to particularly good waters
- Prefers high quality fishing tackle and is aware of the latest innovations in fishing techniques and equipment: may have a considerable amount of fishing equipment, including some specialized equipment to target certain species
- Usually targets a particular species and often releases fish back into the water
- Rarely loses interest even when the fish are not biting
- Uses various information sources and may subscribe to a general angling magazine

Committed Angler

Someone for whom fishing is the central focus of life and whose social life revolves around angling. The committed angler fishes as often as possible, devoting most available free time to angling related activities.

Some characteristics of the ***committed angler*** may include:

- Usually selects fishing waters based on their premium fishing quality even if they are distant
- Uses high-quality, species specific fishing tackle and applies the latest innovations in fishing techniques and equipment: has an impressive collection of specialized fishing tackle.
- Always targets a particular species on a given trip and tends to release any fish that are caught
- Typically continues to fish even when the fish do not appear to be biting
- Uses many sources of information about fishing and may subscribe to angling magazines devoted to certain species or fishing styles

For each stage of the trip, state which of the following best describes how crowded with anglers you perceived the waterbody to be

	Not at all crowded	A little crowded	Moderately crowded	Crowded	Very Crowded
Beginning of your trip	❑	❑	❑	❑	❑
Middle of your trip	❑	❑	❑	❑	❑
End of your trip	❑	❑	❑	❑	❑
The trip overall	❑	❑	❑	❑	❑

For each stage of the trip, state which which of the following best describes how crowded with **NON**-anglers you percieved the waterbody to be

	Not at all crowded	A little crowded	Moderately crowded	Crowded	Very Crowded
Beginning of your trip	❑	❑	❑	❑	❑
Middle of your trip	❑	❑	❑	❑	❑
End of your trip	❑	❑	❑	❑	❑
The trip overall	❑	❑	❑	❑	❑

For each stage of the trip, state which of the following best describes your goal in fishing

	Catch the largest fish possible	Catch the most fish possible	Neither, just enjoying the experience
Beginning of your trip	❑	❑	❑
Middle of your trip	❑	❑	❑
End of your trip	❑	❑	❑
The trip overall	❑	❑	❑

Thank you for your participation in this study, please press submit to finish

Appendix 3-C. Program R code to analyze the effects of angler specialization, day-of objective, and species-sought on angler movement, casting, area covered, and fish captures.

```
##Brian Harmon
##07/12/17
##Angler movement Analysis
library(tidyverse)
library(reshape2)
library(raster)
library(maptools)
library(rgeos)
library(sp)
library(rgdal)
library(gdistance)
library(lme4)
library(lmerTest)

mround <- function(x,base){
  base*round(x/base)
}


toSeconds <- function(x){
  if (!is.character(x)) stop("x must be a character string of the form H:M:S")
  if (length(x)<=0)return(x)

  unlist(
    lapply(x,
           function(i){
             i <- as.numeric(strsplit(i,':',fixed=TRUE)[[1]])
             if (length(i) == 3)
               i[1]*3600 + i[2]*60 + i[3]
             else if (length(i) == 2)
               i[1]*60 + i[2]
             else if (length(i) == 1)
               i[1]
           }
    )
  )
}
```

```
bowling<-readShapeLines("~/Bowling_2_shoreline.shp",
proj4string=CRS("+init=epsg:26822"))
bowling<- spTransform(bowling, CRS("+init=epsg:32614"))
bowling.gg<-fortify(bowling)

halleck<-readShapeLines("~Halleckshoreline_UTM.shp",
proj4string=CRS("+init=epsg:32614"))
halleck.gg<-fortify(halleck)

fit<- do.call(rbind,lapply(list.files(path = "~/Angler movement/fit"), read.csv))
fit<-as.data.frame(fit)

vid<- do.call(rbind,lapply(list.files(path = "~/Angler movement/vid"), read.csv))
vid<-as.data.frame(vid)

casts.only<-vid%>%
  mutate(time3=mround(Time, 60))%>%
  filter(Behavior=="cast")


hour = format(as.POSIXct(fit$time.2,format="%H:%M:%S"),"%H")
minute = format(as.POSIXct(fit$time.2,format="%H:%M:%S"),"%M")
second= format(as.POSIXct(fit$time.2,format="%H:%M:%S"),"%S")
fit$time3<-paste(hour,minute,second,sep=":")

fit$time3<-toSeconds(fit$time3)

fit<-fit%>%
  group_by(uid)%>%
  mutate(time4=mround(time3-min(time3),60))

hour = format(as.POSIXct(fit$time.2,format="%H:%M:%S"),"%H")
minute = format(as.POSIXct(fit$time.2,format="%H:%M:%S"),"%M")
second= format(as.POSIXct(fit$time.2,format="%H:%M:%S"),"%S")
fit$time3<-paste(hour,minute,second,sep=":")
fit$leg.length<-as.numeric(fit$leg.length)
fit2<-fit%>%
  group_by(uid, time3)%>%
  summarize(dtotal=sum(leg.length))
ggplot()+
  geom_line(aes(x=time3, y=dtotal, group=uid), data=fit2)

fit3<-fit
fit3$time4<-toSeconds(fit$time3)

fit3<-fit%>%
```

```
  mutate(time4=toSeconds(time3))%>%
  filter(uid!="0820-5")%>%
  group_by(uid)%>%
  mutate(std.time=time4-min(time4))%>%
  group_by(uid, waterbody, std.time)%>%
  summarize(dtotal=sum(leg.length))%>%
  group_by(std.time)%>%
  mutate(mean.dtotal=mean(dtotal),
         se.dtotal=sd(dtotal)/sqrt(n()))

fit.graphing<-fit3%>%
  filter(uid=="0730-1")

casts.2<-vid%>%
  mutate(std.time=mround(Time, 60))%>%
  filter(Behavior==("cast") | Behavior==("lands fish"))%>%
  mutate(cast=ifelse(Behavior=="cast",1, 0),
         capture=ifelse(Behavior=="lands fish",1,0))%>%
  filter(uid!="0820-5")

fit4<-fit%>%
  mutate(time4=toSeconds(time3))%>%
  filter(uid!="0820-5")%>%
  group_by(uid)%>%
  mutate(std.time=time4-min(time4))
# group_by(uid, waterbody, std.time)%>%
# summarize(dtotal=sum(leg.length))%>%
# group_by(std.time)%>%
# mutate(mean.dtotal=mean(dtotal),
#        se.dtotal=sd(dtotal)/sqrt(n()))

casts.3<-data.frame(uid=casts.2$uid, std.time=casts.2$std.time, cast=casts.2$cast,
capture=casts.2$capture)

full.dat<-left_join(fit4, casts.3, by=c("uid","std.time"))


full.dat$cast<-as.numeric(full.dat$cast)
full.dat$capture<-as.numeric(full.dat$capture)

interview<-read.csv("F:/Thesis.04.10.17/Thesis/Objective 1/Angler
movement/angler.movement.post.interview.csv", header=TRUE)
interview.2<-interview[,c(6:8,13,25)]
interview.3<-interview.2%>%
  filter(goal.4 != "")%>%
  filter(angler.specialization != "")%>%
```

```
  mutate(spp=ifelse(spp.1=="360","Catfish", ifelse(spp.1=="770","Bass","other")),
         special=ifelse(angler.specialization=="code 1", "Casual",
ifelse(angler.specialization=="code 2", "Active", ifelse(
           angler.specialization=="code 3", "Advanced", "Committed"))),
         goal=ifelse(goal.4=="Catch the largest fish possible", "Size", ifelse(goal.4=="Catch
the most fish possible", "Number", "Neither")))

interview.4<-interview.3[,c(1,2,5:8)]
interview.4[] <- lapply(interview.4, factor)

filter.time<-full.dat%>%
  filter(uid!="1013-6")%>%
  group_by(uid)%>%
  filter(!is.na(cast))%>%
  mutate(first=min(std.time),
         last=max(std.time))

##########################################################filter to time between
casts

filter.time.2<-filter.time[,c(1,21:22)]
filter.time.2<-unique(filter.time.2)
filter.time.3<-left_join(full.dat, filter.time.2, by="uid")

filter.time.4<-filter.time.3%>%
  group_by(uid)%>%
  filter(std.time>= first & std.time <=last)


full.dat5<-filter.time.4%>%
  group_by(uid)%>%
  mutate(prop.time=round((std.time-min(std.time))/(max(std.time)-min(std.time)),
digits=2))%>%
  group_by(uid, waterbody, prop.time)%>%
  summarize(dtotal=sum(leg.length),
            tot.cast=sum(cast, na.rm=TRUE),
            tot.capture=sum(capture, na.rm=TRUE))

full.dat5$uid<-as.factor(full.dat5$uid)
full.dat5<-left_join(full.dat5, interview.4, by="uid")


full.dat5.spp<-full.dat5%>%
  filter(spp != "other")
full.dat5.spp<-full.dat5.spp%>%
  filter(!is.na(prop.time))
```

```
mod.1<-lmer(dtotal~prop.time+special+goal+spp +(1|uid) +(1|waterbody),
data=full.dat5.spp)
summary(mod.1)
anova(mod.1)

mod.2<-lmer(dtotal~poly(prop.time,2)+special+goal+spp +(1|uid)+(1|waterbody),
data=full.dat5.spp)
summary(mod.2)
anova(mod.2)

mod.3<-lmer(dtotal~poly(prop.time,3)+special+goal+spp +(1|uid)+(1|waterbody),
data=full.dat5.spp)
summary(mod.3)
anova(mod.3)

mod.4<-lmer(dtotal~poly(prop.time,4)+special+goal+spp +(1|uid)+(1|waterbody),
data=full.dat5.spp)
summary(mod.4)


final.move.mod<-lmer(dtotal~poly(prop.time,2)+spp +(1|uid)+(1|waterbody),
data=full.dat5.spp)

move.pred.grid<-expand.grid(prop.time=seq(0,1, by=0.01), special="Casual",
goal="Neither", spp=unique(full.dat5.spp$spp), uid="0726-2", waterbody="halleck")
pred.grid<-predict(final.move.mod, move.pred.grid, type="response")
move.predictions<-cbind(pred.grid, move.pred.grid)



full.dat5.spp<-full.dat5.spp%>%
  group_by(spp, prop.time)%>%
  mutate(pred.grid=mean(dtotal))


ggplot()+
  # geom_line(aes(x=prop.time, y=pred.grid, group=spp, color=spp), size=2,
data=move.predictions)+
  geom_point(aes(x=prop.time, y=pred.grid, group=waterbody, color=spp, fill=spp),
size=2, data=full.dat5.spp)+
  coord_cartesian(ylim=c(0,100))+
  labs(y="Distance (m)", x="Proportion Time", fill="Species-Sought",color="Species-
Sought")+
  theme_mine()
```

```
## mod 2 best, only spp stands out


cast.mod.1<-lmer(tot.cast~prop.time+special+goal+spp +(1|uid)+(1|waterbody),
data=full.dat5.spp)
summary(cast.mod.1)
anova(cast.mod.1)

cast.mod.2<-lmer(tot.cast~poly(prop.time,2)+special+goal+spp +(1|uid)+(1|waterbody),
data=full.dat5.spp)
summary(cast.mod.2)
anova(cast.mod.2)

cast.mod.3<-lmer(tot.cast~poly(prop.time,3)+special+goal+spp +(1|uid)+(1|waterbody),
data=full.dat5.spp)
summary(cast.mod.3)
anova(cast.mod.3)


final.cast.mod<-lmer(tot.cast~poly(prop.time,2)+spp +(1|uid)+(1|waterbody),
data=full.dat5.spp)


cast.pred.grid<-expand.grid(prop.time=seq(0,1, by=0.01), special="Casual",
goal="Neither", spp=unique(full.dat5.spp$spp), uid="0726-2", waterbody="halleck")
pred.grid<-predict(final.cast.mod, cast.pred.grid, type="response")
cast.predictions<-cbind(pred.grid, cast.pred.grid)


full.dat5.spp<-full.dat5.spp%>%
  group_by(spp, prop.time)%>%
  mutate(pred.grid=mean(tot.cast))

ggplot()+
  # geom_line(aes(x=prop.time, y=pred.grid, group=spp, color=spp),
size=2,data=cast.predictions)+
  geom_point(aes(x=prop.time, y=pred.grid, color=spp, fill=spp), data=full.dat5.spp)+
  coord_cartesian(ylim=c(0,100))+
  labs(y="Casts", x="Proportion Time", fill="Species-Sought",color="Species-Sought")+
  theme_mine()



## mod 2 best, only spp stands out
```

```
cap.mod.1<-lmer(tot.capture~prop.time+special+goal+spp +(1|uid)+(1|waterbody),
data=full.dat5.spp)
summary(cap.mod.1)
anova(cap.mod.1)

cap.mod.2<-lmer(tot.capture~poly(prop.time,2)+special+goal+spp
+(1|uid)+(1|waterbody), data=full.dat5.spp)
summary(cap.mod.2)
anova(cap.mod.2)

cap.mod.3<-lmer(tot.capture~poly(prop.time,3)+special+goal+spp
+(1|uid)+(1|waterbody), data=full.dat5.spp)
summary(cap.mod.3)
anova(cap.mod.3)

cap.pred.grid<-expand.grid(prop.time=seq(0,1, by=0.01),
special=unique(full.dat5.spp$special), goal="Neither", spp="Bass", uid="0726-2",
waterbody="halleck")
pred.grid<-predict(cap.mod.1, cap.pred.grid, type="response")
cap.predictions<-cbind(pred.grid, cap.pred.grid)

ggplot()+
  geom_line(aes(x=prop.time, y=pred.grid, group=special), data=cap.predictions)


cap.mod.final<-lmer(tot.capture~special+goal +(1|uid)+(1|waterbody),
data=full.dat5.spp)

cap.pred.grid<-expand.grid(prop.time=seq(0,1, by=0.01), special="Casual",
goal=unique(full.dat5.spp$goal), spp="Bass", uid="0726-2", waterbody="halleck")
pred.grid<-predict(cap.mod.final, cap.pred.grid, type="response")
cap.predictions<-cbind(pred.grid, cap.pred.grid)

ggplot()+
  geom_line(aes(x=prop.time, y=pred.grid, group=goal), data=cap.predictions)


full.dat5.spp<-full.dat5.spp%>%
  group_by(spp, prop.time)%>%
  mutate(pred.grid=mean(tot.capture))

ggplot()+
  # geom_line(aes(x=prop.time, y=pred.grid, group=goal, color=goal),
size=2,data=cap.predictions)+
  geom_boxplot(aes(x=goal, y=tot.capture, fill=goal), data=full.dat5.spp)+
```

```
  # geom_jitter(aes(x=prop.time, y=pred.grid, color=goal), data=most)+
  # geom_jitter(aes(x=prop.time, y=pred.grid, color=goal), data=full.dat5.spp)+
  coord_cartesian(ylim=c(0, 0.1))+
  scale_y_continuous(expand = c(0.0,0))+
  labs(y="Fish Captured", x="Proportion Time", fill="Day-of Objective",color="Day-of
Objective")+
  theme_mine()

most<-full.dat5.spp%>%
  filter(goal=="Number")
area.dat<-read.csv("F:/Thesis.04.10.17/Thesis/Objective 1/area.dat.csv")
area.covered<-left_join(area.dat, interview.4, by="uid")
area.covered<-area.covered%>%
  filter(spp=="Bass" | spp=="Catfish")
#
# captures<-full.dat5.spp%>%
#   group_by(uid)%>%
#   summarize(cap=sum(tot.capture))

area.mod<-lmer(fished~spp+special+goal+(1|waterbody), data=area.covered)
summary(area.mod)
anova(area.mod)
final.area.mod<-lmer(fished~spp+special+(1|waterbody), data=area.covered)
summary(final.area.mod)


area.mod.data<-area.covered%>%
  group_by(spp)%>%
  mutate(pred.grid=mean(fished),
         se.pred.grid=sd(fished)/n())
area.covered$shoreline<-area.covered$fished*10

ggplot()+
  geom_point(aes(x=spp, y=shoreline, color=spp), data=area.covered)+
  geom_boxplot(aes(x=spp, y=shoreline, fill=spp), data=area.covered)+
  coord_cartesian(ylim=c(0,350))+
  scale_y_continuous(expand = c(0.0,0))+
  labs(y="Shoreline fished (m)", x="Species-sought", fill="Species-
Sought",color="Species-Sought")+
  theme_mine()



geom_line(aes(x=prop.time, y=pred.grid, group=goal, color=goal),
size=2,data=cap.predictions)+
  geom_jitter(aes(x=prop.time, y=pred.grid, color=goal), data=most)+
```

```
  geom_jitter(aes(x=prop.time, y=pred.grid, color=goal), data=full.dat5.spp)+
  coord_cartesian(ylim=c(0,1))+
  labs(y="Fish Captured", x="Proportion Time", fill="Species-Sought",color="Species-
Sought")+
  theme_mine()
```