

Visual Encounter Survey Protocol for Western Pond Turtles

Prepared by:

Samara Group and Oregon Native Turtle Working Group (Jefferson Chapter) for Oregon Department of Fish and Wildlife

Updated April 2020

This project was made possible through support provided by the U.S. Fish and Wildlife Service, the Washington Department of Fish and Wildlife, and the Center for Natural Lands Management, under the terms of USFWS agreement F17AP00814 and WDFW agreement 17-09796. The content and opinions expressed herein are those of the authors and do not necessarily reflect the position or the policy of such agency or Center for Natural Lands Management, and no official endorsement should be inferred.



Photo Courtesy of Don Ashton

Contents

<i>Purpose and Scope</i>	3
<i>Sampling Methodology</i>	5
<i>Tier 1</i>	5
<i>Tier 2</i>	7
<i>Visual Encounter Survey Protocol for Distribution and Occupancy (Tier 1)</i>	8
<i>Timing of Surveys</i>	9
<i>Number of Observers</i>	9
<i>Selecting Observation Points</i>	10
<i>Observation Techniques</i>	10
<i>Accommodating Habitat Variation</i>	11
<i>Land-based Surveys</i>	11
<i>Environmental Data</i>	11
<i>Reporting / Data Submission</i>	12
<i>Tier 1</i>	12
<i>Tier 2</i>	12
<i>Citations and Background Literature</i>	13
APPENDIX	16
<i>Preparations for the field</i>	16
<i>Data Entry</i>	17
<i>Data Sheets</i>	Error! Bookmark not defined.
<i>Resources</i>	23

Protocol Sub-committee and contributors

Meeting Dates: 12/7/2017 Central Point OR; 01/09/2018 Salem OR; 01/31/2018 Salem OR; 03/22/2018 Corvallis OR

Don Ashton <ashton.don@gmail.com>

Bruce Bury <burybr@peak.org>

Steve Niemela <steve.a.niemela@state.or.us>

Jason Reilly <jreilly@blm.gov>

Simon Wray <simon.n.wray@state.or.us>

Christopher Yee <christopher.g.yee@state.or.us>

Jennifer Ringo <Jennifer.b.Ringo@state.or.us>

Dede Olson <dedeolson@fs.fed.us>

Western Pond Turtle Coordinator for ODFW project

Leslie Bliss-Ketchum, Samara Group

<leslie@samarapdx.com>

Jefferson Turtle Group Meeting Participants *(in alphabetical order by last name)*

Meeting Dates: 10/03/2018 Central Point OR

Don Ashton, United States Geological Survey and McBain Associates Applied River Sciences

Susan Barnes, Oregon Department of Fish & Wildlife

Steve Baumgartner, California Department of Fish & Wildlife

Jamie Bettaso, United States Forest Service

Greg Bjornstrom, Bureau of Land Management

Koen Breedveld, Spring Rivers Foundation

Ken Burton, Yurok Tribal Wildlife Program

Bruce Bury, United States Geological Survey Emeritus

Gwyn Bury, Oregon State University

Jessie Bushell, San Francisco Zoo

Steve Godwin, Bureau of Land Management

John Guetterman, Bureau of Land Management

Rob Horn, Bureau of Land Management

Chris Jenkins, Orianna Society

Anthony Johnson, Army Corp of Engineers

Alice Manwearing, United States Fish & Wildlife Service

Todd Musser, Bureau of Land Management

Steve Niemela, Oregon Department of Fish & Wildlife

Dede Olson, United States Forest Service

Laura Patterson, California Department of Fish & Wildlife

Michael Parker, Southern Oregon University

Jason Reilly, Bureau of Land Management

Jennifer Ringo, Oregon Department of Fish & Wildlife

Dave Roelofs, Bureau of Land Management

Arthur Rodriguez, Oregon Department of Fish & Wildlife

Dave Shepherdson, Oregon Zoo

Robin Snider, Bureau of Land Management

Harvest Vieira, California Department of Fish & Wildlife

Chris West, Yurok Tribal Wildlife Program

Simon Wray, Oregon Department of Fish & Wildlife

Kip Wright, Bureau of Land Management

Kate Yates, Bureau of Land Management

Christopher Yee, Oregon Department of Fish & Wildlife

Special Thanks to Kelli Van Norman, Inventory Coordinator for BLM/USFS Interagency Special Status/Sensitive Species Program, for providing input on the survey design and to Pat Cunningham, Mathematical Statistician at USFS PNW Research Station, for consulting with us on the initial design.

**Participation by state and federal employees does not imply agency endorsement.*

Purpose and Scope

This document provides guidance for monitoring trends in distribution and occupancy of the Western Pond Turtle. It is meant to assist the project coordinator (Oregon) implementing the occupancy surveys described in *Advancing Western Pond Turtle Conservation in Washington, Oregon, and California 2017-2020 Competitive State Wildlife Grant (CSWG)*. It also serves as a reference for staff and volunteers implementing occupancy surveys over the next three years.

This document outlines a standardized detection/no-detection survey protocol for assessing Western Pond Turtle occupancy in Oregon and a way to report incidental turtle sightings outside the formal protocol. Our specific goals are to:

1. Use existing data to devise a sampling methodology that allows us to identify changes in distribution and fill data gaps across the potential species' range in Oregon;
2. Provide a standardized occupancy survey protocol for distribution in Oregon using visual encounter surveys (VES) in a variety of habitats and conditions;
3. Develop data submission portals for survey data and incidental observations; a two-tiered approach is employed to accommodate a wide range of professional and community scientists.

This approach relies on a project coordinator to direct the implementation surveys by both professional biologists and community naturalists. The coordinator will oversee survey training, site assignments, data compilation and analysis to ensure consistency and coverage in the surveys. The key to project success is participation by biologists from state and federal agencies, tribes, Oregon's three regional Western Pond Turtle working groups, local watershed groups, and community scientists. It is our hope that this knowledgeable and observant collection of biologists and naturalists will be able to conduct surveys in their own areas, visiting sites with known occurrence, and sites with modeled suitable habitat but lacking reported surveys. We also invite the public to report their observations directly to the project.

Data derived from this process will help guide Oregon's Conservation Strategy and be provided to the USFWS to aid in determining whether to list the species under the federal Endangered Species Act. The Western Pond Turtle is under review for federal listing with a listing decision due by September 2021 and data needed by Summer 2020 at the latest (Cat Darst, USFWS, pers comm 2019).

Given the relatively short timeframe of the CSWG and the listing decision, our purpose is to focus on questions that can be addressed within a 2-3 year period. Answers should inform the listing decision, as well as, where to prioritize conservation actions. Thus, this plan will focus on:

1. What is the distribution and site occupancy of Western Pond Turtles within Oregon?
2. How have Western Pond Turtle distribution and site occupancy changed over time?
3. What is the detection probability for Western Pond Turtles using visual encounter surveys?

Sampling Methodology

We are using two strategies to answer the questions identified above. We will oversee a statewide effort to implement a standard protocol with repeated visits at randomly selected historically-occupied sites and sites of unknown occupancy within modeled “good” habitat across a sampling frame, and we will solicit incidental reports of turtle observations. The result is a two-tiered reporting system, with tiers based on adherence to the repeated visits survey protocol (Tier 1) or incidental observations occurring outside of this protocol’s selected survey sites and methods (Tier 2).

Tier 1 – Distribution and Occupancy

Trained observers will conduct repeat surveys at randomly selected historical sites (Historical Observation) and randomly selected modeled habitat (Modeled Habitat). Resurveying historical sites can give us insight into gross changes in the distribution and occupancy of the population across its range. However, historical site surveys have biases because initial surveys were often non-random. To balance the need to assess change in the population with the need to survey new locations we will also select survey locations from the Oregon Biodiversity Information Center’s (ORBIC) map of modeled Western Pond Turtle habitat (ORBIC 2017).

We created a sampling scheme containing a number of data layers to select from including:

1. Historical (i.e., pre-2018) Western Pond Turtle observations from multiple sources, including: ORBIC Point Observation Dataset, the US Forest Service Natural Resource Information System and the Oregon Department of Fish and Wildlife’s (ODFW) Turtle Observation Database.
2. Western Pond Turtle habitat modeled as “Good” by ORBIC (ORBIC 2017).
3. The hexagon base layer used in the Western Association of Fish and Wildlife Agencies Crucial Habitat Assessment Tool (WAFWA CHAT).
4. A map of our study area.

The WAFWA CHAT project has developed a seamless one mi² hexagon data schema for the entire United States, with attributes that can be used to dissolve hexagons into a series of seven mi², which are referred to as “cogs”. These seven mi² cogs will be used as the primary assessment units for this design study.

Historical observations were aggregated into “sites” by: (1) buffering all observations by 250m; (2) merging all intersecting buffer polygons into a single feature; (3) using the centroid of the resulting aggregated buffer polygon feature as the aggregated historical site.

Cogs were then divided into three categories:

1. Cogs containing a historical site are denoted as Historical Observation cogs,
2. Cogs that do not contain a historical site, but do contain at least 30 acres of Western Pond Turtle habitat modeled as “Good” (ORBIC 2017) are denoted as Modeled Habitat cogs.
3. Cogs with no historical sites, and less than 30 acres of modeled habitat rated as good were eliminated from the sample pool, and removed from the study design.

After cogs were categorized as 1) Historical Observations or 2) Modeled Habitat, a random sixteen digit number between 0 and 1 was assigned to each cog using the Excel RAND() function. Each cog type was then ranked using the randomly generated numbers with the highest random number selected as the

highest survey priority in both the Historical Observation and Modeled Habitat categories. Within each Historical Observation cog, each historical site will also receive a random sixteen digit number between 0 and 1, with the highest number within a cog receiving the highest survey priority. Sample selection for historical sites will proceed by selecting the highest ranked Historical Observation cog, and then selecting the highest ranked historical site within that cog. If sites are not accessible, or suitable habitat cannot be located in the area, surveyors can move onto the next ranked historical site within that cog. If the directions to the site are not obvious from the historical data, the surveyor will survey the best perceived habitat within a 250m radius of any historical observation point used in the aggregation of the historical site. If surveyors cannot access any of the observation points within the randomly selected historical site due to access or private property restrictions, they will document the reason through the Survey123 data submission form and select the next ranked historical site within that cog. If no sites in a cog are accessible, surveyors should move to the next ranked Historical Observation cog. After one historical site within a cog has been surveyed with a total of three visits, that cog will be considered complete; no additional Tier 1 survey sites are required within the 3-year project timeline. If time and resources allow, the surveyor can then move to the next randomly assigned cog.

The process for surveying Modeled Habitat cogs is similar, but since they do not contain historical sites, surveyors will use their local knowledge and experience to select the highest quality habitat within the cog that can be accessed to perform a multiple visit survey. This selection can be undergone either in the office using available data and knowledge or in the field during an initial visit prior to surveying, or ideally using a combination of the two.

In Year 1 (2018), we pilot tested this methodology for both types of cogs with a minimum of 40 sites, 20 Historical Observation cogs and 20 Modeled Habitat cogs. In preparation for a full Occupancy Analysis in Year 2 (2019), the coordinator worked collaboratively to develop an updated study design and consulted with statisticians to confirm that there were no major violations in reasonably conducting an occupancy analysis. Findings from the Year 1 analysis allowed for refinement of the VES protocol, ultimately reducing the number of site visits from four to three, and reducing several of the environmental variables that were required in Year 1. It was also determined that Modeled and Historic sites need to be considered separately in occupancy analysis. The protocol development sub-committee and turtle working group members were invited to discuss these recommended changes before implementation and training began in May 2019.

Surveys at the Tier 1 level are conducted by trained observers recruited from research institutions, universities, and local, state and federal agencies through the Oregon Native Turtle Working Group. It will be the responsibility of the Samara Group, the coordinator hired by ODFW, to assign surveys and coordinate efforts, with the help of regional volunteer coordinators. Each survey consists of three site visits following a standardized Visual Encounter Survey Protocol (see below). At each site surveyors will also collect environmental variables associated with detectability and a variety of other habitat variables such as basking structures and temperature (See Appendix).

To facilitate data entry from a broad set of surveyors, we are developing a digital data entry portal using ArcGIS Survey 123. This allows for the direct entry of data into handheld phones or tablets with immediate aggregation on ESRI's online server; data is then accessible from a desktop computer with an online account. Specific information on how to access and use the Survey123 application will be

included in the protocol training. Additionally, survey and observation data will be shared with project partners for integration into their respective databases.

At the end of each year, the project coordinator, with support from the Oregon Native Turtle Working Group and ODFW, will generate a report describing the following parameters:

1. The proportion of surveyed sites from historical observation sites (Historical Observation) that are still occupied. This will give us some insight into the change from previous surveys and an understanding of the geographic nature of that change.
2. The proportion of surveyed sites from cogs with habitat modeled as “Good” (Modeled Habitat) that are currently occupied by turtles.
3. An estimate of variation within our data, which will help to generate minimum sample sizes for this project and future monitoring efforts.

Tier 2 - iNaturalist

Tier 2 will collect observations of turtles that fall outside of the Tier 1 survey protocol. Anyone is invited to report their incidental observations through the iNaturalist project “Western Pond Turtles in Oregon”. This free, web-based data entry system is accessible from computers or mobile devices and can aggregate data from multiple public sources. Tier 2 will not have the power of multiple revisits, habitat data collection, or a randomized survey design, but it does provide a place to gather observation reports and allow participation by the broader public.

Visual Encounter Survey Protocol for Distribution and Occupancy (Tier 1)

Based on Bury et al. 2012 and Oregon's Native Turtle Best Management Practices (ODFW 2015); see original documents for further descriptions and citations.

Visual encounter surveys (VES) are designed for rapid assessment of species presence with minimal disturbance and can be useful for covering large areas on limited resources. By following a standard protocol with repeated visits, VES can provide an index of relative abundance and reveal population trends. For determining occupancy and detectability, we propose for Year 2 that selected sites receive three standardized surveys in a summer. Collection of environmental conditions at the time of survey aids in assessing detectability and modeling occupancy and distribution (*see below* Environmental Data).

VES methods are based on applying a standardized search effort (time-constrained or area-constrained) to detect animals visually. For pond turtles, this usually means observing turtles during bouts of atmospheric or aquatic basking, usually with aid of binoculars or spotting scopes. Here we employ both time-constrained and area-constrained methods to facilitate comparison across a wide range of habitat types. The number of replicates and duration of surveys used to relate visual counts to actual numbers of turtles can vary by location and habitat type. Therefore, comparisons should be made with caution.

Boulders or logs along or away from shore are preferred for basking by most species of freshwater turtles. Adults tend to congregate on larger basking structures, often near deeper water, whereas juveniles often bask singly in shallows. Turtles may float on top of aquatic vegetation or algal mats, sometimes with only the top of the shell exposed, or they may remain in or under the mat and poke up their heads on occasion to breathe (aquatic basking). Hatchlings and small juveniles do engage in atmospheric basking, but they may bask out of water only for short periods of time, as they heat up rapidly and are quite vulnerable to predation. Hatchlings are usually found in shallower water, but are difficult to detect at a distance because they are small and cryptic. Turtles of all sizes may also crawl out of water to bask in vegetation thickets where they can be difficult to observe.

While our VES methods target individuals engaged in basking (atmosphere or aquatic), observations of foraging, courtship, or overland movements also constitute documentation of species presence and should be included in survey results if detected while following this VES protocol. Observations made outside of this survey protocol (i.e., opportunistic or incidental observations) are difficult to standardize over time or across sites and should be reported separately under Tier 2 in iNaturalist (*see below* Reporting / Data Submission).

Field Season

The field season begins on May 1st and ends on September 15th. These dates have been chosen to provide surveyors the greatest possible opportunity to complete surveys at assigned sites. May might be too early to survey at some locations, and September too late at others however, considering this project's geographic scope and the highly variable conditions within the turtle's range in Oregon, it is important that the field season is of sufficient length to encompass all variables that allow surveys to be conducted under optimum conditions at the local level. Surveyors should aim for a minimum of 3 days between site visits.

Timing of Surveys

Regional, Seasonal, Diel, and Thermal Considerations

Pond turtles are ectotherms that rely on external energy sources to elevate and maintain body temperature during parts of their active season. Season of survey, timing of day, and environmental conditions all influence probability of detection if turtles are present. Plan surveys to target periods when turtles are most likely to be visible; generally, this means warm, sunny days when turtles are basking on rocks, logs, or other emergent structures. Latitude and season will influence ideal survey timing. These turtles often only bask out of water for 2-3 hours each day. Conduct at least one morning visit when the surface of the water is first exposed to direct sunlight; this time will vary by site and it is best to determine the exposure period prior to initiation of surveys. Morning observation periods (0800-1200 hrs.) are most productive at many sites, although in areas with coastal fog, afternoons may provide more favorable basking conditions. In general, Western Pond Turtles become more active when water temperatures consistently reach 15 °C (60 °F) (Jennings and Hayes 1994).

Turtles will avoid basking during high temperatures and may rely completely on aquatic basking, where they remain submerged in warm water areas such as hidden under algal mats or emerge to bask only briefly in the early morning. During prolonged hot periods it may be preferable to postpone a survey until daytime temperatures cool or adjust the timing of a site visit to early morning or evening. In general, these turtles engage in less atmospheric basking as the season progresses (i.e., fewer will be on basking sites at the end of summer than earlier).

Stream sampling is best conducted after winter rains and spring runoff have decreased. During high flow periods, turtles may seek off-channel habitats, take refuge upland, or hunker down beneath cover in the channel. Plan observation times to take advantage of the maximum direct solar exposure within the survey area.

Determining when to conduct a site visit can be challenging as many variables affect turtle detectability. Wind can influence detectability and should be estimated and documented for each survey period. If weather conditions change between leaving home base and arriving at a survey site, a surveyor can abandon the survey and return another day. However, if the site is remote and significant time and energy are required to access it or other time constraints limit a surveyor's ability to return another day, complete the survey and record the conditions on the survey sheet. Because wind, cloud cover, and temperature can all influence detectability, these should be documented for each survey.

Number of Observers

Surveys can be completed by one observer however, for safety reasons we recommend two people per site visit. In such cases, only ONE person should complete the visual survey. To minimize disturbance, the second person should either sit quietly next to the observer during the survey period, or remain quiet, nearby, and hidden from view. Additional personnel will increase the potential for disturbance and reduce turtle detectability. Thus, we strongly recommend that no more than two people are present during a survey.

Number and Frequency of Surveys

Sites selected for Tier 1 surveys will be visited a total of three times during the May - September season with revisits at least three days apart, but close enough together that a change in occupancy between visits is unlikely. Some deviation is permitted to accommodate weather extremes, temporary access

closures, or hydroperiod. The starting point should be based on environmental and season conditions, such as when temperatures regularly reach above 55°F (13°C).

Smaller sites, such as ponds and pools, may allow a surveyor to observe all potential basking perches from one observation point; however, most sites will be too complex or large to observe completely from a single observation point. Surveyors should initially assess the site to select a suitable observation point. In some cases, this may require a separate site visit prior to starting surveys to avoid disturbance to basking turtles.

Selecting Observation Points

Western Pond Turtles are most commonly found in calm waters (e.g. pools, coves) with basking structures, or “perches” (e.g. emergent rocks, logs), and escape cover (e.g. cover objects, vegetation, soft substrates). Algal mats and aquatic vegetation can serve as both basking and cover habitat. A good view of basking perches is probably the most important factor when selecting turtle observation points. Seek inconspicuous observation points with as many potential basking perches in view as possible to maximize turtle viewing opportunities while minimizing disturbance. A small amount of movement around an observation point (10-20 m) may be necessary to see around obstructions; this should be done quietly, and while watching for signs of disturbance to animals. Some observation points may also allow scanning below the surface of the water for swimming or foraging turtles, but this is uncommon. Turtles may use different basking sites at different times of day depending on sun angle, so make sure to survey from observation points at the times of day when the associated basking sites are sun-exposed. For streams and rivers, observers should try to select terrestrial observation points that overlook pool habitats. Although Western Pond Turtles move through all types of stream habitats, most time is spent in pools and glides, or areas with heavy cover. After selecting an observation point, document the location for repeat visits. Record the exact coordinates of each observation point using GPS (lat/long or specify UTM and datum), an aerial photograph, or quality map. Describe how to relocate the point and how to minimize any disturbance when approaching. Estimate approximate size of water body and proportion of area covered in observation. Datasheet and metadata are provided in the Appendix.

Observation Techniques

Western Pond Turtles have keen sight and hearing. They readily detect approaching humans and may leave basking perches at the first sign of danger even when the disturbance or threat is a considerable distance away. Observers should adopt measures to minimize disturbance to turtles; avoid wearing brightly colored or white clothing; communicate with others by signing or in hushed tone; and, avoid making loud noises such as slamming car doors. Stealthily approach an observation point making use of available cover (e.g., shrubs, trees) and get comfortable in a non-conspicuous spot. If you must approach in the open, move slowly and directly towards the turtles. Turtles seem less disturbed if you approach from a bluff or above the basking area rather than walking up to a stream or a pond at the same level. If disturbed, turtles may remain submerged in aquatic refuges for periods longer than the typical survey duration. Once at the survey site, the observer will record turtle observations in six 5-minute intervals during the 30-minute observation period.

Binoculars are an important tool for these visual surveys. Higher power instruments such as spotting scopes may be helpful to confirm the species and, in some cases, to determine sex. Start with a scan of prominent emergent structures (e.g., rocks, logs, brush piles, vegetation) for turtles basking in full view,

then shift to searching for turtles in more cryptic positions. Turtles may bask hidden in willows, cattails, or other shaded areas, especially during warmer conditions. Scan the water surface for turtle heads, noses, or exposed carapaces. Wakes and moving vegetation can alert the observer that a turtle may be beneath the surface, but the animal must be seen to confirm a sighting and species identification. Before conclusion of the survey period, remember to re-scan prominent basking perches for turtles that may have emerged during the survey period.

Disturbances caused by animals (including the surveyor) during the survey period can invalidate the effort. When this occurs and if time permits, reinitiate VES after waiting until normal basking activity resumes. Some high use areas (e.g., recreation sites) may experience heavy disturbance on weekends or other times of high human-use. These areas may need to be surveyed during low human-use periods. Turtles that have gone into the water, often show their noses or heads at the surface within 15 minutes and may eventually crawl back onto basking sites if the observer remains quiet and well hidden.

Accommodating Habitat Variation

Western Pond Turtles occur in a wide variety of habitat types. Typically, survey methods vary depending on the suitability of conducting VES from land or water. During the 2018 survey year we proposed different methods for large lentic water bodies and for lotic habitats. In these habitats the surveyor moved around the habitat area during the 30-minute observation period in order to increase visual coverage of the site. However, we found that these modifications increased the likelihood that disturbed turtles would not re-emerge before the observer had moved to another survey location. Results from the 2018 occupancy analysis showed that detectability probability was significantly lower for lotic habitats in particular and it was decided that for the 2019 survey year, all sites would be surveyed from a single terrestrial location and would follow the “land-based survey” protocol described below.

Land-based Surveys

Land-based surveys are effective where observers have visual access to appropriate basking habitats, and may be more effective than water-based surveys in some situations.

A 30-minute survey comprised of six 5-minute observation periods, will be used for rapid assessment of turtle presence. Conduct a 30-minute VES from the selected observation point. During each 30-minute period, record and report a count of turtles every five minutes; do not report an average or the cumulative total.

During each 5-minute observation period, surveyors should continuously scan the entire area using both binoculars and unaided vision. Compared to binoculars restricted field of view, scanning with the unaided eye provides surveyors the ability to see more of the observation area at one time. Binoculars, however, allow investigation of turtle activity that is hard to see with the unaided eye, such as turtle noses poking out of aquatic vegetation. Besides being physically and mentally demanding, relying solely on the use of binoculars may cause the surveyor to miss critical information that affects turtle activity and detectability. For example, an otter swimming out of the binoculars field of view.

Environmental Data

A standard set of environmental variables should be recorded for each survey. These include weather, habitat variables, and human disturbance (See Location and Environmental Variables Table in Appendix).

Environmental variables will be collected at the conclusion of each 30-minute observation period. Observation Point selection, site photographs, collecting environmental variables, and recording data all add to the survey, so allow for at least an hour on site to complete a 30-minute observation during repeat surveys and plan for additional time during the initial site visit.

Reporting / Data Submission

Tier 1 – Survey123

Data recorded in Tier 1 surveys will be reported using Survey123 and placed in the GIS-based sampling framework for later analysis. While lack of detection does not constitute absence, it is important to submit negative observations (i.e., if you follow the survey protocol and do not observe any turtles, please record and report the negative observation including environmental data). Use the guidelines provided below to report turtle survey data to ensure data are properly linked to this project and your state's diversity database network.

If Survey123 online data submission is not feasible, a hard copy form can be taken into the field, then entered electronically by following the Survey123 project link (see Data Entry section of Appendix). In rare cases when electronic submission is not possible, hard-copies of observation data sheets can be mailed to Samara Group, the project coordinator until 2020 at the address: 80 SE Madison St. Suite 330 Portland, Oregon 97214. After 2020, submit observations directly to your state's Department of Fish and Wildlife. A standardized data sheet is also provided in the Appendix.

Tier 2 – iNaturalist

Observations of Western Pond Turtles that do not follow the standard protocol for Tier 1 surveys, are not from randomly selected sites in our sampling frame, or are "incidental observations" are still a valuable part of this effort. This data will supplement distribution maps and help validate occupancy models. Please submit these observations to the project through the free web-based data entry system accessible from computers or mobile devices, iNaturalist. This system records positive-only observations as simple dots on a map with a date; environmental data are optional, but strongly encouraged. Log in to iNaturalist.org and search projects "Western Pond Turtles in Oregon". Join the project, and then you are able to add observations to this project. Enter the information as prompted.

You can check the status of your entry by viewing the species map. Public view limits detection location to a 10-mile radius, but project curators can see location details to the level reported (iNaturalist automatically masks location in public view for IUCN vulnerable species).

There are currently two iNaturalist Projects for western pond turtles; our Tier 2 observations are directed to the project named "Western Pond Turtles in Oregon" curated by Samara Group and including the ODFW logo.

Required data fields on the iNaturalist page include the waterbody feature the turtle(s) were observed in, the total Number of Western Pond Turtles observed, and the level of certainty of the identification. Optional fields include the number of Western Pond Turtle hatchlings and/or juveniles observed,

elements of disturbance such as human recreation activities and presence of domestic animals, presence of nesting activity, presence of basking structures, and weather conditions. There are additional optional fields to record other aquatic turtle species observed such as the native Western Painted Turtle and the invasive Red-eared Slider and Snapping Turtle.

See the Appendix for additional information on the iNaturalist data entry options and project link.

Citations and Background Literature

- Ashton, D.T., A.J. Lind, and K.E Schlick. 1997. Western Pond Turtle (*Clemmys marmorata*). Natural History. USDA Forest Service, Pacific Southwest Research Station, Arcata, CA. Pp.22. Available at: http://www.krisweb.com/biblio/gen_usfs_ashtonetal_1997_turtle.pdf [Accessed 02/27/2018]
- Ashton, D.T., J.B. Bettaso, and H.H. Welsh, Jr. 2015. Changes across a decade in size, growth, and body condition of Western Pond Turtle (*Actinemys marmorata*) populations on free-flowing and regulated forks of the Trinity River in northwest California. *Copeia* 103(3):621-633.
- Ashton, D.T., H.H. Welsh, Jr., R.B. Bury, and C. Haws. 2012. Sampling design considerations. Western Pond Turtle: Biology, Sampling Techniques, Inventory and Monitoring, Conservation, and Management. Bury, R.B., H.H. Welsh, Jr., D.J. Germano, and D.T. Ashton (Eds.) Northwest Fauna 7:21-27.
- Ashton, D.T., K. Beal, S. Wray, N.E. Karraker, D.A. Reese, K.E. Schlick, , F. Slavens, K. Slavens, and R. Goggans. 2012. Field procedures. Western Pond Turtle: Biology, Sampling Techniques, Inventory and Monitoring, Conservation, and Management. Bury, RB, H.H. Welsh, Jr., D.J. Germano, and D.T. Ashton (Eds.). Northwest Fauna 7:57-67.
- AZA (Association of Zoos and Aquariums). 2015. SAFE: Saving Animals from Extinction Program. Western Pond Turtle Conservation Action Plan. Available at: <https://www.aza.org/safe-western-pond-turtle-conservation-projects> [Accessed 02/27/2018]
- Bury, R.B., and D.J. Germano. 2008. *Actinemys marmorata* (Baird and Girard) - Western pond turtle, Pacific pond turtle. Pp. 001.1-1.9. In Rhodin, A.G.J., P.C.H. Pritchard, P.P. van Dijk, R.A. Saumure, K.A. Buhlman, and J.B. Iverson (eds). The Conservation Biology of Freshwater Turtles and Tortoises. Chelonian Research Monograph 5.
- Bury, R.B., D.T. Ashton, and R. Horn. 2012. Visual encounter surveys. Western Pond Turtle: Biology, Sampling Techniques, Inventory and Monitoring, Conservation, and Management. Northwest Fauna 7:29-35.
- Bury, R.B., H.H. Welsh, Jr., D.J. Germano, and D.T. Ashton (Eds.). 2012. Western Pond Turtle: Biology, sampling techniques, inventory and monitoring, conservation, and management. Northwest Fauna 7. 128 pp.
- Bury, R.B., D.T. Ashton, H.H. Welsh, Jr., D.A. Reese, and D.J. Germano. 2012. Synopsis of biology. Western Pond Turtle: Biology, Sampling Techniques, Inventory and Monitoring, Conservation, and Management. Northwest Fauna 7:9-19.

- Hays, D.W., K.R. McAllister, S.A. Richardson, and D.W. Stinson. 1999. Washington state recovery plan for the Western pond turtle. Department of Fish and Wildlife, Olympia, Washington. Pp.66.
- Holland, D. C. 1993. A synopsis of the distribution and current status of the Western Pond Turtle (*Clemmys marmorata*) in Oregon. Unpublished report to the Nongame Division, Oregon Department of Fish and Wildlife. Pp.41. Available at: http://www.fwspubs.org/doi/suppl/10.3996/012016-JFWM-005/suppl_file/fwma-08-01-05_reference+s2.pdf
- Jennings, M.R. and M.P. Hayes. 1994. Amphibian and Reptile Species of Special Concern in California. Final Report submitted to the California Department of Fish and Game, Inland Fisheries Division. Pp. 255
- Lewis, J.C. 1970. Wildlife census methods: A resume. Journal of Wildlife Diseases 6:356-364. Available at: <http://www.bioone.org/doi/pdf/10.7589/0090-3558-6.4.356>.
- Lindenmayer, D. and B. Scheele. 2017. Do not publish: limiting open-access information on rare and endangered species will help protect them. Science 365(6340):800-801.
- ODFW (Oregon Department of Fish and Wildlife). 2015. Guidance for Conserving OR's Native Turtles including Best Management Practices. Oregon Dept. of Fish and Wildlife. Pp.99. Available at:
- Oregon Biodiversity Information Center (ORBIC). 2017. Western Pond Turtle predicted distribution in Oregon [Map]. Institute for Natural Resources, Corvallis, OR.
- Reese, D.A. and H.H. Welsh, Jr. 1998a. Comparative demography of *Clemmys marmorata* populations in the Trinity River of California in the context of dam-induced alternations. Journal of Herpetology 32(4):505-515.
- Reese, D.A. and H.H. Welsh, Jr. 1998b. Habitat use by Western Pond Turtles in the Trinity River, California. Journal of Wildlife Management 62(3):842-853.
- Rosenberg, D., J. Gervais, D. Vesely, S. Barnes, L. Holts, R. Horn, R. Swift, L. Todd, and C. Yee. 2009. Conservation Assessment of the Western Pond Turtle in OR. Version 1.0, November 2009. Available at: <http://people.oregonstate.edu/~rosenbed/articles/Western%20Pond%20Turtle%20Conservation%20Assessment%20Vers%201.0.pdf> [Accessed 02/27/2018]
- Rosenberg, D., and J. Gervais. 2012. Conservation Plan for Native Turtles in the Columbia Slough, Portland, Oregon. Version 1.0. Report to City of Portland BES, Metro, Port of Portland, Oregon Wildlife Heritage Foundation prepared by Oregon Wildlife Institute. Pp 126.
- Ruso, G.E., E. Meyer, and A.J. Das. 2017. Seasonal and diel environmental conditions predict Western Pond Turtle (*Emys marmorata*) behavior at a perennial and an ephemeral stream in Sequoia National Park, California. Chelonian Conservation and Biology 16(1):20- 28.
- Snover, M.L., M.J. Adams, D.T. Ashton, J.B. Bettaso, and H.H. Welsh, Jr. 2015. Evidence of counter-gradient growth in Western Pond Turtles (*Actinemys marmorata*) across thermal gradients. Freshwater biology, 60(9):1944-1963.
- Snover, M.L. and M.J. Adams. 2016. Herpetological monitoring and assessment on the Trinity River in Trinity County, California. Final Report: U.S. Geological Survey Open-File Report 2016-1089. Pp. 93. Available at: <https://pubs.er.usgs.gov/publication/ofr20161089> [Accessed 02/26/2018]

Thomson, R.C., A.N. Wright, and H.B. Shaffer. 2016. California Amphibian and Reptile Species of Special Concern. Co-published with the California Department of Fish and Wildlife. University of California Press, Oakland. 390 pp.

Welsh, H.H., Jr., and G. Hodgson. 1997. A hierarchical strategy for sampling herpetofauna assemblages along small streams in the Western U.S., with an example from northern California. *Transactions for the Western Section of the Wildlife Society* 33:56-66.

APPENDIX

Appendix Contents

Preparations before going into the field

Data entry

Data entry instructions
Survey123
iNaturalist

Data sheets for Tier 1 surveys

Turtle Counts
Location and Site information
Environmental Variables
Disturbance Factors

Resources

Wind Scale
Species Identification

Preparation before going into the field

Check Weather Conditions

Target days and times where the temperature is between 55 & 85 degrees Fahrenheit (13 and 30 degrees Celsius) and it is at least partly sunny with light/no wind

Field Equipment Checklist

- Binoculars (8x32) or Spotting Scope (20-60x)
- Handheld device or smartphone for data entry and photos
- Clip board with maps and paper data sheets
- GPS unit & camera (if not using smartphone)
- Stopwatch or timer
- Thermometer (air and water in degrees C)
- Meter tape or yard stick
- Tan or dark clothes; plain hat
- Muck boots/waders
- Personal items such as: water bottle, folding light chair, etc.

Data Entry

Tier 1 - ESRI's Survey123



To access the online data entry form, please download the Survey123 App onto your smartphone device. Then scan the QR code or search in the Survey123 app for the project “2019 - Western Pond Turtle Oregon Surveys” to access the project.

You can also upload data into Survey123 from your computer by copying and pasting this link into your browser: <https://arcg.is/9bXWS>

If you are unable to submit your survey online, please contact Leslie Bliss-Ketchum (Leslie@samarapdx.com) for assistance, or mail the completed paper data sheets to:

Samara Group
80 SE Madison Street, Suite 330
Portland OR 97214

Surveys must be completed no later than September 15 2019. All survey data must be entered into the Survey123 system or received via email or mail by **October 1st, 2020 to be included in analysis.*

Tier 2 - Incidental observations: iNaturalist



To record turtle observations in additional locations outside of assigned cogs and observation points please use the “Western Pond Turtles in Oregon” iNaturalist project. Access the project using your smart phone device and the QR code or this link: <https://www.inaturalist.org/projects/western-pond-turtles-in-oregon>

Northwestern Pond Turtle Survey Data Sheets 2020

***Please be sure to return all paper data sheets to Samara Group before October 1st, 2020**

Observer 1 Name and Email: _____

Observer 2 Name and Email: _____

**Please include supervisor's contact information under "Observer 2" if you are in a temporary, seasonal position.*

Survey and Site Information		
CATEGORY	VARIABLE	RESPONSE
SURVEY & SITE INFORMATION	Site Name (Please take note of the site name used and be sure it is consistent for each observation conducted at this site)	
	Name of Waterbody (if known)	
	Site description (Please provide a verbal description with landmarks or other information that indicate the spatial location of your actual survey point.)	
	Access notes (Include vehicle parking location and specific description from vehicle to observation point. Include additional notes as needed to access other observation points or if unable to access the site and why.)	
	Cog ID (###H)	
	Survey Date (mm/dd/yy)	
	GPS coordinates (lat/long)	

	<p>Are you able to proceed with your survey at this location? If Yes please continue with the form. If No please provide the reason you are unable to conduct your survey and submit the data sheet.</p>	<p>If No, why?</p> <ol style="list-style-type: none"> 1. Lack of habitat within 250m of historic location 2. Challenges accessing location 3. Other:
	<p>Percent of survey site observed</p>	<p>_____ %</p>
	<p>Survey Start Time (hh:mm)</p>	
	<p>Photo of viewshed from observation point</p>	<p>(attach and email to m.hepner@samarapdx.com along with completed observation sheet)</p>

<p>Turtle Observations</p>		
<p>Observation Start Time: _____</p>		
<p>Observation Period</p>	<p>Number of Turtles Observed</p>	<p>Northwestern Pond Turtle Age Class</p>
<p>0 - 5 min</p>	<p>#___ Northwestern Pond Turtle #___ Western Painted Turtle #___ Red-eared Slider #___ Other non-native aquatic turtle: _____ #___ Unknown aquatic turtle:</p>	<p>#___ Adult #___ Juvenile #___ Hatchling</p>
<p>6 - 10 min</p>	<p>#___ Northwestern Pond Turtle #___ Western Painted Turtle #___ Red-eared Slider #___ Other non-native aquatic turtle: _____ #___ Unknown aquatic turtle:</p>	<p>#___ Adult #___ Juvenile #___ Hatchling</p>
<p>11 - 15 min</p>	<p>#___ Northwestern Pond Turtle #___ Western Painted Turtle #___ Red-eared Slider</p>	<p>#___ Adult #___ Juvenile #___ Hatchling</p>

	# ___ Other non-native aquatic turtle: _____	
	# ___ Unknown aquatic turtle:	
16 - 20 min	# ___ Northwestern Pond Turtle # ___ Western Painted Turtle # ___ Red-eared Slider # ___ Other non-native aquatic turtle: _____	# ___ Adult # ___ Juvenile # ___ Hatchling
21 - 25 min	# ___ Northwestern Pond Turtle # ___ Western Painted Turtle # ___ Red-eared Slider # ___ Other non-native aquatic turtle: _____	# ___ Adult # ___ Juvenile # ___ Hatchling
26 - 30 min	# ___ Northwestern Pond Turtle # ___ Western Painted Turtle # ___ Red-eared Slider # ___ Other non-native aquatic turtle: _____	# ___ Adult # ___ Juvenile # ___ Hatchling
Please include photos of observed turtles when possible and submit through email with your data form.		

Environmental Variables		
CATEGORY	VARIABLE	RESPONSE
WEATHER	Sky (select one): Clear, few clouds, mostly cloudy, stormy, overcast, smoky	
	Precipitation (select one): Dry, fog, drizzle, light rain, heavy rain, hail, sleet, snow	
	Wind: 1-10 (Beaufort Wind Scale values [see below*])	

TEMPERATURE	Air Temperature °C (Sun at 10 cm above ground)	_____ °C
	Water Temp °C* (If accessible, collect 4 cm below the water surface. Full sun and no aquatic vegetation/obstructions. Water column depth = approx. 45 cm) *if accessible	_____ °C

Habitat Variables		
CATEGORY	VARIABLE	RESPONSE
WATER BODY	Wetland, marsh, pond, lake, reservoir, creek, stream, river	
HABITAT SUITABILITY	Number of Basking structures present (At least 6" wide, 1 ft long, and less than 50% decomposed)	# ___ Wood # ___ Rock # ___ Vegetation # ___ Other: _____
	Presence of bare ground or vegetation <1 ft tall and without canopy cover	Yes/No If yes, describe area: Include distance from water and location relative to the survey site (e.g. 50m from SW corner)
HABITAT SUITABILITY Continued	Presence of floating or emergent vegetation within approximately 2 ft along shoreline	Yes/No If yes, describe vegetation: Describe vegetation (e.g. overhanging willows, aquatic vegetation, etc.)
	Presence of aquatic vegetation?	Yes/No If yes, describe approximate percent vegetation cover:

Disturbance Factors		
CATEGORY	VARIABLE	RESPONSE
INVASIVE SPECIES	Bullfrogs observed?	Yes / No
	Warm water fish observed?	Yes / No
SURVEY SITE DISTURBANCE FACTORS	Human aquatic recreation?	Yes / No If yes, indicate type (circle all that apply): Motorized/non-motorized watercraft, fishing from a boat/shore, swimming, waterskiing, other:
	Human land traffic seen or heard from the observation point?	Yes / No If yes, indicate type (circle all that apply): Hiking, cycling, boating, motorized vehicles, horse riding, other:
	Domestic animals?	Yes/No If yes, indicate type:
	Natural/other disturbance?	Yes/No If yes, indicate type:

End Survey Visit
Survey End Time (hh:mm):

*Please be sure to return this data **before October 1st 2020**. Scanned copies and photos can be emailed to m.hepner@samarapdx.com

Resources

Beaufort Wind Scale

For Wind Conditions, use this Beaufort Scale(source: <http://www.unc.edu/~rowlett/units/scales/beaufort.html>)**Beaufort Scale**

FORCE	NAME	Miles/hr	WIND CONDITIONS
0	Calm	< 1	Smoke rises vertically.
1	Light Air	1-4	Smoke drifts and leaves rustle.
2	Light Breeze	5-7	Wind felt on face.
3	Gentle Breeze	5-11	Flags extended, leaves move.
4	Moderate Breeze	12-18	Dust and small branches move.
5	Fresh Breeze	19-24	Small trees begin to sway.
6	Strong Breeze	25-31	Large branches move, wires whistle.
7	Near gale	32-38	Whole trees in motion, inconvenience in walking.
8	Gale	39-46	Difficult to walk against wind. Twigs blown off trees.
9	Strong Gale	47-54	Minor structural damage occurs (shingles blown off)
10	Storm	55-63	Trees uprooted, structural damage likely.

Species Identification

Images below taken from: ODFW. 2015. Guidance for Conserving Oregon’s Native Turtles including Best Management Practices. Oregon Dept. of Fish and Wildlife. 99 pp.

Native Turtles

Western Pond Turtle - *Actinemys marmorata* (also *Emys*)



Photo Credit: ODFW

Head, neck and leg color same as top shell with flecking pattern

Carapace dark brown to olive



Photo Credit: Ben Power

Carapace has smooth edge

Plastron creamy yellow usually with dark staining

Native Turtles

Western Painted Turtle - *Chrysemys picta bellii*



Photo Credit: ODFW

Yellow, orange, or red stripes on neck and legs

Carapace dark green-black



Photo Credit: Dan Lake

Carapace has smooth edge

Plastron red with unique black pattern

Non-Native Turtles

Red-eared Slider - *Trachemys scripta elegans*



Photo Credit: Myron Wells

Red stripe behind eye

Yellow stripes on head, neck and legs

Carpace dark brown with a serrated edge

Bridge yellow with dark blotches

Plastron yellow with dark blotches

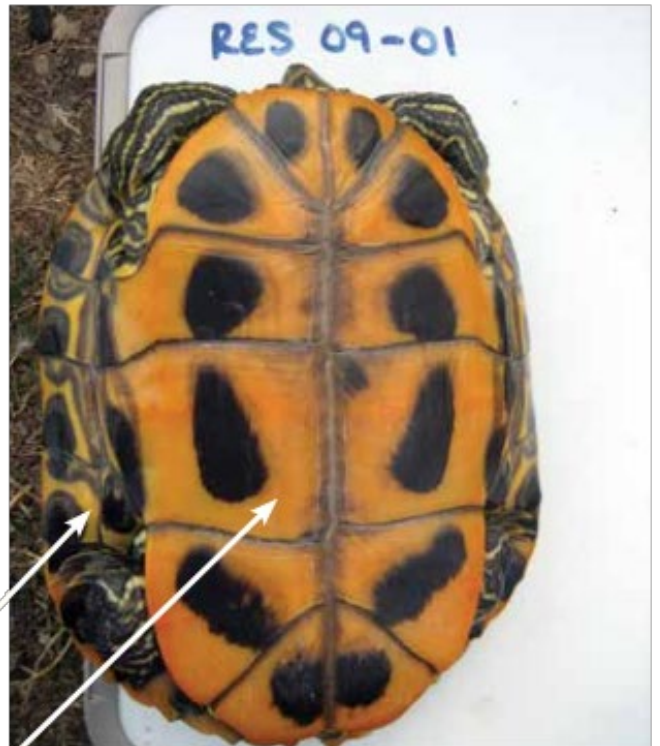


Photo Credit: Laura Guderyahn

Non-Native Turtles

Common Snapping Turtle - *Chelydra serpentina*



Photo Credit: ODFW

Carpace brown to black, serrated edge

Very large head and thick legs

Bumpy skin

Long serrated tail

Very small plastron compared to body size

Very large claws

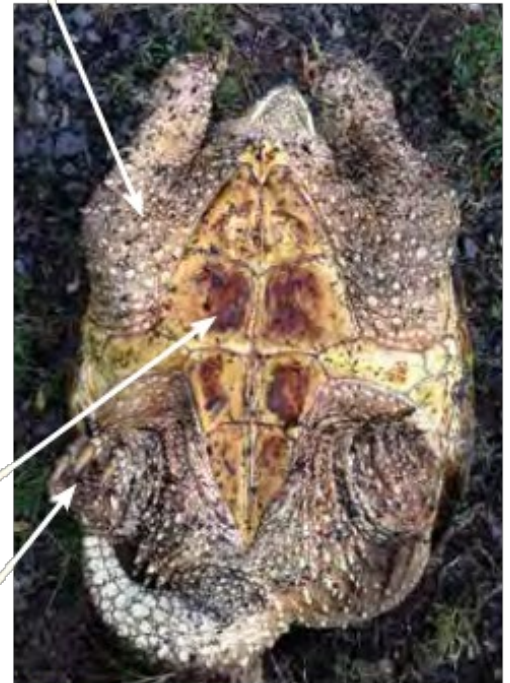


Photo Credit: ODFW