

Distribution of Western Pond Turtle Populations in the Willamette River Basin, Oregon

Project Report to the Western Pond Turtle Working Group
c/o McKenzie Ranger District, McKenzie Bridge, Oregon

by

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Contents

Acknowledgments	3
Introduction	4
Methods.....	4
Data Entry and Analysis.....	7
Results.....	8
Recommendations.....	11

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Introduction

The Western Pond Turtle (*Emys marmorata marmorata*), like most turtles, attracts significant public interest and concern. Part of the growing concern stems from apparent contraction of its historical range and numbers within all or a portion of the Willamette River Basin. Consequently, in this region the US Forest Service (Region 6) has designated it as “Sensitive Species” and the Oregon Department of Fish and Wildlife (ODFW) has designated the turtle as “Sensitive Species – Critical.” The latter listing is advisory only and has helped heighten public and agency awareness of the species and its habitat requirements. One result has been the formation of a Western Pond Turtle Working Group (WPTWG), an interagency group whose mission is to improve and communicate scientific understanding of the species. Recently, members of the WPTWG noted the lack of a well-organized, comprehensive body of up-to-date information on geographic distribution of the species within the Willamette River Basin, traditionally one of its strongholds in the Pacific Northwest. Such information is vital to decisions regarding whether and where to manage the species more intensively and to adjust legal protections of its habitat. Consequently, and in collaboration with several watershed councils which shared this concern about lack of good geographic data, the WPTWG initiated a project represented by this report.

The project results should not be represented as a highly definitive, statistically unbiased determination of the status of the species in the Willamette River Basin or any of its watersheds. Rather, the primary aim of the project was to update and, if possible, expand the database that has provided the most comprehensive geographic information on the species: the database of the Oregon Natural Heritage Information Center (ORNHIC). The project aimed to provide additional information on the species’ occurrence particularly on private lands within the region.

Methods

Data Collection

I began by obtaining and reviewing the existing ORNHIC database, which contains 170 records of Western Pond Turtle (hereinafter abbreviated WPT) in this region. Using geographic coordinates reported in the database, I plotted existing records on detailed (1:24,000 scale) topographic maps, one per location. This provided more useful contextual information (roads, topography, etc.) than was provided by an existing GIS plot of the locations. From the same source, I also plotted and labeled the locations on coarser-scale (1:150,000) regional base maps contained in the DeLorme *Oregon Atlas and Gazetteer*. Such maps are more suitable for planning driving routes to check multiple turtle locations.

I then began to identify locations not already in the database, using four sources:

1. Additional field surveys I conducted during 2002
2. Published reports
3. Contacts with other field biologists
4. Contacts with landowners

1. Field Surveys

The selection of an appropriate protocol for field surveys of turtles is entirely dependent on project objectives. For this project, the WPTWG had decided that the primary objective should be to attempt to expand the existing list of known turtle locations. The project was not designed to estimate relative abundance, demographic structure, temporal trends, or habitat preferences, or to detect nests. Thus, a rapid, visual protocol (modified from the Basic Visual Survey, BVIS, described by Bury et al. *in draft*) was selected that is geographically extensive but which also is perhaps less likely to detect turtles that are present at a particular location. The protocol consists simply of quietly approaching a pond or other aquatic site and scanning for turtles using a spotting scope and/or binoculars. Generally, no less than 3 minutes are spent scanning, and much longer times are warranted when larger expanses of suitable habitat are viewable. Turtles that are basking on above-water structures are most easily spotted, but the observer also attempts to locate turtles that are just beneath the water surface, swimming or resting with only a snout protruding above-water. Closest scrutiny is given to shallow water areas with little or no current and full solar exposure. The only previous visual survey covering the entire Willamette River Basin was conducted in 1991-1993 by Dan Holland and assistants, and covered 303 carefully selected sites. Turtles were found at 19% of those sites at least once during the 3-year survey.

I visited most sites a single time on sunny days during the period March 28 to August 30, 2002, and March 1 to April 28, 2003. Although repeat visits to a larger proportion of the sites certainly would have increased the odds of finding turtles at those sites, many fewer sites could have been visited. Given the study's primary objective of expanding the geographic knowledge of the species, I gave greater weight to visiting more potential sites than to revisiting particular sites. Whenever I spotted a WPT, I photographed the site using a digital camera. JPG images are available upon request. All turtle species were recorded.

Before beginning the field work, I closely examined maps to identify all ponds and other potential turtle habitats that might be viewed from the extensive road network in this 5300 square-mile region. I mainly scrutinized the 1:24,000 USGS topographic maps, but also checked wetland maps of the National Wetland Inventory, maps provided by Weyerhaeuser and BLM for lands they manage, and local detailed gazetteers for the Portland area. I plotted approximately 800 such locations on maps in the Delorme *Oregon Atlas and Gazetteer*, and marked those from which pond turtles had previously been reported according to the ORNHIC database. At the suggestion of the WPTWP, highest priority was accorded to my visiting potential sites that (a) had no prior reports of turtles, (b) were in the partnering watersheds: Long Tom and McKenzie, and (c) were below 1500 ft elevation. Nonetheless, I ultimately visited a majority of all road-accessible ponds and large river slackwater sites in the Willamette River Basin. I did not visit potential sites draining to the Columbia River (e.g., Sauvie Island area, Burlington Bottoms, Smith-Bybee Lakes, Columbia Slough area) or to the Oregon coast (e.g., upper Alsea, Siletz) because they are outside of the Willamette River Basin.

The approximately 800 road-accessible sites I identified for visiting comprise an unknown proportion of all potentially suitable turtle habitat in the region. The proportion is unknown because assessments of habitat suitability for WPT using only existing maps and GIS are

probably subject to substantial errors of commission and omission. That is because many key structural factors (e.g., water depth, occurrence of basking structures) are unmapped or operate at a finer scale than depicted by available maps.

The ability to view sites from adjoining roads varied greatly. In many instances, vegetation, structures, or topography blocked views of likely turtle habitat. Even at sites that offered partial views, it was not possible to adequately assess habitat potential for turtles because doing so requires the ability to see the entire site.

2. Published Reports

Members of the WPTWG provided a few reports and unpublished data sheets whose information had not been fully incorporated into the ORNHIC database. The most substantive of these were two reports by Turnstone Environmental Consultants: *1997 WPT Survey Project* and *1998 Willamette Valley WPT Level 1 Surveys on the Calapooia, Row, and Tualatin Rivers*. A bibliography covering this species was used to identify recent publications (see: <https://www.nwp.usace.army.mil/op/V/webbib.htm>).

3. Contacts With Other Biologists

By phone or email, I contacted 168 other biologists anticipated to know of turtle locations in the region. These persons are listed in Appendix A.

4. Contacts With Landowners

I met several landowners while scanning ponds from the road. All interactions were positive. These chance encounters provided an opportunity to learn if turtles had been seen on other dates, and to explain measures that might be implemented to enhance habitat. I anticipated that a “knocking on doors” approach to meeting pond owners would not be efficient because (a) many landowners are not at home during the day on weekdays, (b) people surprised by a stranger at the door might be less interested, and (c) persons residing next to ponds are often tenants, not the actual pond owner, and therefore could not grant access permission. Thus, I took an alternative approach consisting of a bulk mailing to pond owners in the region, augmented by phone calls to pond owners for whom I had only a phone number. I also personally requested and was granted permission to survey turtles on property of some of the largest private landowners: Weyerhaeuser/Willamette Industries, Boise-Cascade, and Morse Brothers Sand & Gravel.

For the bulk mailing, I developed a consolidated address list of owners of possible turtle habitat from the following sources:

- Oregon Water Resources Department:
 - Permitted Ponds database
 - Permitted Dams database
- Oregon Department of Environmental Quality:
 - Wastewater Permits Database
- contacts with other biologists

- use of reverse-lookup databases on the internet, using addresses or names on mailboxes I had noted close to the potential turtle site
- digital parcel ownership map for Lane County

The mailing consisted of a cover letter describing the project and anticipated use of the data. It included a prepaid reply postcard.

Of 1,105 landowners contacted by mail (excluding letters sent to faulty addresses), 210 (19%) responded. Of these, 59 (28%) checked the box, "*Yes, turtles have been noticed in my pond or neighborhood*" and 151 (72%) checked the box, "*No turtles, or I don't know for certain.*" A total of 38 (64%) of the "yes" responders and 52 (34%) of the "no" responders explicitly indicated a willingness to allow surveys on their property. Due to time and logistical constraints, I was unable to visit all who expressed such willingness.

Although I did not specifically request reports of non-adult turtles and turtle nests, none of the responders mentioned finding these. Several mentioned observing declines in turtles over the decades they had lived at their current address, and none mentioned apparent increases.

The mail survey did not require responders to identify which turtle species they were reporting. The mail survey cannot be considered statistically representative because not all owners of potential turtle habitat were identified. Moreover, the veracity of the information provided could not be independently determined, and differences may exist between those who chose to reply and those who did not, as well as among the observational skills of pond owners.

In addition, I solicited observations through county agricultural extension agents, Oregon State Police (river patrol), and via (a) newsletters of all watershed councils, Audubon chapters, Willamette Kayak & Canoe Club, and professional wildlife societies in the region, and (b) internet list-serve groups (White-Water, Oregon Birders On Line, OSU biology/wildlife students and staff), and (c) radio broadcast (KLCC's "Natural World with John Cooney").

Data Entry and Analysis

A database (WPT_LOCS) consisting of all records was created using Paradox 3.1. Identical copies were created in Microsoft Excel 2000, Microsoft Access 2000, and dBase4. To facilitate transfer of information, the database contains most of the data fields present in the ORNHIC database, plus a few new ones that aid interpretation.

I implemented several database sorts and queries to assure completeness and consistency of data coding, and to then compute tallies of particular data fields. I then prepared a Data Dictionary (Appendix B) that explains each field in the database. Because of the descriptive nature of this study, I conducted no statistical analyses of the data.

Results

Including the 168 sites previously entered in the ORNHIC database, the total number of recorded sites for Western Pond Turtle in the Willamette River Basin is 448. Records added by this project number 280. However, many historical sites have not been checked in many years. If we count only the sites where WPTs have been sighted within the last 5 years (1998-2002), the total is 257. Also, the definition of “site” is quite nebulous. In several instances, a single record in the ORNHIC database may represent several discrete ponds, sloughs, or river reaches, each containing one or more turtles and separated by as much as 0.5 mile.

Of the 280 records added by this project, 112 were classified as “definitely” WPT, 99 were classified as “probably” WPT, and 69 were classified as “possibly” WPT because observation conditions were very poor or they were secondhand reports from non-biologists in areas where the probability of non-native turtles occurring is greater (Multnomah, Washington, Yamhill, Clackamas Counties). Of particular note is the fact that observations of non-adult turtles comprise only 3 of the 280 records added to the database. This may be partly attributed to the fact that many sites were not revisited; studies elsewhere in Oregon suggest that more-frequent surveys yield more detections of non-adults (R. Horn, unpublished data).

In addition to adding records, I updated 54 existing records in the ORNHIC database, i.e., a newer “last observed date” was substituted for the one currently in the database. Updating was completed for 32% of the existing records, resulting in the distribution of sites by year shown in Figure 1. Prior to this project, the most recent records in the database were from 1998 (just 3 records).

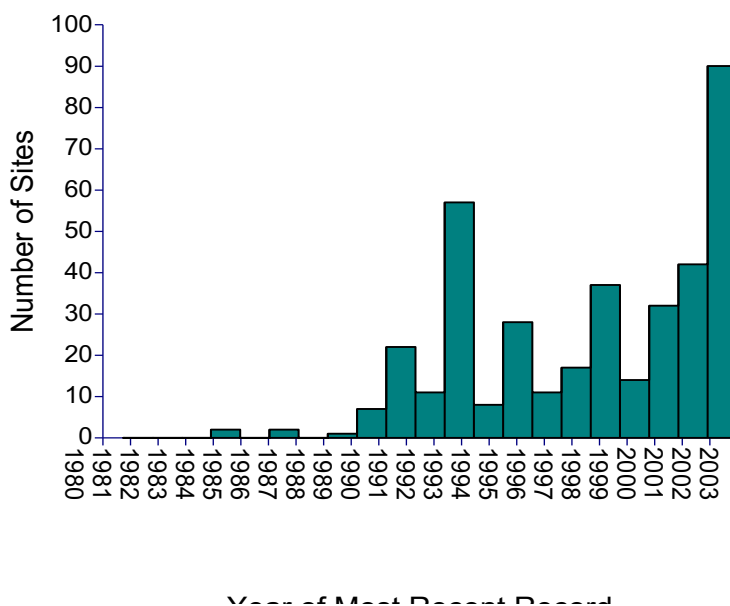


Figure 1. Newness of observation records of WPT in the ORNHIC database following completion of this project

By county, the distribution of all known sites is as follows:

	Original Database	Records Added/	Total (%)
Benton	18 (11)	27 (10)	45 (10)
Clackamas	1 (1)	19 (7)	20 (4)
Lane	108 (64)	86 (31)	194 (43)
Linn	21 (12)	58 (21)	79 (18)
Marion	4 (2)	34 (12)	38 (8)
Multnomah	0 (0)	1 (1)	1 (1)
Polk	3 (2)	19 (7)	22 (5)
Washington	8 (5)	18 (6)	26 (6)
Yamhill	5 (3)	18 (6)	23 (5)

The above results suggest this species may be distributed somewhat more evenly within the region than implied by records in the original database. However, without random sampling, the true distribution pattern of the species cannot be known with certainty. Random sampling, and even stratified-random sampling, is notoriously ineffective for surveying rare species because of the enormous sample sizes (number of sites) required to establish adequate power of detection.

Organized by finer-scale watersheds within the Willamette River Basin, the distribution of known sites is as follows:

(Note: only the 280 *added* records were assigned to a finer-scale watershed; only watersheds with >1 new record are listed below):

Associated Watershed	# of new records
Willamette Mainstem	56
Calapooia R.	30
Long Tom R.	25
Yamhill R.	20
McKenzie R.	18
Tualatin R.	18
South Santiam R.	15
Luckiamute R.	12
Middle Fork Willamette R.	12
Pudding R.	12
Coast Fork Willamette R.	8
Muddy Cr.	8
Mill Cr.	6
Marys R.	5
North Santiam R.	5
Beaver Cr.	3
Frazier Cr.	3
Rickreall Cr.	3
Clackamas R.	2
Claggett Cr.	2
Johnson Cr.	2
Spring Cr.	2

The relatively large number of new sites from the Calapooia watershed is mostly attributable to incorporation of data from a water-based survey conducted by Turnstone Associates in 1998. The relatively large number of new sites from the Long Tom and McKenzie watersheds is partly attributable to the focused attention given by this study to those watersheds. As has been documented before, the number of WPT sites appears to decline in a northward direction. This may be attributed at least partly to increased urbanization and accompanying road network density.

As anticipated, known sites were mostly located below an elevation of 500 ft (Figure 2). Although the project mostly focused on sites below 1500 ft., I received reports of turtles at two sites above 2000 ft, the highest being along Forest Road 19 northeast of Westfir. I did not confirm that the reported turtles were WPT. The ORNHIC database contains three additional reports of turtles above 2000 ft elevation.

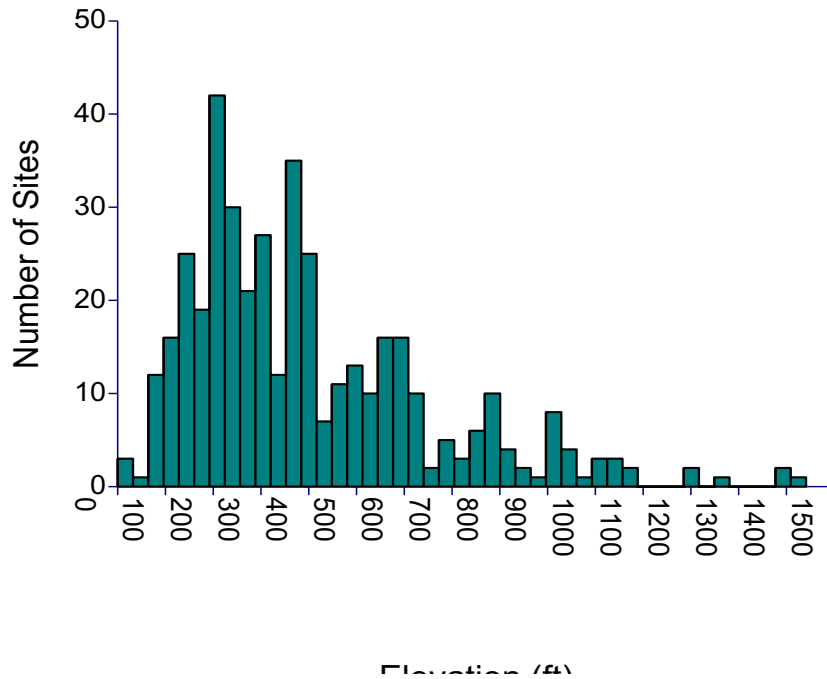


Figure 2. Elevation above sea level of WPT observations in the ORNHIC database following completion of this project

Curiously, a majority of the municipal sewage treatment plants that were contacted mentioned having seen turtles at their facility. This seemed particularly true at plants that contained some lagoons with unchlorinated water (e.g., Veneta). Although certainly not supporting all habitat requirements for turtles, these fenced facilities can provide turtles with refuge from predators, a mild aquatic microclimate, and water during droughts. Opportunities for working with plant managers to enhance conditions within these facilities for turtles, compatible with wastewater treatment goals, should be explored further.

Recommendations

Survey Protocol

The Basic Visual Survey, BVIS, described by Bury et al. (*in draft*) should be expanded to address the needs of projects that are intended to survey turtle presence/absence across large regions during a single season, as opposed to a few sites within a watershed or ranger district. Specifically, the following modifications or clarifications are recommended:

1. Well before field season begins:

- Existing regional maps should be reviewed to thoroughly identify all ponds and riverine slackwater habitats that appear to be viewable from public roads.
- A reconnaissance visit should be made to sites so identified, the purpose being to verify visibility of the site, rate its potential (e.g., presence of basking sites), and note if possible the street address.
- Pond owners should be identified by methods described in this report. If some pond owners cannot be identified using these methods, pond ownership should be determined by visiting county tax offices. Pond owners should be contacted using a bulk mailing approach well before the field season begins. Landowner contacts should be a significant component of all turtle surveys because a landowner's frequent viewing of a site is usually more likely to result in detection of site use by turtles (especially if intermittent) than can be obtained from a few brief visits by a biologist.

2. Field Surveys:

- Rather than using a standard length of survey time (e.g., 15 minutes), the duration of the visual survey in the course of a given visit should be whatever length of time is required to completely and carefully scan the entire visible part of the site. As some reduction in turtle detection may result, this recommendation is applicable only to projects whose purpose is to survey large numbers of sites across a region.
- In large regional projects, the value of repeat visits (to sites identified during the first visit as having high potential) should be balanced against potential gains in detections achieved by visiting a larger number of sites.
- At low elevations, potential sites (other than deep reservoirs) might be surveyed on *unseasonably warm, sunny days* as early as March.

In addition, research is urgently needed to determine the extent to which non-adult WPT differ from adult WPT with regard to their detectability. Specifically, information is needed regarding the influence of time of day, duration of basking, choice of microhabitats, and presence of various types of predators and competitors on adult vs. non-adult detectability. Such differences might partly explain the overwhelming paucity of records for non-adults.

Future Needs

- The region-scale approach used in this project should be implemented on private lands elsewhere within the Oregon range of the WPT. Specifically, such surveys should be

undertaken in the Rogue-Umpqua Valley and (secondarily) in the Coast Range and western Columbia Basin ecoregions.

- All of the 448 sites now known to contain WPT in the Willamette River Basin, or a statistical subsample of them, should be revisited no less than once every 5 years, to determine possible shrinkage of the species' range that might signal population decline.
- Pond owners who indicated a willingness to allow surveys on their property, but who for logistical reasons could not be visited during this project, should be visited. Also, road-viewable sites considered to have the highest potential for turtles, but where no turtles were noted during 2002, should be checked again and if feasible, for a longer observation period.
- Although time-consuming, visits to county tax offices in this region to review property maps will yield additional names of pond owners who should be contacted for turtle information and access permission in future surveys.
- Practical information on WPT habitat needs and enhancement measures should be sent to the 36 landowners who requested such information during this project.
- Continuation and expansion of basic research on WPT life history and habitat requirements is essential to sustaining the species' presence in the Willamette River Basin. In particular, additional studies are needed to assess behavioral adaptations and mortality rates associated with overland dispersal in various landscape types, mortality from various predators (bullfrogs, non-native fish, nutria, herons, domestic pets), effects of altered water regimes on overwinter and drought-season survival, and effects of contaminants on reproduction.

Appendix A. Biologists and Planners Contacted for New Turtle Observations

<u>Last Name</u>	<u>First Name</u>	<u>Affiliation</u>
Acker	Tim	consultant
Adams	Mike	USGS; Forest Sciences Lab
Anderson	David A.	Boise
Anderson	Sven	Oregon State Parks
Andrus	Chip	consultant
Applegarth	John	BLM
Baker	Jeff	Grande Ronde Tribe
Baldwin	Lorna	Eugene Stream Team
Barbarasch	Bruce	METRO - Tualatin Hills Nature Park
Bash	Jeff	Yamhill Basin Council
Beal	Kat	US Army Corps of Engineers
Beall	Jock	USFWS - Finley National Wildlife Refuge
Beatty	Joe	Oregon State University; Dept. Zoology
Bentley	Ray	US Fish & Wildlife Service
Bielke	Sue	ODFW
Bjorklund	Neil	City of Eugene
Blazar	Jason	Friends of Buford Park; Creswell Mitigation Bank
Bonsignore	Chris	Ducks Unlimited
Borg	Dan	Oregon Dept. of Forestry
Borisenko	Aaron	Oregon DEQ
Bourdeau	Virginia	Oregon 4-H Center
Bowman	James	Oregon State University
Brainerd	Dick	Salix Associates
Brown	Lynden	Lebanon High School
Buddhabatti	Jennifer	METRO - Natural Resources
Budeau	Dave	ODFW
Burgett	Sean	Luckiamute Watershed Council
Bury	Bruce	US Forest Service - Forest Sciences Lab
Canty	Bridget	consultant
Cary	Dan	Oregon DSL
Castillo	Bill	ODFW
Catlin	Rich	City of Albany - Planning Dept.
Chase	Susan	ODOT
Coffey	Sara	consultant
Comfort	Dennis	Oregon State Parks - Detroit Lake State Park
Cook	Ralph	METRO - Tualatin Hills Nature Park
Corkran	Char	consultant
Cottam	Doug	ODFW
Coveny	Sandra	Mary's River Watershed Council
Cox	Rob	US Forest Service - Cottage Grove RD
Cunningham	Bonnie	Oregon State Parks
Davis	Jerry	Benton County - Parks
Davis	Chuck	Springfield Utility Board
DeLorenzo	Teresa	consultant
Devereau	M.G.	Oregon State Parks - Tryon Creek State Park
Dickens	Dave	NRCS
Dowlan	Steve	BLM-Salem
Downey	Tim	Eugene Water & Electric Board
Downing	Dave	East Lane SWCD
Duckett	Scott	City of Eugene
Erickson	Dana	Long Tom Watershed Council
Falzone	John	Coast Fork Willamette Watershed Council

<u>Last Name</u>	<u>First Name</u>	<u>Affiliation</u>
Fedje	Steve	NRCS
Fiedler	Chuti	US Forest Service
Field	Dana	Oregon DSL
Finegan	Tommy	NRCS
Forbes	Dick	Portland State University
Friesen	Cheryl	US Forest Service - McKenzie Ranger District
Gaddis	Phil	Clark County Public Works
Gangle	Larry	USGS; Forest Sciences Lab
Gerth	William	Oregon State University
Goggans	Rebecca	ODFW
Gordon	John	consultant - Shapiro Inc.
Graber	Noah	citizen
Gries	Sue	Tualatin River Watershed Council
Hafele	Rick	Oregon DEQ
Hale	Ken	NRCS
Hall	Jon	US Fish & Wildlife Service
Hamilton	Chris	US Fish & Wildlife Service
Harding	Jeff	citizen
Hayes	Marc	Washington Dept. of Fish and Wildlife
Hendrickson	Nancy	Portland - Bureau of Environmental Services
Hendrix	Patrick	consultant
Henny	Chuck	US Fish & Wildlife Service
High	William	ODFW
Hill	Barbara	BLM
Holzhauser	Nancy	consultant
Humes	Marcia	Oregon Dept. of Forestry
Hummon	Cheryl	Calapooia Watershed Council
Hunt	Wayne	ODFW
Huntington	Chuck	consultant
Jeske	Paul	BLM
Johnson	Gregg	Fernhill Marsh Wetland Management Council
Johnson	Travis	Lafayette Watershed Citizens Advisory Board
Kaplan	Robert	Reed College
Kaufmann	Phil	US EPA
Kennison	Ken	ODFW
Kentula	Mary	US EPA
Kerst	Cary	City of Eugene
Kiester	A. Ross	US Forest Service -Forest Sciences Lab
Klock	Clair	Clackamas SWCD
Kohl	Polly	Mohawk Watershed Partnership
Lev	Esther	Wetland Conservancy
Li	Judy	Oregon State University
Loeffler	Donald	Coast Fork Willamette Watershed Council
Lunstrum	Kirk	USFS - Middle Fork RD
Madsen	Sarah	US Forest Service
Markham	Craig	ODOT
Melchiors	Tony	Weyerhaeuser
Michael	Holly	ODFW
Minter	Jeff	Starker Forests
Mitchell	Greg	Oregon National Guard
Moore	Ryland	McKenzie River Trust
Nebeker	Mark	ODFW
Nebeker	Al	US EPA (retired)
Nelson	Dale	ODFW
Newhouse	Bruce	consultant

<u>Last Name</u>	<u>First Name</u>	<u>Affiliation</u>
Newman	TJ	Salem Parks
Nickelson	Tom	ODFW
Olson	Deanna (DeDe)	US Forest Service -Forest Sciences Lab
Orsinger	Chris	Buford Park - Mt.Pisgah
Patteson	Kay	Molalla River Watch; Inc.
Pearl	Chris	Oregon State University
Pendle	Greg	South Santiam Watershed Council
Pesek	Joel	ODFW
Picton	Jeff	Chintimini Wildlife Rehab Center
Quintana-Coyer	Deborah	US Forest Service - Middle Fork RD
Rainbolt	Ray	ODFW
Reams	Jeff	consultant - Turnstone Environmental
Rennis	Denise	consultant
Rochelle	Mike	Willamette Industries (Cascades)
Rogers	Ralph	US EPA – Seattle
Rollins	Dave	Confederated Tribes of the Grande Ronde
Rollins	David	Siletz Tribe
Rombough	Chris	Oregon State University
Russell	Kevin	Willamette Industries (Coast Range)
Ryan	Bill	ODOT
Sandberg	Nicole	North Santiam Watershed Council
Scheerer	Paul	ODFW
Scheuering	Eric	Oregon Natural Heritage Program
Schleier	Jay	Oregon State Parks
Schmidt	Peter	USFWS - Tualatin NWR
Schreiber	Barry	consultant
Seitz	Ruby	US Forest Service – Blue River
Shippey	Mike	consultant
Shumway	Jim	Oregon Dept. of Forestry
Smith	Kendra	Clean Water Services (Tualatin)
Smith	Steve	ODFW
Smith	Clint	Oregon Dept. of Forestry
Smyth	Maurita	consultant
Snook	Hugh	BLM-Salem
Sparks	Ryan	Oregon State Parks
Stevenson	Carrie	Port of Portland
Stewart	Elaine	METRO - Smith & Bybee Lakes
Steyaert	Jeff	Morse Brothers
Stockhouse	Rob	Pacific University
Stoops	Renee	Oregon Gardens
Stout	Amy	Tualatin Riverkeepers
Strohmeier	Karen	NRCS
Taylor	Trevor	City of Eugene
Taylor	Nancy	ODFW
Taylor	Bruce	Wetlands Joint Venture
Thiesen	Cindy	Long Tom Watershed Council
Thom	Alicia	Tualatin Riverkeepers
Thompson	Pat	consultant
Thompson	Jennifer	US Fish & Wildlife Service
Thornton	Tom	ODFW
Thrailkill	Jim	McKenzie Watershed Council
Todd	Laura	US Fish & Wildlife Service
Tollenaar	Paul	Oregon State Parks - Elijah Bristow State Park
Tracey	Rob	NRCS
Troxell	Denise	NRCS

<u>Last Name</u>	<u>First Name</u>	<u>Affiliation</u>
Van Dyke	Dan	ODFW
VandeBergh	Don	ODFW
Vanderkamp	Lynn	consultant
Vesely	David	consultant
Waite	Ian	USGS – NAWQA
Welsh	Juan	Middle Fork Willamette Watershed Council
Wiley	Dennis	Oregon State Parks- Champoeg State Park
Williams	Frank	Weyerhauser
Willis	Pat	Jackson Bottoms
Zonick	Curt	METRO - Natural Resources

Appendix B. Data dictionary for the database file WPT_LOCS

Field Heading	Explanation
SiteCode	numerical identifier for the site. For sites 1-445, this is a truncation of the EoCode field of the ORNHIC database. The numerical sequence has no particular meaning.
Subsite	In a few instances, new turtle locations that were within a few hundred meters of each other were lumped under a single SiteCode and given a suffix of "A" or "B"
Source	ORNHIC= record in the existing database of the Oregon Natural Heritage Information Center, no update; UPDATE= turtles reported more recently in a site already listed in ORNHIC database; NEW= record added from this project. Note: Data may be available for some of the fields that are blank for ORNHIC records, but the data were not brought forward into the new database in all cases.
Delorme	page number in the Delorme atlas for Oregon
County	county location of the site
Quad	associated USGS 1:24,000 quadrangle map(s)
Lat	latitude North
Long	longitude West
ElevEst	elevation above sea level. This was estimated from topographic map.
Precisn	S= location known to within approximately 1 second latitude and longitude (or better); M= to within 1 minute precision (and worse than 1 second)
Habitat	Type of nearest associated water body: L= lake or reservoir; P= pond; R= river, stream, or ditch; SL= slough (natural pond closely connected to river); W= other wetland; STP= sewage treatment plant; U= upland (not near any mapped water)
LU	Surrounding land cover: C= cropland; F= forested; I= industrial/commercial; P= pasture; R= residential; W= wetland. More than one cover type may be listed, e.g., CP= cropland and pasture.
Wshed2	Stream or river into which Wshed3 connects. Wshed2 in turn connects to the Willamette River.
Wshed3	Stream or river into which Wshed4 connects.
Wshed4	Named stream, river, or associated water body that is elevationally highest in the hierarchy of watersheds
Directions	Narrative directions to the site
Observer1	Name of observer (lastname first initial)
NumSeen1	Number of turtles seen. "+" indicates "at least." A report of "several" turtles at a site is represented by "2+"
Behav1	B= basking, T= terrestrial (overland) movement, N= nest or nesting behavior
Age1	A= adult; J= juvenile, i.e., any obviously non-adult turtle
DateYr1	Most recent year of observation
DateMo1	month of observation
DateDay1	day of observation
Repeat?	X= reported by independent observers visiting the site at different times
Observer2	Name of second observer, if any. Also used to denote update of a record already in the ORNHIC database
NumSeen2	similar to above
Behav2	similar to above
Age2	similar to above
DateYr2	similar to above
DateMo2	similar to above
DateDay2	similar to above
SpCertainty	1= species identification classified as "definitive" (individual identified by skilled biologist under adequate conditions); 2= classified as "probably" WPT (secondhand reports from non-biologists in areas with reduced likelihood of non-native turtle species occurrence; 3= secondhand reports from non-biologists in areas with greater likelihood of non-native turtle species occurrence, or observations by biologists under poor (non-definitive) conditions, e.g., observation distance too great, observation too brief.

Photo	X= obtained a photo of the turtle
LandMgr	Land manager: P= private; COE= Corps of Engineers; CITY= municipality; MRT= McKenzie River Trust; TNC= Nature Conservancy; USFS= US Forest Service; USFWS= US Fish & Wildlife Service
Comments	