Wisconsin Geological
and Natural History Survey
DIVISION OF EXTENSION
UNIVERSITY OF WISCONSIN–MADISON

An inventory of springs in Wisconsin

Appendix 1. Field protocol

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CATEGORY	VARIABLE	WORKING FIELD NAME	DESCRIPTION
WATER QUALITY	pH	pH	Measured as close to spring source as possible.
	Specific Conductance	Conductivity_µS	Measured as close to spring source as possible (µmho/cm).
	Temperature	Water_Temp_C	Measured as close to spring source as possible (°C).
GENERAL SITE DESCRIPTION	Site Sketch	---	Hand drawn with scale, north arrow, photo points (labeled PP#), GPS point (GPS), discharge measurement point (DI), water quality measurements (WQ), orifice(s) (OR), pool (PL), channel (CH), and direction of flow
	Spring ID	SpringID	Unique identifier within county.
	County	County	County where spring is located.
	Surveyor(s)	Surveyor	Who conducted the survey (initials).
	Date	Date	Date of field survey.
	Time	Time	Start time.
	Easting	Easting_WTM	Easting using Wisconsin Transverse Mercator (WTM). As close to the spring source as possible.
	Northing	Northing_WTM	Northing (WTM). As close to the spring source as possible.
	Horizontal Precision	Horz_Precision_m	Horizontal accuracy of GPS position (meters).
	Maximum PDOP	Max_PDOP	Maximum positional dilution of precision (PDOP) during measurement.
	Elevation	Elevation_m	From digital elevation model (DEM) (meters).
	Elevation Source	Elevation_source	DEM source and horizontal resolution of DEM used to extract elevation.
	Land Ownership	Land_Owner	List: private, city, county, state, National Park Service (NPS), U.S. Forest Service (USFS), tribal, military, other.
	Access	Access	Directions to springs.
	Ease of Access	Ease_Access	List: Easy access, Difficult access, Terrain prohibits access to other potential spring areas.
	Land Cover	Land_Cover	List: urban, residential, agriculture, grassland, forest, open water, wetland, barren, shrubland, other.
	Photographs	---	Photos of spring orifice, looking upstream, looking downstream, others as necessary.

CATEGORY	VARIABLE	WORKING FIELD NAME	DESCRIPTION
ENVIRONMENTAL CONDITIONS	Air Temperature	Air_temp_f	Air temperature on date surveyed (°F).
	Cloud Cover	Cloud_Cover_percent	Cloud cover at time of survey (%).
	Wind Speed	Wind_Speed_mph	Velocity measurement on date surveyed (mph).
	Aspect	Aspect_degrees	Direction that the spring orifice faces.
	Slope	Slope_degrees	Channel slope (°).
	Slope Variability	Slope_Variability	List: high, medium, low, none.
	Condition	Condition	List: undisturbed, light, moderate, high.
	Type of Disturbance	Type_of_Disturbance	List: wildlife, livestock, recreation, diversion, residence, impounded, dredging, flooding, trails, roadway, invasives, spring house, encased, raceways, human-made structure, trash, storm-water, drain tile, agriculture, other.
GEOLOGY AND GEOMORPHOLOGY	Spring Area	Spring_Area_sqm	List: <2 m^2, 2–10 m^2, 10–100 m^2, 100–1000 m^2, 1000–10,000 m^2, 10,000–100,000 m^2
	Surface Type(s)	Surface_Types	List: pool, channel, backwall, sloping bedrock, colluvial slope, cave, spring mound, other.
	Channel or Pool Width	Width_ft	If a channel or pool exists, the mean width (feet).
	Width Location	Width_Location	List: pool, channel, pond, spring house, other.
	Channel or Pool Depth	Depth_cm	If a channel or pool exists, the mean depth (cm).
	Depth Location	Depth_Location	List: pool, channel, pond, spring house, other.
	Emergence Substrate Composition	Percent_organic, Percent_fines, Percent_sand, Percent_gravel, Percent_cobble, Percent_boulder, Percent_bedrock	Qualitative estimate of the % organics, fines (<0.625 mm), sand (0.625–2 mm), gravel (2–64 mm), cobble (64–256 mm), boulder (>256 mm), or bedrock. Described as close to spring source as possible.
	Bedrock Composition	Bedrock_Comp	List: shale, siltstone, sandstone, conglomerate, limestone, dolomite, igneous or metamorphic, NA, other.

CATEGORY	VARIABLE	WORKING FIELD NAME	DESCRIPTION
HYDROLOGICAL CONDITIONS	Spring Type	Spring_Type	List: rheocrene, limnocrene, hillslope spring, helocrene, other.
	Spring Source	Spring_Source	List: single orifice, multiple orifices, diffuse flow, other.
	Orifice Geomorphic Type	Orifice_Geom	List: seepage/filtration, fracture, contact, tubular.
	Discharge	Discharge_cfs	Spring flow (cubic feet per second, ft^3/s).
	Flow Accuracy	Flow_Accuracy	Level of accuracy of flow measurement, List: low, high
	How Measured	Discharge_Meas	List: timed volume, float velocity method, flume, AA meter (Price-type current meter), AD meter (acoustic Doppler meter), EM meter (electromagnetic meter).
	Flow Location	Flow_Location	Where flow was measured.
	Flow %	Flow_percent	Percent of flow captured (%).
BIOLOGICAL CONDITIONS	Vegetative Bed Cover	Veg_Bed_Cover_percent	The proportion of the spring pool bed or channel bed that is covered by live vegetation (%).
	Vegetative Bank Cover	Veg_Bank_Cover_percent	The proportion of the spring pool banks or channel banks that is covered by live vegetation (%).
NOTES	Notes	Notes	Other notes as necessary.
	Global ID	GlobalID	Automatically generated unique and global ID
	GPS Time and Date	gps_time_date	Automatically generated GPS time and date stamp
	Number of Satellites	sat_signals	Automatically generated number of satellites visible

References used in the development of the field protocol

Florida Department of Environmental Protection, 2007, Florida Springs Initiative, program summary and recommendations: Florida Department of Environmental Protection, 43 p.

Sada, D.W., and Pohlman, K.F., 2006 (draft), U.S. National Park Service Mojave Inventory and Monitoring Network spring survey protocols: Level I and level II: Reno and Las Vegas, NV, Desert Research Institute, Inc., 95 p.

Stevens, L.E., Springer, A.E., and Ledbetter, J.D., 2016, Springs ecosystem inventory protocols: Springs Stewardship Institute, Museum of Northern Arizona, 60 p.

USDA Forest Service, 2012a, Groundwater-dependent ecosystems: Level I inventory field guide: Inventory methods for planning and assessment: Washington, DC, Gen. Tech. Report WO-86a.

USDA Forest Service, 2012b, Groundwater-dependent ecosystems: Level II inventory field guide: Inventory methods for project design and analysis: Washington, DC, Gen. Tech. Report WO-86b.