Physical Habitat Assessment Field Protocol

Hinkson Creek

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Project description

The following protocol serves as a field guide for a physical habitat assessment of Hinkson Creek located in Boone County, Missouri. The physical habitat assessment was endorsed in December of 2012 by the Hinkson Creek Collaborative Adaptive Management (CAM) Stakeholder Committee, Science Team, and is designed to examine longitudinal variations in characteristics including (but not limited to) channel morphology, floodplain width, streambed substrate composition, and adjacent riparian vegetation from the mouth of Hinkson Creek to the first second order confluence at the headwaters. Methods of habitat assessment are intended to be consistent with guidelines recommended by the U.S. Environmental Protection Agency (US EPA), the Missouri Department of Natural Resources (MDNR), and the US Geological Survey (USGS). Procedures have been adapted to suit the objectives and scope of project. Many attributes of the data sheets are adaptations of Peck et al. (2006).

Stream channel survey points will be spaced at 50 meter intervals at latitude / longitude coordinates which have been supplied by Missouri Resources Assessment Partnership (MoRAP). Due to time and funding constraints, the initial survey will be of every other 50 meter point (i.e. every 100 m). When the entire length of Hinkson Creek has been surveyed at 100 m intervals, the field team will begin to fill 50 m gaps. Points will be determined by the Principal Investigator (PI) as time and funds remain available. Each major stream confluence with Hinkson Creek will be surveyed as set forth in the protocol description below. The field team will perform replicate assessments during the physical habitat assessment as follows: every ten working days, the field team will return to the sites surveyed during the first day of that ten day sequence and spend one-half day resurveying every other site, in numerical order starting with the first site of the first day of that ten day sequence.

Anticipated outcomes of the project include accumulation of a high spatial resolution data set that will supply valuable information to support Hinkson Creek multi-objective management decisions at a broad range of scales. In addition to periodic reports by the PI to the CAM Science Team during the project, a final summary report will be provided including a spreadsheet database at the conclusion of the project. The procedures in the protocol are presented in the order in which they are anticipated to occur in the field. Certain procedures are best conducted while the water is relatively clear and the stream bed can be seen, thus these procedures should be carried out first. For example, photographs of the stream bed are best taken before anyone has walked in the stream so that silt from the bed does not cloud the picture. The other workers can begin taking bank measurements while the photos are being taken, provided they only cross the stream downstream of the study area. During the beginning of the study, team members should pay close attention to the order of operations and make adjustments as needed.

Team members include a graduate student crew leader and two graduate student crew members. The crew leader’s duties will primarily be to document observations and data called out by other workers, record GPS data, collect photographs, and supervise the crew member(s). Duties of crew members may vary depending on the number of crew members, funding, and other logistics. One crew member will begin at a site by unwinding a 100 meter line flagged at 10 meter intervals along the bed of Hinkson Creek, keeping the line in the center of the channel as much as is practicable, while another crew member begins to collect bank data. After the line has been run, both crew members will continue to collect data at the survey point. As stated, one team member will record data for the other crew members. As the crew travels between sites, the crew leader will continue to monitor for infrastructure and bank failures and take photographs at each ten meter interval marked with the 100 meter line, one of the crew members will collect Thalweg data at the ten meter intervals, and the remaining crew member will record Thalweg data. The field crew will then advance to the next coordinate provided by MoRAP (skipping every other 50 meter point as previously described) and the survey process will begin again.

Transportation of the field crew to the field will be performed using two vehicles, one positioned at the approximate end point of the day's survey sites. At the conclusion of the working day, the vehicle at the starting point will be retrieved by the field crew. Vehicles are assumed to be personal vehicles of crew members. No project vehicles or fuel costs are currently budgeted.

Materials needed

- One hundred meter line flagged at 10 meter intervals
- Laser level with extension pole (metric)
- Waterproof tripod for holding extension pole in stream*
- Laser range finder or measuring tape
- One meter stick
- Clinometer
- Convex Densiometer
- GPS
- 1 Digital Camera equipped with GPS and date stamping capabilities (with extra batteries and memory cards)
- Underwater viewing box for taking photographs of the streambed
- Waterproof clipboard box for data sheets
- Compass
- Depth finder and battery with float for measuring pool depth
- Inner tube and paddle for surveying deep pools

* Necessary only if there is just one crew member doing the survey

FIELD PROTOCOL

I. *GPS Data*

The survey will be conducted at pre-determined survey points at 100 m intervals, starting at the mouth of Hinkson Creek at Perche Creek and continuing upstream to the first second order confluence at the headwaters of Hinkson Creek. Coordinates for the 100 m survey points have been provided by MoRAP (the Missouri Resources Assessment Partnership) and will be pre-loaded into the GPS device used by the field team. The field team will travel to the coordinates of the first survey point, and at every other 100 m interval thereafter, and record the coordinates provided by MoRAP and the coordinates of the center of the stream channel for each point on the data sheet(s) (see example at end of protocol). In addition, coordinates will be collected at each survey point to mark the position of the stream banks, streambeds and major objects including woody debris piles, public utilities, engineered structures, erosional gullies, bank failures, debris piles, and any other obvious habitat altering features. Additional survey points will be established at the confluence of each of the following tributaries as they are encountered on the survey path from the mouth to the first second order confluence at the headwaters of Hinkson Creek: Meredith Branch (MB), County House Branch (CH), Mill Creek (MC), Flat Branch Creek (FB), Grindstone Creek (GC), Hominy Branch (HB), Nelson Creek (NC), and Varnon Branch (VB). Coordinates will be collected at confluence survey points and recorded in the same manner as the 100 m survey points.

II. *Survey Point Naming Convention*

GPS waypoints will be named using a two letter code for the feature, and the nearest survey point number. For example, the waypoint for survey point one will be named SP1. If there is a trash dump located near survey point one, it will be named TD1. If there is more than one feature of the same type located near a survey point, the naming convention will be in the format TD1-1. Each survey point will be sequentially numbered from the first point at the mouth of Hinkson Creek through the final point near the first second order confluence at the headwaters. The survey point number will be recorded on the data sheets with the corresponding MoRAP and survey crew GPS coordinates. For those survey points that are at the confluence with tributaries, the survey point number will be followed by a hyphen, and then the two letter code for the tributary indicated above. At the conclusion of the initial run through the entire length of Hinkson Creek at 100 m intervals, initially skipped survey points will be revisited (as per the explanation above). Those points will be numbered as half points of the previously surveyed points for the purpose of continuity, i.e. SP1.5 will be located between previously surveyed points SP1 and SP2.

III. *Description of Survey Point*

Each survey point will be the located in the center of the stream channel of the creek and will serve as the center point of a study plot. The study plot will consist of a Principal Transect which runs from bank to bank through the survey point perpendicular to the direction of stream flow, Upstream and Downstream Transects will delineate the beginning and end of the plot and be located 5 meters upstream and downstream of the Principal Transect – the Upstream and Downstream Transects will run parallel to the Principal Transect and extend from bank to bank (Figure 1).

For purposes of this survey, the survey cross section of the study plot at any confluence will be set at the center of the stream channel of Hinkson Creek 5 meters downstream of the downstream bank of the confluence with the tributary so that the study plot is as close to the confluence as possible.

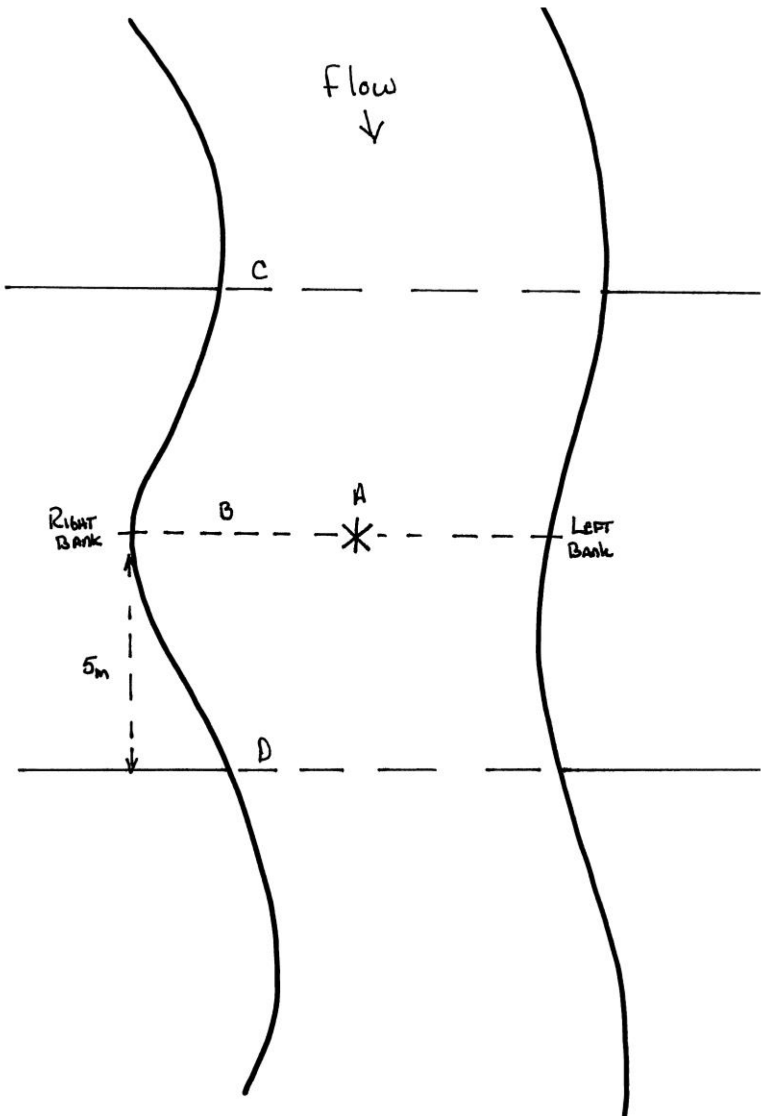

Figure 1. Layout of study plots used for habitat measurements. A: Plot Center. B: Principal Transect. C: Upstream Transect D: Downstream Transect.

IV. *Photographic Journal*

A digital camera will be used to create a photographic journal of each study plot. A mandatory set of photos will be taken from the survey point as follows: directly down at a distance of 1 m from the streambed (streambed composition), directly upstream (normal with the channel), downstream (normal with the channel) and perpendicularly (90 degree angle) towards each stream bank, and a final photo will be taken directly upwards to capture canopy cover. The photographs of the stream banks should capture the extent of vegetative cover present. A photograph of the survey point number will be taken immediately before the first (streambed) photo in the series and again before photos taken at any transect between survey points (survey point – transect number, i.e. SP1-3) so that the photographs can be catalogued later. If a deviation is made from this pattern, it will be documented accordingly in the field notes so that photos can be properly identified later.

At any confluence survey point, additional photographs will be taken as needed to document physical characteristics at the confluence, including at least one photo in the upstream direction of the tributary. In addition, a sketch diagram showing the orientation of the additional photos will be composed.

V. *Special Features*

GPS coordinates will be collected and notes taken for the presence of any of the following special features: bank stabilization structures, including rip-rap, gabion baskets, and other engineered structures; infrastructure not adequately mapped in GIS resources, including pipes, outfalls, discharge control structures, and utilities with any related infrastructure; disturbance features including erosion gullies, debris fans, slumps, bank failures, and woody debris piles; cattle tracks found on either bank or in the substrate; large trash dump in or near the stream; stone bluff streambank. A list of codes used for recording these features on the data sheet is shown in Table 1.

Table 1. Descriptions of special features to be recorded and the codes used to record them on the data sheet.

Code	*Description*
BS	Bank stabilization structures including rip-rap, gabion baskets, etc.
IN	Infrastructure including pipes, outfalls, discharge control structures, and utilities.
WD	Woody debris piles
DI	Disturbance features including erosion gullies, debris fans, slumps, bank failures.
RK	Bedrock outcrops in streambed or banks.
CA	Cattle tracks visible on banks or stream bed, or cattle currently in the stream.
TD	Large trash dump in or near the stream.
BL	Bluff streambank.

VI. *Additional Photographs*

Additional photographs of any special features named above will be collected from multiple directions wherever possible at each study plot, as well as between study plots. The survey point number and transect number of each photo collected will be recorded on the data sheet in the notes pertaining to the structure or cattle tracks. In addition a sketch diagram showing the orientation of the additional photographs will be drawn.

VII. *Underwater Viewer*

Quantitative evaluation of the substrate of Hinkson Creek will be conducted using a plexi-glass equipped streambed viewing device which will be constructed and field tested following general guidelines, for example those provided in Millidine et al. 2011. Numerous photographs (approximately 100) will be collected through the viewing device of the substrate of each study plot and at the transects between study plots, and analyzed later using software such as Digital Gravelometer software (www.sedimetrics.com). After thorough field testing, a complete field protocol will be developed for this section. Where possible, this method will replace the traditional pebble count method of Peck et al. (2006) and Wolman (1954). However, where necessary, those methods may still be used.

VIII. *Canopy Measurements*

Canopy cover will be measured following the method described by Peck et al. (2006). A convex densiometer (Lemmon 1957) will be used, which has been modified to prevent overlap from measurements taken close together. The modification consists of creating a "V" comprised of tape on the face of the densiometer with the vertex pointing towards the viewer such that 17 line intersections exist within the V (Mulvey et al. 1992). The number of line intersections covered by canopy is recorded on the data sheet. Canopy cover is determined as the percentage of points covered by canopy (Peck et al. 2006).

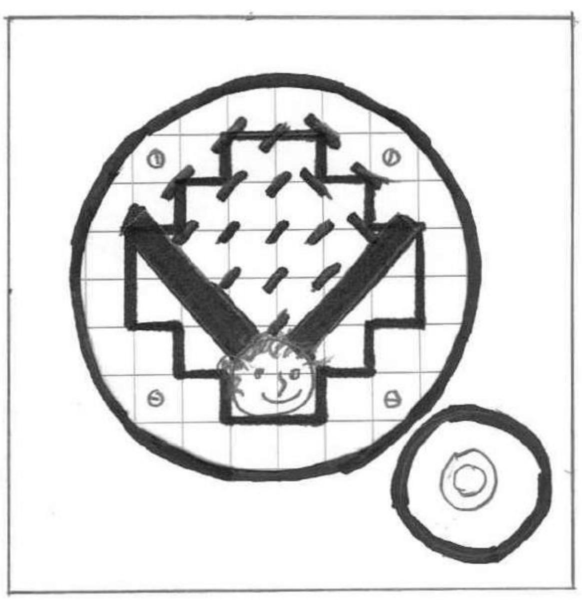

Figure 2. Convex densitometer with tape lines to highlight 17 points of canopy intersection designated with hatch marks.

Procedure for Canopy Cover Measurements

1. Stand on the Principal Transect at mid channel and face upstream.
2. Hold the densiometer 1 m above the streambed. Level the densiometer using the bubble level. Move the densiometer in front of you so your face is just below the apex of the "V".
3. Count the number of grid intersection points within the "V" that are covered by a tree, a leaf, or a high branch. Record the value (0 to 17) in the appropriate place on the datasheet.
4. Face toward the left descending bank (left as you face downstream). Repeat Steps 2 and 3, recording the value in the appropriate place.
5. Repeat Steps 2 and 3 again while facing downstream and again while facing the right bank, recording the values in the appropriate places.
6. Repeat Steps 2 and 3 at the channel's edge on the left bank at the end of the Principal Transect, and again on the right bank, recording the data in the appropriate places.

IX. *Bank Angle, Stream Width and Channel Depth*

At the principal transect running through each survey point, measurements of channel width, wetted width of the stream, bank angle, bankfull width, and bank height will be recorded. Bank angle is the slope of the bank from the edge of the water to the top of the bank. Normally, slope will be between 0º and 90º, however by definition, undercut banks will have an angle greater than 90° because the edge of the water is underneath the overhanging bank.

Bankfull flows are events large enough to erode the streambed and banks, and frequent enough to prevent substantial growth of terrestrial vegetation (Peck et al. 2006). Bankfull level must be determined by visually surveying the bank for bankfull indicators, or using the bankfull bank wherever possible. Whether the right bank or left bank (descending) is used in these measurements will be indicated on the data sheet. Common indicators include the top of pointbars, changes in vegetation from aquatic to terrestrial, changes in slope, changes in bank material (e.g. from coarse gravel to sand), bank undercuts, or stain lines on bedrock or boulders (Harrelson et al 1994). More detailed descriptions of these indicators can be found in Harrelson et al (1994). Determination of bankfull levels may require some discussion among crew members and it is best, if possible, to find multiple indicators that "agree" with each other. Bankfull width is the distance between banks at the bankfull level, measured perpendicular to stream flow. All measurements in this section will be made using a field measuring tape, laser level and/or laser range finder.

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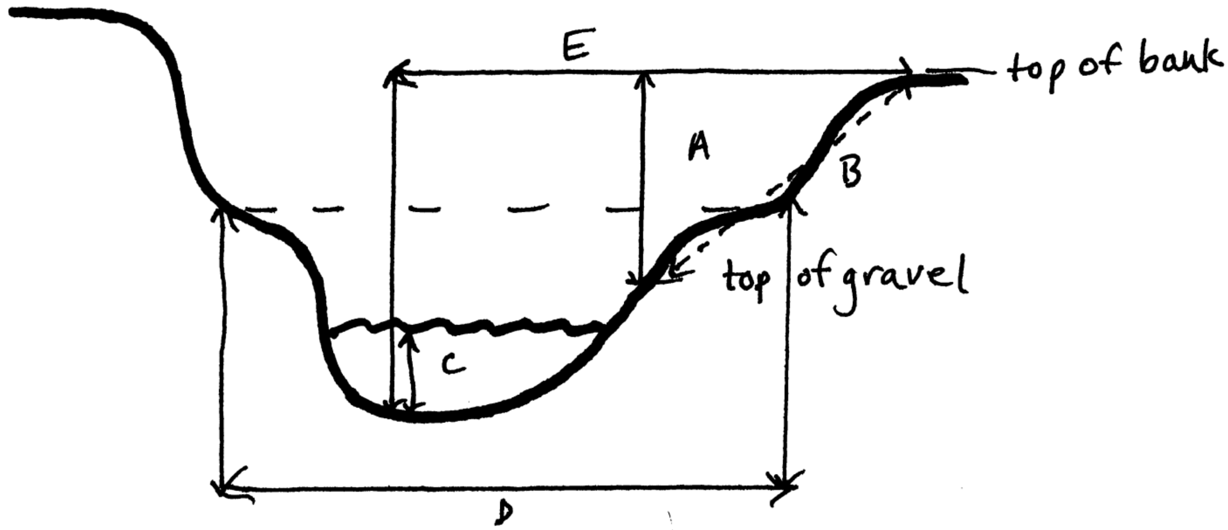

Figure 3. Profile view of channel dimensions to be measured as part of habitat assessment. A: Bankfull height. B: Bank slope. C: Thalweg depth. D: Bankfull width. E. Horizontal Thalweg position.

Procedure for measuring bank angle:

1. Lay the extension pole down on the bank at one end of the Principal Transect so that the base of the pole is at the level of the top of the gravel from the streambed. The extension pole should be extended 2 meters up toward the top of the bank. Lay the clinometer on the extension pole and read the bank angle in degrees (0-90°). If the bank is undercut (>90°), measure from the water's edge along the underside of the undercut, and subtract the clinometer reading from 180°
2. If the bank is undercut, record the undercut depth by placing the meter stick horizontally oriented perpendicular to the stream, at the back of undercut and measuring the horizontal distance to the edge of the bank.
3. If there is a large boulder or a log at the transect point, move the measurement point to a nearby point which is more representative
4. Repeat Step 1 (and Step 2 if necessary) on the opposite bank.

Procedure for measuring Channel Width, Wetted Width, Bank Height, Channel Depth, and Horizontal Thalweg position:

1. Using a measuring tape, or a laser range finder, measure the distance from the edge of the stream channel on the left bank to the edge of the stream channel on the right bank (channel width). Also using a measuring tape or laser range finder, measure the distance

from one side of the stream to the other (wetted width). Record values for channel width and wetted width on the data sheet.

2. To measure bankfull width, begin by locating the bankfull level on the streambank with the highest terrace. For a description of bankfull indicators see Harrelson et al. (1994). While standing on the stream bank with the lowest terrace at the edge near the channel, use the measuring tape or laser range finder to measure the width to the bankfull level on the opposite streambank.
3. Bank height is measured as the distance from the top of the gravel from the streambed near the bank slope to the top of the stream bank.
4. Thalweg depth is measured by positioning the meter stick or extension pole on the stream bed at the deepest part of the channel and reading the depth of the water. This can be done at any time during the surveying procedure. Measured depth can be added to bank height and the distance between the surface of the water and the gravel on the bank later in-spreadsheet. In the event that the water is more than thigh deep, the depth finder and battery with float will be deployed for measuring Thalweg depth.
5. Thalweg position – measure the horizontal position of the Thalweg relative to the left descending bank This measurement will be taken using a measuring tape or laser rangefinder and measuring the distance between the bank and the laser receiver on the extension pole located in the Thalweg and adjusted to the correct height using the laser level

X. *Longitudinal Thalweg Profile*

The Thalweg is the path of the stream that follows the deepest point of the channel (Armantrout 1998). This is also the last part of the channel to become dry during a drought. A longitudinal profile of Thalweg depth yields information about habitat complexity and channel form variability. The Thalweg is measured at each survey point and every 10 m in between study plots. At the location of each Thalweg measurement a field crew member will record the Thalweg depth, the channel unit according to Table 2, the substrate size classification, and the presence or absence of periphyton. More detailed descriptions of the channel form can be found in Table 7.3 in Peck et al. (2006).

Table 2. Channel unit types and codes used in data recording. Adapted from Peck et al. (2006).

Channel Unit	*Code*	*Description*
Plunge Pool	PP	Pool at base of plunging cascade or falls.
Trench Pool	PT	Pool-like trench in the center of the stream.
Lateral Scour Pool	PL	Pool scoured along a bank.
Backwater Pool	PB	Pool separated from the main flow off the side of the channel.
Impoundment Pool	PD	Pool formed by impoundment above dam or constriction.
Pool	P	Pool (unspecified type).
Glide	GL	Water moving slowly, with smooth unbroken surface. Low turbulence.

Riffle	RI	Water moving with small ripples, waves and eddies – waves not breaking, surface tension not broken. Sound: babbling, gurgling.
Rapid	RA	Water movement rapid and turbulent, surface with intermittent white-water with breaking waves. Sound: continuous rushing.
Cascade*	CA	Water movement rapid and very turbulent over steep channel bottom. Much of the water surface is broken in short, irregular plunges, mostly whitewater. Sound: Roaring
Falls	FA	Free falling water over a vertical or near vertical drop into plunge, water turbulent and white over high falls. Sound: from splash to roar.
Dry Channel	DR	No water in the channel or flow is under the substrate (hyporheic).

* Due to the local topography of Hinkson Creek, cascades are unlikely to occur, and thus this category has been omitted from the Channel Unit Code on the data sheet in order to conserve space. If cascades are observed, mark the data sheet accordingly.

Procedure for Measuring Thalweg Profile:

1. Measure the depth of the water at the deepest part of the channel along the Principal Transect. Record this depth (cm) under station “1” on the data sheet.
2. Identify the channel unit and record the channel unit code on the data sheet.
3. Determine the size classification of the substrate at the Thalweg and record the appropriate code from Table 3.
4. Determine presence or absence of periphyton on the substrate at the Thalweg if possible.
5. Using the rope marked at ten meter intervals, continue downstream, following the Thalweg, and repeat Steps 1 and 2 every ten meters between studyplots, recording the data from steps 1 through 4 on the data sheet under stations 2-10 respectively.
6. After the depth at the 90 m mark has been recorded, the field team will move to the next coordinate provided by MoRAP and begin a new data sheet.

XI. *Substrate Characterization (Pebble Count)*

Note: this method may not be followed if method VII is shown to be successful.

The method for substrate particle size characterization described here is adapted from Peck et al. (2006) and Wolman (1954). It consists of estimating the diameter size class of 15 substrate particles at each site. Five particles are sampled from each of the Principal Transect, the Upstream Transect, and the Downstream Transect. On each transect, particles should be sampled from the left and right banks, and from locations which are 25, 50, and 75% of the distance across the width of the channel. Particle size is estimated according to the size classes listed in Table 3.

Table 3. Particle size classes and codes to be used on data sheets.

Diameter (mm)	*Size Equivalent*	*Code*	*Substrate Type*
>4000	Larger than a car	RS	Bedrock (Smooth)
>4000	Larger than a car	RR	Bedrock (Rough)
>4000	Larger than a car	RC	Concrete/Asphalt
1000 to 4000	Meterstick to Car	XB	Large Boulder
250 to 1000	Basketball to Meterstick	SB	Small Boulder
64 to 250	Tennis ball to Basketball	CB	Cobble
16 to 64	Marble to Tennis ball	GC	Coarse Gravel
2 to 16	Ladybug to Marble	GF	Fine Gravel
0.06 to 2	Gritty - up to Ladybug	SA	Sand
<0.06	Smooth, Not gritty	FN	Silt/Clay/Muck
Any size	NA	HP	Hardpan (Firm, Consolidated Fine Substrate)
Any size	NA	WD	Wood
Any size	NA	OT	Other - (Write comment)

Procedure for measuring substrate:

1. Start on the left descending bank of the Principal Transect. Using a meter stick, select the first particle that the meter stick comes in contact with. If the substrate is sand or finer material, you will pick up multiple particles.
2. Estimate the size of that particle (or particles for finer material) according to Table 3. Record the size class on the data sheet.
3. Visually estimate the percent embeddedness of the particle in the substrate (what percentage of the particle is not visible) to the nearest 5%. Note that Sand and Silt are by definition, 100% embedded, and bedrock or claypan are 0% embedded. Record the embeddedness on the data sheet.
4. Move to the next station along the Primary Transect and repeat Steps 1 to 3, recording the data in the appropriate locations on the data sheet. Complete the five measures for the Primary Transect.
5. Repeat Steps 1 to 4 at the Upstream Transect and the Downstream Transect.

References

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Appendices

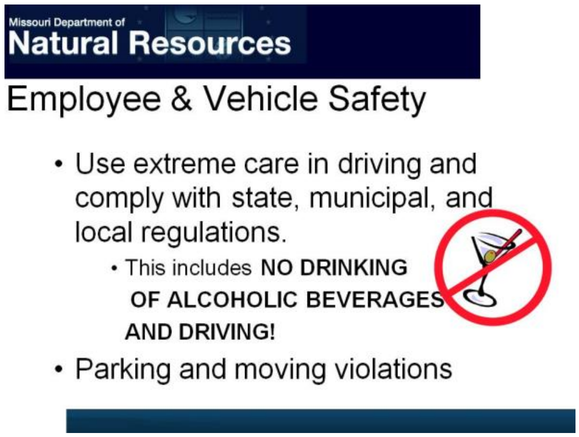
Appendix I: First Aid and Safety

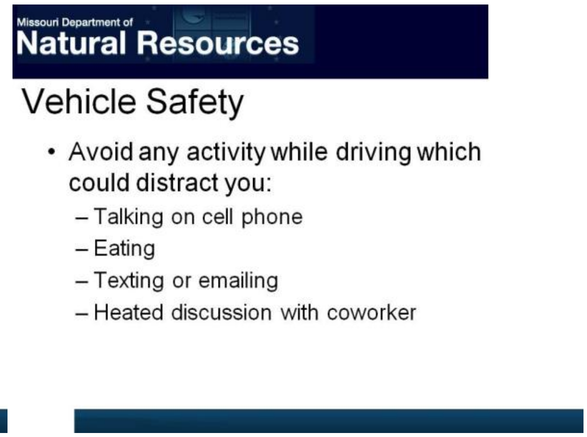
A Guide to Safe Field Operations. USGS.

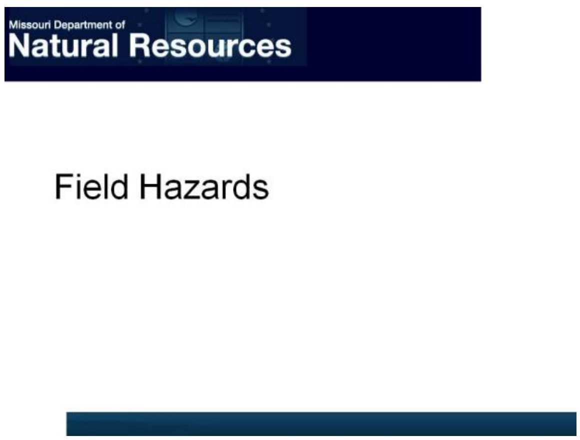
http://pubs.er.usgs.gov/publication/ofr95777

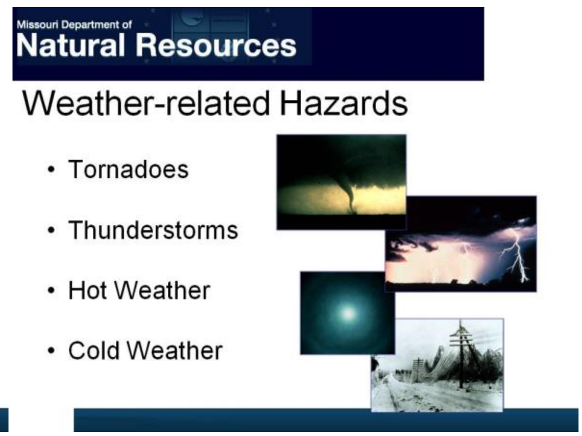
Note: It is recommended that field personnel be up to date with Tetanus and Hepatitis A vaccines.

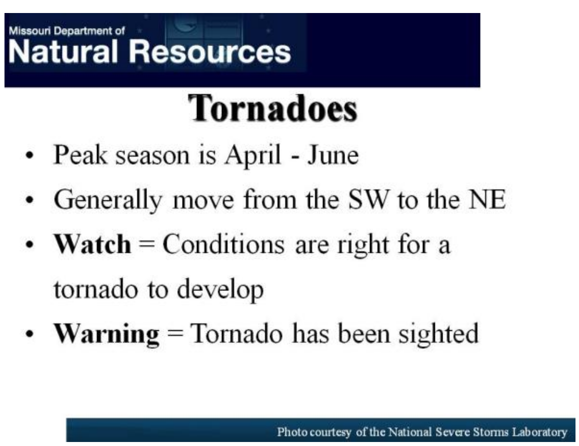
Missouri Department of Natural Resources:

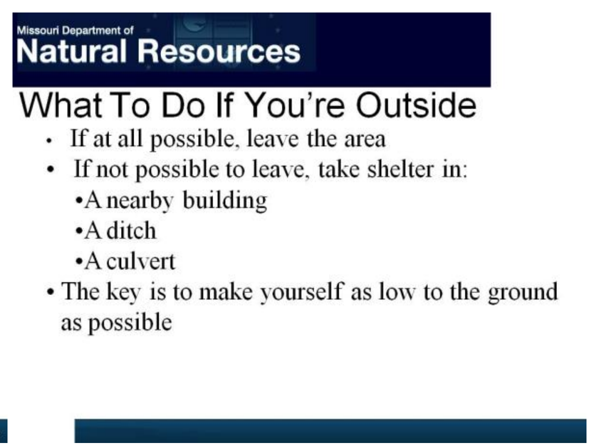












Missouri Department of
Natural Resources

Thunderstorms

- If not possible to go indoors, go to a low lying, open place away from upright objects (trees, etc.).

Don't work on electrical equipment!

Missouri Department of
Natural Resources

High Water/Floods

- If flooding is possible, listen to the radio for weather updates
- Don't drive across water, even if you think it's shallow!
- Don't wade into flooded areas
- If you are in a boat, get off the water

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Natural Resources

Working in Hot Environments

- People are endothermic
  - regulate body temperature internally
  - body functions best within a relatively narrow temperature range
- Working in a hot, humid environment may impede your body's ability to regulate its temperature
- Heat Stress may occur

Missouri Department of
Natural Resources

Heat Stress

- Generic term for heat-related disorders
- Most likely to occur when temperature and humidity are high
- Onset may be rapid
- Wearing chemical protective gear increases the risk of heat stress

Missouri Department of
Natural Resources

Heat Stroke

- LIFE THREATENING
- Occurs when body's mechanism for temperature regulation fails
- Symptoms:
  - hot, dry skin
  - high body temperature
  - rapid, strong pulse
  - headache, dizziness, unusual behavior or unconsciousness

Missouri Department of
Natural Resources

Heat Exhaustion

- May be life threatening
- Caused by the loss of large amounts of fluid (sweating)
- Symptoms:
  - Sweating (note: not everyone will sweat!)
  - body temperature is normal or slightly high
  - rapid, weak pulse
  - cool, clammy skin
  - slow to respond, confused, irritable

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Natural Resources

Heat Stress Treatment

- Call 911 for heat stroke
- Cool victim
  - Move to shade
  - Immerse in or spray/sponge with cool water
- Provide cool liquids to drink
  - Primarily water
  - May intersperse with sports drinks
- Watch for improvement/deterioration in victim

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Heat Stress Prevention

- Use caution when working in hot, humid environments
- Schedule strenuous work during the coolest parts of the day
- Incorporate appropriate rest periods into your work schedule

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Heat Stress Prevention

- Drink plenty of fluids, before and while you are working in a hot environment
- Wear light colored, loose fitting clothing and a hat
- Find out if your medications make you more susceptible to sunlight exposure or heat stress

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Heat Stress Prevention

- Apply sunscreen about 30 minutes prior to going outside to work
- Know the signs and symptoms of heat stress

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Working in Cold Environments

Working in a cold environment forces your body to work overtime to maintain your body temperature.

This may lead to the development of cold stress.

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What is Cold Stress?

- Generic name for cold-related disorders
- All are caused by exposure to cold
  - uncovered skin is at high risk
  - wet skin is at high risk
- Knowledge of signs and symptoms is important in prevention or minimization of damage

Missouri Department of
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Hypothermia

- Symptoms:
  - chills, pain in extremities
  - fatigue or drowsiness
  - euphoria
  - slow, weak pulse
  - slurred speech
  - collapse, shivering, unconsciousness
  - low body temperature (<95 degrees F)

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Hypothermia - Treatment

- Remove victim to a warm place
- Give hot, sweet drinks if they are conscious
- Remove wet clothing
- Provide moderate external warming (heat packs, blankets)
- Transport victim to the nearest hospital

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Frostnip/Frostbite

- Frostnip Symptoms:
  - itching or pain
  - white skin
- Frostbite Symptoms:
  - burning sensation, followed by coldness, tingling or numbness
  - skin color can be white or grayish yellow to reddish violet to black
  - may have blisters

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Frostbite Treatment

- Move victim to a warm area
- Remove any wet clothing
- Soak affected area in tepid water
- DO NOT RUB THE AFFECTED AREA!
- Provide warm, sweet drinks to maintain hydration

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Cold Stress Prevention

- Reschedule outdoor work for a warmer day, if possible

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Cold Stress Prevention

- Work in pairs
- Take frequent breaks to warm up
- Drink plenty of fluids
  - Warm, non-caffeinated drinks encourage hydration
  - Caffeinated drinks speed up both fluid and heat removal from the body

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Cold Stress Prevention

- Dress in layers
  - Outer layer
    - wind resistant layer
    - allow some ventilation (Gortex or nylon)
  - Middle layer
    - insulation
    - sweat absorption (wool, down, fleece)
  - Inner layer
    - ventilation to keep skin dry (cotton, polypropylene, other synthetic weaves)

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Cold Stress Prevention

- Dress to stay dry
  - Wet skin freezes much faster than dry skin
- Minimize exposed skin
  - hat - lots of heat is lost through your head
  - gloves - mittens when it's really cold
  - socks, or layers of socks
  - shoes/boots which will keep feet warm and DRY

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Cold Stress Prevention

- NEVER work on ice of unknown thickness
- Provide your office with an itinerary
  - Update the itinerary as needed
- Keep a cell phone with you, and know who to call in case of an emergency
- Know the symptoms of and treatment for cold stress

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Poisonous Field Stuff

Plants
Animals

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Poisonous Plants

sy of Missouri Department of Conservation

Poison Ivy

- Skin irritant
- Prevention
  - Recognition
  - Change clothes ASAP
  - Wash skin off with soap and tepid water
- "Leaflets of three, leave it be!"

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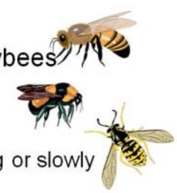
Stinging Insects



- Wasps, yellowjackets, honeybees
- Sting for defense
  - More likely to sting near nest
  - Gently "shoo" away by blowing or slowly brushing
- Attracted to sweet smells
- Know if you are allergic and carry appropriate medications!

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Poisonous Spiders

Black Widow

Brown Recluse

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Poisonous Invertebrates

Centipedes

Scorpions

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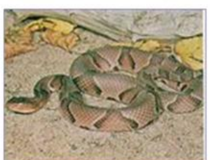
Venomous Snakes

Copperhead
Found statewide
Several habitat types



Cottonmouth

esy of Missouri Department of Conservation

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Venomous Snakes

Pygmy Rattlesnake

Timber Rattlesnake

Massasauga

Photos courtesy of Missouri Department of Conservation

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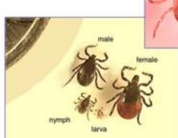
Ticks

- Not poisonous themselves
- Transmit several diseases
  - Rocky Mountain Spotted Fever
  - Ehrlichiosis
  - Tularemia
  - Borreliosis
- Prevention



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Mosquitoes

- Not poisonous themselves
- May transmit several diseases
  - West Nile Virus
  - St. Louis Encephalitis
- Prevention
  - Repellents
  - Avoid working at dusk/dawn if possible

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Basic Water Safety

- Wading in Streams
- Boat Operations
- Electrofishing Equipment

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Wading in Streams

- If your work takes you into a stream, always work in pairs if possible
- DO NOT ATTEMPT to enter a stream
  - In high water
  - If flooding is probable
- Always wear a belt around chest waders!

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Boat Operations

- Boats used primarily on creeks, streams, ponds and lakes
- Operated mainly by WQMS staff, occasionally by EER staff

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Roadway Safety

- Many Field Services personnel hours are spent working in or near highway rights of way each year
- Nationwide >700 deaths and 5,000 injuries occur in work zone accidents annually

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Roadway safety

- Leave traffic control to the "professionals" whenever possible
- Avoid impeding the flow of traffic whenever possible
- Schedule work when volume of traffic is lowest
- Wear your high visibility vest

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Roadway Safety

Request assistance from the appropriate agencies if needed
- MoDOT
- Local Law Enforcement
- Local Fire Departments

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Medical Emergencies

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Minor Emergencies

- First aid supplies for minor emergencies are located throughout the ESP Building
  - Next to the break room
  - New Garage
  - All laboratories
  - In each vehicle

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First Aid/CPR Training

- First Aid/CPR training is made available to all employees periodically
- There is no charge
- Field staff are required to maintain first aid/CPR certification
- It is strongly recommended that all other employees attend these courses

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Providing First Aid

- Employees are encouraged to provide first aid to those in need
- ***Only provide the level of assistance to which you have been trained***
- Be aware of exposure to blood and other body fluids

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Preventative Measures

- If you are helping someone in need, take appropriate precautions:
  - Use a mask for rescue breathing/CPR
  - Wear gloves
  - Wash hands after contact with blood or body fluids

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Dealing with Irate People

- If you must deal with an irate person:
  - Remain calm
  - Do not let yourself be drawn into an argument
  - If the situation deteriorates, leave
- No job is worth getting hurt (or worse)