CHAPTER 16. QUICK REFERENCE GUIDE

The Quick Reference Guide on the next few pages is to be used as a quick field guide to this SOP. It can also be found on the network at:

Q:\WATER RESOURCES\WAB\SOP'S\2015.zip

WVDEP WAB IMPORTANT INFORMATION *(QUICK REFERENCE GUIDE)* 4/14/2015 PAGE 1
Filling out the Form: The front page needs to be filled out for every site we visit or make a failed attempt to visit on a team's list, no matter if it was sampled or not. It does not matter what type of stream it was either, non-random, random, reference. This will help us track the streams more efficiently down the road. Location information should still be written down for these sites (*e.g.* Topo name, coordinates, directions, etc.). **If a site is moved any significant distance >0.5, then a form (front page) should be filled out for the original site stating why it was unsuitable & a form should be filled out for the new site making note of the original site.**
Non-random Sites - Where to Sample? (Also see Reference Sites below): Sample Target sites upstream of bridge or culvert, generally at the first riffle/run. Only sample a stream using MACS or Hand-Pick methodology if you are instructed to do as such on the stream list. If a nasty discharge (AMD stream, point source outfall, etc.) falls within the chosen stream reach, slide the reach upstream of discharge & then take physicochemical samples upstream & downstream of discharge as well as from the discharge itself using a different form for each. If the discharge is a stream & is not on another crew's list, conduct a full Wadeable Benthic assessment on that stream. If you encounter this situation, document the situation thoroughly.
Reference Sites: Some potential reference sites have been identified & are marked as PRS on the crews stream list, these streams have few apparent problems, & should be sampled following reference site protocols (**TAKE RANDOM WQ PARAMETERS!**). If the site marked on the map is not suitable, try scouting upstream to locate a better site. **Every effort should be made to sample the stream as far down in the watershed as allowed by disturbances.** Other potential sites have not been identified & are not marked 'PRS' on the crew's list. It is the crew's responsibility to determine if these sites will meet our criteria (see Reference Site section of SOP) for reference sites. Unless otherwise directed to sample them (e.g., via a note on the stream list), do not sample these sites if there are obvious impacts at these sites. If they do look good, then sample them as reference sites. If a potential reference site is encountered that is not listed on the stream list & you are sure no one has it on another list, then sample it if it meets the requirements. **Very important:** If possible, recon the watershed above the PRS & make notes about the land use quality.
Locating the Random Site: USGS topographic maps with a 1:24,000 scale are marked with an **X (highlighted in pink)** to designate the sampling station for random sites. **This spot is referred to as the X-site & is the downstream end of the 100 m reach that is to be assessed.** If you have confidently navigated to the X site, check GPS readings to make sure you are within 10 seconds of the X-site latitude & longitude. If you have good satellite coverage on your GPS (i.e., low EPE), move as close to the provided coordinates as possible. Crew members should collaborate & utilize best professional judgment (BPJ) to decide where the X-site is located (finely tuned map reading skills are important). If the GPS doesn't work, do the best you can using the topo & indicate as such on the field assessment form. **If you do not reach the X-site due to landowner denial, etc., you will only fill out the EPA X-site coordinates. The coordinates at farmer Joe's house or a locked gate are not X-site coordinates! Also, you will still need to make an educated guess as to the Target status of the site even if you cannot see it.**
Determining Random Site Status: Benthic macroinvertebrate data is the primary tool driving the random program. If a benthic macroinvertebrate sample cannot be collected at a site, skip it & move on to the next site. **Always complete the first page of the field assessment form regardless of whether the site is sampled or not. All unassessed (as well as assessed) sites will be included in the final analysis of the data. So, it is very important to thoroughly document the reason why a site was not sampled.** After establishing the X-site, thoroughly examine the assessment reach & determine if it fits in our target population of random sites. Our target population consists of the following: **1) 1st thru 4th order streams (check stream list provided by Janice), 2) riffle/run habitat, 3) wadeable, 4) can be sampled using kick (rectangular frame kicknet or D-net) protocols that result in comparable data.** Don't confuse riffle/run streams that are heavily embedded (sandy/silty) with true "wetland-like" streams. If stream velocity will effectively carry organisms into the net, then do your best to collect a sample. Look for contours (if present) in the sand/silt & collect sample there. Also, **do not** avoid sites that are all bedrock or have large substrates (boulder). In the final data analysis, these sites can be classified as less productive habitats & not necessarily impaired. Sample bedrock at areas where there are contours, fissures, &/or rough places (if present), etc. Sites to avoid include the following: 1) too deep to wade safely, 2) too deep to get a comparable benthic sample (water flows over the net) 3) too shallow &/or slow to get a comparable sample using our kicking techniques. Many of these types of sites may be revisited in future years to see if the stream condition was temporary.
Sliding the Random Assessment Reach: In some instances, it may be necessary to **slide** the reach. **Remember: never move the X-site, just slide the reach around it.** Do not proceed upstream into a lower order stream when establishing the 100 m reach. If such a confluence is encountered, note the distance & mark the confluence as the reach end. Make up for the loss of the reach length by sliding the other end of the reach an equivalent distance away from the X-site. ***NOTE: the confluence must be within the initial 100m reach for this sliding to apply***. Additionally, if the reach contains a lake, reservoir, or pond, mark the water body as the reach end & make up for the loss of the reach length by moving the other end of the reach an equivalent distance from the X-site. However, if the X-site is completely within a lake, pond, or other such impoundment, no sampling can occur & only the front page of the habitat form needs to be filled out describing the situation. Also, don't slide the reach downstream into a larger order stream. This may occur when you are sliding the reach downstream to avoid lakes, ponds, etc. **We do not slide the reach to encompass better habitat or to get more riffle/run habitat to sample or to avoid man-made obstacles such as bridges, culverts, rip-rap, or channelization.**

WVDEP WAB IMPORTANT INFORMATION *(QUICK REFERENCE GUIDE)* 4/14/2015 **PAGE 2**

COC Column	Preservation Code	Water Quality Parameters Suites: *Take WQ Sonde readings & Fecal coliform at every site!*							
		Parameter	**Random/PRS**	**Acid Rain** **	**AMD** *	**Nutrient** ***	**TDS Ions** *****	**Oil & Gas** ****	**Sediment**
1	3	Hot Acidity	Yes	Yes	Yes				
1	3	Alkalinity	Yes	Yes	Yes	@	Yes	Yes	
1	3	Sulfate	Yes	Yes	Yes		Yes	Yes	
1	2	Chloride	Yes		Yes		Yes	Yes	
1	6	Fecal coli.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1	2	Bromide	Yes				Yes		
1	3	Cold Acidity		Yes					
2	3	TDS	Yes		Yes		Yes	Yes	
2	3	TSS	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	4	Total Phosphorus	Yes			Tot. & Dis.			
2	4	TKN	Yes			Yes			
2	4	NO_2-NO_3-N	Yes			Yes			
2	4	Ammonia-N (NH_3)	#		#	##			
2	3/7	Orthophosphate (PO4-P)				Tot.			
3	5	Al	Tot. & Diss.	Tot. & Diss.	Tot. & Diss.				
3	5	Fe	Tot. & Diss.	Tot. & Diss.	Tot. & Diss.				Tot. & Diss.
3	5	Mn	Tot.	Tot.	Tot.				
3	5	Se	Tot. (Low Level)		Tot. & Diss.				
3	5	Cu	Diss. (Low Level)						
3	5	Zn	Diss. (Low Level)						
3	5	Mg	Tot.	Tot.	Tot.	@ Tot.	Tot.	Tot.	
3	5	Ca	Tot.	Tot.	Tot.	@ Tot.	Tot.	Tot.	
3	5	K	Tot.				Tot.	Tot.	
3	5	Na	Tot.				Tot.	Tot.	
3	5	Be	Tot.						
3	5	Ba	Tot.					Tot.	
Write-in	5	Sr	Tot.					Tot.	
		# of Containers	4 Cubies & 1 Fecal	3 Cubies & 1 Fecal	3-4 Cubies & 1 Fecal	3-4 Cubies & 1 Fecal	2 Cubies & 1 Fecal	2 Cubie & 1 Fecal	3 Cubies & 1 Fecal

* **AMD:** Take when:1) **conductivity alone is > 500**, 2) pH <6.0 & conductivity is >200, 3) if stream is on the 303(d) list for AMD, or 4) if for any reason you suspect mine drainage.

 # Ammonia-N (NH_3) if it is suspected that Ammonia is being used to treat the stream water.

** **Acid Rain:** Take when:1) pH <6.0 & conductivity is <50, 2) if stream is on the 303(d) list for pH unrelated to mining, or 2) if for any reason you suspect acid rain deposition impacting the stream:

*** **Nutrient: Take within 24 hours of a significant rain or** when animal waste, straight pipes, STP outfalls, etc., may be impacting the stream:

@ **Take in large rivers that are experiencing exceptionally excessive algal blooms (e.g., Greenbrier River, Tygart River)**

Take Ammonia-N (NH_3) if cattle or other livestock have direct access to stream or if there is evidence of possible ammonia

**** **Oil & Gas:** Take if oil or gas activities are evident & cond. >200 in absence of other sources like AMD

***** **TDS:** Take if sampling in Monongahela Basin (Monongahela, Dunkard, West Fork, Tygart Valley, Cheat, or Youghiogheny)

WVDEP WAB IMPORTANT INFORMATION *(QUICK REFERENCE GUIDE)* 4/14/2015 PAGE 3

Other Water Quality Notes:

- Place fecal bottles in separate zip-lock sandwich size baggies before putting in **ice** (do not submerge in ice water!).
- Label each container w/ WVDEP WB, stream name, AN-code, date/time collected, collector (especially if a dup.), & preservative type.
- Take water samples at lower end of reach for Non- Random targeted sites. **Take water samples at lower end of 100 m assessment reach for random sites regardless of the location of the X-site. Rinse containers 3 times!!!!!**
- **If Alkalinity is being analyzed, 100% of the air must be expunged from the unfixed cubitainer to avoid contamination.**
- **Collect samples without stirring up sediment or organic debris that can contaminate the sample!**
- **Remember:** A net minimum of 200 mL of filtered sample should be turned in for dissolved metal analysis at **most labs** we deal with.

Water Chemistry Hold Times

Fecal	6 or 24 Hours depending on sampling type
Orthophosphate	48 Hours
TSS	7 Days
Acidity, Alkalinity	14 Days
Chloride, Sulfate, Nutrients	28 Days
Metals	6 Months

Field Blanks: Each team should prepare field blanks **WEEKLY** at the sites designated at the time the normal samples are collected. Distilled, deionized water is the blank "sample". Crews should "collect" a clean, well-sealed one gallon cubitainer of DI water from the water lab at the beginning of the week. When the crew arrives at a designated site, they should prepare a set of cubitainers & preserve the blanks as they would normal samples (this includes filtering one blank for dissolved parameters). Use one cubitainer for each type of preserved sample collected (or expected to be collected) that week. **Be sure to prepare a field blank for all parameters sampled during the week except Fecal.** Blanks are labeled with a false AN-code & stream name (e.g., Surbaugh Branch, KP-100-A-B). A separate "Analysis Request Form" is completed for the field blanks **with faked sonde data on the form.** Do not indicate on any paperwork given to the lab that it is a field blank until after the sample is submitted to the lab.

Duplicate Sites are not Optional!! Attempt to do the duplicate site at the designated site. If the first site you visit on a list provides enough good habitat to do a duplicate, then sample it as a duplicate. Do not wait until the end of a week or list to sample for a duplicate stream. Duplicate sites should be large enough to obtain two complete benthic samples (4 kicks + 4 kicks) in comparable habitat (substrate size & velocity in particular), if not, select another stream. Make sure the in stream substrate & velocity of the benthic sampling sites are as similar as possible. Make sure to write the name of the collector & Dup #1 & Dup #2 on the appropriate sample containers. Each team member should complete the habitat forms & collect macroinvertebrate & appropriate water samples as if they are the only person there (*i.e.*, a one person crew). GPS values can be shared. Hydrolab & flow values should only be recorded on the Dup #1 form. **Only filter the sample you collect!**

WVDEP WAB IMPORTANT INFORMATION *(QUICK REFERENCE GUIDE)* 4/14/2015 PAGE 4

Flow: Locate the best cross section to measure. (Flow parallel to stream bank, minimum of large disturbances, no large eddies, flow not heavily skewed to one side, etc.). Move some substrate to create a spot. **ALWAYS USE A TAPE MEASURE!**

- Select an optimal section of the reach with a maximum of straight, parallel velocity vectors, stable, level streambed, and a minimum velocity of **0.05 ft./s** for the transect.
- Determine the wetted width & approximate edge of effective flows (EFF) of the stream transect.
- **Determine the approximate number and average spacing of velocity measurements.**
  - **For streams < 3ft wide, you get as many measurements as possible no closer together than 0.3 ft. using best professional judgment.**
  - **For streams > 3ft to 10 ft. wide, you should have a minimum of 10 measurements.**
  - **For streams > 10ft wide, you should have a minimum of 20 measurements.**
- Record the distance at one bank (wetted edge) as the 1st measurement (vertical). The last measurement is the opposite bank (wetted edge). Make sure to document the bank designation in the location description.
- The 2nd measurement should be at the EEF. The 2nd to last measurement should be at that opposite EEF and the last measurement is the opposite bank (wetted edge). Record the depth and velocity at both EEFs and the EEF description.
- Determine the number of velocity readings needed per measurement
  - If the depth is <=**1.5 ft**., the velocity is measured only at 4/10ths of depth from the bottom (Middle of the Water Column) at that measurement station=**One-Point Method**.
  - If the depth is >**1.5 ft**., take **2 velocity readings** at that measurement station: one at 2/10ths of depth from the bottom (Bottom of Water Column) & one at 8/10ths (Top of Water Column) =**Two-Point Method**.
  - 1) If the depth is >**1.5 ft**. **and**
    - The **Top reading is greater than 2 times the Bottom** velocity reading **or**
    - The **Bottom reading is greater than the Top** reading **or**
    - The **Top reading is seriously affected** by an obstruction (e.g., ice/ slush cover or overhanging vegetation dipping into the stream channel) **or**
    - The **Bottom reading is seriously affected** by friction or turbulence produced by the streambed or an obstruction

    Take **3velocity readings** at the Top, Middle, and Bottom=**Three-Point Method**.
- Stand downstream of the meter facing the bank with the water flowing against the side of one leg and at least 18 inches from the wading rod.
- **Any negative flow readings should be recorded as that negative value.**
- Always record segment distance & depth in tenths of feet & velocity in ft/second.
- Continue taking measurements along the transect by tightening the increments in plumes of high velocity or radically changing depths or by spreading them out in relatively consistent velocity/depth zones until the last measurement is around one half the average segment length from the other edge of E.F. **The minimum width increment that can be used is 0.3 ft. or the approximate width of the probe head** as any increments smaller than this will be indistinguishable from one another.
- If caught behind an unmovable boulder or other obstacle, you need to take the measurement behind the boulder & also on either side of that boulder to get data from higher velocity plumes deflected around the boulder. If the water depth is >1.5, then take a Three-Point reading behind the boulder.
- If the wetted edge is associated with a depth or velocity (e.g., at an artificial, near vertical wall) you will need to either:
  - Designate an **Edge Factor between 0.9 (smooth wall) to 0.5 (rough wall)** if using an **OTT MF Pro meter**, or
  - Take a measurement at **0.2 ft. and 0.5 from the wall** if using a **Marsh-McBirney Flo-Mate**.
- **Store the flow meter head separate from the rod to avoid damage & keep the physical structure of the head clear, consistent & smooth.**

Remember: The flow measurement probe is not accurate in depths less than 0.2 ft. as it makes the flow measurement unreliable. Consider this carefully when choosing a location for flow measurement. If a stream simply does not have areas with at least 0.2ft depth, then take what measurement you can & indicate that the flow is not comparable on the form & why. Always not flow comparability & unusual situations.

Note: Extreme conductivity could have an effect adverse on the flow reading; be aware & on the lookout for this when working in such streams.

WVDEP WAB IMPORTANT INFORMATION *(QUICK REFERENCE GUIDE)* 4/14/2015 PAGE 5

Biology: ***Check the nets for holes regularly & empty after every kick; always use the small brush on cobble & larger rocks. Put a label on the inside & outside of every sample jar. Sample a variety of riffles (high gradient, intermediate, & low gradient or flat), but sample the most productive or best ones within each group available.***

Comparable Methods:

- Streams w/ riffles & of adequate size, use the **Modified Kick (Surber) net = 4 kicks - 0.5m x 0.5m, 20 seconds each.**
- Streams w/ riffles but too narrow to use Surber, use **D-net = 9 kicks - 0.3m (1 foot) x 0.3m, 20 seconds each**.

Non-comparable methods (use only if directed to do so on the stream list):

- Streams w/ too low of a flow to use other protocols, conduct a **Hand pick = 4 areas (0.5m x 0.5m) thoroughly** in wetted connections between pools, not in pools. It may not be possible to sample a square 0.5m x 0.5m area (stream too narrow); it is fine to sample non-square areas like 0.25m (~10 inches) x 1.0m. Remember that hand pick samples are not comparable, but this type of sampling can still provide valuable data in certain situations.
- Streams w/ no flowing water - use **Multi-habitat (MACS) = 20 jab/sweeps - 0.5m each.** Sample the habitats in proportion to the productive habitat in the reach (*i.e.*, if 50 % of the productive habitat is woody snags, sample 10 woody snags). **Do MACS sites only if absolutely necessary & if there is plenty of proper habitats to sample**. Remember that MACS samples are not comparable, but this type of sampling can still provide valuable data in certain situations.

Sample Preservation – The samples must be properly preserved!! Each sample must have at least 70% ethanol to adequately preserve organisms. If the sample jar is very full (especially with lots of organic material like filamentous algae or leaves), divide sample into two or more labeled jars. Each sample jar should be no more than half full with the benthic sample. Be sure to clearly indicate '1 of 2' & '2 of 2', etc. on the jars. Also, tape any multiple jar samples together back in the lab. *Do not invert the sample jar after putting the organic material (Bugs & Leaf Bits) in on top of the inorganic material (Sand & Silt).*

WVSCI Thresholds

WVSCI Score	Listing Category	Descriptive Category
78.01-100.00	Unimpaired	Very Good
68.01-78.00	Unimpaired	Good
60.61-68.00	Impaired-Gray Zone	Gray Zone-Impaired
45.01-60.60	Impaired	Slightly Impaired
22.01-45.00	Impaired	Moderately Impaired
0-22.00	Impaired	Severely Impaired

RBP Thresholds

RBP Total Score	Category
160-200	Optimal
110-159	Sub-Optimal
60-109	Marginal
0-59	Poor

Relative Bed Stability Thresholds

RBS Score	Category
>=2.0	Highly Impaired-Too little fine sediment
1.00-1.99	Impaired-Too little fine sediment
0.20-0.99	Good
-1.00-0.19	Impaired-Too much fine sediment
<-1.00	Highly Impaired- Too much fine sediment

Substrate Layer Profile Thresholds

SLP Score	Category
90-100	Not Limiting to Colonization
80-89	Not Likely Limiting to Colonization
70-79	Possibly Limiting to Colonization
60-69	Likely Limiting to Colonization
50-59	Limiting to Colonization
<50	Severely Limiting to Colonization

WVDEP WAB IMPORTANT INFORMATION *(QUICK REFERENCE GUIDE)* 4/14/2015 PAGE 6

WQ Standards

	Water Temperature Regime	Water Quality Standards	Units
Water Temperature	Cold or Trout Water	>70	Deg F
	Warm or Warm Water Fishery	>87	

Use Designation	B1- Warm Water Fishery, B4 - Wetlands		B2 - Trout		C - Contact Recreation	A - Public Water Supply	D - Agr/Wildlife, E - Industrial Water Supply
Parameter	**acute**	**chronic**	**acute**	**chronic**	**C**	**A**	**D & E**
Bio Impairment	**WVSCI <=68**	**WVSCI <=68**	**WVSCI <=68**	**WVSCI <=68**			
Fecal Coliform, geo mean- 5 samples min/more than 10% of samples, per 100 ml					200/400	200/400	
Fecal Coliform, per 100 ml, Ohio R. November - April, geo mean 5 samples min					2000		
DO, any time, mg/l minimum	<5	<5	<6, <7 when spawning	<6, <7 when spawning	<5	<5	<5
DO, any time, mg/l minimum (Ohio R; Kan. Zone 1)	<4	<4					
DO, any time, mg/l minimum (Ohio Apr. 15 - June 15)	<5	<5					
DO, daily avg., mg/l minimum (Ohio R)	<5	<5					
pH	<6.0 or >9.0	<6.0 or >9.0	<6.0 or >9.0	<6.0 or >9.0	<6.0 or >9.0	<6.0 or >9.0	<6.0 or >9.0
Aluminum (D), mg/l	0.75	0.75	0.75	0.087			
Iron (T), mg/l		1.5		1		1.5	
Manganese (T), mg/l						1	
Arsenic (T), mg/l					0.05	0.05	0.1
Cyanide (as free), mg/l	0.022	0.005	0.022	0.005	0.005	0.005	
Mercury (T), mg/l	0.0024		0.0024		0.00015	0.00014	
Selenium (T), mg/l	0.02	0.005	0.02	0.005		0.01	
Chromium hexavalent (+6), Diss., mg/l	0.01571	0.01058	0.01571	0.00693			
Ammonia (Un-ionized) mg/l	Need separate spreadsheet						
Chloride, mg/l	860	230	860	230	250	250	
Nitrate (as Nitrate-N), mg/l						10	
Nitrite(as Nitrite-N), mg/l	1		0.06				
Cadmium (D), mg/l	Hardness Dependent				Hardness Dependent		
Lead (D), mg/l	Hardness Dependent						
Nickel (D), mg/l	Hardness Dependent						
Silver (D), mg/l	Hardness Dependent						
Zinc (D), mg/l	Hardness Dependent						

WVDEP WAB IMPORTANT INFORMATION *(QUICK REFERENCE GUIDE)* 4/14/2015 PAGE 7

Use Designation	B1- Warm Water Fishery, B4 - Wetlands		B2 - Trout		C - Contact Recreation	A - Public Water Supply	D - Agr/Wildlife, E - Industrial Water Supply
Parameter	**acute**	**chronic**	**acute**	**chronic**	**C**	**A**	**D & E**
Antimony (T), mg/l					4.3	0.014	
Arsenic (D) Trivalent, mg/l	0.34	0.15	0.34	0.15			
Barium (T), mg/l						1	
Beryllium(T), mg/l	0.13		0.13			0.0000077	
Cadmium (D), mg/l (Ohio R)						0.01	
Chromium trivalent (+3), Diss., mg/l	Hardness Dependent						
Copper (T), mg/l						1	
Copper (D), mg/l	Hardness Dependent						
Fluoride (T), mg/l						1.4	2.0 (for D)
Lead (T), mg/l						0.05	
Methylmercury, mg/l		0.000012		0.000012			
Nickel (T), mg/l					4.6	0.51	
Silver (T), mg/l	Hardness Dependent						
Thallium, (T) mg/l					0.0063	0.0017	
Threshold Odor		>8 at 104 deg. F		>8 at 104 deg. F	>8 at 104 deg. F	>8 at 104 deg. F	
Total Residual Chlorine, mg/l	0.019	0.011	No chlorinated discharges				
Turbidity		X		X	X	X	

Fish Tissue Standard

Mercury in Fish	0.5	Body Burden value, ug/g

Some Basic Flag Codes for the Field Sheets

I	Parameter not recorded or deleted due to instrument problems or maintenance issues
L	Parameter recorded but suspected to be incorrect value; There is a low probability that the value is incorrect
M	There is a moderate probability that the value is incorrect
H	There is a high probability that the value is incorrect

ADB Flag Values

Conductivity	500	umohs
Total Aluminum	0.75	mg/L
Sulfate	170	mg/L
Hardness	200	20-75 soft
Chloride	230	mg/L
Nitrate plus Nitrite	2	mg/L
Phosphorus	0.1	mg/L
Total Suspended Solids	15	mg/L

WVDEP WAB IMPORTANT INFORMATION *(QUICK REFERENCE GUIDE)* 4/14/2015				PAGE 8
WV Invasive/Non-Native Species-Flora				**Probability of finding specimen in WV**
Scientific Name	**Common Name**	**Type**	**Habitat**	
Achillea millefolium	Common Yarrow	Flower	Urban/Roadside	H
Ailanthus altissima	**Tree Of Heaven**	**Tree**	**Urban**	**H**
Albizia julibrissin	Mimosa, Silk-Tree	Tree	Urban/Ornamental	M
Alliaria petiolata	**Garlic Mustard**	**Ground Cover**	**Various**	**H**
Berberis thunbergii	**Japanese Barberry**	**Bush**	**Various**	**M**
Cichorium intybus	Chicory	Flower	Roadside	H
Cleome hassleriana	Spiderflower	Flower		L
Commelina communis	Asiatic Day-Flower	Flower	Bottomland/Riparian	M
Coronilla varia	**Crown Vetch**	**Ground Cover**	**Roadside/Reclaimed Lands**	**M**
Daucus carota	Queen Anne's Lace, Wild Carrot	Flower	Roadside	H
Elaeagnus umbellata	**Autumn Olive**	**Bush**	**Roadside/Reclaimed Lands**	**H**
Glechoma hederacea	Ground-Ivy	Vine	Urban	H
Hedera helix	English Ivy	Vine	Urban	M
Hemerocallis fulva	Common Day Lily	Flower	Urban/Riparian	M
Lonicera japonica	**Japanese Honeysuckle Vine**	**Vine**	**Various**	**H**
Lotus corniculatus	Birdsfoot Trefoil	Flower/Herb	Reclaimed/Disturbed lands	M
Lysimachia nummularia	Moneywort	Vine/Ground Cover	Riparian/Moist Soil	M
Lythrum salicaria	**Purple Loosestrife**	**Tall Herb/Wildflower**	**Riparian/Wetlands**	**M**
Microstegium vimineum	**Japanese Stiltgrass**	**Grass**	**Various**	**H**
Myriophyllum aquaticum	Parrot's Feather	Aquatic/Submerged	Ponds/Streams	L
Myriophyllum spicatum	European Water-Milfoil	Aquatic/Submerged	Ponds/Streams	L
Najas minor	Eutrophic Water-Nymph	Aquatic/Submerged	Ponds/Streams	M
Paulownia tomentosa	Princess-Tree	Tree	Roadside/Railroad	M
Phyllostachys aurea	**Bamboo**	**Grass**	**Urban**	**M**
Polygonum cuspidatum	**Japanese Knotweed**	**Tall Herb**	**Riparian/Streamside**	**H**
Polygonum perfoliatum	**Mile-A-Minute**	**Vine**		**L**
Potamogeton crispus	Curly Pondweed	Aquatic/Submerged	Ponds/Streams	L/M
Pueraria lobata	**Kudzu Vine**	**Vine**	**Various**	**H**
Rosa multiflora	**Multiflora Rose**	**Bush**	**Various**	**H**
Rubus phoenicolasius	Wineberry	Bush		M
Trifolium pratense	Red Clover	Herb/Flower	Fields/Pasture/Urban	H
Urtica dioica	Stinging Nettle, Common Nettle	Herb	Riparian	M
Verbascum blattaria	Moth Mullein	Flower		M
Verbascum thapsus	Great Mullein	Flower	Roadside/Disturbed Soil	H

WV Invasive Species-Fauna				**Probability of finding specimen in WV**
Scientific Name	**Common Name**	**Type**	**Habitat**	
Corbicula fluminea	**Asiatic Clam**	**Mollusca**	**Stream Substrate (Relic Shells or Live)**	**H**
Dreissena polymorpha	Zebra Mussel	Mollusca	Lake-like habitats/waterways	
Lymantria dispar	Gypsy Moth	Caterpillar	Riparian Forest	H
Agrilus planipennis	Emerald Ash Borer	Beetle	Riparian Forest	H
Adelges tsugae	Hemlock woolly adelgid	Aphid-like	Riparian Forest-Hemlock Trees	H

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