APPENDIX A – LDS CRITIERA FOR SELECTED REGIONS OF THE STUDY AREA.

Calcareous Geology-Dominated Streams

Reference Criterion	Size 1 (0-3 mi^2 watershed area)	Size 2 (4-10 mi^2 watershed area)	Size 3 (11-100 mi^2 watershed area)	Size 4 (100+ mi^2 watershed area)
Catchment developed (%)	<= 1	<= 2.4	<= 2	<= 3
Catchment Agriculture (non-row crop) (%)	<= 36	<= 56	<= 59	<= 30
Catchment Agriculture (row crop) (%)	<= 16	<= 22	<= 14.1	<= 15.7
Catchment Forest Cover (%)	>= 60	>= 41	>= 31	>= 56
Riparian Developed (%)	<= 2	<= 2	<= 2	--
Riparian Agriculture (%)	<= 20	<= 40	<= 50	--
Riparian Forest Cover (%)	>= 78	>= 41	>= 37.5	--
# Catchment Point Sources	<= 4	<= 6	<= 10	<= 8
# Catchment Dams	= 0	= 0	<= 1	<= 2
# Catchment Road Crossings	<= 7	<= 19	<= 60	<= 330
Example Streams	*HW of W & E Branches Owego Creek (NY); Tribs to Cross Creek below confluence of North & Middle Forks; Tribs to Brush Run (Raccoon Creek); some tribs to Blacklegs Creek; small tribs to Monongahela & Cheat Rivers near their confluence; almost all tribs to Evitts creek draining ridge to east;* tribs to Horn Run (Standing Stone Creek); *tribs to Basher Kill, just above Neversink R confluence (NY)*	*HW Tribs of W & E Branches Owego Creek (NY); Scott Run (Cross Creek); Big, Harpers & Whiskey Runs (Blacklegs Creek); Perry Mill Run (Monongahela R); Gander Run (Clear Creek); Rocky Gap Run (Evitts Creek); Shobers Run; Hiett Run (North R –WV); upper N. Branch Little Aughwick Run; Beaverdam Run (Juniata R); Thomson Creek (Conodoguinet Creek); Wickecheoke Creek and Plum Brook (NJ)*	*W & E Branches Owego Creek (NY); Bradley Creek (NY); Upper Raccoon Creek; York Run (Georges Creek); Georges Run (Monongahela R); Evitts Creek, above impoundment; Shobers Run; Little Juniata Creek; Bixler Run (Sherman Creek); Fort Run (Aughwick Creek); Beaverdam Run (Juniata R); Wickecheoke Creek (NJ); Moores Run (Cacapon R - WV)*	*Fishing Creek, below Little Fishing Creek (Bald Eagle Creek); Penns Creek, btw Pine Creek and Big Poe Creek; lower Spruce Creek (Little Juniata River)*

Crystalline Silicic Geology-Dominated Streams

Reference Criterion	Size 1 (0-3 mi^2 watershed area)	Size 2 (4-10 mi^2 watershed area)	Size 3 (11-100 mi^2 watershed area)	Size 4 (100+ mi^2 watershed area)
Catchment developed (%)	6	6	6	12
Catchment Agriculture (non-row crop) (%)	25	40	55	43
Catchment Agriculture (row crop) (%)	10	8	12.5	9
Catchment Forest Cover (%)	59	55	37	35
Riparian Developed (%)	5	4.9	6.9	--
Riparian Agriculture (%)	20	15	48.5	--
Riparian Forest Cover (%)	60	55	25	--
# Catchment Point Sources	4	6	16	35
# Catchment Dams	1	2	1	4
# Catchment Road Crossings	11	19	54	290
Example Streams	*HW of Rocky Mountain Creek & Carbaugh Run (Conococheague Creek); HW of Little Lehigh, Swabia & Manatawny Creeks; Mountain Lake Brook (Pequest R)*	*HW tribs to Yellow Breeches Creek; portions of Manatawny Creek; Sacony Creek and Beaver Run*	*W. Br. Brandywine Creek; S. Br. French Creek; W. Br. Perkiomen Creek*	*Brandywine Creek; Musconetcong River (NJ)*

Crystalline Mafic Geology-Dominated Streams

Reference Criterion	Size 1 (0-3 mi^2 watershed area)	Size 2 (4-10 mi^2 watershed area)	Size 3 (11-100 mi^2 watershed area)	Size 4 (100+ mi^2 watershed area)
Catchment developed (%)	6	2.1	6	4.5
Catchment Agriculture (non-row crop) (%)	22	25	55	43
Catchment Agriculture (row crop) (%)	7	8.5	18	10
Catchment Forest Cover (%)	68	67	29	36
Riparian Developed (%)	3.5	3.5	4	--
Riparian Agriculture (%)	10	14.5	13	--
Riparian Forest Cover (%)	65	64	85	--
# Catchment Point Sources	3	4	10	13
# Catchment Dams	0	0	0	0
# Catchment Road Crossings	5	15	110	250
Example Streams	*Tribs to Tohickon Creek; Butter Creek (Unami Creek); Headwaters of Toms Creek*	*Ridge Valley Creek (Unami Creek); Dimple Creek (Tohickon Creek); Rapp & Beaver Creeks (Tinicum Creek)*	*Muddy, Otter & Fishing Creeks (Susquehanna R); W. Br. Brandywine Creek (near mouth)*	*Brandywine Creek, below Buck Run confluence*

Appalachian Plateau Physiographic Province - Waynesburg Hills Section

Reference Criterion	Size 1 (0-3 mi^2 watershed area)	Size 2 (4-10 mi^2 watershed area)	Size 3 (11-100 mi^2 watershed area)	Size 4 (100+ mi^2 watershed area)
Catchment developed (%)	<= 1	<= 3.7	<=0.9	<= 1.4
Catchment Agriculture (non-row crop) (%)	<= 28	<= 37	<= 40	<= 41.5
Catchment Agriculture (row crop) (%)	<= 3.5	<= 4	<= 0.55	<= 1
Catchment Forest Cover (%)	>= 70	>= 60	>= 59	>= 56
Riparian Developed (%)	<= 1.75	<= 3	<= 2	--
Riparian Agriculture (%)	<= 18	<= 25	<= 36.5	--
Riparian Forest Cover (%)	>= 80	>= 75	>= 61	--
# Catchment Point Sources	<= 2	<= 2	<= 2	<= 21
# Catchment Dams	<= 1	<= 1	<= 1	<= 9
# Catchment Road Crossings	<= 6	<= 22	<= 53	<= 300
Example Streams	*Many tribs to Fish Creek PA Fork; many Tribs to Wheeling Creek, both Robinson & Enlow forks, near PA border); many tribs to Meadow Run; Woods Run (Whiteley Creek); tribs to little Whiteley Creek (Monongahela R); all tribs to Middle Run (Monongahela R); Meadow & Bates Runs (Monongahela R)*	*Owens Run (Wheeling Creek, Enlow Fork); Wharton Run (Wheeling Creek, Dunkard Fork); Crabapple Creek; Bissett Run (Fish Creek, PA Fork); Barneys Run (S. Fork Dunkard Run); Kent Run (Wheeling Creek, Dunkard Fork); Sharp Run (Dunkard Creek)*	*S. Fork Dunkard Fork; Wheeling Creek, Dunkard Fork; Fish Creek, PA fork (btw Knob and Pigeon Runs); Dunkard Creek (btw Toms Run & PA Fork Dunkard Creek); PA fork Dunkard Creek (below Clawson Run); Roberts Run (btw Rush & Sheppards Runs); mid Browns Creek; mid Bates Fork (Browns Run); Sections of Wheeling Creek, Robinson Fork; Wheeling Creek, Templeton Fork (btw Rocky Run & Wheeling Creek, Enlow Fork)*	*S. Fork Tenmile Creek (btw Browns Creek & Grimes Run); Tenmile Creek (btw Daniels Creek & Plum Run); Dunkard Creek (btw Miracle Run & Wrights Run)*

Appalachian Plateau Physiographic Province – Northwest Glaciated Plateau Section

Reference Criterion	Size 1 (0-3 mi^2 watershed area)	Size 2 (4-10 mi^2 watershed area)	Size 3 (11-100 mi^2 watershed area)	Size 4 (100+ mi^2 watershed area)
Catchment developed (%)	<= 1	<= 0.65	<= 1.5	<= 2.1
Catchment Agriculture (non-row crop) (%)	<= 30	<= 37	<= 45	<= 35.5
Catchment Agriculture (row crop) (%)	<= 14	<= 13.5	<= 19	<= 13
Catchment Forest Cover (%)	>= 70	>= 50	>= 43	>= 39
Riparian Developed (%)	<= 0.9	<= 1	<= 1.5	--
Riparian Agriculture (%)	<= 29	<= 30	<= 34	--
Riparian Forest Cover (%)	>= 70.5	>= 66	>= 60	--
# Catchment Point Sources	<= 2	<= 3	<= 5	<= 15
# Catchment Dams	<= 1	<= 2	<= 2	<= 4
# Catchment Road Crossings	<= 6	<= 12	<= 44	<= 300
Example Streams	Conneaut Creek & W. Br. Conneaut HW tribs; McConnell Run & Tribs (Sandy Creek); lower Mill Creek tribs (French Creek); Woodcock Creek HW; Sugar Creek HW tribs; lower small tribs to Oil Creek; HW Tribs so Spring Creek (Brokenstraw Creek); some HW tribs to Little Conneauttee Creek	*Middle/East Branches Conneaut Creek; Inlet/Pine Runs (above Conneaut impoundment); HW Watson Run (Conneaut Outlet); Little Sandy Creek tribs; W Br. Sugar Creek; Sugar Creek headwaters; Mackey/Temple Runs (Sandy Creek); many tribs to Oil Creek; Townly Run & Bailey Brook (W. Br. French Creek); Spencer Creek & Baskin Run (S. Br. French Creek); North Br. Akeley & Storehouse Runs (Conewango Creek); Stony Creek (Little Brokenstraw Creek*	*West/Middle Branches Conneaut Creek; Little Elk Creek; North Deer and Mill Creeks (French Creek); middle Lake Creek; middle Little Sugar Creek; Woodcock Creek above impoundment; Muddy Creek btw Potash Run & Federal Run; mid Thompson Run; Spring Creek (Brokenstraw Creek); Little Brokenstraw Creek; Shenango R above Pymatuning*	*Sugar Creek (below Lake Creek Confluence); lower NWGP section of Oil Creek; French Creek, above confluence with S. Br. French Creek; Shenango R, btw Pymatuning & Little Shenango confluence.; Conneaut Creek, below W. Br. Conneaut confluence.*

Piedmont Physiographic Province – All Sections

Reference Criterion	Size 1 (0-3 mi^2 watershed area)	Size 2 (4-10 mi^2 watershed area)	Size 3 (11-100 mi^2 watershed area)	Size 4 (100+ mi^2 watershed area)
Catchment developed (%)	<= 6	<= 6	<= 5.5	<= 5.5
Catchment Agriculture (non-row crop) (%)	<= 40	<= 45	<= 50	<= 40
Catchment Agriculture (row crop) (%)	<= 17.5	<= 15	<= 17	<= 7
Catchment Forest Cover (%)	>= 50	>= 40	>= 32	>= 49
Riparian Developed (%)	<= 2.5	<= 3	<= 3	--
Riparian Agriculture (%)	<= 25	<= 35	<= 45	--
Riparian Forest Cover (%)	>= 55	>= 40	>= 22	--
# Catchment Point Sources	<= 2	<= 2	<= 10	<= 40
# Catchment Dams	= 0	<= 1	<= 2	<= 4
# Catchment Road Crossings	<= 10	<= 20	<= 55	<= 815
Example Streams	*Sawmill Run; Furnace Run (Sawmill Run); Counselman Run (Susquehanna R.); Oakland Run, Huber Run; Trout Run (Climbers Run); Shearers Creek headwaters; headwater tribs of Hammer Creek, above impoundment; Tribs to Allegheny, Sixpenny & Seidel Creeks (Schuylkill R); Tribs to Jehrico Creek*	*Beaver Creek; Tucquan Creek; upper Conewago Creek; upper Chickens Cree/Shearers Creek; Furnace & Segloch Runs of upper Middle Creek; upper Black Creek (Muddy Creek); N. Branch Indian Run (E. Br. Brandywine Creek); Rock, Beaver and Birch Runs (French Creek); Deep Creek (Perkiomen Creek); Ridge Valley Creek (Unami, Perkiomen Creeks); Threemile Run & Haycock Creek (Tohickon Creek); Beaver and Rapp Creeks (Tinicum Creek); Jerhico Creek*	*lower Otter Creek; Middle Creek; upper Hammer Creek; mid Cocalico Creek; upper East Branch Brandywine Creek; S. Branch French Creek & French Creek above S. Branch; W. Branch Perkiomen Creek; Tinicum Creek*	*Perkiomen Creek (Unami Creek confluence to Skippack Creek confluence); Tohickon Creek (Geddes Run to Del. R.)*

Ridge & Valley Physiographic Province – Susquehanna Lowland Section

Reference Criterion	Size 1 (0-3 mi^2 watershed area)	Size 2 (4-10 mi^2 watershed area)	Size 3 (11-100 mi^2 watershed area)	Size 4 (100+ mi^2 watershed area)
Catchment developed (%)	<= 0.75	<= 0.75	<= 1.5	<= 0.75
Catchment Agriculture (non-row crop) (%)	<= 22.5	<= 22	<= 25	<= 20
Catchment Agriculture (row crop) (%)	<= 10	<= 6	<= 10	<= 10
Catchment Forest Cover (%)	>= 75	>= 70	>= 70	>= 70
Riparian Developed (%)	<= 1	<= 1	<= 1.5	--
Riparian Agriculture (%)	<= 15	<= 20	<= 25	--
Riparian Forest Cover (%)	>= 80	>= 75	>= 70	--
# Catchment Point Sources	= 0	= 0	<= 2	<= 3
# Catchment Dams	= 0	= 0	<= 2	<= 2
# Catchment Road Crossings	<= 4	<= 10	<= 35	<= 400
Example Streams	*Tributaries to Big Run (Muncy Run); Tributaries to Lick Run (Muncy Run); Headwaters of West Creek (Fishing Creek); Headwaters of Pine Creek; Laurel Run (Huntington Creek); Headwaters of Spruce Run; Boyers Run (Susquehanna River); Headwaters of South Fork Powell Creek;*	*North & South Forks of Powell Creek; Big Run (to Lost Creek); Big Run and Roaring Run (both to Muncy Creek); Pine Creek (above Bell Creek); Rayburn Creek (to Shickshinny Creek); Roaring Brook (to Hunlock Creek)*	*White Deer Creek (above impoundment); Spruce Run (above Black Run); Rapid Run; Kitchen Creek; Huntington Creek (Laurel Run to Kitchen Creek)*	*Fishing Creek (above Little Fishing Creek and below Raven Creek); Huntington Creek (below Pine Creek); Muncy Creek (below Sugar Run to Susquehanna River); Lycoming Creek (above Bottle Run)*

Ridge & Valley Physiographic Province – Great Valley Section

Reference Criterion	Size 1 (0-3 mi^2 watershed area)	Size 2 (4-10 mi^2 watershed area)	Size 3 (11-100 mi^2 watershed area)	Size 4 (100+ mi^2 watershed area)
Catchment developed (%)	<= 1	<= 1.75	<= 1.5	<= 6
Catchment Agriculture (non-row crop) (%)	<= 50	<= 55	<= 55	<= 40
Catchment Agriculture (row crop) (%)	<= 12	<= 15	<= 17	<= 11
Catchment Forest Cover (%)	>= 40	>= 35	>= 30	>= 50
Riparian Developed (%)	<= 2	<= 2.5	<= 1.5	--
Riparian Agriculture (%)	<= 40	<= 40	<= 45	--
Riparian Forest Cover (%)	>= 40	>= 35	>= 45	--
# Catchment Point Sources	= 0	<= 3	<= 1	<= 20
# Catchment Dams	= 0	= 0	<= 2	<= 5
# Catchment Road Crossings	<= 10	<= 20	<= 55	<= 280
Example Streams	*Headwaters of Keasey Run; Headwaters of Paxton Run; Headwaters of Phillaman Run; Headwaters of Bore Mill Run; Tribs to Locust Creek; Trib to Wertz Run; Headwaters of Crosskill Creek; Headwaters of East Fork Martins Creek; Slateford Creek*	*Headwaters of Doubling Gap Creek; Headwaters of Locust Creek; Headwaters of Monroe Creek; Headwaters of Northkill Creek; Headwaters of Trout Creek; Headwaters of Hokendauqua Creeks - Indian & Hokendauqua*	*Mill Creek; Maiden Creek above Kistler Creek; Indian & Hokendauqua Creeks, above confluence*	*West Branch Conococheague Creek; Conodoguinet Creek between Muddy Run and Paxton Run*

APPENDIX B: POINT SOURCE DATASET DESCRIPTIONS

- **Superfund/CERCLIS (EPA Comprehensive Environmental Response, Compensation, and Liability Information System)**

CERCLIS is a national computerized management information system that automates entry, updating, and retrieval of Comprehensive Environmental Response, Compensation, and Liability Information System data and tracks site and non-site specific Superfund data in support of the Comprehensive Environmental Response, Compensation, and Liability Act. It contains information on hazardous waste site assessment and remediation.

Data source time period: 1983-1997
http://www.epa.gov/superfund

- **IFD**

The major components of the IFD are the Permit Compliance System (PCS), the National Pollution Discharge Elimination System (NPDES), the Construction Grants Needs Survey, the Publicly Owned Treatment Works Study, the regulations and standards from EPA/OW Effluent Guidelines Division, EPA's Duluth Laboratory's Complex Effluent Toxicity Information System (CETIS) database, the Organic Chemical Producer's (OCP) database, EPA Enforcement Form 2C data in STORET, the Hazardous

Data source time period: 1978-1994
http://www.epa.gov/ost/basins

- **TRI (Release Inventory Facilities)**

The TRI data for chemical releases to land are limited to releases within the boundary of a facility. Releases to land include: landfills; land treatment/application farming; and surface impoundments, such as topographic depressions, man-made excavations, or diked areas. Air releases are identified as either point source releases or as non-point (i.e. fugitive) releases, such as those occurring from vents, ducts, pipes, or any confined air stream. Surface water releases included discharges to rivers, lakes, streams, and other bodies of water. In addition, the database covers releases to underground injection wells (where chemicals are injected into the groundwater) and off-site transfers of chemicals to either publicly owned treatment works (POTWs) or any other disposal, treatment, storage, or recycling facility.

Data source time period: 1987-1995
http://www.epa.gov/enviro/html/tris/tris_overview.html

- **PCS (EPA/OW Permit Compliance System)**

PCS is a national computerized management information system that automates entry, updating, and retrieval of National Pollutant Discharge Elimination System (NPDES) data and tracks permit issuance, permit limits and monitoring data, and other data pertaining to facilities regulated under NPDES. PCS records water-discharge permit data on more than 75,000 facilities nationwide.

The NPDES permit program regulates direct discharges from municipal and industrial wastewater treatment facilities that discharge into the navigable waters of the United States. Wastewater treatment facilities (also called "point sources") are issued NPDES permits regulating their discharge. For distribution with BASINS v.2.0, the spatial attributes of the database were prepared in Arcview shape file format while selected relational attributes were prepared in Arcview DBF file format.

Data source time period: 1987-1995
http://www.epa.gov/owmitnet/pcsguide.htm

- **Mines (USBM Mineral Availability System)**

This dataset lists known mining operations, mineral deposits/occurrences and processing plants, and identifies more than 221,000 mineral locations and processing plants. This dataset was derived from the Mineral Availability System (MAS)/Mineral Industry Location System (MILS) CD-Rom.

Data source time period: 1974-1995
http://minerals.er.usgs.gov/minerals/pubs

APPENDIX C: OTHER PA STREAM CLASSIFICATIONS

The state of Pennsylvania protects aquatic life using a "designated use" classification of waters in the Commonwealth under the federal Clean Water Act. Four types of aquatic life should be propagated and maintained based on their designation in Pennsylvania (PA Code 93.3; http://www.pacode.com/secure/data/025/chapter93/s93.3.html):

> **Cold Water Fishes (CWF):** Fishes and associated aquatic flora and fauna preferring colder waters (included in the cold water fishes are trout species).
>
> **Warm Water Fishes (WWF):** Fishes and associated aquatic flora and fauna preferring warmer waters.
>
> **Trout Stocked Fishes (TSF):** Stocked trout species (maintained from Feb 15 to July 31) and warm-water flora and fauna .
>
> **Migratory Fishes (MF):** Fishes (those having anadromous, catadromous, or similar life histories) which must migrate through flowing waters to their breeding habitats.

Additionally, some waterbodies receive additional special protections as "Exception Value" or "High Quality" waters because they are especially valued for aquatic life, water quality, and/or recreation. Meeting relatively high water quality and other standards qualify the water bodies for additional protections from degradation beyond the aquatic life uses (PA Code 93.4b, www.pacode.com/secure/data/025/chapter93/s93.4b.html).

The purpose and meanings differ between the classes defined in Pennsylvania aquatic life use/special protection designations and aquatic fish assemblages from the Pennsylvania Aquatic Community Classification. The similar nomenclature of both classifications may be confusing, but in both cases it is meant to relatively define the organisms and aquatic habitats along a gradient of water temperatures (and associated stream size). The PA stream designations broadly encompass habitats occupied by several ACC fish assemblages (Table 3-2) and are used in water quality regulation.

PA Aquatic Life Uses Designation

- Four types: Warm- and Cold-Water Fishes, Trout-Stocked Fishes, and Migratory Fishes
- Represent general conditions and aquatic habitats
- Water quality standards are set by PA DEP to maintain Aquatic Life Uses

PA ACC Fish Communities

- Eleven types in two basins
- Represent river reach conditions and aquatic habitats based on aquatic fauna characteristics
- Created to describe aquatic assemblages and flowing-water diversity

The most common classes are compared below:

PA CWF vs. ACC Coldwater Fish Communities

CWF

- Often designates a brown trout fishery (and, in some locations, there are brook trout, rainbow trout and other salmonid fisheries). Brown trout are introduced species with widespread distribution in Pennsylvania and have tolerances for warmer temperatures than other trout species (PA FBC, PA Fishes, http://sites.state.pa.us/PA_Exec/Fish_Boat/pubonl.htm, accessed 4/17/2007)
- Includes many large valley streams (watershed areas may exceed 300 sq mi.) that are (likely) seasonally warm (e.g., Tuscarora Creek in Juniata County)
- May also included stocked trout

ACC Coldwater Fish Communities

- Indicated by the presence of cold-water fish like, native brook trout and brown trout
- More narrowly defined small stream habitats than CWF
- Occur small, headwater stream habitats (watershed area usually < 20 sq mi.) on mountain slopes
- Do not include stocked trout

PA WWF vs. ACC Warmwater Fish Communities

WWF

- Habitats include broad range flowing water in the valleys, including small, headwater streams and large rivers
- May also have a Stocked-Trout Fishes designation

ACC Warmwater Fish Communities

- Several warmwater fish communities are defined in the Atlantic and Ohio-Great Lakes Basins; communities indicate small to large warm water valley streams. Each warmwater community type has more narrowly-defined warm-water habitats than the PA WWF designation (Chapter 7).

- Indicated by the presence of warmwater fish in some valley streams and small rivers; however, large river habitats typically have fish community assemblages classified as the Ohio Large River Community, the Atlantic River and Impoundment Community, or the Atlantic Lower Delaware River Community. (Chapter 7)