4.0 SELECTION OF STUDY STREAMS

4.1 Overview

The procedure for selecting study streams involved developing a stream database for Pennsylvania streams, statistical analysis to determine if streams could be classified according to length, rather than slope, further statistical analysis to determine an appropriate length increment for study segments, and random selection of streams in each class to develop a list of potential study streams for field verification. Maryland streams were selected from lists prepared from existing information.

4.2 Development of the Stream Database for Pennsylvania Streams

The stream database was developed by linking the PFBC stream inventory data file with the Pa. DEP stream file, and editing the resulting file. This database was then used for statistical analyses of stream drainage area, slope, and length, and to select study streams.

PFBC has inventoried, and continues to inventory, cold water streams to collect data for management of fishery resources (J. Arway, PFBC, oral communication). Each stream surveyed is divided into one or more sections based on changes in slope, land use, or type of fishery (cold water/warm water). At least 10 percent of the total stream length and at least 1,000 ft of stream are surveyed.

PFBC provided the available inventory data for 3,997 named and unnamed stream sections in a computer file. The data file included all streams where trout reproduction had previously been documented, and unsurveyed streams where reproduction was considered likely, based on the characteristics of other reproducing trout streams in the area. The file included: stream name; stream section number; state water plan subbasin and watershed; county; area fisheries manager; area surveyed (acres and hectares); section length (miles and kilometers); descriptive upstream limit; descriptive downstream limit; whether the section was stocked with trout; stream management classification; and whether the section had been surveyed. Some streams had multiple sections included in the database. Eighty-five unnamed stream sections were deleted from the PFBC file, because they could not be located on a map.

The remaining 3,912 named stream sections were linked to a computer file of the Pennsylvania Gazetteer of Streams (Shaw and Wetzel, 1989) by adding a stream code to the PFBC file. The Gazetteer includes: stream code; stream name; location of the stream mouth (at or near a populated location); latitude and longitude of the mouth of the stream; county; quadrangle map; drainage area; and river-mile of the mouth of the stream (defined as distance to the mouth of the stream, along the stream to which it is tributary). Some named stream sections in the PFBC file were not assigned stream codes, because the available information was insufficient to differentiate between similarly named streams in the same state water plan watershed and county. Other streams were not assigned a stream code, because the stream name in the PFBC file did not match any named stream in the Gazetteer file. The stream code was used to link the PFBC file with the Pa. DEP stream file. This link allowed the determination of the location and amount of withdrawals or wastewater discharges.

Each stream section shown in the linked files was assigned to the appropriate study region using the map of physiographic provinces and sections in Pennsylvania (Pa. Department of Environmental Resources, 1989), and the limestone/freestone classification for streams in the Ridge and Valley Province. The study region boundaries were overlaid on a Pennsylvania stream map (Ings and Simmons, 1991). Then the computer file was sorted by county and quadrangle map, and visually matched to the stream map with the overlay. For the Piedmont Province in Pennsylvania, streams were assigned to one of the

physiographic sections (Piedmont Upland, Piedmont Lowland, and Gettysburg-Newark Lowland), on the assumption that geologic differences among these sections would result in differences in the streams.

Streams in the Ridge and Valley physiographic province were identified as limestone or freestone, and the identification was added to the file. Streams were classified as limestone if they were correspondingly identified by Shaffer (1991), or if they had a total alkalinity greater than 70 mg/L, as shown by PFBC (1994). A map of limestone rocks also was constructed, based on the Atlas of Pennsylvania's Mineral Resources (Pa. Department of Internal Affairs, 1967) and used to validate the list of limestone streams.

For the Ridge and Valley Freestone study region, stream slope was determined for a sample of 64 stream sections and added to the file. The slope was defined as the elevation difference, computed from the contour elevation at the upper and lower limits, divided by the distance along the stream between those limits. Elevations and distances were determined from USGS quadrangle maps.

The PFBC file was manipulated to combine stream sections for streams with multiple sections and develop cumulative lengths and corresponding location descriptions. A summary of streams in the four study regions is shown in Table 4.1. This file contained 553 Ridge and Valley Freestone streams, including the 64 streams for which slope was determined. The file included a few streams with drainage areas in the range from 100 to 200 square miles. The file was used to determine the frequency of stream lengths, and whether there was any correlation between stream slope and stream length, as described in section 4.3. The file also was used to select potential study streams, as described in section 4.4.

Table 4.1. Number of Trout Streams in Each Study Region

Study Region	Number of Study Streams
Ridge and Valley Limestone	119
Ridge and Valley Freestone	553
Unglaciated Plateau	1,781
Piedmont Upland	45
Total	**2,498**

4.3 Slope–Length Relationship and Segment Length Criteria

Stream slope is a major factor affecting channel morphology and fishery habitat, because it directly affects depth and velocity, and indirectly affects substrate**.** For that reason, streams should be categorized according to slope**.** Because the determination of slope is a time-consuming process for such a large number of streams, the relationship between slope and length was investigated to determine whether length could be used as a surrogate for slope.

As discussed in section 4.2, slope was determined for 64 streams in the Ridge and Valley Freestone study region. A simple correlation between length and slope for these streams showed a moderately strong relationship (correlation coefficient of 0.46), with increasing length associated with decreasing slope. Since the relationship was reasonably strong, length was used as a surrogate for slope to classify streams.

Because there also is a strong correlation between drainage area and stream length, drainage area and stream length frequency analyses were used to establish classes of streams within a study region**.** First, the drainage area frequency was analyzed for all the reproducing trout streams in a study region to determine the percentage of streams with drainage areas less than 10 square miles. Then stream length frequency analyses for the same streams for different assumed segment lengths were used to determine the length increment that included approximately the same percentage of streams in the first increment of the frequency plot.

The drainage area frequency analysis (Figure 4.1) for 441 reproducing trout streams in the Ridge and Valley Freestone study region showed 77 percent of these streams have a drainage area less than 10 square miles. Stream length frequency analysis for the 64 streams used in the length/slope correlation analysis for this region showed (Figure 4.2) stream length increments of 5 miles resulted in 78 percent of the streams being within the first increment of the frequency plot. This segment length was adopted for classifying streams within the Ridge and Valley Freestone study region, under the assumption that streams within different length increments of five miles would have different slopes. Differences in slope, mesohabitat types, and other physical features for streams in different length classes were observed visually during field data collection.

This process was repeated for the Ridge and Valley Limestone, Unglaciated Plateau, and Piedmont Upland study regions. The optimum stream length for each of these regions was either equal to, or greater than, the increment determined for the Ridge and Valley Freestone region. A five-mile stream length increment was used for all the study regions to standardize field location procedures, and to eliminate segment length as a variable when comparing study results among different study regions.

4.4 Study Stream Selection Procedure and Results

Study streams were selected in three stages. The first stage was selecting potential study streams from USGS quadrangle maps to prepare a list for use in field selection. The second stage was conducting field verifications to determine if there were any reasons (access, man-made influences, absence of reproducing trout, or poor water quality) that the stream was unusable for this study. The third stage was deleting certain streams, because of problems experienced during mathematical modeling. The first two stages are described in this section, and the third stage is discussed in section 5.6.

Streams in Pennsylvania were selected from the list of reproducing trout streams in each study region, prepared as described in section 4.2. Reproducing trout streams in the Maryland Piedmont Upland study region were selected from a list prepared by Md. DNR staff from a report prepared by Steinfelt (1991). In the Ridge and Valley Freestone and Unglaciated Plateau study regions, only streams that supported reproducing trout populations for their entire length were selected. In the Ridge and Valley Limestone region, the limits of the stream reach that was underlain by limestone rocks and supported reproducing trout populations were easily defined from available data, and used to define study limits.

No data are available to show the variability in habitat among the trout streams in the study regions, and therefore, there was no statistical basis for determining the number of stream segments necessary to provide an appropriate level of accuracy. Considering the expected variability in the WUA versus flow relationships within a study region, and the resources available for the study, a total of 30 stream segments for each study region was assumed to provide an appropriate level of accuracy.

For the Ridge and Valley Limestone study region, the locations of the trout streams were verified, and PFBC files were reviewed to determine whether the limits of the limestone portion of the stream had

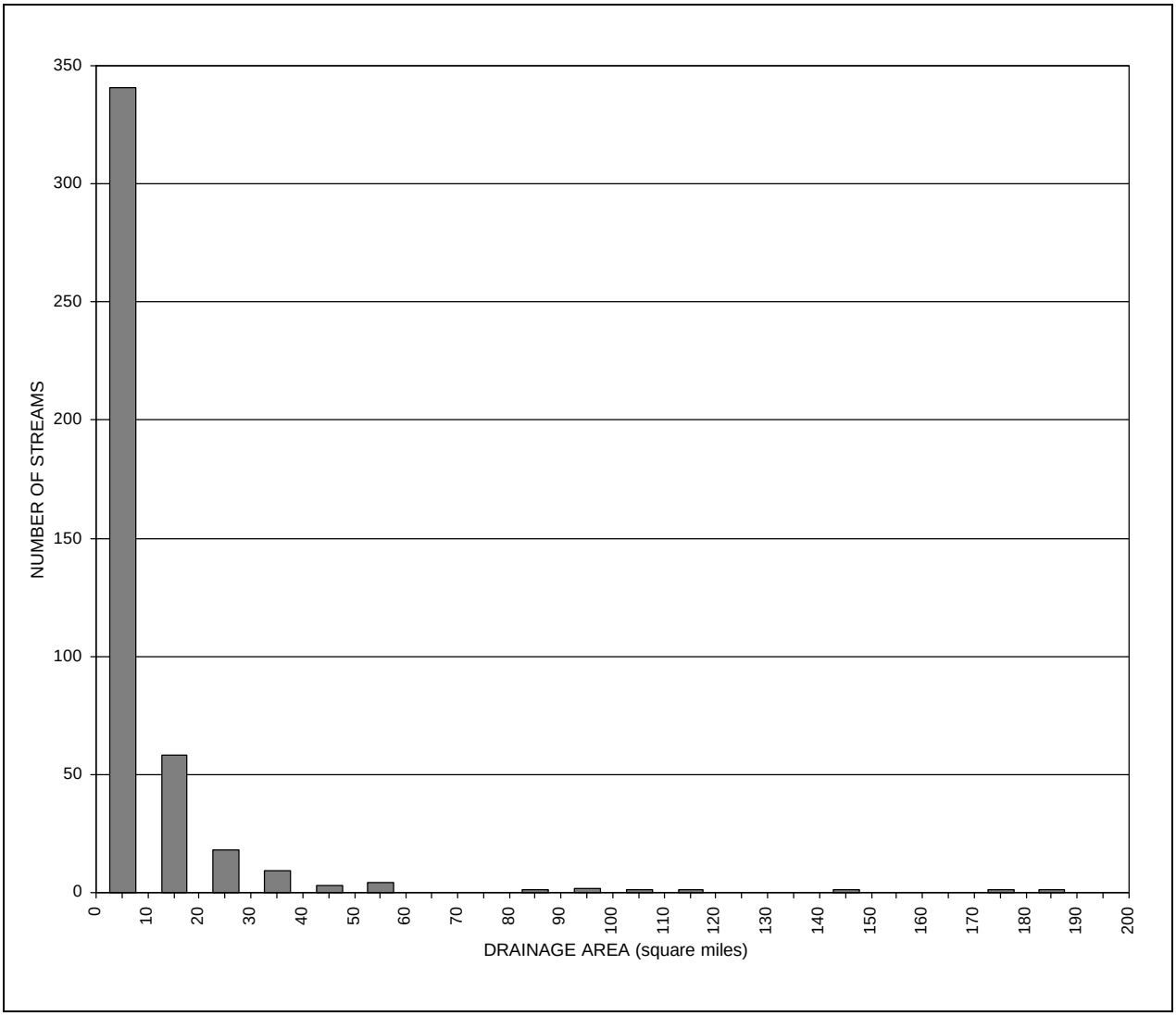

Figure 4.1. Frequency Distribution of Stream Drainage Area in Ridge and Valley Freestone Region

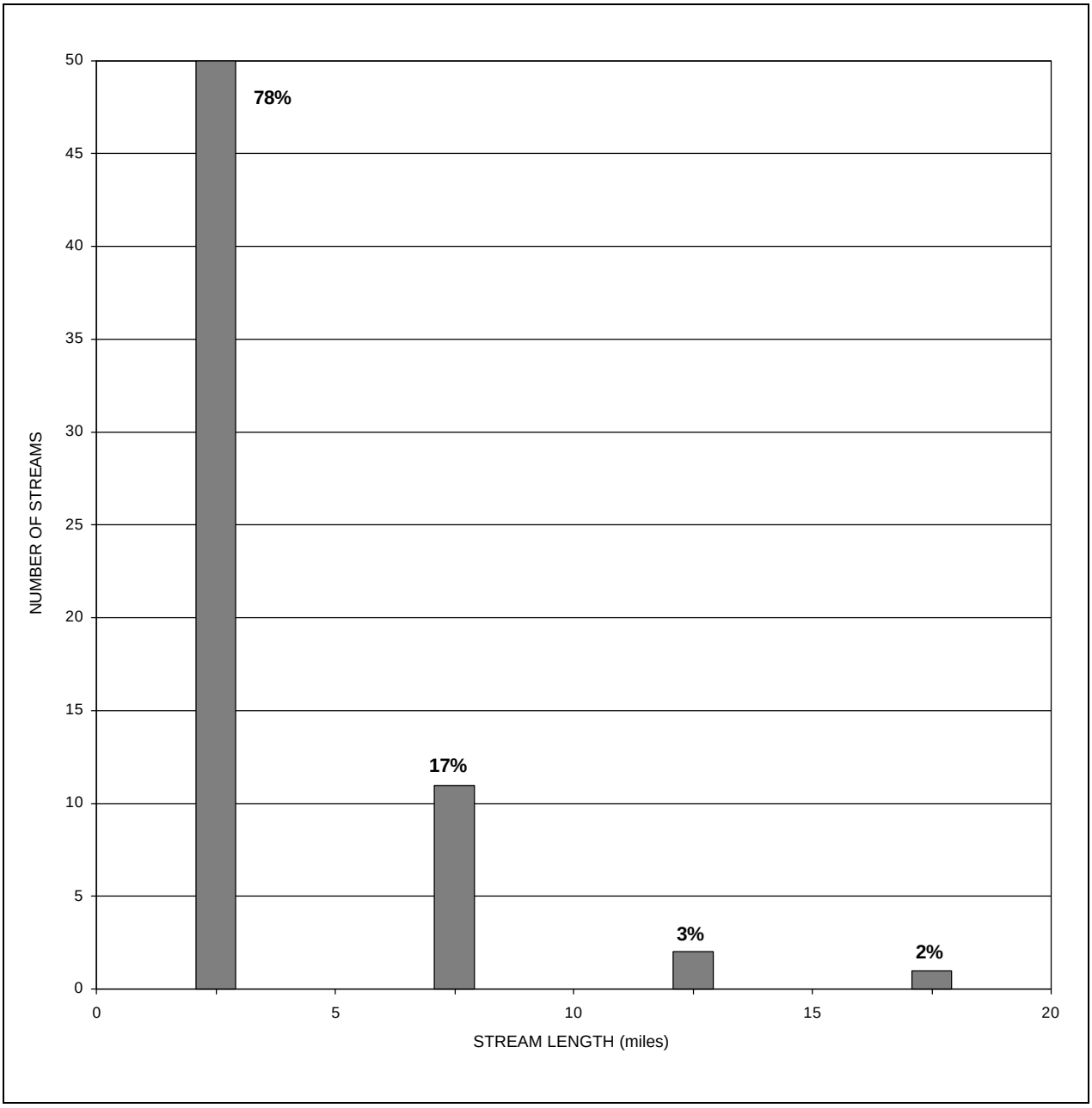

Figure 4.2. Frequency Distribution of Stream Length in Ridge and Valley Freestone Region

been clearly identified, based on total alkalinity exceeding 70 mg/L. Then inaccessible streams, as determined from USGS quadrangle maps, were deleted from the overall list. These steps resulted in a population of 34 streams and 53 stream segments, from which limestone streams were selected.

For all the study regions, streams and stream segments were selected using a stratified random sampling design. The boundaries of each study region were overlaid on a grid of all USGS 7.5-minute quadrangle maps for the states of Pennsylvania and Maryland. Quadrangle maps were retained for site selection if the map was entirely within one study region, and included the mouth of at least one reproducing trout stream.

Then the population of topographic maps for each study region was divided into groups. For the Unglaciated Plateau and Ridge and Valley Limestone and Freestone study regions, the population of maps was divided into three groups of approximately equal surface area. In the Piedmont Upland study region, the maps in the study area were divided into two groups, based on state boundaries. Because 65 percent of the reproducing trout streams in the Piedmont Upland study region were located in Maryland and 35 percent in Pennsylvania, this same proportion of sites was selected from the populations included in the two groups for that region.

To select streams and stream segments for each study region, each quadrangle within each map group (Ridge and Valley Limestone, Ridge and Valley Freestone, Unglaciated Plateau, Piedmont Upland) was numbered. Then a table of random numbers was used to select quadrangles, with the restriction that only quadrangles containing at least two stream segments were used (e.g., two or more one-segment streams, or at least one two-, three-, or four-segment stream). This restriction was intended to minimize travel time for the field crews. This restriction was not applied in selecting limestone streams, because of the limited number of quadrangles available, and because often only one stream was available per map.

The streams within each selected quadrangle were listed in alphabetical order, numbered consecutively, and similarly selected using a random numbers table. This process was continued until ten segments were selected from each group of maps, with the stipulation that the final proportion of streams of the various segment sizes matched as closely as possible the proportion of streams with those same segment sizes in the population of streams in the respective region. Thus, if 80 percent of all the trout streams in the Unglaciated Plateau study region were one-segment streams, approximately 80 percent of the streams selected for that region also were one-segment streams.

In addition, several alternate quadrangles and streams were randomly selected for each region in anticipation that other factors (e.g., access to private property not allowed, excessive development, or water quality or physical habitat constraint), might render selected streams unusable.

As each stream was selected from the quadrangle, the accessibility of that stream by road was reviewed on the map, and inaccessible streams were deleted.

Thirty stream segments were selected for the Piedmont Upland study region; however, available funds allowed inclusion of only 12 stream segments (all in Maryland) in this study. Additional streams in all the Piedmont study regions should be studied to develop instream flow guidelines for those regions.

The number of potential study streams in each study region was tabulated from the stream database, and the numbers of streams in each segment class were determined. The number of segments was determined by dividing the length of the stream reach by the maximum allowable segment length (5 miles), and rounding to the next higher integer (for example, an 8-mile stream would have two segments). The segment length for each stream was determined by dividing the reach length by the number

of stream segments. For example, a stream with a study length of 13 miles, and a maximum allowable segment length of 5 miles, would have three segments, and an actual segment length of 4.33 miles.

Lists of potential study streams are shown in Tables 4.2 through 4.5. A summary of the numbers of potential study streams, both primary and alternate, by segment class, is shown in Table 4.6 for each region.

These lists of potential study streams were furnished to the field crews for stream reconnaissance and final study stream selection in the field. For the Ridge and Valley limestone study region, the list included a description of the limits of each stream having a reproducing trout population, and the length of that reach.

Table 4.2. USGS Quadrangles and Streams Randomly Selected From the Unglaciated Plateau Study Region

(Final quadrangles and streams selected after field reconnaissance are shown in bold.)

USGS Quad	County	Stream	Trout Species (*=Dominant)	Length (miles)
Northeast				
Cameron	Cameron	**Tannery Hollow Run**	Brook	2.0
	Cameron	**Whitehead Run**	Brook*, Brown	2.5
	Cameron	McKinnon Branch		6.6
	Cameron	Hunts Run		7.2
Black Moshannon	Centre	**Benner Run**	Brook*, Brown	3.7
	Centre	**Meyers Run**	Brook	0.9
	Centre	Six Mile Run		9.5
Mt. Jewett	McKean	Sicily Run		3.2
	Elk	Lanigan Branch		3.5
Keating	Clinton	Upper Stimpson Run		1.2
	Clinton	Wistar Run		2.3
	Clinton	Grass Flats Run		2.2
	Clinton	**Mill Run**	Brook	1.7
Norwich	McKean	**Strange Hollow**	Brook	3.1
	McKean	**Lyman Run**	Brook	2.1
	McKean	Havens Run		1.9
	McKean	E. Br. Potato Creek		4.5
Glen Richey	Clearfield	Potts Run		9.4
	Clearfield	Lt. Clearfield Creek		13.9
	Clearfield	**Dunlap Run**	Brook	2.7
	Clearfield	Hogback Run		2.5
	Clearfield	Camp Hope Run		2.5
Hazel Hurst	McKean	Stanton Brook		1.8
	McKean	**Bloomster Hollow**	Brook	3.5
	McKean	**Warner Brook**	Brook	3.7
	Elk	Seven Mile Run		3.3
Northwest				
Russell City	Elk	**E. Br. Spring Creek**	Brook, Brown	11.5
	Elk	Wolf Run		4.7
	Elk	Coon Run		3.0
	Forest	Bogus Run		2.3
Cooksburg	Forest	**Cherry Run**	Brook	3.2
	Jefferson	**Seaton Run**	Brook	2.4
	Forest	Toms Run		5.9
Kennerdell	Venango	**Lower Two Mile Run**	Brook*, Brown	7.0
	Venango	Bullion Run		4.5
	Venango	Dennison Run		2.7
DuBois	Jefferson	Sugar Camp Run		1.9
	Clearfield	**Beech Run**	Brook	4.5
Falls Creek	Jefferson	**McEwen Run**	Brook	3.1
	Jefferson	**Rattlesnake Run**	Brook	4.9
	Jefferson	Rattlesnake Creek		7.9
	Jefferson	Walburn Run		2.0
Marienville W.	Forest	Bearpen Run		3.1
	Forest	Ellsworth Run		1.6

Table 4.2. USGS Quadrangles and Streams Randomly Selected From the Unglaciated Plateau Study Region—Continued

(Final quadrangles and streams selected after field reconnaissance are shown in bold.)

USGS Quad	County	Stream	Trout Species (*=Dominant)	Length (miles)
South				
Irvona	Clearfield	N. Witmer Run		6.2
	Clearfield	Davidson Run		1.5
	Clearfield	Comfort Run		3.4
Beaverdale	Cambria	Otto Run		5.8
Vintondale	Indiana	**Findley Run**	Brook*, Brown	4.9
	Cambria	**Red Run**	Brook	2.5
Central City	Somerset	Calendars Run		2.0
	Somerset	Clear Run		2.5
Colver	Cambria	Dutch Run		9.7
Confluence	Somerset	**Coke Oven Hollow**	Brook	3.0
	Somerset	Smith Hollow		4.1
	Somerset	**Whites Creek**	Brook	9.6
	Somerset	**McClintock Run**	Brook	4.6
	Somerset	Paddytown Hollow		4.1
Kingwood	Somerset	Cranberry Glade Run		3.7
	Somerset	Harbaugh Run		2.7
	Somerset	Sandy Run		6.0
	Somerset	**Fall Creek**	Brook	5.2
Burnside	Indiana	**Cush Creek**	Brown	7.9
	Indiana	Beaver Run		5.3

Table 4.3. USGS Quadrangles and Streams Randomly Selected From the Ridge and Valley Freestone Study Region

(Final quadrangles and streams selected after field reconnaissance are shown in bold.)

USGS Quad	County	Stream	Trout Species (*=Dominant)	Length (miles)
Northeast				
Shickshinny	Luzerne	Black Ash Run		1.9
	Luzerne	Kitchen Creek		7.2
Berwick	Luzerne	**Salem Creek**	Brook*, Brown	4.5
	Luzerne	**Wapwallopen Creek**	Brown*, Brook	22.4
Danville	Columbia	**Mugser Run**	Brown	7.8
	Montour	Kase Run		4.3
Bloomsburg	Columbia	**Green Creek**	Brown	12.0
	Columbia	Stony Brook		4.0
Stillwater	Columbia	**E. Br. Raven Cree**k	Brook	2.9
	Luzerne	W. Br. Ash Creek		3.8
	Luzerne	Bell Creek		3.1
Delano	Schuylkill	Neifert Creek		3.8
	Schuylkill	Lofty Creek		3.8
Northwest				
Williamsport SE	Union	**Mile Run**	Brook	1.2
	Lycoming	Bear Trap Hollow		1.6
	Union	**Sand Spring Run**	Brook, Brown	4.5
Mifflinburg	Union	Buffalo Creek, N. Br.		13.3
	Union	**Rapid Run**	Brook*, Brown	10.9
Coburn	Mifflin	**Swift Run**	Brown*, Brook	2.2
	Centre	Pine Swamp Run		1.9
Tyrone	Blair	**Big Fill Run**	Brown, Brook	7.4
	Blair	**Vanscoyoc Run**	Brown, Brook	5.0
Woodward	Union	**Bear Run**	Brook	2.5
Southwest				
Mexico	Juniata	**Big Run**	Brook*, Brown	5.0
	Juniata	**Laurel Run**	Brook*, Brown	5.3
Newville	Cumberland	Back Creek		5.3
	Cumberland	Three Square Hollow Run		4.6
Chaneysville	Bedford	Blackberry Lick Run		2.1
	Bedford	Georgetown Branch		3.1
Blain	Perry	**Fowler Hollow Run**	Brook	6.2
	Perry	**Kansas Valley Run**	Brook*, Brown	4.0
McConnellsburg	Franklin	**Broad Run**	Brook	8.1
Mifflintown	Juniata	**Horning Run**	Brook, Brown	3.8
Hustontown	Fulton	Roaring Run		3.1
		Sipes Brook		3.4
Schellsburg	Bedford	Spicer Brook		4.4
Lewistown	Mifflin	**Granville Run**	Brook, Brown	3.4
Alexandria	Huntingdon	Emma Creek		2.2
Newton Hamilton	Mifflin	Wharton Run		2.9
Cassville	Huntingdon	**Laurel Run**	Brook	2.0
Breezewood	Fulton	Laurel Run		1.9
Landisburg	Perry	Green Valley Run	Brown	4.1

Table 4.4. USGS Quadrangles and Streams Randomly Selected From the Ridge and Valley Limestone Study Region
(Final quadrangles and streams selected after field reconnaissance are shown in bold.)

USGS Quad	County	Stream	Trout Species (*=Dominant)	Length (miles)	Upstream Limit	Downstream Limit
North						
Bellefonte	Centre	**Spring Creek**	Brown	18.8	Headwaters	Benner Twp. Line
Coburn	Centre	**Penns Creek**	Brown	12.0	Penns Cave	Elk Creek
	Centre	Pine Creek		1.5	SR 2018 Bridge Upstream Jct. T-507	Elk Creek
Howard	Centre	**Lick Run**	Brown	2.5	Headwaters	Mouth
Linden	Lycoming	**Antes Creek**	Brown*, Brook	3.4	Quarry near Oriole	Mouth
State College	Centre	**Cedar Run**	Brown	2.9	Headwaters	Mouth
Burnham	Mifflin	Tea Creek		1.1	US 322 Bridge	Mouth
	Mifflin	**Honey Creek**	Brown	3.8	Alexander Caverns	Mouth
Millheim	Clinton	Fishing Creek		12.3	Spring 427 m upstream T-350	Cherry Run
Bellefonte	Centre	Buffalo Run		12.2	Headwaters	Mouth
Beech Creek	Clinton	**Little Fishing Creek**		1.7	First bridge downstream Rt. 64 at Nittany	Mouth
South						
Carlisle	Cumberland	**Letort Spring Run**		8.7	Headwaters	Mouth
Newton Hamilton	Mifflin	**Long Hollow Run**	Brown	1.9	Second unnamed trib. From west upstream of mouth	Mouth
Roaring Spring	Blair	**Boiling Spring Run**	Brown*, Brook	3.4	Headwaters	Mouth
Wertzville	Cumberland	**Trindle Spring Run**	Rainbow*, Brown	0.9	Silver Springs	Mouth
New Enterprise	Bedford	**Potter Creek**	Brown, Brook	3.4	T-609	Mouth
Newville	Cumberland	**Big Spring Creek**	Brown, Brook	4.8	Headwaters	Mouth
Lemoyne	Cumberland	**Cedar Run**	Brown	3.3	Headwaters	Mouth
Chambersburg	Franklin	**Falling Spring Branch**	Brown, Rainbow	4.7	Falling Spring	Mouth
Clearville	Bedford	Ott Town Run		0.6	Headwaters	Mouth
Mercersburg	Franklin	Buck Run		2.0	Spring 100 m upstream Conrail crossing	Mouth

Table 4.4. USGS Quadrangles and Streams Randomly Selected From the Ridge and Valley Limestone Study Region—Continued
(Final quadrangles and streams selected after field reconnaissance are shown in bold.)

USGS Quad	County	Stream	Trout Species (*=Dominant)	Length (miles)	Upstream Limit	Downstream Limit
East						
Hellertown	Northampton	**Monocacy Creek**	Brown*, Brook	14.7	Rt. 987 bridge at Bath	Mouth
Easton	Northampton	**Bushkill Creek**	Brown	7.1	LR 48021 bridge at Tatamy	Mouth
Allentown East	Lehigh	**Cedar Creek**	Brown	4.2	Headwaters	Mouth
	Lehigh	**Trout Creek**	Brown	1.6	Dixon St. bridge	Mouth
Hamburg	Berks	Moselem Creek		3.7	Headwaters	Mouth
Temple	Berks	Peters Creek		0.7	Headwaters	Mouth
Sinking Spring	Berks	**Spring Creek**	Brown, Brook	4.7	Headwaters	Mouth
Nazareth	Northampton	**Nancy Run**	Brown	2.8	Headwaters	Mouth

Table 4.5. USGS Quadrangles and Streams Randomly Selected From the Piedmont Upland Study Region

(Final quadrangles and streams selected after field reconnaissance are shown in bold.

USGS Quad	County	Stream	Trout Species	Length (miles)
Maryland Streams				
Conowingo Dam	Cecil	**Basin Run**	Brown	6.3
Woodbine	Carroll	**Gillis Falls**	Brown	8.4
Damascus	Howard/Montgomery.	*Patuxent River	Brown	6.6
Finksburg	Baltimore	**Norris Run**	Brook	3.0
	Carroll	**Piney Run**	Brown	5.0
Phoenix	Baltimore	**First Mine Branch**	Brown, Brook	3.6
	Baltimore	**Greene Branch (Upper Section)**	Brook	2.0
	Baltimore	My Ladys Manor Branch	Brown, Brook	1.5
Norrisville	Harford	Jackson Branch	Brown	2.3
	Baltimore	**Third Mine Branch**	Brook	3.4
Reisterstown	Baltimore	**Cooks Branch**	Brook	2.0
	Baltimore	**Timber Run**	Brook	1.7
	Baltimore	*Red Run (Upper Section)	Brown, Brook	3.7
Towson	Baltimore	Fitzhugh Run	Brown	2.8
	Baltimore	Overshot Run	Brown	3.0
	Baltimore	*Dulaney Valley Branch (Upstream End)	Brown	1.6
Hereford	Baltimore	Buffalo Creek (Upper Half)	Brown, Brook	1.8
	Baltimore	Mingo Branch	Brook	1.3
	Baltimore	*Carroll Branch	Brown, Brook	4.7
New Freedom	Baltimore	Owl Branch	Brown, Brook	2.6
New Freedom	Baltimore	Fourth Mine Branch	Brook	3.0
	Baltimore	*Frog Hollow Branch	Brook	1.5
Jarrettsville	Harford	Overshot Branch	Brook, Brown	1.8
	Harford	South Stirrup Run	Brook	3.2
Cockeysville	Baltimore	*Dipping Pond Run	Brook, Brown	0.8
	Baltimore	***Baisman Run**	Brook, Brown	1.7
	Baltimore	*Deep Run (Upper Half)	Brown	1.1
Pennsylvania Streams				
Stewartstown	York	Rambo Run		8.0
Unionville	Chester	*Broad Run (Tributary to W. Branch Brandywine Creek)		6.0
Airville	York	Sawmill Run		2.5
	York	Furnace Run		3.2
Holtwood	Lancaster	Kellys Run		2.8
	Lancaster	Wissler Run		2.2
Parkesburg	Lancaster	Annan Run		2.0
	Lancaster	Knott Run		2.7
Unionville	Chester	Broad Run (Tributary to Valley Creek)		4.2
West Chester	Chester	Brinton Run		2.5
Conestoga	Lancaster	*Trout Run		3.5
Glen Rock	York	*Rehmeyer Hollow Run		1.2
Wagontown	Chester	*Lyons Run		2.2

*Alternate streams

Table 4.6 Summary of Potential Study Streams

Study Region	Number of Potential Study Streams				
	One Segment	Two Segments	Three Segments	Four Segments	Total
Ridge and Valley Limestone	22	2	4	1	29
Ridge and Valley Freestone	31	7	3	1	42
Unglaciated Plateau	47	15	2	0	64
Piedmont Upland	35	5	0	0	40

Field personnel selected streams so that the distribution of streams actually studied corresponded as closely as possible to the percentages of streams within each length category described above. Streams were randomly selected from the list by the field crews, and were either selected, or rejected, based on the following factors: access; landowner permission; presence or absence of man-made influences; presence of trout, as determined by electrofishing; and obvious water quality problems. Streams were selected first from the list of primary streams. Once all the primary streams had been visited, streams were selected from the list of alternates, as necessary.

Field reconnaissance showed some of the Pennsylvania streams selected did not have reproducing trout populations. Although these streams were selected from the PFBC data file of reproducing trout streams (section 4.2), many streams were included in that file, based on assumed similarity with other surveyed streams in the vicinity. Trout reproduction and trout species present in the Pennsylvania streams were verified either by searching PFBC files or by electrofishing by the field crews. The results of the verification are shown in Table 4.7. Trout reproduction was assumed to be occurring if fish less than 75 mm in length were found.

For the Maryland streams, trout reproduction and species present had been confirmed by Md. DNR (Steinfelt, 1991), and verification was not necessary. The trout species present in these streams also are shown in Table 4.7.

The streams selected after field reconnaissance are shown in bold type in Tables 4.2 through 4.5. Some of these streams were subsequently deleted because of problems experienced in the modeling phase of the study, as described in section 5.6. The final study sites are shown in Plate 1.

Table 4.7. Results of Trout Species Verification Studies

Stream	County	Pa. DEP* Subbasin	Trout Species Reproduction (Fish < 75 mm)	Data Source
Appalachian Plateau				
Northeast				
Tannery Hollow Run	Cameron	8A	Brook Trout	Electrofishing 6/22/94
Whitehead Run	Cameron	8A	Brook Trout**, Brown Trout	PFBC Files
Benner Run	Centre	8D	Brook Trout**, Brown Trout	PFBC Files
Meyers Run	Centre	9C	Brook Trout	Electrofishing 6/27/94
Mill Run	Clinton	9B	Brook Trout	Electrofishing 9/12/94
Strange Hollow	McKean	16C	Brook Trout	Electrofishing 6/22/94
Lyman Run	McKean	16C	Brook Trout	Electrofishing 6/21/94
Dunlap Run	Clearfield	8C	Brook Trout	Electrofishing 9/12/94
Bloomster Hollow	McKean	16C	Brook Trout	Electrofishing 6/21/94
Warner Brook	McKean	16C	Brook Trout	Electrofishing 6/20/94
Northwest				
East Branch Spring Creek	Elk	17A	Brook Trout, Brown Trout	PFBC Files
Cherry Run	Forest	16E	Brook Trout	Electrofishing 8/26/94
Seaton Run	Jefferson	17A	Brook Trout	Electrofishing 8/26/94
Lower Two Mile Run	Venango	16G	Brook Trout**, Brown Trout	PFBC Files
Sugar Camp Run	Jefferson	17C	No Trout	Electrofishing 9/12/94
Beech Run	Clearfield	17D	Brook Trout	PFBC Files
McEwen Run	Jefferson	17A	Brook Trout	Electrofishing 8/26/94
Rattlesnake Run	Jefferson	17A	Brook Trout	PFBC Files
South				
Coke Oven Hollow	Somerset	19E	Brook Trout	Electrofishing 9/16/94
Whites Creek	Somerset	19F	Brook Trout	PFBC Files
Red Run	Cambria	18D	Brook Trout	Surface Observations
Findley Run	Indiana	18D	Brook Trout**, Brown Trout	Surface Observations
Fall Creek	Somerset	19E	Brook Trout	PFBC Files
McClintock Run	Somerset	19F	Brook Trout	PFBC Files
Cush Creek	Indiana	8B	Brown Trout	PFBC Files

* Pennsylvania Department of Environmental Resources, 1971

** Dominant species

Table 4.7. Results of Trout Species Verification Studies—Continued

Stream	County	Pa. DEP* Subbasin	Trout Species Reproduction (Fish < 75 mm)	Data Source
Ridge and Valley Freestone				
Northeast				
Wapwallopen Creek	Luzerne	5B	Brown Trout**, Brook Trout	PFBC Files
Salem Creek	Luzerne	5D	Brook Trout**, Brown Trout	Electrofishing 9/7/94
Mugser Run	Columbia	5E	Brown Trout	PFBC Files
Green Creek	Columbia	5C	Brown Trout	PFBC Files
East Branch Raven Creek	Columbia	5C	Brook Trout	Electrofishing 9/25/95
Southwest				
Big Run	Juniata	12A	Brook Trout**, Brown Trout	PFBC Files
Laurel Run	Juniata	12A	Brook Trout**, Brown Trout	Electrofishing 9/15/94
Three Square Hollow Run	Cumberland	7B	No Trout	Electrofishing 10/7/94
Georgetown Branch	Bedford	13A	No Trout	Electrofishing 9/16/94
Kansas Valley Run	Perry	12B	Brook Trout**, Brown Trout	Electrofishing 9/15/94
Fowler Hollow Run	Perry	7A	Brook Trout	PFBC Files
Broad Run	Franklin	13C	Brook Trout	PFBC Files
Horning Run	Juniata	12A	Brook Trout, Brown Trout	PFBC Files
Granville Run	Mifflin	12A	Brook Trout, Brown Trout	Electrofishing 9/27/95
Laurel Run	Huntingdon	11D	Brook Trout	Electrofishing 10/11/95
Northwest				
Sand Spring Run	Union	10C	Brook Trout, Brown Trout	PFBC Files
Rapid Run	Union	10C	Brook Trout**, Brown Trout	PFBC Files
Swift Run	Mifflin	6A	Brook Trout, Brown Trout	Visual and PFBC Files
Big Fill Run	Blair	11A	Brown Trout, Brook Trout	PFBC Files
Bear Run	Union	6A	Brook Trout	PFBC Files
Vanscoyoc Run	Blair	11A	Brown Trout, Brook Trout	PFBC Files
Mile Run	Union	10C	Brook Trout	Electrofishing 10/13/94
Ridge and Valley Limestone				
North				
Spring Creek	Centre	9C	Brown Trout	PFBC Files
Penns Creek	Centre	6A	Brown Trout	PFBC Files
Lick Run	Centre	9C	Brown Trout	PFBC Files
Antes Creek	Lycoming	10A	Brown Trout**, Brook Trout	PFBC Files
Cedar Run	Centre	9C	Brown Trout	PFBC Files
Little Fishing Creek	Clinton	9C	Brown Trout, Brook Trout	PFBC Files***

* Pennsylvania Department of Environmental Resources, 1971 ** Dominant species

*** Natural reproduction has not been documented in this section, but it has been documented in the next section of the stream upstream of the study site..

Table 4.7. Results of Trout Species Verification Studies—Continued

Stream	County	Pa. DEP* Subbasin	Trout Species Reproduction (Fish < 75 mm)	Data Source
Ridge and Valley Limestone—Continued				
South				
Boiling Spring Run	Blair	11D	Brown Trout**, Brook Trout	Electrofishing 9/23/94
Falling Spring Branch	Franklin	13C	Brown Trout, Rainbow Trout	PFBC Files
Potter Creek	Bedford	11D	Brown Trout, Brook Trout	PFBC Files
Big Spring Creek	Cumberland	7B	Brown Trout, Brook Trout	PFBC Files
Long Hollow Run	Mifflin	12C	Brown Trout	Electrofishing 9/15/94
Honey Creek	Mifflin	12A	Brown Trout	PFBC Files
Trindle Spring Run	Cumberland	7B	Rainbow Trout**, Brown Trout	PFBC Files
Letort Spring Run	Cumberland	7B	Brown Trout, Rainbow Trout	PFBC Files
Cedar Run	Cumberland	7E	Brown Trout	PFBC Files
East				
Monocacy Creek	Northampton	2C	Brown Trout**, Brook Trout	PFBC Files
Bushkill Creek	Northampton	1F	Brown Trout	PFBC Files
Cedar Creek	Lehigh	2C	Brown Trout	PFBC Files
Trout Creek	Lehigh	2C	Brown Trout	PFBC Files
Spring Creek	Berks	3D	Brown Trout, Brook Trout	PFBC Files
Nancy Run	Northampton	2C	Brown Trout	PFBC Files
Piedmont				
Maryland Streams				
Basin Run	Cecil		Brown Trout	MDNR Files
Gillis Falls	Carroll		Brown Trout	MDNR Files
Norris Run	Baltimore		Brook Trout	MDNR Files
Piney Run	Carroll		Brown Trout	MDNR Files
First Mine Branch	Baltimore		Brown Trout, Brook Trout	MDNR Files
Green Branch (Upper Section)	Baltimore		Brook Trout	MDNR Files
Third Mine Branch	Baltimore		Brook Trout	MDNR Files
Cooks Branch	Baltimore		Brook Trout	MDNR Files
Timber Run	Baltimore		Brook Trout	MDNR Files
Baisman Run	Baltimore		Brown Trout, Brook Trout	MDNR Files

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