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# INSTREAM FLOW STUDIES PENNSYLVANIA AND MARYLAND

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# CONTENTS

ACKNOWLEDGEMENTS .....	xiii
EXECUTIVE SUMMARY .....	1
1.0 NEED FOR STUDY .....	3
2.0 STUDY CONCEPTS AND PROCEDURES .....	5
2.1 Overall Study Plan for Determining Instream Flow Needs .....	5
2.1.1 Methods for evaluating instream flow needs .....	6
2.1.1.1 Description of IFIM methodology .....	6
2.1.1.2 Description of wetted perimeter method .....	8
2.1.1.3 Comparison of IFIM and wetted perimeter methods .....	8
2.1.2 Evaluation species .....	8
2.1.3 Habitat suitability criteria selection, testing, and development .....	9
2.1.4 Classification of trout streams .....	9
2.1.4.1 Stream classification purpose .....	9
2.1.4.2 Stream classification scheme .....	9
2.1.4.3 Development and selection of study regions .....	10
2.1.5 Selection of study streams .....	11
2.1.6 Selection of study sites .....	12
2.1.7 Development of habitat versus flow relationships .....	12
2.1.8 Impact assessment .....	12
2.1.9 Wetted perimeter method .....	13
2.2 Study Organization .....	13
3.0 SUITABILITY CRITERIA SELECTION, TESTING AND DEVELOPMENT .....	15
3.1 Habitat Suitability Criteria and Species Periodicity .....	15
3.1.1 Depth and velocity criteria .....	15
3.1.2 Substrate/cover criteria .....	17
3.1.3 Periodicity chart .....	18
3.2 Selection of Study Streams for Transferability Testing .....	18
3.3 Description of Study Streams .....	19
3.3.1 Cherry Run .....	19
3.3.2 Little Fishing Creek .....	19
3.3.3 Young Womans Creek .....	19
3.3.4 Whitehead Run .....	21

3.4	Field Data Collection .....	21
3.4.1	Procedures .....	21
3.4.2	General observations .....	23
3.5	Transferability Study Data Analysis Procedures .....	25
3.6	Transferability Study Data Analysis Results .....	26
3.7	Criteria Development .....	27
3.7.1	Procedures .....	27
3.7.2	Depth and velocity criteria .....	28
3.7.3	Substrate and cover .....	37
3.7.4	Results .....	40
3.8	Conclusions and Recommendations .....	40
4.0	SELECTION OF STUDY STREAMS .....	52
4.1	Overview .....	52
4.2	Development of the Stream Database for Pennsylvania Streams.....	52
4.3	Slope-Length Relationship and Segment Length Criteria .....	53
4.4	Study Stream Selection Procedure and Results .....	54
5.0	DEVELOPMENT OF HABITAT VERSUS FLOW RELATIONSHIPS .....	69
5.1	Overview .....	69
5.2	Study Site Selection .....	69
5.3	Field Data Collection Procedures .....	74
5.3.1	Mesohabitat percentages .....	74
5.3.2	Description of data sets .....	74
5.3.3	Model calibration and flow range criteria .....	79
5.3.4	Field measurement procedures .....	81
5.3.5	Problems encountered .....	81
5.3.6	Data processing procedures .....	82
5.4	Spawning Location Characterization Procedure and Results .....	82
5.4.1	Methods for studying spawning location .....	82
5.4.2	Results of spawning location study .....	83
5.4.3	Conclusion .....	96
5.5	Hydrologic Analyses .....	96
5.5.1	Hydrologic analysis concepts .....	96
5.5.2	Stream gage selection .....	97
5.5.3	Hydrology for study sites .....	97
5.5.4	Criteria for dispatching field crews .....	102

5.6	Hydraulic Modeling .....	102
5.6.1	Data input and checking procedures .....	102
5.6.2	Hydraulic model calibration .....	103
5.7	Physical Microhabitat Estimation .....	104
5.8	Comparison of Univariate and Binary Suitability Criteria .....	106
5.8.1	Purpose of comparing alternative criteria .....	106
5.8.2	Development of binary criteria .....	106
5.8.3	Pilot study procedures and results .....	106
5.9	Wetted Perimeter Analysis .....	108
6.0	IMPACT ASSESSMENT METHODS AND RESULTS .....	126
6.1	Overview of Impact Analysis .....	126
6.2	Definition of Median Monthly Habitat .....	126
6.3	WUA for Combinations of Life Stages .....	127
6.4	Habitat Loss Criteria .....	130
6.5	Evaluation of No-Net-Loss Criterion .....	133
6.6	Impact Analysis .....	133
6.6.1	Impact analysis concepts .....	133
6.6.2	Flow and habitat time series impact analysis .....	135
6.6.2.1	General discussion .....	135
6.6.2.2	The detailed analysis program .....	136
6.6.2.3	The preliminary analysis program .....	137
6.6.2.4	Habitat impact curves: development .....	137
6.6.2.5	Habitat impact curves: results and discussion .....	141
6.6.3	Regional hydrology .....	156
6.6.3.1	Overview .....	156
6.6.3.2	Selection of gages to develop regional hydrology .....	157
6.6.3.3	Delineation of hydrologic regions .....	163
6.6.3.4	Regional hydrology application .....	171
6.6.4	Impact analysis using flow and associated habitat duration .....	172
6.6.4.1	Analysis procedure .....	172
6.6.4.2	Flow and associated habitat duration impact analysis results .....	174
7.0	SUMMARY, CONCLUSIONS AND RECOMMENDATIONS .....	181
7.1	Summary .....	181
7.1.1	Study purpose and methods .....	181

7.1.2	Evaluation species and habitat suitability criteria .....	181
7.1.3	Study regions and study streamselection .....	182
7.1.4	Field data collection .....	182
7.1.5	Hydrology and habitat modeling .....	183
7.1.6	Wetted perimeteranalysis .....	184
7.1.7	Impact assessment methods andresults .....	184
7.2	Conclusions .....	186
7.3	Recommendations .....	187
7.4	Areas for Further Research .....	188
REFERENCES .....		191
GLOSSARY .....		197

## APPENDIXES

A.	FIELD MANUAL HABITAT SUITABILITY CURVE TRANSFERABILITY TESTING FOR PENNSYLVANIA INSTREAM FLOW INCREMENTAL METHODOLOGY STUDIES .....	207
	A1.0 Introduction .....	209
	A2.0 Selection of Streams for Transferability Testing .....	209
	A3.0 Field Sampling Procedures .....	211
	Appendix A1 Pennsylvania Fish and Boat Commission Law Enforcement Regional Offices .....	217
	Appendix A2 List of Equipment for IFIM Transferability Studies .....	219
	Appendix A3 Field Data Sheet for Occupied Locations, IFIM Transferability Studies ....	221
	Appendix A4 Field Data Sheet for Unoccupied Locations, IFIM Transferability Studies .	225
	Appendix A5 Trip Notes for IFIM Transferability Studies .....	229
B.	TRANSFERABILITY STUDY TEST RESULTS .....	231
C.	FIELD DATA COLLECTION PROBLEMS .....	243
	C1.0 General Discussion of Field Data Collection Problems .....	245
	C2.0 Specific Stream Data Collection Problems .....	246
D.	HYDROLOGIC COMPUTATIONS FOR SELECTED WATERSHEDS .....	249
	D1.0 Introduction .....	251
	D2.0 Study Sites on Monocacy Creek, NorthamptonCounty .....	251
	D3.0 Study Sites on Bushkill Creek, NorthamptonCounty .....	253
	D4.0 Study Sites on Cedar Creek, LehighCounty .....	254
	D5.0 Study Site on Nancy Run, Berks County .....	254
	D6.0 Study Site on Trout Creek, LehighCounty .....	254
	D7.0 Study Site on Spring Creek, BerksCounty .....	255
	D8.0 Study Sites on Letort Spring Run, CumberlandCounty .....	255

D9.0	Study Site on Trindle Spring Run, CumberlandCounty .....	261
D10.0	Study Site on Big Spring Creek, CumberlandCounty .....	261
D11.0	Study Site on Falling Spring Run, FranklinCounty .....	265
D12.0	Study Sites on Spring Creek, CentreCounty .....	267
D13.0	Study Sites on Penns Creek, CentreCounty .....	268
D14.0	Study Site on Honey Creek, Mifflin County .....	269
D15.0	Study Site on Long Hollow Run, MifflinCounty .....	271
D16.0	Study Sites on Boiling Spring Run, Blair County, and Potter Creek, Bedford County .....	271
D17.0	Study Sites on Wapwallopen Creek and Salem Creek, Luzerne County, and Mugser Run, and East Branch Raven Creek, ColumbiaCounty .....	272
D18.0	Study Site on Red Run, Cambria County .....	272
E.	<b>THE PENNSYLVANIA-MARYLAND INSTREAM FLOW STUDY DATA ANALYSIS PROGRAM .....</b>	<b>273</b>
E1.0	Introduction .....	275
E2.0	Data Needs and Calculation Methods .....	276
E2.1	Detailed AnalysisProgram .....	276
E2.2	Preliminary AnalysisProgram .....	277
E3.0	Program Installation .....	278
E4.0	Program Launch, Input, Output, and Operation .....	278
E4.1	Detailed AnalysisProgram .....	279
E4.1.1	Input data .....	279
E4.1.2	Output table structure and interpretation .....	282
E4.1.3	Graphics .....	288
E4.1.4	Operation .....	289
E4.2	Preliminary AnalysisProgram .....	290

## ILLUSTRATIONS

2.1	Components of Instream Flow IncrementalMethodology .....	7
3.1	Adult Normalized Modified Forage Indexes forDepth .....	29
3.2	Juvenile Normalized Modified Forage Indexes foDepth .....	30
3.3	Spawning Normalized Modified Forage Indexes foDepth .....	31
3.4	Fry Normalized Modified Forage Indexes for Depth.....	32
3.5	Adult Normalized Modified Forage Indexes forVelocity .....	33
3.6	Juvenile Normalized Modified Forage Indexes foVelocity .....	34
3.7	Spawning Normalized Modified Forage Indexes foVelocity .....	35
3.8	Fry Normalized Modified Forage Indexes foVelocity .....	36
3.9	Adult Habitat Suitability Criteria for Depth .....	44

3.10	Juvenile Habitat Suitability Criteria for Depth .....	45
3.11	Spawning Habitat Suitability Criteria for Depth .....	46
3.12	Fry Habitat Suitability Criteria for Depth .....	47
3.13	Adult Habitat Suitability Criteria for Velocity .....	48
3.14	Juvenile Habitat Suitability Criteria for Velocity .....	49
3.15	Spawning Habitat Suitability Criteria for Velocity .....	50
3.16	Fry Habitat Suitability Criteria for Velocity .....	51
4.1	Frequency Distribution of Stream Drainage Area in Ridge and Valley Freestone Region .....	55
4.2	Frequency Distribution of Stream Length in Ridge and Valley Freestone Region .....	56
5.1	Sample Pennsylvania-Maryland Instream Flow Field Data Sheet for Complete Data Set ..	75
5.2	Sample Pennsylvania-Maryland Instream Flow Channel Type Data Sheet .....	76
5.3	Sample Pennsylvania-Maryland Instream Flow Cross-Section Data Sheet .....	77
5.4	Sample Pennsylvania-Maryland Instream Flow Field Data Sheet for Partial Data Sheet ...	78
5.5	Sample Spawning Data Sheet .....	84
5.6	Comparison of Weighted Usable Area for Alternative Habitat Suitability Criteria .....	109
5.7	Typical Wetted Perimeter Plot With Definite Inflection Point (Unglaciated Plateau Study Region, Fall Creek, Segment 1) .....	110
5.8	Typical Wetted Perimeter Plot With Definite Inflection Point (Piedmont Upland Study Region, Basin Run, Segment 2) .....	111
5.9	Typical Wetted Perimeter Plot With No Inflection Point (Ridge and Valley Limestone Study Region, Cedar Creek, Lehigh County, Segment 1) .....	112
5.10	Typical Wetted Perimeter Plot With No Inflection Point (Ridge and Valley Limestone Study Region, Bushkill Creek, Segment 2) .....	113
5.11	Typical Wetted Perimeter Plot With Marginal Inflection Point (Ridge and Valley Freestone Study Region, Big Run, Segment 1) .....	114
5.12	Typical Wetted Perimeter Plot With Two Inflection Points (Ridge and Valley Freestone Study Region, Laurel Run, Juniata County, Segment 1) .....	115
5.13	Wetted Perimeter Graph Showing Effect of Extrapolation, Mile Run, Segment 1 .....	121
5.14	Wetted Perimeter Graph Show Effect of Extrapolation, Mugser Run, Segment 2 .....	122
6.1	Typical Shapes of Weighted Usable Area Versus Flow Relationships .....	131
6.2	Illustration of Effects of Different Habitat Loss Criteria on Withdrawals for Different Flow Relationships .....	132
6.3	Illustrations of Impact on Flow and Habitat at Green Creek, Ridge and Valley Freestone Region .....	138
6.4	Impact of Selected Withdrawal and Passby Flow Combinations, Ridge and Valley Freestone, Wild Brown and Combined Species .....	142
6.5	Impact of Selected Withdrawal and Passby Flow Combinations, Ridge and Valley Freestone, Wild Brook Trout .....	143
6.6	Impact of Selected Withdrawal and Passby Flow Combinations, Ridge and Valley Limestone Group 1, Wild Brown and Combined Species .....	144
6.7	Impact of Selected Withdrawal and Passby Flow Combinations, Ridge and Valley Limestone Group 2, Wild Brown and Combined Species .....	145
6.8	Impact of Selected Withdrawal and Passby Flow Combinations, Ridge and Valley Limestone Group 1, Wild Brook Trout .....	146
6.9	Impact of Selected Withdrawal and Passby Flow Combinations, Ridge and Valley Limestone Group 2, Wild Brook Trout .....	147
6.10	Impact of Selected Withdrawal and Passby Flow Combinations, Unglaciated Plateau Segment Class 1 Streams, Wild Brook Trout .....	148



6.11	Impact of Selected Withdrawal and Passby Flow Combinations, Unglaci-ated Plateau Segment Class 2 Streams, Wild Brook Trout .....	149
6.12	Impact of Selected Withdrawal and Passby Flow Combinations, Unglaci-ated Plateau Segment Class 1 Streams, Wild Brown and Combined Species .....	150
6.13	Impact of Selected Withdrawal and Passby Flow Combinations, Unglaci-ated Plateau Segment Class 2 Streams, Wild Brown and Combined Species .....	151
6.14	Example of Maximum Impact Measure of Selected Withdrawal and Passby Flow Combinations, Ridge and Valley Freestone Streams, Wild Brown and Combined Species.	153
6.15	Flow and Associated Habitat Duration Impact Analysis Procedures .....	173
6.16	Schematic of Computation of Impact of Withdrawal on Habitat .....	175
6.17	Habitat Change and Flow Relationship for Selected Withdrawals for Bear Run, Union County, Brook Trout, Summer Season .....	177
6.18	Example Passby Flow Versus Impact for Different Levels of Withdrawal, Bear Run, Brook Trout, Summer Season .....	180
D1	Letort Spring Run Flow Duration at Stream Gage .....	256
D2	Letort Spring Run Flow Duration for Study Sites and Stream Gage .....	258
D3	Letort Spring Run Flow Duration for Runoff Only .....	260
D4	Big Spring Creek, Cumberland County, Flow Duration for Spring Flow .....	264
D5	Falling Spring Run Flow Durations for Study Site and Springs .....	266
E1.	Instream Flow Impact Analysis Program Main Menu .....	279
E2.	Streamflow Data Form .....	280
E3.	Detailed Analysis Program Stream Information Dialog Box .....	281
E4.	Schematic of Output Table Sections .....	282
E5.	Sample Detailed Analysis Program Output Table, Stream Variation Method .....	283
E6.	Sample Detailed Analysis Program Output Table, Yearly Variation Method .....	285
E7.	Schematic of Duration Analysis Section of Output Table .....	287
E8.	Sample Duration Analysis Table .....	288
E9.	Graphical Output Menu Bar .....	289
E10.	Graph Overlay Dialog Box .....	289
E11.	Preliminary Analysis Program Stream Information Dialog Box .....	291
E12.	Sample Preliminary Analysis Program Output Table .....	292
PLATE 1	Pennsylvania-Maryland Instream Flow Study: Physiographic Regions, Study Regions, Limestone Areas, and Study Site Locations .....	End
PLATE 2	Pennsylvania-Maryland Instream Flow Study Hydrologic Regions .....	End

## TABLES

2.1	Physiographic Provinces, Sections, and Study Regions .....	10
3.1	Depth and Velocity Habitat Suitability Criteria Used for Transferability Testing .....	16
3.2	Classification Scheme for Substrate and Cover .....	17
3.3	Substrate/Cover Habitat Suitability Criteria Used for Transferability Testing .....	17
3.4	Periodicity Chart for Brook and Brown Trout .....	18
3.5	Streams Considered for Transferability Study .....	20
3.6	Sampling Dates and Streamflow Measurements .....	24
3.7	Results of Transferability Testing .....	26
3.8	Normalized Modified Forage Indexes for Substrate and Cover .....	37

3.9	Habitat Suitability Criteria Used for Pennsylvania-Maryland Instream Flow Study .....	41
4.1	Number of Trout Streams in Each Study Region .....	53
4.2	USGS Quadrangles and Streams Randomly Selected From the Unglaci-ated Plateau Study Region .....	59
4.3	USGS Quadrangles and Streams Randomly Selected From the Ridge and Valley Freestone Study Region .....	61
4.4	USGS Quadrangles and Streams Randomly Selected From the Ridge and Valley Limestone Study Region .....	62
4.5	USGS Quadrangles and Streams Randomly Selected From the Piedmont Upland Study Region .....	64
4.6	Summary of Potential Study Streams .....	65
4.7	Results of Trout Species Verification Studies .....	66
5.1	Data for Ridge and Valley Freestone Region Study Sites .....	70
5.2	Data for Ridge and Valley Limestone Region Study Sites .....	71
5.3	Data for Unglaci-ated Plateau Region Study Sites .....	72
5.4	Data for Piedmont Upland Region Study Sites .....	73
5.5	Summary of Study Sites and Segments After Field Data Collection .....	74
5.6	Hydraulic Simulation Limits and Flow Targets .....	80
5.7	Flow Relationships and Target Measurement Flows .....	80
5.8	Streams Evaluated for Redd Locations, October-November 1994 .....	85
5.9	Location of 123 Brook Trout Redds in 19 Streams Evaluated as Part of the Pennsylvania-Maryland Instream Flow Study .....	87
5.10	Location of 29 Brown Trout Redds in Seven Streams Evaluated as Part of the Pennsylvania-Maryland Instream Flow Study .....	88
5.11	Location of 24 Unidentified Trout Redds in Four Streams Evaluated as Part of the Pennsylvania-Maryland Instream Flow Study .....	89
5.12	Location of 176 Trout Redds (Brook Trout, Brown Trout, and Unidentified Trout Combined) in 30 Streams Evaluated as Part of the Pennsylvania-Maryland Instream Flow Study .....	90
5.13	Depth, Velocities, and Substrate Types for Trout Redds .....	91
5.14	Summary of Depth, Velocities, and Substrate Types at Redd Locations for Brown Trout and Brook Trout .....	95
5.15	Study Sites and Gages .....	98
5.16	Summary of Study Sites After Hydraulic Calibration .....	104
5.17	Example of Habitat Output, Green Creek, Segment 1, Ridge and Valley Limestone Study Region .....	107
5.18	Number of Sites Showing Different Wetted Perimeter Curve Types .....	116
5.19	Wetted Perimeter Summary, Ridge and Valley Freestone Study Region (Simulated Flows)	117
5.20	Wetted Perimeter Summary, Ridge and Valley Limestone Study Region (Simulated Flows)	118
5.21	Wetted Perimeter Summary, Unglaci-ated Plateau Study Region (Simulated Flows .....	119
5.22	Wetted Perimeter Summary, Piedmont Upland Study Region (Simulated Flows) .....	120
5.23	Wetted Perimeter Summary, Ridge and Valley Freestone Study Region (Extrapolated to Zero Flow) .....	123
5.24	Wetted Perimeter Summary, Unglaci-ated Plateau Study Region (Extrapolated to Zero Flow)	124
5.25	Wetted Perimeter Summary, Piedmont Upland Study Region (Extrapolated to Zero Flow)	125
6.1	Example Computation of Combined Habitat, Green Creek, Segment 1, Brook Trout .....	128
6.2	Comparison of Median Monthly Flows, No-Net-Loss Flows, and Flow at Maximum Renormalized Minimum Weighted Usable Area for Adult/Juvenile Brook Trout .....	134
6.3	Study Streams Used in Habitat Impact Analysis .....	140

6.4	Sample Summary of Range of Impacts, Unglaciaded Plateau, Wild Brook Trout .....	152
6.5	Limestone Trout Streams in Pennsylvania .....	155
6.6	Gages Retained After Second Stage Screening .....	158
6.7	Hydrologic Region Designation and Description .....	164
6.8	Hydrology Regions and Gages .....	165
6.9	Final List of Gages Used in Regional Hydrology .....	169
6.10	Study Streams Revised for Regional Hydrology .....	171
6.11	Sample Computation of Impact, Bear Run, Union County, Brook Trout, Summer Season .....	176
6.12	Selected Points from Habitat Reduction Plot, Bear Run, Union County, Brook Trout, Summer Season .....	178
B1.	One-Sided Chi-Square Tests for Habitat Suitability Criteria Transferability, Cherry Run, Brown Trout .....	233
B2.	One-Sided Chi-Square Tests for Habitat Suitability Criteria Transferability, Little Fishing Creek, Brook Trout .....	235
B3.	One-Sided Chi-Square Tests for Habitat Suitability Criteria Transferability, Young Womans Creek, Brown Trout and Combined Brook/Brown Fry .....	237
B4.	One-Sided Chi-Square Tests for Habitat Suitability Criteria Transferability, Young Womans Creek .....	239
B5.	One-Sided Chi-Square Tests for Habitat Suitability Criteria Transferability, Whitehead Run, Brook Trout .....	240
D1	Summary of Monocacy Creek Flows for Complete Data Set .....	252
D2	Summary of Monocacy Creek Underflow Estimates .....	253
D3	Big Spring Creek, Cumberland County, Spring Flow Data and Concurrent Flows at Nearby Gages .....	263
D4	Summary of Flow Measurements for Falling Spring Run .....	265
D5	Gages in Spring Creek Watershed, Centre County .....	267
D6	Spring Flow Rates of Spring Creek Watershed, Centre County .....	267
E1.	Explanation of Monthly RMWUA Statistics, Stream Variation Method .....	284
E2.	Explanation of Monthly RMWUA Statistics, Yearly Variation Method .....	286



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# INSTREAM FLOW STUDIES PENNSYLVANIA AND MARYLAND

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## EXECUTIVE SUMMARY

Existing procedures for determining instream flow protection levels have certain deficiencies, which result in conflicts between agencies that regulate water supply withdrawals and agencies that manage fisheries. To overcome these deficiencies, the Pennsylvania Department of Environmental Protection, the Susquehanna River Basin Commission, Pennsylvania Fish and Boat Commission, U.S. Army Corps of Engineers, Maryland Department of the Environment, and the Biological Resources Division of the U.S. Geological Survey cooperatively conducted an instream flow needs assessment study. The Chesapeake Bay Program also provided funding for the study. The goal of the study is to develop a procedure for determining instream flow protection levels that: (1) is based on fishery resource protection; (2) is clearly applicable to Pennsylvania streams; (3) does not require expensive site-specific studies; and (4) can be easily applied during the administrative review of applications for surface water allocations.

The basic approach to the development of the procedure is to conduct instream flow needs assessments at sites selected to be representative of a study region, and then regionalize the results of the site-specific assessments to develop the procedure. Only sites with reproducing trout populations and drainage area less than 100 square miles were included in the study.

Physical habitat components of the Instream Flow Incremental Methodology were applied to selected study sites in the Ridge and Valley Freestone, Ridge and Valley Limestone, Unglaciaded Plateaus, and Piedmont Upland study regions in Pennsylvania and Maryland. The evaluation species are brook and brown trout. Habitat suitability criteria were selected from the literature, and tested to see if they adequately represented habitat usage on Pennsylvania streams. These criteria were found not to be applicable to Pennsylvania. New criteria were developed from the data collected for the transferability study.

Study streams were selected from available information, and divided into segments based on length of the stream. Study sites were selected near the midpoint of each segment. All study sites had good access, reproducing trout populations, and good water quality. Field data and hydraulic modeling provided estimates of the amount of habitat available within a specified range of flows. The amount of habitat available for all life stages present in a defined season of the year was determined for that range of flows.

A computer program was developed to estimate the effects of withdrawals and passby flows on physical microhabitat and availability of flow for withdrawals. The program estimates a number of statistics of the impact for various combinations of withdrawal and passby flow for any project site in the study regions, including the long-term (average annual) impact. This computer program was run with many combinations of species, withdrawal and passby flow for selected study sites within a given class of study sites (study region, segment class) to estimate the average annual reduction in habitat resulting from each combination. These results were used to prepare graphs of constant habitat impact, and the percent of time that water supply is unavailable, for different levels of impact.

The impact curves can be used to develop statewide policies regarding which impact curve(s) should be used to establish passby flows. They also can be used to determine impact of a proposed withdrawal at any site in these study regions. These curves also can be used by water purveyors to analyze stream intake alternatives that meet state fishery protection levels on cold water streams having drainage areas less than 100 square miles. The determination of which impact curve(s) to use will have to consider costs both to the environment and to withdrawal users. Obviously, the curve with the lowest habitat impact provides the greatest protection to the fishery habitat. However, as the degree of habitat protection increases, so does the percent of time that withdrawals cannot be made because of flow limitations or passby flow requirements

Although regional criteria have been developed, the computer program also can be used to evaluate conditions not considered in the development of the regional criteria. A regional hydrology procedure has been developed to provide hydrology for the computer program.

A detailed description of the methodology developed and applied in this study, and recommendations for additional studies, are presented.