

United States  
Environmental Protection  
Agency

Office of Water  
(4305)

EPA-823-B-01-001  
June 2001



# Better Assessment Science Integrating point and Nonpoint Sources

## BASINS

Version 3.0



---

User's Manual

---

## **Disclaimer**

Production of this document has been funded wholly or in part by the U.S. Environmental Protection Agency. Mention of trade names or commercial products does not constitute endorsement or recommendation for use by the U.S. Environmental Protection Agency. The Better Assessment Science Integrating Point and Nonpoint Sources (BASINS) system described in this manual is applied at the user's own risk. Neither the U.S. Environmental Protection Agency nor the system authors can assume responsibility for system operation, output, interpretation, or use.

---

## Acknowledgments

Version 3.0 of the Better Assessment Science Integrating Point and Nonpoint Sources (BASINS) system builds on Version 2.0 of the system. See the Version 2.0 User's Manual for the team involved in the production of that version of the system.

Many groups contributed to the development of BASINS 3.0. Technical direction and guidance was provided by Russell Kinerson, Paul Cocca, Ed Partington, Marjorie Wellman and David Wells of EPA's Office of Science and Technology, Standards and Applied Science Division. Four groups outside of EPA made significant contributions to the BASINS 3.0 system.

AQUA TERRA Consultants, Decatur, Georgia provided project coordination, conceptual design, extension implementation, tool implementation, testing and documentation coordination services under EPA contract number 68-C-98-010. Jack Kittle, Paul Hummel, Paul Duda, Mark Gray and Rob Dusenbury made up the AQUA TERRA team for this effort.

Tetra Tech, Inc., Fairfax, Virginia, provided conceptual design, core system implementation, extension implementation, database update, documentation, testing, and production services as a subcontractor under EPA contract number 68-C-98-010. Henry Manguerra, Dan Sandhaus, Matt Meyers, Haihong Yang, Qin Li, Ansu John, Jian Ouyang, Mustafa Faizullabhoj, Jim Callahan and Alex Trounov made up the Tetra Tech team.

Texas A & M University and the Blacklands Research Center of the Texas Agricultural Experiment Station provided an enhanced version of the SWAT model, extensions linking BASINS to SWAT, a watershed delineation extension, testing and documentation to the BASINS system under EPA InterAgency Agreement number DW12938632. Jeff Arnold, Mauro Di Luzio and R. Srinivasan are recognized for their efforts.

CH2M HILL, Herndon, Virginia provided the PLOAD extension to BASINS 3.0 under EPA contract number OW1435NTLX. Sayedul Choudhury, John Tully and Tim Hare made up the CH2M HILL team which made the enhancements which integrated PLOAD into BASINS 3.0. CH2M HILL also supported the development of the BMP and REPORT modules in the HSPF model. Avinash Patwardhan is recognized for his efforts on that effort.

The Hydrologic Analysis Software Support Program of the United States Geological Survey, Water Resources Division is acknowledged for its support of the development of GenScn version 1.0 and some of the extensions found in GenScn 2.0. Their support of the development of the MetComp software which provided algorithms for the WDMUtil tool is also acknowledged. Kate Flynn and Alan Lumb are particularly recognized.

EPA acknowledges the support of EarthInfo, Inc., which granted permission to import selected hourly precipitation data into BASINS from its CD-ROMs. EarthInfo, Inc., 5541 Central Avenue, Boulder, Colorado, (303) 938-1788.

---

---

## User Assistance and Technical Support

BASINS was developed to promote better assessment and integration of point and nonpoint sources in watershed and water quality management. It integrates several key environmental data sets with improved analysis techniques. Several types of environmental programs can benefit from the use and application of such an integrated system in various stages of environmental management planning and decision making.

EPA's Office of Science and Technology (OST) provides assistance and technical support to users of the BASINS system to facilitate its effective application. Technical support can be obtained at **OST's BASINS Home Page:** <http://www.epa.gov/ost/basins>

---

# Contents

1	Introduction.....	1
2	System Overview.....	5
2.1	Data Products .....	8
2.2	Environmental Assessment Tools .....	14
2.3	Utilities .....	16
2.4	Watershed Characterization Reports.....	18
2.5	Watershed and Instream Models .....	20
3	Hardware and Software Requirements .....	23
4	Installation.....	25
4.1	System Setup .....	27
4.2	Data Extraction.....	34
4.3	Project Builder.....	49
4.4	Opening a BASINS Project.....	52
5	Basins Components - Extension Manager .....	55
6	BASINS Assessment Tools .....	69
6.1	TARGET .....	70
6.2	ASSESS.....	77
6.3	Data Mining.....	84
7	Data Extensions .....	91
7.1	Theme Manager.....	92
7.2	Import BASINS Data .....	94
7.3	NHD Download Tool .....	103
7.4	Grid Projector.....	113
7.5	GenScn .....	133
7.6	WDMUtil .....	134
8	Delineation Tools.....	135
8.1	Manual Watershed Delineation .....	136
8.2	Automatic Watershed Delineation .....	158
8.2.1	DEM Setup .....	160
8.2.2	Stream Definition .....	178
8.2.3	Outlet and Inlet Definition.....	180
8.2.4	Main Watershed Outlet Selection and Definition.....	189
8.2.5	Reservoirs .....	194
8.3	Predefined Delineation.....	197
9	BASINS Utilities .....	205
9.1	Land Use, Soils Class and Overlay .....	206
9.1.1	Land Use and Soil Definition .....	206
9.1.2	HRUs Distribution.....	231
9.2	Land Use Reclassification.....	240

---

---

9.3 Water Quality Observation Data Management .....	245
9.4 DEM Reclassification .....	257
10 Watershed Characterization Reports.....	263
10.1 Point Source Inventory Report.....	264
10.2 Water Quality Summary Report.....	271
10.3 Toxic Air Emission Report .....	277
10.4 Land Use Distribution Report .....	283
10.5 State Soil Characteristic Report .....	288
10.6 Watershed Topographic Report .....	296
10.7 Land Use Distribution Report (Grid) .....	302
10.8 Watershed Topographic Report (Grid) .....	313
10.9 Lookup Tables.....	321
11 Selecting Watershed and Instream Models.....	329
11.1 QUAL2E .....	332
11.2 HSPF .....	333
11.3 SWAT.....	334
11.4 PLOAD.....	335
12 References.....	337