

## Study Unit Reports

This report is based on the summary reports of the first 20 NAWQA Study Units, listed below in alphabetical order by Study Unit name. To view an electronic version of a report or to order copies via the World Wide Web, access

<http://water.usgs.gov/lookup/get?circXXXX>

(where XXXX is the Circular number listed below).

- Spruill, T.B., Harned, D.A., Ruhl, P.M., Eimers, J.L., McMahon, G., Smith, K.E., Galeone, D.R., and Woodside, M.D., 1998, Water quality in the **Albemarle–Pamlico Drainage Basin**, North Carolina and Virginia, 1992–95: U.S. Geological Survey Circular 1157, 36 p.
- Frick, E.A., Hippe, D.J., Buell, G.R., Couch, C.A., Hopkins, E.H., Wangness, D.J., Garrett, J.W., 1998, Water quality in the **Apalachicola–Chattahoochee–Flint River Basin**, Georgia, Alabama, and Florida, 1992–95: U.S. Geological Survey Circular 1164, 38 p.
- Williamson, A.K., Munn, M.D., Ryker, S.J., Wagner, R.J., Ebbert, J.C., and Vanderpool, A.M., 1998, Water quality in the **Central Columbia Plateau**, Washington and Idaho, 1992–95: U.S. Geological Survey Circular 1144, 35 p.
- Frenzel, S.A., Swanson, R.B., Huntzinger, T.L., Stamer, J.K., Emmons, P.J., and Zelt, R.B., 1998, Water quality in the **Central Nebraska Basins**, Nebraska, 1992–95: U.S. Geological Survey Circular 1163, 33 p.
- Garabedian, S.P., Coles, J.F., Grady, S.J., Trench, E.C.T., and Zimmerman, M.J., 1998, Water quality in the **Connecticut, Housatonic, and Thames River Basins**, Connecticut, Massachusetts, New Hampshire, New York, and Vermont, 1992–95: U.S. Geological Survey Circular 1155, 32 p.
- Berndt, M.P., Hatzell, H.H., Crandall, C.A., Turtora, M., Pittman, J.R., and Oaksford, E.T., 1998, Water quality in the **Georgia–Florida Coastal Plain**, Georgia and Florida, 1992–96: U.S. Geological Survey Circular 1151, 34 p.
- Wall, G.R., Riva-Murray, K., and Phillips, P.J., 1998, Water quality in the **Hudson River Basin**, New York and adjacent states, 1992–95: U.S. Geological Survey Circular 1165, 32 p.
- Lindsey, B.D., Breen, K.J., Bilger, M.D., and Brightbill, R.A., 1998, Water quality in the **Lower Susquehanna River Basin**, Pennsylvania and Maryland, 1992–95: U.S. Geological Survey Circular 1168, 38 p.
- Bevans, H.E., Lico, M.S., and Lawrence, S.J., 1998, Water quality in the Las Vegas Valley area and the Carson and Truckee River Basins (**Nevada Basin and Range**), Nevada and California, 1992–96: U.S. Geological Survey Circular 1170, 47 p.
- Petersen, J.C., Adamski, J.C., Bell, R.W., Davis, J.V., Femmer, S.R., Freiwald, D.A., and Joseph, R.L., 1998, Water quality in the **Ozark Plateaus**, Arkansas, Kansas, Missouri, and Oklahoma, 1992–95: U.S. Geological Survey Circular 1158, 33 p.
- Ator, S.W., Blomquist, J.D., Brakebill, J.W., Denis, J.M., Ferrari, M.J., Miller, C.V., and Zappia, H., 1998, Water quality in the **Potomac River Basin**, Maryland, Pennsylvania, Virginia, West Virginia, and the District of Columbia, 1992–96: U.S. Geological Survey Circular 1166, 38 p.
- Stoner, J.D., Lorenz, D.L., Goldstein, R.M., Brigham, M.E., and Cowdery, T.K., 1998, Water quality in the **Red River of the North Basin**, Minnesota, North Dakota, and South Dakota, 1992–95: U.S. Geological Survey Circular 1169, 33 p.
- Levings, G.W., Healy, D.F., Richey, S.F., and Carter, L.F., 1998, Water quality in the **Rio Grande Valley**, Colorado, New Mexico, and Texas, 1992–95: U.S. Geological Survey Circular 1162, 39 p.
- Dubrovsky, N.M., Kratzer, C.R., Brown, L.R., Gronberg, J.M., and Burow, K.R., 1998, Water quality in the **San Joaquin–Tulare Basins**, California, 1992–95: U.S. Geological Survey Circular 1159, 38 p.
- Dennehy, K.F., Litke, D.W., Tate, C.M., Qi, S.L., McMahon, P.B., Bruce, B.W., Kimbrough, R.A., and Heiny, J.S., 1998, Water quality in the **South Platte River Basin**, Colorado, Nebraska, and Wyoming, 1992–95: U.S. Geological Survey Circular 1167, 38 p.
- Land, L.F., Moring, J.B., Van Metre, P.C., Reutter, D.C., Mahler, B.J., Shipp, A.A., and Ulery, R.L., 1998, Water quality in the **Trinity River Basin**, Texas, 1992–95: U.S. Geological Survey Circular 1171, 39 p.
- Clark, G.M., Maret, T.R., Rupert, M.G., Maupin, M.A., Low, W.H., and Ott, D.S., 1998, Water quality in the **Upper Snake River Basin**, Idaho and Wyoming, 1992–95: U.S. Geological Survey Circular 1160, 35 p.
- Peters, C.A., Robertson, D.M., Saad, D.A., Sullivan, D.J., Scudder, B.C., Fitzpatrick, F.A., Richards, K.D., Stewart, J.S., Fitzgerald, S.A., and Lenz, B.N., 1998, Water quality in the **Western Lake Michigan Drainages**, Wisconsin and Michigan, 1992–95: U.S. Geological Survey Circular 1156, 40 p.
- Fenelon, J.M., 1998, Water quality in the **White River Basin**, Indiana, 1992–96: U.S. Geological Survey Circular 1150, 34 p.
- Wentz, D.A., Bonn, B.A., Carpenter, K.D., Hinkle, S.R., Janet, M.L., Rinella, F.A., Uhrich, M.A., Waite, I.R., Laenen, A., and Bencala, K.E., 1998, Water quality in the **Willamette Basin**, Oregon, 1991–95: U.S. Geological Survey Circular 1161, 34 p.

## References Cited

1. Knopman, D.S., and Smith, R.A., 1993, Twenty years of the Clean Water Act: Environment, v. 35, no. 1, p. 17–34.
2. Hitt, K.J., 1994, Refining 1970's land-use data with 1990 population data to indicate new residential development: U.S. Geological Survey Water-Resources Investigations Report 94–4250, 15 p.
3. Bachman, L.J., Lindsey, B.D., Brakebill, J., and Powars, D.S., 1998, Ground-water discharge and base flow nitrate loads of nontidal streams, and their relation to a hydrogeomorphic classification of the Chesapeake Bay Watershed, Middle Atlantic Coast: U.S. Geological Survey Water-Resources Investigations Report 98–4059, 71 p.
4. Fisher, D.C., and Oppenheimer, M., 1991, Atmospheric nitrogen deposition and the Chesapeake Bay Estuary: AMBIO, v. 20, no. 3–4, p. 102–108.
5. Gilliom, R.J., Alley, W.M., and Gurtz, M.E., 1995, Design of the National Water-Quality Assessment Program—Occurrence and distribution of water-quality conditions: U.S. Geological Survey Circular 1112, 33 p.
6. Barbash, J.E., and Resek, E.A., 1996, Pesticides in ground water—Distribution, trends, and governing factors, v. 2 of Gilliom, R.J., ed., Pesticides in the hydrologic system: Chelsea, Mich., Ann Arbor Press, 588 p.
7. Zynjuk, L.D., and Majedi, B.F., 1996, January 1996 floods deliver large loads of nutrients and sediment to the Chesapeake Bay: U.S. Geological Survey Fact Sheet 140–96, 2 p.
8. U.S. Environmental Protection Agency and others, 1998, Clean Water Action Plan—Restoring and protecting America's waters: U.S. Environmental Protection Agency report EPA–840–R–98–001, 89 p.
9. Speiran, G.K., 1996, Geohydrology and geochemistry near coastal ground-water-discharge areas of the Eastern Shore, Virginia: U.S. Geological Survey Water-Supply Paper 2479, 73 p.
10. Tesoriero, A.J., and Voss, F.D., 1997, Predicting the probability of elevated nitrate concentrations in the Puget Sound Basin: Ground Water, v. 35, p. 1029–1039.
11. Litke, D.W., 1999, A review of phosphorus control measures in the United States and their effects on water quality: U.S. Geological Survey Water-Resources Investigations Report 99–4007, 38 p.
12. Puckett, L.J., 1994, Nonpoint and point sources of nitrogen in major watersheds of the United States: U.S. Geological Survey Water-Resources Investigations Report 94–4001, 9 p.
13. Andrienas, P.A., 1974, Farmers' use of pesticides in 1971—Quantities: U.S. Department of Agriculture, Economic Research Service, Agricultural Economic Report No. 252, 56 p.
14. Eichers, T., Andrienas, P., Jenkins, R., and Fox, A., 1968, Quantities of pesticides used by farmers in 1964: U.S. Department of Agriculture, Economic Research Service, Agricultural Economic Report No. 131, 37 p.
15. Eichers, T., Andrienas, P., Blake, H., Jenkins, R., and Fox, A., 1970, Quantities of pesticides used by farmers in 1966: U.S. Department of Agriculture, Economic Research Service, Agricultural Economic Report No. 179, 61 p.
16. Eichers, T.R., Andrienas, P.A., and Anderson, T.W., 1978, Farmers' use of pesticides in 1976: U.S. Department of Agriculture, Economics, Statistics, and Cooperative Service, Agricultural Economic Report No. 418, 58 p.
17. Aspelin, A.L., 1997, Pesticides industry sales and usage, 1994 and 1995 market estimates: U.S. Environmental Protection Agency, Washington, DC, 733–R–97–002, 35 p.
18. Shelton, L.R., 1994, Field guide for collecting and processing stream-water samples for the National Water-Quality Assessment Program: U.S. Geological Survey Open-File Report 94–455, 42 p.
19. Shelton, L.R., and Capel, P.D., 1994, Guidelines for collecting and processing samples of stream bed sediment for analysis of trace elements and organic contaminants for the National Water-Quality Assessment Program: U.S. Geological Survey Open-File Report 94–458, 20 p.
20. Crawford, J.K., and Luoma, S.N., 1994, Guidelines for studies of contaminants in biological tissues for the National Water-Quality Assessment Program: U.S. Geological Survey Open-File Report 92–494, 69 p.
21. Lapham, W.W., Wilde, F.D., and Koterba, M.T., 1995, Ground-water data-collection protocols and procedures for the National Water-Quality Assessment Program—Selection, installation, and documentation of wells, and collection of related data: U.S. Geological Survey Open-File Report 95–398, 69 p.
22. Koterba, M.T., Wilde, F.D., and Lapham, W.W., 1995, Ground-water data-collection protocols and procedures for the National Water-Quality Assessment Program—Collection and documentation of water-quality samples and related data: U.S. Geological Survey Open-File Report 95–399, 113 p.
23. Mueller, D.K., and Stoner, J.D., 1998, Identifying the potential for nitrate contamination of streams in agricultural areas of the United States, *in* Proceedings of the National Water Quality Monitoring Conference, July 7–9, 1998, Reno, Nev., p. III163–III173.
24. National Atmospheric Deposition Program, 1997, National atmospheric deposition program (NRSP-3)/ National trends network, 1997: NADP/NTN Program Office, Illinois State Water Survey, Champaign, Ill.
25. Gilliom, R.J., Mueller, D.K., and Nowell, L.H., 1998, Methods for comparing water-quality conditions among assessment study units, 1992–1995: U.S. Geological Survey Open-File Report 97–589, 54 p.
26. Mueller, D.K., Hamilton, P.A., Helsel, D.R., Hitt, K.J., and Ruddy, B.C., 1995, Nutrients in ground water and surface water of the United States—An analysis of data through 1992: U.S. Geological Survey Water-Resources Investigations Report 95–4031, 74 p.

27. Mueller, D.K., and Helsel, D.R., 1996, Nutrients in the Nation's waters—Too much of a good thing?: U.S. Geological Survey Circular 1136, 24 p.
28. U.S. Environmental Protection Agency, 1996, Drinking water regulations and health advisories: U.S. Environmental Protection Agency report EPA 822-B-96-001 [variously paged].
29. U.S. Environmental Protection Agency, 1986, Quality criteria for water—1986: U.S. Environmental Protection Agency report EPA 440/5-86-001 [variously paged].
30. Nolan, B.T., Ruddy, B.C., Hitt, K.J., and Helsel, D.R., 1997, Risk of nitrate in ground waters of the United States—A national perspective: *Environmental Science & Technology*, v. 31, no. 8, p. 2229–2236.
31. Nowell, L.H., Capel, P.D., and Dileanis, P.D., in press, Pesticides in stream sediment and aquatic biota—Distribution, trends, and governing factors, v. 4 of Gilliom, R.J., ed., *Pesticides in the hydrologic system*: Chelsea, Mich., Ann Arbor Press.
32. Carson, R., 1962, *Silent Spring*: Boston, Houghton Mifflin; Cambridge, Mass., Riverside Press.
33. Goodbred, S.L., Gilliom, R.J., Gross, T.S., Denslow, N.P., Bryant, W.L., and Schoeb, T.R., 1997, Reconnaissance of 17 $\beta$ -estradiol, 11-ketotestosterone, vitellogenin, and gonad histopathology in common carp of United States Streams—Potential for contaminant-induced endocrine disruption: U.S. Geological Survey Open-File Report 96-627, 47 p.
34. Kolpin, D.W., Thurman, E.M., and Linhart, S.M., 1998, The environmental occurrence of degradates in ground water: *Archives of Environmental Contamination and Toxicology*, v. 35, p. 385–390.
35. U.S. Environmental Protection Agency, 1990, Suspended, cancelled, and restricted pesticides: U.S. Environmental Protection Agency, Office of Pesticides and Toxic Substances 20T-4002.
36. Buell, G.R., and Couch, C.A., 1995, National Water Quality Assessment Program—Environmental distribution of organochlorine compounds in the Apalachicola-Chattahoochee-Flint River Basin, in Hatcher, K.J., ed., *Proceedings of the 1995 Georgia Water Resources Conference*: Athens, Ga., Vinson Institute of Government, University of Georgia, p. 46–53.
37. Meade, R.H., ed., 1995, Contaminants in the Mississippi River, 1987–92: U.S. Geological Survey Circular 1133, 139 p.
38. Stamer, J.K., and Wieczorek, M.E., 1995, Pesticides in streams in Central Nebraska: U.S. Geological Survey Fact Sheet FS-232-95, 4 p.
39. U.S. Environmental Protection Agency, 1997, The incidence and severity of sediment contamination in surface waters of the United States, v. 1 of National sediment quality survey: U.S. Environmental Protection Agency, Office of Science and Technology, EPA 823-R-97-006.
40. Newell, A.J., Johnson, D.W., and Allen, L.K., 1987, Niagara River Biota Contamination Project—Fish flesh criteria for piscivorous wildlife: New York State Department of Environmental Conservation, Division of Fish and Wildlife, Bureau of Environmental Protection, Technical Report 87-3.
41. U.S. Environmental Protection Agency, 1995, Guidance for assessing chemical contaminant data for use in fish advisories, v. 1 of Fish sampling and analysis (2d ed.): U.S. Environmental Protection Agency, Office of Water, EPA 823-R-95-007.
42. Rupert, M.G., 1998, Probability of detecting atrazine/desethylatrazine and elevated concentrations of nitrate (NO<sub>2</sub>+NO<sub>3</sub>-N) in ground water in the Idaho part of the Upper Snake River Basin: U.S. Geological Survey Water-Resources Investigation Report 98-4203, 32 p.
43. Larson, S.J., Capel, P.D., and Majewski, M.S., 1997, Pesticides in surface waters—Distribution, trends, and governing factors, v. 3 of Gilliom, R.J., ed., *Pesticides in the hydrologic system*: Chelsea, Mich., Ann Arbor Press, 373 p.
44. Scribner, E.A., Goolsby, D.A., Thurman, E.M., and Battaglin, W.A., 1998, Reconnaissance for selected herbicides, metabolites, and nutrients in streams of nine Midwestern states: U.S. Geological Survey Open-File Report 98-181, 36 p.
45. VanMetre, P.C., Wilson, J.T., Callender, E., and Fuller, C.C., 1998, Similar rates of decrease of persistent, hydrophobic and particle-reactive contaminants in riverine systems: *Environmental Science & Technology*, v. 32, no. 21, p. 3312–3317.
46. VanMetre, P.C., and Callender, E., in press, Trends in sediment quality in response to urbanization, in Buxton, H., and Morganwalp, D.W., eds., *Toxic Substances Hydrology Program, Proceedings of the Technical Meeting, March 8–12, 1999*, Charleston, S.C.
47. U.S. Fish and Wildlife Service, 1992, U.S. Fish and Wildlife Service National Contaminant Biomonitoring Program Fish Data File, 1969–1986: Fish and Wildlife Service National Fisheries Contaminant Research Center, 4200 New Haven Road, Columbia, Mo. 65201, Lotus and ASCII files (8/24/92).
48. Rapaport, R.A., Urban, N.R., Capel, P.D., Baker, J.E., Looney, B.B., Eisenreich, S.J., and Gorham, E., 1985, “New” DDT inputs to North America—Atmospheric deposition: *Chemosphere*, v. 14, no. 9, p. 1167–1173.
49. U.S. Environmental Protection Agency, 1983, Analysis of the risks and benefits of seven chemicals used for subterranean termite control: U.S. Environmental Protection Agency, Office of Pesticides and Toxic Substances, Office of Pesticide Programs EPA-540/9-83-005 [variously paged].
50. Esworthy, R.F., 1987, Incremental benefit analysis—Restricted use of all pesticides registered for subterranean termite control: U.S. Environmental Protection Agency, Benefits and Use Division, Economic Analysis Branch.

# Points of contact for additional information

## 1991 NAWQA STUDY UNITS

### **Albemarle-Pamlico Drainage**

<http://water.usgs.gov/lookup/get?nawqaalbe>

### **Apalachicola-Chattahoochee-Flint River Basin**

<http://water.usgs.gov/lookup/get?nawqaacfb>

### **Central Columbia Plateau**

<http://water.usgs.gov/lookup/get?nawqacct>

### **Central Nebraska Basins**

<http://water.usgs.gov/lookup/get?nawqacnrb>

### **Connecticut, Housatonic, and Thames River Basins**

<http://water.usgs.gov/lookup/get?nawqaconn>

### **Georgia-Florida Coastal Plain**

<http://water.usgs.gov/lookup/get?nawqagaf>

### **Hudson River Basin**

<http://water.usgs.gov/lookup/get?nawqahds>

### **Lower Susquehanna River Basin**

<http://water.usgs.gov/lookup/get?nawqalsus>

### **Nevada Basin and Range**

<http://water.usgs.gov/lookup/get?nawqanvbr>

### **Ozark Plateaus**

<http://water.usgs.gov/lookup/get?nawqaozrk>

### **Potomac River Basin**

<http://water.usgs.gov/lookup/get?nawqapoto>

### **Red River of the North Basin**

<http://water.usgs.gov/lookup/get?nawqaredn>

### **Rio Grande Valley**

<http://water.usgs.gov/lookup/get?nawqariog>

### **San Joaquin-Tulare Basins**

<http://water.usgs.gov/lookup/get?nawqasanj>

### **South Platte River Basin**

<http://water.usgs.gov/lookup/get?nawqasplt>

### **Trinity River Basin**

<http://water.usgs.gov/lookup/get?nawqatrin>

### **Upper Snake River Basin**

<http://water.usgs.gov/lookup/get?nawqausnk>

### **Western Lake Michigan Drainages**

<http://water.usgs.gov/lookup/get?nawqawmic>

### **White River Basin**

<http://water.usgs.gov/lookup/get?nawqawhit>

### **Willamette Basin**

<http://water.usgs.gov/lookup/get?nawqawill>

## NAWQA AND NATIONAL SYNTHESIS PROJECTS

DATA USED FOR NATIONAL SUMMARIES IN THIS REPORT CAN BE FOUND AT

### **National Water-Quality Assessment Program**

<http://water.usgs.gov/lookup/get?nawqa>

### **Nutrient National Synthesis Project**

<http://water.usgs.gov/lookup/get?nawqanuts>

### **Pesticide National Synthesis Project**

<http://water.usgs.gov/lookup/get?nawqapest>

