THE NATIONAL STREAM QUALITY ACCOUNTING NETWORK (NASQAN)-SOME QUESTIONS AND ANSWERS GEOLOGICAL SURVEY CIRCULAR 719

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THE NATIONAL STREAM QUALITY ACCOUNTING NETWORK (NASQAN)— SOME QUESTIONS AND ANSWERS

By John F. Ficke and Richard O. Hawkinson

GEOLOGICAL SURVEY CIRCULAR 719

United States Department of the Interior

STANLEY K. HATHAWAY, Secretary



Geological Survey V. E. McKelvey, Director

Library of Congress Cataloging in Publication Data

Ficke, John F

The National Stream Quality Accounting Network (NASQAN)-Some questions and answers.

(Geological Survey circular;)

Bibliography: p.

Supt. of Docs. no.: I 19.4/2:

1. Water quality management—United States. 2. Water—Pollution—United States—Measurement. 3. National Stream Quality Accounting Network. I. Hawkinson, Richard O., joint author. II. Title. III. Scries: United States. Geological Survey. Circular;

QE75.C5 [TD223] 557.3'08s [628.1'61'0973] 75-619140

CONTENTS

Introduction
Purpose
What is NASQAN?
Why is it needed?
How are NASQAN stations different from those
that have operated for many years?
Who began NASQAN?
Accounting networks
What are the geographical units used in level I accounting?
How are NASQAN stations located within accounting units?
How are stations in coastal units selected?
How are sites selected for stations in closed
basins?

Page		Page
1	Operation	8
1	How many stations are in NASQAN and where	
1	are they?	8
1	What water-quality characteristics are measured	0
	at NASQAN stations?	8
2	Will changes be made in the suite of chara?-	_
-	teristics measured at NASQAN stations?	8
2	Who collects data at NASQAN stations?	8
3	How long will stations be operated?	10
	What will be done with the data?	11
3	What will be the principal problems in the	
	interpretation of the data?	12
5	What is the policy regarding NASQAN sta-	
5	tions near reservoirs?	12
	Summary	12
5	References	12

ILLUSTRATIONS

COVER	Mosaic of ERTS imagery showing parts of the Tennessee, Ohio, and Mississippi
	Rivers. Uncontrolled mosaic from photo prints of band 6 ERTS multi-
	spectral scanner data, constructed by the Maps and Surveys Branch of
	the Tennessee Valley Authority.

FIGURE	1	Map of United States showing outlines of regions and accounting	Page
FIGURE	1.	units	4
	2.	Map showing accounting units in New England	6
	3.	Map of United States showing NASQAN stations in operation January 1, 1975	9
	4.	Graph showing numbers of stations in NASQAN, 1973-78	10

TABLE

			Page
TABLE	1.	Stations in the National Stream Quality Accounting Network on	
		January 1, 1975	15

The National Stream Quality Accounting Network (NASQAN)— Some Questions and Answers

By JOHN F. FICKE and RICHARD O. HAWKINSON

INTRODUCTION

One of the major new efforts of the U.S. Geological Survey is the National Stream Quality Accounting Network (NASQAN). This circular is intended to answer some of the frequently asked questions concerning concepts used in establishing NASQAN, its purposes, design, value, and future plans.

PURPOSE

What is NASQAN?

NASQAN is a series of stations at which systematic and continuing measurements are made to determine the quality of the Nation's streams. Design of the network specifies measurement of a broad range of water-quality characteristics which were selected to meet many of the information requests of groups involved in planning and management on a national or regional scale. The primary objectives are (1) to account for the quantity and quality of water moving within and from the United States, (2) to depict areal variability, (3) to detect changes in stream quality, and (4) to lay the groundwork for future assessments of changes in stream quality.

Why is it needed?

Data of the type needed to determine longterm trends in the physical, chemical, and biological characteristics of the Nation's surface waters are relatively sparse. Wolman (1971) and Enviro Control (1972) have documented the problems associated with the assessment of changes in characteristics of surface waters. Wolman stated some fairly obvious problems involving statistical analysis of water-quality data; these include (1) the relatively short length of hydrologic records, (2) changes in location and frequency of observations, (3) the fact that comparisons of specific variables related to surface-water quality require systematic correlation with hydrologic behavior, and (4) the fact that knowledge of temporal variability of a specific constituent is often essential to the detection of a trend. Enviro Control's study verified the existence of the first problem, noting that of 70,000 stations in the Environmental Protection Agency's waterquality data-storage system, only 142 stations had 8 or more years of records of samples taken as frequently as at quarterly intervals.

Another problem is the unbalanced areal distribution of existing stations having adequate data for statistical analysis. Seventy percent of the stations used in the Enviro Control study were in the northwestern and northeastern United States. Steele and others (1974) noted a deficiency of stations in the northcentral and southeast United States. With continued operation of the series of stations established under NASQAN, a set of systematically collected baseline water-quality data will be available for nationwide studies involving transport of and changes in chemical constituents in surface waters.

NASQAN also will provide data needed to assess regional trends in order to evaluate the effectiveness of programs to control water quality. Such assessments will provide local and State officials with some of the information required to judge whether revisions in programs or new legislation is needed. However, the broad-scale information from NASQAN is not likely to be detailed enough to assess the effectiveness of pollution-control measures on a localized basis, as prescribed by Public Law 92–500. Enough insight should be supplied by the NASQAN data, however, to identify problem areas which require detailed monitoring of subbasins to evaluate the effects of land use and treatment measures.

How are NASQAN stations different from those that have operated for many years?

Stations in NASQAN are different in that they form a nationwide network in which station location was based upon hydrologic subdivision of river basins. This assures fairly uniform coverage of the entire United States, including Puerto Rico. NASQAN stations can be further characterized by the facts that a uniform operational design has been designated and station operations are committed to fulfiling the long-term objectives of detection of trends in water quality.

In the past, it has not been possible, on a nationwide basis, to determine areal differences and (or) changes in water quality over time because most data-collection programs have been operated to satisfy local objectives or objectives of special programs. Consequently, the stations have been operated for short periods. have been moved frequently, and have experienced variation in constituents sampled. However, it should be noted that many of the stations specified in NASQAN were previously operated for other programs and that some historical data exist for certain chemical constituents (primarily the common constituents) that will be useful in evaluation of trends. Unfortunately, most previous data-collection programs did not monitor the suites of constituents (nitrogen and phosphorus species, bacteria, minor elements, organic indicators, and biological parameters) that are of primary concern in establishing the suitability of water for a given use. The NASQAN program, as designed, will help to eliminate this deficiency as well as, in time, some of the problems which Wolman



Sampling from bridge.

(1971) discussed; notably, establishing the data base needed for nationwide evaluation of trends in quality of surface waters, and the need to account for the movement of materials in surface waters.

In addition, NASQAN will use other agencies' documentation of the man-induced changes that occur within basins to help explain changes that may occur in water quality. Water-quality data from adjacent nonnetwork stations and other environmental data will also be used in the analyses and interpretation of NASQAN data, particularly where changes in the waterquality characteristics of a river are detected.

Who began NASQAN?

NASQAN was established by the U.S. Department of Interior, Geological Survey. The initial need for a national network to provide water data for Federal agencies was recognized in Bureau of the Budget Circular A-67, dated August 28, 1964. The circular stated that the national network is the mechanism for providing data on the quantity and quality of surface water and ground water, including sedi-



Sampling by boat in a large river.

ment load of streams, and it assigns the responsibility for network operation to the Department of the Interior. The Office of Water Data Coordination of the U.S. Geological Survey was designated by the Secretary of the Interior to design and coordinate the National Water Data Network.

As a basis for network design activities, the Office of Water Data Coordination used the "level-of-information concept" to specify three categories (levels I, II, and III) into which data-collection activities can be classified (Langford and Davis, 1970). Level I data constitute a basic level of information nationwide and thus are suitable for broad national and regional planning and as a foundation for more detailed work in the future.

The need for a national river-quality accounting network to provide broad-scale accounting data (Office of Water Data Coordination level I information) was a primary component of a Departmental "thrust document" on river-quality monitoring in March 1972. On the basis of this impetus, NASQAN became an official activity of the Geological Survey. Data-collection activities were either initiated or upgraded at 50 stations in January 1973, and at another 50 stations in January 1974, to meet the design specifications for network operation. Appropriations during the 1975 fiscal year permitted expansion to at least one station in each unit of the level I accounting network, thereby placing the present level of network operations at 345 stations.

ACCOUNTING NETWORKS

What are the geographical units used in level I accounting?

Through the Water Resources Planning Act of 1965 (PL 89-80), the Water Resources Council was established to provide a framework that would facilitate coordination of water-resource and land-resource activities. In compliance with this charge, Water Resources Council (1970) divided the United States into waterplanning regions and subregions. The U.S. Geological Survey's Office of Water Data Coordination has carried the division one step further by specification of accounting units. Figure 1 outlines the existing 21 regions and 324 accounting units in the United States.

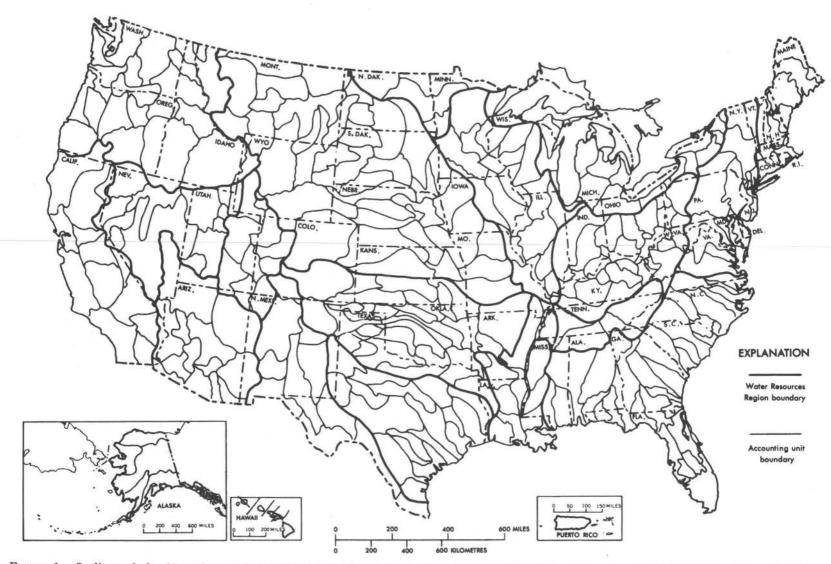


FIGURE 1.—Outlines of the 21 regions and the 324 accounting units as defined by the U.S. Water Resources Council and the Office of Water Data Coordination (U.S. Department of Interior, Geological Survey).

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The Office of Water Data Coordination is presently revising certain accounting-unit boundaries, using input from other Federal, State, and local agencies. Revisions receive approval from the Water Resources Council before publication of base maps (Hydrologic Unit Map —1974, U.S. Geological Survey, issued by State) bearing the hydrologic subdivisions.

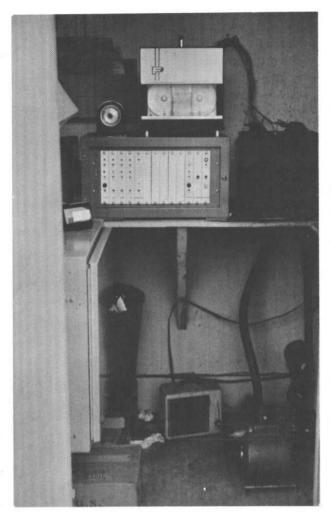
Accounting units in New England are shown at a larger scale (1:5,000,000) in figure 2 to illustrate in greater detail than in figure 1 how stream drainage patterns influence selection of station locations. Figure 2 shows that accounting units along coastlines are drained by numerous streams flowing into the sea; similar situations exist along the shores of the Great Lakes. In inland accounting units, however, most of the outflow drains by single streams.

How are NASQAN stations located within accounting units?

Guidelines for level I accounting that have been established specify that data will measure water discharge and water quality for approximately 90 percent of the surface water leaving an accounting unit. This means that most NASQAN stations will measure or account for discharge and quality at a stream station near the downstream end of each accounting unit. Obvious exceptions must be made for units that discharge to the oceans or to the Great Lakes, across international boundaries, or into closed basins. Current revisions of accounting-unit boundaries have been reviewed and apparently have little affect on the locations of stations specified in 1972 for inclusion in the network.

How are stations in coastal units selected?

As figure 2 shows, some units stretch along coastlines (oceans or the Great Lakes) where numerous stations would be needed to sample 90 percent of the flow. This problem has been recognized in the design of NASQAN, and special criteria have been established for selecting station locations within coastal accounting units. NASQAN stations have been located to provide a sampling of from 30 to 50 percent of the water flowing from the coastal accounting unit. Such sampling is possible because adjacent drainage basins usually have similar physio-



Automatic continuous monitor.

graphic and hydrologic characteristics. Therefore, it may reasonably be inferred that waterquality data from properly selected stations may be extrapolated to represent the remainder of the discharge. In choosing sites for stations, short-term reconnaissance studies are needed to confirm similarity of waters. It is also necessary to recognize and evaluate obvious differences in such parameters as population patterns, geology, or industrial development.

How are sites selected for stations in closed basins?

Accounting units with only interior drainage have been considered on a case-by-case basis in the selection of NASQAN station locations. The principal policy has been to select sites on streams that represent as much of the drainage area of or flow within the accounting unit as possible.

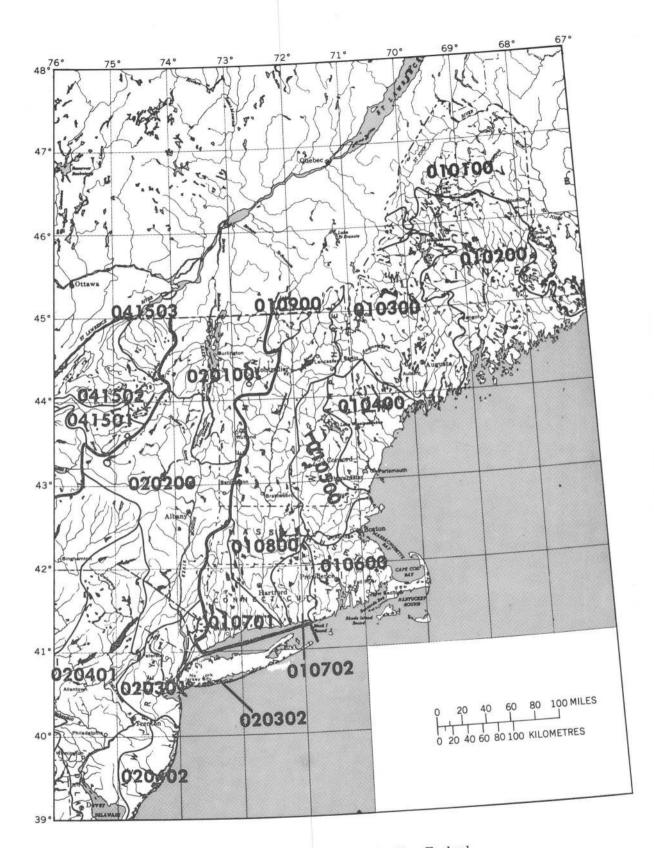
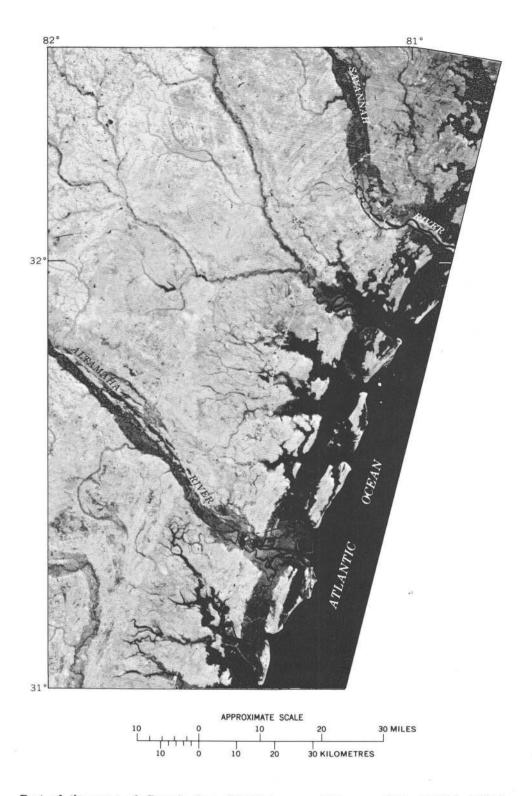


FIGURE 2.-Accounting units in New England.



Part of the coast of Georgia from ERTS imagery, February 1974. (NASA ERTS $\rm E{-}1568{-}15284, \ band \ 7.)$

OPERATION

How many stations are in NASQAN and where are they?

As of January 1, 1975, 345 NASQAN stations were being operated. As stated earlier, the plan used in selecting locations of existing and future stations calls for most of them to be near the points of outflow from accounting units. Locations of the current 345 stations are shown in figure 3. Details of station location, including the names of towns or other cultural features near the stations, and latitudes and longitudes are given in table 1 (see p. 15).

Plans call for NASQAN to reach its final design size of 525 stations by October 1976. Figure 4 summarizes the network's past growth as well as the projected expansion to full implementation.

What water-quality characteristics are measured at NASQAN stations?

The following list summarizes the characteristics measured at network stations and the minimum frequencies of measurements under present network design.

Characteristics measured at NASQAN stations

[Frequencies: C, continuous; D, daily; M, monthly; Q, quarterly]

Field determinations:	Frequency
Water temperature	¹ C. D. or M
Specific conductance	
pH	
Discharge	С
Coliform, fecal	м
Streptococci, fecal	м
Common constituents (dissolved) ² :	³ M or Q
(Bicarbonate, carbonate, total hardness,	
non-carbonate hardness, calcium,	
magnesium, fluoride, sodium,	
potassium, dissolved solids, silica,	
turbidity, chloride, and sulfate).	
Major nutrients:	
Phosphorus, total ⁴ as P	м
Nitrite plus nitrate, total as N	\mathbf{M}
Nitrogen, total Kjeldahl as N	M
Trace elements (total and dissolved):	Q
(Arsenic, cadmium, chromium, cobalt,	
copper, iron, lead, manganese, mer-	
cury, selenium, and zinc).	
Organics and biological:	
Organic carbon, total	Q
Phytoplankton, total, cells/ml	M
Phytoplankton, identification of 3	
co-dominants	M

Characteristics measured at NASQAN stations—Con. Organics and biological—Continued

of total M	
)
Periphyton, biomass, dry weight $g/m^2 = Q$	
Periphyton, biomass, ash weight $g/m^2 - Q$	ļ
Periphyton, chlorophyll a Q	ļ
Periphyton, chlorophyll b Q	ļ
Suspended sediment:	
Suspended sediment concentration M	
Percent finer than 0.062-mm sieve	
diameter M	i

¹ Continuous or daily depending upon whether the station is equipped with a monitor or whether daily observations are made. Monthly measurements made at stations where a long-term record is available.

 $^2\,\rm Dissolved$ constituents in water are those remaining after filtering samples through 0.45-micrometre membrane filters.

³ Quarterly or monthly, depending upon whether relationships have been established between conductance and concentrations of various common constituents.

⁴ Total concentrations are those determined by analyses of unfiltered samples. They include both dissolved and suspended materials.

In addition to the measurements shown above, determinations of pesticide residues and radiochemical constituents are made at selected stations. These stations can be viewed as subnetworks of NASQAN.

Will changes be made in the suite of characteristics measured at NASQAN stations?

Yes, but in a manner that conforms with the stated objectives of the network. A continual examination will be made for correlations among measured characteristics. If correlations are established so that changes in one characteristic can be used to estimate changes in others, certain measurements may be discontinued. Also, some measurements may be added as water-quality characteristics change in importance. Consideration presently is being given to including two 24-hour dissolved oxygen profiles each year, to be conducted during critical periods; to monthly determination of ammonia nitrogen; and to an increased frequency of determination of total organic carbon, from quarterly to monthly. Any such adjustments in the operational design of the network will be made to coincide with the beginning of a water year (October 1).

Who collects data at NASQAN stations?

Most of the NASQAN data are and will be collected by the Geological Survey. However,

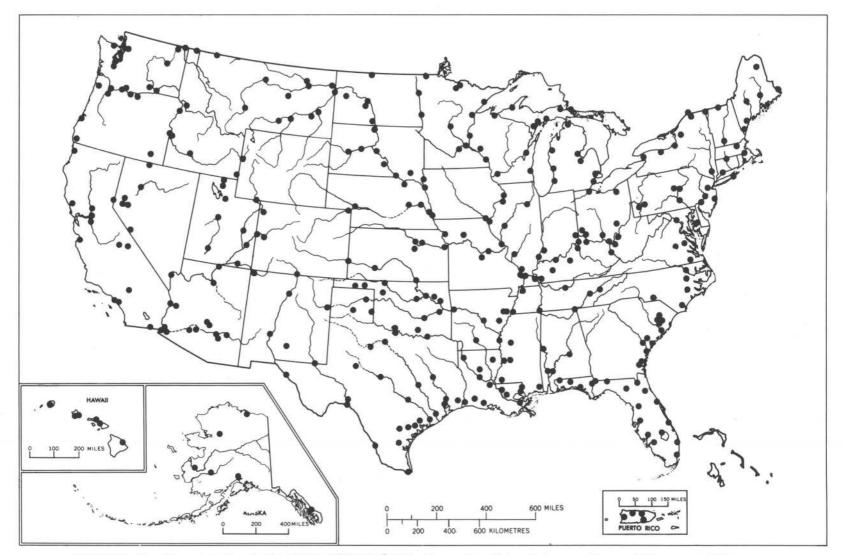


FIGURE 3.-Locations of stations in the National Stream Quality Accounting Network in operation as of January 1, 1975.

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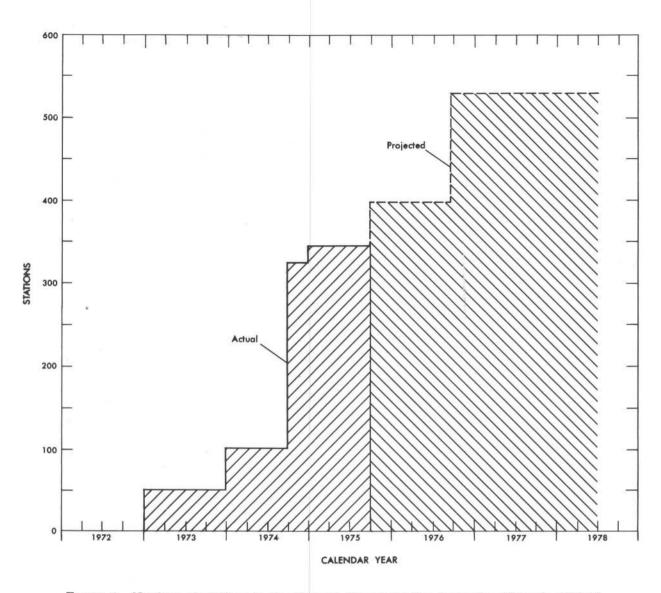


FIGURE 4.-Numbers of stations in the National Stream Quality Accounting Network, 1973-78.

some of the stations are operated partly by other Federal agencies, such as the Environmental Protection Agency and the U.S. Army Corps of Engineers, and some are operated partly by State and local organizations. For those stations operated by the Geological Survey, some are paid for partly by monies from other Federal agencies, from State and local cooperators, and from other more specialized Federal data-collection programs of the Geological Survey. Because of local interests or needs, it is not uncommon to have several different sources interested in and paying for total operations of a single station.

How long will stations be operated?

Indefinitely, as required by one of the network objectives—to assess changes in water quality with time. However, some changes in operating practices will be made, as explained previously in answer to a question regarding changes in the suite of characteristics. Such changes will be made only after it has been determined that the proposed modification, presumably a change in frequency of sampling, will not affect the fulfillment of network objectives.



Automatic analyzer in Central Laboratory, Doraville, Ga.

What will be done with the data?

Present plans call for data collected under the auspices of NASQAN to be published in three types of publications.

First, all data will be published in the annual Geological Survey basic-data reports on a State-by-State basis. Copies of these reports can be obtained from Geological Survey district offices or from Geological Survey headquarters, Reston, Virginia 22092. Users of STORET, the computerized data base of the Environmental Protection Agency, can retrieve NASQAN data by using Geological Survey station numbers (see table 1).

The second type of report is an annual summary report depicting the Nation's surfacewater quality. This report, the prototype of which should be completed by August 1975, will use tabulations of the yearly range in concentrations of specific constituents, statistical summaries, and graphical presentations.

The third type of report, which will be more analytical, will deal with the changes (or lack thereof) in water quality. Preliminary work by the Geological Survey (Steele and others, 1974) employed an approach which may be used to evaluate trends in water quality. This type of report will be prepared less frequently (every 3 to 5 years).

NASQAN interpretive reports (the second and third types) will be published in forms suitable for use by hydrologists as well as nontechnical persons.

What will be the principal problems in the interpretation of the data?

Undoubtedly there will be several problems in data interpretation, but two will probably be hardest to resolve: (1) Differentiating yearto-year variability (wet-year, dry-year effects) from the long-term trends and from the real areal differences in variables significantly affected by flow conditions, and (2) adjusting for the effects of streamflow regulation (particularly by reservoirs) or streamflow diversions on the water-quality conditions.

To resolve the first problem, several statistical and other analytical techniques are being evaluated to discover their utility in determining significant long-term trends from the data. For some water-quality characteristics, 5 or more years of data may be needed before adequate bases exist for detecting longterm trends.

Regarding the second problem, reservoirs are particularly significant because they alter the pattern of streamflow during the year and also influence many water-quality characteristics. Seasonal streamflow patterns are affected by patterns of reservoir release, but the annual volumes of flow usually do not change, except for evaporation losses. The quality of water released from reservoirs differs from that of inflow, in terms of temperature, dissolved solids, sediment, nutrients, dissolved oxygen, and other characteristics. There is much literature describing the processes that take place in reservoirs, but quantitative modeling is not far enough advanced to be helpful in determining the precise degree to which the reservoirs will affect water quality at NASQAN stations.

What is the policy regarding NASQAN stations near reservoirs?

The lower boundaries of many of the accounting units used to establish the hydrologic design of NASQAN cross stream channels at or just below dams. Because an objective of the network operation is to account for the quantity and quality of water actually flowing from one accounting unit into another, the placement of sampling stations below reservoirs is necessary. On the other hand, NASQAN's goal of interpreting changes in water quantity and quality in terms of cultural changes in the basin is not fully served by a station located below a reservoir because the effects of the reservoir will mask most other influences. Therefore, operation of NASQAN will involve evaluation of the effects of some reservoirs by placing secondary stations above several large reservoirs. These stations are referred to as secondary because they will be used to collect a more limited suite of data and probably will operate for a limited number of years.

SUMMARY

NASQAN is designed to describe the water quality of the Nation's streams and rivers on a systematic and continuing basis. NASQAN station operation supplements the ongoing activities of the U.S. Geological Survey and other agencies. Whereas other operations meet local and short-term needs, NASQAN provides for nationwide quantitative descriptions of the physical, chemical, and biological characteristics of streams. There presently are 345 stations in the network, and network design allows for an ultimate size of 525 stations.

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- Wolman, M. G., 1971, The Nation's rivers: Science, v. 174, no. 4012, p. 905-918.

TABLE 1

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		• • 1		
USGS	STATION NAME	ST ¹		LONGI-
STAT.NO.			TUDE	TUDE
			DEG/	DEG/
			MIN	MIN
02420000	ALABAMA RIVER NEAR MONTGOMERY	ΔL	3224	08624
	ALABAMA RIVER AT CLAIBORNE		3133	08731
	TOMBIGBEE RIVER AT GAINESVILLE		3249	08809
	TOMBIGBEE R. AT COFFEEVILLE L&D NR. CFVL			08808
02409102	TOMDIGDEE Nº AT COPPERAILLE LOU MAS CAAL	AL	2142	00000
15024900	STIKINE RIVER NEAR WRANGELL	A 14	5642	13207
15024000	STIKINE RIVER NEAR WRANGELL SUSITNA RIVER AT SUSITNA STATION		6132	15033
	KUSKOKWIM RIVER AT CROOKED CREEK			15807
	YUKON RIVER AT PILOT STATION		6156	16253
15744500	KOBUK RIVER NEAR KIANA Kuparuk river near deadhorse		6658	16007
15896000	KUPARUK RIVER NEAR DEADHORSE	AK	7017	14858
09380000	COLORADO RIVER AT LEES FERRY	AZ		11135
	LITTLE COLORADO RIVER AT CAMERON		3553	11125
	COLORADO RIVER BELOW HOOVER DAM		3601	11444
09426600	BILL WILLIAMS R BL MINERAL WASH NR PLANE	TAZ	3416	11402
	COLORADO RIVER ABOVE IMPERIAL DAM	AZ	3253	11428
09466500	GILA RIVER AT CALVA San Pedro River at Winkelman Gila River at Kelvin	AZ	3311	11031
09473500	SAN PEDRO RIVER AT WINKELMAN		3259	11049
09474000	GILA RIVER AT KELVIN		3306	11059
00480000	GILA RIVER AT KELVIN SANTA CRUZ RIVER NEAR LAVËEN			11210
09409000	SALT RIVER BELOW STEWART MT DAM			11132
				11138
	VERDE RIVER BELOW BARTLETT DAM			
	GILA RIVER ABOVE DIV AT GILLESPIE DAM			11246
	GILA RIVER NEAR MOUTH NEAR YUMA		3243	11433
09522000	COLORADO RIVER AT N.INT.BURY.AB MORELOS	DAZ	3243	11443
0703000			25.00	
07067000	CT EDINATO DIVER NEIO DIOKIN		3508	09004
07047800	ST FRANCIS RIVER NEAR PARKIN		3516	09034
07047900	ST FRANCIS RIVER NEAR PARKIN ST FRANCIS BAY AT RIVERFRONT WHITE RIVER AT CLARENDON		3516	09041
			3441	09119
07250550	ARKANSAS RIVER AT DAM 13 NEAR VAN BUREN		3521	09418
07263620	ARKANSAS RIVER AT L AND D 6 LIT ROCK	AR	3440	09209
07265450	MISSISSIPPI RIVER NEAR ARKANSAS CITY	AR	3334	09115
07362000	OUACHITA RIVER AT CAMDEN	AR	3336	09249
	COLORADO RIVER AQUED. NR SAN JACINTO		3349	11658
	NEW RIVER AT INT. BDRY. NR. CALEXICO		3240	11530
10277400	OWENS RIVER BLW TINEMAHA D. NR BIG PINE	CA	3703	11813
10261500	MOJAVE R. AT LOW NARROWS NR VICTORVILLE		3434	11719
	SANTA ANA RIVER BELOW PRADO DAM		3353	11739
	LOS ANGELES K.AT WIL.ST.BRDG.AT LONG BCH			
	SALINAS RIVER NEAR SPRECKELS		3638	
	FRAINT-KERN CANAL AT FRAINT		3700	
	SAN JOAQUIN RIVER NEAR VERNALIS		3741	12116
¹ See footnote at		U A	3141	10110
a				

TABLE 1.—Stations in the National Stream Quality Accounting Network on January 1, 1975-Continued

USGS STAT.NO.	STATION NAME	ST	LATI- TUCE DEG/ MIN	LONGI- TUDE DEG/ MIN
11447650 11467000	MOKELUMNE RIVER AT WOODBRIUGE Sacramento River at Freeport Russian River Near Guerneville Klamath River Near Klamath	CA CA	381.0 3827 3820 4121	12118 12130 12256 12358
07137500 08251500 09152500 09163530 09251000	SOUTH PLATTE RIVER AT JULESBURG ARKANSAS RIVER NR COOLIDGE (KS) RIO GRANDE NEAR LOBATOS GUNNISON RIVER NEAR GRAND JUNCTION COLORADO RIVER BLW. COLO-UTAH STATE LINE YAMPA RIVER NEAR MAYBELL LITTLE SNAKE RIVER NEAR LILY	C0 C0 C0 C0 C0	4059 38(2 37(5 3859 39(5 4020 4023	10215 10201 10545 10827 10906 10802 10825
01205500	CONNECTICUT RIVER AT THOMPSONVILLE HOUSATONIC RIVER AT STEVENSON	CT	4159 4123	07236 07310
02244450 02248000 02253000 02273000 02279000 02288600 02292400 02292400 02296750 02303000 02313000 02313000 02320500 02329000 02358000 02359000	ST MARYS RIVER NEAR MACCLENNY ST JOHNS RIVER AT PALATKA SPRUCE CREEK NEAR SAMSULA MAIN CANAL AT VERO BEACH KISSIMMEE RIVER AT S65E NEAR OKEECHOBEE WEST PALM BEACH CANAL AT WEST PALM BEACH MIAMI CANAL AT NW 36TH STREET, MIAMI CALOOSAHATCHEE CNL AT ORTONA L.NR LABELLI PEACE RIVER AT ARCADIA HILLSBOROUGH RIVER NEAR ZEPHYRHILLS WITHLACOOCHEE RIVER-NEAR HOLDER SUWANNEE RIVER AT BRANFORD OCHLOCKONEE RIVER NEAR HAVANA APALACHICOLA RIVER AT CHATTAHOOCHEE CHIPOLA RIVER NEAR ALTHA CHOCTAWHATCHEE RIVER NEAR BRUCE	FFFFFFFFFFFFFFFFFFFFFFFFFFFF	2548	08205 08138 08103 08024 08058 08004 08016 08105 08153 08214 08221 08256 08423 08452 08510 08554
02368000 02375500	YELLOW RIVER AT MILLIGAN ESCAMBIA RIVER NEAR CENTURY OGEECHEE RIVER NEAR EDEN	FL FL	3027 3045 3057 3211	
02226000 02228000	ALTAMAHA RIVER AT DOCTORTOWN Satilla River at Atkinson	GA Ga	3139 3113	08149 08152
16213000 16229300 16400000 16618000	WAIMEA RIVER AT WAIMEA WAIKELE STREAM AT WAIPAHU KALIHI STREAM AT KALIHI HALAWA STREAM NEAR HALAWA KAHAKULOA STREAM NEAR HONOKOHAU WAILUKU RIVER AT PIIHONUA at end of table.	HI HI HI HI	2159 2123 2120 2110 2059 1943	15753 15646 15633

TABLE 1.-Stations in the National Stream Quality Accounting Network on January 1, 1975-Continued

USGS STAT.NO.	STATION NAME	ST	LATI- TUDE DEG/ MIN	LONGI- TUDE DEG/ MIN
13154500 13213000 13213100 13290450	KOOTENAI RIVER NEAR COPELAND SNAKE RIVER AT KING HILL BOISE RIVER NEAR PARMA SNAKE RIVER AT NYSSA (C SNAKE RIVER AT HELLS CANYON DAM (C SALMON RIVER AT WHITE BIRD	ID ID (R) ID (R) ID (R) ID	4855 4300 4347 4353 4515 4545	11625 11512 11659 11659 11642 11619
05585500 05594100	ROCK RIVER NEAR JOSLIN ILLINOIS RIVER AT MARSEILLES ILLINOIS RIVER AT MEREDOSIA KASKASKIA RIVER NEAR VENDY STATION BIG MUDDY RIVER AT MURPHYSHORO	IL IL	4143 4120 3949 3827 3745	09011 08843 09034 08938 08921
03374100	WHITEWATER RIVER AT BROOKVILLE WHITE RIVER NEAR HAZELTON WABASH RIVER AT NEW HARMONY	IN	3924 3829 3808	08501 08733 08756
05474500 06486000	MISSISSIPPI HIVER AT CLINTON MISSISSIPPI HIVER AT KEOKUK MISSOURI RIVER AT SIOUX CITY MISSOURI RIVER AT NEBRASKA CITY (N	IA IA	4147 4024 4229 4041	09015 09122 09625 09551
06877600 06887000 06892350 07139500	REPUBLICAN RIVER AT CLAY CENTER SMOKY HILL RIVER AT ENTERPHISE BIG BLUE RIVER NEAR MANHATTAN KANSAS RIVER AT DESOTO ARKANSAS RIVER AT DODGE CITY ARKANSAS RIVER AT ARKANSAS CITY	KS KS KS	3921 3854 3914 3859 3745 3703	09708 09707 09634 09458 10001 09704
03216600 03254000 03277200 03290500 03301630 03303280	BIG SANDY RIVER AT LOUISA OHIO RIVER AT GREENUP DAM LICKING RIVER AT BUTLER OHIO R. AT MARKLAND DAM NEAR WARSAW KENTUCKY RIVER AT LOCK 2 AT LOCKPORT ROLLING FORK NEAR LEHANON JUNCTION OHIO RIVER AT CANNELTON DAM	KY KY KY KY KY	3810 3839 3847 3846 3826 3749 3754	08238 08252 08422 08458 08458 08545 08545
03438220 03609750	GREEN RIVER NEAR BEECH GROVE CUMBERLAND RIVER NEAR GRAND RIVERS TENNESSEE RIVER AT HWY 60 NEAR PADUCAH OHIO RIVER AT L&D 53 NEAR GRAND CHAIN(КҮ I КҮ	3732 3701 3702 3712	08716 08813 08832 08902
02492000 07344410 07355500	PEARL RIVER NEAR BOGALUSA BOQUE CHITTO NEAR BUSH RED RIVER ABOVE SHREVEPORT RED RIVER AT ALEXANDRIA OUACHITA RIVER AT COLUMBIA	LA LA LA	3048 3038 3233 3119 3206	08949 08954 09346 09227 09204

USGS STAT.NO.	STATION NAME	ST ¹	LATI- TUDE DEG/ MIN	LONGI- TUDE DEG/ MIN
07373420 07374508 07378510 07381490 07385700	TENSAS RIVER AT TEMDAL MISSISSIPPI RIVER NEAR ST FRANCISVILLE MISSISSIPPI RIVER AT NEW ORLEANS AMITE RIVER AT 4-H CAMP NR DENHAM SPGS ATCHAFALAYA RIVER AT SIMMESPORT BAYOU TECHE AT KEYST L&D NR ST MARTINSVL CALCASIEU RIVER NEAR LAKE CHARLES		3226 3046 2957 3026 3059 3004 3018	09122 09124 09008 09058 09148 09150 09311
01021050 01034500 01046500 01059000	ARUOSTUOK RIVER AT CARIBOU ST. CROIX RIVER AT MILLTOWN PENOBSCOT RIVER AT WEST ENFIELD KENNEREC RIVER AT BINGHAM ANDROSCOGGIN RIVER NEAR AUBURN SACO RIVER AT CORNISH	ME ME ME ME	4651 4510 4514 4503 4404 4348	06800 06718 06839 06953 07013 07047
01645500	CHOPTANK RIVER NEAR GREENSBORD Potomac River at great falls	MD	3900 3900	07547 07715
	MERRIMACK RIVER ABOVE LOWELL Charles river at charles river village		4238 4215	07122 07116
04045500 04045580 04057005 04059000 04059500 04108690 04122030 04126520 04132052 04132052 04142000 04157000 04165500 04165700	ONTONAGON RIVER NEAR ROCKLAND TAHQUAMENON R. NR TAHQUAMENON PARADISE ST MARYS RIVER ABOVE SAULT STE MARIE MANISTIQUE RIVER AT MANISTIQUE ESCANABA RIVER AT CORNELL FORD RIVER NEAR HYDE KALAMAZOO RIVER AT SAUGATUCK MUSKEGON RIVER AT BRIDGETON MANISTEE RIVER AT BRIDGETON MANISTEE RIVER AT CHEBOYGAN RIFLE RIVER NEAR STERLING SAGINAW RIVER AT SAGINAW CLINTON RIVER AT MT. CLEMENS DETRUIT RIVER AT DETROIT	MI MI MI MI MI MI MI MI	4643 4629 4557 4555 4545 4239 4319 4415 4539 4404 4325 4236 4221	08912 08516 08425 08615 08713 08712 08612 08602 08619 08428 08401 08358 08255 08258
04024000 05112000 05131500 05132000 05267000 05331000 05378500	BAPTISM RIVER NEAR BEAVER BAY ST LOUIS RIVER AT SCANLON ROSEAU RIVER NEAR CARIBOU LITTLE FORK RIVER AT LITTLEFORK BIG FORK RIVER AT BIG FALLS MISSISSIPPI RIVER NEAR ROYALTON MISSISSIPPI RIVER AT ST PAUL MISSISSIPPI RIVER AT WINONA MINNESOTA RIVER NEAR JORDAN	MN MN MN MN MN MN	4720 4642 4859 4824 4812 4552 4457 4403 4442	09112 09225 09628 09334 09348 09348 09422 09305 09138 09338

¹ See footnote at end of table.

TABLE 1.-Stations in the National Stream Quality Accounting Network on January 1, 1975-Continued

USGS STAT.NO.	STATION NAME	ST	LATI- TUDE DEG/ MIN	LONGI- TUDE DEG/ MIN
07287000 07289000 07290000	PASCAGOULA RIVER NEAR BENNDALE YAZOO RIVER AT GREENWOOD MISSISSIPPI RIVER AT VICKSBURG BIG BLACK RIVER NEAR ROVINA HOMOCHITTO RIVER AT ROSETTA	MS MS MS	3053 3331 3219 3221 3119	(8846 (9011 (9054 (9042 (9106
05587550 06818000 06902000 06926500 06934500	DES MOINES RIVER AT ST FRANCISVILLE MISSISSIPPI RIVER BELOW ALTON (IL) MISSOURI RIVER AT ST JOSEPH GRAND RIVER NEAR SUMNER OSAGE RIVER NEAR ST. THOMAS MISSOURI RIVER AT HERMAN MISSISSIPPI RIVER AT THEBES (IL)	M0 M0 M0 M0	4028 3852 3948 3938 3820 3843 3713	(9134 (9008 (9453 (9316 (9214 (9126 (8928
06109500 06130500 06132000 06174500 06185500 06214500 06294700 06308500 06326500 06329500	MISSOURI RIVER AT TOSTON MISSOURI RIVER AT VIRGELLE MUSSELSHELL RIVER AT MOSBY MISSOURI RIVER BELOW FT PECK DAM MILK RIVER AT NASHUA MISSOURI RIVER NEAR CULBERTSON YELLOWSTONE RIVER AT BILLINGS BIGHORN RIVER AT BIGHORN TONGUE RIVER AT MILES CITY POWDER RIVER NEAR LOCATE YELLOWSTONE RIVER NEAR SIDNEY N.F. FLATHEAD RIVER AT FLATHEAD, B.C.	MT MT MT MT MT MT MT	4609 4800 4700 4803 4808 4807 4548 4069 4622 4627 4741 4900	11125 11015 10753 10621 10622 10428 10828 10728 10548 10519 10409 11428
06686000 06792499 06796000 06805500 10249900 10301500 10312000 10335000 10346000 10351700	NIOBRARA RIVER NEAR VERDEL NORTH PLATTE RIVER AT LISCO LOUP RIVER ON AT DIV NR GENOA PLATTE RIVER AT NORTH BEND PLATTE RIVER NEAR LOUISVILLE CHIATOVICH CREEK NEAR DYER WALKER RIVER NEAR WABUSKA CARSON RIVER NEAR FORT CHURCHILL HUMBOLDT RIVER NEAR RYE PATCH TRUCKEE RIVER AT FARAD (CA) TRUCKEE RIVER NEAR NIXON MC DERMITT CREEK NEAR MC DERMITT	NB NB NB NB NV NV NV NV NV	4244 4130 4124 4127 4101 3750 3909 3918 4028 3926 3947 4158	11920
01404100 01408500	CONNECTICUT RIVER AT NORTH WALPOLE RARITAN RIVER NEAR SOUTH BOUND BROOK TOMS RIVER NEAR TOMS RIVER DELAWARE RIVER AT TRENTON end of table.	NJ LA	4308 4031 3959 4013	07226 07432 07413 07447

TABLE 1.-Stations in the National Stream Quality Accounting Network on January 1, 1975-Continued

		,		
USGS	STATION NAME	ST ¹	LATI-	LONGI-
STAT.NO.			TUDE	
			DEG/	DEG/
			0207	0207
47337144	CANADIAN DINED ADAME AN TEN CRATE INF			10000
	CANADIAN RIVER ABOVE NM-TEX STATELINE			10303
08313000	RIO GRANDE AT OTOWI BRIDGE NR S.ILDEFONSO			10608
08358300	RIU GRANDE CNV CH AT SAN MARCIAL		3341	10700
08407500	PECOS RIVER AT RED BLUFF		3204	10402
08481500	TULAROSA RIVER NEAR BENT	NM	3309	10554
09368000	RIO GRANDE CNV CH AT SAN MARCIAL PECOS RIVER AT RED BLUFF TULAROSA RIVER NEAR BENT SAN JUAN RIVER AT SHIPROCK	NM	3648	10844
01304500	PECONIC RIVER AT RIVERHEAD HUDSON RIVER NEAR POUGHKEEPSIE NIAGARA RIVER AT FORT NIAGARA	NY	4100	07241
01372043	HUDSON RIVER NEAR POUGHKEEPSTE	NY	4143	07356
04219440	NTAGADA DIVED AT FODT NTAGADA	NV	4316	07904
0453330040	GENESEE R AT CHARLOTTE DOCKS AT ROCHESTER			07737
04249000	OSWEGO RIVER AT LOCK 7, OSWEGO Black River at Watertown		4327	07630
			4359	07556
	ST LAWRENCE R AT CORNWALL ONT NR MASSENA			07448
04269000	ST REGIS RIVER AT BRASHER CENTER	NY	4452	07447
04295000	RICHELIEU RIVER AT ROUSES POINT	NY	4500	07322
02081000	ROANOKE RIVER NEAR SCOTLAND NECK	NC	3612	07723
02083500	TAR RIVER AT TARBORD		3554	07732
02089500	TAR RIVER AT TARBORO NEUSE RIVER AT KINSTON CAPE FEAR RIVER AT LOCK 1 NEAR KELLY		3515	07735
02007500	CAPE FEAR RIVER AT LOCK 1 NEAR KELLY		3424	07818
	CALE LEAN NATEN AL ECON A NEAN NEEDE		-	
05159000	PEE DEE RIVER NEAR ROCKINGHAM	NC	3457	07952
05054000				00/17
	RED RIVER OF THE NORTH BELOW FARGO		4656	09647
	RED RIVER OF THE NORTH AT USLO (MN)		4812	09708
	SOURIS RIVER NEAR WESTHOPE (OUTFLOW)		4900	10057
06337000	LITTLE MISSOURI RIVER NEAR WATFORD CITY	NÐ	4735	10315
06338490	LITTLE MISSOURI RIVER NEAR WATFORD CITY MISSOURI RIVER AT GARRISON DAM KNIFE RIVER AT HAZEN	ND	4730	10126
06340500	KNIFE RIVER AT HAZEN	ND	4717	10137
06354000	KNIFE RIVER AT HAZEN . Cannon River near breien		4623	10056
				•••••
03150000	MUSKINGUN RIVER AT MCCONNELSVILLE	OH	3939	08151
03234500	SCIOTO RIVER AT HIGBY	ÔН		
	LITTLE MIAMI RIVER AT MILFORD		3910	08418
	GREAT MIAMI RIVER AT NEW BALTIMORE		3916	08440
	MAUMEE RIVER AT WATERVILLE		4130	
04208000	CUYAHOGA RIVER AT INDEPENDENCE	OH	4124	08138
	CIMARRON RIVER NEAR BUFFALO		3655	09924
07161000	CIMARRON RIVER AT PERKINS	ΟK	3558	09702
07164400	ARKANSAS RIVER AT SD SPNG NEAR TUL	OK	3607	09607
	NEWT GRAHAM L&D (VERDIGRIS R) NEAR INOLA			09532
	NEOSHO R BL FT GIBSON RES NR FT GIBSON		3551	09514
	CANADIAN RIVER AT CALVIN		3459	
	N CANADIAN RIVER NEAR GUYMON		3643	
	NORTH CANADIAN (BEAVER) RIVER AT BEAVER	UN	3649	10031
¹ See footnote at	t end of table.			

TABLE 1.—Stations in the National Stream Quality Accounting Network on January 1, 1975-Continued

USGS Stat.no.	STATION NAME	ST	LATI- TUDE DEG/ MIN	LONGI- TUDE CEG/ MIN
07245000 07305000	NORTH CANADIAN RIVER AT WOODWARD Canadian River Near Whitefield NF Red River Near Headrick Washita River Near Durwood	0K OK	3626 3516 3438 3414	09917 09514 09906 09659
14048000 14103000 14128910 14207500 14211720 14301000 14321000	DONNER UND BLITZEN R. NEAR FRENCHGLEN JOHN DAY RIVER AT MCDONALU FERRY DESCHUTES RIVER AT MOODY NEAR RIGGS COLUMBIA RIVER AT WARRENDALE TUALATIN RIVER AT WEST LINN WILLAMETTE RIVER AT PORTLAND NEHALEM RIVER NEAR FOSS UMPQUA RIVER NEAR ELKTON ROGUE RIVER NEAR AGNESS	OR OR OR OR OR OR	4247 4535 4537 4521 4521 4531 4542 4335 4235	11852 12024 12054 12202 12240 12240 12345 12333 12404
01540500 01553500 01570500 03049625	SCHUYLKILL RIVER AT PHILADELPHIA SUSQUEHANNA RIVER AT DANVILLE W.BR. SUSQUEHANNA RIVER AT LEWISBURG SUSQUEHANNA RIVER AT HARRISBURG ALLEGHENY RIVER AT NEW KENSINGTON MONONGAHELA RIVER AT BRADDOCK	PA PA PA PA	4000 4057 4058 4015 4034 4024	07512 07637 07653 07653 07946 07953
50046000 50092000	RIO GRANDE DE MANATI RIO DE LA PLATA AT TOA ALTA RIO GRANDE DE PATILLAS NEAR PATILLAS RIO GRANDE DE ANASCO NEAR SAN SEBASTIAN	PR PR	1826 1824 1802 1817	06632 06615 06602 06703
02136000 02170500 02171500 02175000 02176500	LYNCHES RIVER AT EFFINGHAM BLACK RIVER AT KINGSTREE LAKE MARION MOULTRIE CANAL NR PINEVILLE SANTEE RIVER NEAR PINEVILLE EDISIO RIVER NEAR GIVHANS COOSAWHATCHIE RIVER NEAR HAMPTON SAVANNAH RIVER NEAR CLYO (GA)	SC SC SC SC SC	3403 3340 3323 3327 3302 3250 3232	07945 07950 08008 08009 08024 08108 08116
06438000 06439300 06440000 06452000 06453000 06478500	GRAND RIVER AT LITTLE EAGLE BELLE FOURCHE RIVER NEAR ELM SPRINGS CHEYENNE RIVER AT CHERRY CREEK MISSOURI RIVER AT PIERRE WHITE RIVER NEAR OACOMA MISSOURI RIVER BELOW FT RANDALL DAM JAMES RIVER NEAR SCOTLAND BIG SIOUX RIVER AT AKRON (IA)	SD SD SD SD SD SD	4436 4422 4345 4304 4311	10049 10234 10129 10022 (9933 (9833 (9833 (9738 (9634
	CUMBERLAND RIVER AT CARTHAGE FRENCH BROAD RIVER NEAR KNÛXVILLE end of table.		3615 3558	(8557 (8346

TABLE 1.-Stations in the National Stream Quality Accounting Network on January 1, 1975-Continued

USGS STAT.NO.	STATION NAME	ST ¹	LATI- TUDE DEG/ MIN	LONGI- TUDE DEG/ MIN
03571850 03593005	TENNESSEE R. AT WATTS BAR DAM (TAILWATER) TENNESSEE RIVER AT SOUTH PITTSBURG TENNESSEE R. AT PICKWICK LAND. D.(L.LOCK) OBION RIVER AT OBION	TN TN	3501	08447 08542 08815 08912
07297910 07300000 07308500 07331600 08030500 08041000 08065350 08066500 08066500	CANADIAN RIVER NEAR CANADIAN PDTF RED RIVER NEAR WAYSIDE TEXAS SALT FORK RED RIVER NEAR WELLINGTON RED RIVER NEAR BURKBURNETT RED RIVER AT DENISON DAM NEAR DENISON SABINE RIVER NEAR RULIFF NECHES RIVER AT EVADALE TRINITY RIVER NEAR CROCKETT TRINITY RIVER AT ROMAYOR WEST FORK SAN JACINTO RIVER NEAR CONROE SALT FORK BRAZOS RIVER NEAR ASPERMONT	TX TX TX TX TX TX TX TX TX	3556 3450 3457 3406 3349 3018 3021 3120 3026 3015 3320	10022 10125 10013 09832 09634 09345 09406 09539 09451 09527 10014
08082500 08098290 08116650 08123800 08136700 08158000 08162000 08164500 08176500	BRAZOS RIVER AT SEYMOUR BRAZOS RIVER NEAR HIGHBANK BRAZOS RIVER AT ROSHARON BEALS CREEK NEAR WESTBROOK COLORADO RIVER NEAR STACY COLORADO RIVER AT AUSTIN COLORADO RIVER AT WHARTON NAVIDAD RIVER NEAR GANADO GUADALUPE RIVER AT VICTORIA	TX TX TX TX TX TX TX TX TX TX	3335 3108 2921 3212 3130 3015 2919 2902 2846	09916 09649 09535 10101 09934 09742 09606 09633 09701
08210000 08212400 08370500 08377200 08447410 08459000 08475000	SAN ANTONIO HIVER AT GOLIAD NUECES RIVER NEAR THREE RIVERS LOS OLMOS CREEK NEAR FALFURRIAS RIO GRANDE AT FT QUITMAN RIO GRANDE AT FOSTER RANCH PECOS RIVER NEAR LANGTRY RIO GRANDE AT LAREDO RIO GRANDE AT BROWNSVILLE	TX TX TX TX TX TX TX	2839 2826 2716 3105 2947 2946 2730 2553	09723 09811 09808 10536 10145 10127 09930 09727
09234500 09315000 09379500 10059500 10126000 10141000 10171000 10224000 10237000	COLORADO RIVER NEAR CISCO GREEN RIVER NEAR GREENDALE GREEN RIVER AT GREEN RIVER SAN JUAN RIVER NEAR BLUFF BEAR LAKE OUTLET CANAL NEAR PARIS (ID) BEAR RIVER NEAR CORINNE WEBER RIVER NEAR CORINNE WEBER RIVER NEAR PLAIN CITY JORDAN RIVER AT SALT LAKE CITY SEVIER RIVER NEAR LYNNDYL BEAVER RIVER AT ADAMSVILLE	UT UT UT UT UT UT UT	4135 4117 4044 3929 3815	10918 10925 11009 10952 11121 11206 11205 11155 11224 11246 07211
¹ See footnote at	CLYDE RIVER AT NEWPORT end of table.	VI	445ŕ	V/211

TABLE 1.-Stations in the National Stream Quality Accounting Network on January 1, 1975-Continued

USGS STAT.NO.	STATION NAME	ST	LATI- TUDE DEG/	LONGI- TUDE DEG/
01673000 02035000	· · · · · · · · · · · · · · · · · · ·		3746 3740	07720 07805
02049500	BLACKWATER RIVER NEAR FRANKLIN		3646	07654
	CHEHALIS RIVER AT PORTER ELWHA R AT MCDONALD BRIDGE NR PT ANGELES		4656	12319 12335
12200500	SKAGIT RIVER NEAR MT VERNUN	WA	4831	12220
	PEND OREILLE R AT INTERNATIONAL BOUNDARY COLUMBIA RIVER AT NORTHPORT		4900 4855	11721 11747
12433000	SPOKANE RIVER AT LONG LAKE		4750 4615	11751 11929
13353200	COLUMBIA RIVER AT NORTHPORT SPUKANE RIVER AT LONG LAKE YAKIMA RIVER AT KIONA SNAKE RIVER AT BURBANK KLICKITAT RIVER NEAR PITT	WA	4613	11901
14113000	KLICKITAT RIVER NEAR PITT	WA	4545	12113
	KANAWHA RIVER AT WINFIELD		3832	08155
03204500	MUD RIVER NEAR MILTON	WV	3823	08207
	BAD RIVER NEAR ODANAH		4629 4420	09042 08810
	FOX RIVER AT WRIGHTSTOWN MILWAUKEE RIVER AT MILWAUKEE	-	4420	08755
	ST. CROIX RIVER AT ST. CROIX FALLS	-	4524	09239
	CHIPPEWA RIVER AT DURAND Wisconsin River at Muscoda		4438 4312	09158 09026
13022500	SNAKE RIVER ABOVE RESERVOIR NEAR ALPINE	WY	4318	11047

 1 If two States are shown, that in parentheses is the State in which the station is located. The other State designates the Geological Survey district that operates the station.

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