Staff Papers Series

Staff Paper P87-3

February, 1987

ESTIMATES OF WASTEWATER TREATMENT CAPITAL
REQUIREMENTS IN RURAL AMERICA

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Staff Paper Febuary 1987

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* This study was made possible in part by funding from the Economic Research Service of the U.S. Department of Agriculture. The author gratefully acknowledges their support, as well as the support and guidance of Professor Thomas F. Stinson.

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SUMMARY

Sewage treatment capital requirements for rural America in 1984 are estimated at $20.2 billion dollars, but changes in National spending policy leave it uncertain how they will be financed. Over a six year period ending in 1984, both national and rural needs declined by 25% in real terms. A closer examination, by community size and Census region, reveals wide differences in the distribution of rural needs.

Communities in the North Central and Southern regions made dramatic progress in developing their wastewater treatment infrastructure and reducing their backlogs, as did larger incorporated cities throughout rural America. Residents in the Northeast and in the smallest rural communities made considerably less progress, and will have the hardest time funding the remaining capital spending requirements.

Approximately 85 million Americans live in rural communities of less than 50,000 persons. Of the 45,766 communities this study considers rural, most are very small and only 37% require centralized treatment systems. Between 1978 and 1984 an additional 16.5 million rural residents began receiving sewage treatment services, bringing the total to 51.5 million.

INTRODUCTION

The condition of America's sewage treatment infrastructure, and the effectiveness of government programs designed to stimulate their production, are questions of significant social and economic importance. Essential to public health and community development, sewage treatment projects have received much attention and funding over the last decade and a half. Since passage of the Clean Water Act in 1972, over $52 billion in Federal monies (1984 dollars) has gone to facility construction. In 1984 alone, over 11% of Federal infrastructure outlays, some $3 billion, went for this purpose. While still a significant program, compared to expenditures of the past, recent spending levels represent a dramatic reduction.

After a long period of federal dominance in public sector financing, the Reagan administration's new federalist philosophy and deficit reduction pressures are changing the structure of intergovernmental fiscal relations. Many categorical programs have been reduced or eliminated, and responsibility for funding local services is being shifted back to state and local governments.

Given the public nature of clean water, and the unique economic characteristics of rural America, an important policy issue continues to be the financial impact on rural communities yet to comply with water quality standards. Considerable information is available about the needs of urban areas and the Nation as a whole, but the treatment needs of rural communities go largely unrecognized.

This study estimates the cost of bringing rural wastewater treatment facilities up to national standards, and documents progress in meeting that goal. The focus is on capital spending requirements and system needs by community size and geographic region. Current spending requirements include new construction needs and improvements required of existing facilities. The costs of various system components are compiled, along with estimates of service-area populations. Finally, as a rough indicator of financial hardship, an average per capita community need is calculated. Observing change overtime is an important dynamic in policy analysis and therefore, each variable is estimated biennially from 1978 to 1984. To give some perspective to changes in needed spending, this report begins with a brief summary of federal spending policies under the Clean Water Act.

FEDERAL CAPITAL SPENDING AND ABATEMENT POLICY

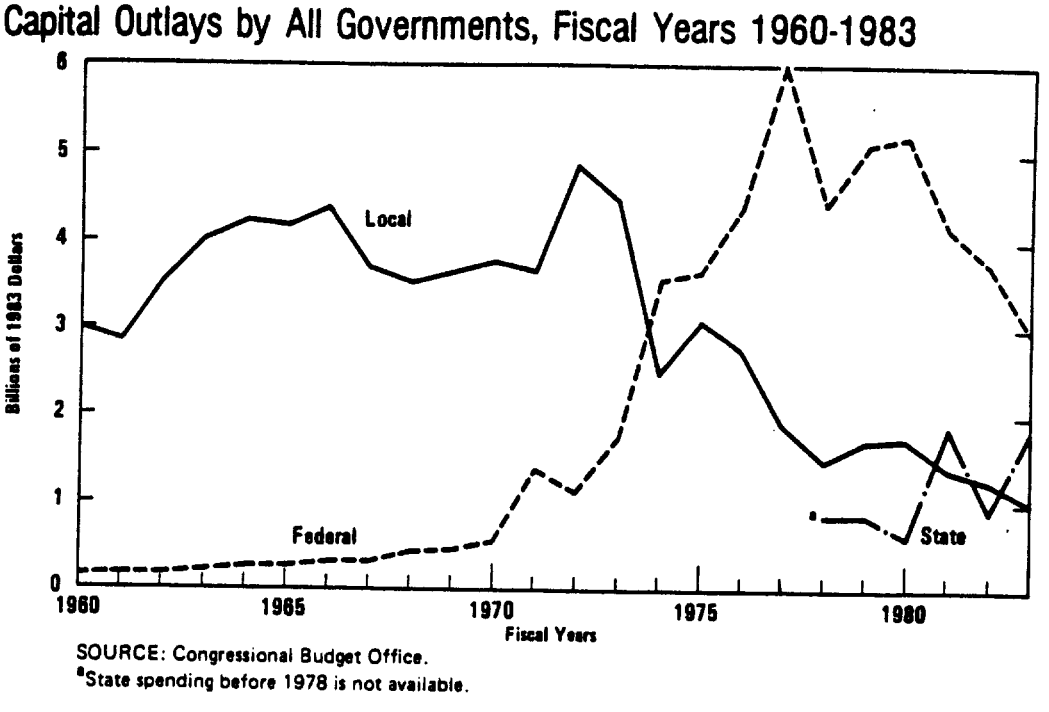
The debate over the adequacy of America's public sector capital investment is mired in definitions of standards and predictions of future demand. Consequently, estimates vary widely on the magnitude of the problem. Summing across a spectrum of public services, estimates of the capital investment needed by the turn of the century range as high as $3 trillion. (1) Current requirements for sewage treatment alone are believed to exceed $60 billion nationally. Findings of this study indicate that rural areas account for about one third of that backlog. How those projects will be

billion nationally. Findings of this study indicate that rural areas account for about one third of that backlog. How those projects will be financed, and more importantly by whom, are pressing questions on the domestic policy agenda.

State and local governments have traditionally been the primary providers of public services. Yet over the last 20 years, the federalization of our fiscal system has brought about a new allocative process through a series of regulations and grants-in-aid. Water pollution control is a prime example of the shifting of financial responsibilities to the federal level. Faced with a deterioration of the nation's water quality and the lack of adequate facilities to reverse it, Congress passed in 1972 what has come to be known as the Clean Water Act (CWA). Like so many other programs of the time, the CWA imposed national minimum performance standards accompanied by generous federal support programs.

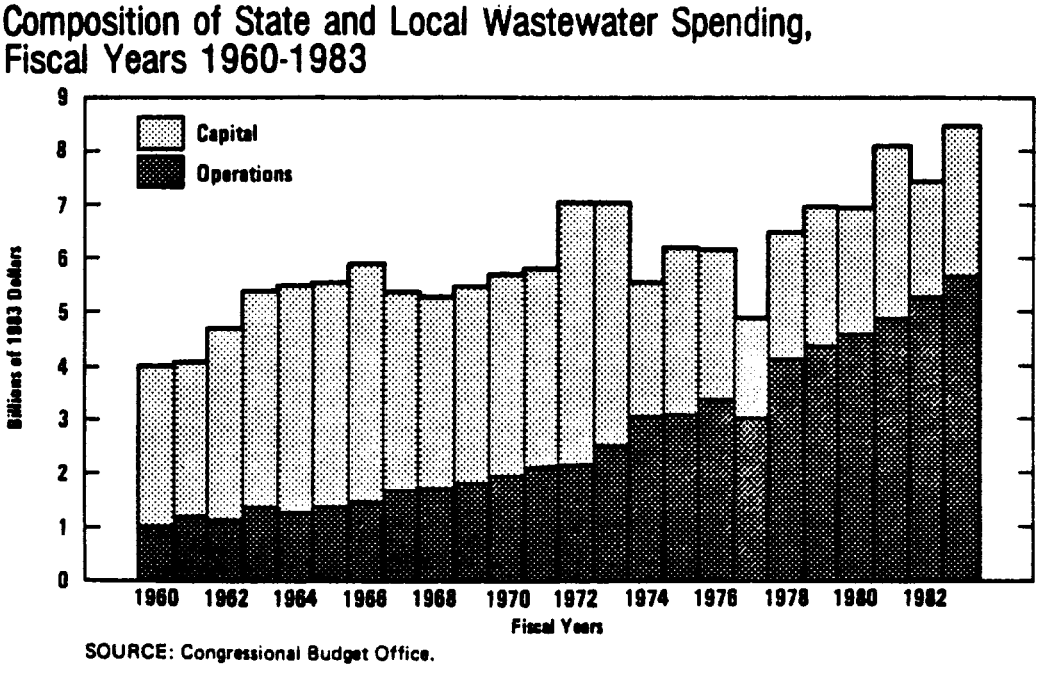
With $18 billion in authorization for the first three years, the newly formed Environmental Protection Agency (EPA) through its Construction Grants Program offered 75% subsidies to eligible communities building wastewater treatment facilities. (2) This was a dramatic shift from the 50% matching rate and comparatively meager budgets of the past federal program. The goal was to expedite facility construction by supplementing local spending. Instead, it led to the displacement, or substitution, of federal for local dollars. (Fig. 1) A recent study by Jondrow and Levy estimates that for each EPA dollar put towards sewer system construction, state and local expenditures were reduced by as much as two-thirds. While this substitution can take many forms, including tax relief, an increased spending on facility operations and maintenance is also possible. (Fig. 2)

FIGURE 1



SOURCE: Congressional Budget Office.
[a]State spending before 1978 is not available.

FIGURE 2



Criticized for failing to address existing needs, increasing delays, and being narrow in its acceptance of treatment processes, the program was amended in 1977. States were given more latitude in project selection and management, communities were provided with a waiver process, and systems employing innovative designs were rewarded with an additional 10% subsidy. Additionally, Congress cut the authorized spending level by 25%, and reiterated its original intention to fund only treatment capacity for the population base recognized as of 1972. (3)

Under continued pressure from mounting delays and inefficiencies, and with the newly elected Reagan administration demanding reform, the program underwent a dramatic revision in 1981. Three changes were of particular importance: direct federal funding was restricted to the basic or "core" treatment components- treatment plants and interceptor systems; the Federal share of project funding was reduced from 75% to 55%; and authorized federal spending was reduced from the previous $4 billion to $6 billion range, to $2.4 billion annually for the four years ending in fiscal 1985. To improve program efficiency and reliability, planning was streamlined, reserve capacity funding eliminated, and compliance deadlines extended. Except for the lower spending levels, most changes did not become effective until October 1, 1984.

With these new initiatives basically untried, policy may again undergoing major change. The Reagan administration's 1987 budget proposal calls for a

four year phase-out of EPA's Construction Grants Program, asserting a fulfillment of the federal commitment to the 1972 population base, and maintaining a philosophical opposition to federal involvement. In the Administration's view, many rural system are of marginal abatement importance, not worthy of conversion from septic to sewer systems. Where support is merited, a Federal-State block grant program targeting rural economic development could provide support.

Not all agree with this solution. A Congressional Budget Office (CBO) study suggests that the administration's approach creates an inequitable treatment of communities that have yet to reach the secondary treatment standard. The same study asserts that the program revisions made in 1981 will be sufficient to restore local incentives for cost saving and reduce secondary treatment needs by as much as 30%. CBO argues that waste, inefficiency, and unwarranted excess capacity make up a third of the backlog, and that this can be eliminated by lowering the matching funds rate and forcing the recognition of real resource costs on local officials. While it considers the revised current program more equitable, the report warns that it will fail to meet the goals without cost-effective state and local participation. Other proposals are under study as well, and some change seems inevitable. (4)

How the remaining treatment needs will be financed, and by whom, is as yet undetermined. Rural interests have been protected in the past by set-asides and rural-specific programs, but current proposals offer little support for their special needs. For example, elimination of direct funding for collector systems under the 1981 amendments could have an especially adverse effect on rural communities, where low population density increases the demand for this component. (5) In addition, the lowering of matching rates puts a disproportionate burden on the residents of small rural communities, where fewer users are available to share costs. The impact is compounded in those areas, particularly the South, with low incomes. Those responsible for providing sewage treatment services to rural communities, and those who ultimately must pay for it, face an uncertain future.

DATA AND ESTIMATION METHODS

This study is an extension of the preliminary National Rural Community Facilities Assessment Study (NRCFAS), published by the Department of Agriculture in 1984. Sampling methods and estimation techniques developed for that study were used here. In brief, a sample of 2,172 rural communities was drawn from the 45,766 rural communities within the 48 contiguous states. The rural universe is described in more detail below. The sample was first stratified by state, with a nearly equal number of communities selected from each state. Then, within each state, communities were stratified by size class, and selections were made on a random basis within each class. Distributional weights were assigned accordingly.

Results are reported by community size and political organization, and for the four U.S. Census regions. Incorporated communities are disaggregated into five size classes: all unincorporated communities are combined into a sixth class. To avoid the double counting of facilities, community-based estimates were developed by identifying facilities that were located within and serving the sample rural communities. Facilities serving yet located outside the sample communities' boundaries, such as regional treatment plants, were excluded.

Like all statistical estimates, those produced here are subject to a sampling error. This measure allows the user to develop a sense of the sampling accuracy, and is shown beneath the point estimate in the tables. (6)

The Rural Universe

More than 85 million Americans live in rural communities of less than 50,000 persons. (7) Of the nearly 46,000 communities in rural America, approximately 1/3 are incorporated towns and cities, while 2/3 are unincorporated townships or equivalent areas. Distinguishing between incorporated and unincorporated gives an indication of the communities' basic administrative capacity, and is considered an important factor in motivating a community towards establishing a treatment system. Another is community size, important in determining a project's economic feasibility and funding potential. Not surprisingly, the great majority of rural communities are small. Eighty-two percent of all unincorporated places have populations less than 2,500; only 2% have greater than 10,000 residents. Similarly, 80% of all incorporated place have less than 2,500 residents, while only 5% have greater than 10,000.

TABLE 1. RURAL POPULATION AND COMMUNITY DISTRIBUTION 1980

	N.East	N.Ctl	South	West	Total
POPULATION (mill)					
incorporated	4.3	13.2	14.8	6.1	38.5
unincorporated	9.1	11.9	20.6	5.5	47.1
Total Rural Pop.	13.4	25.1	35.4	11.6	85.6
COMMUNITY NUMBER					
incorporated	1,368	7,476	5,557	1,648	16,049
unincorporated	3,598	16,145	8,009	1,965	29,717
All Rural Comm.	4,966	23,621	13,566	3,613	45,766

Source: National Planning Data Corporation, Universe of Rural Communities, 1980.

Over half of all unincorporated places, and nearly half of all incorporated ones, are in the North Central region, yet less than a third of the rural population lives there. This region also has the largest number and greatest proportion of incorporated communities with less than 2,500 persons. The South with 41% of the rural population has 30% of the total rural communities. The South and North Central regions combined represent 70% of the total rural population, and over 80% of all rural communities.

EPA Needs Surveys

A major problem in estimating the demand for public works is in defining a standard for that service, and none is better defined than the need for publicly-owned sewage treatment systems. As a provision of the Clean Water Act, the Environmental Protection Agency estimates biennially the difference between the Nation's current municipal wastewater treatment capacity and that needed to comply with established clean water standards. The Needs Surveys, as they are called, catalog a variety of information about system requirements, both at the time of the survey and projected into the future. This amounts to a complete inventory of the Nation's capital requirements for treatment systems. They are the basis for the Congressional allocation of grant funds, and the source of data for this study.

The Surveys break system needs into five categories and a number of subcategories. Categories I and II covers the physical treatment plants. Processes range from basic screening or primary treatment, to secondary and tertiary treatments. The latter involve an increasingly complex technology for detecting and eliminating organic and inorganic contaminants.

Two concerns over system deterioration are expressed in Category III. Subcategory IIIa addresses the cost to correct the infiltration of groundwater into the conveyance system, which can significantly inhibit a plant's treatment capacity and unnecessarily increase its costs. Subcategory IIIb represents a second problem, that of structurally unsound interceptors and collectors.

Conveyance systems, made up of interceptor and collectors (Cat's. IVa, IVb), connect treatment plants with users. Interceptors are the main trunk lines radiating out from a plant into general areas of the community. Collectors branch off the interceptors to connect individual neighborhoods and developments. Category V is an inventory of combined sewer and stormwater overflow needs. Primarily an urban problem, these costs are not a part of this study.

The estimates developed here are restricted to the costs of current system needs and service availability. Backlog costs are the current costs of the construction required to bring the community up to the water quality standards of the Clean Water Act. Population estimates describe the total number of persons within a facility service area, and the number actually receiving service. A third variable, community average per capita need, is developed as an indicator of the distribution in financial hardship.

RESULTS

Rural Versus National Need

Between 1978 and 1984, national wastewater treatment needs (urban and rural) increased 16%, from $53.4 billion to $61.8 billion. Rural needs during the same period increased 23% from $17.0 billion to $20.3 billion. (Table 2) From this perspective, all areas, and rural areas in particular, have failed to keep pace with the requirements of the Clean Water Act. But measuring progress in nominal or current dollars disregards the impact of inflation, an important economic characteristic of the study period.

TABLE 2. WASTEWATER TREATMENT NEEDS - NATIONAL AND RURAL *

Year	National (nominal $)	National (1984 dollars)	Rural (nominal $)	Rural (1984 dollars)
1978	53.40	84.20	16.99	26.80
			(1.19)	(1.80)
1980	53.90	69.10	16.53	21.20
			(1.12)	(1.44)
1982	56.86	63.11	16.72	18.56
			(1.35)	(1.50)
1984	61.80	61.80	20.27	20.27
			(1.65)	(1.65)

Source: EPA Need Surveys 1978, 1980, 1982, 1984 (billions $)
* EPA Categories I-IV
Standard errors in parentheses

According to EPA estimates, construction costs for publicly-owned treatment works increased 23% between 1978-80, 15.5% from 1980-82, and 11% between 1982-84. Compounded, this amounts to a 58% rate of inflation over the six-year period. Expressing all needs in constant (1984) dollars illustrates the cost of past construction were it to be undertaken in the 1984 cost environment. When the comparison is made on a constant dollar basis, a very different picture emerges. Nationally, needs fell from $84.2 billion to $61.8 billion, a 26% decline over the study period. Rural needs fell a comparable 24%, from $26.8 to $20.3 billion. Notably, the greatest progress, both national and rural, was made in the first period when inflation was at its height.

The effect of federal cuts in capital funding for wastewater treatment projects since 1980 can be seen in the slowing of decline in national treatment needs. The rural estimates suggest a reversal in the declining trend between 1982 and 1984, but the increase is not statistically significant. Indeed, the last three surveys are within such a narrow

range, there is no statistically significant difference between them. Each, however, is statistically different from the 1978 results. This relationship holds generally throughout the data, therefore inferences about the short-term are avoided. Of more importance to policy analysis are the long term changes between 1978 and 1984. For these, the statistical support is strong.

The makeup of rural wastewater treatment needs, like national needs, changed little over the study period. The 1984 distribution is representative. (Table 3.) The major structural differences between rural and non-rural areas include the greater need nationally for sewer line repair (generally associated with the "urban decay" of the older, larger cities) and the rural areas' proportionally greater need for new collectors due to population growth and lower density settlement.

An interesting delineation not made by this analysis, is the differences in treatment plant requirements of urban and rural communities. That is, higher levels of industrial pollutants produced in urban areas often require more advanced treatment levels to meet EPA standards. Whereas, rural areas typically lack the population base to benefit from economies of scale, thus they face higher costs to provide basic service.

TABLE 3. 1984 CATEGORICAL NEEDS - NATIONAL and RURAL

SYSTEM COMPONENT	EPA CAT.	National Backlog	%Natl Need	Rural Backlog	%Rural Need
Treatment	I, II	$27.10	43.9	$8.28 (.80)	40.9
Sewer Repair	IIIa,b	$6.00	9.7	$1.16 (.16)	5.7
Collectors	IVa	$18.00	29.1	$7.65 (.80)	37.7
Interceptors	IVb	$10.70	17.3	$3.18 (.37)	15.7

Source: EPA Need Survey 1984 (billions 1984 dollars)
Standard errors in parentheses

Rural Needs by Community Type

Not all rural communities need sewage treatment systems. Sparsely populated areas, which typically remain unincorporated, rely on septic systems for sewage disposal. When populations become more concentrated, however, on-site disposal is no longer feasible and treatment systems are required. For all rural communities, this study estimates that only 37% require some type of centralized treatment facility. Ninety percent of all incorporated communities need them, compared to only 12% of all unincorporated.

Prior to program revisions in 1981, funding priorities were biased in favor of larger communities. This is reflected in the distribution of backlogs across communities of differing size. The largest percentage reduction in backlog (37%) was made by the largest cities, the smallest (21%) by the smallest cities. (Table 4.,Fig. 3.) In unincorporated areas, unmet needs were reduced by only 17% compared with the 28% drop when all incorporated places are combined. Given their similarity in community size distribution, an attractive explanation for the relative success of the incorporated communities is the presence of an effective political organization capable of securing financial support. Needs remained greatest in cities with populations of less than 2,500 and in unincorporated communities. In 1984, these two groups accounted for nearly two-thirds of the entire rural backlog.

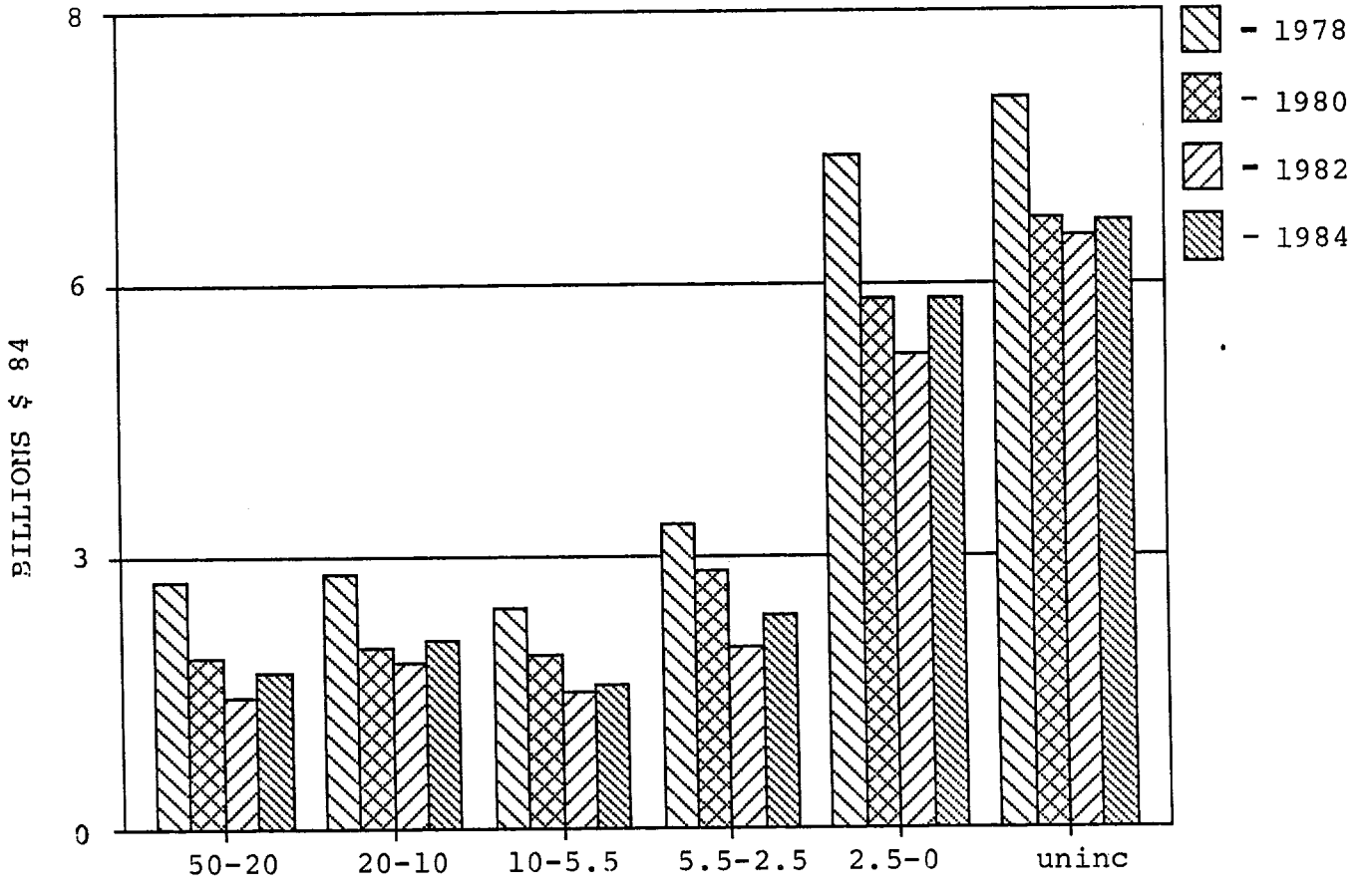


FIG. 3 TOTAL COMMUNITY BACKLOG COSTS

As the construction grants program was originally structured, the incentive was to construct new, grant-eligible facilities, instead of making improvements to the existing ineligible ones, even where this would have been more cost-effective. This inefficiency was recognized by 1980, and upgrading existing facilities became a program objective. Today, many small communities, and nearly all larger cities, are giving more attention to improving existing facilities to meet water quality standards and growth. Of the estimated $20.2 billion in current rural needs, nearly 60% is assigned to facility improvements, primarily in the larger cities. New construction projects are concentrated in the very small cities and unincorporated areas, which combined account for 90% of the $8.5 billion new construction backlog. This would seem the logical progression in the development of treatment infrastructure; accommodating the demands of larger populations first. To a degree, the fact that nearly all but the very smallest communities have some treatment facility, demonstrates how far we have come in meeting the CWA objectives.

Treatment plants and collector systems constitute the greatest portion of rural system requirements with a combined backlog of nearly $16 billion in 1984. Nearly all of the $6.5 billion reduction in total need occurred in these two categories, and again most of this came during the first period. (Table 5.) The need for new interceptors has remained unchanged at around $3 billion, but between individual size classes needs have varied widely. At just over $1 billion in 1984, the backlog for sewer line repairs fell in all but the unincorporated class. Across all need categories, the largest cities saw the largest reductions, the smallest cities the least. Almost without exception, the unincorporated communities made less progress than any incorporated category.

Rural treatment systems brought an additional 17.3 million people within their service areas, between 1978 and 1984. Of these, 16.5 million received some form of sewage treatment, raising the total to 51.5 million. The total service area population increased more than 37%, while the number receiving treatment increased by more than 47%. (Table 6.) The most dramatic change was in the unincorporated places, where the number of people being serviced increased by nearly 10 million, or 300%, presumably the result of a number of large facilities coming on-line.

The flat nature of change seen in the number of service-area residents not receiving treatment, suggests an estimation of those "structurally untreatable" at approximately 12 million. Fully three-quarters of the total service-area population is in incorporated areas.

Finally, service rates (bottom of Table 6.) indicate the percentage of the population within the service range of a treatment facility actually being served. These have remained relatively higher for the larger incorporated communities, but thanks to steady advances the unincorporated rate is nearly comparable with 76% of area residents receiving some form of service.

TABLE 4. BACKLOG COSTS BY COMMUNITY TYPE (billions of $1984)

COMM. CLASS	50000-20000	19999-10000	9999-5500	5499-2500	2499-1	Total Inc.	Total Uninc.	Total
TOTAL BACKLOG								
1978	2.75	2.81	2.45	3.37	7.39	18.78	8.02	26.80
SE	.39	.19	.19	.31	.80	.98	1.51	1.80
1980	1.89	2.01	1.91	2.84	5.83	14.49	6.71	21.20
SE	.27	.18	.16	.27	.63	.77	1.21	1.44
1982	1.46	1.83	1.51	2.01	5.23	12.04	6.51	18.55
SE	.25	.24	.16	.29	.68	.84	1.24	1.50
1984	1.73	2.07	1.59	2.35	5.84	13.58	6.69	20.27
SE	.29	.21	.19	.30	.60	.78	1.45	1.65
IMPROVEMENTS TO EXISTING FACILITIES								
1978	2.44	2.59	1.95	2.56	2.75	12.32	3.09	15.41
SE	.35	.19	.17	.26	.58	.77	1.12	1.36
1980	1.74	1.89	1.66	2.40	2.25	9.94	2.97	12.92
SE	.24	.17	.15	.25	.39	.57	.95	1.10
1982	1.28	1.79	1.37	1.55	1.76	7.77	2.61	10.38
SE	.22	.24	.15	.21	.39	.57	.89	1.06
1984	1.56	1.99	1.50	1.82	2.22	9.10	2.63	11.73
SE	.26	.21	.19	.22	.40	.60	.55	.81
PLANNED NEW CONSTRUCTION								
1978	.32	.22	.50	.78	4.64	6.46	4.93	11.40
SE	.07	.09	.12	.19	.62	.67	1.06	1.25
1980	.15	.12	.25	.44	3.59	4.54	3.74	8.28
SE	.04	.06	.08	.13	.53	.56	.78	.96
1982	.18	.04	.14	.46	3.47	4.28	3.90	8.17
SE	.06	.05	.05	.19	.60	.63	.89	1.09
1984	.17	.08	.09	.52	3.61	4.48	4.05	8.53
SE	.05	.05	.04	.20	.50	.54	1.28	1.39

Source: EPA Need Surveys, 1978, 1980, 1982, 1984. Excludes Alaska and Hawaii.

TABLE 5. CATEGORY COSTS BY COMMUNITY TYPE (billions $1984)

COMM. CLASS	50000-20000	19999-10000	9999-5500	5499-2500	2499-1	Total Inc.	Total Uninc.	Total
SECONDARY AND ADVANCED TREATMENT (Cat. I, IIa, b)								
1978	1.24	1.43	1.15	1.54	2.65	8.02	2.31	10.33
SE	.15	.13	.11	.14	.28	.39	.59	.71
1980	1.07	1.01	.97	1.50	2.54	7.09	2.14	9.23
SE	.14	.11	.10	.15	.29	.38	.49	.62
1982	.84	.87	.72	.92	2.19	5.54	1.95	7.49
SE	.14	.12	.08	.12	.30	.38	.41	.57
1984	.94	.90	.79	1.11	2.48	6.21	2.06	8.28
SE	.14	.11	.11	.13	.26	.36	.71	.80
INFILTRATION / INFLOW, REHABILITATION (Cat. IIIa, IIIb)								
1978	.24	.26	.24	.27	.26	1.27	.15	1.42
SE	.04	.05	.04	.05	.06	.10	.05	.12
1980	.17	.26	.24	.29	.21	1.16	.22	1.39
SE	.03	.04	.04	.05	.05	.10	.08	.13
1982	.11	.17	.21	.22	.12	.83	.15	.98
SE	.03	.03	.04	.05	.04	.08	.07	.11
1984	.16	.18	.16	.25	.20	.95	.21	1.16
SE	.08	.03	.03	.05	.07	.13	.09	.16
NEW COLLECTORS (Cat. IVa)								
1978	.90	.87	.82	1.17	3.43	7.19	4.55	11.74
SE	.18	.10	.10	.17	.39	.48	.96	1.08
1980	.45	.51	.49	.64	2.44	4.52	3.29	7.81
SE	.14	.08	.07	.11	.33	.39	.73	.83
1982	.38	.42	.41	.59	2.20	4.00	3.27	7.28
SE	.13	.08	.07	.11	.38	.44	.80	.91
1984	.42	.53	.40	.66	2.41	4.41	3.24	7.65
SE	.14	.09	.06	.11	.32	.38	.70	.80
NEW INTERCEPTORS (Cat. IVb)								
1978	.38	.25	.26	.39	1.05	2.33	1.00	3.33
SE	.14	.04	.04	.07	.41	.45	.17	.48
1980	.20	.23	.21	.41	.65	1.71	1.06	2.77
SE	.06	.06	.04	.07	.29	.31	.22	.38
1982	.13	.36	.17	.28	.71	1.67	1.14	2.81
SE	.04	.13	.06	.14	.23	.31	.23	.39
1984	.20	.47	.25	.33	.74	2.00	1.18	3.18
SE	.06	.14	.07	.14	.17	.28	.24	.37

Source: EPA Need Surveys,1978, 1980, 1982, 1984. Excludes Alaska and Hawaii.

TABLE 6. SERVICE AREA POPULATION BY COMMUNITY TYPE (millions)

COMM. CLASS	50000-20000	19999-10000	9999-5500	5499-2500	2499-1	Total Inc.	Total Uninc.	Total
POPULATION RECEIVING SERVICE								
1978	7.53	6.90	5.74	5.62	5.97	31.76	3.14	34.90
SE	.41	.25	.17	.21	1.11	1.24	1.01	1.61
1980	8.82	7.80	5.88	5.90	6.59	35.00	9.26	44.26
SE	.41	.40	.20	.27	.53	.85	2.12	2.28
1982	8.88	7.80	6.37	6.16	7.21	36.43	10.99	47.42
SE	.43	.31	.24	.29	.71	.96	2.34	2.53
1984	9.63	8.11	6.74	6.49	7.91	38.88	12.59	51.47
SE	.51	.30	.23	.30	.76	1.04	3.02	3.19
POPULATION NOT RECEIVING SERVICE								
1978	1.09	1.08	1.21	1.53	3.18	8.09	3.75	11.85
SE	.19	.14	.15	.26	.64	.75	.91	1.16
1980	1.36	1.25	1.32	1.52	3.36	8.81	4.16	12.97
SE	.26	.14	.15	.27	.36	.56	.76	.95
1982	1.40	1.29	1.17	1.50	3.42	8.79	4.95	13.75
SE	.26	.15	.12	.26	.37	.56	.94	1.09
1984	1.41	1.23	1.18	1.57	3.17	8.56	4.04	12.60
SE	.27	.13	.12	.25	.36	.54	.79	.95
TOTAL SERVICE AREA POPULATION								
1978	8.62	7.97	6.95	7.15	9.15	39.86	6.89	46.75
SE	.52	.30	.22	.35	1.64	1.80	1.41	2.29
1980	10.18	9.04	7.21	7.42	9.95	43.80	13.42	57.22
SE	.56	.42	.25	.40	.62	1.05	2.45	2.66
1982	10.28	9.09	7.54	7.66	10.63	45.22	15.94	61.16
SE	.59	.36	.29	.43	.79	1.16	2.79	3.03
1984	11.05	9.34	7.92	8.06	11.08	47.45	16.62	64.07
SE	.66	.35	.29	.43	.83	1.23	3.33	3.56
SERVICE RATE								
1978	87%	87%	83%	79%	65%	80%	46%	75%
1984	87%	87%	85%	80%	71%	82%	76%	80%

Source: EPA Need Surveys, 1978, 1980, 1982, 1984. Excludes Alaska and Hawaii.

Rural Needs by Region

In addition to the distribution of treatment needs by community size, estimates were developed for the four U.S. Census regions as well. Population density, economic growth, and water resource endowment uniquely characterize each. Even within regions, these characteristics vary widely. In 1984, only 37% of all rural communities were required to provide sewage treatment systems, but in the densely populated Northeast and the water-scarce West, the rates are much higher, 56% and 49% respectively. The South approached the national average at 42%, while only 29% of all communities in the North Central region need treatment systems.

The Southern and North Central regions combined, account for 88% of the $6.5 billion real reduction in need between 1978 and 1984. (Tbl. 7.,Fig 4) Backlogs in the Northeast fell just over $1 billion, while Western needs remained virtually unchanged. (8)

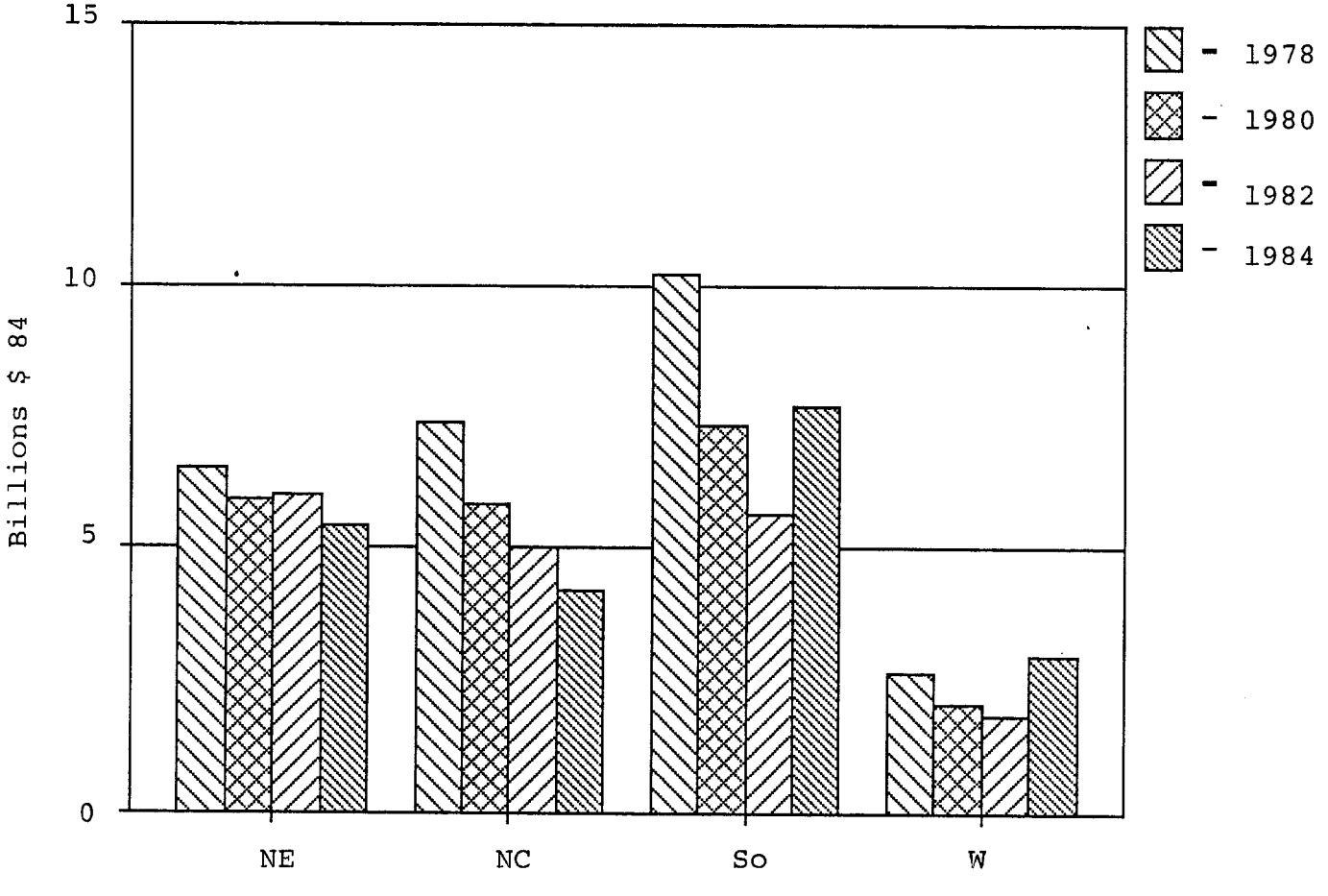


FIG. 4 TOTAL REG. BACKLOG COSTS

Improvements to existing facilities made up two-thirds of the total reduction, and again it occurred almost exclusively in the North Central and South. Facility improvement needs in the Northeast and West went unchanged. A third of the $8.5 billion needed for new construction in 1984 was in the Northeast. This seemingly disproportionate share has remained, despite a $1.0 billion reduction over the 6 year period. New construction demands increased in the West to $1.34 billion, while continual declines lowered the 1984 requirements in the North Central and South to $1.5 billion and $2.8 billion respectively.
Conveyance needs (new collectors and interceptors), are the greatest in the Northeast and South, while treatment plants are the major requirement of the North Central and Western regions. (Table 8.) The Northeast and South each face a billion dollar backlog for new interceptors, and $2.3 billion and $3.1 billion in new collector requirements. Their combined need in 1984 for new interceptors and collectors accounts for 71% of all conveyance needs. The striking difference, however, is that the Northeast has only a third as many communities as the South. In keeping with the general pattern, the North Central region consistently reduced its relative share of each category's backlog, and the Northeast and West consistently increased theirs. The Southern shares have remained basically unchanged, except for a growing demand for new interceptor systems.

Demographic shifts and public works spending are evident in the service-area population estimates (Table 9). In the West nearly 12 million residences were receiving treatment in 1984, double the number in 1978. The South and West combined accounted for two-thirds of the service area expansion. The North Central region saw modest growth, which was readily accommodated by wastewater treatment expenditures. In contrast, the Northeast experienced no service area growth, and only slight increases in the number receiving service. The higher service rates in the North Central and Western regions, compared to the Northeast, may result in part from a more efficient settlement pattern or perhaps more conducive geologic conditions.

TABLE 7. BACKLOG COSTS BY CENSUS REGION (billions of $1984)

Census Region	North-east	North Central	South	West	Total
TOTAL BACKLOG					
1978	6.52	7.39	10.23	2.66	26.80
SE	1.22	.85	.85	.56	1.80
1980	5.93	5.84	7.36	2.07	21.20
SE	1.05	.59	.66	.45	1.44
1982	6.03	5.04	5.65	1.84	18.55
SE	1.08	.67	.68	.42	1.50
1984	5.41	4.19	7.70	2.96	20.27
SE	.70	.49	.94	1.05	1.65
IMPROVEMENTS TO EXISTING FACILITIES					
1978	2.64	4.55	6.43	1.79	15.41
SE	1.05	.56	.57	.31	1.36
1980	2.70	3.95	4.78	1.49	12.92
SE	.88	.37	.47	.29	1.10
1982	2.70	2.90	3.45	1.32	10.38
SE	.86	.35	.46	.24	1.06
1984	2.54	2.73	4.85	1.61	11.73
SE	.46	.30	.53	.27	.81
PLANNED NEW CONSTRUCTION					
1978	3.89	2.84	3.80	.87	11.40
SE	.73	.68	.64	.41	1.25
1980	3.23	1.89	2.58	.58	8.28
SE	.64	.47	.47	.26	.96
1982	3.33	2.13	2.20	.51	8.17
SE	.71	.58	.52	.26	1.09
1984	2.88	1.46	2.85	1.34	8.53
SE	.55	.40	.79	.92	1.39

Source: EPA Need Survey, 1978, 1980, 1982, 1984. Excludes Alaska and Hawaii

TABLE 8. CATEGORICAL NEEDS BY CENSUS REGION (billions of $1984)

REGION	North East	North Central	South	West	Total
SECONDARY AND ADVANCED TREATMENT (Cat. I, IIa,b)					
1978	2.16	3.77	3.48	.92	10.33
SE	.50	.36	.23	.26	.71
1980	2.26	3.22	2.94	.81	9.23
SE	.41	.31	.26	.23	.62
1982	2.27	2.58	2.00	.65	7.49
SE	.41	.31	.20	.14	.57
1984	1.94	2.36	2.69	1.28	8.28
SE	.28	.26	.45	.54	.80
INFILTRATION / INFLOW, REHABILITATION (Cat. IIIa, IIIb)					
1978	.11	.32	.77	.23	1.24
SE	.02	.05	.08	.06	.12
1980	.09	.40	.71	.18	1.39
SE	.02	.07	.10	.05	.13
1982	.12	.19	.51	.14	.98
SE	.04	.04	.08	.05	.11
1984	.11	.19	.66	.21	1.16
SE	.02	.04	.10	.11	.16
NEW COLLECTORS (Cat. IVa)					
1978	3.37	1.91	5.15	1.30	11.74
SE	.78	.40	.53	.33	1.08
1980	2.74	1.29	3.02	.76	7.81
SE	.65	.24	.39	.22	.83
1982	2.63	1.60	2.25	.79	7.28
SE	.70	.38	.36	.25	.91
1984	2.35	1.09	3.11	1.10	7.65
SE	.46	.24	.44	.41	.80
NEW INTERCEPTORS (Cat. IVb)					
1978	.88	1.38	.85	.21	3.33
SE	.15	.40	.21	.04	.48
1980	.83	.93	.69	.32	2.77
SE	.17	.27	.17	.12	.38
1982	1.01	.67	.88	.25	2.81
SE	.20	.23	.22	.11	.39
1984	1.02	.55	1.24	.36	3.18
SE	.20	.16	.22	.14	.37

Source: EPA Need Surveys, 1978, 1980, 1982, 1984. Excludes Alaska and Hawaii.

TABLE 9. SERVICE AREA POPULATION BY CENSUS REGION (millions)

REGION	North East	North Central	South	West	Total
POPULATION RECEIVING SERVICE					
1978	3.94	13.33	11.35	6.27	34.90
SE	.33	.89	1.20	.49	1.61
1980	4.58	15.00	15.65	9.02	44.26
SE	.44	1.00	1.40	1.42	2.28
1982	5.01	16.50	16.49	9.41	47.42
SE	.49	1.40	1.44	1.46	2.53
1984	5.14	17.16	17.25	11.92	51.47
SE	.46	1.43	1.50	2.38	3.19
POPULATION NOT RECEIVING SERVICE					
1978	3.65	1.76	5.62	.81	11.85
SE	.61	.31	.92	.19	1.16
1980	4.04	1.72	5.98	1.21	12.96
SE	.61	.31	.57	.31	.94
1982	4.01	1.71	6.76	1.26	13.74
SE	.60	.31	.81	.26	1.09
1984	3.38	1.61	6.29	1.38	12.60
SE	.45	.30	.73	.28	.95
TOTAL SERVICE AREA POPULATION					
1978	7.59	15.10	16.98	7.07	46.75
SE	.76	.93	1.87	.57	2.29
1980	8.62	16.72	21.63	10.24	57.22
SE	.82	1.08	1.75	1.48	2.66
1982	9.02	18.21	23.23	10.67	61.16
SE	.86	1.45	1.98	1.54	3.03
1984	8.46	18.77	23.54	13.30	64.07
SE	.74	1.48	1.99	2.44	3.56
SERVICE RATE					
1978	52%	88%	67%	89%	75%
1984	61%	91%	73%	90%	80%

Source: EPA Need Surveys, 1978, 1980, 1982, 1984. Excludes Alaska and Hawaii.

Average Backlogs and Per Capita Costs

Over the study period, the number of rural communities requiring treatment systems remained constant at 37%, while those requiring capital spending declined. Only one in four communities in 1984 had a positive treatment backlog. Almost without exception, real backlogs have fallen significantly, both according to community size and Census region.

An important policy question is whether the cost of the average project has increased, decreased, or remained the same. This in effect asks if the easier, less costly projects have been eliminated, leaving the more demanding, expensive ones. One way of examining this issue is in terms of the average community project backlog, or simply the total backlog divided by the number of communities with a positive backlog.

The cost for an average rural community to comply with the standards of the CWA remained constant at roughly $2.0 million between 1978 and 1984. But the largest incorporated communities, those with between 20,000 and 50,000 residents, have seen their average cost fall from $12 million to just over $8 million. Making the conservative assumption, that all the communities in this class had only 20,000 persons, the maximum average per capita would be backlog only $416. At the other end of the scale, the smallest incorporated communities, those with less than 2,500 persons, saw virtually no change in the average project cost of $900,000. Assuming all of these communities had fully 2,500 residents, the minimum average per capita backlog was $3700. Recall that 80% of all rural communities (incorporated and unincorporated) have less than 2,500 residents.

Not surprisingly, the cost of the average project fell with the size of the community. For all unincorporated places, the average backlog fell from $4 million to $3 million, a near exact match of the decline in the median incorporated class. Across the four census regions the average community backlog declined in all but the Western region. At roughly $2.5 million, the average project in the Northeast or West cost twice that of the North Central region. In the South, typical projects most nearly resembled the national average at just under $2 million.

While describing project costs in average value terms is simple and intuitive, it remains an inadequate measure for analysis. The more important issue is the distribution of community average per capita backlogs. By disaggregating costs into discrete price ranges, the areas where per capita needs are highest can be identified. (9) Using this technique, the smallest cities, those with populations of less than 2,500, will face the greatest financial hardship in meeting water quality standards. (Tbl. 10 and Appendix A) Over 20% of the communities in this group have per capita needs greater than $1000. While the concept of hardship is difficult to quantify, relative to other community groups, where 6% greater than $1000 per person is typical, the burden on these small cities seems disproportional. The diseconomies of scale associated with providing a capital-intensive service to such a small group is painfully obvious. (10) Notably, unincorporated places do not share the

high per capita rate, reinforcing the idea that their needs are primarily for systems serving relatively large communities.

Regionally, the number of communities requiring treatment systems were again unchanged, and the number of communities with positive backlogs also declined. (Tbl 11., Fig 6.) As noted, the compliance requirement is greatest in the Northeast and West, and least in the South and North Central regions. Only 14% of the communities in the North Central region have positive backlogs, compared to 43% in the Northeast. Per capita costs are the highest in the Northeast as well, where 22% of all communities face a per capita backlog of greater than $1000. While higher costs in this region are not surprising, in the other regions only 6% face such an expense.

TABLE 10. 1984 COMMUNITY PER CAPITA BACKLOG

COMM. CLASS	50000-20000	19999-10000	9999-5500	5499-2500	2499-1	Total Inc.	Total Uninc.	Total
$84	Number of Rural Communities							
N/A	2	3	16	43	2525	2589	26189	28777
se	1	1	5	25	305	306	358	471
0	86	168	336	716	3703	5009	1304	6313
se	13	20	26	59	356	362	258	445
1-500	180	286	378	742	2001	3587	575	4162
se	14	20	26	55	258	266	186	324
501-1000	26	67	56	216	1609	1974	478	2452
se	7	14	14	39	215	219	132	256
1001-2000	2	26	39	68	1931	2066	677	2743
se	1	7	13	22	249	250	147	290
G.T. 2000	0	7	12	36	769	824	494	1318
se	0	4	7	14	195	195	112	225
TOTAL	296	557	837	1821	12538	16049	29717	45766

N/A - Not applicable; no treatment req'd, or provided by others
Source: EPA Need Surveys, 1984. Excludes Alaska and Hawaii.

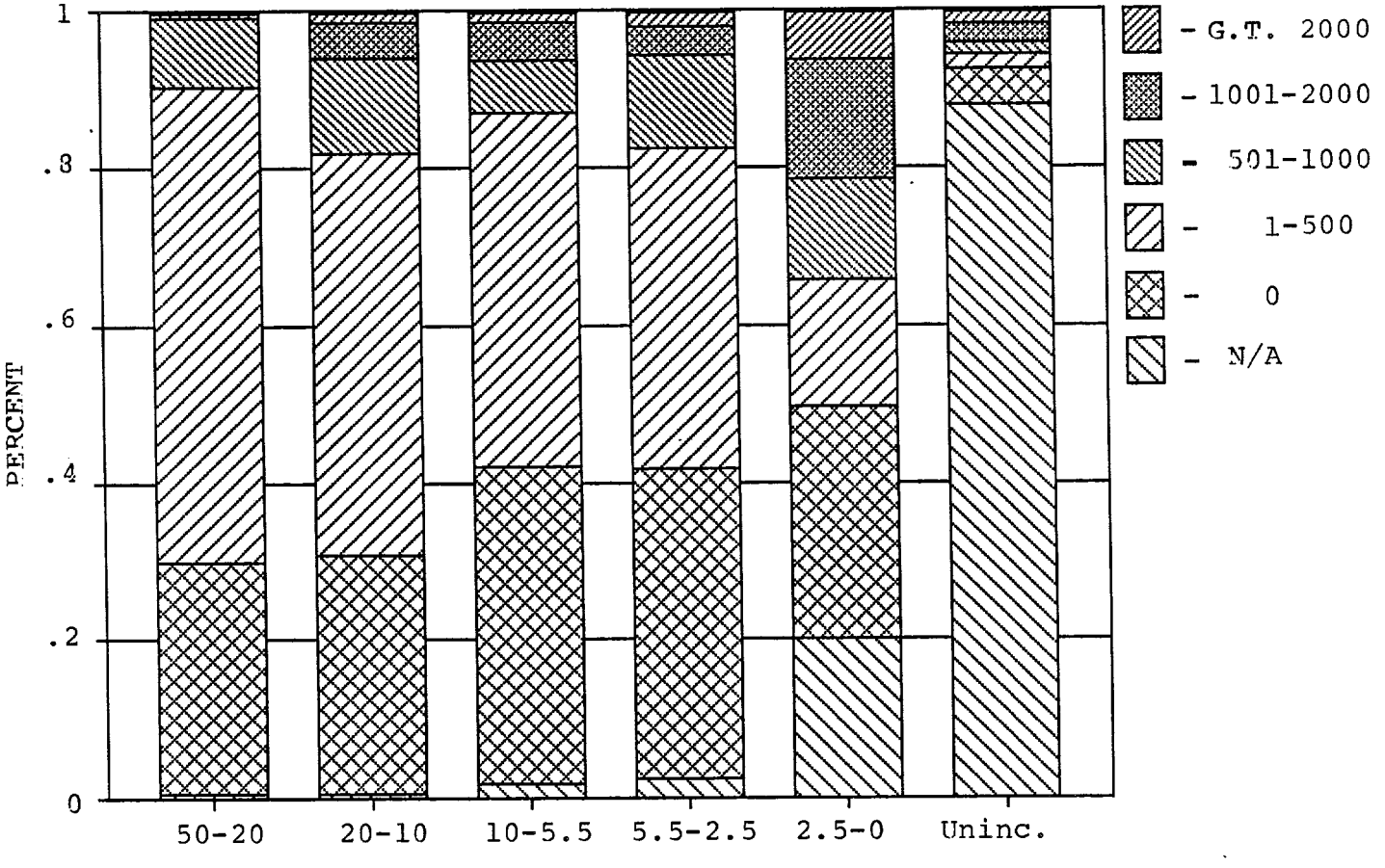


FIG. 5 1984 COMM. PER CAPITA COSTS

TABLE 11. 1984 REGIONAL AVERAGE PER CAPITA BACKLOG

Census Region	North East	North Central	South	West	Total
$84	Number of Rural Communities				
N/A	2189	16833	7905	1850	28777
se	189	334	261	75	471
0	646	3518	1452	697	6313
se	137	354	224	63	445
1-500	417	1235	1882	628	4162
se	118	198	227	63	324
501-1000	439	658	1158	198	2453
se	122	166	148	35	256
1001-2000	824	822	943	154	2743
se	161	189	143	37	290
G.T.2000	451	555	226	86	1318
se	110	180	74	35	225
TOTAL	4966	23621	13566	3613	45766

N/A - Not applicable; no treatment req'd, or provided by others
Source: EPA Need Survey, 1984. Excludes Alaska and Hawaii.

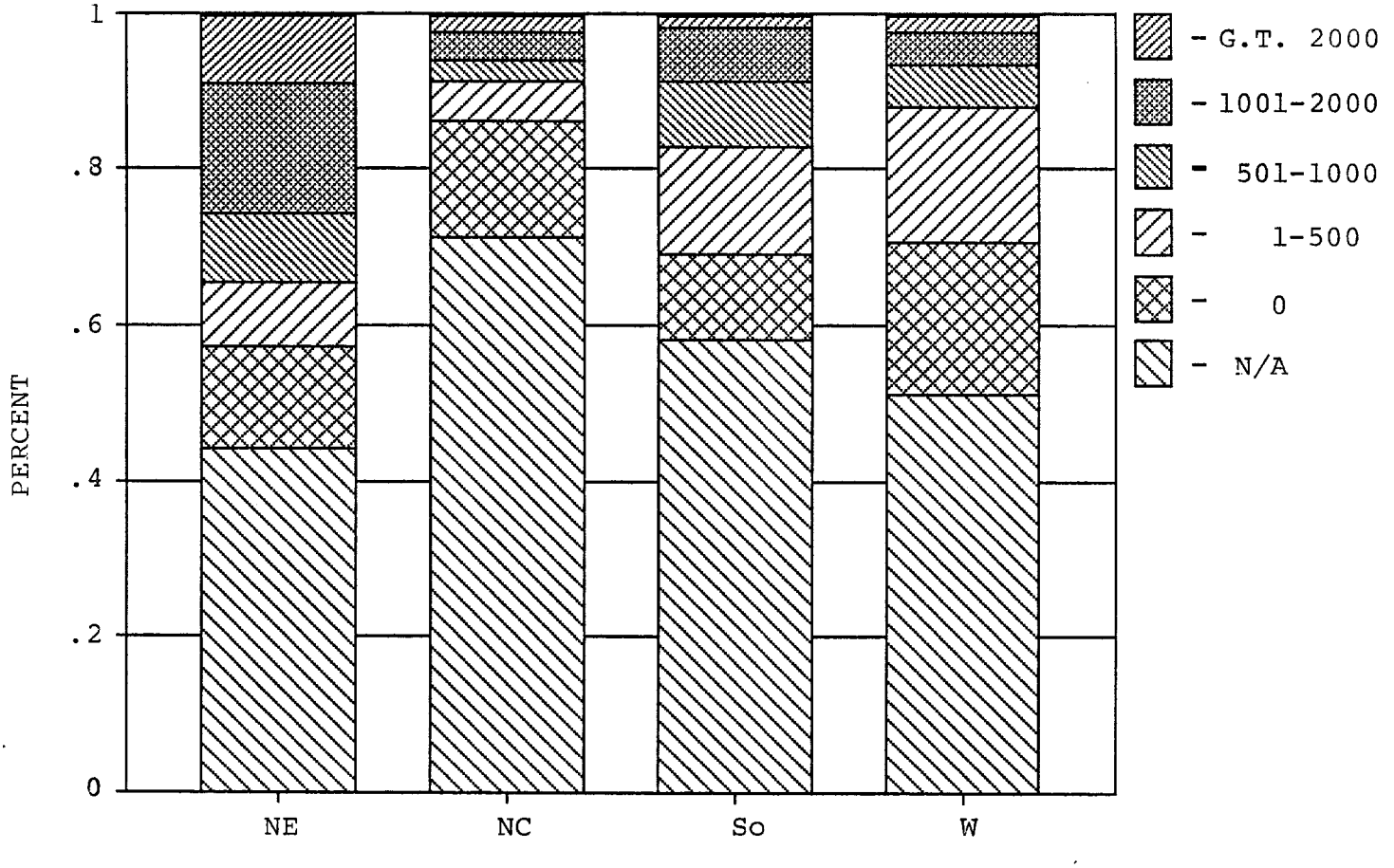


FIG 6. 1984 REG. PER CAPITA COSTS

CONCLUSIONS

During the six year study period, rural America shared equally in the Nation's efforts to create a wastewater treatment infrastructure. When measured in constant 1984 dollars, both national and rural needs declined by about 25%. In 1984, the Nation's $61.8 billion capital spending requirement for EPA categories I-IV was $22.4 billion lower than in 1978, and the estimated $20.3 billion rural backlog was $6.5 billion lower. The changes among regions and various rural community size categories, however, have been more variable. The North Central and Southern regions, which represent 80% of the Nation's rural communities, accounted for almost 90% of the regional changes. On a community size basis, results followed policy and large communities improved more rapidly than those of small communities. In 1984, the remaining needs were concentrated in the very small cities and unincorporated areas.

Treatment facilities and new collector systems make up the bulk of rural system requirements. Over time, almost all of the $6.5 billion reduction in needs came in these two categories, primarily between 1978 and 1980. In 1984, the Northeast made up nearly a third of the $8.5 billion in new construction backlog. On a community size basis, incorporated communities of less than 2,500 and unincorporated places combined accounted for 90% of this new construction need. Also in 1984, 38% or $7.65 billion of the rural backlog was for new collector systems, a category no longer eligible for direct federal funding under current policy. The same policy restricts funding for the $1.16 billion in sewer repairs, as well.

Rapid system growth has brought an additional 16.5 million rural residents into service, a 47% increase. Dramatic increases were experienced in unincorporated communities, and in the Southern and Western regions. For the average rural community, the backlog stayed constant at about $2.0 million. Larger communities and unincorporated areas saw dramatic reductions in the cost of an average project, but in very small communities it went unchanged. The cost of compliance for the average resident is highest in very small communities and in the Northeast. From an arbitrary standpoint (per capita backlogs of greater than $1000), these two groups face the greatest hardship in meeting Clean Water Act standards.

For those rural communities that have yet to construct the required treatment systems, the funding policy changes underway must seem untimely and unfair. The demand for public services is growing, while the revenue available to finance them is dwindling. Just as the programs designed to mitigate high construction costs reach them, they are reduced or eliminated. The regulations demanding their participation, however, are unchanged. The argument made in support of the original Clean Water Act, and still appropriate today, was that the entire Nation benefits from clean water and fair economic treatment. More than ever, these principles apply to the communities in rural America burdened by the high cost of sewage treatment systems.

One goal of the CWA, the zero discharge of effluent into any surface water by 1985, is far from being realized, and the environmental ideology it represents has been challenged by a decade of inflation and social change. One requirement of the Act, that all municipalities provide secondary treatment to their effluent by July 1, 1988, may again be changed. But communities still face real economic sanctions for non-compliance, both in the form of financial penalties and limited community development. For some of the 85 million Americans living in rural communities, the cost of complying with this law is of increasing significance.

FOOTNOTES

(1) Estimates vary with the definition of infrastructure, and the time-frame used. Pat Choate (America in Ruins, 1982) estimates in excess of $2.5 to $3.0 trillion will be required by 1995 just to maintain present levels of service. A study by the Joint Economics Committee of Congress (1984), puts the investment needed by the year 2000 for water and transportation alone, at $1.2 trillion. Using the same timeframe but a wider definition, the Association of General Contractors (1983) estimates a $3.0 trillion need.

(2) The Construction Grants Program accounts for about 90% of the federal outlays for facility construction. The remainder has come from three programs with differing objectives. Housing and Urban Development grants targeted low and moderate income communities, supplementing public-works projects. The Economic Development Administration has done the same in economically distressed areas. The Farmers Home Administration has supported water and sewer projects with loans and grants specifically for low income rural areas.

(3) Limiting subsidies to the 1972 population base put a cap on the federal commitment. Referred to as a "sunset condition", the provision is meant to encourage timely participation and establishes a point for the eventual transition away from federal assistance. Some critics argue that these conditions are seldom effective in terminating programs and are detrimental to long term decision-making.

(4) Perhaps the most popular alternative strategy is the establishment of revolving state infrastructure funds. Capitalized by state and federal contributions, the fund could be use directly for projects, or as security for bond issues, leveraging its effect. After the first round of investments, such a fund would grow with loan repayments and accrued interest. An EPA task force report on the Federal government's future role in sewage treatment funding, endorsed this concept as the most promising. In the transition to state and local self sufficiency, they recommend a mix of current program features, plus incentives to establish a revolving infrastructure fund. Always an option under any policy, are regulatory reforms such as relaxing water quality standards, and paying greater attention to seasonal and site-specific conditions. Here, the conflict between economic efficiency and environmental balance meet head on.

(5) A provision of the 1981 amendments allows for 20% of a state grant allocation to be used at their discretion. This could be a mitigating factor in states where rural demands are strongest.

(6) By multiplying the standard error (SE) times a t-statistic for some level of confidence, the reader can define with that degree of confidence, a range for the point estimate. For example, in Table 2 the point estimate for the 1978 total backlog cost is $26.80 billion. The SE is $1.80 billion and the t-statistic to estimate a 95% confidence interval is approximately 2. From this, the reader can assume with a 95% confidence, that the true average value for the 1984 total backlog is between $23.20 and $30.20 billion. (26.80 +/- 3.60)

Common T-statistics	Confidence level	90%	95%	99%
	T-value	1.65	1.96	2.58

(7) "Rural" in this study is defined as all incorporated or unincorporated places outside an urbanized areas as of 1970, except communities with a 1978 population of 50,000 or more.

(8) Caution is advised when interpreting the Western region estimates, due to the large standard errors. This appears to be the result of one or more heavily weighted communities registering the need to construct new treatment facilities. The estimates are still statistically significant, but many of the inter-year comparisons are not.

(9) High per capita needs do not indicate financial hardship, only the possibility. A more meaningful analysis would consider ability-to-pay, the actual share a community had to finance, and the benefits received from the service. Nevertheless, this measure does offer some valuable insights.

(10) Also working against them is the higher costs of building than say 5 or 10 years ago, the higher financing costs typically paid by very small communities when they can get backing, and the higher levels of treatment that may be required as pollution detection becomes more advanced. Admittedly, there may be some benefits from delay, mainly due to innovations and technological advancements in service delivery pioneered by other communities.

APPENDIX A

TABLE A1. 1982 AVERAGE COMMUNITY PER CAPITA BACKLOG

COMM. CLASS	50000-20000	19999-10000	9999-5500	5499-2500	2499-1	Total Inc.	Total Uninc.	Total
$84	Number of Rural Communities							
N/A	1	0	20	49	2581	2651	25976	28627
se	1	0	8	25	307	308	371	482
0	65	124	237	619	3105	4150	1025	5175
se	13	18	25	56	326	332	239	409
1-500	202	305	430	806	2190	3933	836	4769
se	13	21	27	58	267	276	205	344
501-1000	2	9	119	228	1965	2435	701	3136
se	6	14	20	40	250	254	162	302
1001-2000	3	24	20	81	1861	1989	819	2809
se	1	7	7	27	233	235	160	284
G.T. 2000	0	7	11	38	835	892	359	1251
se	0	4	7	15	198	199	97	221
TOTAL	296	557	837	1821	12538	16049	29717	45766

TABLE 2A. 1982 REGIONAL AVERAGE PER CAPITA BACKLOG

Census Region	North East	North Central	South	West	Total
$84	Number of Rural Communities				
N/A	2153	16945	6996	1773	28627
se	217	338	261	259	482
0	561	2933	1029	653	5175
se	128	337	182	62	409
1-500	462	1431	2207	669	4769
se	109	202	248	61	344
501-1000	721	818	1318	278	3136
se	160	185	171	46	302
1001-2000	792	810	1009	198	2809
se	161	174	151	41	284
G.T.2000	277	684	248	42	1251
se	84	190	72	23	221
TOTAL	4966	23621	13566	3613	45766

N/A - Not applicable, no treatment req'd or provided by others

Source: EPA Need Survey, 1982 Excludes Alaska and Hawaii

APPENDIX A Continued

TABLE A3. 1980 AVERAGE COMMUNITY PER CAPITA BACKLOG

COMM. CLASS	50000-20000	19999-10000	9999-5500	5499-2500	2499-1	Total Inc.	Total Uninc.	Total
$84	Number of Rural Communities							
N/A	1	4	20	61	2142	2229	26136	28365
se	3	4	7	30	283	285	356	456
0	39	148	209	454	2541	3391	744	4135
se	11	20	24	52	304	311	207	373
1-500	230	294	423	856	2887	4690	896	5586
se	12	21	27	58	304	311	212	377
501-100	25	85	143	289	2552	3096	588	3684
se	5	15	21	42	261	266	160	310
1001-2000	1	20	34	86	1897	2037	1052	3089
se	0	6	11	22	253	254	182	312
G.T. 2000	0	7	7	74	518	606	301	907
se	0	4	5	28	173	175	90	197
TOTAL	296	557	837	1821	12538	16049	29717	45766

TABLE 4A. 1980 REGIONAL AVERAGE PER CAPITA BACKLOG

Census Region	North East	North Central	South	West	Total
$84	Number of Rural Communities				
N/A	1966	16833	7826	1740	28365
se	208	313	246	76	456
0	546	2233	822	535	4135
se	128	301	171	60	373
1-500	536	1953	2336	760	5586
se	138	254	233	63	377
501-1000	712	805	1840	327	3684
se	164	178	188	47	310
1001-2000	924	1344	582	239	3089
se	167	236	107	51	312
G.T.2000	282	453	159	13	907
se	96	159	66	5	197
TOTAL	4966	23621	13566	3613	45766

N/A - Not applicable, no treatment req'd or provided by others

Source: EPA Need Survey, 1982 Excludes Alaska and Hawaii

APPENDIX A continued

TABLE A5. 1978 AVERAGE COMMUNITY PER CAPITA BACKLOG

COMM. CLASS $84	50000-20000	19999-10000	9999-5500	5499-2500	2499-1	Total Inc.	Total Uninc.	Total
	Number of Rural Communities							
N/A	2	11	28	52	2018	2111	27381	29492
se	2	6	10	28	252	254	291	386
0	66	147	180	409	2490	3293	374	3667
se	13	20	24	52	328	333	136	360
1-500	183	262	429	794	2657	4325	258	4583
se	13	21	28	57	306	313	95	327
501-1000	32	94	129	321	1813	2388	418	2806
se	7	15	20	44	232	237	148	280
1001-2000	14	36	51	148	2453	2701	973	3673
se	5	9	12	29	278	280	176	331
G.T. 2000	0	7	20	97	1108	1232	313	1545
se	0	4	8	30	227	229	81	243
TOTAL	296	557	837	1821	12538	16049	29717	45766

TABLE 6A. 1978 REGIONAL AVERAGE PER CAPITA BACKLOG

Census Region $84	North East	North Central	South	West	Total
	Number of Rural Communities				
N/A	2436	16730	8460	1866	29492
se	232	256	157	71	386
0	397	1938	863	469	3667
se	109	297	162	59	360
1-500	441	1912	1530	701	4583
se	107	251	171	60	327
501-1000	526	589	1427	263	2806
se	161	146	171	43	280
1001-2000	888	1558	980	248	3673
se	161	259	120	42	331
G.T.2000	278	894	307	66	1545
se	85	213	77	27	243
TOTAL	4966	23621	13566	3613	45766

N/A - Not applicable, no treatment req'd or provided by others

Source: EPA Need Survey, 1982 Excludes Alaska and Hawaii

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