

Revenue  
Special Report

**SRF Bonds Provide Safe Harbor**

**Analysts**

Jason F. Dickerson  
1 212 908-0684  
jdickerson@fitchibca.com

Chad H. Farrington  
1 212 908-0886  
cfarrington@fitchibca.com

David T. Litvack  
1 212 908-0593  
dlitvack@fitchibca.com

**Fitch IBCA-Rated Revolving Funds**

**Cross-Collateralized Clean/Drinking Water SRFs**

Arizona .....	AA+
Colorado .....	AAA
Indiana .....	AAA
Massachusetts (Series 2-5).....	AAA
Minnesota .....	AAA
Missouri .....	AAA
New Jersey.....	AAA
New York (Pooled Issues).....	AAA

**Clean Water SRFs**

Connecticut .....	AAA
Maryland.....	AA
Rhode Island .....	AAA
Texas (SRF Senior Lien).....	AAA
Virginia .....	AAA

**Drinking Water SRF**

Kansas.....	AA-
-------------	-----

**Single-Borrower SRF Bonds**

Massachusetts	
Massachusetts Water Resources Authority (Subordinate).....	AA+
New Bedford (Series 1998A) .....	AA
South Essex Sewerage District .....	AA
New York	
New York City Water Authority (Except Series 1991 A and E).....	AA+

**Other Municipal Loan Pools**

New Mexico Finance Authority Public Project Revolving Fund.....	AA-
Ohio Water Development Authority Community Assistance Program.....	A+
Oregon Bond Bank Water and Public Work Funds.....	AA-
Pennsylvania Pennvest Loan Pool.....	AAA
Wisconsin Clean Water Fund.....	AA+
SRFs – State revolving funds.	

**Summary**

Leveraged state revolving funds (SRFs), which issue bonds to fund loans to water and sewer utilities in the U.S., have lent more than \$11 billion since 1987. Fitch IBCA rates bonds of 22 federally capitalized SRFs. Debt for all but four of these statewide loan pools is now rated ‘AAA’, due primarily to SRFs’ key structural features — substantial reserves and excess cash flows allowing bond payment even during periods of unprecedented pledged loan defaults. Ratings in the sector have risen since the mid-1990s due to SRFs’ increasing levels of loan pool diversification, longer histories of strong management, nearly flawless loan performance, and new rating guidelines consistent with those used in collateralized loan pool and financial guarantor analysis.

**Introduction of the Fitch IBCA SRF Strength Index:** The Fitch IBCA SRF Strength Index, described on pages 8–10, will allow investors to track cash flow and reserve coverage, loan quality, borrower concentration, and other credit trends among SRFs and municipal loan pools issuing ‘AAA’ rated bonds. The index gauges the margin by which the bonds pass Fitch IBCA’s ‘AAA’ SRF stress test. It measures the percentage of loans that can default for four years without causing an SRF bond default divided by the percentage of defaults assumed in the ‘AAA’ stress test. Current scores range from 135% for the Rhode Island Clean Water Finance Agency (meaning default tolerance totals 1.35 times the ‘AAA’ stress test requirement) to 656% for the Massachusetts Water Pollution Abatement Trust. Fitch IBCA plans to update the index annually, allowing quantitative long-term tracking and comparison of credit trends among ‘AAA’ SRFs, including advance indication in the highly unlikely event of credit deterioration.

The strength index illustrates the superior credit quality of all ‘AAA’ rated SRF and related debt. Rhode Island’s ‘AAA’ rated SRF bonds, with the lowest strength index score due to the large portion of its loans made to one borrower, could withstand municipal defaults 950 times the historical level revealed in Fitch IBCA’s recent default study. Even in large, diverse loan pools, Fitch IBCA’s ‘AAA’ stress test currently assumes defaults of speculative grade loans at about 800 times historical loss levels. Most SRF loans are secured by low-risk general obligation and water/sewer revenue pledges; thus, most SRFs have never experienced a permanent loan loss or a materially late loan payment. Fitch IBCA may revise its SRF stress tests in the coming months as its study of default risk continues. Likely rating effects, if any, would be positive.

**States Have Designed Well Capitalized Loan Pool Structures:** States have taken advantage of the flexibility granted by Congress and the U.S. Environmental Protection Agency (EPA) to develop and reinvent SRFs that serve environmental needs with low-cost capital for utilities while preserving impressive credit strength. Reserves and excess

cash flows funded from EPA and state SRF capitalization grants are primarily responsible for the sector's superior ratings and remain substantial despite high loan demand in some states. Overall capitalization levels, typically 33%–70% of SRF bonds outstanding, well exceed those of the 'AAA' rated municipal bond insurers, for which the average ratio of claims-paying resources to insured par is 47:1. However, single-state SRFs lack the portfolio diversity, capital raising capacity, and ability to turn away speculative credits that private bond insurers possess.

**Drinking Water Funds Prove Beneficial to Credit Quality:** The initiation of drinking water SRFs (DWSRFs), authorized in 1996 following the successful first decade of clean water SRFs (CWSRFs), has proven beneficial to the sector's credit quality, contrary to the expectations of some in the industry. As expected, average loan pool credit quality for the DWSRFs is weaker than that of existing CWSRFs due to increased lending to small systems. However, legally combining, or cross-collateralizing, the new DWSRFs' substantial assets with those of the mature CWSRFs has allowed some states to compensate for this credit risk. Cross-collateralization has dramatically increased the rate of loan pool diversification in some states as demand from new DWSRF borrowers expands the existing CWSRF loan pools. By doing this, states lessen the risk that any one borrower's distress would threaten overall financial integrity of an SRF.

**Other Creative Elements of State Loan Programs:** Structural improvements coinciding with the advent of DWSRFs are just one example of how states have creatively developed the programs. States have also helped sustain successful loan performance in the programs by encouraging financial discipline in small systems and taking action to prevent isolated borrowers' difficulties from becoming concerns for SRF bondholders. By structuring the programs to focus low-cost capital on localities with large Clean Water Act capital needs, some states have bolstered the credit quality of municipal wastewater utilities during heavy debt issuance in the 1990s. SRFs have aided utilities in the Boston, Kansas City, New York, Providence, Houston, and metropolitan Washington, D.C. areas in this manner. Massachusetts gained EPA approval in 1998 to extend some SRF loans from 20–30 years to relieve the financial impact on communities facing intense capital pressures.

**Revolving Funds Well Positioned to Meet Future Demands:** Well into the second decade of the SRF programs, states continue to innovate. Several, including Arizona, Minnesota, New Jersey, and New

York, are extending their expertise in underwriting loans to small municipal and private utilities, now eligible for DWSRF funding. Environmental demands from these utilities are growing. Moreover, environmental priorities are shifting in many states to include combined sewer overflow remediation and the abatement of watershed pollution from a broad array of private sector and residential land users, including agricultural and industrial enterprises. The degrees to which states and the EPA mandate capital improvements for these problems and SRFs are a part of the financing strategy that will affect credit quality in the coming decades. SRFs, with their very high collateralization levels, are well positioned for the demands from a credit perspective.

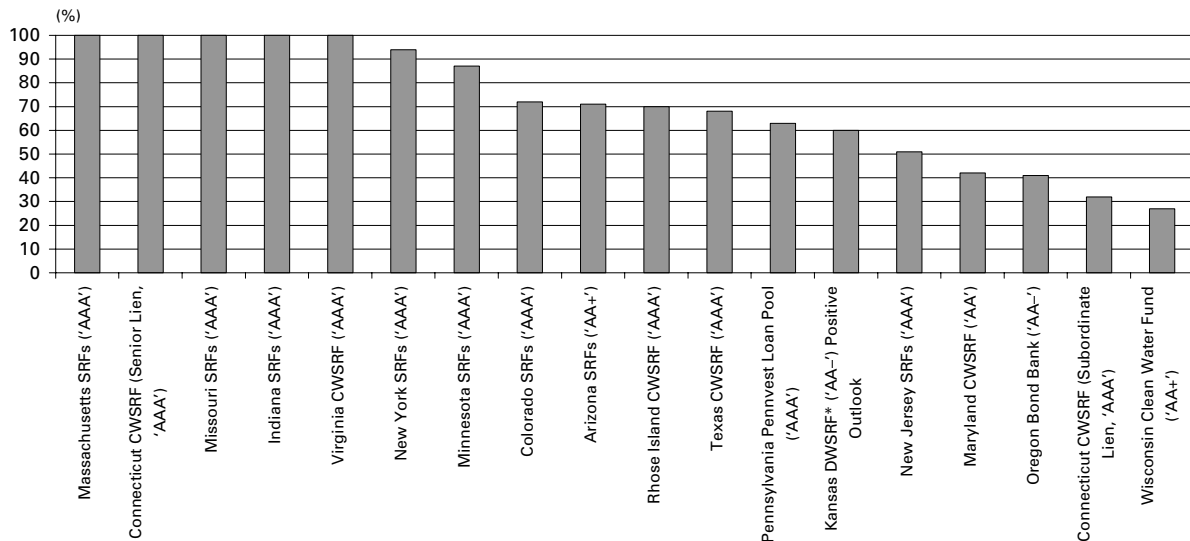
**Fitch IBCA Experience in Analyzing Sector:** Fitch IBCA rates bonds of 27 separately capitalized SRFs and other similar loan pools in 19 states. Fitch IBCA's analysis of the debt incorporates criteria and expertise related to structured and traditional municipal finance transactions. A variety of important credit issues are considered with each rating — loan pool structure, management, loan underwriting and due diligence guidelines, and investment practices. In addition, Fitch IBCA's stress test simulates the ability of loan pools to withstand unprecedented loan defaults. In general, higher rated bonds must be able to withstand more stress.

## ■ Revolving Fund Structures

**Two Basic Structures, One Credit Standard:** Leveraged loan pool programs, such as SRFs, vary from state to state. SRF structures differ due to the flexibility granted by Congress and the EPA to states for design programs that suit their unique demands and resources. While each program is different, two basic structures — the reserve fund and cash flow program models — have evolved. Fitch IBCA's rating guidelines apply similar standards to each, particularly in terms of the stress test, to ensure rating comparability throughout the sector. 'AAA' rated municipal loan pools include reserve structures in Colorado, Connecticut, Indiana, Massachusetts, Missouri, New York, Rhode Island, and Virginia; cash flow structures in New Jersey, Pennsylvania, and Texas; and a hybrid structure in Minnesota.

Both structures accomplish states' dual goals of accommodating environmental demand and providing strong bondholder security by using EPA capitalization grants and/or state matching moneys to generate significant subsidies for local borrowers while simultaneously pledging them to bondholders to cover potential loan defaults. In both, bond-funded loan repayments constitute principal bond security, which is

**Benchmark Four-Year Loan Default Tolerance**



\*Leveraged bonds. SRFs – State revolving funds. CWSRF – Clean water SRF. DWSRF – Drinking water SRF. Note: Benchmark default tolerance statistics used in stress tests are typically for the initial four years of reserve fund SRF bonds, since repeated issuance at the same leveraging rates should restore reserves to the same percentage of outstanding par, or the four years with the lowest projected coverage for cash flow SRFs.

supplemented, if needed, by reserves or excess cash flows. In non-SRF leveraged loan pools, states use alternative capitalization sources since SRF funds may only be used for prescribed purposes under federal and state laws.

**Reserve Fund SRF Structure:** In a reserve fund structure, bond proceeds fund loans to utilities, while federal capitalization grants and state matching funds are placed into reserve funds. Reserves are typically invested in collateralized guaranteed investment contracts (GICs) with highly rated financial institutions. GIC earnings subsidize loan interest rates, thereby enhancing local utilities’ access to capital. The GIC reserve corpus would be available to cure loan defaults, if needed, producing very high loan default tolerance.

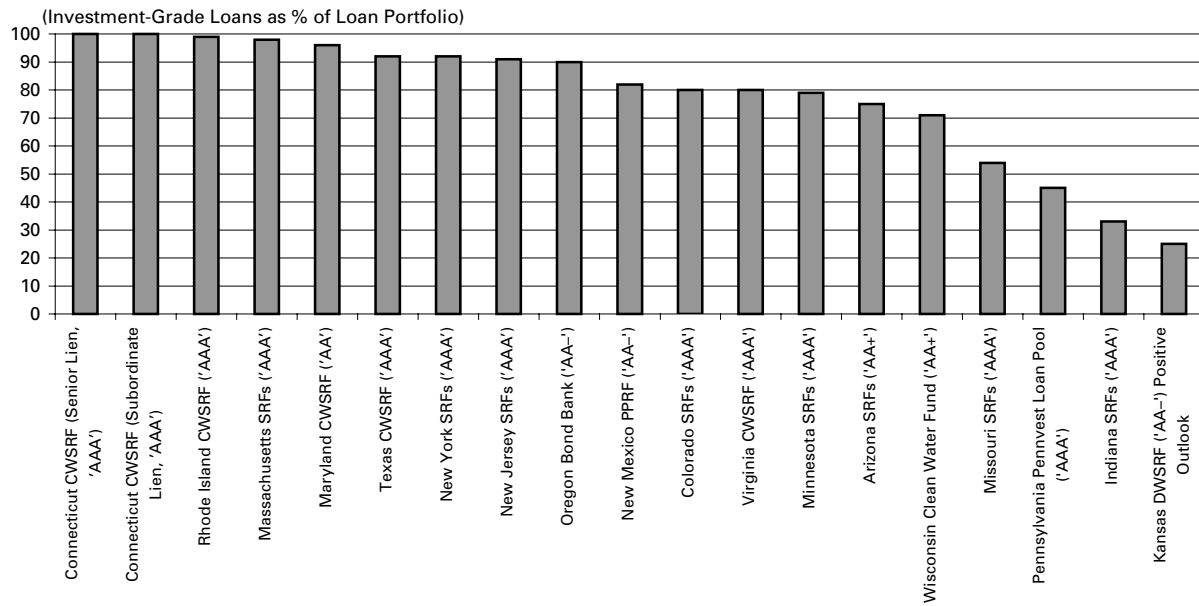
Reserves are generally released from the GIC as bonds amortize so that they are constantly maintained at an established percentage of bonds outstanding. Once released, reserves can be recycled to fund new loans in one of two ways — either by placing them in a new GIC against which new debt is issued or by lending the released funds directly to eligible utilities. States could increase their rates of program leverage by reducing reserve levels over time if loan demand outpaced available SRF funds. This credit risk for

reserve fund SRFs is mitigated by the fact that reserve levels must be maintained to sustain historical loan subsidy rates. In some cases, with reserve and cash flows models, additional parity issuance is prohibited if it would result in downgrades by one or more rating agencies. Bond indentures of Indiana’s SRFs prohibit reductions of reserve levels that would threaten the state’s ‘AAA’ SRF bond ratings.

**Cash Flow SRF Structure:** In cash flow structures, loan financing comes from bond proceeds and loan pool capital, such as EPA SRF capitalization grants and state matching moneys. All loan repayments are pledged to bondholders so that pledged revenues cover debt service needs by a large margin. Unlike typical municipal revenue bonds, excess coverage often can lead to an ‘AAA’ rating since cash flows derive from multiple repayment sources instead of a single bond obligor. Structures typically include coverage tests as preconditions for parity bond issuance.

**State Choices Reflect Public Policy Demands:** States typically use either the reserve fund or cash flow structure as the model for their CWSRF and DWSRF programs, although Kansas and Minnesota now utilize one structure for their CWSRF program and the other one for the DWSRF. In 1999, the

**Estimated Investment-Grade Participation in Loan Portfolios**



CWSRF – Clean water state revolving fund. PPRF – Public project revolving fund. DWSRF – Drinking water SRF.

Water Infrastructure Finance Authority (WIFA) of Arizona restructured its SRF bonds from a reserve fund to a cash flow model, believing that the latter would give the state more flexibility to accommodate intense loan demand in a timely manner. States sometimes choose to avoid reserve fund models, in part, because excess funds must be invested in GICs, often with out-of-state or international providers, instead of in the state’s own infrastructure. However, highly rated GICs provide exceptionally stable revenues to subsidize local borrowers’ loan rates over time.

**■ Characteristics of ‘AAA’ State Revolving Funds**

**Substantial Current and Future Overcollateralization:** ‘AAA’ rated bonds of SRFs and other loan pools are overcollateralized by reserve funds and/or excess cash flows funded from state and federal capitalization grants. This is the key structural feature that has led to the sector’s credit health.

Overcollateralization means that pledged resources exceed projected debt service liabilities, allowing continued bond performance even if loans were to default at many times above historical levels (see *Fitch IBCA’s Municipal Loan Pool Stress Test*, page 11). Reserve fund structures typically maintain reserves at 33%–50% of par, and repayment and other revenues

usually cover debt service requirements by more than 1.5 times annually in cash flow models. Fitch IBCA’s SRF stress test not only considers the level of bondholder protection provided by this overcollateralization and resulting loan default tolerance, but also the underlying quality and diversity of the loan portfolio. Leveraged loan pool bonds must be overcollateralized more highly when their borrowers are of lower credit quality or diversity.

The stress test is used to consider the current overcollateralization of SRFs, as well as their prospective overcollateralization relative to projected future loan demand. Even if an SRF possesses enough overcollateralization to pass a stress test at the time of issuance, this does not guarantee that it will pass the test in the future. For example, bonds of Arizona’s SRFs currently pass Fitch IBCA’s ‘AAA’ stress test by a wide margin, but they are carrying the slightly lower ‘AA+’ rating in 1999 because coverage may fall from its current 1.7x annual level closer to the 1.2x minimum coverage requirement given strong loan demand relative to available funds. Bonds of the Oregon Bond Bank and New Mexico Finance Authority loan pools are also assigned lower ratings than indicated by their current stress test performance due to likely additional leveraging of loan pool resources and the possibility that lending to lower quality borrowers could increase.

In contrast, the Texas Water Development Board's senior lien CWSRF bonds maintain 'AAA' credit quality despite the state's plans to decrease coverage as it accommodates substantial loan demand. Fitch IBCA's stress tests indicate that excess cash flows for Texas' CWSRF could decline more than 20% and remain reasonably consistent with the 'AAA' rating category, a fact consistent with the structure's high current score on the SRF Strength Index.

**Strong Loan Underwriting Guidelines:** 'AAA' rated loan pools distribute most of their funds to municipal borrowers that provide a general obligation or water/wastewater revenue pledge as repayment security. In some cases, additional enhancements, such as a bond insurance policy or a commitment to intercept available state aid payments due to the locality, are also a component of loan security. These types of municipal securities rarely default, particularly when they exhibit characteristics associated with municipal finance's traditional investment-grade rating categories (*see Fitch IBCA Research on "Municipal Default Risk," dated Sept. 15, 1999, available on Fitch IBCA's web site at [www.fitchibca.com](http://www.fitchibca.com)*). Even when loans are not consistent with the investment-grade designations because of the narrowness or weakness of underlying economic bases, the repayment pledges provide strong long-term security. On the rare occasion when these securities experience debt repayment interruptions, recovery of delinquent revenues usually follows due to the ongoing essential nature of the service provided. While SRFs were initiated, in part, to provide small systems traditionally unable to access the public debt markets with low-cost capital, this strong historical record bodes well for SRF bondholders.

In addition to these prevailing municipal security pledges, as well as alternative local pledges (special assessments, sales taxes, and fuel taxes, among others) in some 'AAA' rated revolving fund bonds, New Jersey's DWSRF has initiated lending to highly rated investor-owned utilities that provides drinking water to much of the state's population. Lending to these regulated utilities with strong franchises does not pose a threat to 'AAA' ratings in the sector.

While general obligation or system revenue pledges predominate among loan pools with 'AAA' rated bonds, estimated rating distributions of the loan portfolios vary. Bonds backed by lower quality loan pools must devote greater reserves or cash flows to achieve 'AAA' credit quality. For example, SRFs and other loan pools backing 'AAA' rated bonds in Indiana, Missouri, and Pennsylvania have loan portfolios with 30%–55% investment-grade

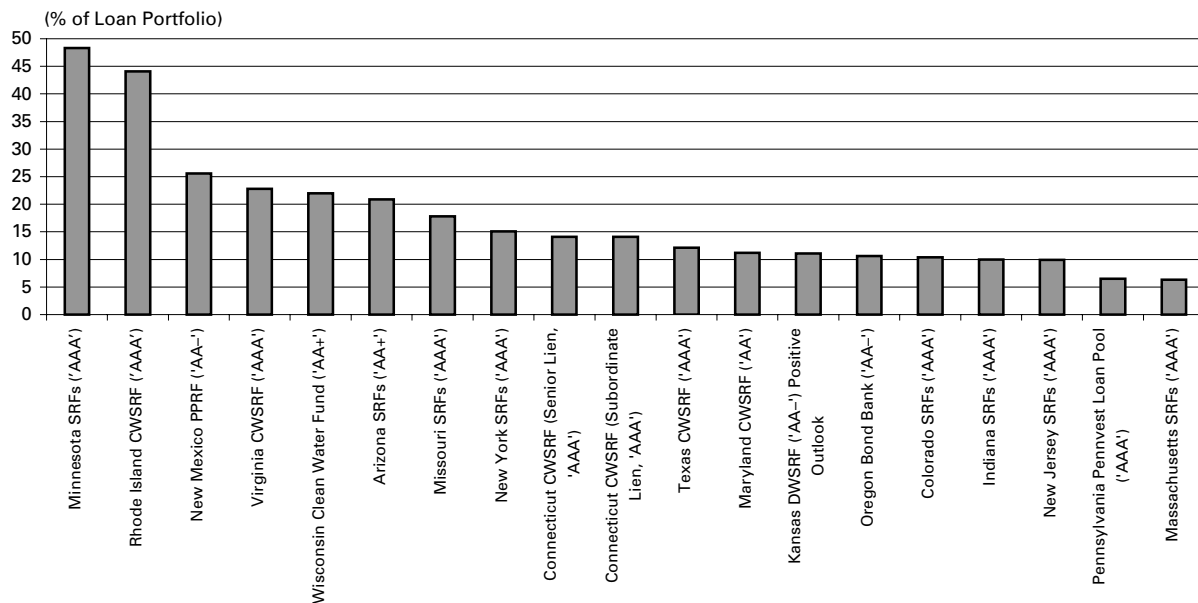
participation, levels consistent with several 'AA' rated SRFs and loan pools (*see chart, page 4*). These programs' bonds achieve 'AAA' credit quality by maintaining particularly large reserve funds or excess cash flows to offset their loan quality weaknesses. In Indiana, SRF program assets are nearly 200% of projected liabilities, Missouri's SRF loan reserves equal up to 70% of associated outstanding bonds, and projected Pennsylvania Pennvest Loan Pool Program cash flows are 2.37x annual debt service requirements.

Lending of SRFs and related governmental entities is inevitably driven by environmental policy and, on occasion, political considerations. In contrast, bond insurers have strong incentives to maintain stringent underwriting standards to prevent losses that would endanger their ratings, market position, and profitability. Revolving funds cannot manage the credit quality of their loan portfolios as cautiously as the bond insurers control their books of business. Nevertheless, 'AAA' rated SRFs tend to establish fairly strong underwriting procedures and collaborate with potential borrowers to strengthen repayment pledges, when needed.

Loan underwriting skills will prove important as more SRF loans go to small private utilities, including those of neighborhood associations, mobile home communities, summer camps, and retirement communities, among others. To provide needed environmental financing to such entities, loan pool management must be able to structure loans with multiple security protections suited to the individual borrower's unique operating environment, such as segregated debt service charges on customer bills, lock box financial arrangements, and liens on system assets or personal property. Some states are utilizing local banks for loan underwriting purposes or pairing with the financial institutions to finance portions of the environmental loan. Others may protect bondholders of their statewide municipal loan pools from credit risk by initiating loans to private systems directly from capitalization funds without issuing bonds.

**Considerable Borrower Diversity:** 'AAA' rated SRF and related bonds benefit from considerable diversity in their borrower pools. The more diverse a loan pool, the less likely its financial strength is to be compromised by the distress of any single borrower. For example, because of its ongoing and prospective diversification, Kansas' DWSRF, now rated 'AA-', carries a positive long-term credit outlook. In three other SRFs (Minnesota, Missouri, and New Jersey), loan pool diversity, proactive remedial measures, and other structural protections have preserved 'AAA' bond ratings despite difficulty with the following

**Largest Borrowers in SRF and Other Municipal Loan Pools**



SRFs – State revolving funds. CWSRF – Clean water SRF. PPRF – Public project revolving fund. DWSRF – Drinking water SRF.

borrowers, respectively: Cambridge, MN (suffering from financial troubles); Branson, MO (whose loan repayment source was invalidated by a court); and Camden, NJ (which filed for bankruptcy protection in July 1999). Each accounted for no more than 1.0% of their respective SRF portfolios. Leveraged SRFs’ default tolerance amply exceeds this level.

Cross-collateralization of DWSRF and CWSRF assets for bond security purposes can improve SRF diversification rates considerably. In Colorado, the DWSRF alone consisted of 25 leveraged and direct loan borrowers in 1998, when its bonds were rated ‘AA’. Following the cross-collateralization of DWSRF reserves with those of the existing, mature Colorado CWSRF in 1999, the combined loan pool expanded to 79 borrowers. The added loan pool diversification was a major consideration when Fitch IBCA upgraded the DWSRF bonds to the highest rating category.

In addition to cross-collateralization, some SRFs encourage loan pool diversification with aggressive marketing to encourage localities to explore SRF financing options. The EPA encourages this practice, since it has expressed concern with the perceived slow pace of lending in some states. When individual localities’ needs resulted in large loan demand that would have harmed diversification efforts, SRFs in

Colorado and Texas encouraged borrowers to acquire ‘AAA’ rated bond insurance policies for SRF loans, and the Rhode Island Clean Water Finance Agency plans to do so to preserve its ‘AAA’ rating despite increasing future lending to the Narragansett Bay Commission, the Providence area wastewater treatment utility. The Indiana Bond Bank may acquire insurance for future SRF loans to Indianapolis. Other states have initiated separate single-borrower bond indentures, such as Massachusetts and New York for their large urban utilities, to avoid very large single risk concentrations in their loan portfolios.

Fitch IBCA uses several measures of loan pool diversity. The size of loan pools backing ‘AAA’ rated bonds ranges from 17 for Rhode Island’s CWSRF to 350 for Pennsylvania’s Pennvest Loan Pool Program. The largest borrowers range from Massachusetts’ Lynn Water and Sewer Commission (6.2% of the SRF’s pledged loans) to the Metropolitan Council of Minnesota’s Twin Cities, whose own superior credit quality anchors the SRFs there with 48.3% of pledged loans. Fitch IBCA’s stress test assumes a 100% four-year default rate by any pool’s largest borrower when its rating is lower than that of the SRF. On average, less diversified loan pools must have larger reserves or excess cash flows to earn ‘AAA’ bond ratings.

## Issuers of SRF and Other Municipal Loan Pool Debt

Loan Pool	Name of Issuer
Arizona SRFs ('AA+')	Water Infrastructure Finance Authority of Arizona
Colorado SRFs ('AAA')	Colorado Water Resources and Power Development Authority
Connecticut CWSRF ('AAA')	State of Connecticut
Indiana SRFs ('AAA')	Indiana Bond Bank
Kansas DWSRF ('AA-')	Kansas Development Finance Authority
Maryland CWSRF ('AA')	Maryland Water Quality Finance Administration
Massachusetts SRFs ('AAA')	Massachusetts Water Pollution Abatement Trust
Minnesota SRFs ('AAA')	Minnesota Public Facilities Authority
Missouri SRFs ('AAA')	Missouri Environmental Improvement and Energy Resources Authority
New Jersey SRFs ('AAA')	New Jersey Environmental Infrastructure Trust
New Mexico PPRF ('AA-')	New Mexico Finance Authority
New York SRFs ('AAA')	New York State Environmental Facilities Corp.
Oregon Water and SPWF Funds ('AA-')	Oregon Bond Bank
Pennsylvania Pennvest Loan Pool ('AAA')	Pennsylvania Infrastructure Investment Authority
Rhode Island CWSRF ('AAA')	Rhode Island Clean Water Finance Agency
Texas CWSRF ('AAA')	Texas Water Development Board
Virginia CWSRF ('AAA')	Virginia Resources Authority
Wisconsin Clean Water Fund ('AA+')	State of Wisconsin

SRFs – State revolving funds. CWSRF – Clean water SRF. DWSRF – Drinking water SRF. PPRF – Public project revolving fund. SPWF – Special public works fund.

Massachusetts and Wisconsin general obligations represent a large portion of pledged funds in their respective loan pools — more than any single municipal borrower. Concentration risk related to the state's large financial participation is considered in the rating process but is not a major stress test factor, even when states are rated one to two rating notches below their respective SRFs. Defaults by states on their general obligations are virtually non-existent historically, with the last one occurring during the Great Depression when Arkansas defaulted. Even if defaults did occur, Fitch IBCA believes they would be very short and followed by prompt curative action and payment recovery. Given their high levels of collateralization, most SRFs could likely withstand such temporary payment defaults, even in a severe stress scenario.

### Strong Management Policies and State Support:

The size and scope of maturing SRF programs necessitates very strong management practices. SRFs have developed sophisticated systems to oversee borrowers' fiscal health and track loan repayments. Interagency agreements and contracts often delegate specific management tasks, such as investments, loan disbursements, environmental priority determinations, and engineering reviews, to organizations best suited to fulfill them.

Numerous examples exist of strong management practices that contribute to 'AAA' revolving fund ratings. Texas regularly updates a detailed 22-year cash flow forecasting model, and other states use software models promoted by the EPA. In Colorado and New Jersey, existing oversight agencies for local and

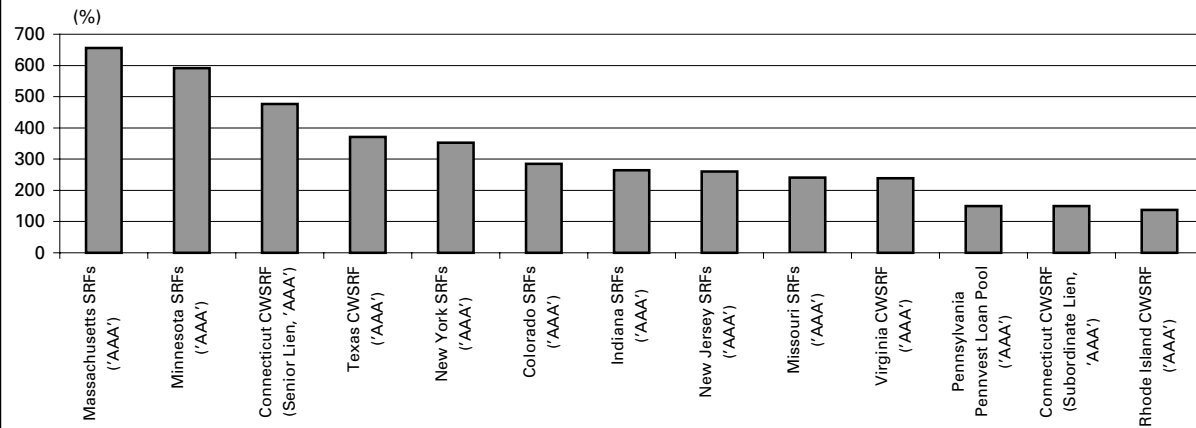
private utility finances participate in loan underwriting processes. In Pennsylvania, an independent accounting firm conducts ongoing credit assessments of all loan recipients. Increasingly, as in Connecticut and Pennsylvania, automatic clearing houses and other electronic media are used to transfer loan payments directly to state agencies or bond trustees.

States with highly rated SRFs and other loan pools are committed to their financial health. State commitment to SRF programs begins with the federal requirement that they contribute 20% matching funds of EPA grants designed to capitalize SRFs for perpetuity. By contributing financially, states increase their incentives to preserve the financial integrity of these critical infrastructure programs. Missouri demonstrated its commitment with swift administrative, gubernatorial, and legislative action to correct the invalidation of Branson's SRF loan pledge in 1997, and Minnesota provided additional financial support to aid Cambridge in 1996. Massachusetts provides substantial additional resources to subsidize SRF loans through contract assistance payments that are a state general obligation, and Connecticut funds more than its requirements through a similar mechanism. Laws in Massachusetts, Missouri, New Jersey, New York, and Virginia enable SRFs to intercept available state aid to cover delinquent loan payments.

Strong state commitment is also evident for SRFs and other loan funds issuing bonds rated in the 'AA' category. Like Massachusetts, Wisconsin provides substantial annual payments to subsidize local borrowing through its 'AA+' rated Clean Water Fund. New Mexico has capitalized its 'AA-' rated

**Fitch IBCA SRF Strength Index Scores — ‘AAA’ Rated Loan Pools**

(As of October 1999)



CWSRF – Clean water state revolving fund (SRF). Note: 100% is the theoretical minimum score for ‘AAA’ rated SRFs in which default tolerance equals stress test requirements.

Public Project Revolving Fund by pledging a gross receipts tax to supplement local borrower loan payments. Some Oregon Bond Bank loan programs, whose bonds are rated ‘AA–’, were capitalized by appropriations of state lottery revenues.

**Conservative Investment Practices:** SRF investment practices are strong across the board, with the largest portion of invested funds, principally bond reserves, placed in collateralized GICs with highly rated financial institutions. In its stress test, Fitch IBCA gives full credit for investments with ratings equal to or higher than the SRF bonds’ ratings. If a GIC provider’s long-term rating is below the bond rating, full credit can still be given if the provider carries Fitch IBCA’s highest short-term rating (‘F1+’) and the issuer can replace the provider on short notice. In addition to investment provider credit quality, the agreements’ collateralization, typically by U.S. Treasury instruments, provides bondholders with additional protection, although collateral could be delayed before passing to bondholders in the event of the provider’s bankruptcy or insolvency.

■ **Fitch IBCA SRF Strength Index**

**Purpose:** Fitch IBCA’s new SRF Strength Index provides investors with a tool to gauge the characteristics of ‘AAA’ rated loan pool bonds relative to those of their peers and to track these characteristics over time. While rating trends are stable, the index is designed to provide analysts and investors with a quantified indicator of ‘AAA’ rated revolving funds that may be decreasing their overcollateralization rates,

increasing loan portfolio concentration, or changing underwriting patterns. Annual fluctuations will be typical; serious downward trends can be judged only over the long term.

**Description:** The SRF Strength Index is a single quantitative score for ‘AAA’ rated statewide loan pool programs that reflects their pledged resources relative to expected losses in a severe economic downturn, adjusted for the loan pool’s credit quality, diversity, and security. The level of expected losses is determined by Fitch IBCA’s SRF stress test. A program’s SRF Strength Index score is the percentage by which its bonds’ benchmark four-year loan default tolerance exceeds that required by Fitch IBCA’s ‘AAA’ stress test. (For example, Massachusetts SRF bonds can withstand four-year defaults by 100% of its loan portfolio, while the ‘AAA’ stress test assumes default losses of 15.25%. Thus, the SRFs’ strength index score is 656%, or 100 divided by 15.25.) By utilizing the results of the stress test, the index score reflects variables representative of each factor considered in Fitch IBCA’s rating guidelines — overcollateralization, loan quality and diversification, and investment practices. The SRF Strength Index score will fluctuate as each loan pool changes with regard to these rating factors.

**Methodological Notes:** Over time, Fitch IBCA can update the SRF Strength Index regularly to track trends in the public sector. Fitch IBCA will attempt to note when methodological adjustments, rather than

real credit changes, alter results. Year-to-year results for a particular program may not be comparable if Fitch IBCA has recently rated a borrower for the first time. Often, when Fitch IBCA does not rate an entity, it uses shadow ratings, or credit quality estimates, based on available information, ratings of other nationally recognized rating agencies, or the existence of bond insurance on parity or related debt (indicating investment-grade quality). When issuers improve reporting practices, results can be altered if it causes Fitch IBCA to change shadow ratings for borrowers or provides more accurate estimates of structural default tolerance.

Methodological fluctuations are reduced because Fitch IBCA conducts thorough shadow rating reviews of borrowers exceeding 10% of SRF loan portfolios when they are not rated by Fitch IBCA. If other rating agencies rate borrowers in different rating categories, Fitch IBCA typically assumes the lower as its shadow rating.

In September 1999, Fitch IBCA published a study of historical default risk in the municipal market (*see Fitch IBCA Research on "Municipal Loan Default Risk," dated Sept. 15, 1999, available on Fitch IBCA's web site*). Water/sewer debt, which comprises the bulk of SRF loans, was shown to be the least risky, with cumulative default rates of 0.04%. Most other SRF loans are backed by general obligation pledges, considered to be even more secure. Fitch IBCA may adjust SRF stress tests in future months considering the study's findings. Rating effects, if any, would likely be positive. Fitch IBCA will also apply the study's results to determine appropriate rating ranges for various categories of municipal debt. These reviews will likely result in revisions on some ratings of individual local issuers, which could affect SRF ratings by extension. SRF Strength Index results will change to reflect the rating criteria modernization.

## ■ Strength Index Results

**Massachusetts:** SRF cash flows exhibit very strong credit quality due to substantial state general obligation contributions and fairly strong provisions to intercept state aid to communities if needed to cover a default. Leveraging demands from a new 30-year CWSRF loan program and the new DWSRF may push SRF Strength Index scores somewhat lower in future years. 'AAA' credit strength should be preserved (score: 656%).

**Minnesota:** Minnesota SRF debt scores exceptionally high due to the loan portfolio's dominance by the Metropolitan Council, the Twin Cities' service provider rated 'Aaa' by Moody's and 'AAA' by Standard and Poor's (score: 592%).

**Connecticut:** Connecticut's contributions to its CWSRF far exceed federal requirements, the loan portfolio exhibits above-average credit quality, and the subordination of refunding debt strengthens senior lien collateralization levels (score: 476% senior lien; 150% subordinate lien).

**Texas:** The Texas Water Development Board's senior lien SRF debt benefits from the extraordinary 55% of its loans insured by 'AAA' rated financial guarantors. Loan interest rate guidelines create incentives for borrowers to seek insurance to maximize their loan subsidy. These incentives are expected to continue and offset some negative effects of plans to decrease debt service coverage so that the state can meet strong loan demand (score: 371%).

**New York:** Diversifying impressively in recent years with the introduction of a DWSRF, New York's SRFs benefit from extremely strong and experienced management (score: 352%).

**Colorado:** About 15% of current loans exhibit 'AAA' quality due to their insurance by monoline financial guarantors. This proportion will decrease, as the SRFs' recently upgraded 'AAA' ratings lessen incentives to seek such policies. However, 'AAA' caliber collateralization should be maintained through the reserve fund structure (score: 281%).

**Indiana:** Currently, Indiana's SRF reserves far exceed indenture requirements, which stipulate that these invested funds may not be reduced if the SRF debt's outstanding ratings would be affected. Thus, although SRF Strength Index scores may decline with future increases in demand that necessitate additional leveraging of SRF capital, 'AAA' security will likely be maintained due to the indenture provision (score: 265%).

**New Jersey:** Initiation of more loans to private drinking water utilities will probably contribute to decreased scores in future years, as Fitch IBCA stress tests assume higher default rates for such debt. Nevertheless, strong underwriting practices should preserve the superior 'AAA' credit quality (score: 260%).

**Missouri:** Missouri's SRFs are marked by increasing loan pool diversification and the maintenance of very strong reserve levels, particularly for the CWSRF. Missouri's DWSRF is also expected to initiate private drinking water loans, including some to highly rated utilities. (score: 241%).

**Virginia:** In October 1999, Virginia's CWSRF became the first SRF to earn a natural 'AAA' rating on its initial debt offering. Debt issuance for the pool's largest borrower, the Alexandria Sanitation Authority (ASA), should continue at a rapid pace over the short term, as a massive upgrade to reduce Chesapeake Bay watershed pollution by one of ASA's plants is under way. Fitch IBCA expects the Virginia Resources Authority's strength index score to fall for the next several years as a result but remain above the 'AAA' requirements (score: 239%).

**Pennsylvania:** Extremely strong cash flow levels, borrower surveillance mechanisms, and diversification offset low portfolio credit quality. Modest future issuance needs, due to the use of the separate SRFs to fund most municipal needs, and a conservative

additional bonds test heighten the likelihood of future SRF Strength Index stability (score: 150%).

**Rhode Island:** The Rhode Island Clean Water Finance Agency's intention to seek 'AAA' rated bond insurance on some future loans to the Narragansett Bay Commission, which has large combined sewer overflow remediation needs, should keep the SRF's score fairly stable over time. Reserves are significant, and borrower credit quality is high (score: 137%).

## Fitch IBCA State Revolving Fund Stress Tests

(%, Annual Loan Repayment Default Rates During Severe Four-Year Recession)

### Loans Backed by Local General Obligation Pledges

Loan Rating	Stress Test Severity			
	'BBB'	'A'	'AA'	'AAA'
<b>Pools of 50 or More Borrowers</b>				
Speculative/NR	26	30	34	38
'BBB'	0	8	12	16
'A'	0	0	6	10
'AA'	0	0	0	6
'AAA'	0	0	0	0

### Pools of 20–49 Borrowers

Speculative/NR	28	32	36	40
'BBB'	0	10	14	18
'A'	0	0	8	12
'AA'	0	0	0	8
'AAA'	0	0	0	0

### Pools of 10–19 Borrowers

Speculative/NR	32	36	40	44
'BBB'	0	12	16	20
'A'	0	0	10	14
'AA'	0	0	0	10
'AAA'	0	0	0	0

### Loans Backed by System Revenue or Other Local Taxes

Loan Rating	Stress Test Severity			
	'BBB'	'A'	'AA'	'AAA'
<b>Pools of 50 or More Borrowers</b>				
Speculative/NR	28	32	36	40
'BBB'	0	10	14	18
'A'	0	0	8	12
'AA'	0	0	0	8
'AAA'	0	0	0	0

### Pools of 20–49 Borrowers

Speculative/NR	30	35	40	45
'BBB'	0	12	16	20
'A'	0	0	10	14
'AA'	0	0	0	10
'AAA'	0	0	0	0

### Pools of 10–19 Borrowers

Speculative/NR	35	40	45	50
'BBB'	0	16	20	24
'A'	0	0	14	18
'AA'	0	0	0	14
'AAA'	0	0	0	0

NR – Not rated. Note: Bonds typically must continue to be paid on a timely basis under a given stress test to be eligible for assignment to that rating. The largest borrower with credit quality below the desired rating on the loan pool bonds is generally assumed to default 100% for four years during the scenarios. Default rates for loans backed by other security, state revolving fund pools smaller than 10 borrowers, and other municipal loan pools are developed on a case-by-case basis (for more information, see Fitch IBCA Research on "State Revolving Fund Rating Guidelines," dated March 18, 1998, available on Fitch IBCA's web site at [www.fitchibca.com](http://www.fitchibca.com)).

## ■ Fitch IBCA's Municipal Loan Pool Stress Test

**Purpose:** The stress test gauges the ability of loan pool resources, such as reserves or cash flows, to cover loan defaults on a timely basis during a period of unprecedented economic distress. Fitch IBCA uses it to test the overcollateralization of all municipal loan pool bonds, relative to borrower quality, diversity, and security. While the stress test is just one component of Fitch IBCA's rating process, it is particularly important in determining whether a loan pool's bonds are of 'AAA' quality. 'AAA' rated SRF or loan pool bonds always pass the 'AAA' stress test, although doing so does not guarantee receipt of the 'AAA' rating. 'AAA' rated SRF or loan pool bonds must also demonstrate that current program strength will continue in the future despite expected loan demand, management, underwriting, investment, and other policies.

**Application:** The stress test simulates a severe economic downturn lasting four years, the period during the Great Depression when bond defaults exceeded recoveries in the U.S. The simulation may be conducted at several points, if appropriate, to

account for different coverage levels throughout the life of the bonds. The higher the desired pool rating, the more stringent the level of simulated loan defaults. Full resumption of payments is typically assumed for public sector borrowers following the stress period due to the taxing power of local governments, the monopoly environment in which municipal utilities operate, and the essential services that they provide. All sources of overcollateralization are used in the scenario. Mechanisms that allow for their replenishment after defaults are typical.

**Loan Pool Characteristics:** Fitch IBCA's stress test and strength index incorporate facets of SRFs important at every stage of the rating process. By applying higher default rates to loans of lower assumed credit quality, the strength of the borrower pool is considered. Harsher loan default assumptions are applied to weaker loan securities, thus testing underwriting standards. Diversification of the loan pool is taken into account with higher default rates for smaller loan pools, as well as the standard assumption of full four-year default by the largest loan pool borrower rated below the SRF's rating.

Copyright © 1999 by Fitch IBCA, Inc., One State Street Plaza, NY, NY 10004  
Telephone: New York, 1-800-753-4824, (212) 908-0500, Fax (212) 480-4435; Chicago, IL, 1-800-483-4824, (312) 214-3434, Fax (312) 214-3110;  
London, 011 44 207 417 4222, Fax 011 44 207 417 4242; San Francisco, CA, 1-800-953-4824, (415) 732-5770, Fax (415) 732-5610  
John Forde, Publisher; Madeline O'Connell, Director, Subscriber Services; Nicholas T. Tresniowski, Senior Managing Editor; Diane Lupi, Managing Editor; Paula M. Sirard, Production Manager; Jennifer Hickey, Igor Zaslavsky, Editors; Martin E. Guzman, Senior Publishing Specialist; Harvey Aronson, Publishing Specialist; Colin Grubb, Robert Rivadeneira, Julie Taub, Publishing Assistants. Printed by American Direct Mail Co., Inc. NY, NY 10014. Reproduction in whole or in part prohibited except by permission.  
Fitch IBCA ratings are based on information obtained from issuers, other obligors, underwriters, their experts, and other sources Fitch IBCA believes to be reliable. Fitch IBCA does not audit or verify the truth or accuracy of such information. Ratings may be changed, suspended, or withdrawn as a result of changes in, or the unavailability of, information or for other reasons. Ratings are not a recommendation to buy, sell, or hold any security. Ratings do not comment on the adequacy of market price, the suitability of any security for a particular investor, or the tax-exempt nature or taxability of payments made in respect to any security. Fitch IBCA receives fees from issuers, insurers, guarantors, other obligors, and underwriters for rating securities. Such fees generally vary from \$1,000 to \$750,000 per issue. In certain cases, Fitch IBCA will rate all or a number of issues issued by a particular issuer, or insured or guaranteed by a particular insurer or guarantor, for a single annual fee. Such fees are expected to vary from \$10,000 to \$1,500,000. The assignment, publication, or dissemination of a rating by Fitch IBCA shall not constitute a consent by Fitch IBCA to use its name as an expert in connection with any registration statement filed under the federal securities laws. Due to the relative efficiency of electronic publishing and distribution, Fitch IBCA Research may be available to electronic subscribers up to three days earlier than print subscribers.