2021 REGION C WATER PLAN

Volume I. Main Report

November 2020

Prepared for the Region C Water Planning Group

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2021
REGION C
WATER PLAN

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5D.1 Recommended Strategies for Major Water Providers

5D.1.1 Dallas Water Utilities

Dallas Water Utilities (DWU) provides treated and raw water for most of Dallas County as well as several surrounding counties.

Table 5D.1 summarizes the projected demands for DWU and all existing and potential future customers. DWU is under no obligation to provide supplies for the potential future customers listed within the Region C Water Plan.

Dallas' supply is composed of several reservoirs and run-of-river diversions from the Elm Fork of the Trinity River. The system is divided into western and eastern subsystems. The western subsystem supplies Dallas' Elm Fork and Bachman water treatment plants and the eastern subsystem supplies the Eastside water treatment plant.

The City of Dallas completed an update to its Long Range Water Supply Plan[5] which was reviewed and adopted by the Dallas City Council on October 8, 2014. At the direction of Dallas, all of the recommended and alternative water management strategies identified in Dallas' Long Range Plan have been incorporated into this Region C Plan. Descriptions of projects below that are in quotations and italics have been taken directly from Dallas' Long Range Plan without revision. In addition, the Long Range Plan evaluated multiple potentially feasible water management strategies which were not selected. Those potentially feasible water management strategies have not been repeated in this Region C Plan.

The recommended water management strategies for DWU are:

- **Conservation**
- **Additional Indirect Reuse**
- **Connect Lake Palestine (Dallas Portion of IPL and IPL to Bachman)**
- **Neches Run-of-River**
- **Lake Columbia**
- **Infrastructure to Treat and Deliver to Customers**

The alternative water management strategies for DWU are:

- **Direct Reuse**
- **Carrizo-Wilcox Groundwater**
- **Sabine Conjunctive System Operation (Off Channel Reservoir and Groundwater)**
- **Red River Off Channel Reservoir**
- **Marvin Nichols Reservoir (328)**
- **Wright Patman Reallocation**
- **Toledo Bend**
- **Lake Texoma Desalination**

These strategies are discussed individually below.

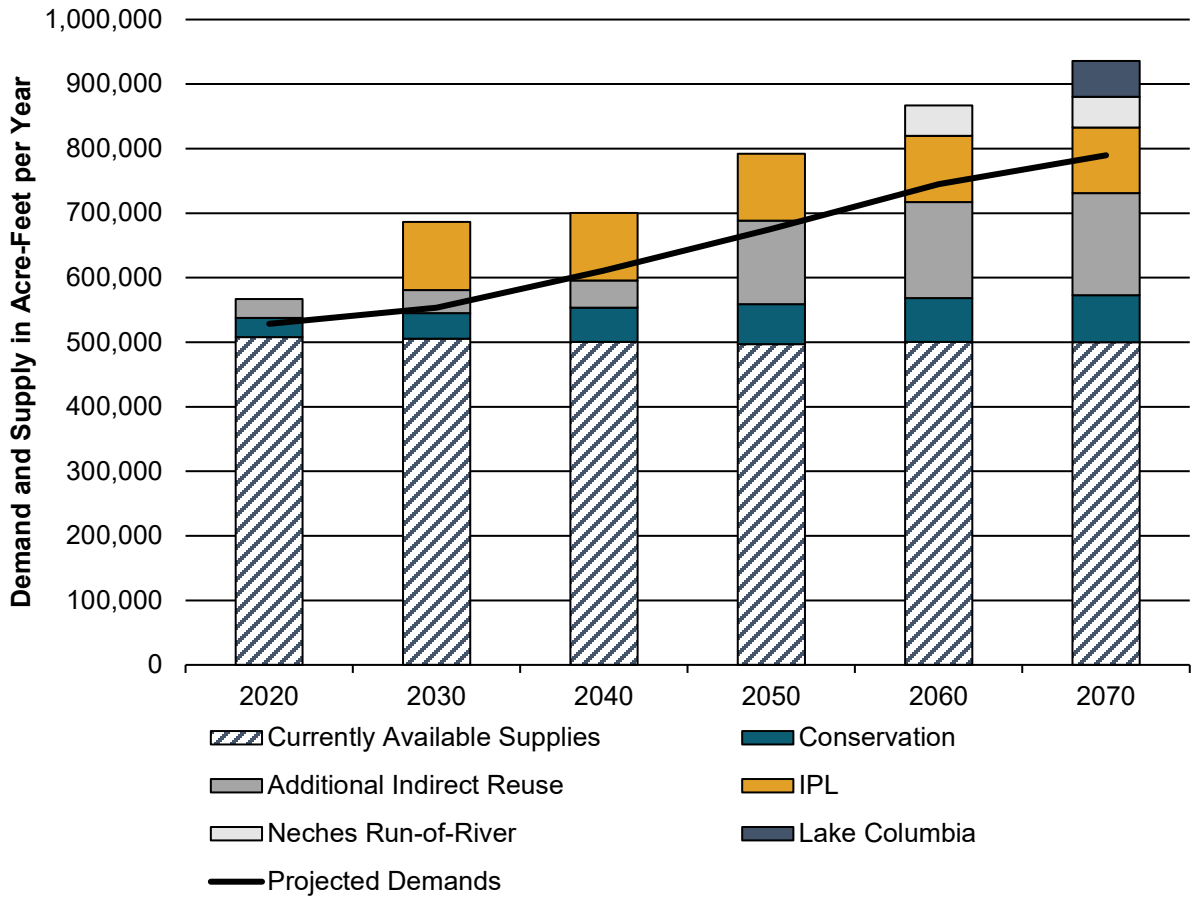
Conservation. The conservation savings for DWU's retail and wholesale customers are based on the Region C recommended water conservation program. Not including savings from low-flow plumbing fixtures (which are built into the demand projections) and not including reuse, conservation by DWU retail and wholesale customers is projected to reach 72,884 acre-feet per year by 2070.

Additional Indirect Reuse

Share of Additional Discharges to Lewisville Lake DWU's water right in Lewisville is larger than the yield which grants them access to additional discharges into the Lake.

Elm Fork Swap and Ray Hubbard Exchange DWU and NTMWD are in discussions to swap reuse water from several wastewater treatment plants. DWU will receive NTMWD treated wastewater discharges into the Lewisville watershed and in return DWU will provide discharges from their WWTPs on the Main Stem of the Trinity River to NTMWD. (The amount provided to NTMWD from Dallas will equal the increase in discharges from NTMWD's Lewisville watershed above historical levels.) NTMWD will divert the water provided by DWU to Lake Lavon using the Main Stem Pump Station. The projected supply from the Elm Fork Swap is based on wastewater flow projections for the purposes of regional and state planning – actual supplies are contingent on what is actually discharged. Capital costs are to be determined.

Figure 5D.1 Recommended Water Management Strategies for Dallas Water Utilities



Main Stem Balancing Reservoir DWU's recent Long Range Water Supply Plan identified a 300,000 acre-foot off channel reservoir in Ellis County southeast of Bristol Texas as the Main Stem Balancing Reservoir.

"*This site…could store Dallas' (and potentially other entities') return flows as well as stormwater runoff originating in the upstream Trinity River watershed. Additionally, because the diversion location for this strategy is downstream of the confluence with the East Fork of the Trinity River (East Fork), the Main Stem Balancing Reservoir could also be used to transfer water from Dallas' eastern system to Dallas' western system by storing water released from either Lake Ray Hubbard or from Dallas' eastern raw water transmission pipelines where they cross the East Fork. Dallas has secured water rights to use return flows from their Central and Southside wastewater treatment plants. This reuse water is a valuable asset that can be utilized by Dallas and does not require additional appropriation of state water. The storage of return flows in the balancing reservoir provides several benefits including water quality benefits and the benefit of being able to store the water during times of plenty and diverting it for subsequent use during times of drought….Water supplies will be delivered to the Joe Pool area through a 36.5 mile transmission system*."

The quantity of supplies available from this strategy is decreased from the previous round of planning. This is due in part to a portion of the DWU Central and Southside discharges now being allocated to NTMWD through the Elm Fork/Ray Hubbard Exchange strategy.

Connect Lake Palestine. DWU is currently working with Tarrant Regional Water District (TRWD) to develop integrated transmission facilities (Integrated Pipeline, or IPL) to connect Lake Palestine with the DWU system by 2030. DWU has a contract for 114,337 acre-feet per year of water from Lake Palestine but cannot currently access this supply due to lack of infrastructure. The firm yield of Lake Palestine is estimated to be 197,710 acre-feet per year in 2020. This represents a decrease from the authorized diversion, which is attributed to the reduction in storage capacity of the lake due to sedimentation and to releases for senior water rights downstream. The infrastructure necessary to move the water from Lake Palestine to a location near Joe Pool Lake for this strategy is discussed in the IPL Project Technical Memorandum located in **Appendix G**.

There will be a separate project to move the water from the IPL delivery point to the Bachman Water Treatment Plant where the supplies will be treated before being distributed to customers. It is assumed that the water from the IPL will be delivered directly to the Bachman WTP by pipeline.

Both capital costs are associated with the quantity of water available from Lake Palestine.

Neches Run-of-River Supply. Dallas and UNRMWA are long-term partners on Lake Palestine with their initial water sale contract being in place since 1972.

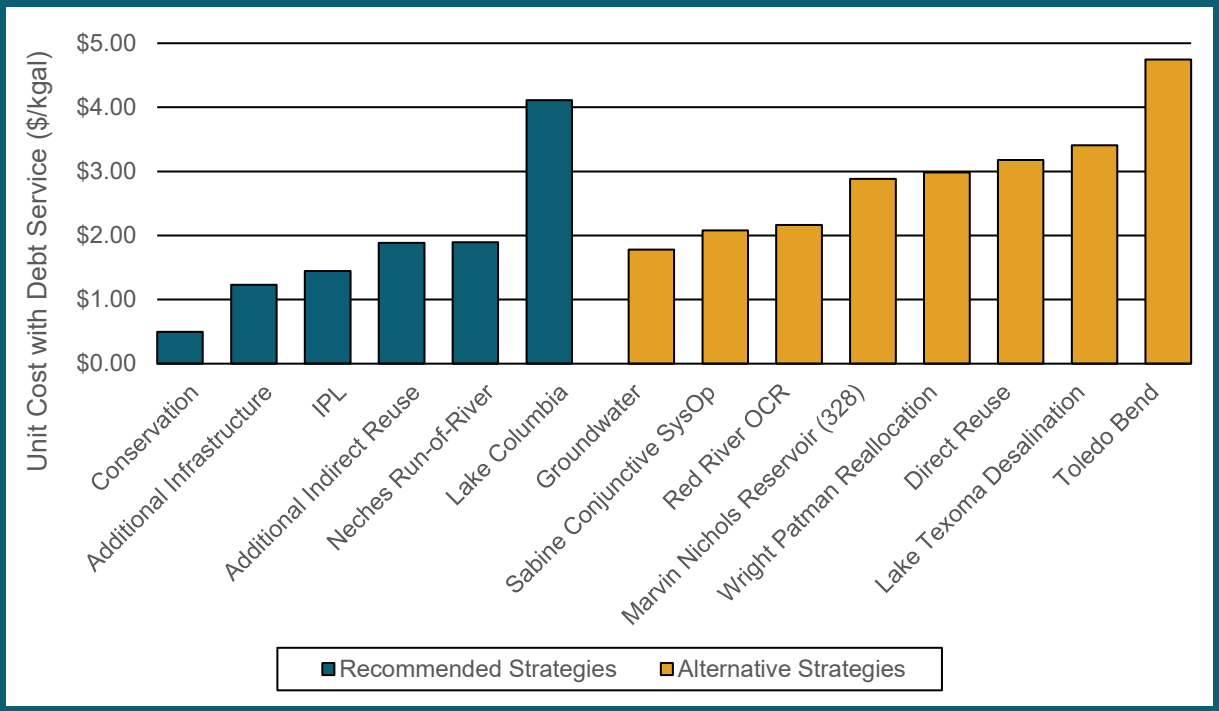
"*In 2013 Dallas and the Upper Neches River Municipal Water Authority (UNRMWA) initiated the Upper Neches River Water Supply Project Feasibility Study to evaluate options to replace the Fastrill Reservoir project that was rendered not feasible, at this time, by the establishment of a US Fish & Wildlife Service (USFWS) wildlife refuge in the footprint of the reservoir. The study provided technical evaluations of a range of potential water supply strategies for an Upper Neches Project….*"

"The selected Upper Neches Project strategy includes a new river intake and pump station for a run-of-river diversion from the Neches River near the SH 21 crossing. Water would be delivered through a 42-mile, 72-inch diameter pipeline to Dallas' pump station at Lake Palestine for delivery to Dallas through the IPL. Facilities include a small diversion dam on the Neches River, a river intake and pump station, and a transmission pipeline and booster pump station with delivery to the IPL pump station site near Lake Palestine."

Lake Columbia. *"Lake Columbia is a proposed reservoir project (previously known as Lake Eastex) of the Angelina and Neches River Authority (ANRA) and is a recommended strategy in the 2011 East Texas Regional Water Plan (Region I RWP). ANRA has been granted a water right permit (Permit No. 4228) by the TCEQ to impound 195,500 acre-feet in a new reservoir and to divert 76.3 MGD (85,507 acre-feet per year) for municipal and industrial purposes. ANRA estimates that after considering local needs, approximately 50 MGD of supply would be available to Dallas. The reservoir would be connected to Dallas' western system via a pipeline from Lake Columbia to the proposed IPL pump station at Lake Palestine. Water would then be delivered to the Lake Joe Pool area via the IPL. As currently planned, Dallas' capacity in the IPL is 150 MGD and, after considering Dallas' Lake Palestine supply of 102 MGD, the IPL will initially have available excess capacity of about 48 MGD. Considering the potential for Dallas to manage pumping rates from both Lakes Palestine and Columbia, it is reasonable for Dallas to potentially contract for up to 50 MGD of supply from Lake Columbia. The cost split is subject to future negotiations*

Strategy Unit Costs

Costs were developed for both recommended and alternative strategies. Costs are summarized in **Table 5D.2** and **Table 5D.3**.



between Dallas and ANRA. Although for purpose of this study [Dallas Long Range Plan], the assumption was made that Dallas will be responsible for 70 percent of the dam, reservoir land acquisition, and relocations, and the local entities involved in the project will be responsible for the remaining 30 percent of these costs."

In January 2015 Dallas provided a letter to ANRA outlining Dallas' intent to pursue Lake Columbia as a recommended future strategy. ANRA is currently in the process of obtaining a US Army Corps of Engineers Section 404 permit.

Infrastructure to Treat and Deliver to Customers. In addition to securing raw water sources, Dallas must also treat the water, and Dallas is responsible for the infrastructure to deliver this treated water to its wholesale customers.

Several of DWU's recommended strategies involve connecting to and transporting supplies through the IPL. Due to capacity constraints of DWU's shared portion of the IPL, costs for a parallel IPL were included as well.

Downtown Dallas Skyline

Table 5D.1 Summary of Major Water Provider Plan – Dallas Water Utilities

Dallas Water Utilities (Ac-Ft/Yr)	2020	2030	2040	2050	2060	2070
Projected Demands						
Dallas	275,297	292,402	326,909	361,492	389,250	402,811
Addison	6,137	6,486	6,856	7,248	7,657	8,069
Carrollton	24,256	24,191	23,788	23,565	23,521	23,518
Cedar Hill	10,619	12,804	15,029	16,296	16,281	16,279
Cockrell Hill	417	431	415	405	536	1,140
Coppell	11,129	11,225	11,142	11,086	11,071	11,071
Balch Springs	2,749	2,894	3,066	3,293	3,546	3,808
Dallas County-Other (other than DFW airport)	126	65	77	88	171	232
Dallas County-Other (DFW airport only)	1,336	1,336	1,335	1,335	1,335	1,335
DeSoto	9,422	9,965	10,703	11,575	12,483	12,856
Duncanville	6,091	6,464	6,322	6,244	6,230	6,229
Farmers Branch	9,031	9,448	9,901	10,446	11,020	11,606
Flower Mound	6,166	6,166	6,166	6,166	6,166	6,166
Glenn Heights	1,824	2,413	3,049	3,797	4,544	6,214
Grand Prairie and Customers	33,454	34,195	37,499	37,246	37,187	37,182
Grapevine	2,778	2,847	2,701	2,674	2,696	2,730
Hutchins	2,186	3,033	3,888	4,748	5,612	6,479
Irving	17,052	5,000	5,000	5,000	5,000	5,000
Lancaster	7,670	9,755	11,407	12,634	13,905	15,186
Wilmer	*423*	*455*	*702*	*1,293*	*2,027*	*3,680*
Lewisville	20,142	22,440	25,329	28,688	31,973	31,969
Denton County FWSD 1-A	1,207	2,143	2,566	2,565	2,564	2,564
Ovilla	1,070	1,338	1,651	2,104	2,565	4,693
Red Oak	628	1,265	1,687	2,390	2,936	4,582
Seagoville	2,064	2,416	2,783	3,167	3,576	3,575
Combine WSC	352	408	470	565	671	786
Tarrant County-Other (DFW Airport)	1,335	1,335	1,335	1,335	1,335	1,335
The Colony	5,856	5,616	5,890	6,642	6,629	6,626
UTRWD Current Contract	42,919	49,097	51,809	52,622	53,281	53,952
Irrigation, Collin	2,844	2,844	2,844	2,844	2,844	2,844
Irrigation, Dallas	3,695	3,695	3,695	3,695	3,695	3,695
Manufacturing, Dallas Co	15,255	16,184	16,184	16,184	16,184	16,184
Steam Electric Power, Dallas	1,000	1,000	1,000	1,000	1,000	1,000
Irrigation, Denton	1,579	1,579	1,579	1,579	1,579	1,579
Manufacturing, Denton	26	26	26	26	26	26
Irrigation, Kaufman	28	28	28	28	28	28
Irrigation, Rockwall	347	347	347	347	347	347
Subtotal	**528,510**	**553,336**	**605,178**	**652,412**	**691,471**	**717,376**
Potential Future Customers						

Dallas Water Utilities (Ac-Ft/Yr)	2020	2030	2040	2050	2060	2070
Denton and Customers	0	0	2,842	13,707	36,049	53,389
UTRWD Additional	0	0	0	5,605	11,210	11,210
Subtotal	***0***	***0***	***2,842***	***19,312***	***47,259***	***64,599***
Projected Demands	**528,510**	**553,336**	**608,020**	**671,724**	**738,730**	**781,975**
Existing Supplies						
Lake Ray Roberts/Lewisville/Elm Fork System	172,975	165,580	158,185	150,791	143,396	136,001
Grapevine Lake	7,367	7,367	7,367	7,142	6,896	6,650
Lake Ray Hubbard	55,730	54,828	53,926	53,024	52,122	51,220
Lake Tawakoni	174,080	169,120	164,160	159,200	154,240	149,280
Lake Fork	50,120	55,080	60,040	65,000	69,960	74,920
Direct Reuse (Golf courses)	1,121	1,121	1,121	1,121	1,121	1,121
White Rock Lake (Irrigation Only)	3,200	3,200	3,200	3,200	3,200	3,200
Indirect Reuse	43,451	49,167	52,547	57,540	69,313	77,705
Total Supplies	**508,044**	**505,463**	**500,546**	**497,018**	**500,248**	**500,097**
Need (Demand-Supply)	**20,466**	**47,873**	**107,474**	**174,706**	**238,482**	**281,878**
Water Management Strategies						
Conservation						
DWU Retail	*17,663*	*24,632*	*37,392*	*43,655*	*46,402*	*47,947*
Wholesale Customers	*11,846*	*15,085*	*15,673*	*18,263*	*21,645*	*24,923*
Additional Indirect Reuse						
Share of Additional Discharges to Lewisville Lake	*1,166*	*4,351*	*6,575*	*11,395*	*16,195*	*16,901*
Elm Fork Swap	*7,591*	*8,617*	*10,645*	*13,975*	*15,806*	*16,880*
Ray Hubbard Exchange	*20,477*	*22,783*	*24,899*	*25,483*	*26,931*	*28,778*
Main Stem Balancing Reservoir (Reuse)	*0*	*0*	*0*	*78,447*	*89,741*	*95,829*
Connect Lake Palestine (Palestine to IPL to Bachman)	0	105,370	104,564	103,704	102,791	101,555
Neches Run-of-River	0	0	0	0	47,250	47,250
Lake Columbia	0	0	0	0	0	56,000
Infrastructure to Treat and Deliver to Customers	*28,068*	*136,770*	*140,108*	*221,609*	*282,519*	*346,292*
Total Supplies from Strategies	**58,743**	**180,838**	**199,748**	**294,922**	**366,761**	**436,063**
Total Supplies	**566,787**	**686,301**	**700,294**	**791,940**	**867,009**	**936,160**
Reserve or (Shortage)	**38,277**	**132,965**	**92,274**	**120,216**	**128,279**	**154,185**
Management Supply Factor	**1.07**	**1.24**	**1.15**	**1.18**	**1.17**	**1.20**

Table 5D.2 Summary of Costs for Recommended Strategies - DWU

Strategy	Date to Be Developed	Quantity for DWU (Ac-Ft/Yr)	DWU Share of Capital Costs	Unit Cost ($/1000 gal) With Debt Service	Unit Cost ($/1000 gal) After Debt Service	Table for Details
Conservation (Retail)	2020	47,947	$16,933,907	$0.50	$0.26	H.11
Conservation (Wholesale)	2020	24,856	Included under County Summaries in Chapter 5E.			
Share of Additional Discharges to Lewisville Lake	2020	16,901	No costs associated with this WMS.			
Elm Fork Swap	2020	16,880	*To be determined*			
Ray Hubbard Exchange	2020	28,778				
Main Stem Balancing Reservoir (Reuse)	*2050*	*95,829*	*$772,904,000*	*$1.89*	*$0.63*	*H.34*
Connect Lake Palestine (Dallas Portion of IPL and IPL to Bachman)	2030	105,370	$717,381,000	$1.45	$0.46	H.25 & H.35
Neches Run-of-River	2060	47,250	$261,616,000	$1.89	$0.97	H.36
Lake Columbia	2070	56,000	$322,267,000	$1.77	$0.86	H.37
Infrastructure to Treat & Deliver to Customers	*2020*	*346,292*	$2,250,435,000	$1.23	$0.15	H.38
Parallel IPL	*2070*	*56,000*	$795,236,000	$2.34	$0.45	H.44
Total DWU Capital Costs			**$5,136,772,907**			

Table 5D.3 Summary of Costs for Alternative Strategies - DWU

Strategy	Online Date	Quantity for DWU (Ac-Ft/Yr)	DWU Share of Capital Costs	Unit Cost ($/1000 gal) With Debt Service	Unit Cost ($/1000 gal) After Debt Service	Table for Details
Direct Reuse Alternative	2020	2,501	$40,094,000	$3.18	$0.50	H.39
Carrizo-Wilcox Groundwater	2020	30,000	$185,710,000	$1.78	$0.75	H.40
Sabine Conjunctive SysOp (Off Channel Reservoir and Groundwater)	2020	104,200	$911,690,000	$2.08	$0.73	H.41
Red River Off Channel Reservoir	2020	114,000	$963,458,000	$2.16	$0.76	H.42
Marvin Nichols Reservoir (328)	2030	85,437	$1,092,760,000	$2.88	$0.71	H.21
Wright Patman Reallocation	2050	28,905	$397,470,000	$2.98	$0.91	H.24
Toledo Bend	2070	100,000	$2,010,393,000	$4.74	$1.39	H.19
Lake Texoma Desalination	2020	146,000	$1,429,468,000	$3.41	$1.78	H.43

Kentucky Town Water Supply Corporation

The Kentucky Town WSC is located in southeastern Grayson County. The WSC gets its current water supply from the Woodbine aquifer, and water management strategies include conservation and connection to Sherman. **Table 5E.210** shows the projected population and demand, the current supplies, and the water management strategies for Kentucky Town WSC.

Table 5E.210 Summary of Water User Group – Kentucky Town WSC

(Values in Ac-Ft/Yr)	2020	2030	2040	2050	2060	2070
Projected Population	**2,856**	**3,443**	**4,008**	**4,537**	**5,761**	**7,387**
Projected Demands						
Municipal Demand	355	412	469	525	665	852
Total Projected Demand	***355***	***412***	***469***	***525***	***665***	***852***
Currently Available Supplies						
Woodbine Aquifer	365	365	365	365	365	365
Total Currently Available Supplies	***365***	***365***	***365***	***365***	***365***	***365***
Need (Demand – Supply)	***0***	***47***	***104***	***160***	***300***	***487***
Water Management Strategies						
Water Conservation	3	5	5	7	11	17
Connect to Sherman	0	42	99	153	289	470
Total Supplies from Strategies	***3***	***47***	***104***	***160***	***300***	***487***
Reserve (Shortage)	**13**	**0**	**0**	**0**	**0**	**0**