



WorleyParsons

resources & energy

Texas Desal 2014
BEST PRACTICES & EMERGING TECHNOLOGY

Seawater Projects & Texas Industry

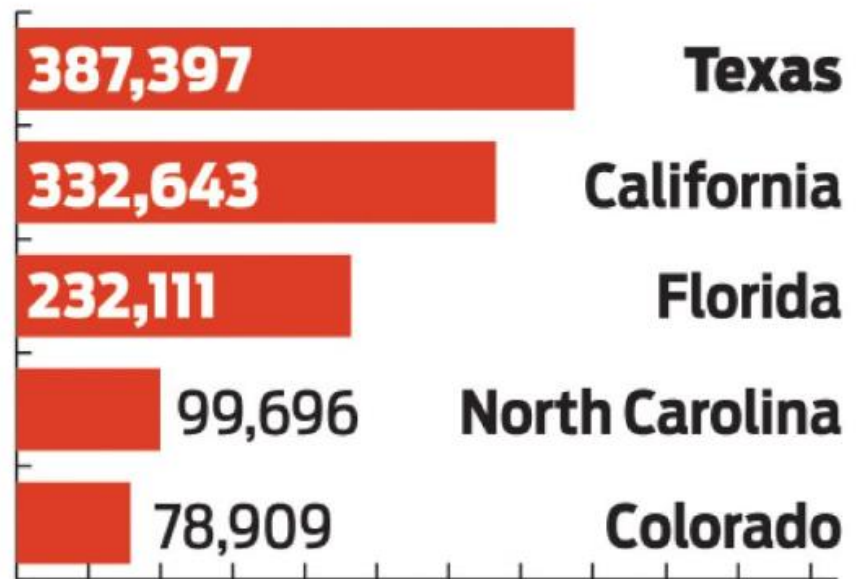
Ken Burris
Vice President – Water/Geosciences

September 11, 2014

Texas beats California

Texas added more residents than any other U.S. state between 2012 and 2013, according to estimates released Monday.

Sorted by raw population growth 2012 to 2013



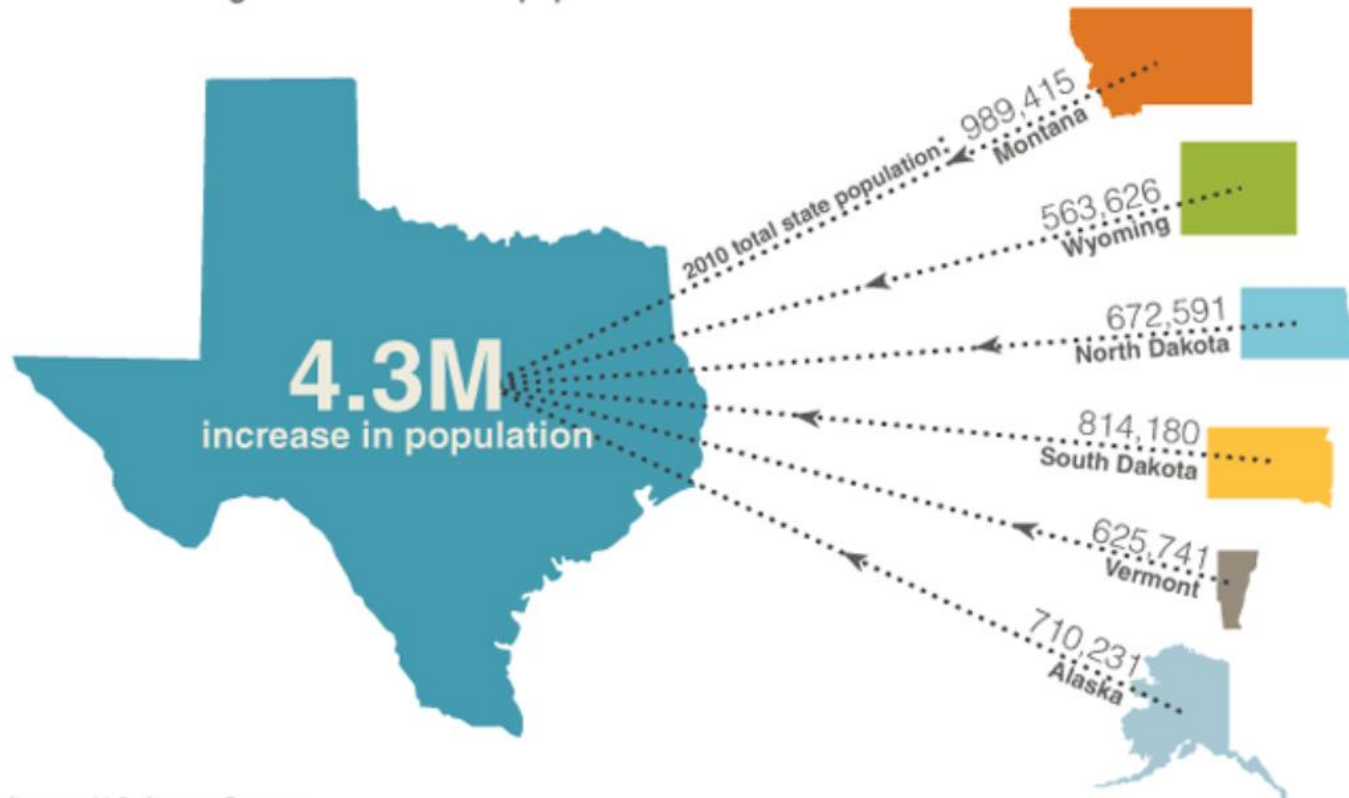
Source: U.S. Census Bureau

Chronicle

Houston Chronicle

The state's population increased 4.3M since 2000.

That's like adding the combined 2010 populations of six states.

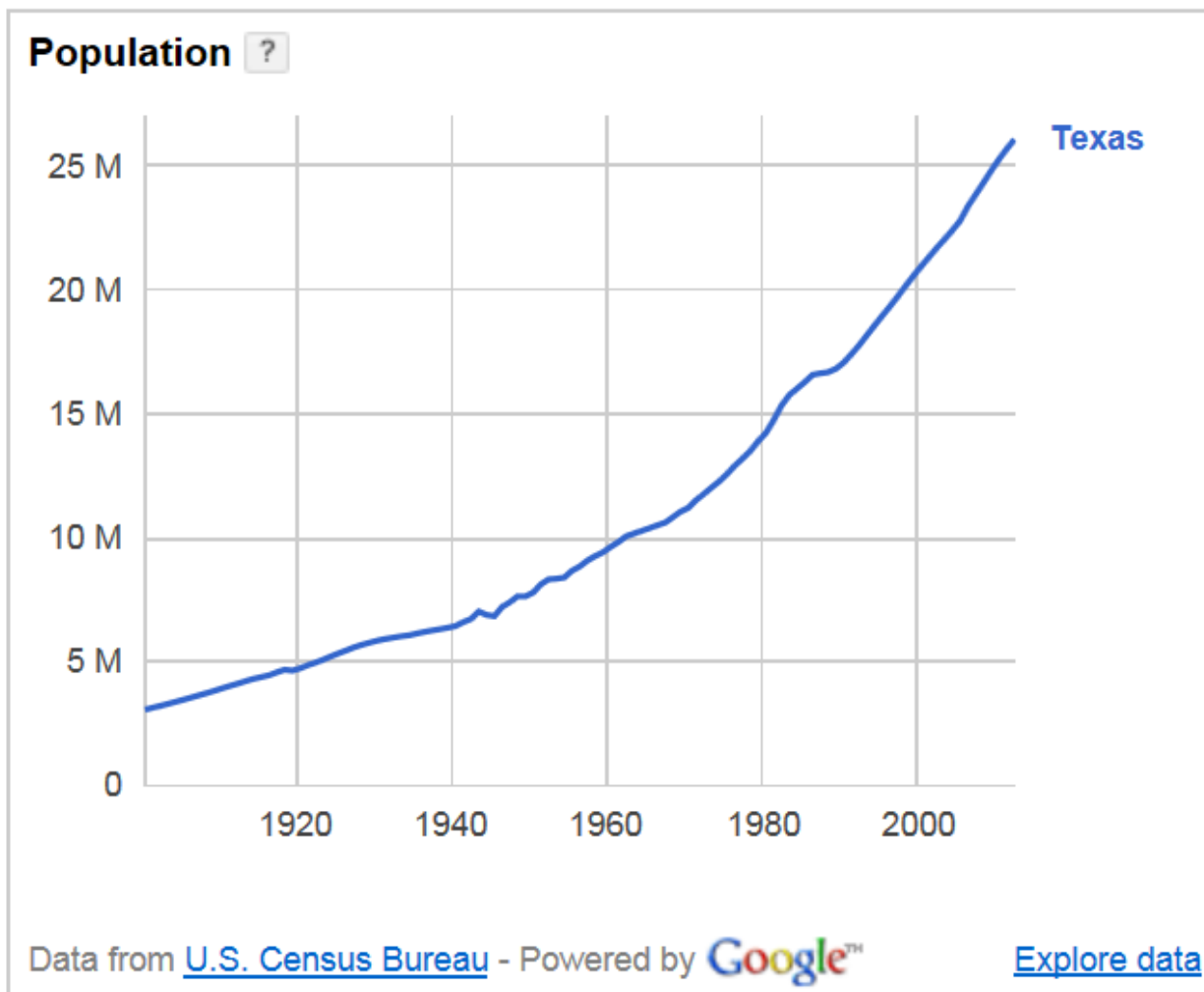


Source: U.S. Census Bureau.

Source:
KERA News,
August 15, 2014

KERA News, August 15, 2014

Texas' population keeps growing



Source:
KERA News,
August 15, 2014

Texas Production and Consumption Indicators

Annual Totals

Year	Value of Crude Oil Produced (Millions)	Value of Natural Gas Produced (Millions)	Active Oil & Gas Drilling Rigs	Gasoline (Millions of Taxed Gallons)	Diesel (Millions of Taxed Gallons)	Median Sales Price Existing Single Family Homes	Auto Sales Net Value (Millions)	Cigarette Packages Taxed (Millions)
2006	\$19,657.5	\$19,852.1	746	11,372.8	3,731.6	\$143,100	\$45,756.2	1,280.2
2007	\$21,622.1	\$18,858.5	613	11,624.8	3,886.9	\$146,450	\$48,992.8	1,004.9
2008	\$30,631.3	\$23,258.8	640	11,709.7	3,854.0	\$145,850	\$44,442.4	1,077.0
2009	\$18,363.9	\$9,317.4	396	11,916.3	3,475.8	\$143,650	\$34,792.6	949.9
2010	\$26,054.9	\$11,300.3	670	12,141.8	3,698.1	\$146,750	\$38,797.5	951.2
2011	\$39,412.6	\$13,368.6	849	11,948.4	3,835.2	\$147,800	\$44,235.2	951.7
2012	\$55,130.1	\$10,701.6	912	12,261.5	3,963.4	\$158,600	\$52,866.3	958.2
2013	\$74,788.8	\$14,553.9	837	12,436.1	4,005.4	\$172,150	\$57,239.9	937.3

Source: The Texas Economy Website

Texas Production and Consumption Indicators

Monthly Totals								
Month/ Year	Value of Crude Oil Produced (Millions)	Value of Natural Gas Produced (Millions)	Active Oil & Gas Drilling Rigs	Gasoline (Millions of Taxed Gallons)	Diesel (Millions of Taxed Gallons)	Median Sales Price Existing Single Family Homes	Auto Sales Net Value (Millions)	Cigarette Packages Taxed (Millions)
06/13	\$6,010.6	\$1,136.8	841	1,081.5	353.3	\$180,800	\$4,901.5	69.7
07/13	\$6,988.4	\$1,180.9	841	1,059.2	333.6	\$179,400	\$5,363.0	83.1
08/13	\$7,259.5	\$1,259.1	848	1,053.7	334.1	\$177,600	\$5,185.5	91.9
09/13	\$7,116.0	\$1,273.4	837	1,091.8	350.7	\$172,500	\$5,096.3	60.2
10/13	\$6,889.5	\$1,348.8	820	1,017.9	316.6	\$170,800	\$5,228.2	88.2
11/13	\$5,995.4	\$1,282.4	829	1,075.5	354.8	\$170,800	\$4,456.5	79.1
12/13	\$6,633.3	\$1,437.9	843	1,026.2	333.7	\$175,700	\$4,625.6	68.1
01/14	\$6,628.8	\$1,684.6	836	1,027.7	308.4	\$164,500	\$4,992.0	56.4
02/14	\$6,590.9	\$1,815.7	844	1,015.2	347.6	\$174,000	\$4,982.1	63.0
03/14	\$7,390.6	\$1,855.6	864	963.6	323.2	\$178,000	\$4,666.7	76.5
04/14	\$7,458.7	\$1,785.6	885	1,085.6	366.6	\$179,900	\$3,815.3	79.6
05/14	\$7,472.2	\$1,906.5	892	1,073.8	364.9	\$187,500	\$5,236.2	71.3
06/14	\$7,758.5	\$1,812.7	891	1,109.9	367.1	\$193,600	\$5,715.4	74.1
07/14	\$7,909.0		904			\$191,500		80.2
08/14			900					

Source: The Texas Economy Website

Shale Play Drilling Rig Counts - Sep 8, 2014

Rig Counts - select states with key plays

Select states	This Week	Change from last week	3 months ago	One year ago
Alaska	7	0	10	14
Arkansas	12	+1	11	13
California onshore	44	0	47	33
Colorado	74	-1	65	68
Kansas	23	-2	31	27
Mississippi	13	0	10	14
N. Louisiana	29	0	29	27
New Mexico	96	+2	86	74
North Dakota	183	0	169	168
Ohio	41	0	39	34
Oklahoma	213	+1	198	170
Pennsylvania	57	+2	57	51
Texas	907	+7	896	838
Utah	23	0	27	30
West Virginia	29	0	25	36
Wyoming	57	+1	48	49
Total US	1925	+11	1860	1767
Total Canada land	412	+7	212	384

Source:
Weekly Oil &
Gas Update,
Sep 8, 2014

Oil & Gas Prices

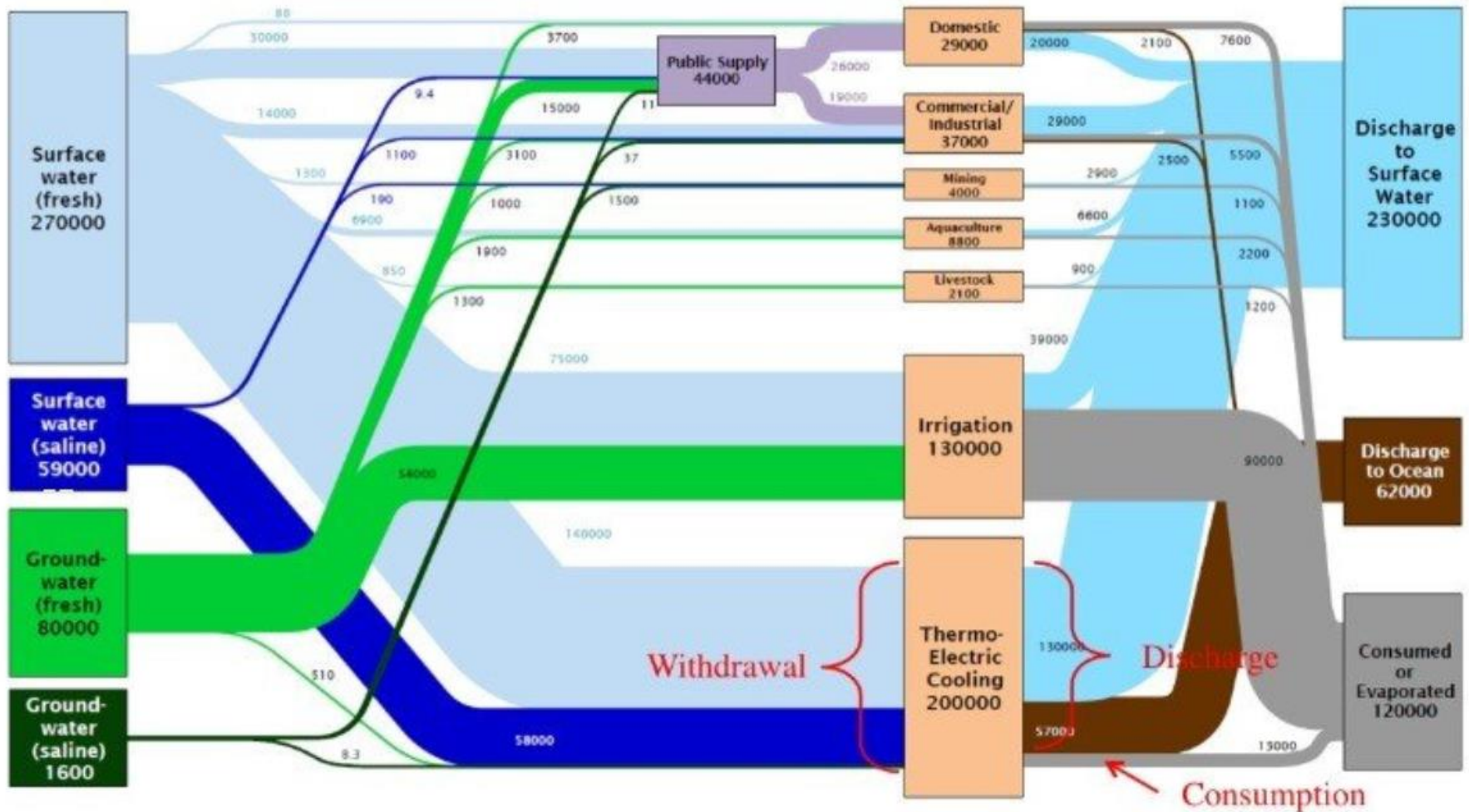
Sep 8, 2014

Oil & Gas Prices - Bloomberg/EIA

	This Morning	12 weeks ago	1 year ago
Crude Oil - USD/bbl			
WTI	92.47	107.52	109.62
Brent	100.09	113.42	115.49
Natural Gas-USD/mmbtu			
NYMEX Henry Hub	3.82	4.71	3.66

Source:
Weekly Oil &
Gas Update,
Sep 8, 2014

Water Use in the U.S.



Units: MGal/Day

Source: DOE/Lawrence Livermore National labs, 2011 (Data from USGS Circular 1344, 2009)

Industrial Water Use



AP



Industrial Water Use

Refineries, Petrochemical, Chemical and other industrial Manufacturing

- **Cooling Water**
- **Steam Generation**
- **Utility Water (OSBL)**
- **Process Water (ISBL)**
- **Fire Water**
- **Domestic Water (Drinking/Shower)**

Industrial Water Use



Industrial Water Use



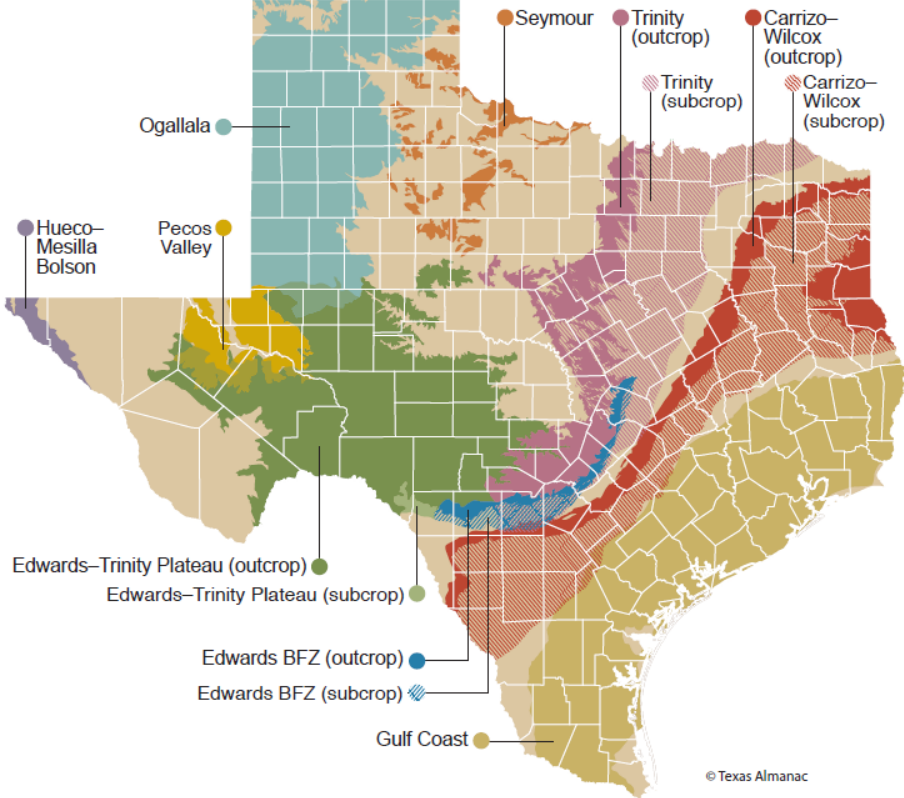
Industrial Water Use

Decision of source of water??

- **Availability** – Infrastructure to Deliver to Site
- **Volume** – Sufficient Volume for Plant Need; Incorporating Future Expansion?
- **Price** – Important, but Not as Critical as Availability/Volume
- **Quality** – Not Critical. Most Plants have their Own Water Treatment Systems to Produce Varying Grades of Quality.

Industrial Water Sources

Major Aquifers of Texas



Industrial Water Use

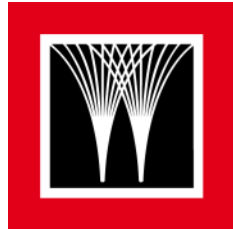
Decision of water expansion/need??

- **Availability – Source/Infrastructure Proximity to Site**
- **Volume – Sufficient Volume for Plant Expansion/Need**
- **Schedule – Critically Important**

Industrial Water Use

Water expansion/need??

- **Local Municipal Authority**
- **Groundwater – (Brackish or Saline)**
- **Seawater**
- **Recycle/Reuse – Utility, Process, Stormwater**



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Ken Burris

Vice President – Water/Geosciences

(713) 354-5491 / Cell (832) 713-5236

ken.burris@worleyparsons.com