

Safe Groundwater for Texans: Texas Department of State Health Services (DSHS) Role and Perspectives

Texas Groundwater Protection Committee Meeting

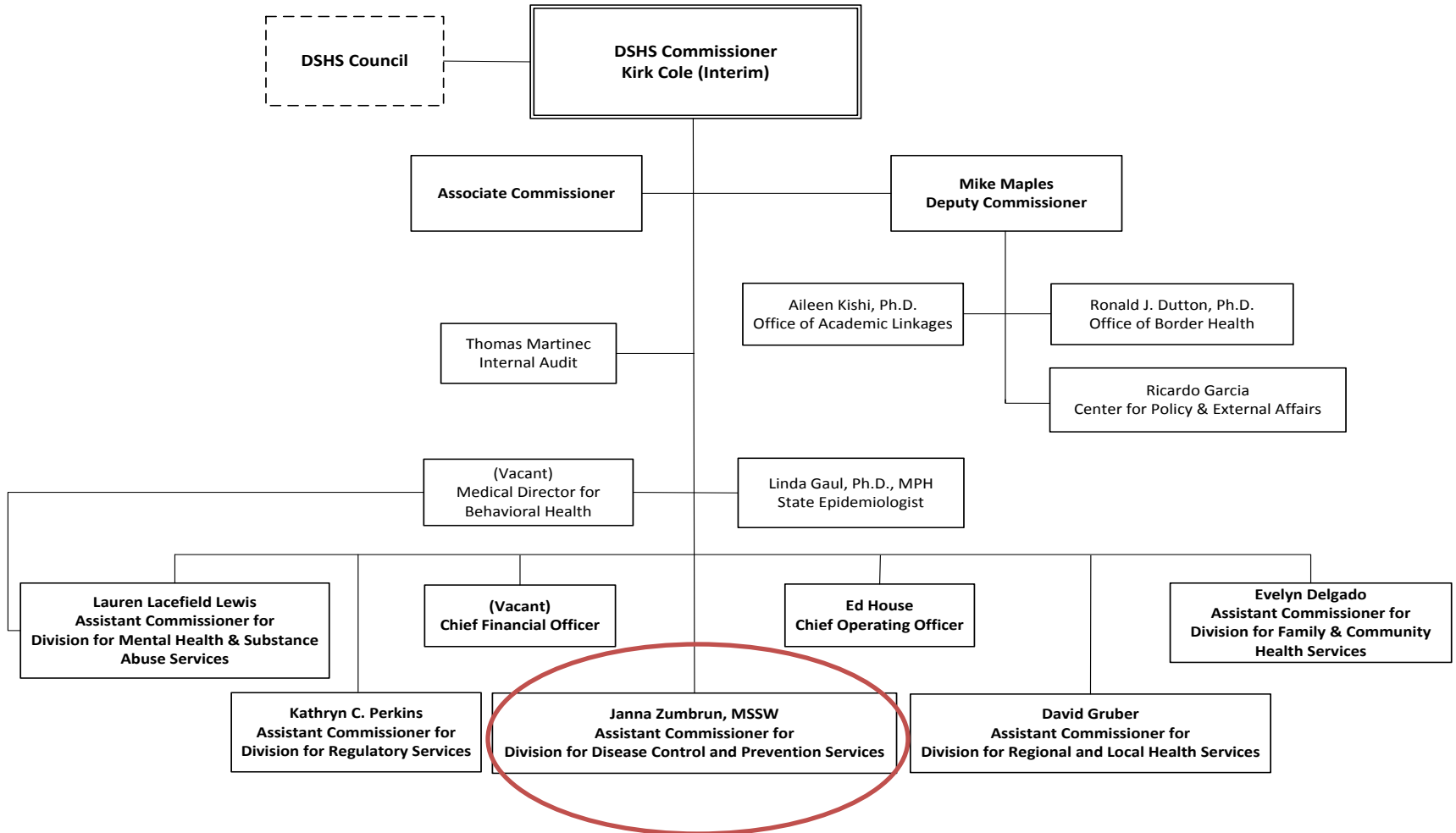
TCEQ
October 21, 2015

Deba P. Dutta, P.E., Engineer
Texas Fluoridation Program

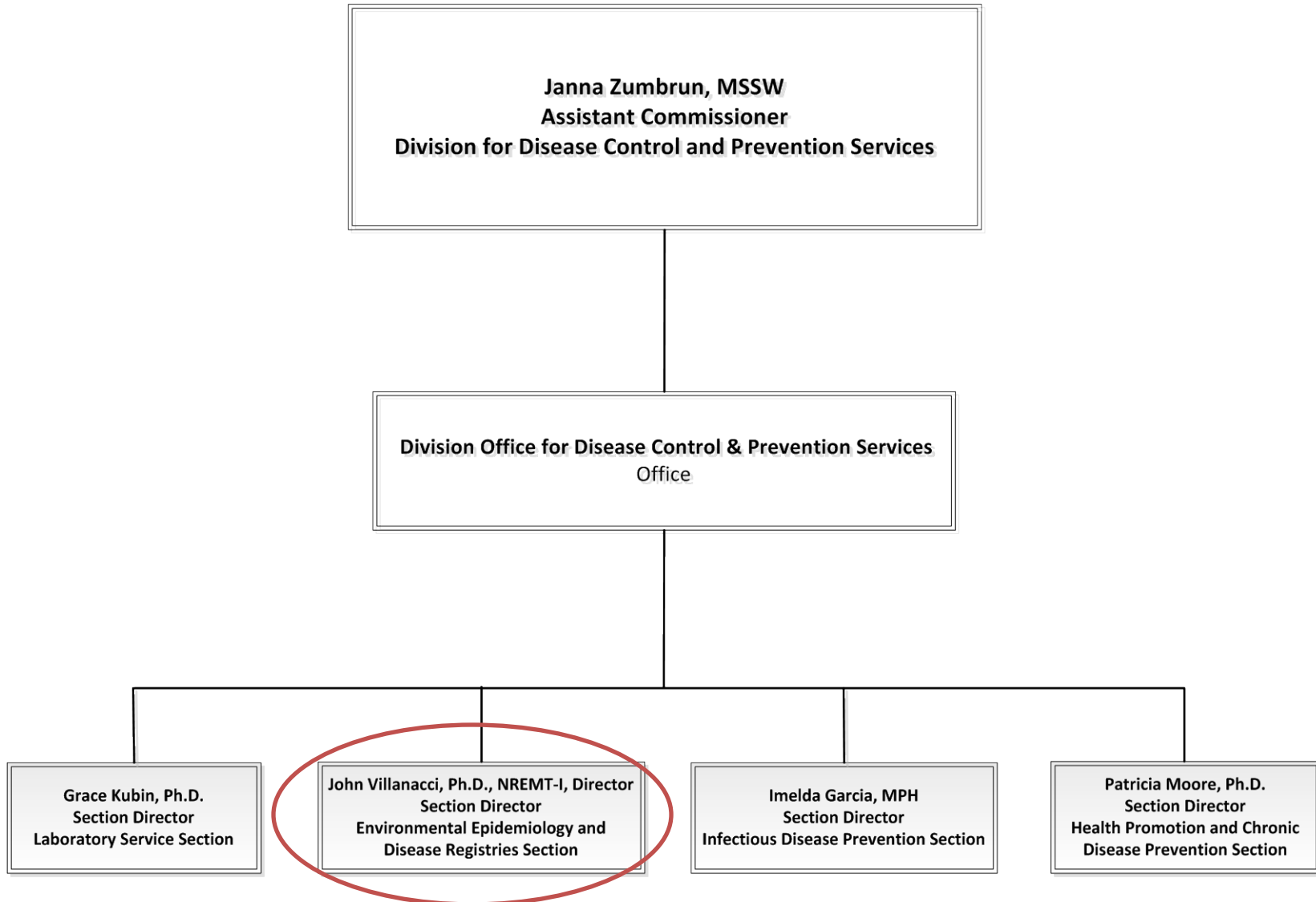
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Environmental & Injury Epidemiology and Toxicology Unit



DSHS Organizational Chart



Disease Control and Prevention Services



Environmental Epidemiology and Disease Registries Section (EEDRS)

- **Environmental & Injury Epidemiology and Toxicology Unit**
- Cancer Epidemiology and Surveillance Branch
- Birth Defects Epidemiology and Surveillance Branch

Environmental & Injury Epidemiology and Toxicology (EIET) Unit

Mission statement:

The Unit uses the principles of epidemiology, toxicology, and surveillance to identify populations at risk, to develop evidence-based actions, and to protect and promote the health of the people of Texas.



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Environmental & Injury Epidemiology and Toxicology (EIET) Unit

Environmental Epidemiology and Toxicology

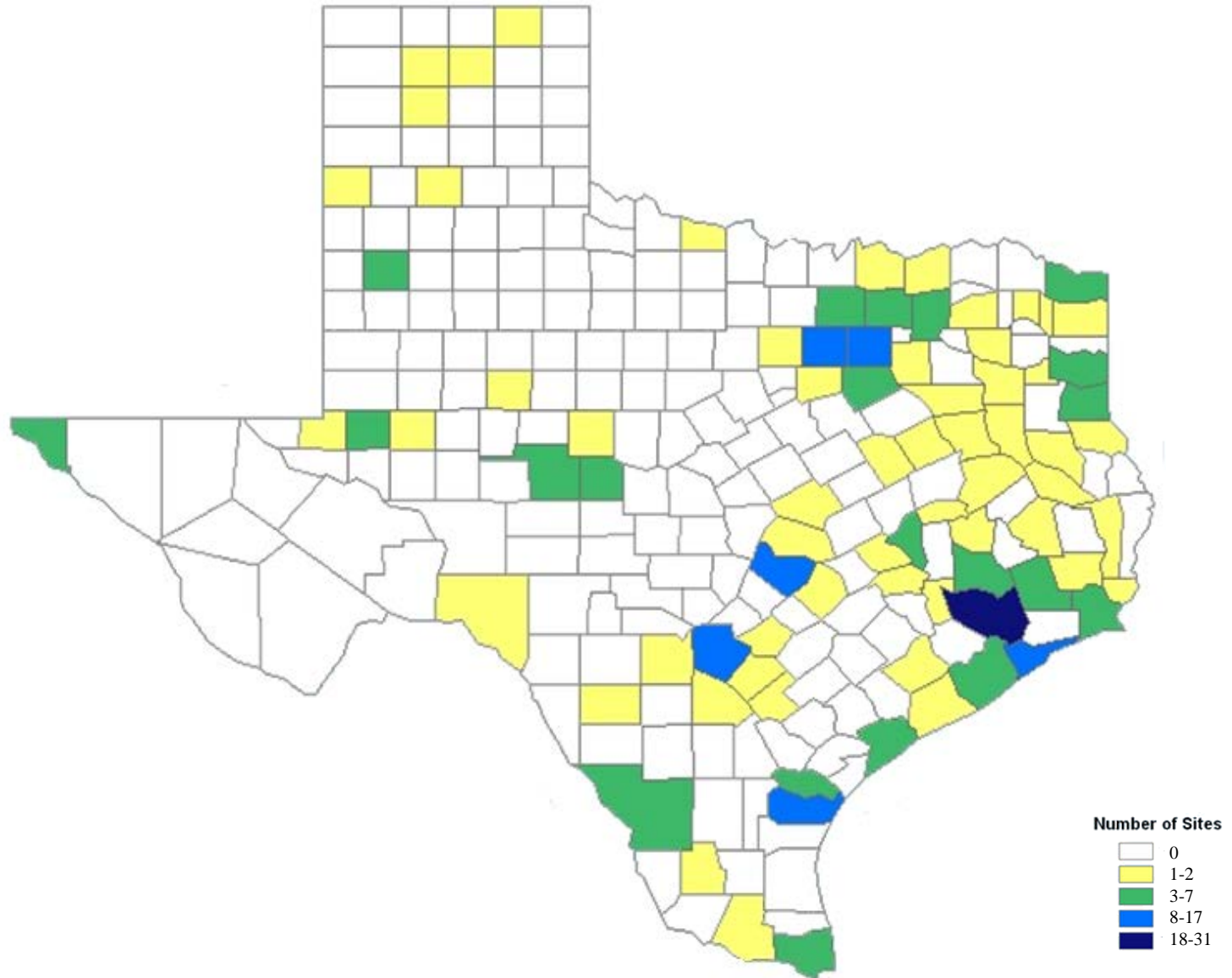
- Environmental epidemiology studies
- Occupational disease surveillance
- Health Assessment and Consultation Program
- Texas Fluoridation Program

Health Assessment and Consultation Program

- Principal state public authority in Texas involved with public health and hazardous waste issues.
- Works under a cooperative agreement with the Agency for Toxic Substances and Disease Registries (ATSDR).
- Investigates and evaluates human exposures to hazardous and chemical substances.
- Responds to health concerns by performing health assessments.
- Conducts community outreach and health education activities.



Health Assessment and Consultation Program



EIET Environmental Epidemiology

- Evaluate associations between environmental exposures (e.g. lead exposure, chemicals in drinking water, etc.) and chronic health conditions.
- Investigate non-communicable disease clusters.
 - Lead state response to community cancer cluster concerns.



Past EIET Epi Projects

- Evaluated relationship between prenatal exposure to lead and infant lead levels at 0-6 months of age.
- Investigation into the prevalence of lupus and systemic sclerosis in Crystal City, TX.
- Vapor intrusion investigation in Grand Prairie, TX (contaminated groundwater).
- Examined association between the amount of fluoride in drinking water and incidence of childhood and adolescent bone cancer.



Drinking water fluoride study

- Population-based case-control study.
- Both case and control data were obtained from the Texas Cancer Registry (TCR).
- Eligible cases included Texas children and adolescents (0 – 19 years of age) reported to the TCR diagnosed with primary malignant osteosarcoma between Jan. 1, 1996 and Dec. 31, 2006.
- Controls were sampled 4:1 from Texas children and adolescents reported to TCR who were diagnosed with either central nervous system tumors (brain cancers) or leukemia during the same timeframe.
- A total of 308 cases and 1202 controls were included.



Drinking water fluoride study

- Geocoded address information was joined with public water supply (PWS) boundary shapefiles.
- Average fluoride level for corresponding PWS was determined using data from CDC's Water Fluoridation Reporting System (WFRS).
- Exposure variable of interest was defined as:
 - Low or sub-optimal fluoride in drinking water (0.0 – 0.6 ppm)
 - Optimal fluoride in drinking water (0.7 – 1.2 ppm)
 - Above optimal fluoride in drinking water (≥ 1.3 ppm)

Drinking water fluoride study

Table 3. Crude and adjusted odds ratios (ORs) of osteosarcoma for optimal and above-optimal average fluoride level categories, compared to the referent category (low/sub-optimal fluoride level), and corresponding 95% confidence intervals (CIs).

Average Fluoride Level	OR	95% CI
Crude estimates		
Low/sub-optimal (0 – 0.6 ppm)	1.00 (Referent)	---
Optimal (0.7 – 1.2 ppm)	0.86	(0.63, 1.16)
Above optimal (≥ 1.3 ppm)	0.94	(0.57, 1.53)
Adjusted estimates*		
Low/Sub-optimal (0 – 0.6 ppm)	1.00 (Referent)	---
Optimal (0.7 – 1.2 ppm)	0.85	(0.62, 1.16)
Above optimal (≥ 1.3 ppm)	0.96	(0.58, 1.57)

Drinking water fluoride study

Table 4. Adjusted ORs and corresponding 95% CIs of osteosarcoma stratified by sex for optimal and above-optimal average fluoride level categories, compared to the referent category (low/sub-optimal fluoride level).

Average Fluoride Level	OR	95% CI
Boys		
Low/sub-optimal (0 – 0.6 ppm)	1.00 (Referent)	---
Optimal (0.7 – 1.2 ppm)	1.03	(0.68, 1.56)
Above optimal (≥ 1.3 ppm)	1.31	(0.70, 2.46)
Girls		
Low/sub-optimal (0 – 0.6 ppm)	1.00 (Referent)	---
Optimal (0.7 – 1.2 ppm)	0.68	(0.42, 1.10)
Above optimal (≥ 1.3 ppm)	0.58	(0.25, 1.36)

Drinking water fluoride study

Conclusions:

- Our study, like most prior studies, **did not find an association between fluoride levels in drinking water and osteosarcoma.**
- Community water fluoridation is the most effective public health method for prevention of tooth decay, and was hailed by CDC as **one of the greatest public health initiatives of the 20th century.**

FLUORIDATION PROGRAM OVERVIEW

Fluoride is Naturally Occurring

Soil

13th most abundant element in the earth's crust

Air

- 💧 50% volcanic
- 💧 25% wind erosion
- 💧 25% from human activities

Water

- 💧 Surface water – 0.1 to 0.3 mg/L
- 💧 Ground water – 0 to 8 mg/L
- 💧 Ocean water – 0.8 to 2.4 mg/L



What is Fluoridation ?

Adjustment of fluoride to a level beneficial for reduction of tooth decay



$$\text{Natural F in Water} + \text{Added F} = \mathbf{0.7 \text{ mg/L Optimal}}$$

Recommended by US Public Health Services

EPA → SCL: 2 mg/L, MCL: 4 mg/L

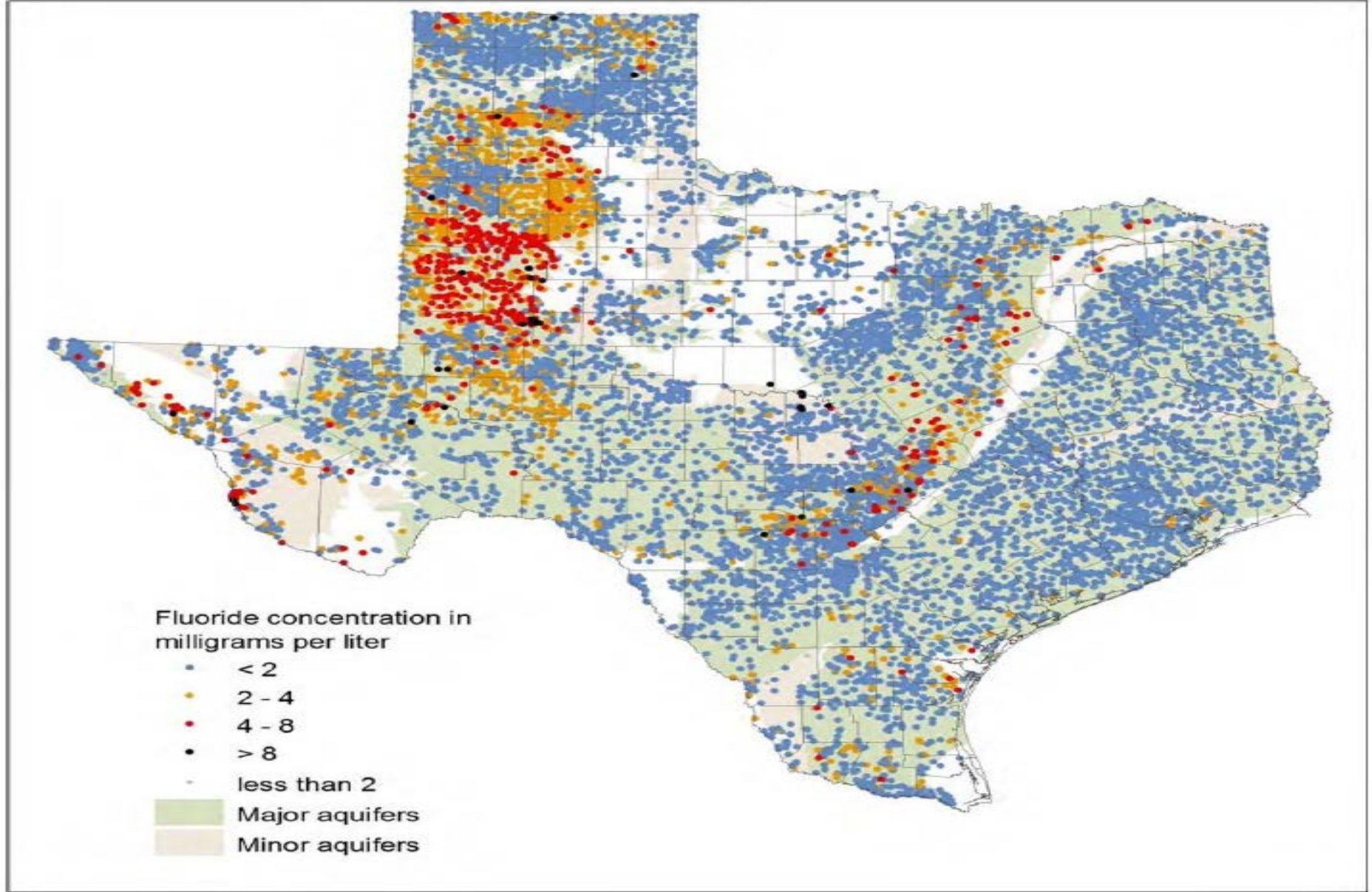


Figure 10. Fluoride concentrations in Texas groundwater. Colored symbols indicate detected concentrations within indicated ranges. Smaller gray symbols and associated less than values indicate non-detects below the indicated detection limit concentration. Prepared by BEG for TWDB contract #1004831125, with data from TWDB, 2011.

HOW FLUORIDE WORKS

FLUORIDE IN DRINKING WATER



IS TAKEN IN BY
TEETH
STILL DEVELOPING
BELOW THE GUMS



TO HELP CREATE A
STRONG SURFACE

PROTECTING THE
TEETH FROM CAVITIES

IN CHILDREN AND ADULTS

TEETH ARE BATHED

IN FLUORIDE WHEN DRINKING WATER



GIVING TEETH THE
FLUORIDE THEY NEED
ALL DAY LONG

ACID PRODUCED BY BACTERIA
IN THE MOUTH CAN CREATE
HOLES ON THE SURFACE
OF THE TEETH



FLUORIDE HELPS PROTECT
& REBUILD THIS SURFACE

PREVENTING
ABOUT 25% OF CAVITIES

Build a better foundation for healthy teeth and keep your teeth stronger, longer. Fluoride in water. 70 years and going strong. At a faucet near you. Visit www.CDC.gov/Fluoridation for more information.



Why Fluoridation?

- 💧 For the past 70 years, fluoride has been a principal contributor to reduction in tooth decay and loss.
- 💧 Community Water Fluoridation has played a major role in this dramatic decline in tooth decay across all age groups.
- 💧 Inexpensive, and does not depend on access to professional care.
- 💧 Despite dramatic declines, tooth decay is still the most common childhood chronic disease affecting two-thirds of children.

More Children with tooth decay in Texas

Table 3. Dental Caries Experience and Untreated Dental Decay Among 6- to 8-year-old Children: U.S. and Texas

	Caries Experience		Untreated Decay	
	U.S. ^b (%)	Texas ^c (%)	U.S. ^b (%)	Texas ^c (%)
TOTAL	50	68	26	44
Race/Ethnicity				
White	46	61	21	39
Black	56	67	39	44
Hispanic	69	72	42	47
Other	N/A	63	N/A	40
Sex				
Male	50	68	28	45
Female	49	68	24	44
Medicaid				
Yes	N/A	70	N/A	38
No	N/A	67	N/A	48

^b Data source: *Healthy People 2010*, Progress Review 2000. U.S. Department of Health and Human Services. Available at www.cdc.gov/nchs/pptr/hpdata2010/focus_areas/fa21.xls

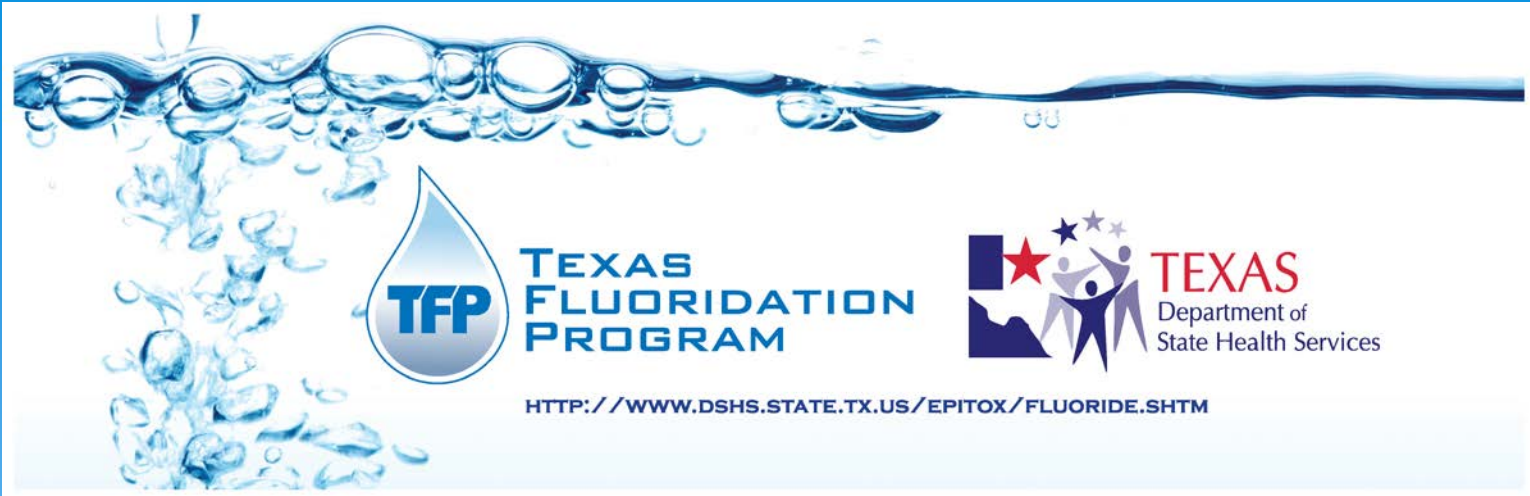
^c Data source: Basic Screening Survey, Texas Department of State Health Services, Oral Health Program 2004–2006.

- 💧 More 6-8 year-olds in Texas have experienced caries or have untreated decay than in the US
- 💧 For all groups
 - By race/ethnicity
 - Gender
- 💧 Poverty in Texas – 17.6%
- 💧 Poverty in US – 15.4%

Courtesy: Dr. Philip Huang, Austin_Travis County HHS

Achievements

- 💧 44 of the 50 largest cities in the United States have fluoridated water.
- 💧 75% of the U.S. Population served by Public Water Systems receiving optimally fluoridated water.
- 💧 Community Water Fluoridation has been endorsed by more than 100 health organizations for preventing dental decay.
- 💧 CDC has proclaimed Community Water Fluoridation as one of ten great public health achievements of the 20th century.



Department of State Health Services Texas Fluoridation Program Updates 2015

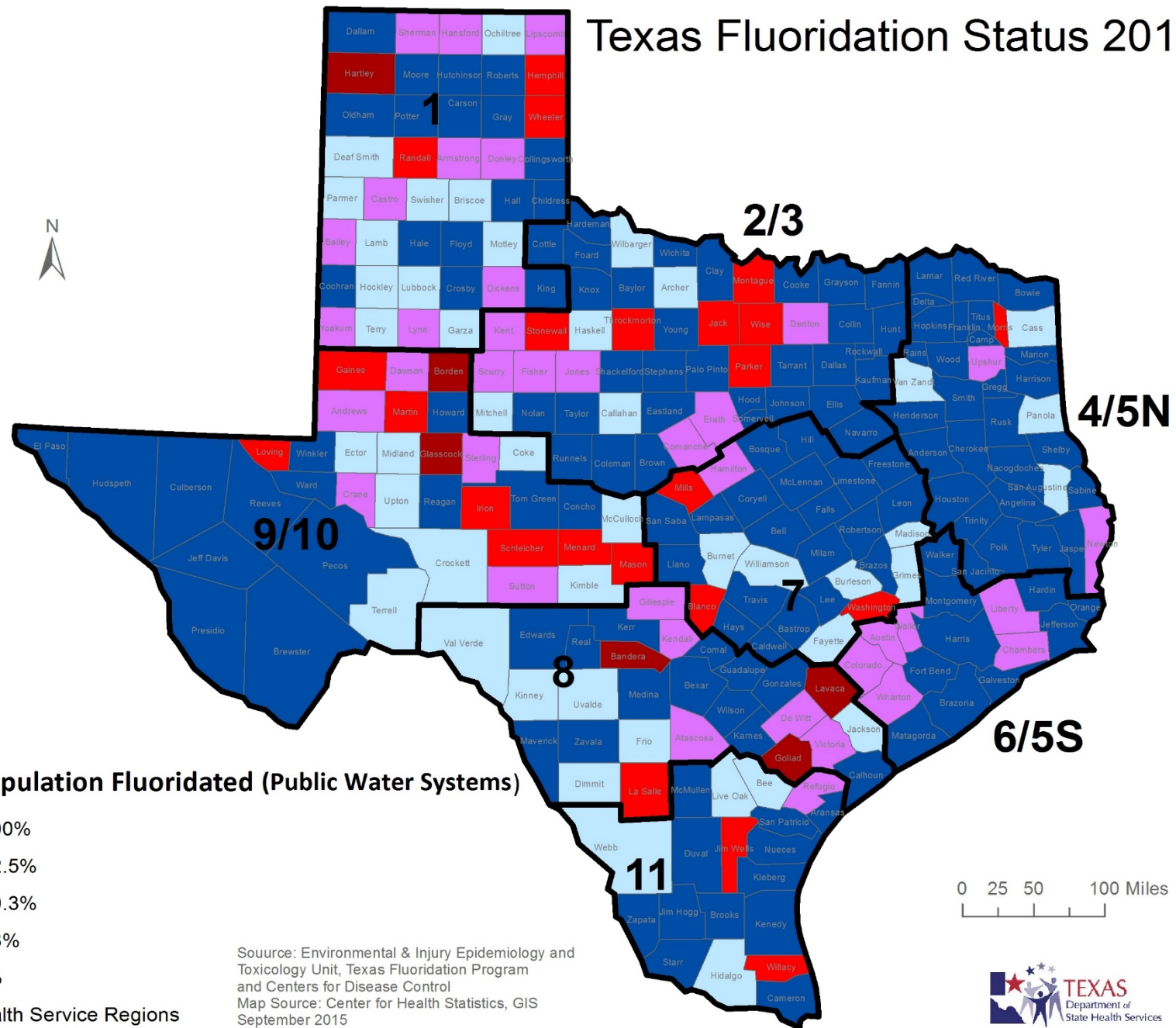
Texas Fluoridation Program

- 💧 Texas Fluoridation Program (TFP) has been helping Texans to improve oral health since 1979.
- 💧 Provides technical assistance by designing and installing fluoride systems for public water systems.
- 💧 Conducts fluoride system inspections.
- 💧 Monitors the fluoride level in the PWS and maintains a national database.
- 💧 Provides technical training.

Fluoridation Statistics

- 💧 In Texas, 160 Public Water Systems adjust fluoride level that serves approximately 9.9 million people.
- 💧 Over 19.8 million people (79% of the total population) drink adjusted or naturally fluoridated water in Texas.
- 💧 The average cost to fluoridate water is estimated to be approximately \$0.50 a year per person.
- 💧 For most cities, every \$1 invested in water fluoridation saves \$38 in dental treatment costs.

Texas Fluoridation Status 2015



Typical Fluoridation System

Bulk Tank → Transfer Pump → Day Tank → Metering Pump → Injection



Day Tank with Metering Pump



Fluoridation Program Challenges

- 💧 One of the big challenges is inadequate funding. There is no State funding.
- 💧 Texas Fluoridation Program used to provide equipment under CDC grant.
- 💧 Most of the small cities, interested in adding fluoridation, don't have enough funds to buy equipment/chemicals.
- 💧 Lack of adequate technical staff (only 3 staff for the whole State).

Anti-Fluoride Activities

- **Dental Fluorosis**
- **IQ**
- **Infant Formula**
- **Cancer**
- **“Fertilizer Byproduct”**



CDC

Check your water's fluoride level:
https://nccd.cdc.gov/DOH_MWF/Default/Default.aspx



Texas Fluoridation Program Web Site

<http://www.dshs.state.tx.us/epitox/fluoride.shtm>

Contact Information
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