



Conserving Groundwater In Place In Texas

Vanessa Puig-Williams | March 2017

1. Groundwater in Texas

2. Why you should care

3. What you can do

Groundwater in Texas



100 Groundwater Conservation Districts

Groundwater Conservation Districts

- 1 High Plains UWCD No.1 - 9/29/1951
- 2 North Plains GCD - 1/2/1955
- 3 Panhandle GCD - 1/21/1956
- 4 Hudspeth County UWCD No. 1 - 10/5/1957
- 5 Real-Edwards C and R District - 5/30/1959
- 6 Evergreen UWCD - 8/30/1965
- 7 Plateau UWC and Supply District - 3/4/1974
- 8 Harris-Galveston Subsidence District- 4/23/1975
- 9 Glasscock GCD - 8/22/1981
- 10 Hickory UWCD No. 1 - 8/14/1982
- 11 Iron County WCD - 8/2/1985
- 12 Permian Basin UWCD - 9/21/1985
- 13 Sutton County UWCD - 4/5/1986
- 14 Coke County UWCD - 11/4/1986
- 15 Mesquite GCD - 11/4/1986
- 16 Hill Country UWCD - 8/8/1987
- 17 Barton Springs/Edwards Aquifer CD - 8/13/1987
- 18 Lipan-Kikapoo WCD - 11/3/1987
- 19 Sterling County UWCD - 11/3/1987
- 20 Santa Rita UWCD - 8/19/1989
- 21 Fort Bend Subsidence District - 8/28/1989
- 22 Bandera County RA & GWD - 11/7/1989
- 23 Live Oak UWCD - 11/7/1989
- 24 Sandy Land UWCD - 11/7/1989
- 25 Saratoga UWCD - 11/7/1989
- 26 Mesa UWCD - 1/20/1990
- 27 Crockett County GCD - 1/26/1991
- 28 Medina County GCD - 8/26/1991
- 29 Headwaters UWCD - 11/5/1991
- 30 South Plains UWCD - 2/8/1992
- 31 Plum Creek CD - 5/1/1993
- 32 Uvalde County UWCD - 9/1/1993
- 33 Jeff Davis County UWCD - 11/2/1993
- 34 Gonzales County UWCD - 11/2/1994
- 35 Edwards Aquifer Authority - 7/28/1996
- 36 Garza County UWCD - 11/5/1996
- 37 Hemphill County UWCD - 11/4/1997
- 38 Wintergarden GCD - 1/17/1998
- 39 Culberson County GCD - 5/2/1998
- 40 Llano Estacado UWCD - 11/3/1998
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- 42 Menard County UWCD - 8/14/1999
- 43 Clearwater UWCD - 8/21/1999
- 44 Presidio County UWCD - 8/31/1999
- 45 Guadalupe County GCD - 11/14/1999
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- 47 Blanco-Pedernales GCD - 1/23/2001
- 48 Brewster County GCD - 11/6/2001
- 49 Coastal Bend GCD - 11/6/2001
- 50 Coastal Plains GCD - 11/6/2001
- 51 Fayette County GCD - 11/6/2001
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- 58 Refugio GCD - 11/6/2001
- 59 Texana GCD - 11/6/2001
- 60 Kinney County GCD - 1/12/2002
- 61 Lone Wolf GCD - 2/2/2002
- 62 Kimble County GCD - 5/3/2002
- 63 Middle Trinity GCD - 5/4/2002
- 64 Bluebonnet GCD - 11/5/2002
- 65 Brazos Valley GCD - 11/5/2002
- 66 Clear Fork GCD - 11/5/2002
- 67 Cow Creek GCD - 11/5/2002
- 68 Lost Pines GCD - 11/5/2002
- 69 Mid-East Texas GCD - 11/5/2002
- 70 Middle Pecos GCD - 11/5/2002
- 71 Post Oak Savannah GCD - 11/5/2002
- 72 Red Sands GCD - 11/5/2002
- 73 Trinity Glen Rose GCD - 11/5/2002
- 74 Wes-Tex GCD - 11/5/2002
- 75 Gateway GCD - 5/3/2003
- 76 Hays Trinity GCD - 5/3/2003
- 77 Rusk County GCD - 6/5/2004
- 78 Kenedy County GCD - 11/2/2004
- 79 Southeast Texas GCD - 11/2/2004
- 80 Corpus Christi ASRCD - 6/17/2005
- 81 Victoria County GCD - 8/5/2005
- 82 Central Texas GCD - 9/24/2005
- 83 Brazoria County GCD - 11/8/2005
- 84 Lower Trinity GCD - 11/7/2006
- 85 San Patricio County GCD - 5/12/2007
- 86 Northern Trinity GCD - 5/15/2007
- 87 Colorado County GCD - 11/6/2007
- 88 Pandia County GCD - 11/6/2007
- 89 Starr County GCD - 11/6/2007
- 90 Upper Trinity GCD - 11/6/2007
- 91 Southern Trinity GCD - 6/19/2009
- 92 Duval County GCD - 7/25/2009
- 93 Prairielands GCD - 9/1/2009
- 94 Red River GCD - 9/1/2009
- 95 Brush Country GCD - 11/3/2009
- 96 North Texas GCD - 12/1/2009
- 97 Terrell County GCD - 11/6/2012
- 98 Calhoun County GCD - 11/4/2014
- 99 Comal Trinity GCD - 6/17/2015
- 100 Reeves County GCD - 11/3/2015

Pending Confirmation

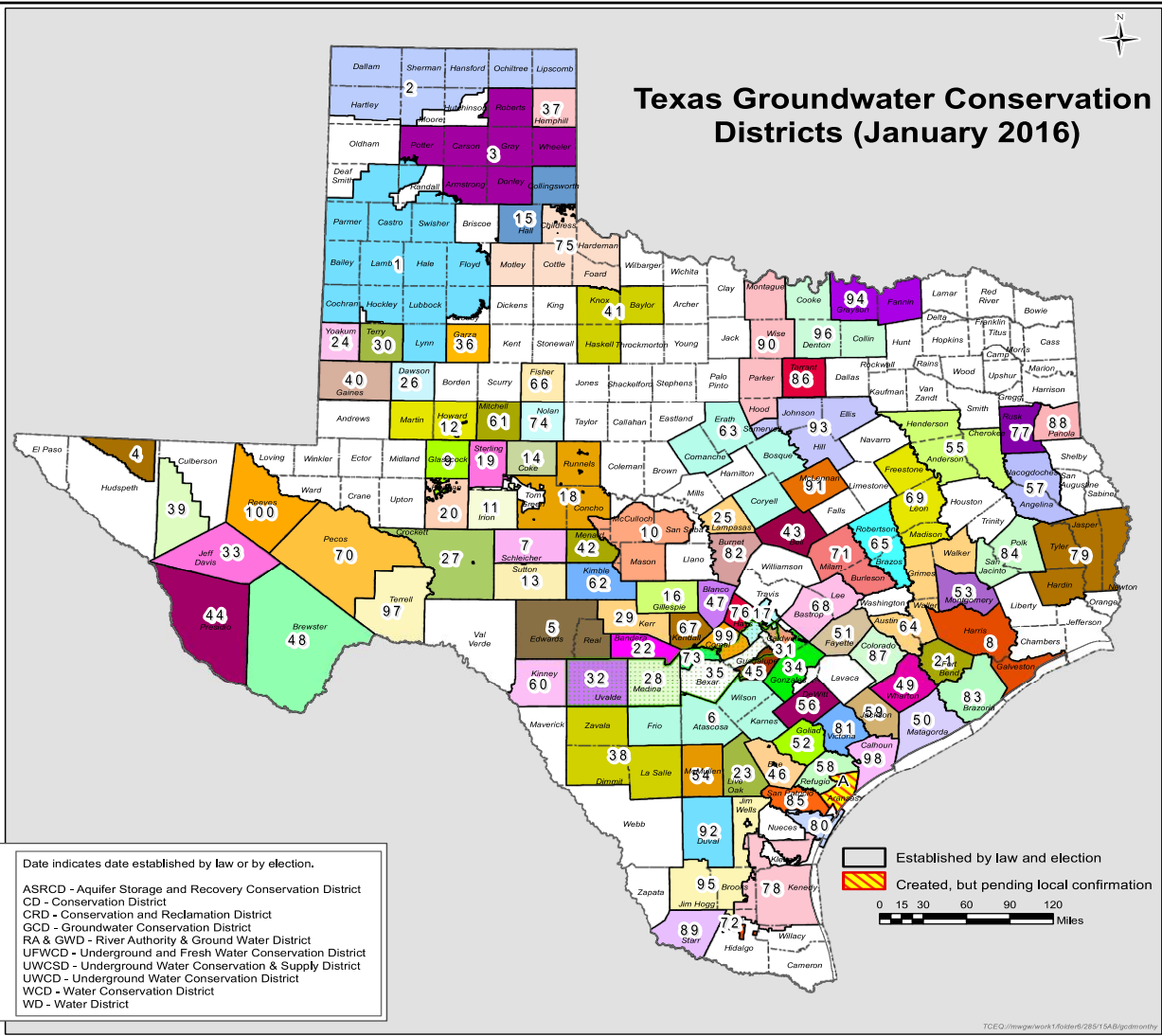
A - Aransas County GCD

Texas Commission on Environmental Quality

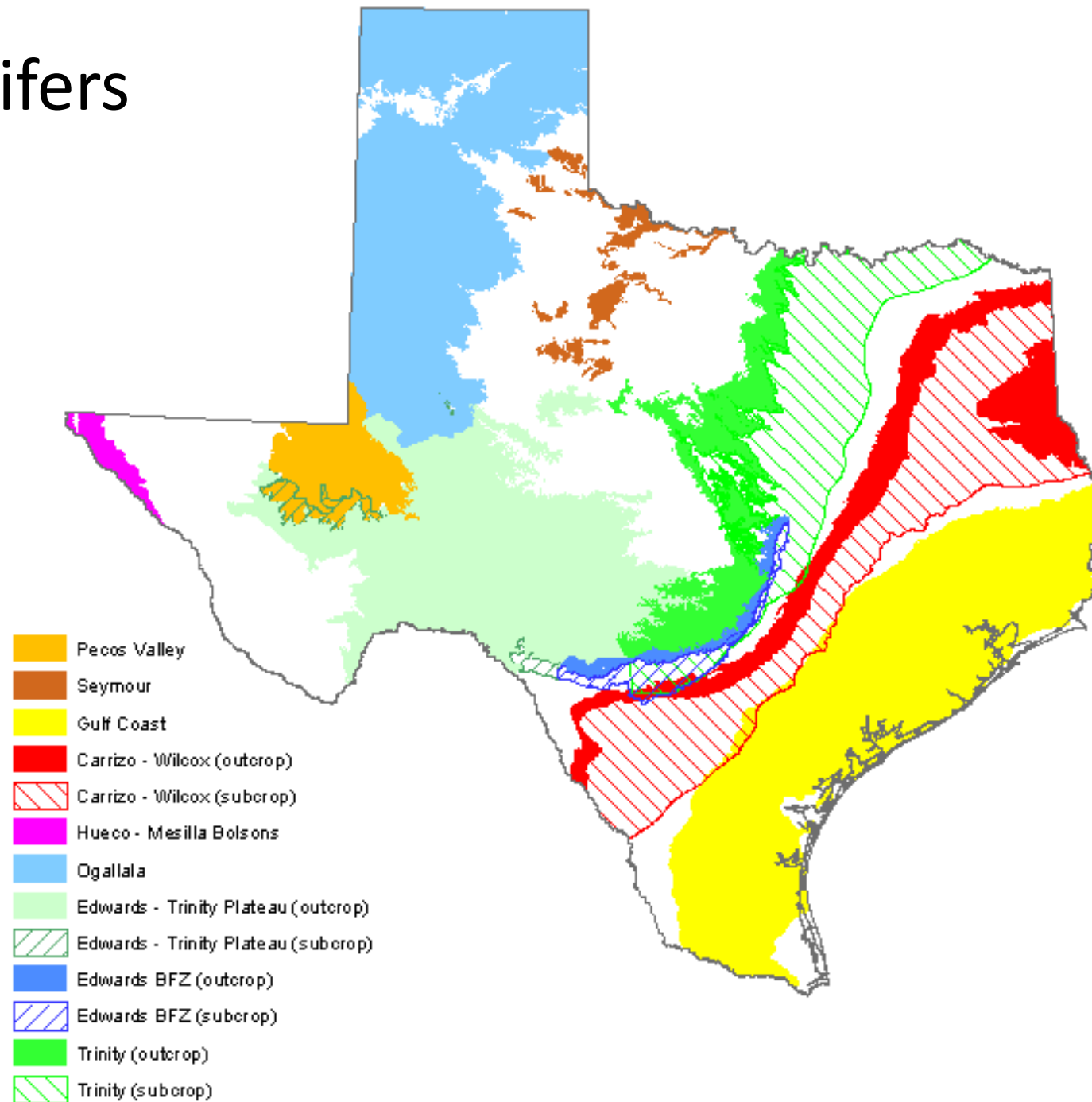


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Map printed January, 2016.



9 Major Aquifers



100 Groundwater Conservation Districts

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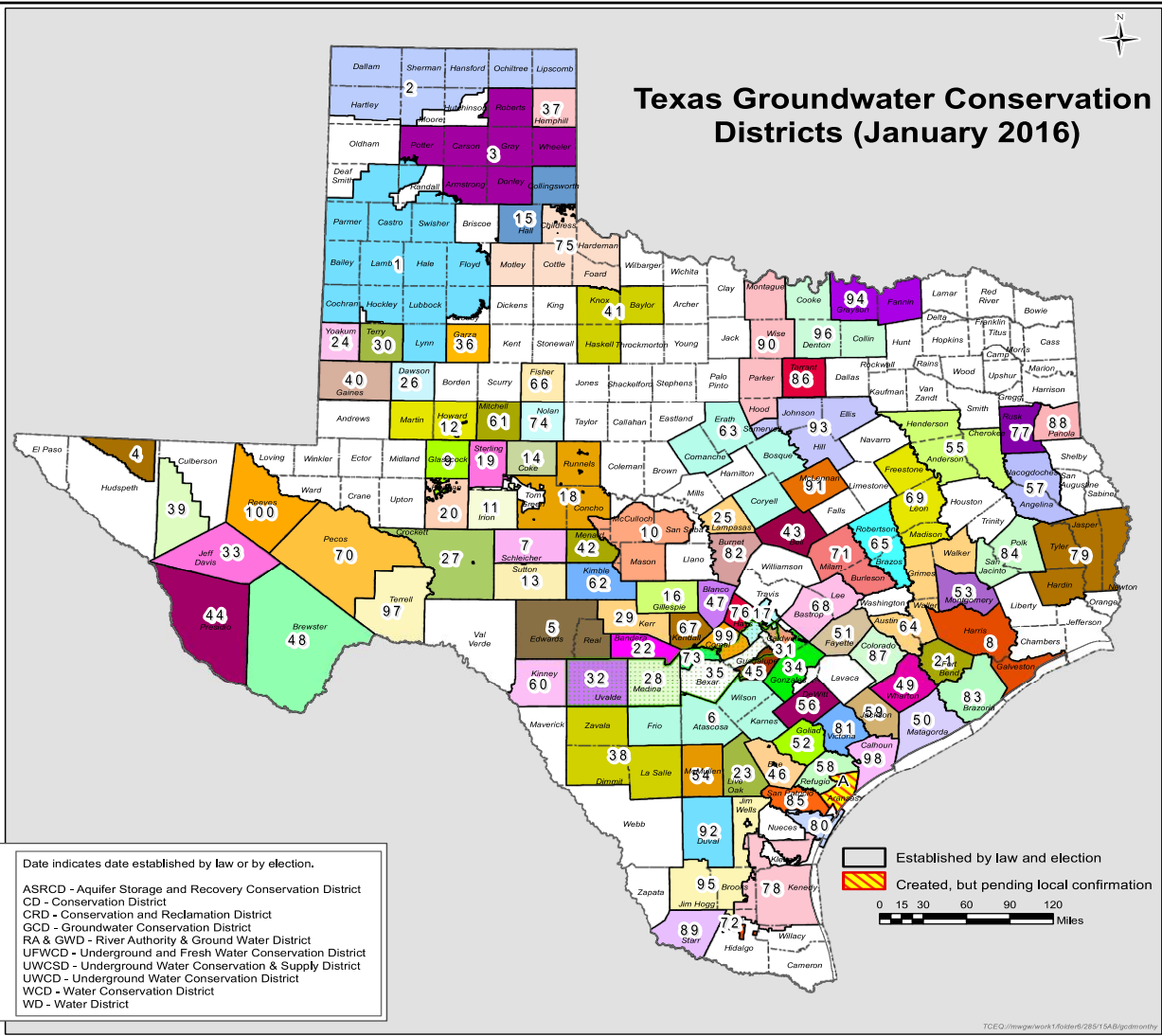
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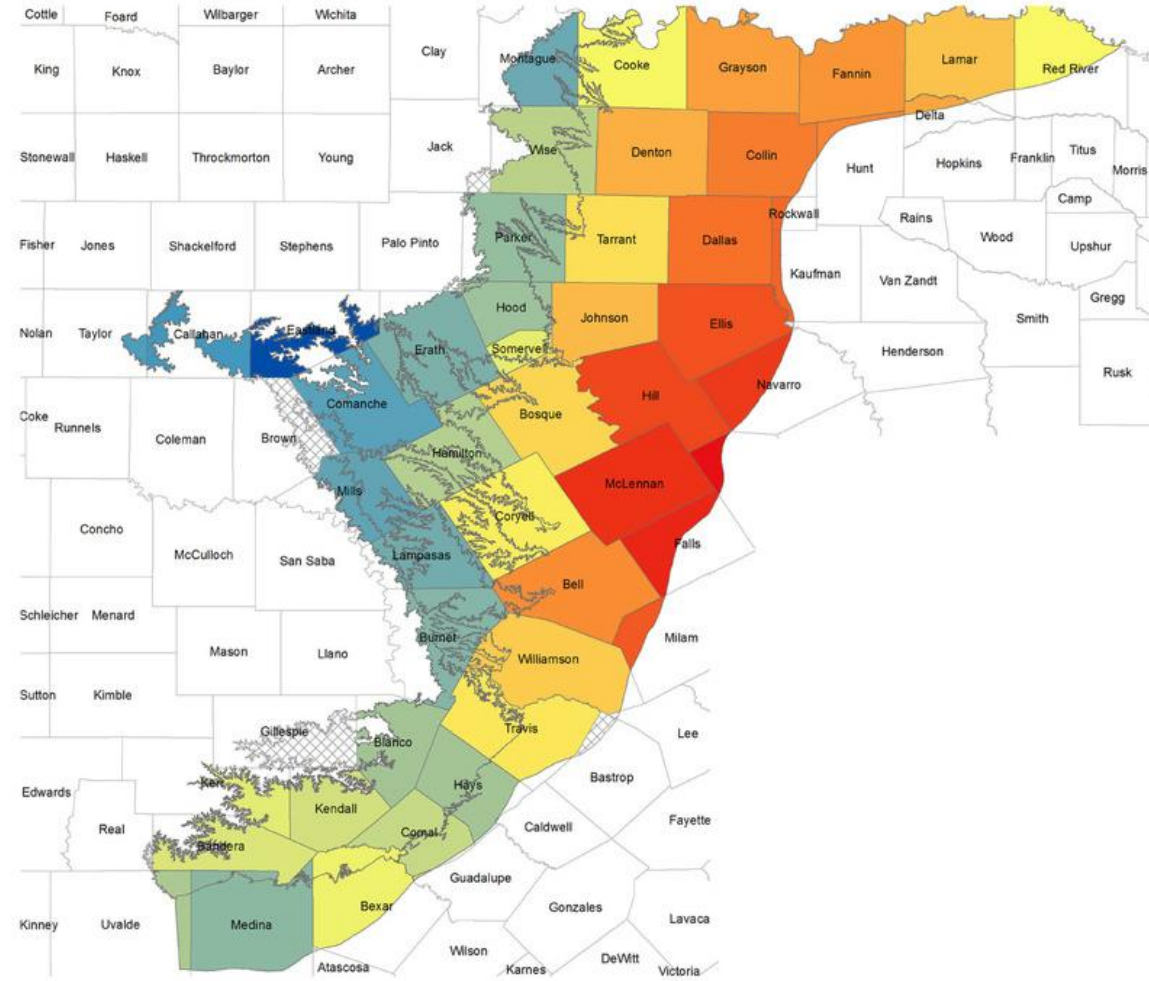
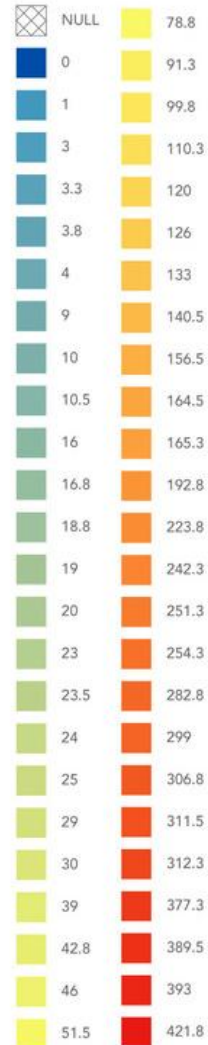
Map printed January, 2016.



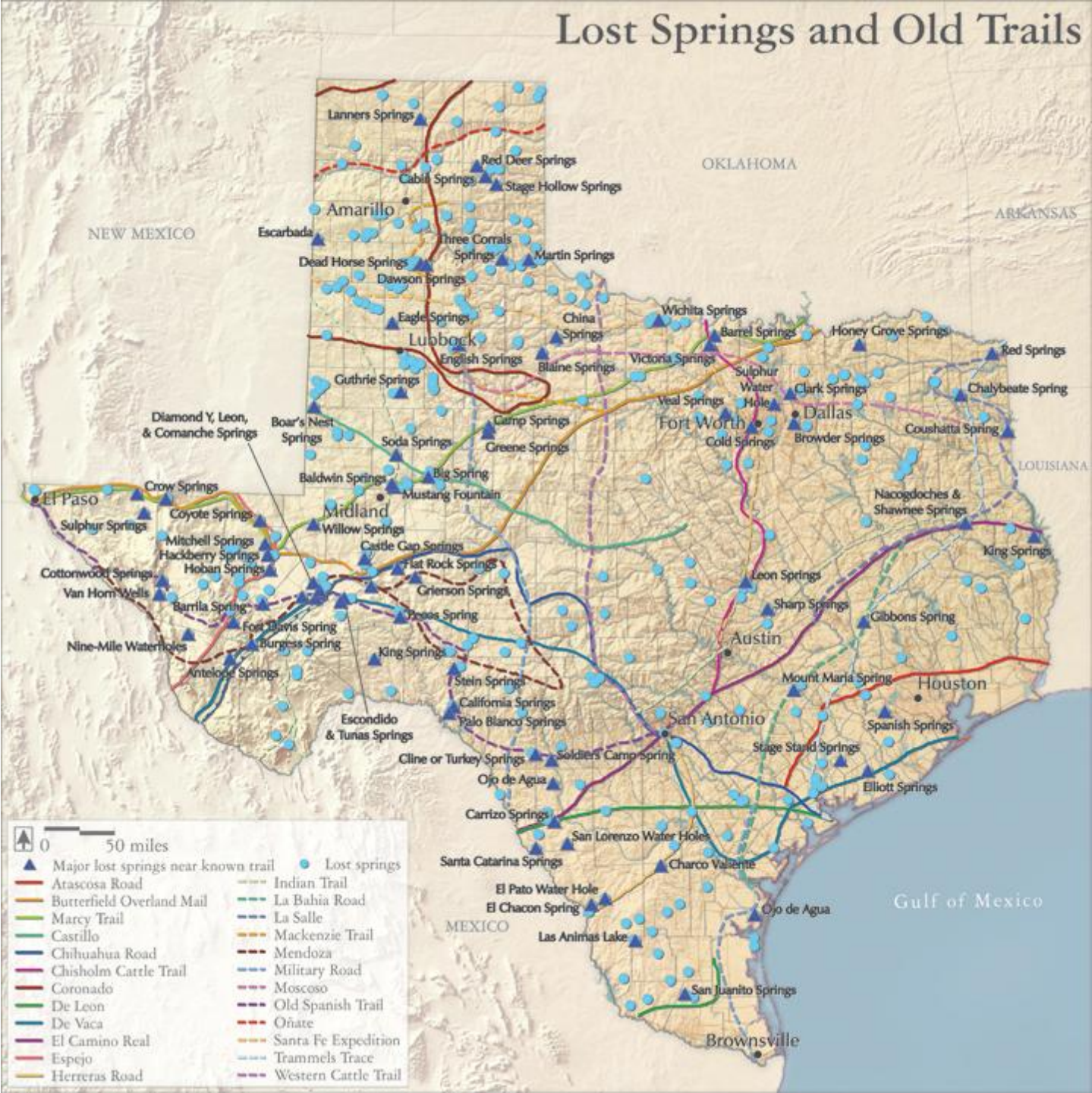
Trinity Aquifer DFC's by County—Managed Depletion

LEGEND

DRAWDOWN (FEET)



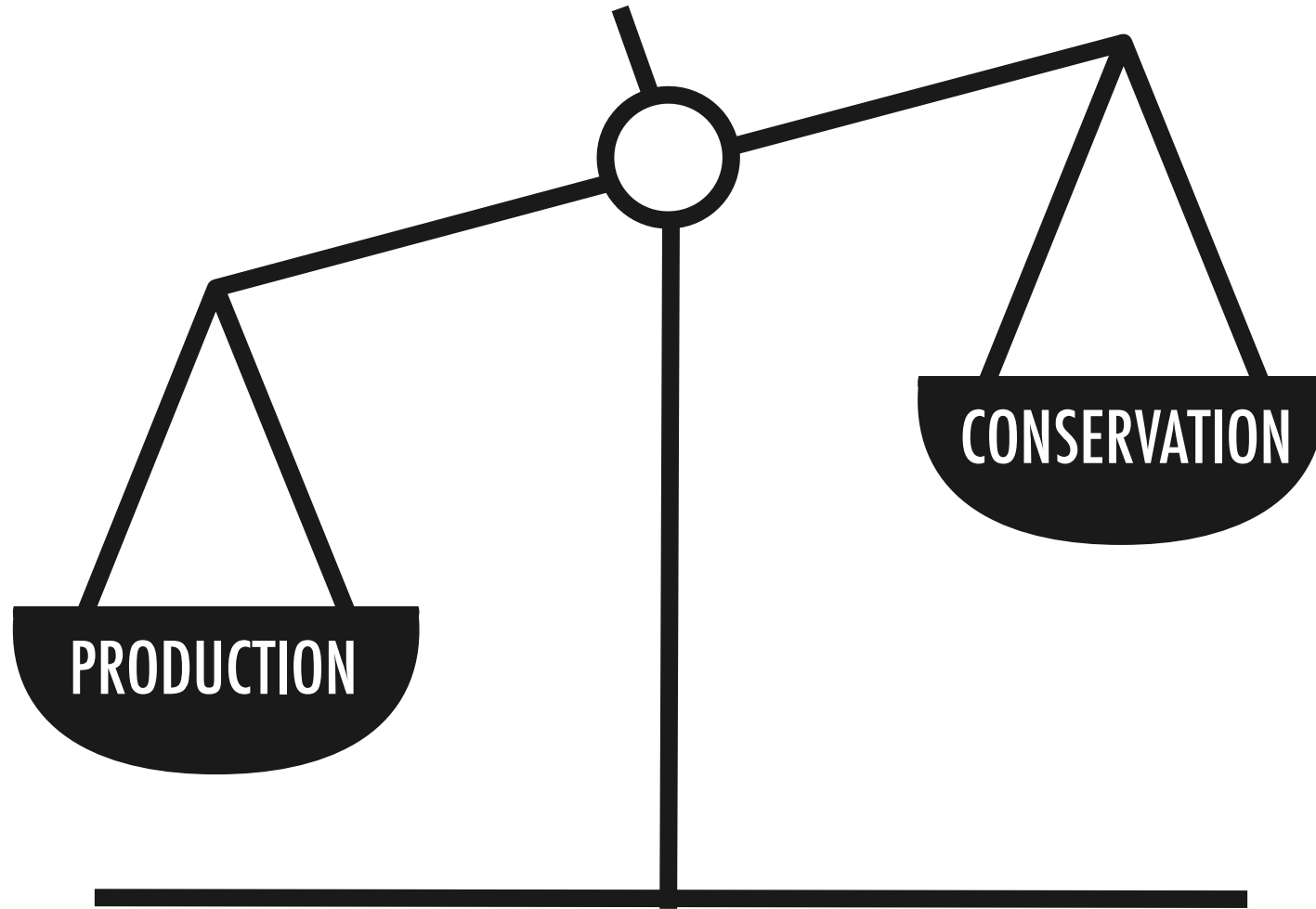
Over 400 Lost Springs in Texas



Comanche Springs, Pecos County



Groundwater Law in Texas



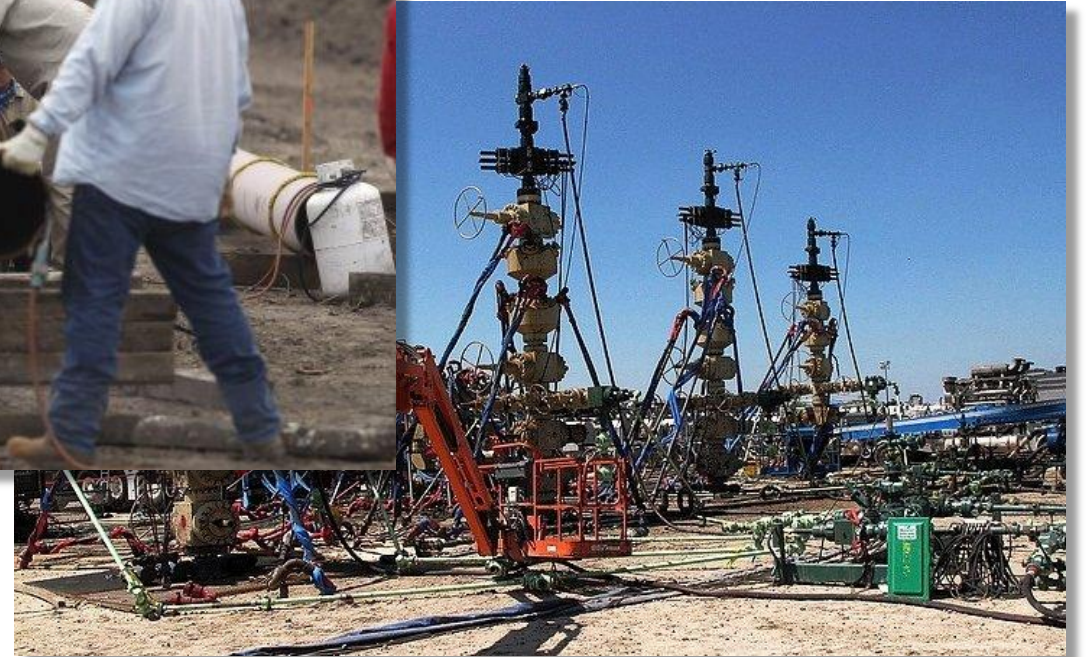
Landowners Own Groundwater in Place



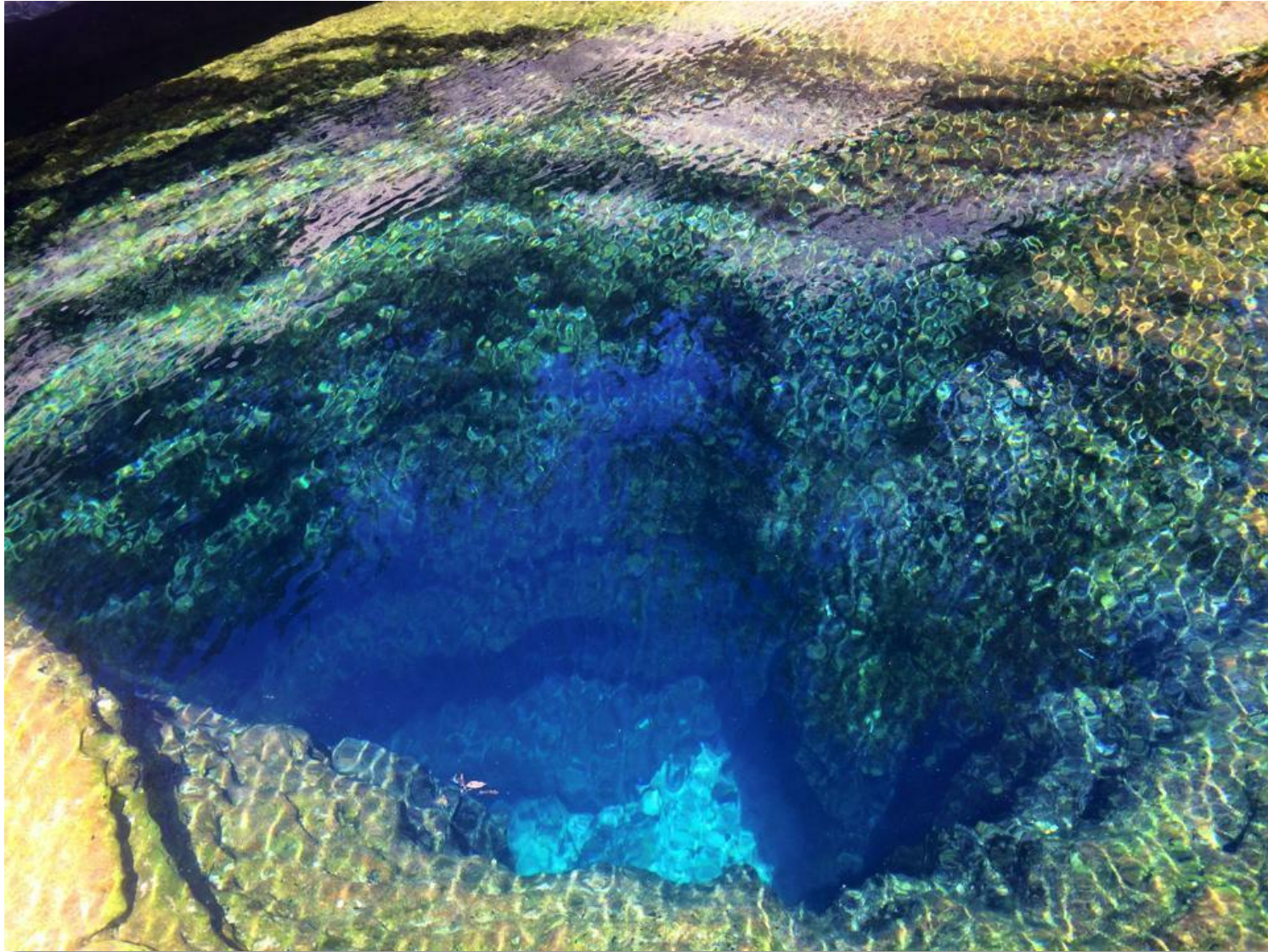
Oil and Gas Are Owned In Place



Oil and Gas Are Commodities



Groundwater Has Value in Place



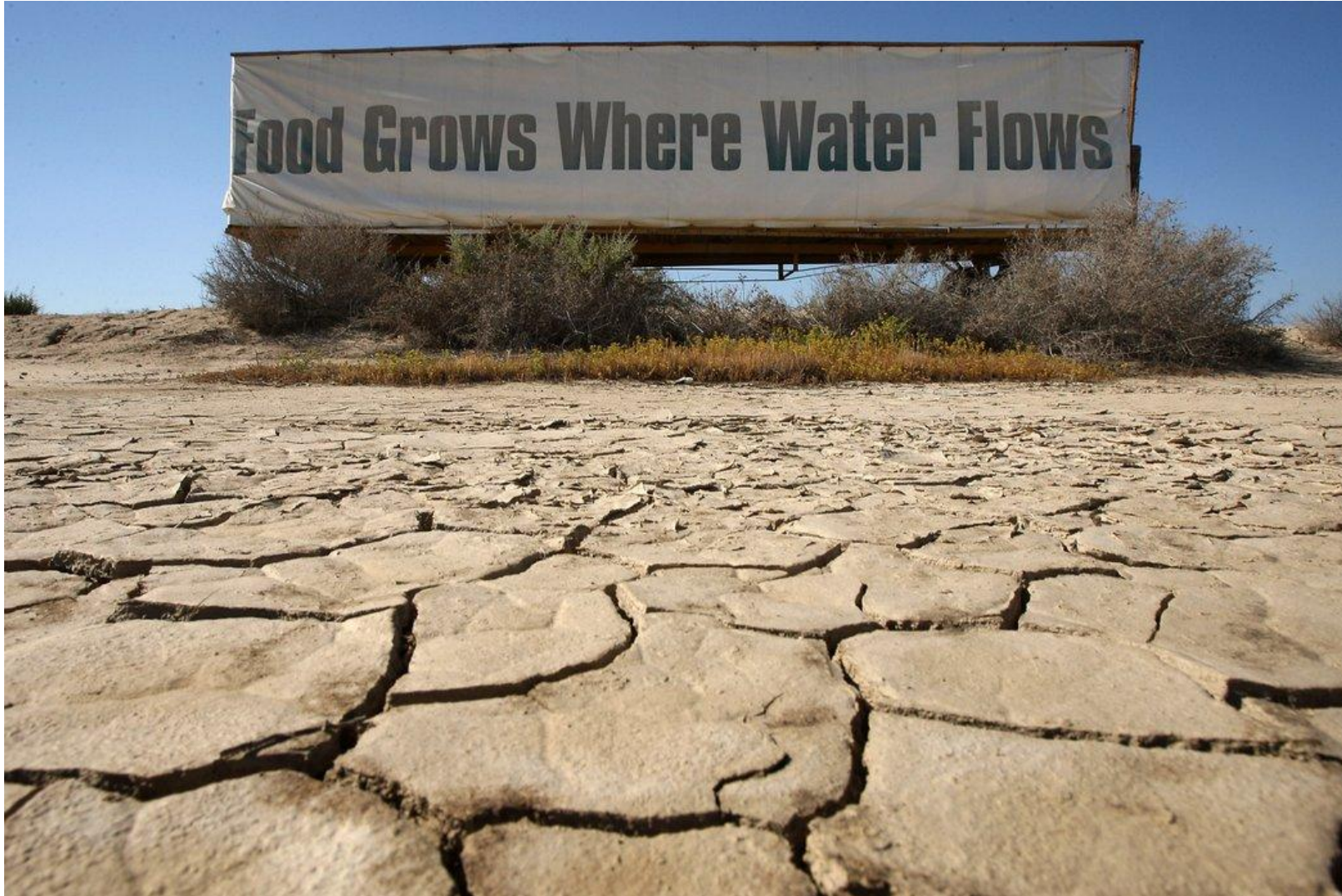
Groundwater Sustains Creeks



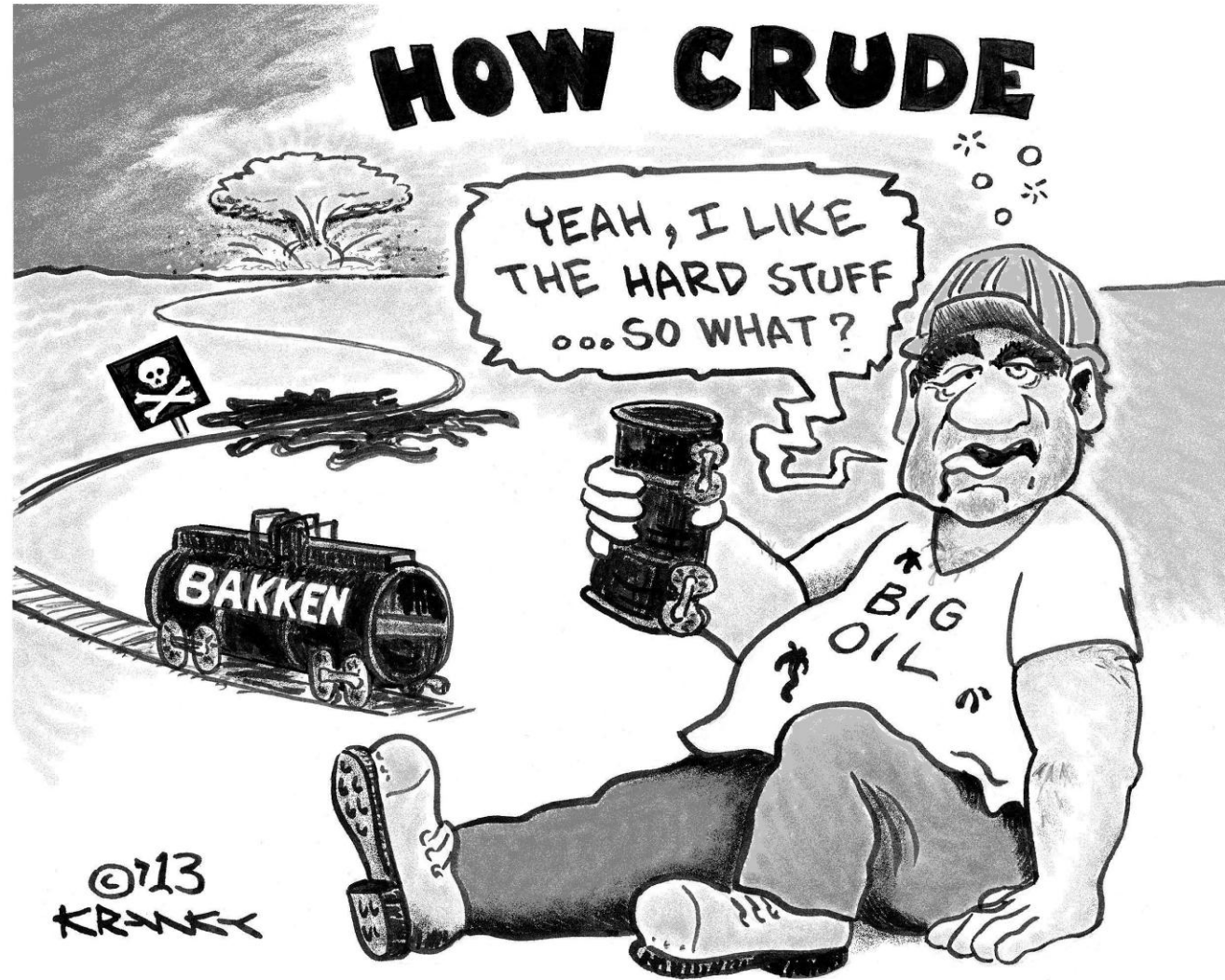
Groundwater Sustains Rivers



Without Water Land is Worthless



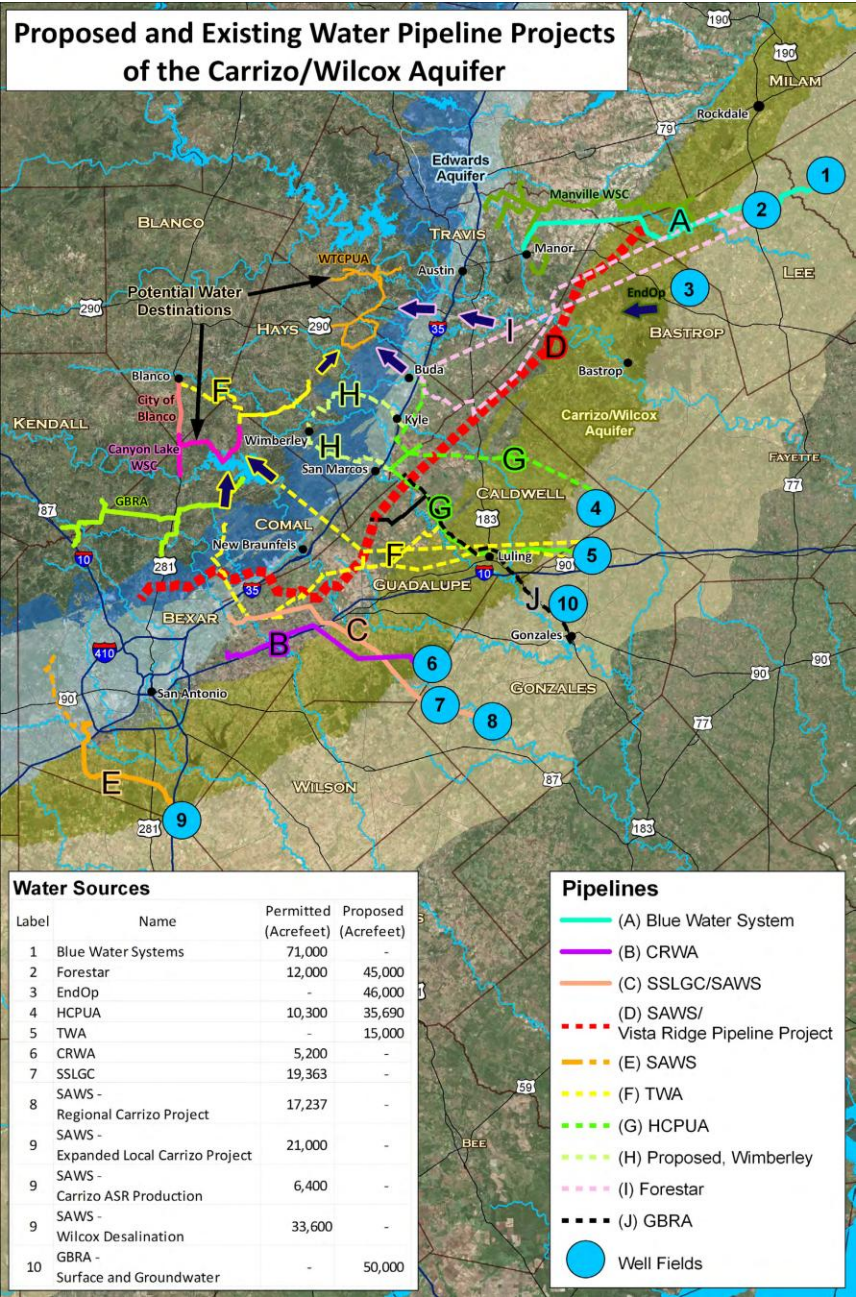
You Can't Drink Oil



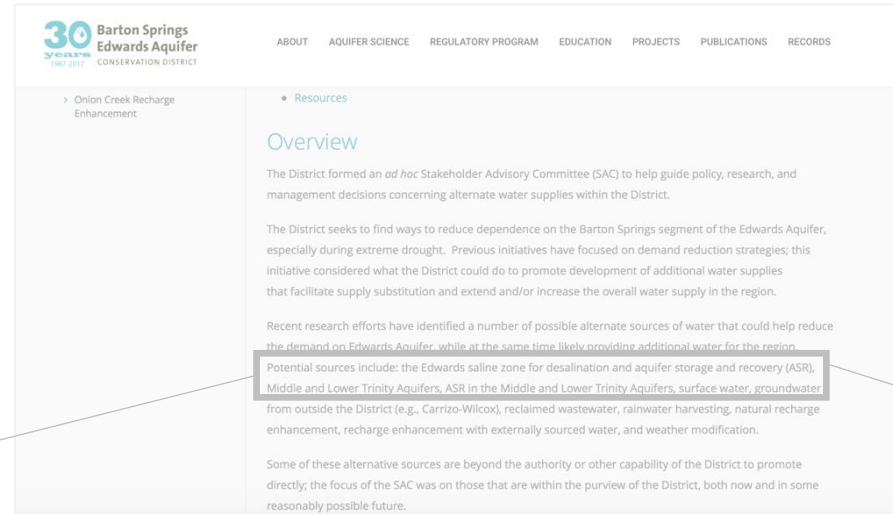
Why you should care



Groundwater Development



Groundwater = Alternative Water Supply



Potential sources include: the Edwards saline zone for desalination and aquifer storage and recovery (ASR), Middle and Lower Trinity Aquifers, ASR in the Middle and Lower Trinity Aquifers, surface water, groundwater

You Own Your
Groundwater

In Place

You Have A **RIGHT**
To **CONSERVE** It

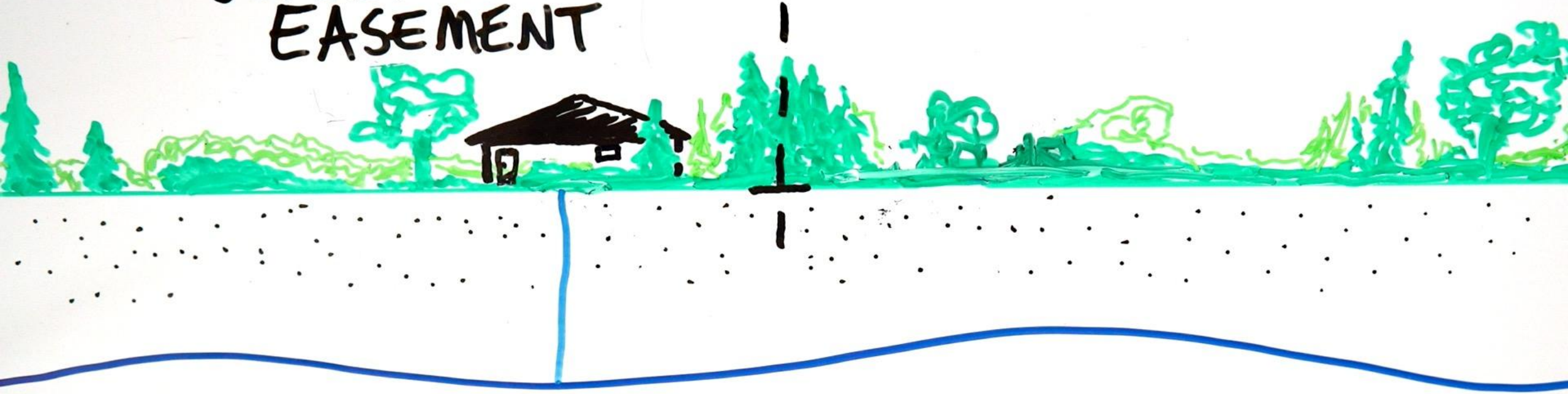
In Place



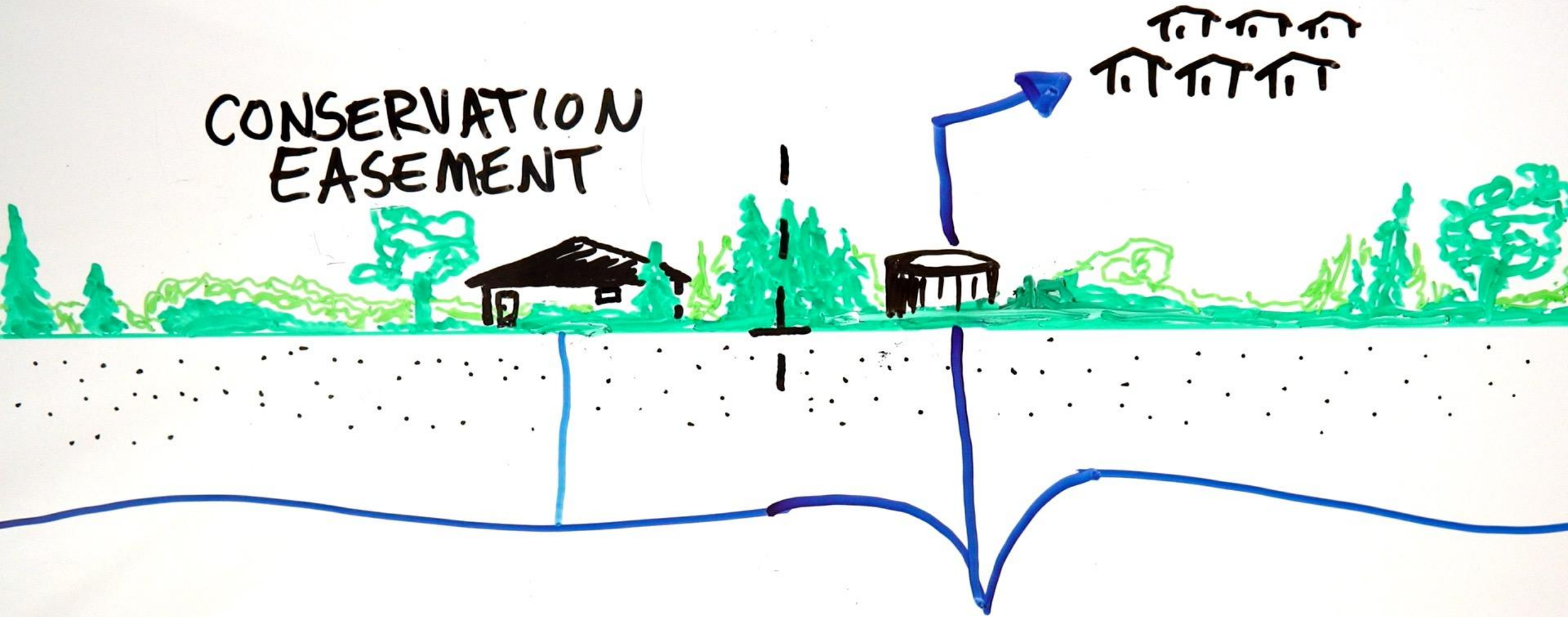
CONSERVATION EASEMENT



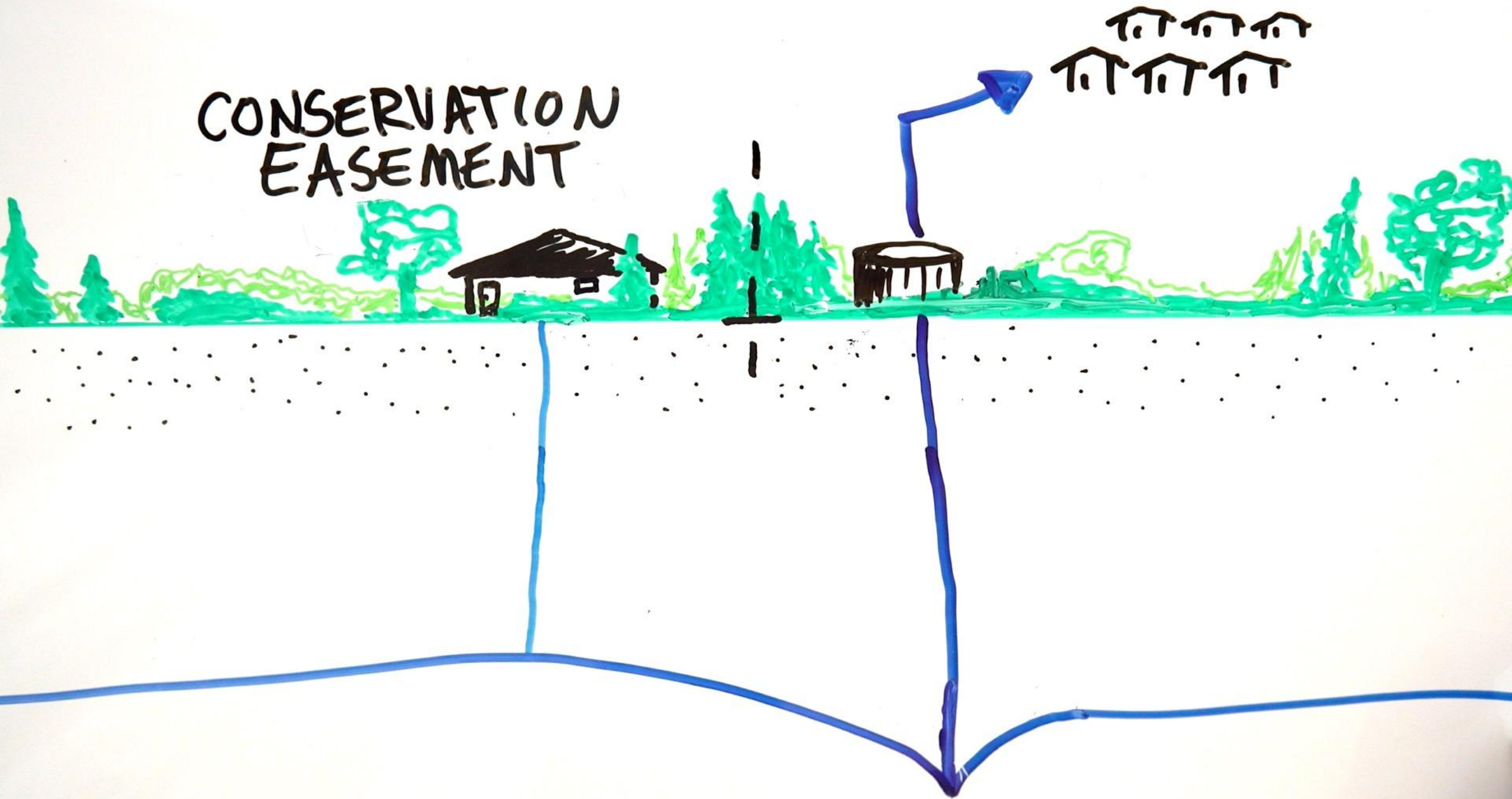
CONSERVATION EASEMENT



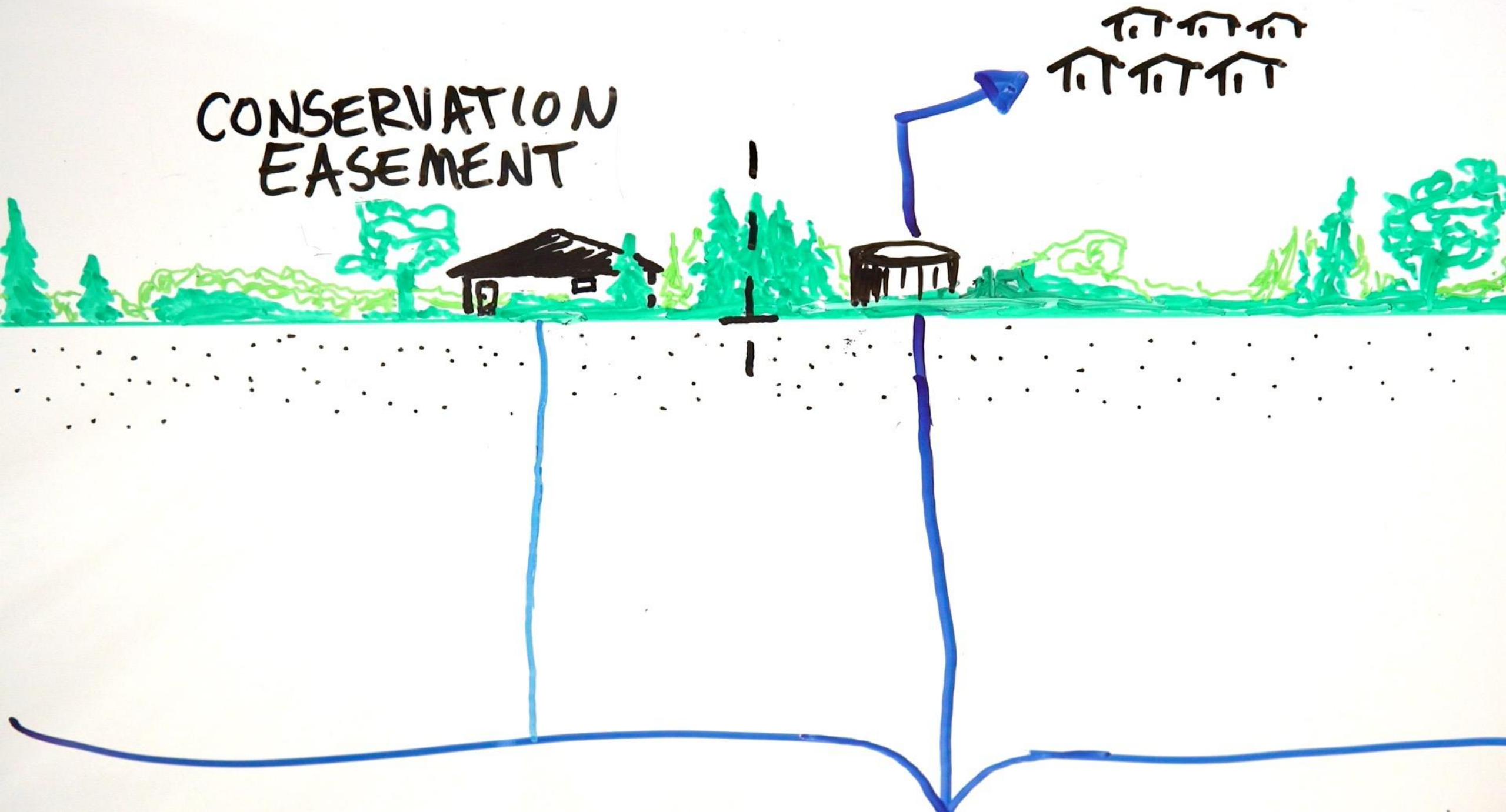
CONSERVATION EASEMENT



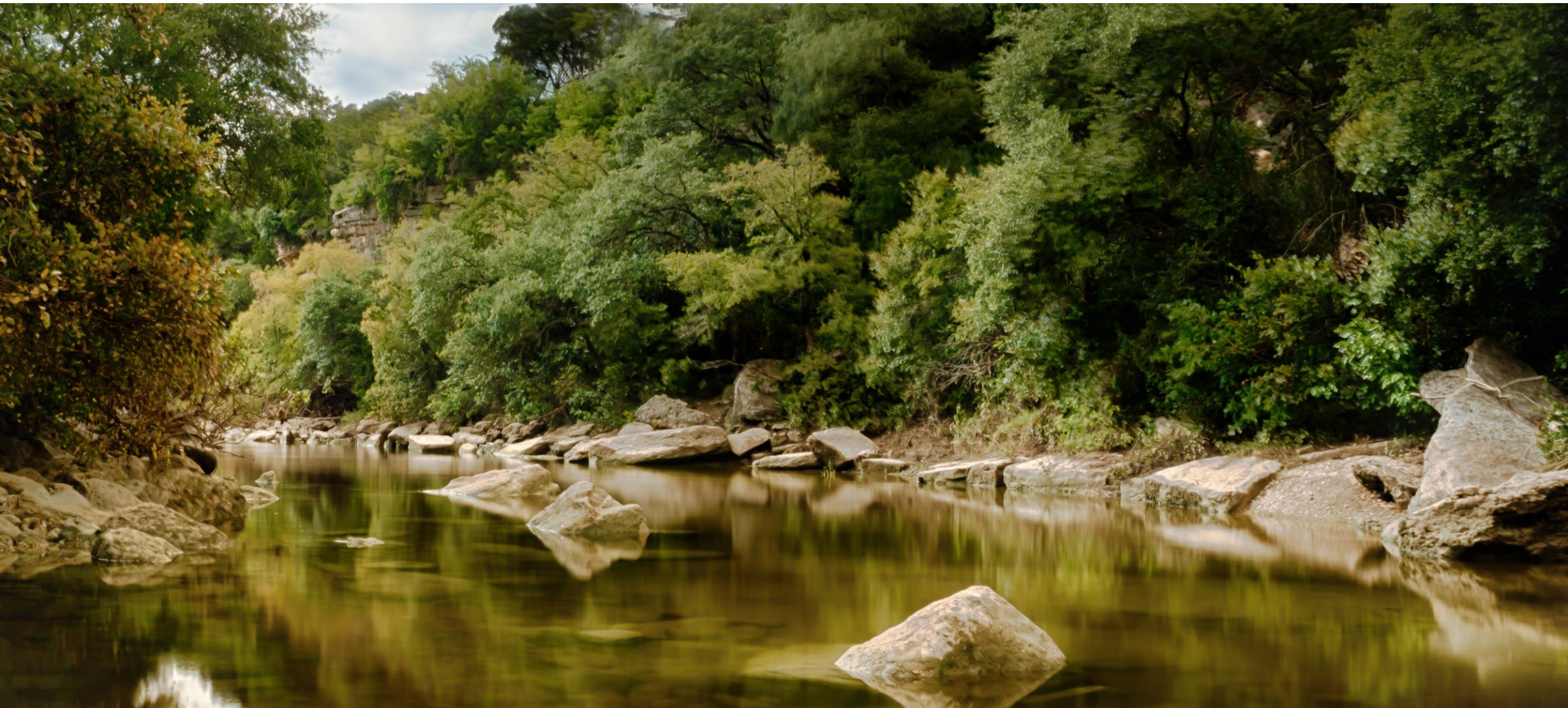
CONSERVATION EASEMENT



CONSERVATION EASEMENT



What Can You Do?



Conservation Easement on Land Should Protect Groundwater

and if not updated, the Plan then in force shall apply. Any vegetation management varying from the Conservation Area Plan shall require Grantee's prior written approval.

No restrictions on clearing or otherwise managing vegetation apply within the Building Envelopes.

2.10 Hydrology. Except as permitted, depletion or extraction of surface or subsurface water on the Property, nor shall activities be conducted that could alter the natural water level or flow in or over the Property. No sale, lease, or other conveyance of surface water, groundwater, or any other water rights separate from conveyance of the Property as a whole is permitted.

2.11 Signage. No signs or billboards shall be placed on the Property, except for those signs whose placement diminishes the scenic character of the Property.

2.12 Biocides. Except as needed and approved in writing by the Grantor, no pesticides or biocides shall be applied to the Property, except in a manner that is not detrimental to the Conservation Values of the Property.

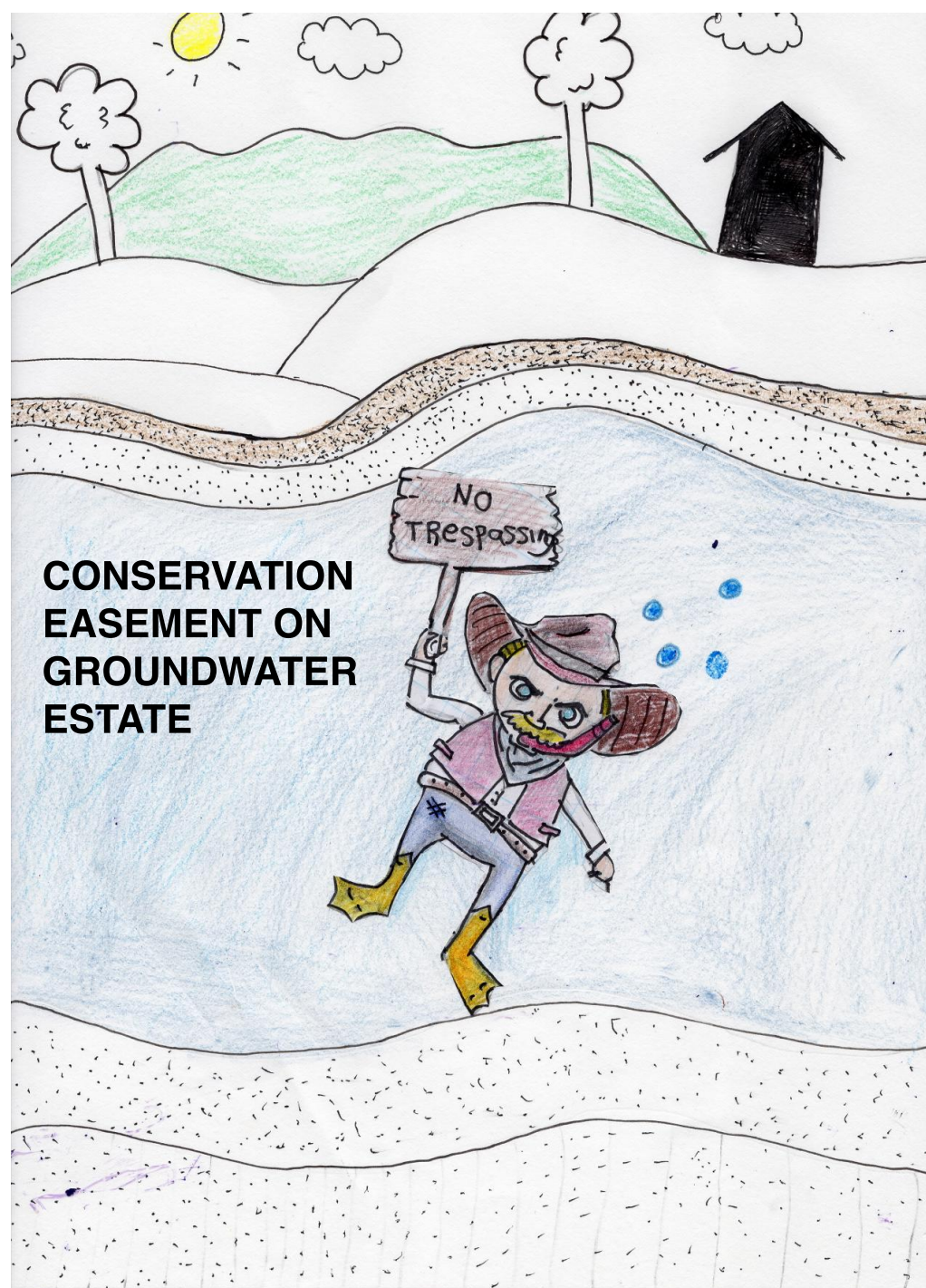
2.13 Dumping. There shall be no permitted dumping of any other unsightly or offensive material, hazardous waste, or other material on the Property, except as permitted elsewhere in this Easement. Spoils from the Protected Property may be stored temporarily in designated areas at intervals.

2.14 Pollution. There shall be no pollution of surface water, ponds, marshes, subsurface water or any other water bodies, nor shall activities be conducted on the Property that would be detrimental to water purity.

2.15 Predator Control. Grantor shall have the right to control, destroy, or trap predatory and problem animals that pose a material threat to people, other animals, or habitat by means and methods approved by Grantee.

2.10 Hydrology. Except as permitted in Paragraph 2.3, there shall be no alteration, depletion or extraction of surface or subsurface water on the Property, nor shall activities be conducted that could alter the natural water level or flow in or over the Property. No sale, lease, or other conveyance of surface water, groundwater, or any other water rights separate from conveyance of the Property as a whole is permitted.

**CONSERVATION
EASEMENT ON
GROUNDWATER
ESTATE**



Conservation Easement on Mineral Estate

COMMENT

Mineral Estate Conservation Easements: A New Policy Instrument to Address Hydraulic Fracturing and Resource Extraction

by Robert B. Jackson, Jessica Owley, and James Salzman

Robert B. Jackson is Michelle and Kevin Douglas Provostial Professor, Department of Earth System Science, Woods Institute for the Environment, and Precourt Institute for Energy, Stanford University. Jessica Owley is Professor of Law, University at Buffalo School of Law, the State University of New York. James Salzman is the Donald Bren Distinguished Professor of Environmental Law, Bren School of the Environment, University of California, Santa Barbara, and University of California, Los Angeles Law School.

In a few short years, hydraulic fracturing (or fracking, as it is colloquially called) has transformed the oil and natural gas industries and changed the landscape of energy policy. While helping the United States approach energy independence, fracking has also generated major conflicts over local land-use decisions.

Although the hydrocarbons trapped in shale and sandstone formations had been viewed as unrecoverable, the advent of high-volume hydraulic fracturing in the early 2000s changed that view.¹ In high-volume hydraulic fracturing, roughly 8,000 to 80,000 cubic meters (2-20 million gallons) of water, chemicals, and sand and other proppants² are pumped underground at pressures (10,000-20,000 pounds per square inch) sufficient to crack open impermeable rock formations, allowing the oil and natural gas to flow through the well to the surface.³ A hydraulically fractured well can now follow a thin layer of impermeable shale or tight sandstone for kilometers or more laterally.⁴ Long horizontal wellbores⁵ often travel under multiple

landowners' properties, requiring companies to acquire larger leases than they need for conventional wells.

The United States, where hydraulic fracturing was developed, is one of the world's largest producers of oil and natural gas.⁶ The country produced nine million barrels of oil daily in 2015, more than one-half from hydraulically fractured wells, with oil production almost doubling since 2000.⁷ In fact, the United States has gone from being the world's largest net importer of oil to being a global exporting powerhouse.⁸

Natural gas extraction and production are also increasing, primarily derived from hydraulic fracturing. Companies produced 12.3 trillion cubic feet of natural gas from shale and other impermeable formations in the United States in 2014, approximately one-half of all gas produced that year.⁹ Electricity powered by natural gas reached parity with coal, at 33% domestic market share in 2015, and natural gas overtook coal for the first time in 2016 as the dominant source of electricity in the United States.¹⁰

Accompanying the rise of high-volume hydraulic fracturing¹¹ has been a suite of environmental and social con-

Authors' Note: We would like to thank Collin Doane for his research assistance on this project and Fred Cheever, Amy Pickle, and Amy Mall for comments on an earlier draft.

1. U.S. ENERGY INFORMATION ADMINISTRATION (EIA), "TECHNICALLY RECOVERABLE SHALE OIL AND SHALE GAS RESOURCES: AN ASSESSMENT 13 (2013), available at <http://www.eia.gov/analysis/studies/worldshalegas/pdf/fullreport.pdf>; ROYAL SOCIETY & ROYAL ACADEMY OF ENGINEERING, SHALE GAS EXTRACTION IN THE UK: A REVIEW OF HYDRAULIC FRACTURING 12 (2012) [hereinafter ROYAL SOC'Y]; NATURAL RESOURCES CANADA, *Exploration and Production of Shale and Tight Resources*, <http://www.nrcan.gc.ca/energy/sources/shale-tight-resources/17677> (last visited Dec. 12, 2016).
2. A proppant is material used to keep cracks in the rock open after the water used in hydraulic fracturing leaves. ROYAL SOC'Y, *supra* note 1, at 68.
3. Robert B. Jackson et al., *The Environmental Costs and Benefits of Fracking*, 39 ANN. REV. ENV'T & RESOURCES 327, 329 (2014).
4. *Id.* at 334.
5. A wellbore is the "hole created by drilling operations," synonymous with borehole. ROYAL SOC'Y, *supra* note 1, at 69.

6. Linda Doman et al., *United States Remains Largest Producer of Petroleum and Natural Gas Hydrocarbons*, TODAY IN ENERGY, May 23, 2016, <http://www.eia.gov/todayinenergy/detail.cfm?id=26352>.

7. *Id.*

8. See EIA, *Petroleum and Other Liquids—Crude Oil Production*, www.eia.gov/dnav/pet/pet_crd_crdn_adc_mblpld_a.htm (last visited Dec. 12, 2016).

9. EIA, *Frequently Asked Questions: How Much Shale Gas Is Produced in the United States?*, <http://www.eia.gov/tools/faqs/faq.cfm?id=907&ic=8> (last visited Dec. 12, 2016).

10. Tyler Hodge et al., *Natural Gas Expected to Surpass Coal in Mix of Fuel Used for U.S. Power Generation in 2016*, TODAY IN ENERGY, Mar. 16, 2016, <http://www.eia.gov/todayinenergy/detail.php?id=25392>.

11. High-volume hydraulic fracturing is distinguished from other fracturing methods because it requires larger volumes of water. See NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, FINAL SUPPLEMENTAL GENERIC ENVIRONMENTAL IMPACT STATEMENT ON THE OIL, GAS, AND

Conservation Easement on Groundwater Estate

A “Conservation easement” is defined as “a non possessory interest of a holder in **REAL PROPERTY** that imposes limitations or affirmative obligations designed to

- (A) retain or protect natural, scenic, or open-space values of real property or assure its availability for agricultural, forest, recreational, or open-space use;
- (B) protect natural resources;
- (C) maintain or enhance air or water quality; or
- (D) preserve the historical, architectural, archeological, or cultural aspects of real property.”

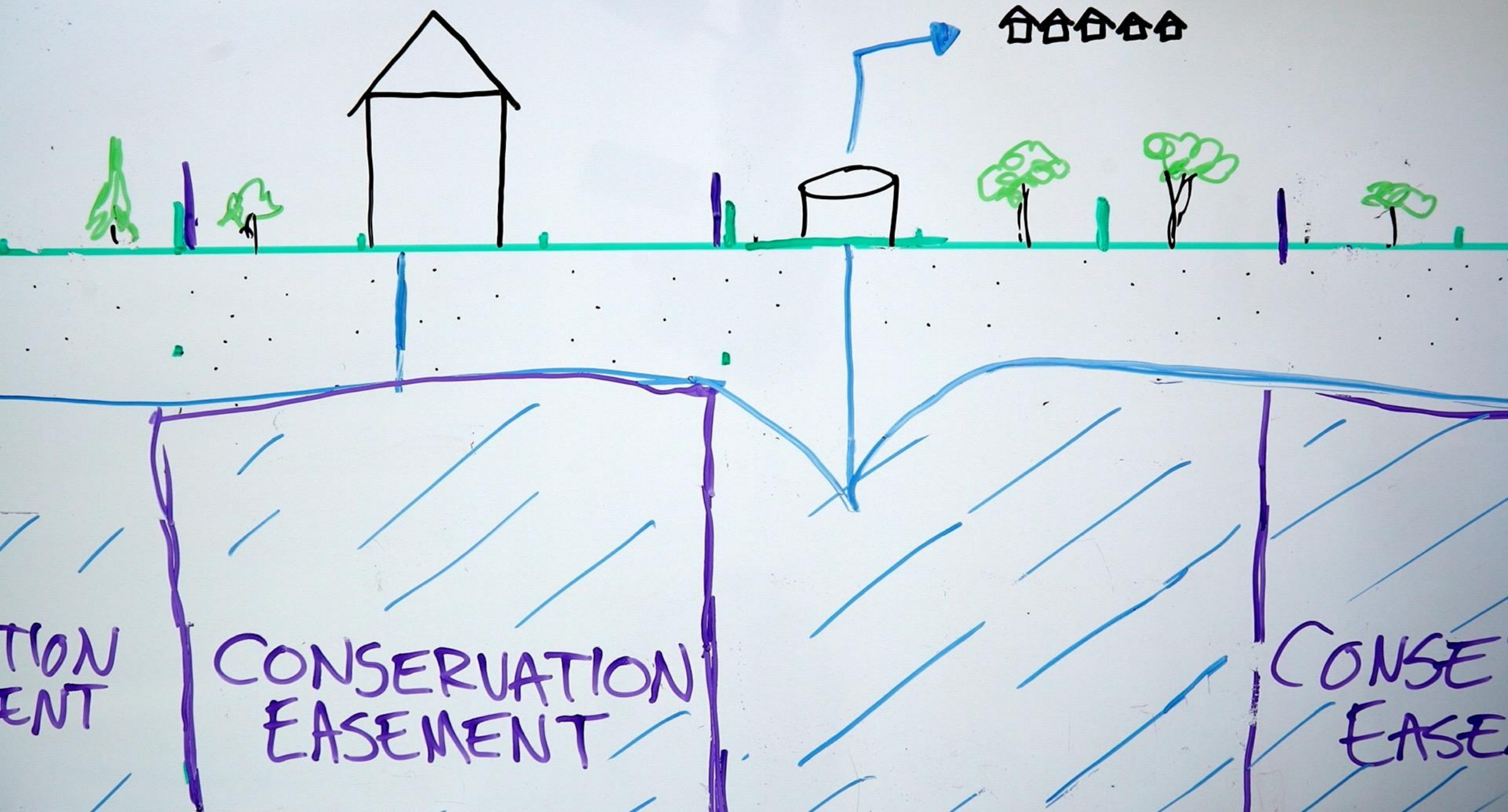
Texas Natural Resources Code § 183.001



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CONSERVATION
EASEMENT

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Obstacles



Likely Not Deductible

26 USC § 170

A “qualified conservation contribution” means a contribution—

(A) of a qualified **real property interest, (this is groundwater in Texas)**

(B) to a qualified organization,

(C) exclusively for conservation purposes.

“Conservation purpose” means:

(i) the preservation of **land** areas for outdoor recreation by, or the education of, the general public, [not going to work for just groundwater]

(ii) the protection of a relatively natural habitat of fish, wildlife, or plants, or similar ecosystem,

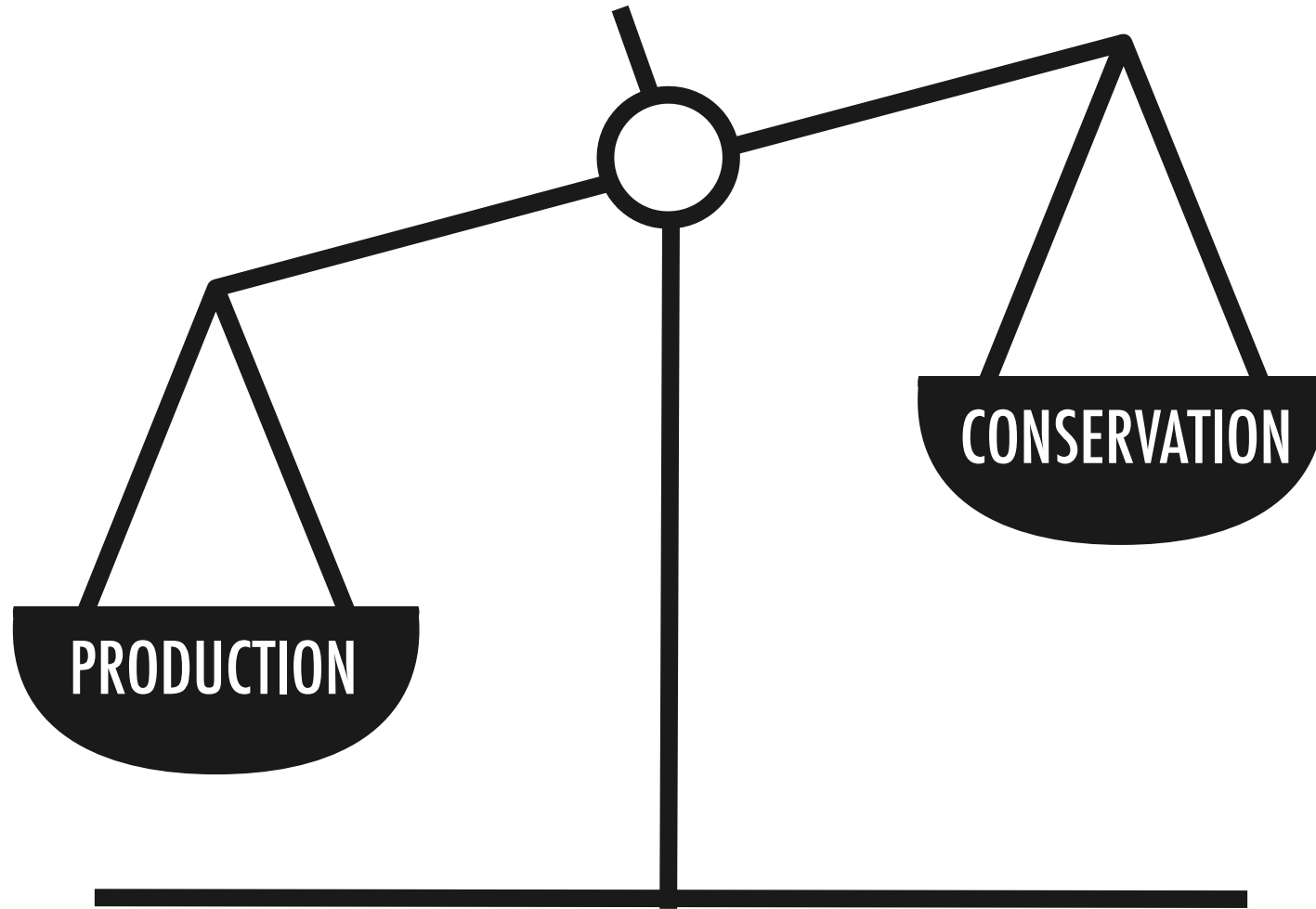
(iii) the preservation of **open space** (including farmland and forest land) where such preservation is— [wont work for just groundwater]

(I) for the scenic enjoyment of the general public, or

(II) pursuant to a clearly delineated Federal, State, or local governmental conservation policy, and will yield a significant public benefit, or


(iv) the preservation of an historically important land area or a certified historic structure.

Groundwater Law in Texas



*“Water links us to our neighbor
in a way more profound and
complex than any other.”*

- John Thorson, Federal Water Master, Washington State



Thank You
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