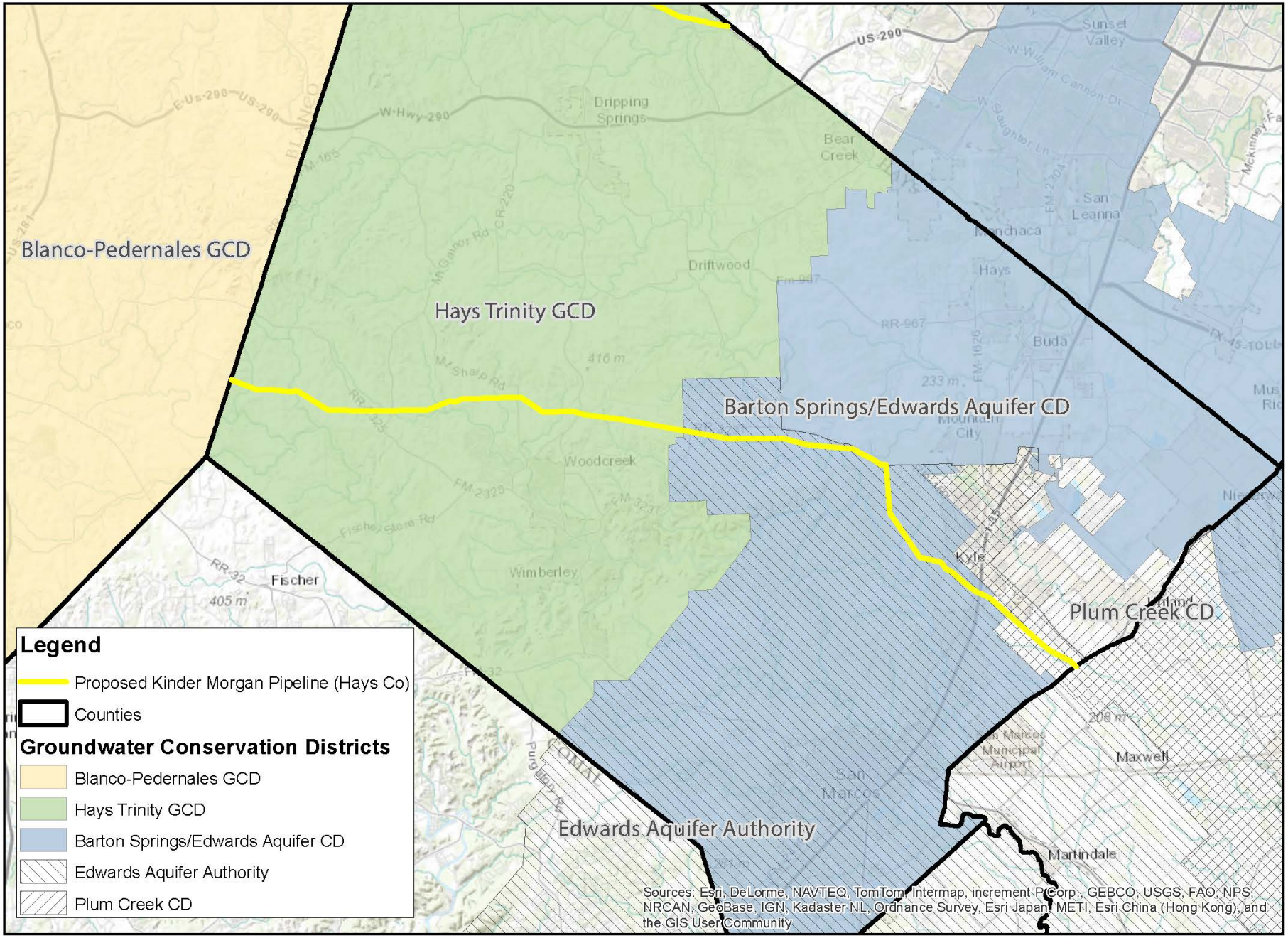
Karst Systems of Hays County and the Edwards and Trinity Aquifers

Presentation to Board of Directors
March 14, 2019

Barton Springs/Edwards Aquifer
CONSERVATION DISTRICT

Groundwater Conservation District Jurisdictions



Outline

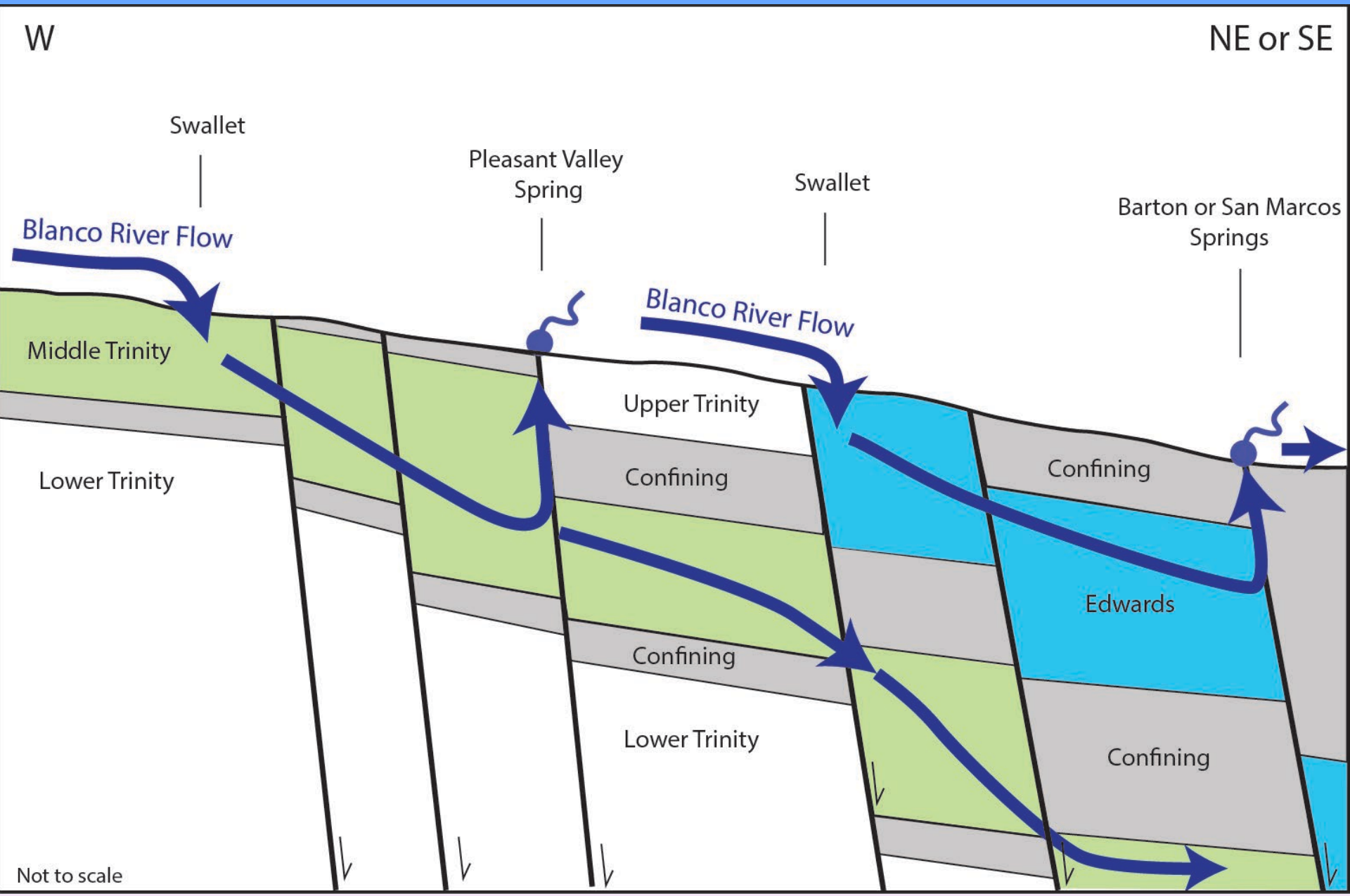
1. What is karst?
2. Hydrogeology and karst of Hays County
3. Pathways and contaminant transport in karst
4. Highway and pipeline construction over karst
5. Concerns and Questions
6. Conclusions

Karst

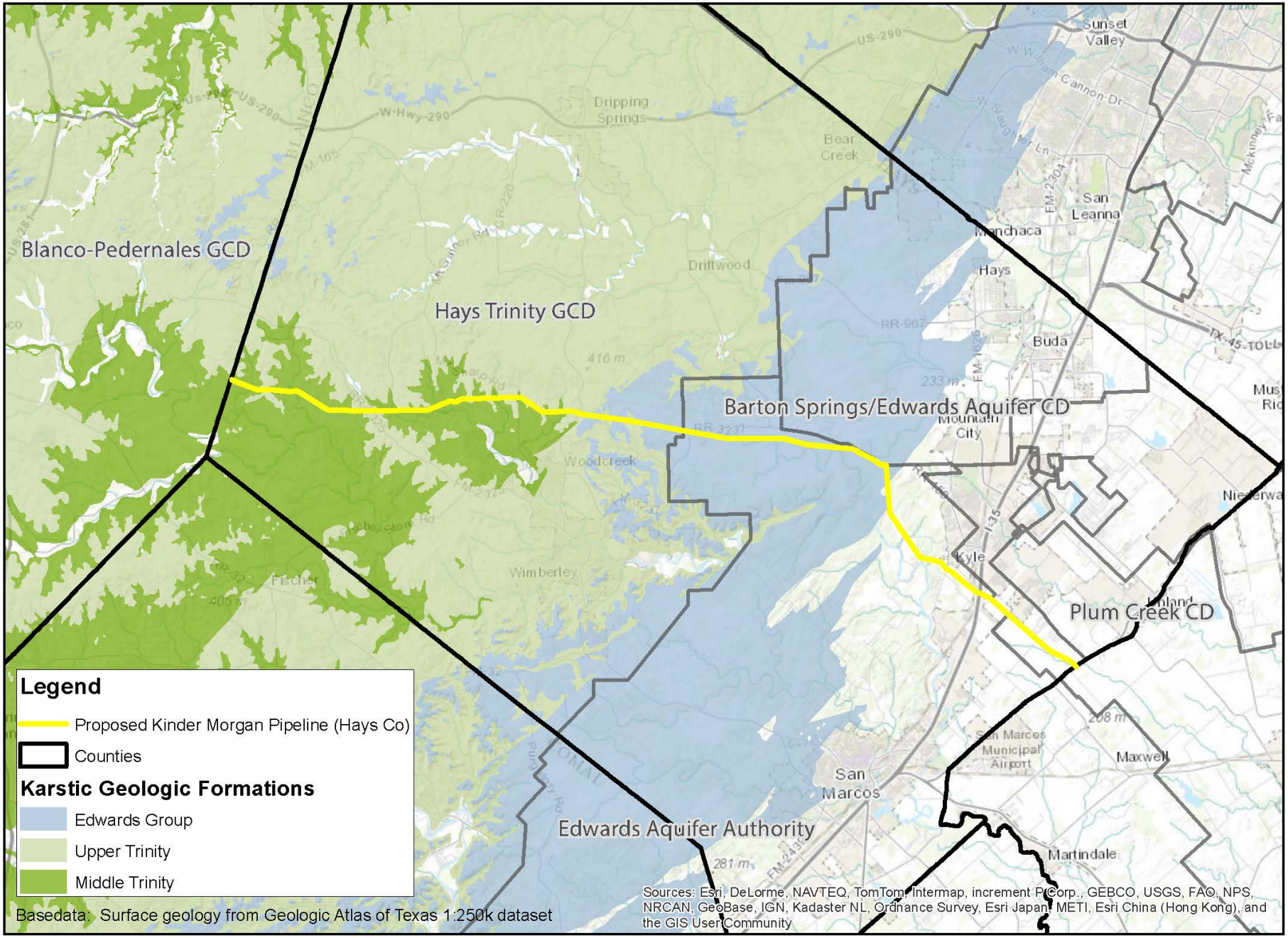
- Landforms produced through the dissolution of rock.
- Characterized by caves, sinkholes, and springs.
- Edwards and Trinity are karstic aquifers

Kiwi Sink (Upper Glen Rose limestone)

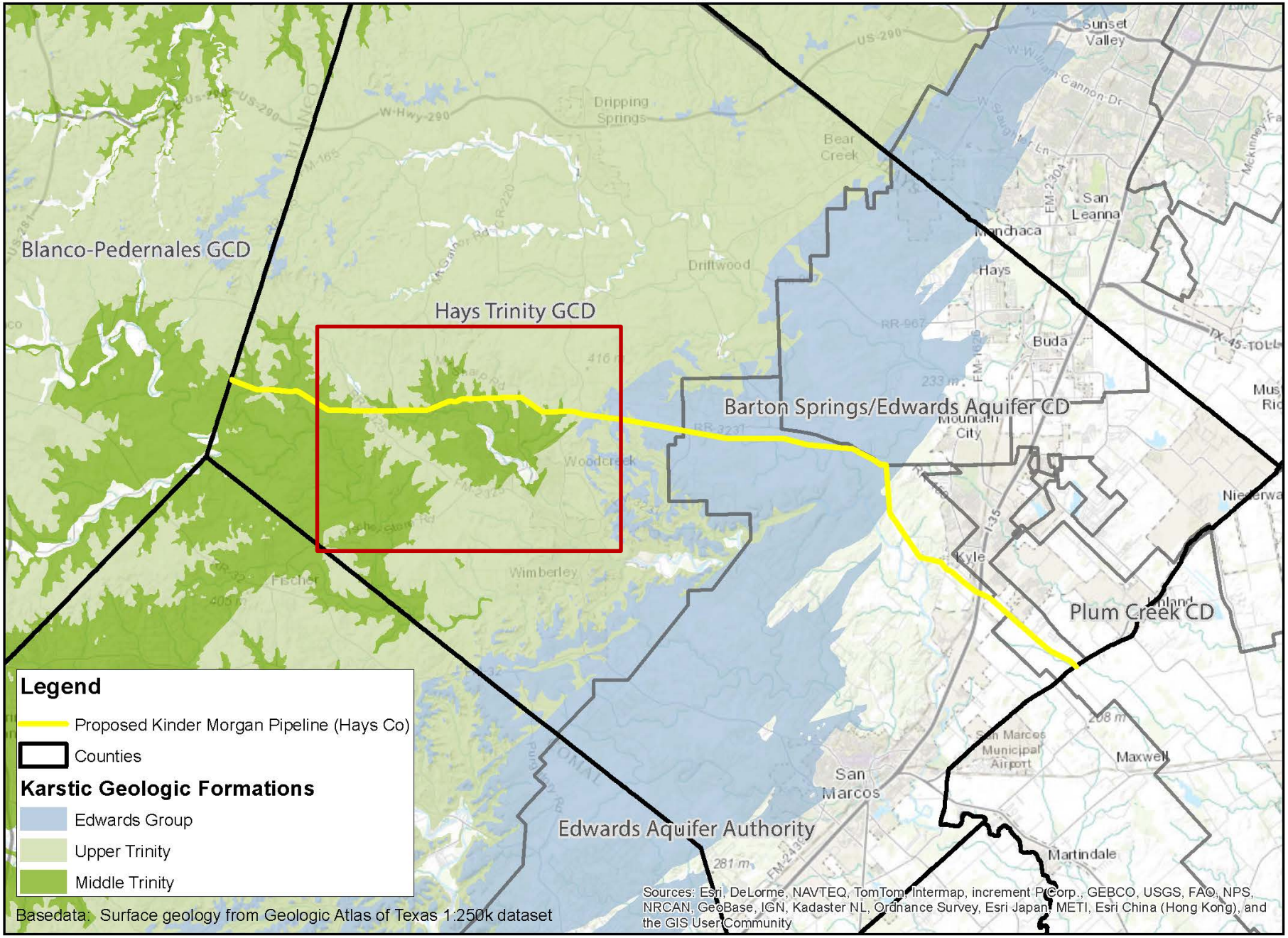
Jacob's Well, Wimberley, Photo Source: http://www.smartdivers.com/photojacobwell.html

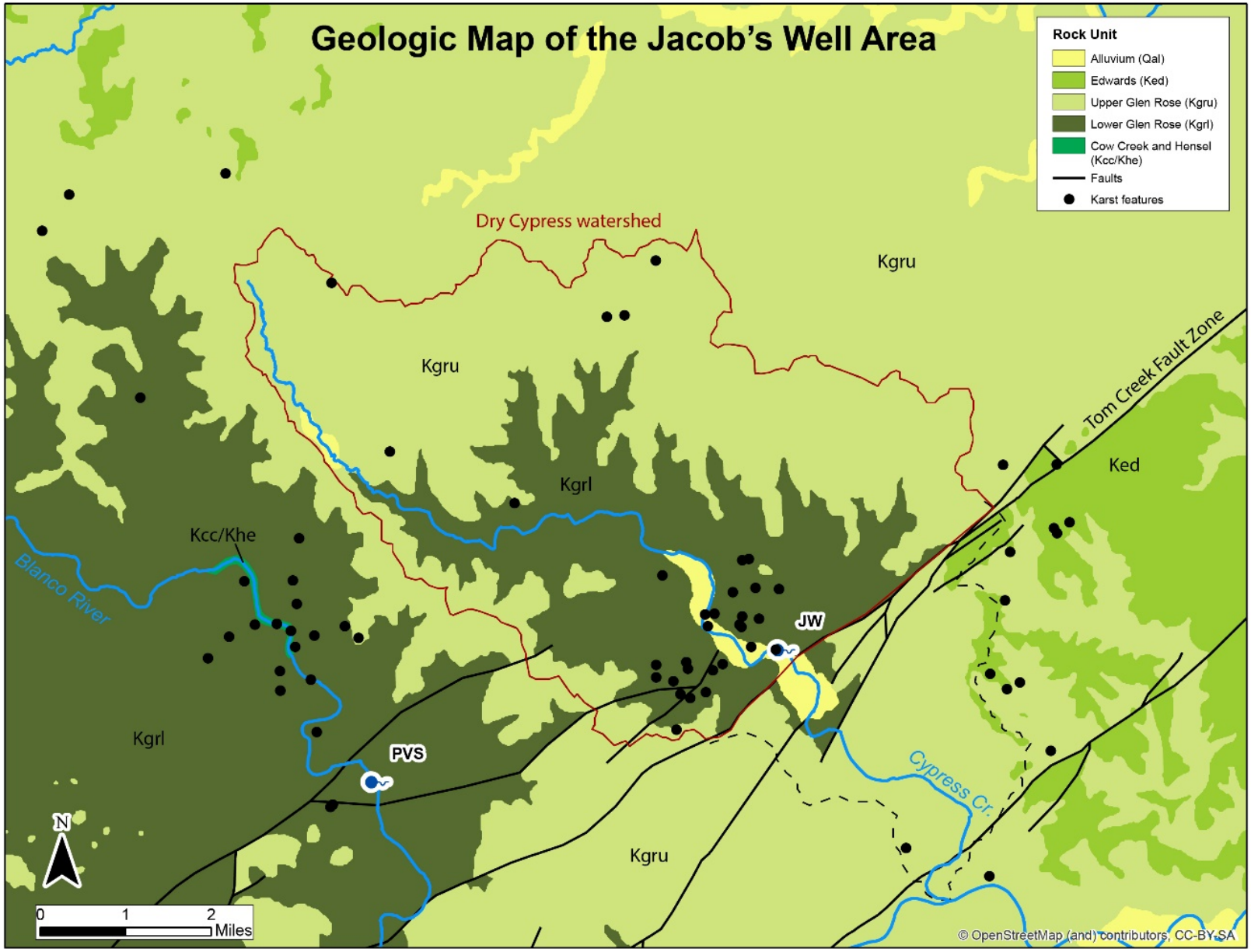

W
NE or SE
Swallet
Pleasant Valley Spring
Swallet
Barton or San Marcos Springs
Blanco River Flow
Blanco River Flow
Middle Trinity
Lower Trinity
Upper Trinity
Confining
Confining
Edwards
Confining
Lower Trinity
Confining
Not to scale

Karst Geology



Karst Geology




Geologic Map of the Jacob's Well Area
Rock Unit
Alluvium (Qal)
Edwards (Ked)
Upper Glen Rose (Kgru)
Lower Glen Rose (Kgrl)
Cow Creek and Hensel (Kcc/Khe)
Faults
Karst features
Dry Cypress watershed
Kgru
Kgru
Kgrl
Kcc/Khe
Blanco River
Tom Creek Fault Zone
Ked
JW
PVS
Kgrl
Cypress Cr.
Kgru
N
0
1
2
Miles
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Blanco Basin: Lower Glen Rose Karst

Lower Glen Rose—Hensel

Lower Glen Rose

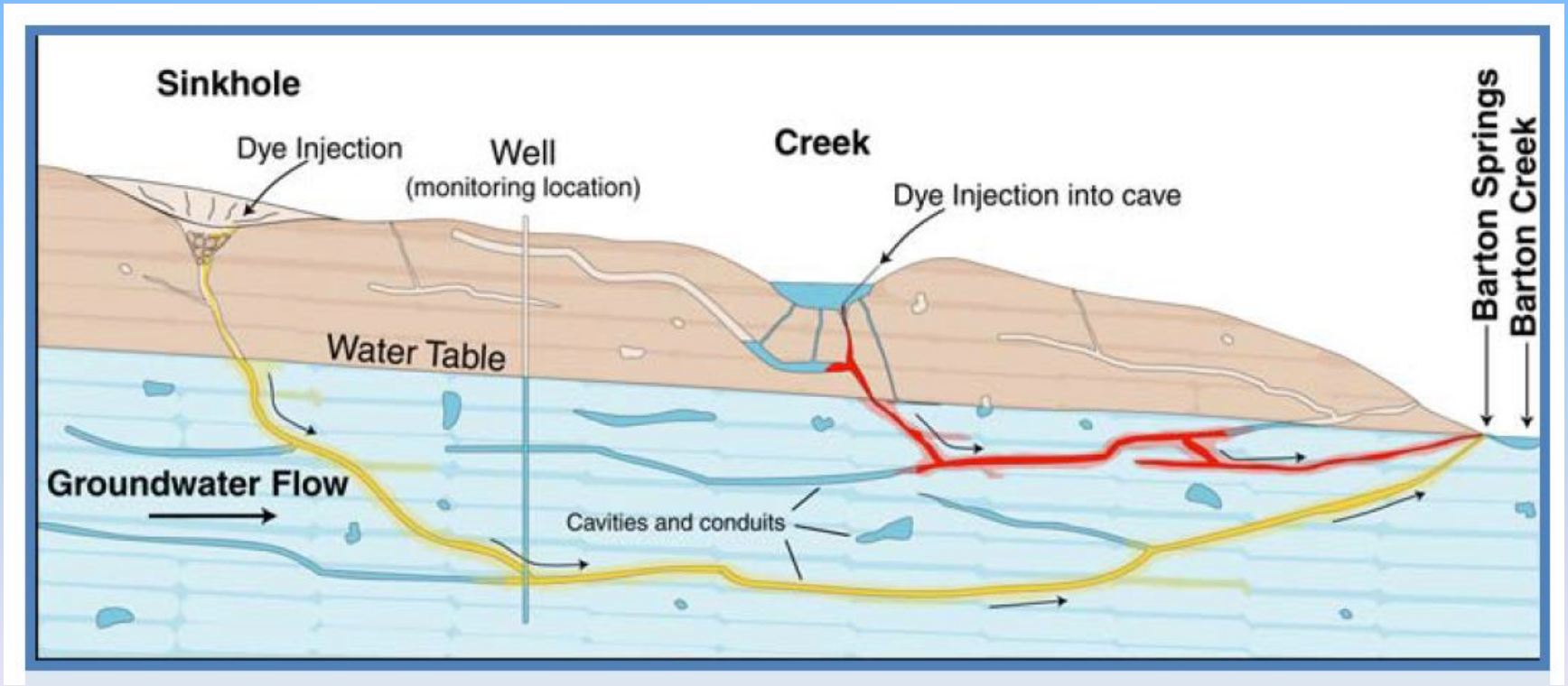
limestone

Silty dolomite

Hensel

Little Blanco River, Hays County
Photo by Steve Musick

Pathways and contaminant transport in karst

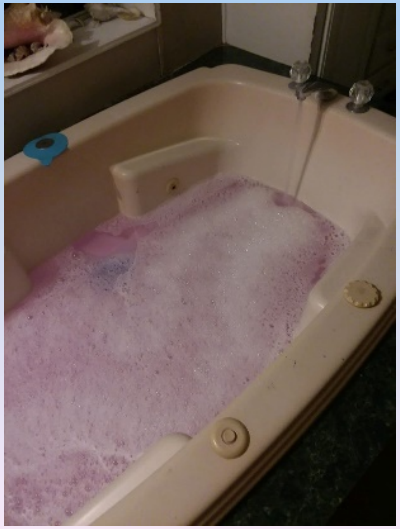


Saunders Swallet in Blanco River
Cow Creek Limestone

Trinity Aquifer Dye Traces

Saunders Swallet (Blanco Basin)

Bigote Swallet (Onion Creek Basin)

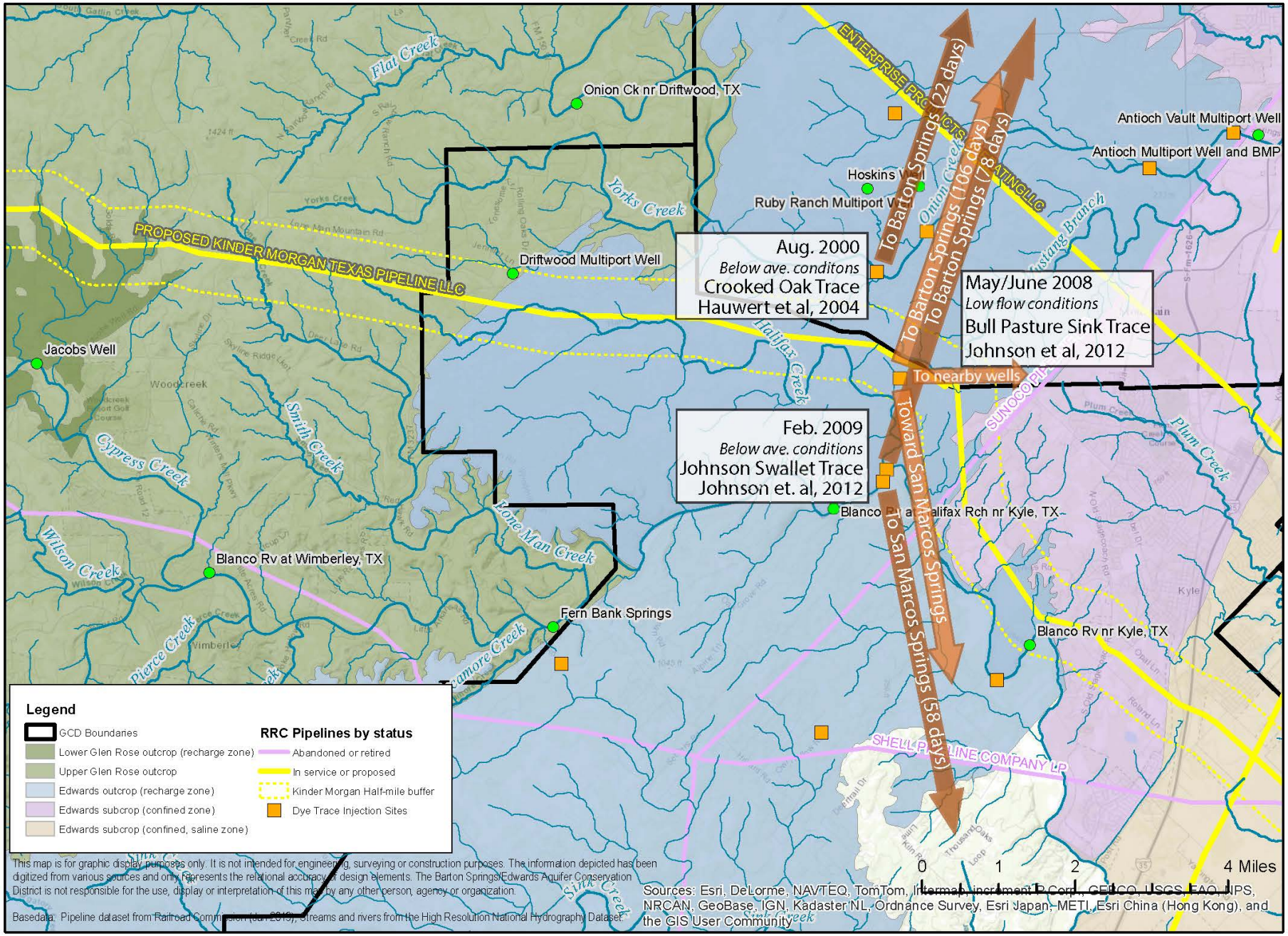


Edward Aquifer Dye Trace
Blanco River and Onion Creek

Cripple Crawfish cave

Bull Pasture Sinkhole

Selected Dye Trace Studies



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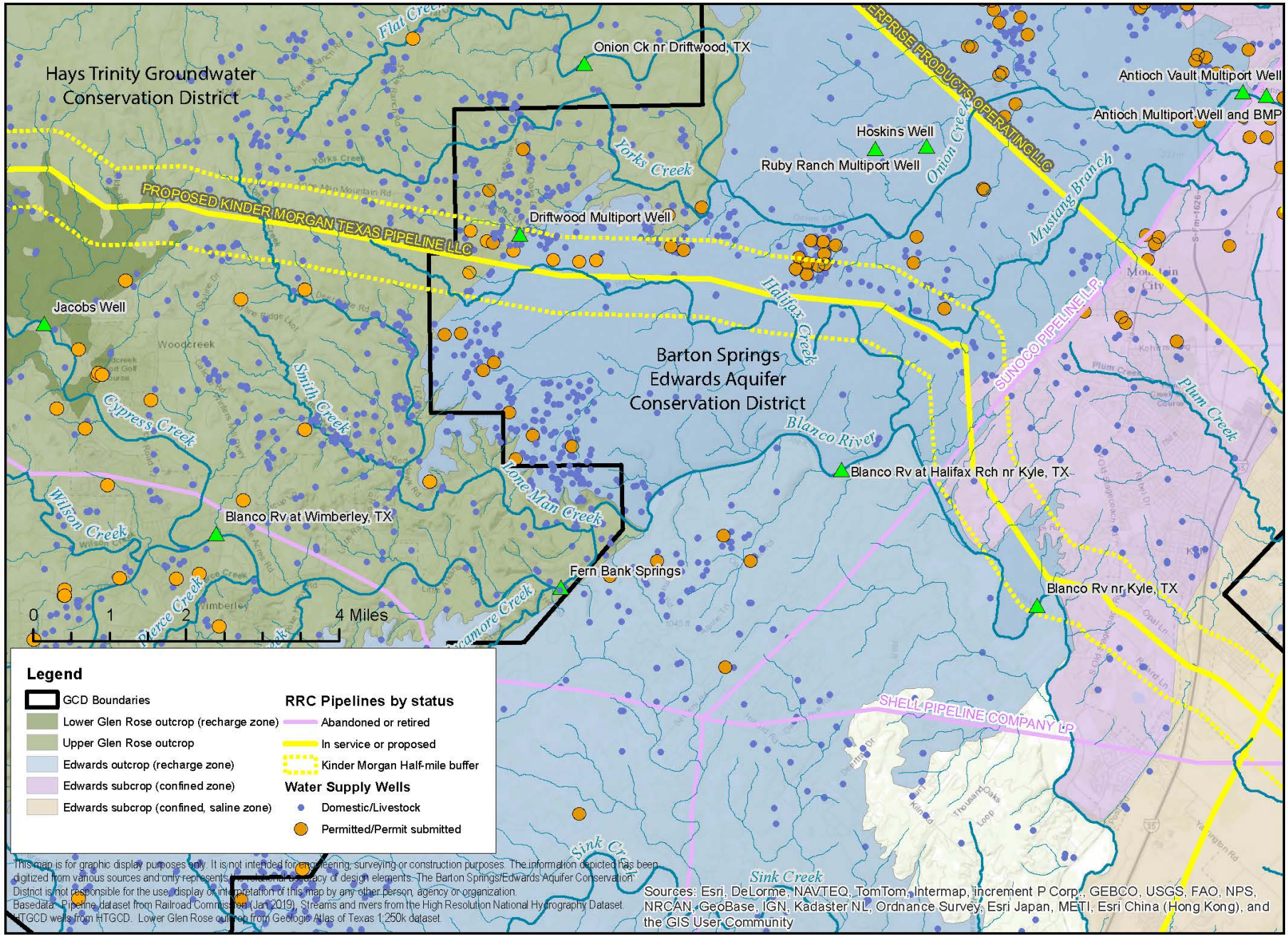
Basedata: Pipeline dataset from Railroad Commission (Jan 2015), Streams and rivers from the High Resolution National Hydrography Dataset

Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), and the GIS User Community

BSEACD, Pipelines, Hydro Zones, and Wells



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Basedata: Pipeline dataset from Railroad Commission (Jan 2019), Streams and rivers from the High Resolution National Hydrography Dataset. HTGCD wells from HTGCD. Lower Glen Rose outcrop from Geologic Atlas of Texas 1:250k dataset.

Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), and the GIS User Community

Highway and Pipeline Construction over Karst

Void in side of wall for highway construction

Karst features encountered in the Edwards limestone during construction activities in South Austin

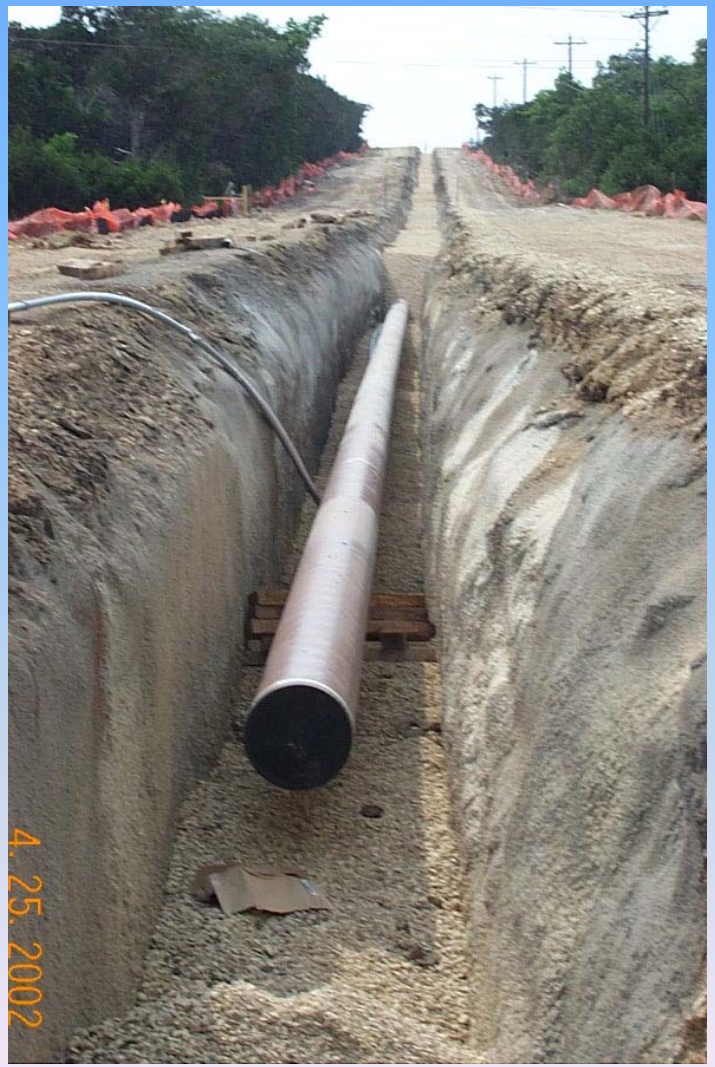
Void in the bottom of trench for water pipeline installation

Highway 45- South Austin

Photo 2. Feature PF-004.

Highway rerouted to avoid large karst feature.

Longhorn Pipeline- South Austin



Concerns and Questions
Design, Construction, and Operations

- **Requirements of Pipeline and Cathodic Protection Wells**
  - KM plans to develop a corrosion prevention plan.
    - ❖ BSEACD requests to review the plan for cathodic well specifications

- **Excavation Impacting Karst Features and Potential for Groundwater Contamination**
  - KM has hired an expert who is conducting a survey to identify karst features.
    - ❖ BSEACD requests to review the survey report.

  - The KM karst expert will be developing a void mitigation plan.
    - ❖ BSEACD requests to review the plan to ensure construction methods eliminate the potential impacts to karst features.
    - ❖ BSEACD requests a plan to restore the excavated areas.

  - KM will be preparing a biological assessment for the USFWS
    - ❖ BSEACD's requests to review.

- **Stormwater Runoff during Construction**
  - What sedimentation controls will be in place?
  - How long will the trench be open?
  - How will they cover the trench?
  - How long will the spoils be in place?
    - ❖ BSEACD requests an aquifer protection plan be developed - Such a plan should be based on the TCEQ Edwards Rules (Texas Water Code, §26.046).

Concerns and Questions
Design, Construction, and Operations

- **Oversight to Construction**
  - ❖ BSEACD requests to be notified when karst features are encountered during construction and to be allowed access to significant features that are found.

- **Potential for Hydrocarbons in Highly Permeable Rock**
  - What is the chemical make-up of the natural gas to be transported?
  - Will separators be used to remove condensation?
  - What will be done with the condensate?
  - Will KM conduct ongoing sampling of groundwater wells for possible pipeline contaminants?
    - ❖ BSEACD requests a plan to be in place to protect water users.

- **Pipeline Management Plan**
  - KM should produce its pipeline management plan including its inspections and testing plans.

Conclusions

- The Trinity and Edwards Aquifer meet the definition of a karst aquifers due to conduit permeability within soluble rocks.
- These aquifers are very sensitive to activities, such as construction and contaminant spills, at and near the surface.
- Tens of thousands of people in central Hays County depend on these aquifers as their sole source of drinking water.

Additional information and maps:
https://bseacd.org/2019/02/proposed-kinder-morgan-pipeline/

Thank you.
Questions?

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