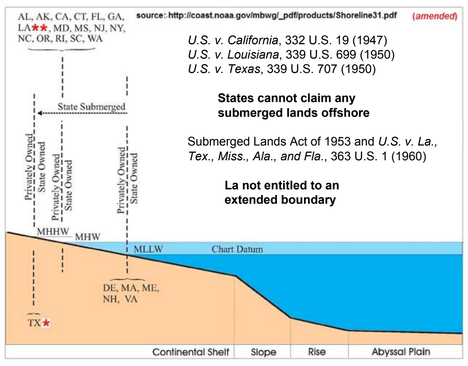
Some Critical Legal Aspects of Coastal Change Resulting from Both Anthropogenic and Natural Forcings

Kelly M. Haggar, JD; MPA

Riparian, Inc. and Dynamic Measurement, LLC



U.S. v. California, 332 U.S. 19 (1947)
U.S. v. Louisiana, 339 U.S. 699 (1950)
U.S. v. Texas, 339 U.S. 707 (1950)

States cannot claim any submerged lands offshore

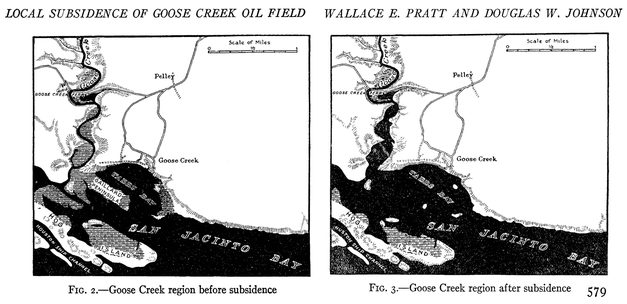
Submerged Lands Act of 1953 and *U.S. v. La., Tex., Miss., Ala., and Fla.*, 363 U.S. 1 (1960)

La not entitled to an extended boundary

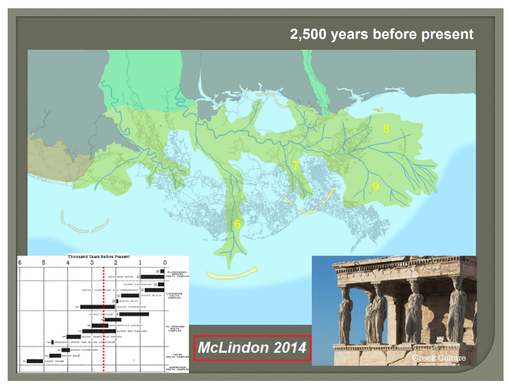
Coastal law has changed very little in more than 2,000 years. *La Civ Code Art 451* ("**Seashore is the space of land over which the waters of the sea spread in the highest tide during the winter season.**") was copied from Roman law; **"The seashore extends as far as the greatest winter flood runs up"** (*Corpus Iurus Civilis* [Body of Civil Law], *Institutes*, Book II, Of Things; Chapter I. Divisions of Things; Article 3. Issued in three parts between 529 and 533AD. However, Justian only *assembled* and *codified* existing laws; he didn't write them!

Moreover, the alluvial soil added by a river to your land becomes yours by the law of nations. Alluvion is an imperceptible increase; and that is added so gradually that no one can perceive how much is added at any one moment of time. *Institutes*, Book II, Of Things; Chapter I. Divisions of Things; Article 20.

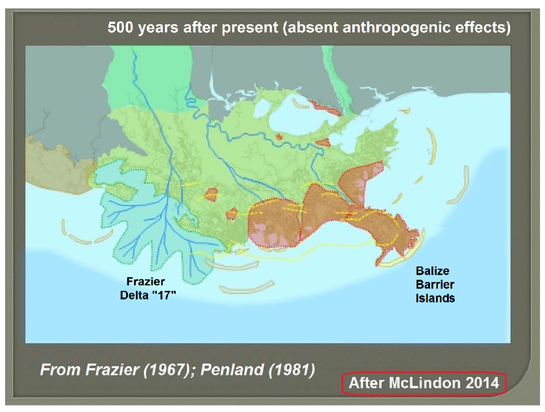
If the accretion originates from a river bank, the riparian (private) owner gets that land - - but if it originates from the beach, then Louisiana owns it. Remand ("do over") down to the trial court to figure out which one (or parts of both?) happened. See *Davis Oil Co. v Citrus Land Co.* 576 So.2d 495 (La. 1991).



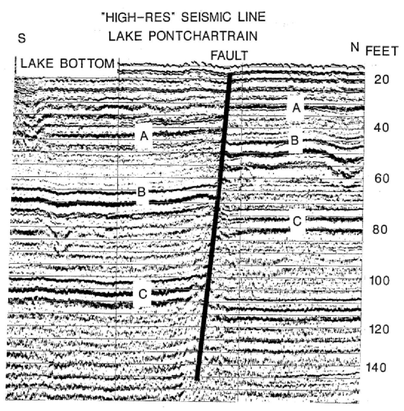
. . . [n]o act of man can operate to deprive another man of his property . . . If the subsidence at Goose Creek had been a natural process . . . then . . . title to the submerged land would have passed to the state, and property worth millions of dollars would have been lost . . . *Local Subsidence of the Goose Creek Oil Field* by Wallace E. Pratt and Douglas W. Johnson, The Journal of Geology, Vol. 34, No. 7, Part 1 (Oct. - Nov., 1926), pp. 577-590



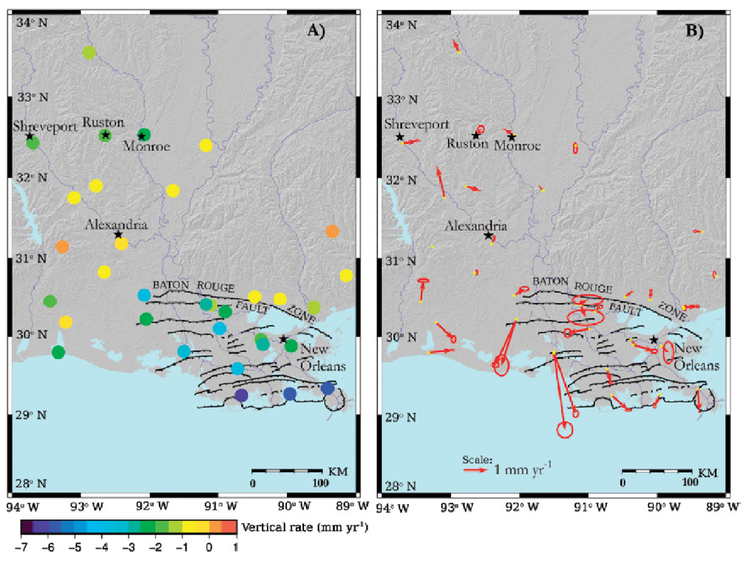
A McLindon 2014 breakout of Frazier's last 16 deltas (1967) using Penland's "4 stroke" lobe cycle (1981). Under both common and civil law, land submerging naturally reverts to the state, while land naturally forming from the beach/shore belongs to the state. . . "***by application of Article 450 of the*** [Louisiana] ***Civil Code, a body of water which, though non-navigable in 1812, subsequently becomes navigable by natural forces, is a public thing*** [and thus may no longer be privately owned]. See, generally, A.N. Yiannopoulos, *2 La. Civil Law Treatise Property* (3rd Ed.) § 63 (1991) [and see] Lee Hargrave, *Statutory and Hortatory Provisions of the Louisiana Constitution of 1974*, 43 La. Law Rev. at 660-661 (1983)." From *Vermillion Bay Land Company v. Phillips Petroleum Company*, 646 So.2d 408, 411-412 (La.App. 4th Cir. 1994)



Between (a) the Wax Lake Outlet and the Lower Atchafalaya River merging into "Frazier Delta 17," (b) sediment deficit, (c) sea level rise, and (d) geo-hazards such as faulting, the Louisiana coast will likely just repeat the lobe cycle of the last few thousand years - - regardless of anthropogenic effects. The yellow dashes are just some of the known faults.

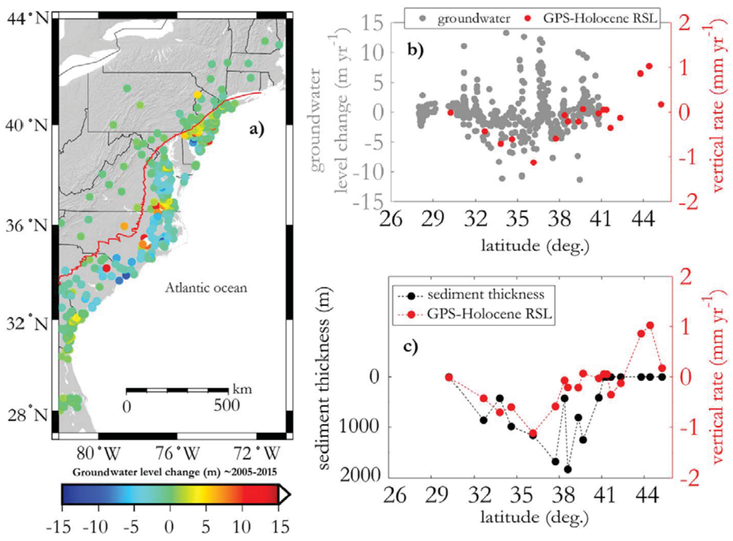


after Gagliano *et al* 2003: Perhaps the most easily seen surface expression of a fault in Southeast Louisiana; the bent guard rails of the Hwy 11 bridge across Lake Pontchartrain caused by the south dipping normal fault as recorded on USGS high resolution seismic line. Abrupt terminations of shallow reflectors indicate that the fault is within 10 ft (3 m) of the lake bottom (after Lopez, J. A., S. Penland and J. Williams. 1997. "Confirmation of Active Geologic Faults in Lake Pontchartrain in Southeast Louisiana." Transactions of the Gulf Coast Association of Geological Societies, 47th Annual Convention; 47: 299-303.).

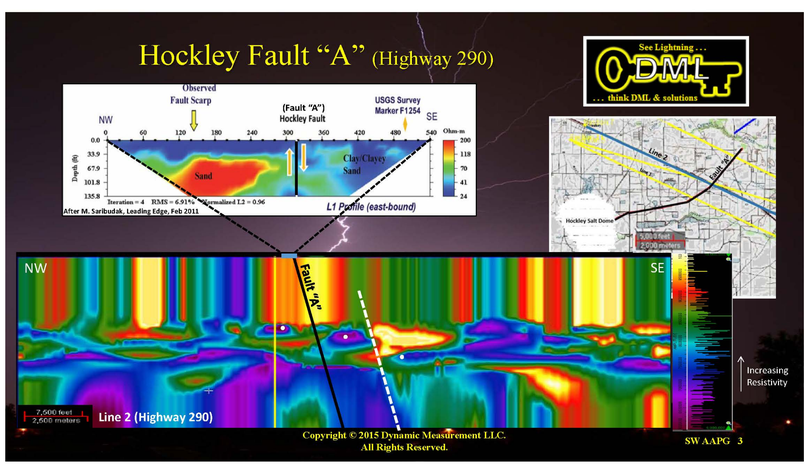


General heading vectors (2014) of Continuously Operating Reference Stations (CORS) used to calibrate both position and elevation of GPS receivers. Compare the North American plate's motion with that of Souteast Louisiana/Balize Delta. Much of the Louisiana delta is descending at rates as high as 20 mm/ year while it is moving more than 90 degrees away from the state at 1 to 2 mm/year.

Karegar's Figure 1 (2015) gives both horizontal and vertical motions of many Louisiana CORS facilities after a decade of operation. The major faults Karegar cited are from Murray, 1961. The fault offsetting the Hwy 11 bridge is part of the Baton Rouge Fault System. No conventional means of subsurface assessment can rapidly or affordably identify, locate, or quantify the geo-hazards arising from these hard-to-document subsurface causal features. See Karegar, Makan A., Timothy H. Dixon, and Rocco Malservisi. 2015. A three-dimensional surface velocity field for the Mississippi Delta: Implications for coastal restoration and flood potential, Geology, published online 27 April 2015 as doi:10.1130/G36598.1, GEOLOGY, June 2015; v. 43; no. 6; p. 1–4.



after Figure 3; *after* Abstract. (a) Average trend in groundwater level since 2005. (b) GPS vertical velocities corrected for glacial isostatic adjustment (GIA) and other long-term geologic effects. ["GIA" is a viscoelastic response of the Earth's crust and mantle to retreat of the Laurentide Ice Sheet since the last glacial maximum ~ 20,000 years ago (e.g., Peltier, 2004)]. The GPS rate minus late Holocene RSL rate is calculated for each box shown in Figure 1; (red dots) and average trend in groundwater level changes (gray dots, east of Fall Line) versus latitude. (c) Corrected GPS vertical velocities (red dots) and sediment thickness [Trapp and Meisler, 1992] (black dots for each box) versus latitude. The red line shows the Fall Line, a boundary between the compressible coastal plain sediments and the incompressible bedrock of the Piedmont Province [Meng and Harsh, 1988]. Due to "excessive groundwater extraction between Virginia (38°N) and South Carolina (32.5°N), **t**he[se] ***present-day subsidence rates . . . are approximately double the long-term geologic rates, which has important implications for flood mitigation*** [emphasis added]. Tide gauge records, therefore, should be used with caution for studying sea-level rise in this region." Karegar, M. A.,T. H. Dixon, and S. E. Engelhart (2016), Subsidence along the Atlantic Coast of North America: Insights from GPS and late Holocene relative sea level data, Geophys. Res. Lett., 43, doi:10.1002/ 2016GL068015.



The Gulf Coast Association of Geological Societies has twice recognized the potential of a new technology which may be able to both detect and assess geo-hazards which are not yet noticeably exhibiting a surface deformation. Natural Source Electromagnetic Method (NSEM) is the analysis of lightning strike properties and their relationship to subsurface features. The first two NSEM papers published in *Transactions* were each awarded the Grover E. Murray Best Paper Award (2014; 2015). This slide merges NSEM with conventional 2D resistivity over a salt dome near Houston. Lightning analysis offers great potential to remotely detect faults and other subsurface risks to projects and infrastrucure, rapidly and at low cost.