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Cover Page Footnote

The author is grateful to Monica Reimer and Jonathan A. Glogau for their thoughtful contributions to this article.

THE ORDINARY HIGH WATER BOUNDARY ON FRESHWATER LAKES AND STREAMS: ORIGIN, THEORY, AND CONSTITUTIONAL RESTRICTIONS

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I. INTRODUCTION

All navigable lakes and rivers in Florida are the property of "no one, or rather, the public at large . . . ."[1] This status extends to both waters and beds. Specifically, navigable waters and their beds are held in a perpetual trust for the use and benefit of the public at large. They are a species of common lands. The legal boundary between these navigable waters and the uplands privately owned by riparian landowners is the *ordinary high water line*. Confusion over the meaning of this term has recently arisen, and artificial manipulation of water levels in many Florida lakes has exacerbated the problem. This paper explains the origin of the ordinary high water boundary, traces the development of the case law defining that boundary in Florida, suggests solutions to unresolved issues relating to the legal consequences

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1. Geiger v. Filor, 8 Fla. 325, 338 (1859); *see also* State *ex rel.* Ellis v. Gerbing, 56 Fla. 603, 608-09, 47 So. 353, 355 (1908) (holding that "[t]he navigable waters in the states and the lands under such waters, including the shore or lands between ordinary high and low water marks, are the property of the states, or of the people of the states in their united or sovereign capacity, and are held, not for the purposes of sale or conversion into other values, or reduction into several or individual ownership, but for the use of all the people of the states, respectively, for purposes of navigation, commerce, fishing, and other useful purposes afforded by the waters in common to and for the people of the states.").

The Florida Constitution provides that:

> The title to lands under navigable waters, within the boundaries of the state, which have not been alienated, including beaches below mean high water lines, is held by the state, by virtue of its sovereignty, in trust for all the people. Sale of such lands may be authorized by law, but only when in the public interest. Private use of portions of such lands may be authorized by law, but only when not contrary to the public interest.

FLA. CONST. art. X, § 11. The last two sentences of this section were added in 1970, substituting for the last sentence of the original 1968 section, which read: "Sale or private use of portions of such lands may be authorized by law, but only when not contrary to the public interest." FLA. CONST. art. X, § 11 (1968, repealed 1970).

of changes in water levels, and delineates significant constitutional restrictions and legislative attempts to dispose of public waters by redefining the boundaries.

II. ORIGIN OF THE ORDINARY HIGH WATER BOUNDARY

The ordinary high water boundary in navigable lakes and streams originated in the tidal boundary. Public ownership of all navigable freshwaters is an American statutory and common law development of the early nineteenth century.[2] Under English common law, only tidally influenced waterbodies were public.[3] Thus, bed ownership by the public at large extended only to those lakes and streams that were subject to the ebb and flow of the tide. The legal boundary between those publicly owned waters and the adjacent private uplands was the high water line, meaning the reach of the high tide. Although the *tidal influence* test may have been well-suited to the island of Britain,[4] America's network of inland navigation routes, most of which were not subject to tidal influence, made that test inappropriate in America. That restriction was abandoned both in statute and common law in favor of a simple *navigability* test, regardless of tidal influence.[5]

Waters lacking a daily ebb and flow of the tide also lack the boundary provided by the daily high tide. However, while the *daily* cycle is lacking, inland rivers and lakes have annual and recurring high and low water phases corresponding to wet and dry seasons.[6] During the genesis of these developments in the law, the use of the term "tide" was not restricted to the daily ebb and flow of the sea, but was applied to many regular cycles of nature.[7] Indeed, early descriptions of water cycles referred to the daily tide of the seas and the annual tide of inland freshwaters.[8] The high tide boundary was the same in both cases—the reach of waters of the high tide—but the length of the cycle was different.

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2. L. HOUCK, A TREATISE ON THE LAW OF NAVIGABLE RIVERS 65-77 (1868).

3. Barney v. Keokuk, 94 U.S. 324, 337-38 (1876).

4. L. HOUCK, *supra* note 2, at 62 (citing Sponner v. McConnell, 22 F. Cas. 939 (C.C.D. Ohio 1838) (No. 13,245)).

5. 43 U.S.C. § 931 (1988); *see* Barney v. Keokuk, 94 U.S. 324, 336-38 (1876) (English common law tidal limitation inapplicable in United States; navigability in fact is controlling test).

6. FLORIDA STATE UNIVERSITY, WATER RESOURCES ATLAS OF FLORIDA 22 (1984) (chart showing seasonal variations in rainfall for various locations around the state).

7. WEBSTER'S NEW DICTIONARY OF THE ENGLISH LANGUAGE 2156 (1st ed. 1922) (defined *tide* as "time; hour; period; season"); WEBSTER'S II NEW RIVERSIDE UNIVERSITY DICTIONARY 1209 (1st ed. 1984) (provides a word history for the word *tide*: "the words *time* and *tide* are related and were once synonymous, both meaning 'an interval of time'").

8. *Land in New Orleans Called the Batture*, XVII *American State Papers*, (Public Lands, Vol. II) 2, 90 (1810).

In principle, the water boundary is intended to locate where the water ends and the land begins. With almost all fresh and salt waters in a state of continuous cyclic change, the root question is which phase in the cycle will be used to define this location. The choice of the ordinary high water line as the boundary is the choice of the high phase and has two policies as its foundation. First, some early cases conceptualize the issue as attempting to locate the dominion of the sea and freshwaters.[9] That dominion is discernable when the sea or river is full.[10] Second, adoption of the ordinary high water boundary provides for public status of the shore—the zone that is dry at low water and submerged at high water.[11] This principle appears to have originated in Roman law, where the public had a right to use the shore.[12] Uses included mooring, landing of goods, fishing, and recreation.[13] Of course, many of these uses are possible only during the times when the shore is exposed—at low water.

The reach of the daily tide is not the same every day because of monthly and annual cycles in the gravitational pulls of the sun and moon. For example, spring tides—exceptionally high tides occurring "twice each month at full and change of the moon"[14]—are uncommon events which produce few unusually high tides each year. The limitless number of different high tides makes the reach of the tide different every day, thus producing an uncertain boundary.[15]

A few early American cases seem to refer to the high water boundary as the highest reach of water during the whole year[16]—that is, the

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9. Houghton v. The C., D. & M. R. Co., 47 Iowa 370, 373-74 (1877) ("in determining what belongs to the public we have to determine what properly belongs to the river. . . . Vegetation may, in places, dispute the dominion of the river with doubtful issue.").

10. *Cf.* Storer v. Freeman, 6 Mass. 435, 439 (1810) ("[W]hen the sea is full, the margin is [the] high water mark.").

11. "[T]he use of the shore (that is, of the land) that is usually overflowed by the highest tide, . . . is public in the same manner as the sea." Geiger v. Filor, 8 Fla. 325, 335 (1859) (quoting J. ANGELL, A TREATISE ON THE RIGHT OF PROPERTY IN TIDEWATERS AND IN THE SOILS AND SHORES THEREOF 18, 68 (1847)). Thomas Jefferson explained that the purpose of the high water boundary was to facilitate public use of the shores and beaches. *Land in New Orleans Called the Batture*, XVII *American State Papers*, (Public Lands, Vol. II) 2, 91 (1810).

12. E. WARE, ROMAN WATER LAW §§ 41, 75, 76 (1905).

13. State *ex rel.* Ellis v. Gerbing, 56 Fla. 603, 608-09, 47 So. 353, 355 (1908). These rights were explicit under Spanish law: "every man may use them, tying their vessels to the trees which grow thereon, mooring their ships and depositing their sails and merchandise thereon, and the fishermen may also place their fish there and sell them, and dry their nets, and use the shores for all such things as belong to their trade." *See* 3 LAS SIETE PARTIDAS tit. 28, § 6.

14. Borax Consol. v. Los Angeles, 296 U.S. 10, 23-24 (1935). A thorough discussion of the various astronomical fluctuations in the daily tides of Florida saltwaters is set out in Note, *Florida's Sovereignty Submerged Lands: What Are They, Who Owns Them and Where is the Boundary?*, 1 FLA. ST. U.L. REV. 596, 612-16 (1973).

15. *Borax*, 296 U.S. at 23-24; *see also* Note, *supra* note 14, at 612-16.

16. *E.g.*, Brown v. Lakeman, 37 Mass. (17 Pick.) 444, 447 (1835) (high water line is debris line left by highest waters of year, excluding the result of exceptional storms).

boundary of the sea is at its fullest point during spring tides.[17] Later cases placed the boundary at the *ordinary* high water line, meaning not the *highest* annual reach, but the *normal* or *ordinary* reach of the high tide.[18] By adding the qualifier "ordinary," the extreme high tides of spring are excluded, along with the exceptionally high tides resulting from severe storms.[19] This normal reach of the high tide leaves an imprint on soil and vegetation resulting from the persistent, recurring reach of the high tide. Although the high tide reaches a different point virtually every day, the ordinary high water mark on soil, vegetation, and local objects, *i.e.*, dock pilings, reflects a rough average of high tides. The *normal* or *ordinary* high water mark is a soil and vegetative indicator that evidences the reach of the ordinary high tide.[20]

In short, the principles underlying the ordinary high water mark for daily tidally influenced waters are: (1) the boundary is located at the point where the waterbody reaches its full or high water stage; (2) *ordinary* high water excludes the reach of the exceptional tides, such as spring tides, storm tides, and unusually low tides; and (3) a mark is discernable at the line reached by ordinary high tides. As will be seen later, these same three principles also apply to the ordinary high water line for freshwater bodies not affected by the daily ebb and flow of the tide.

III. *HOWARD V. INGERSOLL* AND THE CURRENT POLICY DEBATE

In 1851, the Supreme Court debated the wisdom of various possible water boundary choices in *Howard v. Ingersoll*.[21] The case involved a treaty dispute between Georgia and Alabama, which centered on whether the low or high water line should be used as the boundary. *Howard* raised most of the factual, legal, and policy arguments made in the contemporary debate.

The current controversy over water boundaries is the same. Florida common law holds that the boundary is the reach of ordinary high water. This means that public ownership encompasses the full river or

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17. *Land in New Orleans Called the Batture*, XVII *American State Papers*, (Public Lands, Vol. II) 2, 91 (1810).

18. Miller v. Bay-to-Gulf, Inc., 141 Fla. 452, 459-60, 193 So. 425, 428 (1940) (*ordinary high tide* means normal, average or usual tide and not the exceptionally high tides of the spring).

19. *See* Island Harbor Beach Club v. Department of Natural Resources, 495 So. 2d 209, 215-17 (Fla. 1st DCA 1986) (concerning storm surges above mean high tide and regulation of the coastal severe impact zone of these storms). *See also* FLA. STAT. § 161.053(1)(a) (1989) (concerning storm surges resulting from hurricanes).

20. J. GOULD, A TREATISE ON THE LAW OF WATERS § 21 (1900) (ordinary high water mark signifies the reach of the ordinary high tide).

21. 54 U.S. (13 How.) 381 (1851).

stream, including shores exposed during the ordinary or average stage of water.[22] Reformers representing large riparian landowners urge the ordinary, common, and usual stage of water as the boundary, advocating private ownership of shores because of their grazing value and the possibility of reclamation.[23] These arguments represent an effort to reopen the question of Florida water boundaries that was resolved a century ago:[24] whether the boundary should be ordinary high water or ordinary low water. If the reformers are successful in changing the indicators from ordinary high water to indicators of ordinary low water, they will, in essence, transfer the shores of all rivers and lakes to the adjacent riparian owners.

Although *Howard* was not a riparian boundary case, its extensive discussion of river borders provides useful insight into the principle of ordinary high water. In *Howard*, the issue was whether a river border defining the Georgia/Alabama boundary should be located at high water, low water, or somewhere in between.[25] The majority held that

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22. State *ex rel.* Ellis v. Gerbing, 56 Fla. 603, 608, 47 So. 353, 355 (1908) (the "lands under navigable waters including the lands between ordinary high and low water marks are the property of the people of the states in their sovereign capacity."); State v. Black River Phosphate, 32 Fla. 82, 127-28, 13 So. 640, 654 (1893) (the low water mark is defined as the reach of "waters at their ordinary stage"); Trustees v. Walker Ranch, 496 So. 2d 153, 156 n.3 (Fla. 5th DCA 1986) (quoting D. MALONEY, WATER LAW (1980)) (the low water mark is defined as "the usual, common, or ordinary stage"). Thus, at its ordinary stage, the water is at the low water mark, leaving exposed the zone between the ordinary high and low water marks.

23. Washburn, *The Riparian Developer's Dilemma: Locating the Boundary of Navigable Lakes and Rivers*, 18 REAL PROP. PROB. & TR. J. 538, 544-47 (1983) (advocating the watermost edge of aquatic forests as the ordinary high water boundary, contending that the boundary excludes any foragable water margins, and attempting to avoid use of water records in identifying the elevation of ordinary high water). *See also* Jacobs & Fields, *Sovereignty Lands in Florida: Lost in a Swamp of Ambiguity*, 38 U. FLA. L. REV. 347, 387-89 (1986) (contending that aquatic forests and grazable water margins should be private property above the ordinary high water boundary). Proposals to change the law to correspond with the above-described proposals have been presented to and rejected by the Florida Legislature regularly since 1988. Fla. HB 1215 (1988); Fla. HB 328 (1989); Fla. HB 2269 (1990). In 1988, these same proposals were codified into a proposed administrative surveying rule by the Board of Professional Land Surveyors under the guise of "technical standards." These rules were legally invalidated before they could take effect because of gross inconsistencies with Florida law. Board of Trustees v. Board of Professional Land Surveyors, 11 Fla. Admin. L. Rep. 2449, 2494 (1989), *aff'd*, 566 So. 2d 1358 (Fla. 1st DCA 1990).

24. State v. Black River Phosphate Co., 32 Fla. 82, 106, 13 So. 640, 648 (1893) (public ownership of navigable waters includes shore between high and low water marks).

25. The precise question presented in *Howard* was the meaning of the phrase "along the western bank" of the Chattahoochee River in the 1802 Treaty of Cession between the United States and Georgia. A dispute occurred over Howard's dam which impeded the operation of Ingersoll's upstream mill. The opinion of the Court paints the following picture of the physical facts at the site of the mill and dam. At the mill, the low water channel of the river was approximately 30 yards wide. On either side of this channel were 30 to 60 yards of flats covered with rocks, bounded at the outer edges by high banks. The western edge of the flats was the site of

the treaty—in which Georgia ceded the Alabama territory to the United States—reserved the whole or full river to Georgia.[26] The Court described the water line as obvious and needing "no scientific exploration to find,"[27] and it concluded by stating that "where the bank is fairly marked by the water, that water level will show at all places where the line is."[28] This formulation is necessary because the line is *not* obvious in the areas where there are no steep-banks: when water is at the level of a mark on the soil or on a local object, the water's edge discloses the location of the ordinary high water line at other locations.

The "full river" meant the river when it was flowing at its high stage; anything less meant that Georgia had ceded part of the river because the use of the bank as the border served to "exclude the idea that any part of the river or its bed was not to be within the State of Georgia."[29] By determining that the water boundary must encompass the river when it is full, the majority selected the high rather than the low water line as the boundary. This rationale reaffirmed the theoretical foundation for the ordinary high water principle: the full stream

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Ingersoll's mill. This location was 'covered with water at ordinary high water but is bare and dry in ordinary low water,' and the water was below the toe of the high banks for two-thirds of the year. *Howard*, 54 U.S. at 414. *See* Bailey v. Miltenberger, 31 Pa. 37, 43 (1856) (Allegheny River occupies only one-third of its bed when the river is at low water). In this dual-channel configuration, a narrow low water channel conveys a continuous ground water stream, and a broad upper channel above it conveys the high water flows of the rainy season. *See* FLORIDA STATE UNIVERSITY, WATER RESOURCES ATLAS OF FLORIDA 183 (1984); F. MALONEY, S. PLAGER & F. BALDWIN, JR., WATER LAW AND ADMINISTRATION: THE FLORIDA EXPERIENCE 142 (1968) (explaining that low water flows are typically composed of ground water while high water flows combine ground water with a large proportion of rainwater run-off). The upper channel is exposed except during the rainy season, and in Florida often contains aquatic forests. This configuration is typically found in areas of low topographical relief with large seasonal variations in rainfall. FLORIDA STATE UNIVERSITY, *supra*, at 54-64, 93.

26. The treaty which ceded the territory of Alabama established the western bank of the Chattahoochee as the new western boundary of Georgia. The Court interpreted this term to mean that Georgia had intended to reserve the entire river to itself. *Howard*, 54 U.S. at 412. In construing the term "banks," the Court held that it was intended to mean the features that "contain their waters at their highest flow," and the bed was bounded by these banks. *Id.* at 415. That the line selected was the high water line is clear from the facts set out in the opinion. The water reached the base of the high bank (the slope break between the flats and the high banks) only one-third of the year. *Id.* at 414. In particular, the Court identified a *water line* on the high banks above the slope break, "where the action of the water has permanently marked itself upon the soil." *Id.* at 417. Although the majority opinion does not characterize it as an *ordinary* high water line, its location on the high banks makes it susceptible of that characterization. Beyond this line were lands, not part of the river bed, which were described as swamps and low grounds reclaimable for agriculture and usable for natural pasture in the dry season. *Id.* at 415-16.

27. *Id.* at 416.

28. *Id.* at 419.

29. *Id.* at 416.

or lake is owned by the public at large as sovereignty lands and the boundary is located by reference to the mark impressed by waters at their full or high stage. Justice Nelson developed a different rationale in his dissent[30] since the use of the high water line as the border would mean that Alabama would be deprived of hydraulic[31] and other uses of the river because the border would be dry shore for most of the year. In short, Nelson advocated the low water line[32] as the boundary so as to provide Alabama with sovereignty over the shore or space between ordinary high water and ordinary low water.[33]

IV. THE ORDINARY HIGH WATER BOUNDARY IN FLORIDA LAW

Florida follows the saltwater principle of the normal reach of high water as the framework for developing the common law pertaining to

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30. Justice Nelson's opinion could more accurately be characterized as dissenting in part and concurring in part. On the issue of where the Treaty placed the border between the two states, Justice Nelson contended that the majority's adoption of the high water mark was in error. *Id.* at 422-24 (Nelson, J., dissenting). On a separate issue—the right of riparian land owners to dam a stream and use the water, so as to prejudice other riparian owners—Justice Nelson opined that the trial court had erred. *Id.* at 425-26 (Nelson, J., dissenting).

31. *Id.* at 423. The term *hydraulic purposes* appears to refer to water-powered mills.

32. Justice Nelson, who was joined by Justice Grier, contended that the intended boundary was the low water line. His opinion included a number of facts not adopted by the majority, but which revealed the criteria he relied on in his argument that the low water mark was the proper boundary line. At the outset, he explained that some portions of the river had banks so low that areas nearly a mile from them were inundated during high water. *Howard*, 54 U.S. at 419 (Nelson, J., dissenting). This appears to be a complaint about the majority's use of the water level at clear high water marks to locate the high water line in places without clear marks. Justice Nelson then pointed out three criteria which showed why the low water mark is preferable to the high water mark: (1) during the winter season (the ordinary state of the river) the water extends only to a ridge of sand and gravel halfway across the flats; (2) trees grow in the flats between the high and low water lines; and (3) "a small portion of the flats are, at times, put under cultivation." *Id.* The third criteria is not surprising, however. In unusually dry years, crops may be capable of marginal cultivation below the line of ordinary high water even though in ordinary years no cultivation would be possible. Broward v. Mabry, 58 Fla. 398, 405-06, 411-12, 50 So. 826, 829, 831 (1909). This latter criterion is more fully developed later in the dissent wherein Justice Nelson explained that the soils on lands below the high water line are often exceptionally fertile. *Howard*, 54 U.S. at 423 (Nelson, J., dissenting). This is consistent with the legislative finding that the low swampy marsh lands within navigable lakes are exceptionally fertile. Ch. 7891, Laws of Fla. (1919).

33. Justice Curtis authored a third opinion concurring in the reversal but contending that both the majority opinion and Justice Nelson's dissent were wrong as to the meaning of the term *banks* in the 1802 treaty. *Howard*, 54 U.S. at 427 (Curtis, J., concurring). He contended that in finding the real boundary, "neither the line of ordinary high-water mark, nor of ordinary low-water mark, nor of a middle stage of water, can be assumed as the line dividing the bed from the banks." *Id.* To Justice Curtis, the boundary intended in the treaty equated to the *clearest* mark on soil and vegetation. *Id.* He made it very clear that "the line dividing the bed from the banks" is not ordinary high water, but rather is a line unrelated to water stage—it "depend[s] upon the character of the stream." *Id.*

the high water boundary.[34] Both framework and indicators were set out in two 1927 Florida Supreme Court cases: *Tilden v. Smith*[35] and *Martin v. Busch*.[36] These two cases derived Florida water boundary law from the United States Supreme Court case, *Howard v. Ingersoll*,[37] the Minnesota rule spelled out in *Carpenter v. Hennepin County*,[38] and the Wisconsin rule articulated in *Illinois Steel v. Bilot*.[39] In essence, these decisions confirm that the seasonal high water phase analogous to the daily high tide forms the theoretical basis for the ordinary high water boundary and that the full reach of waters at that high phase marks the boundary.

The Florida courts fashioned the law independently because water boundaries and the physical indicators of those boundaries are strictly questions of state law. Neither the equal footing doctrine nor any other principle of federal law requires Florida to apply federal decisions for these indicators. As the Supreme Court held in *Oregon ex rel. State Land Board v. Corvalis Sand & Gravel Co.*:[40]

> Although federal law may fix the initial boundary line between fast lands and the riverbeds at the time of a State's admission to the Union, the State's title to the riverbed vests absolutely as of the time of its admission and is not subject to later defeasance by operation of any doctrine of federal common law. . . . Once the equal-footing doctrine had vested title to the riverbed in Arizona as of the time of its admission to the Union, the force of that doctrine was spent.[41]

Under this holding, federal law may govern the initial boundary, but the law of Florida governs thereafter to determine all property rights, including the identification of the landforms which locate the bound-

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34. Ordinary high water definitions are controlled by state law. Once Florida became a state, it entered into the union "on an equal footing with the original States in all respects whatever" and "[had] the same rights of sovereignty, freedom and independence as the other States." Shively v. Bowlby, 152 U.S. 1, 26 (1894) (quoting Northwest Territory Ordinance to Grant State's Rights (July 13, 1787), adopted by Georgia in 1802). "The thirteen original states dealt with their navigable waters according to [their] own views of justice and policy, reserving [their] own control over such lands, or granting rights therein . . . as [they] considered for the best interests of the public." *Id.* This freedom to act necessarily includes the ability to determine, in the unique context of the topography of each state, what landforms are the most appropriate indicators of the reach of ordinary high water.

35. 94 Fla. 502, 113 So. 708 (1927).

36. 93 Fla. 535, 112 So. 274 (1927).

37. 54 U.S. (13 How.) 381 (1851).

38. 56 Minn. 513, 58 N.W. 295 (1894).

39. 109 Wis. 418, 85 N.W. 402, 405 (1901).

40. 429 U.S. 363, 370-71 (1977) (citing Weber v. Board of Harbor Comm'rs, 85 U.S. (18 Wall.) 57 (1893); Wilcox v. Jackson, 38 U.S. (13 Pet.) 498 (1839)).

41. *Id.*

ary. No reported federal case prior to 1845 defined the proper landforms for identifying the reach of ordinary high water. For this reason, the task of determining the law of Florida regarding the definition of water boundaries remains exclusively a question for development by the Florida courts.

Until relatively recently, the boundary of all public saltwater[42] or freshwater[43] in Florida was the ordinary high water line. In 1974, however, the legislature set forth the *mean high-water line* test as the boundary for tidally affected waters, supplanting a more exact mathematical definition of normal or average high tide.[44] Nevertheless, the freshwater boundary remains the ordinary high water line, as explained and defined sixty years ago in the two controlling Florida Supreme Court decisions from 1927: *Tilden v. Smith*[45] and *Martin v. Busch*.[46]

Tilden v. Smith provides a full explanation of the general principles.[47] In defining the boundary, the *Tilden* court adopted a lengthy quotation from a Minnesota Supreme Court opinion:

> In the case of fresh water rivers and lakes in which there is no ebb and flow of the tide but which are subject to irregular and occasional

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42. *E.g.*, Brickell v. Trammell, 77 Fla. 544, 559, 82 So. 221, 226 (1919) (Biscayne Bay); State *ex rel.* Ellis v. Gerbing, 56 Fla. 603, 608, 47 So. 353, 355 (1908) (a tidal case in which the Court found that the State owns "the navigable waters . . . and the lands under such waters, including the shore or lands between ordinary high and low water marks . . . ."). *See also* Apalachicola Land & Dev. Co. v. McRae, 86 Fla. 393, 449-50, 98 So. 505, 523-24 (1923) (Apalachicola Bay).

43. *E.g.*, Martin v. Busch, 93 Fla. 535, 563-64, 112 So. 274, 283 (1927) (Lake Okeechobee).

44. FLA. STAT. § 177.27(15) (1989). The Florida Legislature supplanted the common law definition of ordinary high water for tidal areas with the mathematical average elevation of the high tide over 19 years. By this means, the ordinary high water stage became substantially more precise. Denominated "mean high water," the new construct incorporated scientific advances in data collection to enhance the degree of certainty in coastal boundaries. *Cf.* Borax Consol. v. Los Angeles, 296 U.S. 10, 22-27 (1935) (mean high tide line is criterion for the ordinary high water mark).

45. 94 Fla. 502, 113 So. 708 (1927).

46. 93 Fla. 535, 112 So. 274 (1927).

47. It is possible to misread a portion of the *Tilden* decision, and misconstrue the discussion of "ordinary water level," 94 Fla. at 511-12, 113 So. at 711-12, as addressing the definition of the ordinary high water boundary. Such discussion relates to a statute prohibiting water level manipulation, not to the water boundary. The controversy in the decision concerned exceptional flood waters in Lake Johns which had killed established fruit and pine trees, and flooded long-established structures. Smith, a littoral owner, attempted to lower the lake level, triggering an injunctive action by Tilden, another lakefront owner. *Id.* Tilden based his request for relief on statutes prohibiting the lowering of the water level in some lakes. A main issue in the case was the proper interpretation of the term "level," which the court construed to mean the ordinary level of the lake; *i.e.*, under the statutes, the waters could not be lowered below the "normal, usual, and ordinary level of the lake." The exceptional flood waters that triggered the lawsuit were well above this *ordinary* level. *Id.* at 512, 113 So. at 712.

> changes of height without fixed quantity or time except that they are periodical, recurring with the wet or dry seasons of the year, high water mark [is the] line between a riparian owner and the public . . . .[48]

Thus, the court began with the analogy between the daily tides of the oceans and the seasonal cycles of high[49] and low water on lakes and rivers. The court then explained the mark identifying the reach of ordinary high water:

> [It] is to be determined by examining the bed and the banks and *ascertaining where the presence and action of the water are so common and usual and so long continued in all ordinary years as to mark upon the soil of the bed a character distinct from that of the banks in respect to vegetation, as well as to the nature of the soil itself.* High water mark means what its language imports,—a water mark. It is co-ordinate with the limit of the bed of the water, and that only is to be considered the bed which the water occupies sufficiently long and continuously to wrest it from vegetation and to destroy its value for agricultural purposes. Ordinarily the slope of the bank and the character of its soil are such that the water impresses a distinct character upon the soil as well as upon the vegetation. In some places, however, where the banks are low and flat, the water does not impress on the soil any well defined marks of demarcation between the bed and the banks.
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> In such case the effect of the water upon vegetation must be the principal test of determining the location of high water mark as a line between the riparian owner and the public. It is the point at which the presence and action of the water is so continuous as to destroy the value of the land for agricultural purposes by preventing the growth of vegetation, constituting what may be termed an ordinary agricultural crop.[50]

The passage from *Carpenter* was an amalgamation of five authorities that were used by the Minnesota court as the basis for its formula-

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48. *Id.* at 512, 113 So. at 712 (quoting Carpenter v. Board of County Comm'rs, 56 Minn. 513, 522, 58 N.W. 295, 297 (1894) (issue was whether a government dam raised a lake level above ordinary high water)).

49. An earlier passage in *Tilden* pointed out that "government patents of lands bounded by navigable waters convey titles to the *ordinary* high-water mark of such waters, and not to high-water mark temporarily existing during flood or freshet or unusually high tides." 94 Fla. at 510, 113 So. at 711 (citing 9 C.J. *Boundaries* §§ 74-75 (1916)) (emphasis in original). The *Corpus Juris* citation explains that on non-tidal waters the "high water mark is the point to which the water rises at its average highest stage." 9 C.J. *Boundaries* §§ 74-75 (1916).

50. *Tilden*, 94 Fla. at 512-13, 113 So. at 712 (quoting Carpenter v. Board of County Comm'rs, 56 Minn. 513, 522, 58 N.W. 295, 297 (1894)).

tion.[51] Three of those authorities employed the tidal analogy,[52] confirming that the *high-water* mark refers to the high water phase of a lake or stream.[53] Three of the cases explained the *ordinary* component as excluding the reach of extreme high waters.[54] One of the cases contained a description of water marks, characterizing them as changes in soil and vegetation resulting from the presence and action of water.[55] Finally, one court determined that land dry enough to permit agricultural cultivation was not within the dominion of the river, and therefore not within the reach of ordinary high water.[56]

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51. Several authorities were cited at the end of this quote. J. GOULD, A TREATISE ON THE LAW OF WATERS § 45 (1900); Houghton v. The C., D. & M. R. Co., 47 Iowa 370 (1877); Plumb v. McGannon, 32 U.C.R. 8 (U.C.Q.B. 1871); Stover v. Jack, 60 Pa. 339 (1869); Howard v. Ingersoll, 54 U.S. (13 How.) 381 (1851). In addition to the *Carpenter* quotation, the *Tilden* court quoted from Dow v. Electric Co., 69 N.H. 498, 45 A. 350 (1899). The *Dow* decision is less than one-half page long and contains no facts and no legal pronouncements beyond the sentence quoted in *Tilden*. It cited *Carpenter*; J. GOULD, *supra*; *Howard*; and *Houghton*. The quote is identical in substance to the portion of the *Carpenter* formula dealing with a clearly imprinted mark and provides no additional insights.

52. J. GOULD, *supra* note 51, at 106. This treatise analogizes the daily cycle of low and high tides and the annual cycle of low and high water in freshwater waterbodies: "[f]resh rivers, although not subject to the daily fluctuations of the tide, may rise and fall periodically at certain seasons, and thus have defined high and low-water marks." *Id.*; *see* Plumb v. McGannon, 32 U.C.R. 8 (U.C.Q.B. 1871) (also explains the ordinary high water boundary "by analogy to tidal waters"); Stover v. Jack, 60 Pa. 339, 340-41 (1869) (the court affirmed a trial court's analogy between low water mark in freshwaters and the low tide mark).

53. *E.g.*, J. GOULD, *supra* note 51, at 150 ("The true boundary line of a navigable stream or lake is the point to which the water usually rises in ordinary seasons of high water.").

54. Plumb v. McGannon, 32 U.C.R. 8 (U.C.Q.B. 1871), concerned the issue of whether a boat-house was located within the boundary of the St. Lawrence River. The court rejected a boundary on inland waters which would be the highest limit the water would reach each year caused by freshets (great meltings of snow), spring rains, and unusual floods. *Id.* at 14. This directly parallels the exclusion of extraordinarily high tides from "ordinary high tide" determinations. In Stover v. Jack, 60 Pa. at 343-44, the court explained the "ordinary" element: as the stream rises and falls, marks are found at the water's limits, excluding the limits of extraordinary floods or extreme droughts. Similarly, the court in *Houghton*, 47 Iowa at 372, excluded land inundated by freshets lasting only one or two days per year.

55. Howard v. Ingersoll, 54 U.S. (13 How.) 381, 427 (1851) (Curtis, J., concurring) (describing a mark in terms of recognizable changes in soil and vegetation resulting from the presence and action of water; contending that the boundary should be at the most "noticeable" marks, whether they reflected ordinary high water, low water, or somewhere in between).

56. Houghton v. The C., D. & M. R. Co., 47 Iowa 370 (1877) (involving a riparian boundary dispute on the Mississippi River). The *Houghton* court recognized that shallow vegetated margins obscure the indicators of the reach of ordinary high water. "The impression may, in places, be indistinct. Vegetation may, in places, dispute the dominion of the river with doubtful issue . . . ." *Id.* at 374. To help resolve the dilemma of the location of the line in such places, the court in *Houghton* utilized an *agriculture* test: "[w]hatever difficulty there may be in determining [the high water mark] in places, this doubtless may be said: [w]hat the river does not occupy long enough to wrest from vegetation, so far as to destroy its value for agriculture, is not river bed." *Id.* The *Carpenter* court incorporated this component of *Houghton* by adopting an *ordinary agricultural crop* test, which identifies the ordinary high water line as the location where the water is present for a duration sufficient to prevent cultivation of ordinary agricultural crops. *Carpenter*, 56 Minn. 513, 517, 58 N.W. 295, 297 (1894).

Together, *ordinary* and *high water* describe the *stage* of water that is the boundary. The presence of the water over a period long enough to prevent the cultivation of ordinary agricultural crops describes the *duration* of the water at that stage. Stage and duration are complementary measures. The duration (length of time) that water is at or higher than a particular stage (elevation) can be used to compare stages. Except in droughts, a river's stage is at or above low water all the time;[57] low water has a *long* stage duration. In contrast, extreme high water occurs only during floods that last a few days and has a very *short* stage duration.

Stage and duration are complimentary concepts because duration is the essential basis of the prefixes *ordinary* or *extreme* in the description of water stages: *ordinary* denotes a recurring phenomenon of moderate duration, while *extreme* denotes an event of short duration. Stage and duration together identify the hydrologic condition that is "ordinary high water." The criteria or indicators for locating the ordinary high water line are surrogates or indicators that identify the reach of waters when they are at their ordinary high stage.

Tilden described those indicators as they evidence the reach of ordinary high water on two distinct types of waterbodies: steep banked and flat banked.[58] For waterbodies with high, steep banks, the ordinary high water line is found at the point where the water occupies the land sufficiently long and continuously to wrest it from vegetation so as to destroy its value for agricultural purposes.[59] These steep banked lakes and streams predominate in Florida.[60] Controversies rarely erupt over the boundaries of these waters because the steepness of the banks leaves only a narrow zone for argument. Less common are lakes and streams exhibiting the low flat banked profile, although such profiles occur on sections of most major Florida streams.[61] On low flat banked waterbodies, the water does not impress a well-defined mark on the

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57. *Cf.*, United States v. Harrell, No. 89-7432, slip op. at 8 (11th Cir. Mar. 15, 1991) (equates the ordinary high water line for navigational servitude purposes with "the relatively permanent elevation of the water.") This baffling description seems to suggest that the court viewed high water as being the same as low water. *But see* State v. Black River Phosphate, 32 Fla. 82, 127-28, 13 So. 640, 654 (1893) (the low water mark is defined as the reach of "waters at their ordinary stage"); Trustees v. Walker Ranch, 496 So. 2d 153, 156 n.3 (Fla. 5th DCA 1986) (quoting D. MALONEY, WATER LAW 1980) (the low water mark is defined as "the usual, common or ordinary stage").

58. 94 Fla. 502, 513, 113 So. 708, 712 (1927).

59. *Id.* (citing *Carpenter*, 56 Minn. 513, 58 N.W. 295 (1894)).

60. *Id.* at 512-13, 113 So. at 712.

61. Interview with Terry Wilkinson, Chief Cadastral Surveyor for the State of Florida (Mar. 14, 1991).

soil, and the ability to cultivate ordinary agricultural crops is the principal test.[62]

The court in *Tilden* referred to the term "agricultural purposes" twice[63] and to the term "agricultural crop" once.[64] Read in isolation, the "agricultural purposes" language would appear to have the effect of permitting cattle foraging on natural vegetation to be an agricultural purpose. Thus, the foraging behavior of cattle would locate the boundary, rather than the reach of ordinary high water. However, the foraging behavior of livestock is unrelated to any particular water line. As long as the water remains shallow, cattle can and will forage on natural vegetation as far out into the water as they can go; in some cases hundreds of yards from the shore. It was evidently for this reason that the court, in *Tilden*, explicitly clarified that *agriculture* was not intended to include livestock foraging: a water line is present which prohibits use of the land for agricultural purposes by preventing the growth of "an ordinary agricultural crop." Livestock foraging is not an "agricultural purpose" for purposes of locating the ordinary high water line.[65]

In the same year as *Tilden*, the Florida Supreme Court decided *Martin v. Busch*,[66] a quiet-title action concerning a portion of the former bed of Lake Okeechobee which had been exposed as a result of government drainage projects.[67] In the course of the decision, the court discussed methods for locating the ordinary high water boundary on low, flat banked waterbodies with swampy vegetated margins:

> In flat territory or because of peculiar conditions, there may be little if any shore to navigable waters, or the elevation may be slight and the water at the outer edges may be shallow and affected by

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62. *Tilden*, 94 Fla. at 512, 113 So. at 712.

63. *Id.* at 512-13, 113 So. at 712.

64. *Id.*

65. *Id.*; *but see* United States v. Harrell, No. 89-7432, slip op. at 7-8 (11th Cir. Mar. 15, 1991) (foraging of hogs is an "agricultural purpose" for ordinary high water line identification for purposes of federal navigational servitude).

66. 93 Fla. 535, 112 So. 274 (1927). The case involved the Trustees of the Internal Improvement Fund, made up of the governor and cabinet in the capacity of Trustees over various lands and the title holder of exposed (reclaimed) sovereignty lands. Ch. 7891, Laws of Fla. (1919). Martin, the governor, was the first named party appellant. Busch, the appellee, was the littoral landowner.

67. *Busch*, 93 Fla. at 572, 112 So. at 286. A handful of projects dating back to the 1880's had substantially lowered the level of the lake, leaving the historic ordinary high water line in doubt. ACTS, REPORTS, AND PAPERS RELATING TO EVERGLADES OF FLORIDA AND THEIR RECLAMATION, S. DOC. No. 89, 62nd Cong., 1st Sess. 76 (1911). However, the controversy in *Busch* centered on the ordinary high water line that existed prior to a recent drainage project by the Everglades Drainage District. *Busch*, 93 Fla. at 547, 112 So. at 278-79.

> vegetable growth or other conditions, and the line of ordinary high-water mark may be difficult of accurate ascertainment; but, when the duty of determining the line of high-water mark is imposed or assumed, the best evidence attainable and the best methods available should be utilized in determining and establishing the line of true ordinary high-water mark, whether it is done by general or special meandering or by particular surveys of adjacent land. Marks upon the ground or upon local objects that are more or less permanent may be considered in connection with competent testimony and other evidence in determining the true line of ordinary high-water mark.[68]

Thus, "the best evidence attainable and the best methods available" are mandated when locating ordinary high water within vegetated areas. If competent testimony shows permanent marks on the ground or on local objects to be ordinary high water marks, the water itself, when at the level of those marks, will provide the boundary.[69]

V. WATER BOUNDARY SURVEYS

Unfortunately, modern surveys of Florida lakes and streams rarely indicate the reach of ordinary high water. Instead, they depict only the location of the water's edge on the day of the survey. This may be a consequence of the fact that a commonly used survey manual contains hopelessly garbled instructions on water boundaries.[70] The cur-

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68. *Busch*, 93 Fla. at 564, 112 So. at 283.

69. Justice Whitfield's method of identifying the elevation of ordinary high water so as to locate the boundary in places without clear marks is the same as the technique referred to by the majority in Howard v. Ingersoll, 54 U.S. (13 How.) 381, 419 (1851). On lakes, the elevation of the marks provides an ordinary high water elevation that can be surveyed into the swamp by using a transit and level, rather than finding the water's edge at the exact moment the water is at the water mark. On rivers, the downstream slope may prohibit this technique. In that case it may be necessary to locate the water margin in the riverine swamp at a time when the river stage is actually at the true line of ordinary high water mark. Computer modeling can be used in lieu of setting the river at the exact stage of ordinary high water. Mobil Oil Corp. v. Coastal Petroleum Co., 2 Fla. Supp. 2d 12 (Fla. 10th Cir. Ct. 1982) (for example, see the Trustees Amended Exhibit List, Exhibit No. 896A).

70. Federal surveys of public lands were conducted in western and southern states over the early to mid-nineteenth century. Standard instructions to the public lands surveyors were formulated in the General Land Office. C. WHITE, A HISTORY OF THE RECTANGULAR SURVEYING SYSTEM vii (1982). The sinuosities of the shores of navigable waters were to be approximated by "meander" surveys which described those sinuosities by a series of straight line segments. Where shorelines were to be meandered, the instruction manual omitted any instruction on whether the line was to be at high water, low water, or any particular place in between. In 1881, the instructions were amended to require meander lines to be placed at the ordinary low water mark, *id.* at 523, and in 1894, were amended to require placement at the *ordinary mean high water mark*. *Id.* at 621. The General Land Office attempted to conform its instructions to case precedents in 1902 with embarrassingly inadequate results. That year's manual contains two short paragraphs at-

rent version of the manual continues the tradition of garbling the ordinary high water concept.[71] The new manual inexplicably defines *mean high water* as necessarily falling below the average water level: "mean high water elevation is found at the margin of the area occupied by the water for the greater portion of each average year."[72] This "majority of the year" definition actually sounds more like the ordinary low water line.[73]

In Florida, in the mid-nineteenth century, portions of a few dozen streams and about 230 lakes were subjected to shoreline surveys.[74] However, these "meander" surveys were not intended to and did not locate the ordinary high water boundary.[75] In any event, a century of continuous shoreline permutations renders useless any nineteenth century shoreline survey.[76]

Water boundary surveys should be done uniformly and in conformance with the law. Because shorelines are normally in a constant state of change, inexpensive methods for ascertaining the reach of ordinary high water are needed. As previously mentioned, the Florida Supreme Court mandated, over sixty years ago, that "the best evidence attainable and the best methods available should be utilized."[77] In other words, technical and scientific advances should be employed as they become available. Since *Martin*, more evidence has become

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tempting to interpret state court decisions.

Although Houghton v. The C., D. & M. R. Co., 47 Iowa 370, 374 (1877), actually holds that in vegetated areas of the river bed the ordinary high water line may not be obvious because "[t]he impression may, in places, be indistinct. Vegetation may, in places, dispute the dominion of the river with doubtful issue . . . ." The Manual summarized the case as holding that "[the] high water mark in the Mississippi River is to be determined from the river bed; and that only is river bed which the river occupies long enough to wrest it from vegetation." *Id.* This error creates the impression that the case holds that the high water line is always the line between vegetation and open water. C. WHITE, *supra*, at 717. The second state case summarized in the 1902 manual is Mills v. Buchanan, 14 Pa. 59 (1850). It is characterized as holding that "a bank is defined as the continuous margin where vegetation ceases, and the shore is the sandy space between it and low-water mark." C. WHITE, *supra*, at 717. Actually, *Mills* concerned a dispute over a boundary line between two farms; there is no bank, no shore, and no low-water mark discussed anywhere in the case.

71. UNITED STATES DEPARTMENT OF THE INTERIOR, MANUAL OF INSTRUCTIONS FOR THE SURVEY OF THE PUBLIC LANDS OF THE UNITED STATES 95 (1973).

72. *Id.*

73. *See* State v. Black River Phosphate Co., 32 Fla. 82, 127-28, 13 So. 640, 654 (1893) (defining ordinary low water as the "ordinary stage" of water).

74. Interview with Terry Wilkinson, Chief Cadastral Surveyor for the State of Florida (Mar. 14, 1991).

75. C. WHITE, *supra* note 70, at 717.

76. Board of Trustees v. Board of Professional Land Surveyors, 11 Fla. Admin. L. Rep. 2449, 2493 (1989), *aff'd*, 566 So. 2d 1358 (Fla. 1st DCA 1990) (passage of century of time renders old water lines meaningless).

77. Martin v. Busch, 93 Fla. 535, 564, 112 So. 274, 283 (1927).

available, including daily water level and flow rate records and high resolution aerial photography. In particular, aerial mapping techniques employing false color infrared photography have become highly sophisticated in depicting and differentiating vegetative, soil, and hydrologic patterns on the ground. High resolution aerial photos are now available throughout the State, as well as several photographs taken over the past forty years. These aerial maps are becoming the foundation for water boundary identification, and this process should be accelerated.

The boundary of lakes and streams is the normal reach of water during the high water season. Where the water margins are very flat and shallow, small fluctuations in the water level translate to large lateral changes in the location of the water's edge. This problem, compounded by the irregular pattern of daily, seasonal, and annual fluctuations in water levels, tends to defy efforts to locate a valid, replicable line depicting the exact reach of ordinary high water. The irregular tidal cycle dependent on the sun and moon, the seasons, and the irregular pattern of storms and winds, similarly obscures the exact reach of normal high water in shallow tidal waters. In this case, the problem is solved by using tide-gauge records to average out constant fluctuations and generate an exact elevation that represents "mean high water."[78] This solution is possible because of the enormous number of tide-gauges from which long term records can be obtained, and because gaps between gauges can be filled in by interpolation. Unfortunately, this solution is not available for freshwaters because long term records of daily water elevations exist for only a relatively small number of lakes and streams,[79] and because interpolation is generally

78. *See* FLA. STAT. § 177.27 (1989) (establishes the average of nineteen years of high tides as the elevation of water, forming the tidal boundary).

79. Daily records of water elevations on numerous rivers and lakes were maintained for more than 60 years. Many more waterbodies have daily records dating back 30 to 50 years. The location of the gauges and period for which records have been maintained are set out in two maps published jointly by the United States Geological Survey and Florida Department of Natural Resources. D. FOOSE & J. SOHM, UNITED STATES GEOLOGICAL SURVEY, FLORIDA DEP'T OF ENVTL. REGULATION, MAP SERIES 107, LONG-TERM STREAMFLOW STATIONS IN FLORIDA, 1980 (1983); D. FOOSE, UNITED STATES GEOLOGICAL SURVEY, FLORIDA DEP'T OF ENVTL. REGULATION, FLORIDA GEOLOGICAL SURVEY, FLORIDA DEP'T OF NATURAL RESOURCES, MAP SERIES 118, LONG-TERM STAGE RECORDS OF LAKES IN FLORIDA (1987).

Water records for most lakes and streams, however, are non-existent or incomplete. For this reason, the development of water boundary techniques for freshwaters remains in the posture that saltwater boundaries were in before long-term tidal gauge data became universally available. Only then did a mathematical surrogate for ordinary high water in tidal areas become possible. Until long-term stage records become available for all Florida freshwaters, a development which will require decades to accomplish, the existing stage data on freshwater lakes and rivers can and should be used to identify and verify reliable vegetative indicators of the reach of ordinary high water which can be clearly recognized on aerial maps.

not possible.[80] However, the principle of seeking long term averages can be followed through physical indicators of average daily, seasonal, and annual fluctuations in the water level.

Some species of vegetation are found only where, during normal or average years, the land is regularly or consistently submerged during the high water season. Scientific research in recent decades has revealed that vegetation patterns correspond closely to normal hydrologic regimes.[81] These vegetative surrogates can provide a reliable substitute for long-term average hydrologic data, and are consistently found in bands corresponding to the reach of water during different hydrologic regimes. The boundaries between these bands of vegetative communities are identifiable in detailed aerial photographs, and can be brought into sharp focus in false color infrared aerial photographs.[82] More research is needed to identify plant communities which are consistently found at the normal reach of high waters in lakes and streams.

Such techniques can be viewed as an improvement to the "ordinary agricultural crop" test when locating the ordinary high water boundary. The cultivated crop is a vegetative surrogate which reveals that land is not within the "dominion of the river"—that is, it is not submerged during a normal high water season.[83] Naturally occurring vegetative patterns merely provide a much broader information source, especially when such patterns can be clearly differentiated in aerial photographs.

Aerial photographs should become the primary instrument for performing ordinary high water boundary surveys, replacing the antiquated method of conducting "meander" surveys using transits and

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80. Lakes and streams generally lack unimpeded hydraulic connections between them, rendering interpolation between water gauges impossible. Interview with Terry Wilkinson, Chief Cadastral Surveyor for the State of Florida (Mar. 14, 1991).

81. *See* H. LEITMAN, J. SOHM & M. FRANKLIN, UNITED STATES GEOLOGICAL WATER-SUPPLY PAPER 2196, WETLAND HYDROLOGY AND TREE DISTRIBUTION OF THE APALACHICOLA RIVER FLOOD PLAIN, FLORIDA (1984). Hydrologic data may show that a vegetation line is the low water line, rendering it ineligible as being too low to be the ordinary high water line, or that a soil and vegetative break is the 25 year or the 1 year flood line, rendering it ineligible as being too high to be the ordinary high water line.

82. For example, the boundaries of aquatic forests (cypress and water tupelo trees) are apparent in color infrared aerial photographs. H. LEITMAN, UNITED STATES GEOLOGICAL SURVEY, HYDROLOGIC INVESTIGATIONS ATLAS, FOREST MAP AND HYDROLOGIC CONDITIONS, APALACHICOLA RIVER FLOOD PLAIN, FLORIDA HA-672 (1984).

83. Houghton v. The C., D. & M. R. Co., 47 Iowa 370, 374 (1877) (ability to grow agricultural crop discloses that the land is not in the dominion of the river). *But see* United States v. Harrell, No. 89-7432, slip op. at 3 (11th Cir. Mar. 15, 1991) (classifying cypress and water tupelo trees as "terrestrial vegetation" signalling that they are beyond the ordinary high water line for navigational servitude purposes).

measuring tapes. Under the latter method, surveyors measure a consecutive series of straight line segments along the curving shore of a lake or river shore and approximate the curves by measuring (with a transit) the angle between each straight line segment.[84] The series of angles and straight lines constitute a geometric formula which approximates the contour of the shoreline, permitting it to be mapped and facilitating acreage estimates.[85] Employed since the early 1800's, this surveying technique was an important technical innovation because it enabled maps to be constructed depicting the land in plane perspective—as if the land were seen from hundreds or thousands of feet above. Now that aerial photography yields images actually photographed from that altitude, meander surveys are pointless and extremely expensive. Ground surveys should be conducted for the limited purpose of verifying conclusions about ground features suggested from aerial photo interpretation.

Scientific research also provided advances in the understanding of hydrology, geology, botany, and soils science, all of which are capable of assisting in interpreting aerial maps to identify the reach of hydrologic regimes. These techniques were already used by the parties to major ordinary high water boundary disputes.[86] Further research is needed to identify reliable vegetative indicators for the reach of ordinary high water that are clearly visible in aerial photographs. The techniques for aerial photo interpretation and for ground verification should be standardized so that they yield consistent results. Under this approach, ordinary high water boundaries can be identified quickly and inexpensively.

VI. NON-NAVIGABLE ARMS, COVES, AND SIMILAR FEATURES

Public ownership of freshwaters encompasses all parts of the lake or stream, regardless of how shallow, and includes non-navigable arms or coves so long as they are "part of" a navigable lake or stream. In an opinion written by Justice Whitfield, the author of most major Florida decisions relating to navigable waters,[87] the court for-

84. C. BREED, SURVEYING 118-20, 198 (1957).

85. *See, e.g.*, C. WHITE, *supra* note 70, at 717.

86. *See, e.g.*, Board of Trustees v. Board of Professional Land Surveyors, 566 So. 2d 1358 (Fla. 1st DCA 1990); Lightsey v. Department of Natural Resources, No. 84-451 (Fla. 10th Cir. Ct. July 6, 1988) (Mutual Pretrial Stipulation); Mobil Oil Corp. v. Coastal Petroleum Co., 2 Fla. Supp. 2d 12 (Fla. 10th Cir. Ct. 1982) (settled by Consent Order December 14, 1987).

87. Freed v. Miami Beach Pier Corp., 93 Fla. 888, 112 So. 841 (1927); Martin v. Busch, 93 Fla. 535, 112 So. 274 (1927); Apalachicola Land & Dev. Co. v. McRae, 86 Fla. 393, 98 So. 505 (1923); City of Tarpon Springs v. Smith, 81 Fla. 479, 88 So. 613 (1921); Brickell v. Trammell, 77 Fla. 544, 82 So. 221 (1919); Panama Ice & Fish Co. v. Atlanta & St. A. B. Ry., 71 Fla. 419, 71

mulated this rule in *Martin v. Busch*,[88] a case involving the bed of Lake Okeechobee. *Martin* involved a riparian landowner who asserted private ownership of a cove or pond separated from Lake Okeechobee by a sandbar three miles wide, contending that it was five miles from the waters in the cove to the navigable waters of the lake. Thus, he contended that this cove was private land because it was not navigable.[89] In response, the court adopted the Wisconsin rule set forth in *Illinois Steel v. Bilot*,[90] holding that the public domain includes "the beds of all navigable lakes to ordinary high water mark, however shallow the water may be at the outside lines or elsewhere, if the water is in fact a part of the particular lake that is navigable for useful public purposes."[91]

The question before the Wisconsin Supreme Court in *Bilot* was whether an area at the confluence of a river and lake was to be treated as part of the river or as part of the lake into which the river flowed.[92] A two-fold test was applied by the court to answer that question: (1) was the water lake or river water, and (2) did the water rise and fall with the level of the lake.[93] Justice Whitfield adopted the second part of the test to determine the public status of coves and arms of Florida's freshwater lakes and rivers.

Thirty years after *Busch*, the case of *Baker v. State*[94] presented the court with a dispute involving a non-navigable arm that had been rendered navigable by improvements. The dispute in *Baker* concerned a renewed lease from the State to Baker for Cromartie Arm, described as a part of the bed of Lake Iamonia.[95] Pursuant to the original lease, "a dam and spillway was constructed as agreed with the result that a

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So. 608 (1916); Merrill-Stevens Co. v. Durkee, 62 Fla. 549, 57 So. 428 (1912); Clement v. Watson, 63 Fla. 109, 58 So. 25 (1912); Board of Trustees v. Root, 59 Fla. 648, 51 So. 535 (1910); Broward v. Mabry, 58 Fla. 398, 50 So. 826 (1909); Ferry Pass Inspectors' & Shippers' Ass'n v. White's River Inspectors' & Shippers' Ass'n, 57 Fla. 399, 48 So. 643 (1909); State *ex rel.* Ellis v. Gerbing, 56 Fla. 603, 47 So. 353 (1908).

88. 93 Fla. 535, 112 So. 274 (1927).

89. The appellee's brief in *Busch* contended that the cove "was not a part of Lake Okeechobee and was not connected therewith by navigable water, and therefore constituted land capable of and actually privately owned . . . ." Appellee's Brief at 18, Martin v. Busch, 93 Fla. 535, 112 So. 274 (1927) (No. 27-2106).

90. 109 Wis. 418, 438-39, 85 N.W. 402, 405 (1901).

91. *Busch*, 93 Fla. at 563-64, 112 So. at 283.

92. Rivers and lakes are treated differently under Wisconsin law. River beds are held in private ownership, while lake beds are held in public ownership. Illinois Steel v. Bilot, 109 Wis. 418, 438-39, 85 N.W. 402, 405 (1901).

93. *Id.* at 438, 85 N.W. at 405.

94. 87 So. 2d 497 (Fla. 1956).

95. *Id. See also* Petitioner's Amended Petition for Declaratory Decree, Exhibit "B", Baker v. State, 87 So. 2d 497 (Fla. 1956) (No. 26875); 29 MINUTES OF THE TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND 63-64 (Aug. 19, 1952).

fine fresh water lake has been established on such property which has become known as Cromartie Lake."[96] Baker owned all the land surrounding Cromartie Arm and sought to raise the water level to attract fish and waterfowl. As a result of the dam and spillway, the water level was raised, rendering the arm susceptible of boating.[97] A local resident sued to enforce his public right of access to the area.

The special master and the trial court held that the arm was navigable and the lease was valid; however, the lease could not defeat the public's rights to use the land.[98] The Florida Supreme Court reversed, holding that in its ordinary and natural condition, prior to the construction of the dam, the arm was not navigable.[99] Although this fact defeated the plaintiff's claim of a public navigation easement,[100] the court left undisturbed the conclusion that Cromartie Arm was part of the lake.

The court concluded its analysis in *Baker* with a citation to *Clement v. Watson*,[101] a case involving a non-navigable cove of the sea which an adjacent riparian owner dredged to make it susceptible to boat traffic. In *Clement*, the court rejected the suggestion that an easement to navigate and fish arises from such private improvements. The *Baker* decision triggered a public controversy over the practice of leasing parts of public lakes to private landowners and resulted in the termination of Baker's lakebed lease from the State.[102] *Baker* indicates

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96. Petitioner's Amended Petition for Declaratory Decree, Exhibit "B", Baker v. State, 87 So. 2d 497 (Fla. 1956) (No. 26875).

97. Special Master's Report and Recommendations at 31, Baker v. State, 87 So. 2d 497 (Fla. 1956) (No. 26875).

98. *Id.* at 31, 34-35. *See also* Final Decree at 39, Baker v. State, 87 So. 2d 497 (Fla. 1956) (No. 26875).

99. Baker v. State, 87 So. 2d 497, 498 (Fla. 1956).

100. Under Florida law, the public enjoys an easement to bathe, navigate, fish, and make other similar uses of all navigable waters. Broward v. Mabry, 58 Fla. 398, 412, 50 So. 826, 830 (1909). Because of the federal regulatory power over interstate and foreign commerce, a federal navigational servitude exists on all navigable waterbodies that connect to other states or international waters. Kaiser Aetna v. United States, 444 U.S. 164, 178 (1979). A federal navigational servitude exists on waters that are not navigable naturally but which have been or could be rendered navigable through improvements such as dredging channels, construction of locks and dams, and removal of rapids. United States v. Appalachian Elec. Power Co., 311 U.S. 377, 407-09 (1940). This navigational servitude provides a public right of way for navigation and empowers the federal government to engage in water control activities. *Id.* However, unreasonable improvements that render navigable a formerly non-navigable waterbody do not automatically create a resulting public navigational servitude under federal law. *Kaiser Aetna*, 444 U.S. at 178.

101. 63 Fla. 109, 58 So. 25 (1912).

102. Following the supreme court's decision, the governor calmed public fears that the non-navigable arms of the state's lakes had been lost by publicly reaffirming the *Busch* rule. 30 MINUTES OF THE TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND 520 (Jan. 30, 1956). The Trustees yielded to public pressure and indicated that they would not renew the lease so that public access to this arm of the lake would be restored at the expiration of the lease. 29 MINUTES OF THE TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND 63-64 (Aug. 19, 1952).

that the non-navigable parts of lakes may be the subject of sovereignty lands leases that are not subject to a public navigation or use easement. However, such leases are now restricted by article X, section 11 of the Florida Constitution.[103]

In freshwater lakes and streams, the ordinary high water boundary encompasses all parts of the waterbody no matter how shallow the water is at the outside lines or elsewhere.[104] This rule includes all non-navigable coves, arms, and similar features that meet the two pronged "part of" test: whether the water in the arm or cove is water from the main navigable waterbody and whether the waters rise and fall with those of the main waterbody.

VII. Law of Ambulatory Boundaries

The fact that the boundary is an ambulatory one, continually shifting in response to natural processes, also complicates determinations

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103. The last clause of article X, section 11 of the Florida Constitution provides that "private use of portions of [sovereignty] lands may be authorized by law, but only when not contrary to the public interest." It is difficult to imagine a lease barring public access to part of a public lake that would not be contrary to the public interest. This view is reinforced by the public clamor that arose over the lease of Cromartie Arm in Lake Iamonia.

104. A completely different rule applies to tidelands. The tidelands rule originated in two opinions authored by Justice Whitfield in the early part of this century and holds that tidelands which neither immediately border the sea nor comprise the shores of the sea (the zone between ordinary high and ordinary low water) are the subject of private ownership unless they are themselves navigable. City of Tarpon Springs v. Smith, 81 Fla. 479, 88 So. 613 (1921) (isolated salt marsh not sovereignty lands); Clement v. Watson, 63 Fla. 109, 58 So. 25 (1912) (non-navigable tidal cove is proper subject of private ownership). Later, the court decided a dispute over Tampa Bay in State *ex rel.* Buford v. City of Tampa, 88 Fla. 196, 208, 102 So. 336, 340 (1924), and relied on the tidelands rule for the principle that the public status of tidelands "does not include lands that do not immediately border on the navigable waters and that are covered by water not capable of navigation for useful public purposes . . . ." *See* Lopez v. Smith, 109 So. 2d 176 (Fla. 2d DCA 1959) (navigability of tidally affected portion of the lower Little Manatee River).

In 1988, the United States Supreme Court held that the states received all navigable and non-navigable tidal lands as sovereignty lands upon entering the Union. Phillips Petroleum v. Mississippi, 484 U.S. 469 (1988). At issue in that case were non-navigable tidelands that did not comprise shores or immediately border on the sea. The Court held that such lands passed to the states by operation of law under the equal footing doctrine, *id.* at 479-80, but noted that some coastal states abandoned them as sovereignty lands. *Id.* at 483. The Florida cases cited above indicate that Florida abandoned such lands in the early part of this century.

In Martin v. Busch, 9 Fla. 535, 112 So. 274 (1927), a riparian owner sought to extend the tidelands rule to non-navigable coves on freshwater lakes. Busch contended that the cove "was not a part of Lake Okeechobee and was not connected therewith by navigable water, and therefore constituted land capable of and actually privately owned within the meaning of Clement v. Watson, 63 Fla. 109, 58 So. 25; Lord v. Curry, 71 Fla. 68, 71 So. 21; City of Tarpon Springs v. Smith, 88 So. 613; State v. Gerbing, 56 Fla. 603, 47 So. 353." Appellee's Brief at 18, Martin v. Busch, 93 Fla. 535, 112 So. 274 (1927) (No. 27-2106). The court tersely rejected the suggestion that the tidelands rule applied to freshwaters, noting simply that "[t]here are no tidelands adjacent to the navigable waters here as there were in Tarpon Springs v. Smith, 81 Fla. 479, [88 So. 613]; Clement v. Watson, 63 Fla. 109, [58 So. 25]; and Lord v. Curry, 71 Fla. 68, [71 So. 21]." *Busch*, 93 Fla. at 568-69, 112 So. at 285. Thus, the court confirmed that tidelands cases have no applicability to freshwater lakes and streams.

of water boundaries. These processes can be divided into two categories: those which are the result of the action of the water and those which are the result of the raising or lowering of the water level. The current of rivers and the wave action on lakes cause the shoreline to move.[105] These gradual shoreline changes take two forms: erosion and accretion. Erosion is the gradual wearing away of the land by the action of the water, causing the shoreline to retreat.[106] Accretion is the gradual accumulation of land by deposition of sediment, causing the shoreline to advance.[107]

These natural processes[108] shift the legal boundary as long as the process taking place is slow and imperceptible.[109] Depending upon whether the waterbody is eroding or accreting, a riparian owner may either lose or gain land. Avulsive changes such as flood events which cut off an oxbow, thereby permanently shifting the course of a river, do not shift property boundaries.[110] The purpose of this common law rule is to prevent sudden massive water boundary changes with inherently inequitable results.[111] On the other hand, inequitable results do

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105. The movement of the shoreline can be conceptualized by viewing it from the perspective of someone in a boat in the middle of the waterbody.

106. 3 AMERICAN LAW OF PROPERTY—A TREATISE ON THE LAW OF PROPERTY IN THE UNITED STATES § 15.26 (Casner ed. 1952).

107. Board of Trustees v. Sand Key Assoc., 512 So. 2d 934, 936 (Fla. 1987).

108. Rivers gradually erode on the outside of turns and deposit sediment (accrete) on the inside of those turns. Accretion and erosion also occur on lakes, and the same general rules apply. J. ALLEN, PHYSICAL PROCESSES OF SEDIMENTATION—AN INTRODUCTION 118-46 (1977); W. TWENHOFEL, PRINCIPLES OF SEDIMENTATION 227-29 (1950).

109. Board of Trustees v. Medeira Beach Nominee, Inc., 272 So. 2d 209, 211 (Fla. 2d DCA 1973); Municipal Liquidators, Inc. v. Tench, 152 So. 2d 728, 730 (Fla. 2d DCA 1963); Siesta Properties v. Hart, 122 So. 2d 218, 224 (Fla. 2d DCA 1960); Mexico Beach Corp. v. St. Joe Paper Co., 97 So. 2d 708, 710 (Fla. 1st DCA 1957).

110. Arkansas v. Tennessee, 246 U.S. 158, 162 (1918) (oxbow suddenly rerouting course of Mississippi River); Nebraska v. Iowa, 143 U.S. 351, 361 (1842) (Missouri River course suddenly changed by cutting off oxbow). Avulsive changes which do not change boundaries can also occur in other situations. Hurricanes can change the landforms on the coast, but will not change land boundaries. Bryant v. Peppe, 238 So. 2d 836 (Fla. 1970); Siesta Properties v. Hart, 122 So. 2d 218 (Fla. 2d DCA 1960).

111. Bonelli Cattle Co. v. Arizona, 414 U.S. 313, 327 (1973). The legal descriptions in riparian deeds normally use one side of the river as a call in the boundary. For example, the call on the west side owner's deed will be "to the west bank of the river." If the land on the west side of the river constitutes the outer edge bank of a west looping oxbow, then the western riparian owner would gain all the land within the oxbow loop if the river were to change course by pinching off the oxbow. If this avulsive change were permitted to shift legal boundaries, the land enclosed in the oxbow loop—comprising hundreds or even thousands of acres—would be transferred spontaneously from one riparian owner to another. Examples of this natural process are clearly recognizable in detailed political maps of the Mississippi and Missouri Rivers. Former oxbows that have been cut off are visible in the borders between states where those borders form large loops that no longer correspond to the course of the river.

not accrue when erosion and accretion progress at glacial speed; for that reason they operate to shift the water boundary gradually.[112]

Natural changes in water levels also shift boundaries. When water levels rise, the shoreline retreats; when water levels fall, the shoreline advances. The former process is "submergence";[113] the latter process is "reliction."[114] If these changes are the result of natural causes acting slowly and imperceptibly, the boundary will gradually shift accordingly.[115] On lakes, and particularly on landlocked lakes,[116] the boundary aspect of submergence and reliction is sometimes complicated by a hydrologic cycle which combines an annual cycle of low and high water (dry and wet seasons) with a much longer cycle, often extending over decades, related to a regularly recurring climatic cycle of high and low rainfall.[117] The end result is a cyclic pattern of alternating submergence and reliction. The boundary is lower during the dry decades and higher during the wet decades. This process creates a recognizable zone within which the dominion of the lake is constantly shifting. However, at any given time during this cycle there is always an identifiable place where the water ends and the land begins. This place constitutes the legal boundary line.

Since this extended cycle is regular and periodic, neither party has a reasonable expectation of the land in this *submergence/reliction zone* being either permanently relicted or permanently submerged. This natural cycle produces a zone of alternating tenancies in which neither

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112. If gradual erosion and accretion did not shift the boundary, the riparian owner on the eroding side of the river would gradually gain a steadily growing strip of riparian land on the opposite side of the river. The only practical effect of this transfer would be to deprive the opposite riparian owner of a boundary contiguous with water. It has been suggested that the doctrine of erosion and accretion stems from the Roman principle of accession; the principle that ownership to property includes the right to new property which grows from the existing property. Like the calf born of a cow, the new property created by accretion can be viewed as a growth of new property on old property. The erosion rule is then viewed as a corollary necessary to produce symmetry of outcome. Note, *supra* note 14, at 621-22.

113. "'Submergence' [is] the disappearance of land under water and the formation of a more or less navigable body over it." BLACK'S LAW DICTIONARY 1278 (5th ed. 1979).

114. Martin v. Busch, 93 Fla. 535, 574, 112 So. 274, 287 (1927).

115. *Id.*; Padgett v. Flood Control Dist., 178 So. 2d 900, 904 (Fla. 2d DCA 1965).

116. Lakes are often wide portions of rivers or streams. For example, the St. Johns River contains several large lakes in its course.

117. FLORIDA STATE UNIVERSITY, WATER RESOURCES ATLAS OF FLORIDA 31-35 (1984). Examples of lakes unusually affected by climatic changes are Lake Miccosukee and Lake Jackson in Leon County, Florida. These "sinkhole" lakes have a 30 year cycle of high and low water. Approximately every 30 years, the underlying aquifer will become so depleted due to an extended period of low precipitation that the water runs out of the lakes through sinkholes and the lakes will go almost completely dry. It was during such a dry period that the state attempted to sell the temporarily exposed beds of Lakes Jackson and Miccosukee, prompting two actions that reached the state supreme court: Broward v. Mabry, 58 Fla. 398, 50 So. 826 (1909); Broward v. Sledge, 58 Fla. 414, 50 So. 831 (1909).

the public nor the riparian landowner should have the right to diminish the rights of the other. The doctrine of waste addresses such alternating and successive tenancies.

Temporal division of estates results in two parties sharing successive interests in real property: the tenant in possession and the remainderman with a future interest.[118] Where the property is subject to depredation by "abuse or destructive use of the property by one in rightful possession,"[119] the common law doctrine of waste provides a remedy for the remainderman.[120] This doctrine renders unlawful "destruction or material alteration of any part of a tenement by a tenant for life or years to the injury of the person entitled to the inheritance; . . . or, in other words to the lasting injury of the inheritance."[121] The remainderman has a remedy "for any injury to the inheritance, committed or threatened, whether by the tenant in possession or by a stranger."[122] Waste includes alteration of buildings,[123] dredging of sand and gravel from the land,[124] and cutting of timber.[125] Although waste resounds in tort, both injunction and damages are available remedies.[126]

The waste doctrine should be applicable to the submergence/reliction zone of alternating tenancies found on lakes with ordinary high water lines that shift in long cycles. Successive tenancies in the public and then the riparian owner are required because the function of the ordinary high water boundary is to provide the public with the use of the shore and the riparian owner with a boundary abutting water. But, like other successive tenancies, the interests of the future tenant must be protected. A prohibitory injunctive action against waste should lie if either the state or the riparian owner attempts to mine in the submergence/reliction zone. Similarly, absent explicit agreement by both parties, either the state or the riparian owner should be able to enjoin the harvest of trees in that zone. An injunctive action to prohibit waste should also lie if either tenant attempts to defeat the

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118. 22 FLA. JUR. 2D *Estates, Powers and Restraints* §§ 118-19 (1980).

119. Stephenson v. National Bank, 92 Fla. 347, 350, 109 So. 424, 425-26 (1926).

120. *Id.* at 350-52, 109 So. at 426.

121. *Id.* at 350, 109 So. at 425.

122. Weed v. Knox, 157 Fla. 896, 898-99, 27 So. 2d 419, 420 (1946) (quoting 33 AM. JUR. *Life Estates and Remainders* § 177 (1941)).

123. *Stephenson*, 92 Fla. at 350, 109 So. at 426.

124. Halifax Drainage Dist. v. Gleaton, 137 Fla. 397, 409, 188 So. 374, 378-79 (1939).

125. Sauls v. Crosby, 258 So. 2d 326, 327 (Fla. 1st DCA 1972) (life tenant has no right to cut and sell timber from an estate; remainderman has action in tort for waste).

126. *Stephenson*, 92 Fla. at 351, 109 So. at 426 (injunction available to prevent lease tenant's alterations to buildings). *See* Knabb v. Hill, 111 Fla. 272, 149 So. 335 (1933) (temporary injunction prohibiting removal of building from land); Gentry-Futch Co. v. Gentry, 90 Fla. 595, 602, 106 So. 473, 475 (1925) (damages available in action for waste).

recurrence of the boundary shift: the state cannot excavate to escape reliction, and the riparian cannot fill to defeat submergence. Neither the state nor the riparian owner should be able to construct permanent improvements in the submergence/reliction zone.

VIII. ARTIFICIAL MANIPULATION OF WATER LEVELS

The law regarding water boundaries has developed over centuries. Its complexity is the result of the courts seeking to provide equitable and practical means to respond to the constant natural changes in the location of the water/land intersection. Equitable results become more difficult when artificial manipulation augments or supplants the natural processes. In *Martin v. Busch*,[127] the Florida Supreme Court confronted the problem of ownership of exposed lands resulting from the artificial lowering of Lake Okeechobee. The court determined that the lowering of the lake by government drainage projects did not change the public ownership of the exposed lands because the act of artificially lowering the lake could not be legally equated with the slow, imperceptible process of reliction.[128] A later Florida Supreme Court decision explicitly equated the artificial lowering of a waterbody with avulsion.[129]

The Legislature initially dealt with the problem of lake-bottoms permanently exposed by drainage projects by simply selling the land, yet reserving a right of first refusal to the adjacent riparian owner.[130] The Trustees of the Internal Improvement Fund were charged with deciding whether the exposed lands should be sold. Occasionally, exposed lands were withheld from sale when future water storage needs left open the possibility that the exposed lands would need to be resubmerged.[131]

The Trustees randomly sold thousands of acres of exposed lake-bottoms. In 1967, this problem was aggravated when concerns about conservation persuaded the Trustees to adopt a moratorium on such sales.[132] These same concerns undoubtedly played a role in the adop-

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127. 93 Fla. 535, 112 So. 274 (1927).

128. *Id.* at 574, 112 So. at 287 (doctrine of reliction does not apply where land is reclaimed by governmental agencies as by drainage operations). *Accord* State v. Florida Nat'l Properties, 338 So. 2d 13, 18 (Fla. 1976) ("we recognize that the doctrine of reliction . . . does not apply where land is reclaimed by deliberate drainage . . .").

129. Bryant v. Peppe, 238 So. 2d 836, 838 (Fla. 1970).

130. Ch. 7891, Laws of Fla. (1919) (codified at FLA. STAT. § 253.36 (1989)).

131. *E.g.*, 30 MINUTES OF THE BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT FUND 591 (Mar. 27, 1956) (decision not to sell exposed lands on Lake Hatchenaha exposed by Corps of Engineers project).

132. 36 MINUTES OF THE BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT FUND 142-44 (Jan. 31, 1967).

tion of article X, section 11 of the 1968 Florida Constitution which placed public interest restrictions on the sale of sovereignty submerged lands.

Meanwhile, riparian landowners began to assert private ownership claims and construct improvements.[133] In 1970, the Florida Legislature attempted to remedy this problem by permanently fixing the riparian boundary at the ordinary high water line as it existed at statehood in 1845.[134] This had the effect of preventing the legal boundary from shifting with natural changes in the actual position of the ordinary high water line due to erosion, accretion, reliction, and submergence. The supreme court declared the statute unconstitutional because it could deprive the riparian owner of his most important property right:[135] the right to a boundary contiguous with the water.[136]

As a result, the fate of thousands of acres of exposed lake-bottom lands was again thrown into confusion. Proposals for restoration of lakes to their former water levels generated a heated controversy and were tabled as a result. A definitive resolution has yet to be reached and one is needed.[137] The resolution must reconcile two constitutional obligations imposed on State government. Sovereignty lands cannot be conveyed to private ownership unless the conveyance serves the public interest for which the trust was created.[138] Those purposes are to facilitate public use of the waters and shore—navigation, fishing, and bathing. However, the constitution also guarantees the right of a riparian property owner to enjoy a boundary contiguous with water.[139]

Those competing constitutional rights can be reconciled by requiring the state to either restore the lake level to its natural elevation or sell the exposed land to the contiguous riparian owner. In either in-

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133. 30 MINUTES OF THE BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT FUND 524-29 (Jan. 31, 1956). *Id.* at 626 (Apr. 24, 1956). 31 MINUTES OF THE BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT FUND 354-55 (July 7, 1957) (private parties attempted to fence the lake basin of Lake Jackson and fill areas of Crooked Lake and Lake Conway, to which the Trustees objected).

134. FLA. STAT. § 253.151 (1971).

135. State v. Florida Nat'l Properties, 338 So. 2d 13, 18-19 (Fla. 1976). The case did not involve artificial manipulation of water levels, but concerned the riparian owner's right to benefit from future accretion or reliction.

136. If sediment accreted so as to build up or increase waterfront land, but the legal boundary did not change correspondingly, the riparian owner would no longer own a water front parcel. The state would then own the accreted land and would be able to sell it to a different owner.

137. CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL DISTRICT RESOURCE PLANNING DEPARTMENT, REPORT TO THE GOVERNING BOARD ON REGULATORY LEVELS FOR THE LAKES OF THE UPPER KISSIMMEE BASIN (Feb. 20, 1975) (revised Feb. 28, 1975).

138. See *supra* note 1 and accompanying text.

139. *Florida Nat'l Properties*, 338 So. 2d at 18.

stance, the riparian owner regains his boundary contiguous with water and the public retains complete ownership and control of all submerged land. This latter element is the essence of the public trust doctrine.[140] The Trustees of the Internal Improvement Trust Fund have the statutory authority to manage and sell exposed lake-bottoms.[141] All lakes with portions of their beds permanently exposed as a result of government-sponsored drainage projects should be identified. The Trustees should then designate all lakes that they intend to restore to their previous levels. That process should balance equitable considerations resulting from the passage of time against environmental considerations and prospective public uses.

All exposed lake bottoms that are not designated for restoration should be sold to the riparian land owners at prices reflecting the real value of the property rights being transferred. When lake waters are artificially lowered, the legal water boundary does not shift because the state retains ownership over the newly-exposed lake bed. Consequently, the riparian owner loses his boundary contiguous with water. When the riparian owner purchases the exposed land, that boundary contiguous with water is restored. Because the riparian landowner had waterfrontage before the lowering of the lake, the land value attributable to the fact that the exposed land is waterfront should be removed from the price charged by the Trustees. Of course, this rule should apply only to sovereignty lands converted to fast lands by the lowering of lake waters. In cases where the land was filled, new additional waterfront property is created and the price should reflect that fact. The passage of time may yield uncertainties as to the location of the ordinary high boundary before the lake-bottoms were exposed. The valuation process should reflect these uncertainties.

Accretion resulting from government projects creates similar problems. In *Board of Trustees v. Sand Key Associates*,[142] an inseparable mix of artificial and natural accretion gradually built up a waterfront lot, and the riparian owner claimed the newly accreted land.[143] The changes took place slowly and imperceptibly, and the court deter-

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140. As discussed above, the purposes for which sovereignty submerged lands are held are public navigation, commerce, bathing, fishing, and similar public uses. *See supra* note 97 and accompanying text. Both common and statutory law have recognized that exposed sovereignty lands do not serve those purposes. In State v. Black River Phosphate, 32 Fla. 82, 112, 13 So. 640, 650 (1859), the court noted that when sovereignty lands are filled in, they are relieved of the public trust constraints.

141. FLA. STAT. § 253.36 (1989).

142. 512 So. 2d 934 (Fla. 1987).

143. A nearby beach renourishment project by the government had deposited large amounts of sand on a public beach, some of which had drifted down-current to supplement naturally occurring accretion on the plaintiff's waterfront land. *Id.* at 935, 938.

mined that the land belonged to the riparian owner under the doctrine of accretion.[144]

One principle has remained constant throughout: a riparian landowner cannot gain land by his own artificial manipulation. In *Sand Key*, the court emphasized that owners may not benefit from accretion which they themselves caused.[145] A natural corollary of this rule is that riparian owners may not cause the waters in a lake or river to recede[146] and thereby gain the exposed land.[147] The sovereignty submerged lands converted into fast lands by the riparian owner's manipulation remain in the public domain.[148]

Practical and equitable results can be obtained even when the land/water intersection is in a continuous state of change. Generally, courts hold that slow, natural changes serve to shift the legal boundary, that sudden natural or artificial changes do not change that boundary, and that a landowner is incapable of changing the boundary to his or her benefit. The waste doctrine should apply to the reliction/submergence zone on landlocked lake shores where the ordinary high water line gradually shifts in cycles lasting decades. Permanently exposed lake bottoms should be sold to adjacent riparian owners unless the exposed lands are on lakes designated for restoration.[149]

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144. *Id.* at 941. The riparian owner had not in any way contributed to the accretion. As in *Florida Nat'l Properties*, the court in *Sand Key* expressed concern that a riparian owner, through no action of his own, stood to lose his boundary contiguous with the water. *Id.* at 939.

145. *Id.* at 938.

146. This could be accomplished by directly pumping water out of a lake or river or indirectly through massive pumping of groundwater.

147. The general principle in property law is that one who claims the existence of a boundary has the burden of proving it. St. Joseph Land and Dev. Co. v. Board of Trustees, 365 So. 2d 1084, 1088 (Fla. 1st DCA 1979); Board of Trustees v. Charley Toppino & Sons, Inc., 514 F.2d 700, 703 (5th Cir. 1975) (applying Florida law). This holds true with disputes over accreted or relicted lands. City of Pensacola v. Capital Realty Holding Co., 388 So. 2d 642, 643 (Fla. 1st DCA 1980). Proving a shifted boundary is difficult under Florida law. Florida law requires that the party claiming relicted sovereignty lands must affirmatively prove the fact of the shift. Williams v. Guthrie, 102 Fla. 1047, 1055-56, 137 So. 682, 686 (1931). Moreover, a party seeking to prove a shift in boundaries must show the correctness of the boundary by affirmative proof. In Seymour v. Creswell, 18 Fla. 29, 34 (1881), the court held that when a plaintiff seeks the advantage of a shifted water boundary he has the burden of proving the fact of the shift. *Accord* City of Pensacola v. Capitol Realty Holding Co., 388 So. 2d at 643; Board of Trustees v. Lord, 189 So. 2d 534 (Fla. 2d DCA 1966). These rules must be applied more strictly when sovereignty lands are claimed because a claim to ownership of sovereignty submerged lands is "a most unusual and extraordinary one that should be particularly shown when claimed in a suit." Brickell v. Trammell, 77 Fla. 544, 563, 82 So. 221, 227-28 (1919).

148. This comports with the rule set out in Martin v. Busch, 93 Fla. 535, 574, 112 So. 274, 287 (1927), that the State can lower water levels and expose its own lands. Conversely, the riparian owner does not transfer land to the State when he submerges waterfront land by excavation.

149. This policy should not apply to riparian owners who deliberately manipulate water levels so as to expose waterfront land. Otherwise, lakes and river beds could be subjected to private reclamation projects.

IX. THE PUBLIC TRUST DOCTRINE AND CONSTITUTIONAL RESTRAINTS ON REDEFINITION OF WATER BOUNDARIES

The Florida Constitution now prohibits the State government from divesting the public of sovereignty lands by modifying legal boundary definitions.[150] In *Coastal Petroleum v. American Cyanamid*,[151] the court refused to construe a statute as divesting the public of navigable waters not explicitly excepted from government conveyances because navigable waters "were not, [and] could not be, conveyed to private owners."[152] The statute in question purported to confirm private ownership of lakes contained in land grants that did not reserve public rights.[153] In concluding its discussion of the applicable constitutional provision, the *Coastal* court noted that the statute attempted to elevate the public trust doctrine articulated in previous case decisions to the status of constitutional mandate.[154] These previous Florida Supreme Court cases determined that the public trust doctrine holds the State to its trust obligations and prohibits the wholesale transfer of any category of sovereignty land by the device of relocating the boundary.

As a legal doctrine restricting the power of the State to alienate sovereignty land, the public trust doctrine first appeared in *Geiger v. Filor*,[155] which concerned the effect of the 1856 Riparian Act.[156] That Act appeared to shift the riparian boundary from the ordinary high water line all the way to the edge of the navigation channel by *divesting* the state of ownership down to that point. Tracing the history of the law of navigable waters, the *Geiger* court found that under the common law of England and Spain, navigable waters were a specie of common land. The King held only bare legal title for the purpose of assuring uninterrupted public use. Sovereignty submerged land "belonged to no one, or rather, to the public at large, and . . . the crown of neither country could alienate it."[157] For this reason, the United States (and hence the state of Florida) received only the bare title formerly held by the Spanish and English kings, and the trust restrictions survived transfer of sovereignty.[158] Like the *Coastal* court, however,

150. *See supra* note 1 and accompanying text.
151. 492 So. 2d 339 (Fla. 1986).
152. *Id.* at 343.
153. FLA. STAT. § 197.228(2) (1985).
154. *Coastal Petroleum*, 492 So. 2d at 344.
155. 8 Fla. 325 (1859) (concerned tidelands at Key West).
156. Ch. 791, Laws of Fla. (1856).
157. *Geiger*, 8 Fla. at 338.
158. For this proposition, the court relied on New Orleans v. United States, 35 U.S. (10 Pet.) 662, 736-37 (1836), wherein the United States Supreme Court held that when the Spanish King

the *Geiger* court avoided dealing directly with the legality of the statute, but instead construed it as being applicable only to riparian owners whose title extended to the low water line.[159]

Subsequently, in *State v. Black River Phosphate*,[160] the court construed the 1856 Riparian Act to avoid an interpretation indicating that the Legislature had divested the public of sovereignty lands by shifting the riparian boundary waterward. A phosphate company had asserted a right to mine the bed of a river down to the navigation channel on the theory that the Act had divested the State of ownership down to that point.[161] The court explained that the Act had to be construed to comply with the public trust under which the state held the beds of navigable waters:

> at the time of the passage of [the] riparian act the navigable waters of the State and the soil beneath them, including the shore or space between high and low water marks, were the property of the State, or of the people of the State in their united or sovereign capacity, and were held not for the purposes of sale or conversion into other values, or reduction into several or individual ownership, but for the use and enjoyment of the same by all the people of the State for, at least, the purposes of navigation and fishing, and other implied purposes . . . .[162]

Despite its sweeping language of wholesale divestiture, the Act was construed as conveying only portions of the water bottoms that had been actually improved so as to provide a public benefit. Because the state could elect to facilitate the landing and storage of goods by constructing warehouses or by depositing fill up to the navigation channel, the State could authorize private parties to do the same.[163] The enhancement of waterborne commerce resulting from these improvements in aid of navigation justified limited conveyances of sovereignty lands after the benefits were actually conferred by the improve-

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had held lands reserved for public streets in trust for the city, the trust obligations survived the transfer of New Orleans by treaty to the United States. Therefore, the United States lacked the legal power to convert the streets at issue to private use.

159. *Geiger*, 8 Fla. at 340. Since the riparian boundary under both English and Spanish law was the ordinary *high* water mark, the 1856 Act conferred no benefits on the claimant before the court. *Id.*

160. 32 Fla. 82, 13 So. 640 (1893).

161. *Id.* at 106, 13 So. at 648.

162. *Id.*

163. *Id.* at 108-09, 13 So. at 649.

ments.[164] For this reason, the purposes of the public trust were served.[165] *Black River Phosphate* holds that the public trust doctrine does not permit wholesale divestiture of a category of sovereignty land by shifting the boundary waterward, but it does permit particular conveyances of sovereignty land if they advance the purposes of the public trust pursuant to which navigable waters are held by the State.[166]

The *Black River Phosphate* court characterized the restriction on alienation of sovereignty lands as stemming not only from the absence of a proprietary interest but from the State's inability to abdicate its police powers. Analogizing to other governmental obligations, the court held that the State could not abandon its duty of trusteeship over sovereignty lands any more than it could abdicate its police power to administer government and keep public order.[167] This perspective fortifies the restrictions on the State's power to alienate sovereignty lands.

The public trust doctrine is a common law theory used by courts to protect public common lands.[168] The vigor of that doctrine waxed and waned over the past century. Beginning with the nineteenth century decisions in *Geiger* and *Black River Phosphate*, the doctrine continued to gain strength under the stewardship of Chief Justice Whitfield in

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164. The 1856 Riparian Act was revised by chapter 8537, Laws of Florida, in 1921. This act, known as the "Butler Act", required permanent improvements as a precondition of transfer of sovereignty lands to adjacent riparian owners. This act was repealed by chapter 57-362, Laws of Florida, in 1957. Article X, section 11 of the Florida Constitution now sharply limits the power of the Legislature to alienate any sovereignty lands.

165. *Black River Phosphate*, 32 Fla. at 108-09, 13 So. at 649.

166. *Id.* The Legislature may, of course, implement improved methods of boundary location without *shifting* that boundary. FLA. STAT. § 177.27(15) (1989). Indeed, section 177.28(1), Florida Statutes, states that no divestiture of sovereignty lands is intended by operation of the statute.

167. *Black River Phosphate*, 32 Fla. at 99-100, 13 So. at 646.

168. Other features of the public trust doctrine operate to void attempted conveyances of sovereignty submerged lands, or to except by operation of law the navigable waters encompassed in the legal descriptions of land conveyances. Coastal Petroleum Co. v. American Cyanamid Co., 492 So. 2d 339, 343 (Fla. 1986) (Marketable Record Title Act inapplicable to sovereignty lands; beds of navigable waters not conveyed by Swamp and Overflowed Land Act deeds); Martin v. Busch, 93 Fla. 535, 569, 112 So. 274, 285 (1927) (Trustees deeds to sovereignty lands issued "by mistake or otherwise" ineffective to convey such lands). The essence of the rule of deed construction is that navigable waters are obvious to even the casual observer. For that reason, navigable waters, like highways and railroads, are title defects not actionable under the warranty because they are disclosed by inspection. Purchasers are charged with legal notice of what an inspection of the land would disclose. Pasco County v. Johnson, 67 So. 2d 639, 642 (Fla. 1953) (clearly visible road); Van Ness v. Royal Phosphate, 60 Fla. 284, 53 So. 381 (1910) (railroad bed). In spite of this rule, section 253.29, Florida Statutes, entitles grantees to refunds whenever Trustees' deeds fail to convey title, thereby allowing purchasers refunds for the acreage under navigable waters. FLA. STAT. § 253.29 (1989). This statute has been in effect since 1903. Ch. 5175, Laws of Fla. (1903).

the early twentieth century. In one two-year period, the Chief Justice explained that deeds to swamp and overflowed lands did not and could not convey any part of the beds of navigable waters,[169] and enjoined the Governor and Cabinet from selling Lakes Jackson and Miccosukee on the ground that navigable waters were held by the State for the use of the public rather than for sale into private ownership.[170] As the property of no one, or of everyone, the inherent public character of navigable waters renders such waters intrinsically incapable of private ownership; and, as trustee rather than proprietor, the State lacks the legal power to act contrary to the purposes of this public trust.

The public trust doctrine reached full bloom in *Apalachicola Land and Development v. McRae*,[171] where a Spanish period deed had encompassed Apalachicola Bay in the legal description of a vast conveyance from an Indian tribe. The court, again speaking through Chief Justice Whitfield, held that navigable waters were public under both Spanish, American, and Indian law, and that those sovereigns could not and did not convert waters or beds to private ownership.[172] The grant was construed as not conveying any lands waterward of the ordinary high water line of the bay.

As the first half of this century unfolded, interests in development, mining, and agriculture cultivated a rich generosity in state government, and the public trust doctrine retreated to its lowest ebb. Numerous laws were enacted that sold or conveyed sovereignty lands.[173] Various statutes vested title to submerged lands in the state cabinet

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169. State *ex rel.* Ellis v. Gerbing, 56 Fla. 603, 613, 47 So. 353, 356-57 (1908). In 1850, the United States conveyed to Florida all of the swamp and overflowed lands in Florida, defining them as those lands which could be cultivated if they were drained and reclaimed. Swamp & Overflowed Lands Act, ch. 74, 9 Stat. 519 (1850). Pursuant to various statutes, the Trustees of the Internal Improvement Fund received title to the lands obtained from the federal government under this Act, and sold them into private ownership. Ch. 332, Laws of Fla. (1851); Ch. 496, Laws of Fla. (1852); Ch. 610, §§ 1-2, Laws of Fla. (1855). Because the state already held navigable waters as a right of sovereignty when it attained statehood in 1845, no parts of navigable waters were conveyed to the state under the Swamp and Overflowed Lands Act. *Gerbing*, 56 Fla. at 613, 47 So. at 356-57. Moreover, the Trustees did not hold title to sovereignty lands and therefore lacked the power to convey them. *Id.* Finally, the court explained that extension of survey lines over the beds of navigable waters cannot and does not alter the inherent public character of navigable waters. *Id.*

170. Broward v. Mabry, 58 Fla. 398, 412-13, 50 So. 826, 831 (1909) (Trustees enjoined from attempting to lease or sell Lake Jackson); Broward v. Sledge, 58 Fla. 414, 50 So. 831 (1909) (Trustees enjoined from selling Lake Miccosukee).

171. 86 Fla. 393, 449-50, 98 So. 505, 523 (1923).

172. *Id.* at 450, 98 So. at 523-24.

173. Ch. 6769, Laws of Fla. (1913); Ch. 6961, Laws of Fla. (1915); Ch. 15749, Laws of Fla. (1931); Ch. 16296, Laws of Fla. (1933); Ch. 18401, Laws of Fla. (1937); Ch. 21130, Laws of Fla. (1941); Ch. 21169, Laws of Fla. (1941); Ch. 21345, Laws of Fla. (1941).

and granted it powers of disposition and sale,[174] and the Butler Act of 1921[175] created statutory rights allowing riparian owners the right to fill and bulkhead out into the seas, bays, and inlets. The supreme court did not press the issue. In *State ex rel. Buford v. Tampa*,[176] the court upheld a legislative grant of Tampa Bay and the Hillsborough River to the City of Tampa. The plaintiff had asserted that the bay and river could not be sold into private ownership, but the court held that the Legislature had validly conveyed a fee simple interest virtually unencumbered by trust obligations.[177] A later supreme court decision side-stepped the public trust doctrine in *Watson v. Holland*[178] by observing that the Florida Constitution did not expressly or implicitly impose trust restrictions on the State's power to dispose of the shores and beds of navigable waters.[179]

The public trust doctrine sprang back to life in 1957 when the Florida Supreme Court in *Hayes v. Bowman*[180] reiterated the common law: navigable waters and the shores up to high water mark are "trust property and should be devoted to the fulfillment of the purposes of the trust, to wit: the service of the people."[181] And, reflecting soberly on the panoply of laws that in past decades had resulted in widespread losses and depredations to the public seabeds, the court observed that:

> [the] power of the State to dispose of submerged tidal lands has assumed important proportions in recent years. Valuable subdivisions have been built on dredged-in fill. Large areas have been leased to those who would speculate in drilling for oil. Increased interest in this type of land bears forebodings of even more complex problems in the future. These lands constitute tremendously valuable assets. Like any other fiduciary asset, however, they must be administered with due regard to the limitations of the trust with which they are impressed.[182]

The Florida Legislature repealed the Butler Act later that year.[183]

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174. Ch. 6451, Laws of Fla. (1913); Ch. 7304, Laws of Fla. (1917). *See* FLA. STAT. §§ 253.06-.08 (1949) (repealed by Ch. 29763, Laws of Fla. (1955)).

175. Ch. 8637, Laws of Fla. (1921).

176. 88 Fla. 196, 102 So. 336 (1924).

177. *Id.* at 209-10, 102 So. at 340-41. Justices Whitfield and Terrell dissented on the theory that trust obligations were carried along with the transfer of the navigable waters to the city. *Id.* at 211-25, 102 So. at 341-46.

178. 155 Fla. 342, 20 So. 2d 388 (1944).

179. *Id.* at 345, 20 So. 2d at 390.

180. 91 So. 2d 795 (Fla. 1957). The case concerned a riparian rights dispute on a four-thousand foot long peninsula artificially created by depositing fill into Boca Ciega Bay. *Id.* at 796-97.

181. *Id.* at 799.

182. *Id.* at 800.

183. Ch. 57-362, § 9, 1957 Fla. Laws 806, 812.

This call to old values was also answered in the new constitution of 1968. Article X, section 11 of the Florida Constitution elevated the public trust doctrine to the stature of a constitutional mandate,[184] and the supreme court later held that the provision is a constitutional codification of the public trust doctrine as articulated in its previous decisions.[185] That doctrine held that the State was trustee rather than proprietor of navigable waters and that acts in breach of that trust were judicially voidable. Accordingly, the constitution holds that sovereignty lands are held in trust for all the people and permits sale of those lands only when "in the public interest."[186]

This constitutional restriction on conversion of navigable waters and their beds into private ownership requires much more than merely a reasoned perception by the legislative or executive branches that the conversion will yield a net social benefit. Such an interpretation would eviscerate the constitutional mandate. The Legislature anticipated a net social benefit when it attempted in 1856 to gratuitously convey the shores and shallows of the sea to the adjacent riparian owners.[187] Similarly, the governor and cabinet undoubtedly believed that society would be advantaged by draining Lakes Jackson and Miccosukee so that their fertile beds could be sold for agricultural cultivation.[188]

The requirement of article X, section 11, that sovereignty submerged lands can be sold only to advance public interest, was intended to codify the public trust doctrine as developed in Florida Supreme Court precedents.[189] As previously discussed, those cases held that the public at large is the beneficial owner of all navigable waters and that the State, as Trustee, is legally barred from violating the purposes of the trust. Those purposes are set out in cases dating as far back as the mid-nineteenth century: navigation, fishing, fowling, swimming, and other similar public uses.[190]

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184. *See supra* note 1.

185. Coastal Petroleum Co. v. American Cyanamid Co., 492 So. 2d 339, 344 (Fla. 1986).

186. *See supra* note 1.

187. Chapter 791, Laws of Florida, recited in its preamble that continued public ownership of the shores and shallows of the sea was inhibiting commercial development. The Legislature apparently believed that wholesale transfer of these lands to adjacent riparian owners would spur economic development and yield a net public benefit.

188. Broward v. Mabry, 58 Fla. 398, 404, 50 So. 826, 830 (1909) (Trustees enjoined from selling bed of Lake Jackson); Broward v. Sledge, 58 Fla. 414, 50 So. 831 (1909) (Trustees enjoined from selling Lake Miccosukee).

189. *Coastal*, 492 So. 2d at 344.

190. Apalachicola Land & Dev. Co. v. McRae, 86 Fla. 393, 424, 98 So. 505, 519 (1923); Broward v. Mabry, 58 Fla. 398, 407-08, 50 So. 826, 829 (1909); State v. Black River Phosphate, 32 Fla. 82, 106, 13 So. 640, 648 (1893); Geiger v. Filor, 8 Fla. 325, 338 (1859).

Although the State's primary interest is in its governmental obligation to exercise police powers,[191] the constitution permits the State to alienate sovereignty lands when purposes of the trust are thereby furthered. Conveyances to other governmental entities to facilitate use as public parks[192] and projects that aid or facilitate navigation[193] serve to advance those purposes. Of course, the State's police power to regulate public use of navigable waters is unaffected by the restrictions on alienation of sovereignty lands. Private use of or rights in sovereignty submerged lands is constitutionally permitted as long as it is "not contrary to the public interest."[194] Examples of such rights are easements for private bridges over navigable streams, mariculture leases (for cultivation of oyster and clam beds), dock leases, and other private use rights that will not significantly interfere with public use and enjoyment of submerged lands.[195]

Legislative "redefinition" of water boundaries constitutes alienation of sovereignty submerged lands if it has the effect of conveying all or part of the shore to private ownership. The purposes of the trust are obviously defeated by wholesale alienation of any category or class of sovereignty submerged lands, rendering the alienation unconstitutional *per se*. The State's obligations can now be avoided only by constitutional amendment.

X. Conclusion

The ordinary high water boundary on freshwater lakes and streams is the reach of waters when the waterbody is full or at its normal or ordinary high stage. This choice of boundary is based on two policies: that public character of navigable waters includes the whole waterbody, meaning the lake or stream when it is full; and that the public should have a right to use and enjoy the shore or spaces between the ordinary high and low water lines. Although large landholders are currently seeking to shift the boundary to the average or even low water line, the public trust doctrine, now embedded in the state constitu-

191. *State v. Black River Phosphate*, 32 Fla. 82, 99-100, 13 So. 640, 646 (1893) (indicating that the State's interest in navigable waters is its obligation to exercise police powers).

192. Weller v. Askew, 363 So. 2d 1091, 1094 (Fla. 1978) (transfer of navigable waters to federal government for park purposes satisfies mandate of article X, section 11 of the Florida Constitution).

193. Marinas, docks, canals and other similar works presumably facilitate public access and use.

194. *See supra* note 1.

195. Oil and gas leases are occasionally permitted in sea beds. Mounting evidence suggests that oil and gas extraction poses a risk of catastrophic degradation of the marine environment. If that risk is grave enough, the constitutional prohibition may be implicated.

tion, effectively precludes divestiture of sovereignty lands by way of boundary redefinition.

The ordinary high water mark on trees, dock pilings, and other objects discloses the recurring and continued presence of water during the normal high water season. Florida law has sanctioned the use of other surrogates that indicate the reach of ordinary high water, including the waters' effect on vegetation and the ability of the land to sustain an ordinary agricultural crop. The best evidence available must be used, and detailed aerial photographs are now the best evidence. Universally available for all parts of the state, these aerial photos permit boundary location by identifying vegetation bands that correspond to the reach of ordinary high water. Research aimed at identifying vegetation patterns that reliably indicate the reach of ordinary high water should be undertaken. These methods can and should be tested and standardized to yield a valid, reliable, and replicable system of water boundary identification based on aerial photographs.

Waterfront boundaries on a great number of Florida lakes have been cast into confusion by decades of water control projects that shifted the location of the waters edge but did not shift the legal boundary. Where these water control projects have lowered the water level, the State should proceed diligently to list all waterbodies that will be restored to their previous natural condition. All other exposed portions of lake and stream beds should be sold to the adjacent upland owner at prices reflecting the equities of the situation.