

CHAPTER 3

Land Ownership in the United States

31. GENERAL STATEMENT

All the land in the United States, now owned by individuals, formerly belonged either to the Federal Government, to an individual state, or to a foreign nationality which disposed of it to an individual proprietor before that particular territory became a part of this country.

The British claim of dominion over the territory included within the Original Thirteen Colonies was based upon discovery, consummated by possession, the wandering Indian tribes being regarded as having a mere right of occupancy.¹ The dominion and ownership thus acquired was, in some of the colonies, granted by the British Crown to individual proprietors or proprietary companies, by whom parts of the land were in turn granted to individuals.

1. *Johnson v. McIntosh*, 8 Wheat. 543 (21 U.S., 1823). This case involved a claim to land based upon grants made by certain Indian tribes which conflicted with the claims of Virginia under her charter of 1609. The question of titles to Indian lands was thoroughly examined by the Supreme Court and the conclusion reached that the fee to Indian lands is in the United States, and, therefore, the Indians are not able to grant titles to the same which the courts would recognize. But the Indian's right of occupancy has always been held to be sacred; something not to be taken from him except by his consent, and then upon such consideration as should be agreed upon. *Minnesota v. Hitchcock*, 185 U.S. 373 (1902).

As between the United States and the Indians, the long held rule has been that Indian claims to land may be extinguished by the sovereign without compensation and its justness is not open to the courts unless the Federal Government has recognized them. *Johnson v. McIntosh*, *supra*. The decade from 1930, however, marked a notable period in the history of Indian legislation, and one of the important acts passed by Congress was that of Aug. 26, 1935 (49 Stat. 801), which conferred jurisdiction upon the Court of Claims to adjudicate all claims arising out of the original Indian title to lands occupied by certain tribes and bands in Oregon. Under the Supreme Court's interpretation of this act, the Indians are entitled to recover compensation for lands taken without their consent even though Congress has never formally recognized their claims. *United States v. Alcea Band of Tillamooks*, 329 U.S. 40, 53 (1946). An even greater liberal attitude toward Indian claims was manifested by Congress in the Act of Aug. 13, 1946 (60 Stat. 1049), known as the Indian Claims Commission Act, under which "claims based upon fair and honorable dealings that are not recognized by any existing rule of law or equity" may be submitted to the Commission with right of judicial review by the Court of Claims. On the matter of the taking of Indian lands by the United States under the power of eminent domain, see *Federal Power Commission v. Tuscarora Indian Nation*, 362 U.S. 99 (1960), where it was held that the prohibition against the alienation of lands from any Indian nation without the consent of Congress, under section 177 of the U.S. Code, does not apply to the United States or its licensees.

In other colonies the title to the soil remained in the British Crown, and grants were made to individuals by the Governor of the colony in the name of the King. After the Revolution, the title of the Crown to lands still undisposed of passed to the states, and lands belonging to the original proprietaries were in some cases confiscated.

The title to all land within the Thirteen Original States is therefore derived, directly or indirectly, from the British Crown, except for considerable bodies of land in the State of New York which are based on grants by the Dutch Government. These grants were recognized and confirmed by the British Crown upon the conquest of that territory.²

Land ownership in the United States can thus be divided into three categories—federal (*see* 35), state (*see* 36), and private (*see* 37). These give rise to a variety of waterfront boundary disputes the adjudication of which frequently involves the surveys, particularly the early ones, of the Bureau. An understanding of the background and development of these classes of ownership, and of the authority and methods by which the United States may acquire territory, will aid in better comprehending some of the legal implications involved in these ownerships.

32. POWER OF THE UNITED STATES TO ACQUIRE TERRITORY

The Constitution does not expressly confer upon the United States the power to acquire territory additional to that held at the time of the adoption of the Constitution in 1789. This, however, has not prevented it from acquiring territory both within and without the continental area of North America.

32I. EARLIEST ACQUISITION—THE LOUISIANA PURCHASE

The earliest acquisition of foreign territory by the United States was in 1803 when the Louisiana Territory was purchased from France (*see* 351). There was a body of opinion at the time of this acquisition, and of the later annexation of Texas (*see* 351), that held that there was no constitutional authority to annex foreign territory. Even President Jefferson had doubts as to the constitutionality of the Louisiana Purchase although, upon grounds of political expediency, he urged that the treaty providing for it be ratified, and, if necessary, a constitutional amendment be adopted authorizing an extension of our boundaries. But Jefferson's difficulty seemed to be not so much with

2. TIFFANY, A TREATISE ON THE MODERN LAW OF REAL PROPERTY 830 (1912).

the power of acquiring territory under the Constitution as with the power to incorporate it in the United States as a part thereof. In January 1803, he wrote to Secretary of the Treasury Gallatin as follows: "There is no constitutional difficulty as to the acquisition of territory, and whether when acquired it may be taken into the Union by the Constitution as it now stands will become a question of expediency. I think it will be safer not to permit the enlargement of the Union but by the amendment of the Constitution."³

The precedent thus established was acquiesced in and supported by the later decision of the Supreme Court, impliedly first,⁴ and expressly later, when it held, shortly after Florida was purchased from Spain, that "The constitution confers absolutely on the government of the Union the powers of making war and of making treaties; consequently, that government possesses the power of acquiring territory, either by conquest or by treaty."⁵

322. SOURCES OF POWER

Besides the power to acquire territory based on the war-making and treaty powers, other sources of power have been said to be derived from the power to admit new states into the Union, and from the power as a sovereign nation to acquire territory by discovery and occupation, or by any other methods recognized as proper by international usage.⁶ The power derived from national sovereignty has been recognized by the Supreme Court in the case of *Jones v. United States*, 137 U.S. 202, 212 (1890), where it said: "By the law of nations, recognized by all civilized States, dominion of new territory may be acquired by discovery and occupation, as well as by cession and conquest."⁷

3. WILLOUGHBY, *THE CONSTITUTIONAL LAW OF THE UNITED STATES* (2d ed.) 411 (1929).

4. *Ex parte Bollman*, 4 Cr. 75 (8 U.S., 1807) and *Sere and Laralde v. Pitot*, 6 Cr. 332 (10 U.S., 1810).

5. *American Insurance Co. v. Canter*, 1 Pet. 511, 542 (26 U.S., 1828). This principle was subsequently reaffirmed by the Court in *Mormon Church v. United States*, 136 U.S. 1, 42 (1890), when it said, "The territory of Louisiana, when acquired from France . . . became the absolute property and domain of the United States." The rule has remained unaltered in the years that have followed.

6. WILLOUGHBY (1929), *op. cit. supra* note 3, at 408.

7. This case upheld the power of the United States to acquire territory under the Act of Aug. 18, 1856 (11 Stat. 119), the so-called Guano Act, which constituted a blanket grant of authority to the President to proclaim the "appurtenancy" to the United States of certain guano islands. Specifically, the act provides: "That when any citizen or citizens of the United States may have discovered, or shall hereafter discover a deposit of guano on any island, rock, or key, not within the lawful jurisdiction of any other government, and not occupied by the citizens of any other government, and shall take peaceable possession thereof, and occupy the same, said island, rock, or key may, at the discretion of the President of the United States, be considered as appertaining to the United States." The guano islands are scattered all over the Pacific Ocean and the Caribbean Sea. For a description of some of the more important ones and references to source material pertaining to others, *see* DOUGLAS, *BOUNDARIES, AREAS, GEOGRAPHIC CENTERS, AND ALTITUDES OF THE UNITED STATES AND THE SEVERAL STATES* (2d ed.) 54-56, *BULLETIN* 817, U.S. GEOLOGICAL SURVEY (1932).

The Oregon Territory (*see* 351) was acquired in 1846 through discovery, occupation, and convention with England.

323. MODES OF ACQUIRING TERRITORY

A history of the territorial expansion of the United States shows that territories have been annexed principally by the following three methods: (1) by treaty; (2) by joint resolution of the two Houses of Congress, and (3) by statute.

Annexation by treaty or convention has been the method most used and was followed in the case of the Louisiana Territory, Florida, the Mexican cessions, Alaska, the Samoan Islands, Puerto Rico, the Philippines, and the Virgin Islands.⁸ In two instances, that of Texas and Hawaii, sovereignty of the United States was extended over new territory by means of a joint resolution.⁹ The least used method is by simple statute and executive action authorized thereby. This was the method used to acquire territory under the Guano Act (*see* note 7 *supra*).

(a) *Land Acquisition Within States*.—What has been considered thus far is the power and mode of acquisition of territory by the Federal Government outside the states of the Union. But mention should also be made of the acquisition of land by the Government within the states. This has been done by purchase, a power granted to it by the Constitution,¹⁰ and by an exercise of the right of eminent domain, which is a recognized attribute of sovereignty. Under the first method, the Federal Government has acquired territory in practically every state. In most cases it has been acquired with the consent of the state; in some cases it has been acquired without consent.¹¹

Under the second method, that is, the right of eminent domain, the Fed-

8. WILLOUGHBY (1929), *op. cit. supra* note 3, at 426. In the case of the Philippines, it was a stewardship which terminated on July 4, 1946, by Presidential Proclamation No. 2695, signed the same date (60 Stat. 1352), but which was authorized by the Congress in 1934 (48 Stat. 456). The islands then became an independent republic. Under the Philippine Rehabilitation Act of 1946 (60 Stat. 128), the Coast and Geodetic Survey continued survey operations in the islands until June 30, 1950.

9. The difference between annexation by treaty and annexation by joint resolution is that under the first a two-thirds favorable vote in the Senate is required, whereas under the second only a simple majority in each of the two legislative branches (with the approval of the President) is required. *Ibid.*

10. Art. I, sec. 8, cl. 17 provides that Congress shall have power "to exercise like Authority [as over the Seat of Government of the United States] over all Places purchased by the Consent of the Legislature of the State in which the Same shall be, for the Erection of Forts, Magazines, Arsenals, dock-Yards, and other needful Buildings."

11. If consent has not been obtained as provided in the Constitution (*supra* note 10), the political jurisdiction of the state is not ousted. The possession of the United States, unless political jurisdiction has been ceded in some other way, is simply that of an ordinary proprietor. In that case, the property, unless used as a means to carry out the purposes of the Government, is subject to the legislative authority and control of the states equally with the property of private individuals. *Fort Leavenworth R.R. Co. v. Lowe*, 114 U.S. 525 (1885). But the ownership and use of lands for public purposes, without more, do not withdraw the lands from jurisdiction of the state. *Surplus Trading Co. v. Cook*, 281 U.S. 647 (1930).

eral Government has also acquired property in the several states. This right may be defined as the power which inheres in every politically organized society to condemn private property for a public use.¹² It is thus vested in the United States and in each of the several states. As to the United States, the Federal Constitution does not expressly include the power of eminent domain among those conferred upon the General Government, but the 5th amendment impliedly recognizes that the United States possesses the power by providing that private property shall not be taken for public use without just compensation. It also flows from the power expressly granted for carrying into execution the specific powers delegated to the Federal Government. This power is thus not without limit but must be exercised in compliance with the constitutional requirement of "just compensation." Subject to this limitation, the Federal Government's right of eminent domain extends over every foot of its territory. When thus obtained, the lands, like those acquired by direct purchase and without the consent of the states, remain subject to the general political jurisdiction of the states in which they are located. But as property of the United States, they are not subject to taxation by the states.¹³

(b) *Extent of Land Acquisition Within States.*—As of June 30, 1961, the Federal Government had acquired, by purchase and otherwise, 56,889,369.3 acres in the various states (including the District of Columbia), of which 16,878.6 acres were in Alaska and 265,706.6 in Hawaii. In addition, it owned

12. *Kohl v. United States*, 1 Otto 367 (91 U.S., 1876).

13. *Van Brocklin v. Tennessee*, 117 U.S. 151 (1886). Upon admission of the states into the Union, the exemption of lands of the United States from taxation is usually declared. *Id.* at 163. And the legislatures of most of the states have affirmed the same principle by inserting in their general tax acts an exemption of property belonging to the United States. For an enumeration of the existing statutes in the several states see *id.* at 171 *et seq.* As to the right of eminent domain in the several states, it must be exercised in compliance with the "due process" requirement of the Fourteenth Amendment to the Constitution. In addition, the constitutions of most of the states also contain a provision for "just compensation" as in the Federal Constitution. The power of eminent domain, both federal and state, is to be distinguished from the taxing power. Although the latter is also a taking of property for a public use, it is not, in itself, considered a taking without due process, nor does actual compensation have to be made since that would defeat the very purpose of the taxation, but compensation is considered to arise from the benefits of government. A state's police or regulatory power must also be distinguished from the power of eminent domain. No constitutional principle requires a state to pay for property that may have been taken or destroyed in the exercise of such power, if it be a legitimate exercise and does not violate constitutional guarantees. *Pacific Gas and Electric Co. v. Police Court*, 251 U.S. 22 (1919).

An important element in the doctrine of eminent domain is the "taking," which raises the problem of what constitutes a "taking." This is usually a question of fact to be deduced from the evidence in a particular case and no generalization is possible other than to note that any interference with ownership, enjoyment, or the value of private property is usually considered as a taking. Thus, interference with the adjacent airspace has been held a taking under certain factual situations (see text at note 114 *infra*). And a destruction or impairment of a landowner's riparian rights in a navigable stream that cannot be justified on the basis of some superior public right is considered a taking. *Yates v. Milwaukee*, 10 Wall. 497 (77 U.S., 1870). For a comprehensive discussion of "What Constitutes Taking of Property," with citations to authorities, see ROTTSCHAEFER, CONSTITUTIONAL LAW 710-718 (1939). See also CLARK, A TREATISE ON THE LAW OF SURVEYING AND BOUNDARIES (3d ed.) 596-601 (1959).

349,727,310.5 acres of the public domain in conterminous United States and 361,149,755.6 acres in Alaska.¹⁴

33. STATES, TERRITORIES, AND POSSESSIONS

From the very beginning, the American constitutional system has included other political units than the states. For example, in 1781 New York ceded part of its territory to the General Government. This act was followed by other states and these lands became the first territories of the United States. This was later followed by the acquisition of other lands, some of which acquired territorial status.

Alaska and Hawaii were the only remaining territories of the United States until their admission into the Union in 1959 (*see* 3431 and 3432), all others having been admitted to full statehood. Areas subject to the dominion of the United States which do not have state or territorial status are called "insular possessions," existing examples being the Virgin Islands and Samoa.¹⁵ Insular possessions, while subject to the sovereignty of the United States, are not incorporated as a part of it and hence do not come under the protective clauses of the Constitution. In the case of territories, such as Alaska and Hawaii were, the Constitution was extended to them by statute.¹⁶

331. THE DISTRICT OF COLUMBIA

The District of Columbia stands in a different category from areas heretofore mentioned. It was organized under a special provision of the Constitution enabling the United States to acquire territory for the seat of government.¹⁷

14. GSA, INVENTORY REPORT ON REAL PROPERTY OWNED BY THE UNITED STATES THROUGHOUT THE WORLD 47 (June 30, 1961). For jurisdictional status of federal lands, *see* GSA, INVENTORY REPORT ON JURISDICTIONAL STATUS OF FEDERAL AREAS WITHIN THE STATES 26-27 (June 30, 1957).

15. Puerto Rico was in the category of an insular possession until July 3, 1952, when Congress approved the constitution of the Commonwealth of Puerto Rico as adopted by the people of the island, and it was given commonwealth status (66 Stat. 327).

16. The Philippine Islands were in the category of an insular possession, but Congress did enact fundamental laws for them and for Puerto Rico which were identical with many of the provisions of the Constitution of the United States. The other possessions are governed under statutes enacted by Congress but their governments are more those of dependencies than is that of Puerto Rico. WEAVER, CONSTITUTIONAL LAW AND ITS ADMINISTRATION 139 (1946).

17. Art. I, sec. 8, cl. 17 provides that Congress shall have power "To exercise exclusive Legislation in all Cases whatsoever, over such District (not exceeding ten Miles square) as may, by Cession of particular States, and the Acceptance of Congress, become the Seat of the Government of the United States." The original boundaries of the District of Columbia included cessions from Maryland in 1788 and from Virginia in 1789 and 1791, and included lands on both sides of the Potomac River. For details regarding the present boundaries of the District, and for a discussion of the most recent demarcation of the District of Columbia-Virginia boundary line by the Bureau and the long dispute leading thereto, *see* 422.

The District is neither a state nor a territory in the sense, for example, that Maryland is a state or that Alaska was a territory. It does not possess the attributes of sovereignty as a state does, nor does it have a complete territorial government as a territory would have. In an early case, it was declared by the Supreme Court that the District of Columbia was not a state of the Union within the meaning of Article III, section 2, clause 1, of the Constitution, which gives to the Federal courts jurisdiction in suits between *citizens of different states*.¹⁸ But it is a state as that word is used in treaties with foreign powers in respect to the ownership, disposition, and inheritance of property.¹⁹

The District is under the exclusive jurisdiction of Congress. It has no self-government (in 1963), but is governed by a board consisting of two commissioners and an officer of the Corps of Engineers of the Department of the Army, usually designated as the Engineer Commissioner, all appointed by the President with the approval of the Senate.

The Federal courts in the District are the District Court of the United States for the District of Columbia and the United States Court of Appeals for the District of Columbia. They have the same powers and exercise the same jurisdiction as the district courts (*see* 221) and the courts of appeals (*see* 222) of the United States. The other courts, such as the Court of General Sessions (formerly the Municipal Court), are non-Federal courts.

34. ADMISSION OF NEW STATES

The creation of new states out of existing territory of the United States, to wit, the Northwest Territory (*see* note 61 *infra*), or out of territory subsequently acquired, is derived from Article IV, section 3, clause 1, of the Constitution, which provides that "New States may be admitted by the Congress into this Union."²⁰ Thus, statehood lies wholly within the discretion of Congress and no

18. *Hepburn and Dundas v. Ellzey*, 2 Cr. 445 (6 U.S., 1804). The effect of this decision was to close the Federal courts in the states to inhabitants of the District of Columbia when the sole basis was diversity of citizenship. And they remained closed for 136 years until Congress enacted a statute in 1940 (reenacted in 1948 as 62 Stat. 869, 930) expressly conferring on Federal courts jurisdiction in cases between citizens of the District of Columbia and citizens of another state. This statute came before the Supreme Court in 1949 on a question of constitutionality. While the Court refused to overrule the *Hepburn* case, it held the 1940 statute valid on the ground that "Congress may exert its power to govern the District of Columbia by imposing the judicial function of adjudicating justiciable controversies on the regular federal courts." *National Mutual Insurance Co. v. Tidewater Transfer Co.*, 337 U.S. 582, 600 (1949).

19. *Downes v. Bidwell*, 182 U.S. 244, 262 (1900).

20. The only expressed limitation upon this power, as defined in the same section of the Constitution, is that no new state shall be formed within the jurisdiction of any other state, nor by the junction of two or more states, without the consent of such states, as well as of the Congress (*see* 342).

legal means exist for compelling action should it refuse to grant the privilege, although it is generally agreed that at the time of the adoption of the Constitution it was probably believed that all "territory held or to be held by the United States was to be regarded as material from which new States were to be created as soon as population and material development should warrant."²¹

The process of admitting new states to the Union is a comparatively simple one. The Constitution itself provides neither the method nor the conditions that must be met by a given territory. It is entirely discretionary with Congress. The usual process for obtaining statehood is for Congress to pass an "enabling act," upon petition from the people of a territory, authorizing the framing of a constitution and laying down certain requirements that must be met. When the conditions have been met, a resolution is passed by Congress reciting this fact, and the territory is declared a state and admitted as such into the Union.²²

Vermont was the first state to be admitted to the Union. The area comprised within the present limits of the state was included in conflicting grants made by France and England and was simultaneously claimed by Massachusetts, New Hampshire, and New York. After the Revolution these states agreed to the independence of Vermont and by an act approved February 18, effective March 4, 1791 (1 Stat. 191), it joined the Thirteen Original States as a member of the Union.²³

Ohio was the first of the states to be carved out of the original "Northwest Territory" which was ceded to the Federal Government by the Confederation of States and governed according to the provisions of the Northwest Ordinance of 1787. The provisions were reenacted on August 7, 1789 (1 Stat. 50), upon establishment of the new Government.²⁴ The date of its admission to statehood is generally regarded as November 29, 1802, when the constitutional convention of Ohio completed its work, although the congressional enabling act was approved April 30, 1802 (2 Stat. 173), and the territorial delegate in Con-

21. WILLOUGHBY (1929), *op. cit. supra* note 3, at 403. This is buttressed by the language used in the several treaties by which the United States acquired the Louisiana Territory, Florida, California, New Mexico, and Alaska. This was to the effect that the territories thus acquired were to be incorporated as integral elements of the United States and ultimately to be erected into states and admitted into the Union in full and equal fellowship with the Original States. *Id.* at 413, 414. Thus, the treaty which provided for the cession of Louisiana declared that "The inhabitants of the ceded territory shall be incorporated in the Union of the United States, and admitted as soon as possible according to the principles of the Federal constitution, to the enjoyment of all the rights, advantages and immunities of citizens of the United States." 8 Stat. 202 (1803).

22. WILLOUGHBY (1929), *op. cit. supra* note 3, at 404. In some cases the final step in the process is a proclamation issued by the President (*see* 3431).

23. DOUGLAS (1932), *op. cit. supra* note 7, at 85, 86.

24. WILLOUGHBY (1929), *op. cit. supra* note 3, at 408.

gress retained his seat until March 1, 1803, from which it would appear that Congress assumed the latter date to be the beginning of statehood.²⁵

Texas holds a unique position among the states insofar as statehood is concerned. It is the only state that was an independent republic just prior to admission, and did not pass through the status of a territory but immediately became a state of the Union upon annexation.²⁶

34I. EQUALITY OF THE STATES—THE "EQUAL FOOTING" CLAUSE

The Constitution does not directly mention that all the existing states are to be equal in stature or that new states are to be admitted on an equal footing with the other states. But it does define the political privileges which the states are to enjoy and declares that all powers not granted to the United States shall be reserved to the states. This has been held to establish an indestructible Union composed of indestructible states that are equal in power, dignity, and authority, each competent to exert that residuum of sovereignty not delegated to the United States by the Constitution itself.²⁷

This principle of the equality of the states had its origin even before the adoption of the Constitution. In a resolution passed by Congress on October 10, 1780, it was provided that new states should be formed in such territories as might be ceded to the United States by the Original States and that they should have "the same rights of sovereignty, freedom and independence, as the other states" (18 JOURNS. OF CONG. 915 (1780)). The Northwest Ordinance of 1787 (*see text at note 24 supra*) declared that the new states that were to be carved out of the territory should be admitted "on an equal footing with the original States in all respects whatever." And this has become a fixed principle in the

25. DOUGLAS (1932), *op. cit. supra* note 7, at 186, 187. For dates of admission to the Union of the various states, *see* Table 1. This is based on information contained in *id.* at 86-242. The Thirteen Original States (*see note 64 infra*) are omitted from this tabulation since strictly speaking they were not admitted to the Union but formed the Union. They ratified the Constitution on various dates between 1787 and 1790. *Id.* at 246.

26. By a joint resolution, approved Mar. 1, 1845, Congress gave its consent for admitting the Republic of Texas as a state, provided certain conditions were accepted. 5 Stat. 797. On Dec. 29, 1845, Texas was formally admitted as a state of the Union. 9 Stat. 108. The only other state that was formerly an independent republic is the new State of Hawaii and was known as the Republic of Hawaii, but unlike Texas it acquired territorial status first (*see 3432*).

27. In laying down the rule that admiralty jurisdiction applied to navigable waters above the ebb and flow of the tide as it did to tidal waters, the Supreme Court of the United States said: "The Union is formed upon the basis of equal rights among all the states. . . . And it would be contrary to the first principles on which the Union was formed to confine these rights to the states bordering on the Atlantic, and to the tide-water rivers connected with it, and to deny them to the citizens who border on the lakes, and the great navigable streams which flow through the western states. Certainly such was not the intention of the framers of the Constitution. . . . That equality does not exist, if the commerce on the lakes and on the navigable waters of the West are denied the benefits of the same courts and the same jurisdiction for its protection which the Constitution secures to the states bordering on the Atlantic." *The Genesee Chief v. Fitzhugh*, 12 How. 443, 454 (53 U. S., 1851).

TABLE I.—*Admission of States to Union*

[Numbers in parentheses indicate order of admission.]

State	Organized as territory	Admitted to Union
Alabama (22)	Mar. 3, 1817	Dec. 14, 1819
Alaska (49)	Aug. 24, 1912	Jan. 3, 1959
Arizona (48)	Feb. 24, 1863	Feb. 14, 1912
Arkansas (25)	July 4, 1819	June 15, 1836
California (31)		Sept. 9, 1850
Colorado (38)	Feb. 28, 1861	Aug. 1, 1876
Florida (27)	Mar. 30, 1822	Mar. 3, 1845
Hawaii (50)	June 14, 1900	Aug. 21, 1959
Idaho (43)	Mar. 3, 1863	July 3, 1890
Illinois (21)	Mar. 1, 1809	Dec. 3, 1818
Indiana (19)	July 4, 1800	Dec. 11, 1816
Iowa (29)	July 3, 1838	Dec. 28, 1846
Kansas (34)	May 30, 1854	Jan. 29, 1861
Kentucky (15)		June 1, 1792
Louisiana (18)	Mar. 26, 1804	Apr. 30, 1812
Maine (23)		Mar. 15, 1820
Michigan (26)	June 30, 1805	Jan. 26, 1837
Minnesota (32)	Mar. 3, 1849	May 11, 1858
Mississippi (20)	Apr. 7, 1798	Dec. 10, 1817
Missouri (24)	June 4, 1812	Aug. 10, 1821
Montana (41)	May 26, 1864	Nov. 8, 1889
Nebraska (37)	May 30, 1854	Mar. 1, 1867
Nevada (36)	Mar. 2, 1861	Oct. 31, 1864
New Mexico (47)	Sept. 9, 1850	Jan. 6, 1912
North Dakota (39)	Mar. 2, 1861	Nov. 2, 1889
Ohio (17)		Mar. 1, 1803
Oklahoma (46)	May 2, 1890	Nov. 16, 1907
Oregon (33)	Aug. 14, 1848	Feb. 14, 1859
South Dakota (40)	Mar. 2, 1861	Nov. 2, 1889
Tennessee (16)		June 1, 1796
Texas (28)		Dec. 29, 1845
Utah (45)	Sept. 9, 1850	Jan. 4, 1896
Vermont (14)		Mar. 4, 1791
Washington (42)	Mar. 2, 1853	Nov. 11, 1889
West Virginia (35)		June 19, 1863
Wisconsin (30)	July 3, 1836	May 29, 1848
Wyoming (44)	July 25, 1868	July 10, 1890

admission of new states. It was embodied in slightly different language ("a new and entire member of the United States of America") in the statute admitting the first state (Vermont) to the Union of States (*see* text at note 23 *supra*). Subsequent statutes of admission generally used the phrase "on an equal footing." For example, in admitting Hawaii, the fiftieth state, the statehood act reads "is declared admitted into the Union on an equal footing with the other States in all respects whatever" (73 Stat. 4 (1959)).

Although this policy has been rigidly followed by the Congress from the beginning, it had in many cases attached various types of conditions to the acts of admission that it considered binding upon the would-be states.²⁸ Although the practice of attaching restrictions on new states was followed for a long time, the question of their binding force was not fully dealt with judicially until 1911, when the question of the condition imposed by Congress upon Oklahoma restricting the moving of its capital (*see* note 28 *supra*) was raised in the Supreme Court. In sustaining the right of Oklahoma to move its capital at its discretion, regardless of the condition, the Court enunciated the important doctrine of the political equality of the states, to wit, that "when a new State is admitted into the Union, it is so admitted with all of the powers of sovereignty and jurisdiction which pertain to the original States, and that such powers may not be constitutionally diminished, impaired or shorn away by any conditions, compacts or stipulations embraced in the act under which the new State came into the Union, which would not be valid and effectual if the subject of congressional legislation after admission."²⁹

But the equal-footing doctrine is considered not to be impaired when the condition of admission pertains purely to a matter of internal policy of the state, such, for example, in reference to property. This involves no question of equality of status, but only of the power of a state to deal with the Nation in reference to such property.³⁰ And neither is it impaired because of diversity

28. This stems from the discretionary power which Congress has over the admission of new states (*see* 34). Thus, when Ohio was admitted in 1802, a condition of admission was that it would not tax the public lands sold by the United States for 5 years (a similar requirement was demanded of many of the states subsequently admitted). When the enabling act for Utah was passed in 1894, it was provided that public schools must be maintained free from sectarian control; and in the case of Oklahoma, the enabling act of 1906 provided that the capital city of the state should be at Guthrie and should not be changed prior to 1913. WILLOUGHBY (1929), *op. cit. supra* note 3, at 311.

29. *Coyle v. Smith*, 221 U. S. 559, 573 (1911). The Court held that the restriction in the act of admission relative to moving the seat of government was invalid because if Oklahoma was admitted on an equal footing with the Original States, she, "by virtue of her jurisdictional sovereignty as such a State may determine for her own people the proper location of the local seat of government. She is not equal in power to them if she cannot." *Id.* at 579.

30. It was thus held by the Supreme Court, in *Stearns v. Minnesota*, 179 U. S. 223 (1900), that a provision in the act admitting Minnesota to the Union whereby the state received from the United States valuable public lands in return for which it agreed not to tax the land still owned in the state by the Federal Government, could be enforced in a subsequent effort of the state to violate it.

in the economic aspects of the several states resulting from differences in area, location, geology, and latitude. The requirement of equal footing is designed not to wipe out such diversities, but to create parity as respects political standing and sovereignty.³¹

3411. *Application to Tidelands and Submerged Lands*

The equal-footing principle has been held to have a direct effect on certain property rights and has been applied by the Supreme Court in connection with state ownership of tidelands (lands between high and low water) and lands under inland navigable waters, and federal paramount rights in the submerged lands along the open coast seaward of the low-water mark.

In an early case involving a controversy over a tideland area bordering on the Mobile River in Alabama (a subsequently admitted state), the Court held that when Alabama ceased to be a territory and was admitted into the Union as a state, she was thereby placed "on an equal footing with the original states." And since the shores of navigable waters and the soils under them were not granted by the Constitution to the United States they were reserved to the states as an attribute of sovereignty. Alabama, therefore, acquired the same rights in such lands by virtue of her admission on an equal footing with the Original States.³² This rule has never been departed from.

Recently, the scope of the "equal footing" doctrine was considered by the Supreme Court and given a new interpretation in connection with ownership of the submerged lands off the coast of Texas. The rule set out in the *Pollard* case (*supra* note 32) is the normal application of the doctrine, that is, no state can be deprived of such property rights if others possess them; otherwise the states would not be equal in power, dignity, and authority. But in *United States v. Texas*, *supra* note 31, the Court held that the "equal footing" doctrine works also in the converse and prevents extension of the sovereignty of a state into the domain of national sovereignty from which other states have been excluded. *Id.* at 717. Since it had previously found that none of the Original States separately acquired ownership of the submerged lands off their coasts, and that the Federal Government, rather than the states, had paramount rights in these lands (*United States v. California*, *supra* note 32), it now held that whatever rights Texas may have had as an independent

31. *United States v. Texas*, 339 U.S. 707, 716 (1950) (*but see* 3411).

32. *Pollard's Lessee v. Hagan*, 3 How. 212, 229, 230 (44 U.S., 1845). This case was invoked by California in support of its contention of state ownership of submerged lands in the marginal belt, but the Supreme Court rejected this contention. *United States v. California*, 332 U.S. 19, 36 (1947). (*See* Volume One, Part 1, 112.)

republic were relinquished upon her admission into the Union on an "equal footing" with the other states (*see* Volume One, Part 1, 13).

342. COMPACTS BETWEEN STATES

Compacts or agreements between the states have been made ever since the formation of the United States. These are authorized by Article I, section 10, clause 3, of the Constitution which provides that "No State shall, without the Consent of Congress . . . enter into any Agreement or Compact with another State."³³ There has never been any doubt that when congressional assent is given, states may enter into such compacts. The provision is in effect a legal device for adjusting interstate relations, the requirement of congressional consent insuring that national interests will not suffer in the process.

It would be difficult to establish specific guide lines for determining what compacts require consent and what compacts do not. The circumstances in a given case would have considerable bearing on the decision. But the principle that the Supreme Court has enunciated is that congressional assent is required only if the interstate compact or agreement tends to increase the political power or influence of the states or which may encroach or interfere with the full and free exercise of federal authority.³⁴ As to the consent itself, the Constitution does not state when or how the consent shall be given, and it has been held that it may be given before or after the compact is made and may be expressed or implied.³⁵

33. Compacts between the states were a practice that existed even prior to the adoption of the Constitution, one of the most noteworthy being the Compact of 1785 between Maryland and Virginia by which Virginia was allowed free fishing rights in the Potomac River in return for Maryland's right of free navigation through the Virginia capes (*see* 4211, particularly note 14 thereof).

34. *Virginia v. Tennessee*, 148 U.S. 503 (1893). This is a leading case on the subject of compacts. There is no difference between the terms "compacts" and "agreements" other than that the former is generally used with reference to more formal undertakings than is usually implied in the latter.

35. *Id.* at 520. As authority for an implied consent, the Court cited Justice Story to the effect that where a state is admitted into the Union, notoriously upon a compact made between it and the state of which it previously was a part, the act of Congress admitting such state is an implied consent to the terms of the compact. *Id.* at 521. Although the Court did not cite the case by name this was the situation in *Green v. Biddle*, 8 Wheat. 1 (21 U.S., 1823), which involved the admission of Kentucky into the Union pursuant to a compact between Virginia and the district of Kentucky (a part of Virginia) erecting the district into an independent state. Justice Story in his Commentaries on the Constitution of the United States (Vol. II, 4th ed. 265 (1873)) actually spells out the compact between Virginia and Kentucky and cites *Green v. Biddle*, *supra*, as authority for implied consent. The oblique boundary between California and Nevada was established by the Coast Survey in 1893-1899 and was accepted by both states as the true boundary, but has not yet been confirmed by Congress. DOUGLAS (1932), *op. cit. supra* note 7, at 237. However, on the doctrine of *Virginia v. Tennessee*, *supra* note 34, and *Green v. Biddle*, *supra*, it would seem that confirmation would be implied from the fact that Congress did describe the boundary and appropriated funds for the partial cost of the survey. Annual Report, U.S. Coast and Geodetic Survey 287, 314 (1900), and 27 Stat. 357 (1892).

Recently, the question arose for the first time whether an interstate compact once consented to was subject to future investigation by Congress to discover if it is still in the interest of the United States and if the task for which the compact was permitted by Congress was being performed, or whether the con-

3421. *Interstate Boundaries*

A common area of compacts between states is in the adjustment of their boundaries. If the boundary established is to cut off an important and valuable portion of a state, the political power of the state enlarged would be affected by the settlement of the boundary. Hence, an agreement to adopt such a boundary, it has been said, would probably require the consent of Congress. However, where the running of a boundary simply serves to mark and define what actually existed before, but was undefined and unmarked, the agreement to run the boundary line, or its actual survey, would not require the consent of Congress.³⁶

Acceptance of jurisdiction by the Supreme Court over boundary disputes between states had its origin in the case of *Rhode Island v. Massachusetts*, 12 Pet. 657 (37 U.S., 1838), where the Court overruled a motion by Massachusetts to dismiss the request of Rhode Island to ascertain and establish the disputed northern boundary between the states. The reasoning of the Court was that when the several states adopted the Constitution they made a grant to the United States of judicial power over controversies between two or more states (see 22 and 223), and that by the Constitution, it was ordained that this judicial power be exercised by the Supreme Court. Since there can be but two tribunals—the legislature or the judiciary—under the Constitution that can act on the boundaries of states, and since the former (Congress) is limited in express terms to assent or dissent where a compact or agreement is referred to

sent is eternal and unalterable. The case dealt with the Port of New York Authority established in 1921 under an interstate compact between New York and New Jersey and consented to by Congress. In an investigation of its operations by a congressional committee, an official of the Authority refused to yield certain internal working papers sought by the committee and was cited for contempt of Congress. At the trial, the citation was upheld. While not prepared to rule that in no situation can privilege attach to documents of a compact agency, the court believed it to be appropriate "in this situation to establish a test which balances congressional need for documents subpoenaed from compact agencies against the dangers to the particular compact involved and to the compact process in general which would result from the particular subpoena and investigation." On the facts of the case the court struck the balance in favor of disclosure. *United States v. Tobin*, 195 F. Supp. 588, 612 (1961). On appeal, however, the contempt conviction was reversed on the ground that the House of Representatives had not authorized the committee to subpoena such papers. *Tobin v. United States*, 306 F. 2d 270 (1962). On Nov. 13, 1962, the Supreme Court denied without comment a petition for review by the Government. *United States v. Tobin*, 371 U.S. 902.

36. *Virginia v. Tennessee*, *supra* note 34, at 520. A recent case of a compact between states, involving a boundary line, is the agreement entered into by Virginia and West Virginia with respect to a portion of their common boundary running through the Allegheny Mountains. The agreed-upon line was submitted to Congress for its consent and was approved Sept. 21, 1959 (73 Stat. 599). In the Maryland-Virginia boundary dispute, the Award of the Arbitrators of 1877 was ratified by both states (this, in effect, was a compact between them) and by Congress (see 4211). When the boundary line was run and marked by the Coast Survey in 1930, and ratified by both states, the question arose whether the ratification required the approval of Congress. It was decided administratively that the approval of the Award of 1877 was sufficient and that the actual delimitation of the boundary line merely carried out the award (see 4212 A).

it by the states (*see* 342), the power must reside in the Supreme Court or it cannot exist at all. It had been contended that the question of boundaries between states was political rather than judicial and therefore did not come within the purview of the Constitution for the settlement of controversies between states. But the Court said: "There is neither the authority of law or reason for the position, that boundary between nations or states, is, in its nature, any more a political question, than any other subject on which they may contend." *Id.* at 737.

A. FINALITY OF BOUNDARIES—EFFECT OF ERRORS

Questions have arisen in connection with boundaries as to the effect of errors in the demarcation line on the validity of the boundary. An oft-cited case in this area is *Virginia v. Tennessee*, *supra* note 34. Virginia sought to have her boundary with Tennessee declared null and void and a new line established—85 years after it was approved by both states and was assented to by Congress—on the basis that the boundary line as marked did not follow a due east and west line along the parallel of 36° 30' North, but varied from it from 2 to 8 miles in width for a strip about 113 miles in length.³⁷ But the Supreme Court denied Virginia's request, stating: "The compact in this case having received the consent of Congress, though not in express terms, yet impliedly, and subsequently, which is equally effective, became obligatory and binding upon all the citizens of both Virginia and Tennessee. Nor is it any objection that there may have been errors in the demarcation of the line which the states thus by their compact sanctioned. After such compacts have been adhered to for years neither party can be absolved from them upon showing errors, mistakes or misapprehension of their terms, or in the line established; and this is a complete and perfect answer to the complainant's position in this case."³⁸

37. The validity of the boundary was also challenged on the ground that it was not consented to by Congress (*see* note 35 *supra*).

38. *Id.* at 525. This case was cited by the Supreme Court in *Arkansas v. Tennessee*, 310 U. S. 563, 569 (1940), for the doctrine that as between the states of the Union, long acquiescence in the assertion of a particular boundary and the exercise of dominion and sovereignty over the territory within it, should be accepted as conclusive. The boundary between New Mexico and Colorado along the 37th parallel was approved by the Supreme Court on Oct. 24, 1960, pursuant to the report filed in 1960 by the commissioner designated to survey and mark the boundary under a decree of the Court of Apr. 13, 1925. *New Mexico v. Colorado*, 364 U. S. 296 (1960). The original case was decided Jan. 26, 1925, where the question was as to the alleged location of the line. Different surveys had been made—one in 1868 (by Darling) and the other in 1903 (by Carpenter), the two lines varying considerably in position. Both surveys were made under authority of the General Land Office, the later survey having been recognized from 1904 to 1908. The Court held the Darling line to control on the ground that for more than a half century this line was recognized successively as the boundary between the two territories, between the State of Colorado and the Territory of New Mexico, and between the two states. "The effect of this recognition of the Darling line

The situation is different, however, where markers on the boundary line have become indistinct or obliterated and it is desired to restore them in their original position. In such situations, an order may be issued for the restoration of such marks without any change of the line.³⁹

(a) *County Boundaries*.—Similar questions have arisen in the case of county boundaries within a state. The law is well settled that the legislature of a state has the sole power to define and determine the boundary lines between counties and to provide the means or methods by which such boundaries, when in dispute, may be established and marked on the ground. If the legislature has declared the true line of a boundary, the courts cannot declare any other line to be the boundary, in the absence of legislative authority to so declare. But the court can declare and construe the law on the subject.⁴⁰

343. RECENT ADMISSIONS

The most recent admissions to the Union were Alaska and Hawaii—the last of the territories of the United States. The admission of Alaska to statehood was notable in at least one respect—it was the first time that a non-contiguous territory, although on the same continent and separated from the 48 states by foreign lands or international waters, was admitted to statehood. The admission of Hawaii was even more noteworthy because it was a non-contiguous territory completely detached from the American Continent. Thus, by 1959, the whole gamut of acquisition, incorporation, and admission was run, and all doubts as to the constitutionality of any of these acts completely resolved.⁴¹

by the United States," the Court said, "was not impaired by the temporary recognition of the Carpenter line." (The Carpenter line was accepted by Congress in 1908 as the proper location of the 37th parallel. This was vetoed by the President after which the General Land Office abandoned its recognition of the Carpenter line.) *New Mexico v. Colorado*, 267 U. S. 30, 37, 41 (1925)

39. *Virginia v. Tennessee*, *supra* note 34, at 528. Where there is evidence that a boundary marker had been moved it would be proper under the doctrine enunciated in this case to reestablish the marker from the original data.

40. *Trinity County v. Mendocino County*, 90 Pac. 685 (1907). In this case, the California legislature had declared that the boundary between the two counties should be the 40th parallel and that its location should be established by a surveyor and that the surveyor, when employed, should "accurately run" the line of the 40th parallel and mark it accordingly. The line so fixed and marked was to be the true boundary. It was contended that the quoted words were a limitation on his power and that if he ran the line inaccurately the survey would be void. But the Supreme Court of California held that the purpose and effect of the act was that, whether correct or not, the line surveyed and marked should thereupon be the true line. The construction contended for, the court said "would leave the county lines always subject to change and uncertainty; for if the line must be absolutely accurate in order to be valid, if the true line of that parallel and not any particular surveyed line thereof is to be the true county line, it would be subject to relocation and change whenever new discoveries, more accurate instruments, or more careful surveys should demonstrate that the previously surveyed line was incorrectly located on the ground." *Id.* at 688.

41. Alaska, although purchased in 1867, was not made a territory until Aug. 24, 1912. 37 Stat. (pt. 1) at 512. Hawaii was formally annexed to the United States July 7, 1898 (30 Stat. 750) (the transfer of sovereignty took place Aug. 12, 1898), and was constituted a territory by act of Apr. 30, 1900, effective June 14, 1900 (31 Stat. 141).

343I. Admission of Alaska

Alaska, which was an "incorporated" territory of the United States,⁴² was admitted to statehood by Presidential Proclamation No. 3269, issued January 3, 1959 (73 Stat. C 16), the enabling act having been approved on July 7, 1958 (72 Stat. 339).⁴³ No specific boundary provisions are included other than the statement in Section 2 that "The State of Alaska shall consist of all the territory, together with the territorial waters appurtenant thereto, now included in the Territory of Alaska." The state is thus made coextensive with the territory without any exceptions.⁴⁴

The Submerged Lands Act of 1953 (*see* Volume One, Part 2, 11), by which the several states were granted title to the submerged lands seaward of their coasts to their historic boundaries, is made specifically applicable to the State of Alaska.⁴⁵

42. Although Alaska was granted territorial government in 1912, its legal status as an "incorporated" territory was considered settled by the Supreme Court in 1905 (*Rasmussen v. United States*, 197 U. S. 516). By that time, the possessions which had been acquired recently from Spain (Puerto Rico and the Philippines) were declared to be "unincorporated" territories, appurtenant to, and dependencies of, the United States, but not a part of the United States. H. Rept. 624, 85th Cong., 1st sess. (1957). The difference between an incorporated and an unincorporated territory is that in the first there is a general applicability of the Constitution with respect to the civil and private rights of the inhabitants, for example, the right to trial by jury, whereas in the second, Congress, in legislating for such territory, is bound by but few of the limitations which apply in the case of incorporated territories. WILLOUGHBY (1929), *op. cit. supra* note 3, at 476.

43. For information bearing on Alaska statehood, *see* H. Rept. 624, *supra* note 42. Alaska was the first territory to be admitted to the Union since Feb. 14, 1912, when, by Presidential proclamation (37 Stat. 1728), the admission of Arizona, the last of the 48 states, was declared in effect.

44. For a description of the boundary of the Territory of Alaska, *see* DOUGLAS (1932), *op. cit. supra* note 7, at 39-45.

45. One effect of the admission of Alaska into the Union was to shift the geographic center of the United States (if there be such a concept as a geographic center of two noncontiguous land areas) from its former position near Lebanon, Kans., in latitude 39°50' North, longitude 98°35' West, to its new position in Butte County, S. Dak., in latitude 44°59' North, longitude 103°38' West, or a distance of 439 miles in a northwesterly direction. This position, now unmarked, is about 11 miles west of Castle Rock, S. Dak., and 20 miles east of the tristate corner of South Dakota, Montana, and Wyoming. It is near a hill which bears the descriptive name of Two Top Peak. The method used to determine the new geographic center is a variation of the so-called "center-of-gravity" method. The geographic center of the 48 states being known, the geographic center of Alaska (including offlying islands, such as the Aleutians and those in the Bering Sea) was next determined by the center-of-gravity method and found to be at latitude 63°50' North, longitude 152°00' West, or about 60 miles northwest of Mt. McKinley. (In this computation, water areas were excluded except for inland waters and straits, passes, canals, etc., in the Alexander Archipelago in Southeast Alaska.) In the final determination of the geographic center of the 49 states, the 3,022,387 square miles of the 48 contiguous states were weighed against the 586,400 square miles of Alaska, and the new location considered to be at that point along a line of shortest distance between the two centers where the areas would balance. Due to the difficulty of determining the exact geographic center of two, large, irregular and separated areas on a spheroid, the uncertainty of the new location is considered to be about 10 miles in any direction. *Geographic Center of the United States*, Circular of July 30, 1958, U.S. Coast and Geodetic Survey. *See also New Geographic Center of the United States*, 18 SURVEYING AND MAPPING 430 (1958). For a discussion of the method of determining the geographic center of the United States, *see* Adams, *Geographical Centers*, 24 MILITARY ENGINEER 586 (1932). (*See* 3432 D for geographic center of the 50 states of the Union.)

3432. *Admission of Hawaii*

The Territory of Hawaii is the most recent to be admitted to statehood. It was proclaimed by the President on August 21, 1959 (73 Stat. C 74), under Presidential Proclamation No. 3309, the enabling act for its admission having been approved on March 18, 1959 (73 Stat. 4). As in the case of Alaska, the Submerged Lands Act of 1953 is made applicable to Hawaii, but the Outer Continental Shelf Lands Act of 1953 (*see* Volume One, Part 2, 21), by which jurisdiction of the United States over the submerged lands of the outer continental self was established, is also made applicable.⁴⁶

A. ISLANDS AND REEFS OF HAWAII

Section 2 of the enabling act sets out the boundaries of the new state insofar as the inclusion or exclusion of certain islands is concerned. Specifically, it provides that "The State of Hawaii shall consist of all the islands, together with their appurtenant reefs and territorial waters, included in the Territory of Hawaii on the date of enactment of this Act, except the atoll known as Palmyra Island, together with its appurtenant reefs and territorial waters, but said State shall not be deemed to include the Midway Islands, Johnston Island, Sand Island (offshore from Johnston Island), or Kingman Reef [about 35 miles northwest of Palmyra Island], together with their appurtenant reefs and territorial waters." (*See* fig. 95.)

The statehood act is thus quite explicit as to the islands to be excluded from the new state, but it fails to specify the islands that are to be included except by the general reference to "all the islands . . . included in the Territory of Hawaii." The specific islands that constituted the territory must therefore be inferred from other documents. Questions have arisen regarding this and other matters pertaining to the new state and the results of these investigations are summarized and explained herein to eliminate duplication of effort in the future.⁴⁷

The basic document for this purpose is the Report of the Commission on Annexation (S. Doc. 16, 55th Cong., 3d sess. (1898)) and is considered the foundation of the Organic Act of the Territory. In it are enumerated eight

46. The inclusion of the Outer Continental Shelf Lands Act was on recommendation of the Department of the Navy as a technical matter to show explicitly that it will apply to the State of Hawaii. S. Rept. 80, 86th Cong., 1st sess. 29 (1959).

47. The general purpose of the act is to include in the new state those islands that were formerly a part of the Territory of Hawaii. This accounts for the inclusion of two exclusionary provisions instead of grouping all the excluded islands together. It was for the purpose of differentiating between those that were part of the territory and those that were not.

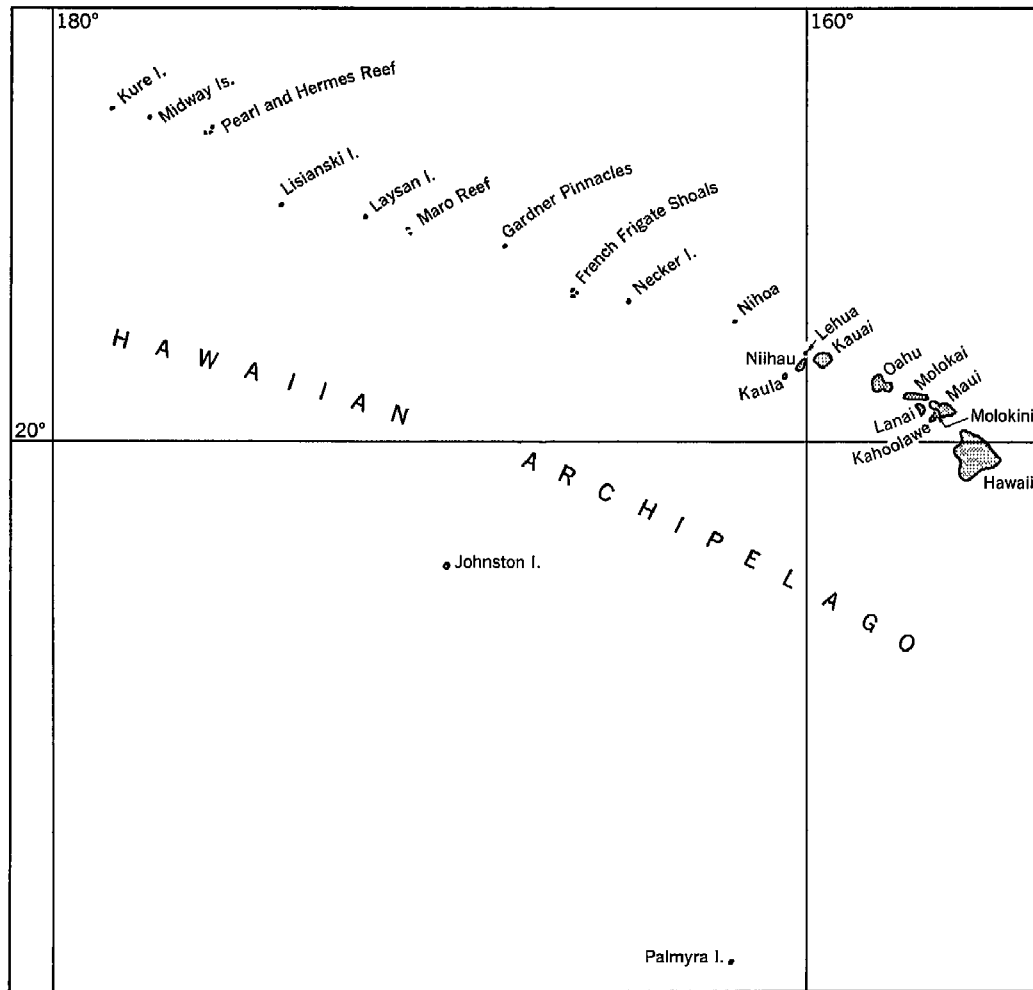


FIGURE 95.—The Hawaiian Archipelago and Johnston and Palmyra Islands.

principal islands (Hawaii, Maui, Molokai, Lanai, Kahoolawe, Oahu, Kauai, and Niihau); a group of small islands, atolls, and shoals (Molokini, Lehua, Kaula, Niihau, Necker, French Frigate Shoal, Gardner Pinnacles, Laysan, Lisianski, and Ocean (now known as Kure)); and Palmyra Island. To these islands should be added Pearl and Hermes Reef, and Maro Reef, both of which have land exposed at high water.⁴⁸

48. The inclusion of these reefs in the Territory of Hawaii has never been questioned and is supported by the material in the "Index to the Islands of the Territory of Hawaii," prepared by the Territorial Survey Department in 1931, and by a paper contained in the Forty-second Annual Report of the Hawaiian Historical Society (1933). From "Memorandum Re the Islands Now Included in the Territory of Hawaii" (Mar. 16, 1953), by the Deputy Attorney General of Hawaii.

Of the islands excluded from the new state, Palmyra is the only one that was formerly a part of the Territory. The island is small and is owned by one family. Because of its great distance from the main Hawaiian group of islands (about 1,200 miles to the southwestward), the Senate committee that considered the statehood bill did not believe it was an appropriate part of the new state even though it has been included within Honolulu County for census purposes.⁴⁹

The other islands excluded from the State of Hawaii by the statehood act (Midway Islands, Johnston Island, Sand Island, and Kingman Reef), are generally placed in the doubtful category insofar as being a part of the Territory of Hawaii. Although the committee report states that these islands are not considered to be part of the territory (S. Rept. 80, *supra* note 46, at 2), this requires some clarification. To avoid repetitive statements in the following paragraphs, it should be stated here that the first three islands were definitely not included in the enumeration given in the Report of the Commission on Annexation, *supra*, but the fourth, Kingman Reef, could be inferred from the language used (*see (d)*, below).

(a) The *Midway Islands* are commonly, but erroneously, assumed to be a part of the Territory of Hawaii because of their location at the western end of the Hawaiian Archipelago and because they lie between islands that are definitely a part of the territory. They were taken possession of in the name of the United States in 1867 and therefore were not part of the Kingdom of Hawaii that came under the Act of Annexation of 1898 (*see* note 41 *supra*) to become the Territory of Hawaii.⁵⁰

(b) *Johnston Island* (formerly referred to as Cornwallis Island) has also sometimes been assumed to be part of the Territory of Hawaii because it is closer to the main Hawaiian Islands than Palmyra Island. The island was visited and taken possession of several times in the 1850's on behalf of the United States and the Kingdom of Hawaii, respectively, and was formally proclaimed by the King as part of Hawaii. However, in 1859, the Attorney General of the United States took the position that the King's proclamation was ineffective to give Hawaii jurisdiction and therefore fell in the same category as the Midway Islands (9 OPS. ATT'Y GEN. 364).⁵¹

49. S. Rept. 80, *supra* note 46, at 2. It has sometimes been questioned whether Palmyra Island belongs to the Hawaiian group because of its great separation from the main Hawaiian Islands. But this was settled by a 1947 decision of the Supreme Court of the United States (*United States v. Fullard-Leo*, 331 U.S. 256), which held that the island was annexed to the Kingdom of Hawaii on Feb. 26, 1862, and came within the territory annexed in 1898. A 1936 decision of the U.S. Geographic Board specifically includes the island as part of the Territory of Hawaii. Although Palmyra Island is not part of the new state and is not owned by the United States in a proprietary sense, it is still subject to the latter's sovereignty.

50. This view was supported by the United States Supreme Court in the case of *Downes v. Bidwell*, 182 U.S. 244 (1901) and by the Attorney General of Hawaii in 1905 and 1923 (from "Memorandum Re the Islands Now Included in the Territory of Hawaii," *supra* note 48). A decision of the U.S. Geographic Board in 1936 expressly excludes the islands from the Territory of Hawaii.

51. This position was upheld by the territorial Attorney General in 1923 and it was concluded that Johnston Island was not part of the Territory of Hawaii (from "Memorandum Re the Islands Now Included in the Territory of Hawaii," *supra* note 48). Also, the Supreme Court of the United States in 1947, by a dictum in *United States v. Fullard-Leo*, *supra* note 49, at 262, indicated that Johnston Island (there

(c) *Sand Island* (about 1 mile to the northeastward of Johnston Island) is a small island about 1,500 feet in diameter. Both Sand and Johnston Islands are part of the same atoll formation, and it is reasonable to assume that everything said in paragraph (b), above, also applies to Sand Island.

(d) *Kingman Reef* (about 35 miles northwestward of Palmyra Island) is bare at high water in only a very small part (approximately 2,000 square yards, or about one-half acre). It cannot be stated with certainty whether it was ever a part of the Territory of Hawaii. Although not enumerated as such in the Report of the Commission on Annexation, *supra*, it could be inferred to be included from the words "scattered reefs or shoals," with which the enumeration ends. However, the report on statehood (S. Rept. 80, *supra* note 46, at 2) indicates that only Palmyra Island was considered to be part of the territory, the other excluded islands and reefs being in a different category.⁵²

B. AREAS OF TERRITORY AND STATE

Various values have been given for the area of the Hawaiian Islands. While no great differences have been noted, the question has arisen as to what constitutes the official area of the new state and how it differs from the area of the territory. A study and an original computation for some of the islands and reefs yielded the following values:

(a) For the 8 major islands the total area is 6,435 square statute miles. By individual islands the areas are: Hawaii=4,030; Maui=728; Molokai=260; Lanai=141; Oahu=604; Kauai=555; Niihau=72; Kahoolawe=45.⁵³

(b) For the remaining islands of the state (*see* text accompanying note 48 *supra*), the total area equals 2,401 acres, or 3.8 square statute miles.⁵⁴

(c) The total area of the State of Hawaii thus equals 6,435 + 3.8, or 6,438.8 square statute miles.

(d) For the Island of Palmyra, excluded from the new state (*see* text at note 49 *supra*), the actual land area equals 592 acres, or 0.9 square statute mile.⁵⁵

referred to as Cornwallis Island) was not part of Hawaii. A 1936 decision of the U.S. Geographic Board expressly excludes it from the territory.

52. With respect to the Hawaiian Archipelago, Palmyra Island, though part of the territory, was never a part of the archipelago; Midway Islands, while never a part of the territory, are part of the archipelago; and Johnston Island, Sand Island, and Kingman Reef were never a part of either the territory or the archipelago. U.S. Geographic Board (decision of 1936).

53. These figures are based on material prepared in 1959 by the Territorial Surveyor, the Commissioner of Public Lands, and the Deputy Attorney General of Hawaii for the Chairman of the House of Representatives Subcommittee on Territorial and Insular Affairs of the United States Congress. The 1940 Census of the United States gives a corresponding value of 6,419 square statute miles. The figures given in the text are the preferred values primarily because they are probably a later determination, although the overall difference between the two is no more than one-quarter percent, which could be accounted for by the margin of error inherent in the method of measurement, by the different personal equations of the cartographers making the measurements, and by the possible differences in the scale of the charts used by each.

54. These islands and reefs individually have the following areas in acres: Molokini=18; Lehua=278.7; Kaula=108.5; Nihoa=169.6; Necker=45; French Frigate Shoal=66.7; Gardner Pinnacles=5.4; Laysan=1,023.9; Lisianski=377.7; Kure=219.6; Pearl and Hermes Reef=87.5; Maro Reef=0.2.

55. A word of explanation is necessary regarding this value. Palmyra Island is an atoll consisting of many small islets on a barrier reef that encloses three lagoons. If the entire area within the high-water line is included (low-water reef and lagoons), then the area of the island is 3.8 square statute miles. Because of the peculiar situation of the land above high water with respect to the lagoons and the areal ratio of one to the other, only the land above high water is included in the area of the island.

(e) The total area of the Territory of Hawaii was therefore 6,438.8+0.9, or 6,439.7 square statute miles.⁵⁶

C. SEAWARD BOUNDARIES

Apart from the land areas of Hawaii, as discussed above, the boundaries of the new state include the territorial waters (a 3-mile belt) that surround the various islands and reefs but do not include the waters separating them (see 384). Thus, where the channel between two islands is greater than 6 nautical miles, a strip of high seas remains. Vessels plying between two such islands are therefore for a part of the time on the high seas which are not under the jurisdiction of the State of Hawaii. This raises the question of the effect of the commerce clause of the Constitution on interisland commerce.⁵⁷ It has been held by the Supreme Court that transportation necessitating passage through waters not under the jurisdiction of a state, even though both termini of the voyage lie within the borders of that state, is not intrastate commerce, but rather foreign commerce for the purpose of the commerce clause of the Constitution.⁵⁸ The net effect of this is to vest in Congress full authority to regulate interisland traffic in Hawaii; however, under a well-established principle of constitutional law, the state could exercise such authority should Congress choose to refrain from exercising its own superior authority.⁵⁹

56. The areas given in (b) and (d) are based on determinations made in the Coast Survey in Sept. 1959, using a polar planimeter and the largest-scale charts and surveys available. They have been computed for the actual land areas (above high water); they do not include shoals and reefs submerged at high water, nor are the appurtenant territorial waters of the various islands included. This is in conformity with the principles adopted by the U.S. Bureau of the Census in 1940 for computing the land area of the United States, where the areas of tidal flats (area between high and low water) were specifically excluded and the mean high-tide line adopted as the limiting line for measurement. The difference between this treatment and the inclusion of reef areas (areas mostly submerged at high water) would in the case of Palmyra Island amount to the difference between 0.9 and 7.3 square statute miles. In the case of Kure Island it would mean the difference between 0.34 and 21.4 square statute miles (a figure of 18 square miles has been frequently given). For a discussion of the principles followed in computing the area of the United States in connection with the 1940 Census, see 38. For the area of the territorial sea of Hawaii, see 384.

57. Art. I, sec. 8, cl. 3 provides that Congress shall have power "To regulate Commerce with foreign Nations, and among the several States, and with the Indian Tribes."

58. In *Lord v. Steamship Co.*, 12 Otto 541 (102 U.S., 1880), it was held that a ship transporting goods from San Francisco to San Diego was engaged in foreign commerce, even though both termini were in California, because the ship of necessity passed outside the 3-mile limit of California's jurisdiction. This interpretation of the meaning of "Commerce with foreign Nations, and among the several States" has been repeatedly reaffirmed, as, for example, in *Hanley v. Kansas City Southern Ry. Co.*, 187 U.S. 617 (1903).

59. In *Wilmington Transportation Co. v. California R.R. Com.*, 236 U.S. 151 (1915), it was held that sea transportation between the mainland of California and Santa Catalina Island (a part of California) was a matter over which the state could take jurisdiction, notwithstanding such transportation necessitated passage over waters outside California's boundaries, in the absence of congressional action in this area of regulation. The basis for the decision was that there is a distinction between those matters of interstate or foreign commerce where, if any legislation should be enacted at all, it ought to be of a national or general character, and those other matters of interstate or foreign commerce which are distinctly local in character and in which it would be proper for states to act in the absence of federal action. The instant case was held to fall within the second category. A similar doctrine was enunciated

D. NEW GEOGRAPHIC CENTER OF THE UNITED STATES

As in the case of Alaska, the addition of Hawaii to the Union has required a further revision of the geographic center of the United States, but in a much lesser degree. It has now been calculated by the Coast Survey to be in latitude $44^{\circ}58'$ North, longitude $103^{\circ}46'$ West, or about 6 miles in a west-southwest direction from its position determined when Alaska was admitted to statehood (*see note 45 supra*). It is still in Butte County, S. Dak., and is approximately 17 miles west of Castle Rock.⁶⁰

35. FEDERAL OWNERSHIP—THE PUBLIC DOMAIN

The “public domain” or the “public lands” is the term applied to those areas of land that were turned over to the General Government by the Original States and to such other lands as were later acquired by treaty, purchase, or cession, and are disposed of under authority of Congress.⁶¹ But the meaning of the words “public lands” may vary somewhat in different statutes passed for different purposes, and they are given such meaning in each as comports with the intention of Congress in their use.

The fundamental necessity of federal ownership of lands not included within the boundaries of the several states was early recognized and took form under a resolution of the Congress of the Confederation passed October 10, 1780, which provided for the reception and care of such unappropriated lands as might be ceded by the states to the United States, and for the disposition of such lands for the common good. In pursuance of this policy, cessions were

by the Supreme Court in the early case of *Cooley v. The Board of Wardens of the Port of Philadelphia*, 12 How. 299 (53 U.S., 1852), upholding the regulation of pilots by the State of Pennsylvania.

Material in this section is based on a memorandum prepared by the Department of the Interior, Mar. 27, 1953, for the Senate Committee on Interior and Insular Affairs, and published in S. Rept. 80, *supra* note 46, at 73.

60. In computing the new position, the same method was used as in determining the geographic center of the 49 states. The geographic center of Hawaii was determined and the area of the 49 states weighed against the area and location of Hawaii. The new location was considered to be at a point along a line of shortest distance between the two centers where the areas would balance. The uncertainty of the new location is estimated at about 10 miles in any direction. *Geographic Center of the United States*, Circular of Mar. 1959, U.S. Coast and Geodetic Survey. *See also Geographic Center of the United States Moves Again*, 19 SURVEYING AND MAPPING 295 (1959).

61. In 1776, when the Thirteen Colonies declared their independence from England, many of them possessed unoccupied territory, much of which was entirely detached and lay west of the Appalachian Mountains. A number of states, including Pennsylvania, New York, Massachusetts, Connecticut, and Virginia, laid claims to areas in what was afterward known as the Territory Northwest of the Ohio River or the Northwest Territory, a region comprising an area of approximately 278,000 square miles and now contained mainly in the States of Ohio, Indiana, Illinois, Michigan, and Wisconsin. These claims were to a greater or lesser extent conflicting, and most of the boundary lines were ill defined. DOUGLAS (1932), *op. cit.*, *supra* note 7, at 63, 68.

made between 1781 and 1802 by seven states—New York, Virginia, Massachusetts, Connecticut, South Carolina, North Carolina, and Georgia—of an area amounting to 259,171,787 acres of land.⁶² These transfers were the origin of the public domain. A foundation was thus laid for a common ownership to be exercised on behalf of the entire Nation.

The total land surface of the public domain, including Alaska, aggregated, at its greatest extent, 2.8 million square miles, or approximately the area of conterminous United States.⁶³ This does not include lands lying within our insular possessions, which have their own laws for the administration of the public lands independent of the national public-land system.

The Thirteen Original States⁶⁴ and the States of Kentucky, Maine, Vermont, West Virginia, Tennessee, and Texas were never part of the national public domain and their public lands and records remained with them.⁶⁵

New states took no title to the vacant and unappropriated lands within their borders except as such lands were granted to them by the United States. This, however, did not apply to the tidelands and the lands under inland navigable waters (*see* Volume One, Part I, III).⁶⁶

351. PRINCIPAL ACCESSIONS TO THE TERRITORY OF THE UNITED STATES

The following are the principal accessions to the territory of the United States (*see* fig. 96):

1. *Louisiana Purchase.* This was the first of several land acquisitions that paved the way for the great western migrations (*see* 321). It was ceded by

62. PROUDFIT, PUBLIC LAND SYSTEM OF THE UNITED STATES I, U.S. DEPARTMENT OF INTERIOR (1923).

63. Gumm, *The Foundation of Land Records*, OUR PUBLIC LANDS 4, Bureau of Land Management (Oct. 1957). With the admission of Alaska and Hawaii to statehood, a new nomenclature has been proposed for designating the various geographic groupings of the United States, to wit: *conterminous* United States—the 48 states and the District of Columbia; *continental* United States—conterminous United States plus Alaska; *United States*—continental United States plus Hawaii. *Minutes*, U.S. Board on Geographic Names (July 21, 1959).

64. These comprised New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, Pennsylvania, New Jersey, Delaware, Maryland, Virginia, North Carolina, South Carolina, and Georgia.

65. Gumm, *supra* note 63, at 4. When Hawaii was annexed in 1898, the crown lands of the former monarchy and the government lands became federal lands. The territory had administered the public lands, except federal reservations, for the United States since annexation. S. Rept. 80, *supra* note 46, at 2-3.

66. The enabling act, admitting Alaska to statehood, provides that within 25 years after statehood the state is granted and is entitled to select from lands within national forests in Alaska which are vacant and unappropriated at the time of selection an amount not to exceed 400,000 acres, and from other public lands in Alaska which are vacant, unappropriated, and unreserved at the time of selection another 400,000 acres. An additional 102,550,000 acres are granted during the same period from the public lands in Alaska that are vacant, unappropriated, and unreserved at the time of their selection, bringing the total available to the State of Alaska during the next 25 years to 103,350,000 acres, or 161,484 square miles. 72 Stat. 340 (1958). These grants are in lieu of the grant of land for internal improvements and in lieu of the swamp land grants usually made to new states. *Id.* at 343. (*See* 36.)

France on April 30, 1803. France's title had its origin and was based upon the discovery and proclamation of La Salle on April 9, 1682. The territory purchased was bounded generally by the Mississippi River on the east, and on the west by a line which ran, approximately, along the present eastern boundary of Idaho, and through the center of what are now Colorado and New Mexico. This territory extended north to Canada, and south to the Arkansas River and the present northern boundary of Texas.⁶⁷

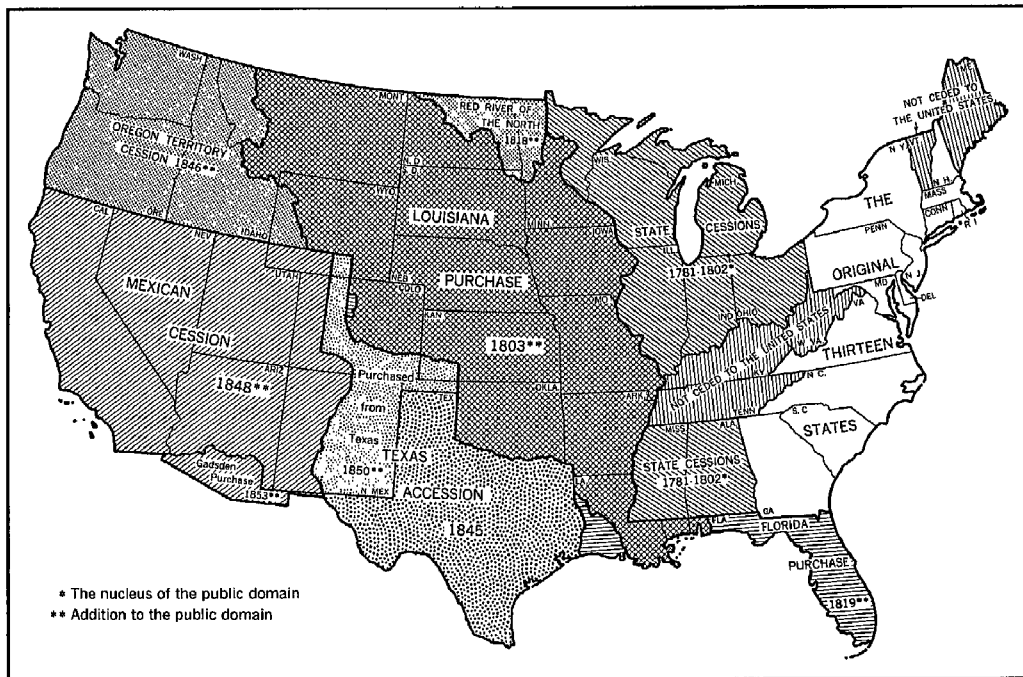


FIGURE 96.—Acquisition of the territory of the United States (exclusive of Alaska and island possessions) and origin of the public domain.

2. *Florida Purchase.* This was the second addition to the territory of the United States. It was ceded by Spain under a treaty dated February 22, 1819. From the date of the Louisiana Purchase, the territory known as West Florida was in dispute between the United States and Spain. The treaty of 1819 settled this and other conflicts and defined the boundary between the United States and the Spanish possessions in the Southwest.⁶⁸

67. TIFFANY (1912), *op. cit. supra* note 2, at 831. For a historical sketch of the original Louisiana and the changes in its boundary during the 137 years between 1682 and 1819, when Florida was purchased from Spain, see BOND, *THE LOUISIANA PURCHASE SESQUICENTENNIAL (1803-1953)*, U.S. DEPARTMENT OF INTERIOR (1952).

68. DOUGLAS (1932), *op. cit. supra* note 7, at 35. This treaty was not ratified by Spain until Oct. 20, 1820, after which it was proclaimed by the President on Feb. 22, 1821. *Id.* at 36.

3. *Texas Accession.* The next acquisition of territory was the Republic of Texas, which was admitted as a state by joint resolution of December 29, 1845.⁶⁹ The resolution incorporated, by reference, the joint resolution of March 1, 1845 (5 Stat. 797), approving the annexation of Texas. This resolution provided for the retention by Texas of "all the vacant and unappropriated lands within its limits, to be applied to the payment of the debts and liabilities of said Republic of Texas." On September 9, 1850, by act of Congress (9 Stat. 446), the United States purchased from the State of Texas certain lands now included in the States of Kansas, Colorado, New Mexico, Oklahoma, and Wyoming.

4. *Oregon Territory Cession.* In 1846, by treaty with Great Britain, the territory that is now occupied by the States of Washington, Oregon, and Idaho, and parts of Montana and Wyoming, which had been in dispute between the two countries for many years, was ceded by Great Britain, this country ceding in return all claim to the territory to the north thereof.⁷⁰

5. *Mexican Cessions.* On February 2, 1848, by the Treaty of Guadalupe Hidalgo (proclaimed July 4, 1848), which marked the close of the war with Mexico, that nation ceded to the United States, for a modest consideration, territory included approximately within the present limits of California, Nevada, Utah, and within parts of Colorado, Arizona, and New Mexico, extending in effect from the Pacific Ocean to the western limit of the Louisiana Purchase. Subsequently, on December 30, 1853, a second purchase was made from Mexico, adjoining the present Mexican boundary in order to settle a question as to the limits of the cession of 1848. This is known as the "Gadsden Purchase" and lies in the States of Arizona and New Mexico.⁷¹

6. *Alaska Purchase.* The last of the major acquisitions to the territory of the United States was the purchase of Alaska from Russia. The convention between the two countries was signed March 30, 1867, and proclaimed June 20, 1867.⁷²

352. TERRITORY UNDER UNITED STATES SOVEREIGNTY, JURISDICTION, ETC.

The territory under the sovereignty, jurisdiction, etc., of the United States comprises, in addition to the 50 states and the District of Columbia, the following: Palmyra Island (*see* note 49 *supra*); Kingman Reef (*see* 3432 A(d)); Johnston Island (*see* 3432 A(b)); Sand Island (*see* 3432 A(c)); Midway Islands (*see*

69. 9 Stat. 108 (1845). Texas was an independent republic from 1836 to 1845.

70. PROUDFIT (1923), *op. cit. supra* note 62, at 2; DOUGLAS (1932), *op. cit. supra* note 7, at 21.

71. *Id.* at 37-39.

72. *Id.* at 39. For an account of other acquisitions by the United States, including territory leased from foreign governments, *see id.* at 45-59.

3432 A(a)); Wake Island; Guam; Howland, Baker, and Jarvis Islands; American Samoa (including the Island of Tutuila, the Manua Islands, and all others of the Samoan group east of longitude 171° west of Greenwich, together with Swains Island); the Commonwealth of Puerto Rico (*see* note 15 *supra*); the Virgin Islands of the United States; Navassa Island; and the Swan Islands.⁷³

3521. *The Trust Territory*

As a result of World War II, certain islands in the Western Pacific (specifically, the Caroline, Marshall, and Mariana Islands (except Guam)), which were formerly under Japanese mandate, have been placed under the administration of the United States through an agreement with the United Nations (61 Stat. 397 (1947)). They are known as "The Trust Territory."

3522. *Rights in Antarctica—The Antarctic Treaty*

On August 10, 1960, the Senate ratified a treaty (known as the Antarctic Treaty) with Russia and 10 other nations, including all 7 which have advanced territorial claims to Antarctica, to maintain the Antarctic as a peaceful international preserve.⁷⁴ These countries are those that participated in the Antarctic program of the International Geophysical Year (IGY) of 1957–1958. Through the treaty, the countries accept the following objectives: the Antarctic Continent and surrounding areas shall be used exclusively for peaceful purposes; nuclear explosions and radioactive waste disposal shall be banned in the treaty area; no territorial claims or rights shall either be recognized or affected; freedom of scientific investigation shall be maintained and international cooperation to that end promoted; and complete rights of unilateral inspection shall insure fulfillment of these objectives. Geographically, the treaty applies to the area south of latitude 60° South, including all ice shelves, but does not affect the rights of any nation under international law with regard to the high seas within that area. It is of indefinite duration but may be amended at any time

73. *United States and Outlying Areas*, Geographic Report No. 4 (June 23, 1961), Office of the Geographer, U.S. Department of State. The Canal Zone is under the jurisdiction of the United States in accordance with Art. III of the 1903 Convention between the United States and Panama, and is governed by the Canal Zone Government. In addition to the islands enumerated above, there are some 25 islands in the Pacific Ocean over which the United States claim to sovereignty is disputed by other governments. Chief among these are Canton, Enderbury, Christmas, and Funafuti. Three islets in the Caribbean Sea fall into the same category. There are also certain islands in the Western Pacific to the south of the main Japanese islands, which, as a result of Art. 3 of the peace treaty with Japan, are under United States authority. *Ibid.*

74. 106 CONG. REC. 16090 (1960). For background and text of the treaty, *see* 41 DEPT. STATE BULLETIN 650, 911–917 (1959).

by the unanimous agreement of the consultative parties. After 30 years, amendments may be proposed by majority agreement. The treaty entered into force on June 23, 1961.⁷⁵

353. DISPOSITION OF THE PUBLIC DOMAIN

Originally, and for many years thereafter, it was the primary conception of Congress that the public lands would be sold as the main source of revenue for the country. Later, this concept was broadened and the disposition geared to aid in the settlement and industrial development of the country. The pre-emption law, the homestead act, the townsite acts, the railroad grants, the reclamation acts, and the mineral lands acts were all exemplifications of the new concept.

Grants were also made to states under various enactment statutes (*see* 36). Of the total area of the public domain, about 775 million acres still remain under federal ownership.⁷⁶

It has been the policy of the Government to make no disposition of its public lands until after they have been surveyed and a plat of the survey has been filed with and approved by the Bureau of Land Management (formerly the General Land Office) of the Department of the Interior.⁷⁷ When lands are thereafter granted, the plat is a part of the patent or deed (*see* 3532) and binds all parties as to the boundaries of the land conveyed, to the same extent as would be the case if the descriptive features of the plat were set forth in the patent.⁷⁸

3531. *Rectangular System of Surveys*

The rectangular system of surveys was inaugurated by the Continental Congress on May 20, 1785, with "An ordinance for ascertaining the mode of locating and disposing of lands in the western territory, and for other purposes therein mentioned." This is commonly called the "Land Ordinance of 1785."⁷⁹

75. 47 DEPT. STATE BULLETIN 40 (1962).

76. Gumm, *supra* note 63, at 4. *See also* note 66 *supra*. Authority for congressional disposition of the public domain is derived from Art. IV, sec. 3, cl. 2 of the Constitution, which provides that Congress shall have power "to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States." This power of Congress to dispose of such property has been held to be without limitation. *Alabama v. Texas*, 347 U.S. 272 (1954).

77. *Buxton v. Traver*, 130 U.S. 232 (1889).

78. *Cragin v. Powell*, 128 U.S. 691 (1888).

79. 28 JOURNS. OF CONG. 375-381 (1785). Thomas Jefferson was chairman of the committee appointed by the Continental Congress to prepare the plan for the survey and disposition of the public lands. Because of this, he has sometimes been mentioned as the originator of the Rectangular System of Surveys. The prevailing opinion, however, seems to be that the system was not the result of any single individual's thinking. PATTON, 1 LAND TITLES (2d ed.) 289 (1957).

The first public land surveys were made under this ordinance. This required the surveys to begin "on the river Ohio, at a point that shall be found to be due north from the western termination of a line which has been run as the southern boundary of the state of Pennsylvania." This southern boundary had been completed in 1784, but the western boundary (common with Virginia) had not been surveyed. It therefore became necessary for the line between Pennsylvania and Virginia (later West Virginia) to be surveyed before the surveys of the public lands could be started. The survey of the west boundary of Pennsylvania was completed in the summer of 1785, and a point on the west boundary at the north bank of the Ohio River marked by a stake on August 20, 1785. Thus was set the mark for the "point of beginning" of the survey of the public lands at a place now known as East Liverpool, Ohio. Actual work on the survey was begun on September 30, 1785, under the personal supervision of Thomas Hutchins—then Geographer of the United States—by running a line west from the point of beginning, as required by the statute. This was intended as a base line to govern the township subdivisional surveys.⁸⁰

That part of the Northwest Territory (*see* note 61 *supra*) which became the State of Ohio was the experimental area for the development of the system. The original intent was to establish townships exactly 6 miles square, these to be divided into 36 sections, each of which was to be exactly 1 mile square (640 acres). No allowance was made for the curvature of the earth and numerous complexities resulted. Successive amendments to the rules were made by acts of Congress as the surveys progressed westward. The culmination of these successive changes is the present system.⁸¹

Early public land surveys were made under changing systems and until 1910 were generally made by contractors who used crude instruments and often worked under unfavorable field conditions. Consequently, the lines and corners are sometimes in other than their theoretical positions. To eliminate litigation and to avoid costly resurveys, the original corners as established on the ground stand as the legally true corners, regardless of any irregularities in the original surveys (*see* note 129 *infra*).

80. "Point of Beginning" Commemoration, 20 SURVEYING AND MAPPING 475 *passim* (1960). For an account of the early surveys of the public lands, *see* PATTISON, BEGINNINGS OF THE AMERICAN RECTANGULAR LAND SURVEY SYSTEM, 1784-1800 (1957). The early acts of the United States Congress that dealt with the sale and survey of the public lands are embodied in the Act of May 18, 1796 (1 Stat. 464), entitled "An Act providing for the Sale of the Lands of the United States, in the territory northwest of the river Ohio, and above the mouth of Kentucky river," and the Act of Feb. 11, 1805 (2 Stat. 313), entitled "An Act concerning the mode of Surveying the Public Lands of the United States."

81. The adoption of the rectangular system marked an important transition from the surveying practices that prevailed in most of the Original Colonies where land grants were made without reference to any system and generally by "metes and bounds" (*see* 3741 C). CLARK (1959), *op. cit. supra* note 13, at 110.

The unit of the system is the *township*, a tract of land approximately 6 miles square; its distinguishing characteristic is that in the main, and in all cases where practicable, its units are in rectangular form. The township layouts are based on two primary lines—a *principal meridian* and a *base line* passing through an *initial point* (see fig. 97). The principal meridian is a true north-south line (a meridian) extending both north and south of the initial point, and the base line is a true east-west line (a parallel of latitude) extending both east and west of the initial point. These two lines constitute the axes of a system and the initial point constitutes the origin of that system.

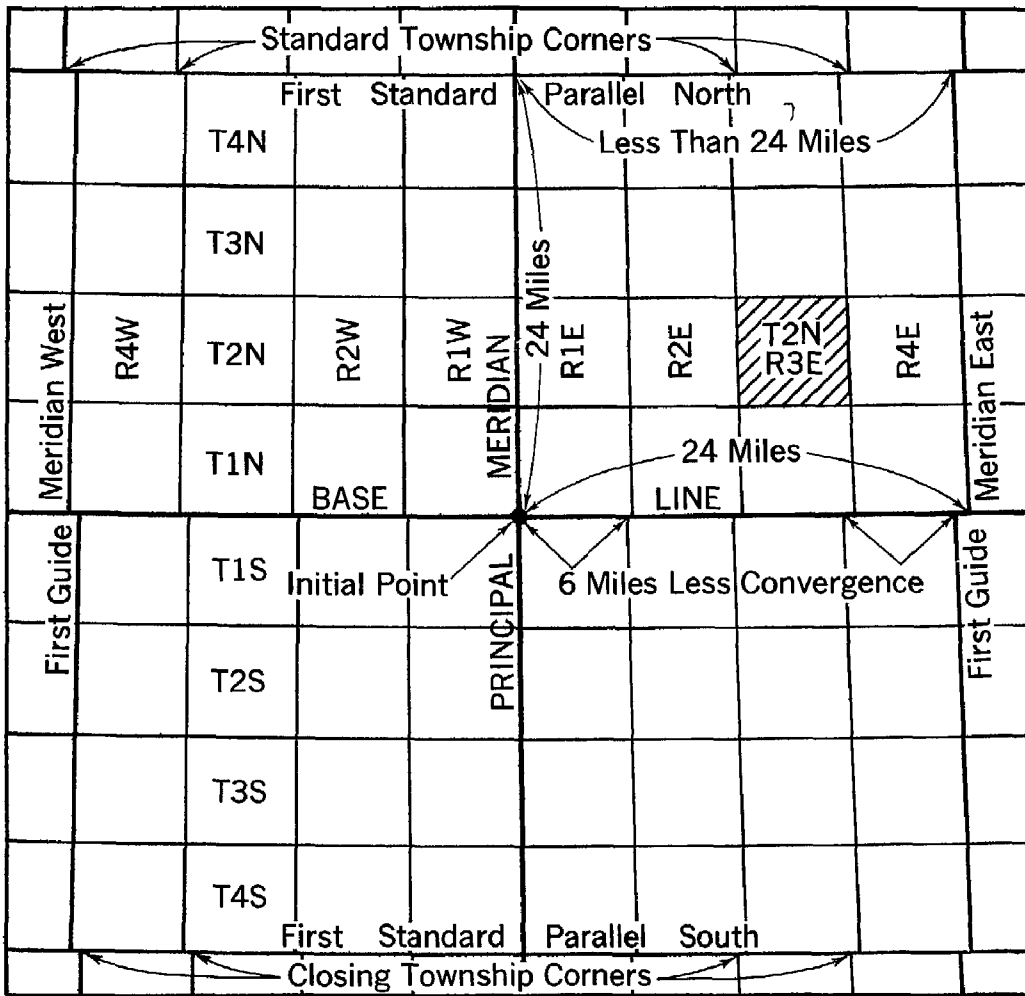


FIGURE 97.—Subdivision of the public lands into 24-mile tracts and townships under the rectangular system of surveys.

Since public land surveys have been in progress simultaneously in widely separated areas of the country, a large number of initial points with corresponding principal meridians and base lines have been established and from these the public land surveys are extended. Subdivisions of the public lands are referenced to their appropriate principal meridian which is designated by name or number.⁸²

Surveys of the public lands are under the jurisdiction of the Bureau of Land Management. The law prescribes the chain as the unit of linear measure for the survey of the public lands and all measurements are made in miles, chains, and links. A chain equals 100 links, or 66 feet, and 80 chains equals 1 statute mile, or 5,280 feet. Steel ribbon tapes from 2 to 8 chains in length are used.⁸³

Public land surveys are incomplete in the following states: Alaska, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.⁸⁴

A. SURVEY OF 24-MILE TRACTS

Each system to be surveyed is divided into tracts by means of standard parallels or correction lines (true parallels of latitude) located at intervals of 24 miles to the north and south of the base line and by means of guide meridians (true meridians) spaced at intervals of 24 miles east and west of the principal meridian. These meridians start at points on the base line or standard parallels and extend north to the next standard parallel. These two systems of lines form tracts approximately 24 miles square, the largest unit in the public lands system today. (See fig. 97.)⁸⁵

82. There are 32 initial points in the United States and no more are contemplated. As of 1947 there were 3 such points established in Alaska. *MANUAL OF INSTRUCTIONS FOR THE SURVEY OF THE PUBLIC LANDS OF THE UNITED STATES* 166-168, U.S. BUREAU OF LAND MANAGEMENT (1947). (The table on page 168 of that publication gives the latitudes and longitudes for all the initial points and the states they control.) Since 1947 (as of June 1960), two additional principal meridians have been established in Alaska—the Kateel River meridian with initial point at longitude $158^{\circ}45'31''.014$ W., latitude $65^{\circ}26'16''.374$ N. (21 Fed. Reg. 8123 (1956)), and the Umiat meridian with initial point at longitude $152^{\circ}00'04''.551$ W., latitude $69^{\circ}23'29''.654$ N. (22 Fed. Reg. 152 (1957)).

83. *MANUAL OF INSTRUCTIONS*, etc. (1947), *op. cit. supra* note 82, at 24, 25. Township plats (see 3531 B) are generally drawn to a scale of 1:31,680, but scales of 1:15,840, or larger, may be used when necessary for showing portions of townships in detail. The sheet size is always 19 by 24 inches, regardless of the scale. Plats are reproduced by photolithography. *Id.* at 401, 420.

84. *A Program to Strengthen the Scientific Foundation in Natural Resources*, H. Doc. 706, 81st Cong., 2d sess. 51 (1950). For a treatise on the Rectangular System and a history of the development of the public land surveys, see STEWART, *PUBLIC LAND SURVEY* (1935).

85. Because of the convergence of the meridians, the distance between the guide meridians is 24 miles only at the starting points; at all other points the distance is less by the amount of the convergence. There are thus two sets of corners along each standard parallel—one set (standard corners) referring to the guide meridian north of the parallel and the other set (closing corners) less than 24 miles apart established by the guide meridians from the south closing on that parallel.

B. SURVEY OF TOWNSHIPS

The next subdivision in the system is the *township*. In each 24-mile tract there are 16 townships, each approximately 6 miles square. This is accomplished by means of *range lines* (true meridians) laid out along the base line and each standard parallel in the same way as the guide meridians are laid out (*see note 85 supra*), and by township or *tier lines* (true parallels) which join corners on the principal meridian, guide meridians, and range lines. (*See fig. 97.*)⁸⁶

C. SURVEY OF SECTIONS

The final subdivision in the system under the original ordinance is the *section* (*see fig. 98*). Each township contains 36 sections, each 1 mile square, or 640 acres. Succeeding amendments to the original ordinance provided for further subdivisions into quarter sections, and quarter-quarter sections, the last containing 40 acres each (*see fig. 99*).⁸⁷ The sections are formed by straight lines, 1 mile apart, run parallel to the eastern range lines of the townships and by straight east-west lines, 1 mile apart, run parallel to the south township line.

The 36 sections in a township are numbered consecutively from 1 to 36, commencing with No. 1 in the northeast corner of the township, proceeding west to section 6, south to section 7, east to section 12, and so on, alternately, to No. 36 in the southeast corner.⁸⁸

D. MEANDER LINES

When land which would otherwise be comprised within a section is in part covered by navigable water, "meander lines" are run. These lines are

86. Townships are numbered consecutively as Township 1 North (T1N), Township 1 South (T1S), etc., north and south of the base line to the limit of the system, and east and west of the principal meridian as Range 1 West (R1W), Range 1 East (R1E), etc., to the limit of the system, a complete designation of a township being T1N, R1W. When associated with the principal meridian the description absolutely fixes its location geographically.

87. Sections are not subdivided in the field by the government engineers, but monuments are placed halfway between the section corner monuments and imaginary lines are drawn on the official plats dividing the section into four quarter sections of approximately 160 acres each. Surveys of subdivisions smaller than the section are the work of the local engineer. The government engineer is required so to establish the official section boundary monuments that a proper foundation is laid for the subdivision of the section, whereby the officially surveyed lines may be identified and the subdivision of the section controlled as contemplated by law. *MANUAL OF INSTRUCTIONS, etc. (1947), op. cit. supra note 82, at 205.*

88. A section is defined with reference to the township in which it is located, thus: Section Three, Township One North, Range One West. A subdivision of the same section, for example, a quarter-quarter section, would be defined thus: The northeast quarter of the southeast quarter of Section Three, Township One North, Range One West, or as the case may be for any other quarter-quarter section. In each case, the principal meridian would be designated to fix the parcel geographically. (*See 3741 A.*)

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	Section 14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

FIGURE 98.—Subdivision of townships into sections. There are 36 sections in each township always numbered as shown in the figure.

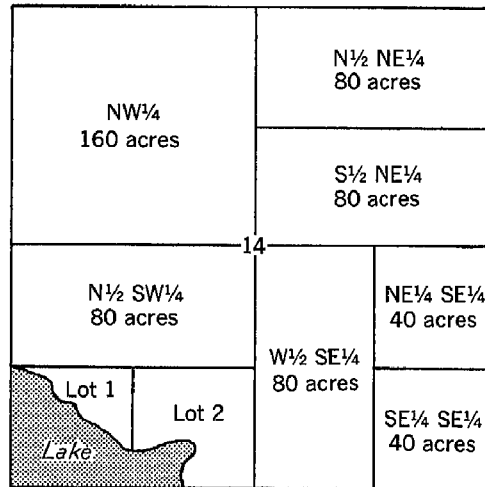


FIGURE 99.—Subdivision of section into quarter sections, half-quarter sections, quarter-quarter sections, and lots.

usually a short distance back from the water's edge. They disregard the minor sinuosities of the shore, and are used as a means of determining the quantity of land in the "fractional" section, as it is called. The meander line is not, however, a boundary line. Whenever a government plat shows a subdivision to be bounded by meandered water, unless there is a clear indication to the contrary, it is the water itself, and not the meander line, which forms the boundary.⁸⁹ But there is an exception to this where there is fraud or mistake in running the meander line. If either of these elements is present, the courts have generally held that the meander line is the actual boundary.⁹⁰

89. *Mitchell v. Smale*, 140 U.S. 406 (1891). In Nebraska, however, the meander line is presumptively the boundary (*Harrison v. Stipes*, 51 N. W. 976 (1892)), and in Michigan, private ownership of land along Lake Michigan is held not to extend beyond the meander line (*Ainsworth v. Munoskong Hunting Club*, 123 N. W. 802 (1909)), but the state's ownership of the land between the meander line and the water is subject to a right of access to the water by the riparian owner (*Staub v. Tripp*, 226 N. W. 667 (1929)). The State of Washington has adopted a rule that where the federal meander line is below the actual high-water line, a federal patent issued before statehood, or the right to which vested before statehood, carries title as far as the meander line. *Mercer Island Beach Club v. Pugh*, 334 P. 2d 534, 536 (1959). This notwithstanding the fact that the federal rule is perfectly clear that the water line and not the meander line is the true boundary. *Hardin v. Jordan*, 140 U.S. 371, 380-381 (1891); *City of Los Angeles v. Borax Consolidated, Ltd.*, 74 F. 2d 901, 902 (1935), and cases there cited. The Supreme Court of Washington explained the Washington rule as an exercise of the state's power to dispose of lands below the high-water line, pointing out that the state has no corresponding power to deal with lands above the high-water line, as that line marks the limit of the title which is acquired upon statehood. *Washougal Transp. Co. v. Dalles, etc., Nav. Co.*, 68 Pac 74, 77 (1902).

90. The judicial statement of the rule regarding meander lines can be summarized as follows: If the body of water is located substantially as shown upon the government plat, it is this natural monument which forms the boundary. But if there never was a body of water in front of a given parcel of land, or if one did not exist there at the time of the survey, then there was no natural object or monument marking the

Another qualification of the general rule is that the meander line will be treated as a boundary line if the meander line is actually or by necessary implication made a boundary of the land sold. So, if a meander line is established at an excessive distance from the actual shore as to leave between its course and the shore an excess of unsurveyed land, as where impassable marsh is encountered but later surveyed and patented by the Government, the meander line will be considered the boundary line of the first tract surveyed and not the shoreline.⁹¹

3532. Method of Transfer—Federal Patents

When the Government transfers to an individual a part of the public lands it does so by means of a "patent." A patent is a document that vests in the transferee the complete legal title to the land transferred, or furnishes evidence of the transfer. A patent is necessary to pass a perfect legal title to public lands.⁹²

The patent is, in form, a conveyance of the land, and corresponds to a "deed" when the parties to the conveyance are private individuals. When issued, the patent must be signed in the name of the President, either by himself or by his duly appointed secretary, sealed with the seal of the General Land Office (now the Bureau of Land Management), and countersigned by the recorder.⁹³

When Congress has made a grant taking effect *in praesenti* (at the present time), a patent is not necessary to transfer the title but its purpose is merely to furnish evidence of the transfer, or to show compliance with the conditions thereof, thus obviating the necessity of other proof of title in any legal controversy that may arise.⁹⁴ The Swamp Lands Act of 1850 (*see* 361) is an example of a grant taking effect at the date of the act and not at the time of issue of the patent.⁹⁵

boundary of the parcel; therefore, resort must be had to the secondary evidence, that is, the courses and distances which are ascertainable from the plats and surveys, and they must prevail. *French-Glenn Live-Stock Co. v. Springer*, 58 Pac. 102 (1899) (Oreg.) and affirmed by the Supreme Court of the United States in 185 U.S. 47 (1902). This statement of the rule was also approved by the Minnesota court in *Security Land & Exploration Co. v. Burns*, 91 N. W. 304 (1902) and affirmed by the Supreme Court in 193 U.S. 167 (1904).

91. *Niles v. Cedar Point Club*, 175 U.S. 300 (1899). This case involved fast land lying a considerable distance south of Lake Erie, and was bounded on the north by a boggy, wet marsh adjoining the lake. The patent of the fast land was held to be limited by the original meander line and not to include the marsh land.

92. Patents are also issued by the state governments to transfer title to state lands.

93. *McGarrahan v. Mining Co.*, 6 Otto 316 (96 U.S., 1878). Until all these have been done, the United States has not executed a patent for a grant of lands. *Id.* at 320.

94. *Wright v. Roseberry*, 121 U.S. 488 (1887).

95. *Id.* at 507. In this case, the lower court had held that inasmuch as the Commissioner of the General Land Office had not certified the lands in controversy as swamp lands there was no title in the state (Calif.) which it could convey. The Supreme Court held this to be an erroneous interpretation of the act on the ground that title passed as of the date of the act and all that was necessary was to show that the lands in question were swamp and overflowed lands on that date and no certificate of the Commissioner was necessary to pass the title. *Id.* at 520-521.

The extent of a federal patent, that is, the limit of the land conveyed is necessarily a federal question. It is a question which concerns the validity and effect of an act done by the United States—a right asserted under federal law. But rights and interests of riparian owners in the tidelands—lands between the high- and low-water marks—which are subject to the sovereignty of the state, are matters governed by local law.⁹⁶

36. STATE OWNERSHIP

It has already been noted that the Thirteen Original States and seven other states were never a part of the public domain (*see* notes 64 and 65 *supra* and accompanying text). Their lands remained with them to be disposed of by them under their own laws.

In the remaining states, land ownership included grants by the Federal Government of portions of the public domain under various enactment statutes. Among the more important of these were those for educational purposes. Usually, section 16 in every township, and sometimes also section 32, has been granted to the state or territory for the support of schools. In addition, grants have been made for state universities, agricultural colleges, and for other similar purposes. To each state, also, in which there were public lands, 500,000 acres were granted for internal improvements (Act of Sept. 4, 1841 (5 Stat. 453)).⁹⁷

36I. SWAMP AND OVERFLOWED LANDS—THE SWAMP LANDS ACT

State ownership is also derived from the grant by the Federal Government of swamp and overflowed lands. This had its origin in the Act of March 2, 1849 (9 Stat. 352), when Congress granted to Louisiana all the swamp and overflowed lands within the state for the purpose of aiding in reclamation. The Act of September 28, 1850 (9 Stat. 519), known as the "Swamp Lands Act," extended the grant to other public-land states then in the Union, but states subsequently admitted acquired no rights under it. Similar grants, however, have been made by special acts of Congress to some of the later states.⁹⁸

Under the Swamp Lands Act, all swamp and overflowed lands, within the respective boundaries of the states, which were part of the public domain and were unfit for cultivation were granted to them, if the same were unsold at the

96. *Borax Consolidated, Ltd. v. Los Angeles*, 296 U.S. 10, 22 (1935).

97. TIFFANY (1912), *op cit. supra* note 2, at 835-836.

98. *Pengra v. Munz*, 29 Fed. 830 (1887) (Oreg.). This case construes the Act of Mar. 12, 1860 (12 Stat. 3), extending the swamp lands grant to Oregon and Minnesota.

time of passage of the act and if their character *at that time* brought them within the provisions of the grant. The effect of the act was thus to invest the states *in praesenti* with an inchoate or equitable title to those lands falling within the description of the act, to be perfected into a legal title when the lands were identified as swamp lands (by the Secretary of the Interior) and a patent issued. The legal title, when acquired, related back to the date of the passage of the act. But it did not include swamp lands which the Government had not acquired nor did it free any of them of obligations to which they were subject when the act was passed.⁹⁹ On the other hand, if the lands claimed by a state were in fact swamp and overflowed lands on the day the act took effect, then they were not afterwards public lands at the disposal of the United States.¹⁰⁰ And it was held in *State v. Gerbing*, 47 So. 353, 357 (1908) (Fla.), that the act did not apply to the lands between ordinary high- and low-water marks (the tidelands) because the title to such lands was not in the United States when the 1850 act was passed, but was in the State of Florida by virtue of its sovereignty on admission into the Union (citing *Mann v. Tacoma*, 153 U.S. 273 (1894)).

Questions regarding the nature of the land may arise many years after the passage of the act—witness the cases cited in notes 99 and 100 *supra*—when the land in controversy has been subjected to filling or other man-made improvements. Early surveys of the Bureau, if available, could play a decisive role.¹⁰¹

As to what constitutes swamp and overflowed lands under the statute, no uniformity of opinion exists because of the inherent difficulty of laying down a hard-and-fast rule. But certain general tests have been applied by the courts. Thus, for example, it has been held that the proper test is the capacity of the land to produce a staple crop as the result of cultivation. The fact that land is subject to periodic overflow does not of itself constitute it as swamp and overflowed land. But land which is subject to overflow and requires artificial means to subject it to beneficial use is within the statute.

99. *United States v. O'Donnell*, 303 U.S. 501, 509–510 (1938). In determining the nature of the land at the time of passage of the act, early Bureau surveys played an important part in the final adjudication of this case (see 414).

100. *Wright v. Roseberry*, 121 U.S. 488, 521 (1887). In this case, the Supreme Court held that, under the Swamp Lands Act, the action of the Secretary of the Interior in identifying the lands as swamp and overflowed lands is conclusive against collateral attack, but when he has neglected or failed to make the identification, it is competent for the grantees of the state to identify the lands in any other appropriate mode which will effect that object. *Id.* at 509.

101. A case in point is the request of Sept. 17, 1958, from the Interior Department for copies of surveys along a section of the delta area of the Louisiana coast between 1839 and 1851. These surveys were necessary for determining whether or not there were lands in existence on Mar. 2, 1849, or Sept. 28, 1850 (see text at note 98 *supra*), and if there were it was essential to know the character of the land. On investigation, it developed that the earliest survey made by the Bureau in this area was dated 1884, but the incident emphasizes the collateral value of these early surveys.

While the terms "swamp lands" and "overflowed lands" have been distinguished, they have also been regarded as synonymous.¹⁰²

362. OFFSHORE SUBMERGED LANDS—THE SUBMERGED LANDS ACT

The most recent grant of lands by the Federal Government to the states is embodied in Public Law 31, which was approved May 22, 1953 (67 Stat. 29), and is identified as the Submerged Lands Act. Under it Congress confirmed and established the titles of the states to submerged lands under navigable waters within state boundaries. The act confers rights in three categories of cases: lands under inland navigable waters, tidelands (lands between high- and low-water marks), and lands under the open sea. Insofar as the first two categories are concerned, the act is merely declaratory of existing law and gives legislative expression to the doctrines enunciated by the Supreme Court in a long line of decisions beginning with *Martin v. Waddell*, 16 Pet. 367 (41 U.S., 1842), and *Pollard's Lessee v. Hagan*, 3 How. 212 (44 U.S., 1845) (see Volume One, Part 1, 111). The new aspect of Public Law 31 is the granting to the coastal states the submerged lands seaward of ordinary low-water mark and outside the inland waters, which the Supreme Court had held under the paramount rights doctrine to belong to the Federal Government (see Volume One, Part 1, 112).¹⁰³

37. PRIVATE OWNERSHIP

Private land ownership in the United States comprises those lands that formerly belonged to the Federal Government, to an individual state, or to a

102. *Miller v. Tobin*, 18 Fed. 609, 614 (1883) (Oreg.). In this case, it was said that the phrase "swamp and overflowed" as used in the statute is merely the equivalent of the phrase "wet and unfit for cultivation" and therefore land which is too wet for cultivation is swamp and overflowed, whether the water flows over it or stands upon it. On the other hand, it has been held that the word "swamp" without the addition of the word "overflowed" would have conveyed all lands so lacking in drainage as to be temporarily covered by water in the rainy seasons, and therefore the word "overflowed" was added for the purpose of bringing within the statute permanently submerged areas. *McDade v. Bossier Levee Board*, 33 S. 628, 631 (1902) (La.). The "permanently submerged areas" referred to in this case were the overflowed swamps and the shallow lakes of Louisiana. It does not apply to the beds of the Great Lakes, or even the smaller lakes, for the reason that such bodies of water are not susceptible of private ownership and because the purpose would not be to reclaim them, as contemplated by the statute. *Ibid.* It has also been held that the term swamp lands refers to lands that require drainage to fit them for cultivation (*Irwin v. San Francisco Savings Union*, 136 U.S. 578 (1890)), while the word overflowed refers to a permanent condition of the land and will remain so without reclamation or drainage. *Heath v. Wallace*, 138 U.S. 573, 584 (1891). For an enumeration of situations (with citations to cases) where the lands have been held to be within the Swamp Lands Act, see 50 *Corpus Juris*, at 999 n. 34, and 73 *Corpus Juris Secundum*, at 764-766.

103. For a comprehensive treatment of the various aspects of the Submerged Lands Act, see Volume One, Part 2, chap. 1.

foreign government. Grants made by the Federal Government which form the present basis of private ownership have already been noted in 353. It remains therefore to consider those lands derived from a state or from a foreign government.¹⁰⁴

371. GRANTS BY STATES

Of the lands within the Thirteen Original Colonies, the larger part had, at the time of the American Revolution, been granted to individuals or to associations, to hold in private ownership, and their rights, except insofar as the lands were confiscated for disloyalty, were not affected by the transfer of the sovereignty to the state. The lands not so encumbered vested in the Original States to be disposed of by them in accordance with a statutory system providing for their survey and sale to persons making formal application to the state authorities.

Grants made to individuals by states which ceded certain lands to the General Government were recognized by the United States in accordance with the agreement of cession.

Within the states formed from territory ceded to the United States by foreign governments (*see* 351) and in which grants have been made by the United States to the states (*see* 353), the latter have disposed of some of the lands so granted to individuals and corporations.

372. GRANTS BY FOREIGN GOVERNMENTS

Within the territory ceded to the United States by France, Spain, and Mexico, there existed, at the time of the cession, private rights based upon grants previously made. These were recognized by the United States after examination of their validity by commissioners named for the purpose, or by the Federal courts.¹⁰⁵

Lands comprised within the limits of the present State of Texas have been, in succession, the subject of private grants by the Spanish Government, the Mexican Government, the Mexican States of Coahuila and Texas, the Republic of Texas, and the present State of Texas.¹⁰⁶

104. There is a distinction between ownership and possession. The former signifies the right of possession or use and control of the land owned, whereas the latter signifies a use of the land, whether supported by ownership or not. An owner may not have possession, but he has the right of possession.

105. TIFFANY (1912), *op. cit. supra* note 2, at 841; *United States v. O'Donnell*, *supra* note 99, at 511.

106. TIFFANY (1912), *op. cit. supra* note 2, at 842. For a comprehensive statement on the main sources of private title in the separate states with reference to original grants to the states, the laws in force, and judicial decisions, *see* PATTON, 2 LAND TITLES (2d ed.) 73-111 (1957).

373. EXTENT OF OWNERSHIP

According to 16th century English law, *cujus est solum, ejus est usque ad coelum et ad inferos* (to whomsoever the soil belongs, he owns also to the sky and to the depths) was an accepted maxim and rule. That is, the owner of realty, unless there has been a division of the estate, is entitled to the free and unfettered control of his own land above, upon, and beneath the surface.¹⁰⁷ This is a sweeping rule which, with respect to private ownership above the surface, would appear to be completely out of focus with the needs of the modern air age. How 20th century courts have dealt with this maxim and the principles that have been developed are discussed in the following paragraphs.¹⁰⁸

373I. Above the Surface

The *ad coelum* doctrine, as it is called, has not been accepted universally with respect to ownership of the airspace. It has been challenged as never having been the law—at least was never taken literally—but rather as a mere figurative phrase to express the full and complete ownership of land and the right to whatever superjacent airspace was necessary or convenient to the enjoyment of the land. Thus, it was said by the Ninth Circuit Court of Appeals

107. BLACKSTONE, 2 COMMENTARIES (Lewis ed., 1902) 18 (1769). For a legal history of the maxim from its earliest conception to its recent consideration, see Klein, *Cujus Est Solum Ejus Est . . . Quousque Tandem?* 26 THE JOURNAL OF AIR LAW AND COMMERCE 237 (Summer 1959).

108. The upward extent of private ownership is to be distinguished from national sovereignty over the airspace. In the Convention on International Civil Aviation, signed at Chicago in 1944, it is proclaimed that "the contracting States recognize that every State has complete and exclusive sovereignty over the air space above its territory," thus recognizing the old English maxim. But the full scope of this basic international rule has never been established. Nor was it of particular importance that it be more specifically defined. The advent of satellites, missiles, and rockets has, however, emphasized the need for reexamining this rule in terms of the upward extent of a nation's sovereignty—does it end where there is no longer sufficient air to support aircraft, does it stop at the outer limit of the atmosphere, or does it extend into outer space? See Hogan, *Legal Terminology for the Upper Regions of the Atmosphere and for the Space Beyond the Atmosphere*, 51 AMERICAN JOURNAL OF INTERNATIONAL LAW 362 (1957); and Bookout, *Conflicting Sovereignty Interests in Outer Space: Proposed Solutions Remain in Orbit!* 7 MILITARY LAW REVIEW 23 (Department of the Army Pamphlet No. 27-100-7, Jan. 1960).

Cognizance is being taken on an international level of the possible legal questions that these technological developments raise. On Dec. 13, 1958, the General Assembly of the United Nations adopted a resolution establishing an *ad hoc* committee to report, among other things, on "the nature of legal problems which may arise in carrying out programs to explore outer space." This committee reported to the General Assembly on June 25, 1959 (U.N. Doc. A/4141), but made no determination of precise limits between airspace and outer space. Jessup and Taubenfeld, *The United Nations Ad Hoc Committee on the Peaceful Uses of Outer Space*, 53 AMERICAN JOURNAL OF INTERNATIONAL LAW 877 (1959). Although the problem is new and no agreements have been reached, judicially or otherwise, a considerable literature is developing in this field. See, for example, Fenwick, *How High Is the Sky?* 52 AMERICAN JOURNAL OF INTERNATIONAL LAW 96 (1958); Potter, *International Law of Outer Space*, *id.* at 304; Latchford, *The Bearing of International Air Navigation Conventions on the Use of Outer Space*, 53 AMERICAN JOURNAL OF INTERNATIONAL LAW 405 (1959); Kloman, *The Law and Outer Space*, 87 U.S. NAVAL INSTITUTE PROCEEDINGS 44 (1961); *Survey of Space Law*, H. Doc. 89, 86th Cong., 1st sess. (1959); and *Legal Problems of Space Exploration* (A Symposium), S. Doc. 26, 87th Cong., 1st sess. (1961). The last is a compilation of 94 articles written between 1951 and 1958.

that this "formula 'from the center of the earth to the sky' was invented at some remote time in the past when the use of space above land actual or conceivable was confined to narrow limits, and simply meant that the owner of the land could use the overlying space to such an extent as he was able, and that no one could ever interfere with that use."¹⁰⁹

It has also been challenged on the ground that the maxim is no more than dictum, insofar as laying down a principle of ownership of the airspace beyond the range of actual occupation, since in every case in which it was found it was used in connection with occurrences common to the era, such as overhanging branches or eaves (*see* 3733).¹¹⁰

This limitation on the *ad coelum* doctrine became more crystallized with the passage of the Air Commerce Act of 1926 (44 Stat. 568, 572) and the Civil Aeronautics Act of 1938 (52 Stat. 973, 980). These have given the United States "complete sovereignty of the airspace" over the country and have granted "any citizen of the United States a public right of freedom of transit in air commerce through the navigable air space of the United States."¹¹¹

The question reached the Supreme Court of the United States in 1946 in a case involving the right of military aircraft of the United States to fly so low with respect to private property as to destroy the use of the property as a poultry farm.¹¹² In reviewing the finding of the Court of Claims against the Govern-

109. *Hinman v. Pacific Air Transport*, 84 F. 2d 755, 757 (1936). An injunction and money damages were sought against the airline on the ground of alleged ownership of a stratum of airspace overlying real property which the airline invaded by gliding planes within 100 feet of the surface. Without defining the upward extent of such stratum of airspace, it was alleged that the space to an altitude of not less than 150 feet may reasonably be expected to be used. The court denied the injunction on the ground that no injury was shown other than the use of airspace which is lawful unless it causes injury to the landowner's possession. The principle of this case was cited with approval by the Supreme Court in *United States v. Causby*, note 112 *infra* (*see* text following note 113 *infra*), and by the United States Court of Appeals in the later case of *Allegheny Airlines v. Village of Cedarhurst*, 238 F. 2d 812 (1956) (*see* note 116 *infra*).

110. *Thrasher v. City of Atlanta*, 173 S. E. 817 (1934); *Swetland v. Curtiss Airports Corp.*, 55 F. 2d 201 (1932).

111. "Air commerce" is defined in the 1938 act as including "any operation or navigation of aircraft which directly affects, or which may endanger safety in, interstate, overseas, or foreign air commerce"; and "navigable air space" is defined as "air space above the minimum altitudes of flight prescribed by regulations issued under the Act." These definitions are essentially the same as appear in the "Federal Aviation Act of 1958" (72 Stat. 731, 739), except that navigable airspace also includes "airspace needed to insure safety in take-off and landing of aircraft." Intrastate air commerce, at least in the lower airspace over a private owner's property, is subject to regulation by the states and the federal regulations do not apply. *Strother v. Pacific Gas & Electric Co.*, 211 P. 2d 624 (1949). The Uniform State Law for Aeronautics provides that "sovereignty in the space above the lands and waters of this State is declared to rest in the State, except where granted to and assumed by the United States." 2 *Corpus Juris Secundum*, at 903.

112. *United States v. Causby*, 328 U.S. 256 (1946). The dwelling and farm was located about 1/3 mile from a municipal airport near Greensboro, N.C., which the Government had leased in 1942 for a term of 1 month with the right to renew until 1967. The 30 to 1 safe glide angle, approved by the Civil Aeronautics Authority, caused the path to one of the runways to pass directly over the property at a height of 83 feet, which was 67 feet above the house, 63 feet above the barn, and 18 feet above the highest tree. The Court of Claims, where the suit originated, awarded damages against the Government for the value of the property destroyed and the easement imposed. But it made no finding as to the

ment, the Supreme Court considered the old doctrine of ownership of the airspace in the light of the modern air age. It rejected the doctrine in no uncertain terms as not being one of general applicability, and said: “. . . that doctrine has no place in the modern world. The air is a public highway, as Congress has declared. Were that not true, every transcontinental flight would subject the operator to countless trespass suits. Common sense revolts at the idea. To recognize such private claims to the airspace would clog these highways, seriously interfere with their control and development in the public interest, and transfer into private ownership that to which only the public has a just claim.”¹¹³

But the principle enunciated, the Court held, did not apply to the instant case for the reason that, while the airspace is a public highway, and normally flights over private land do not constitute a “taking of property” (*see note 113 supra*), they are a taking if so low and so frequent as to be a direct and immediate interference with the enjoyment and use of the land. If the landowner is to have full enjoyment of his land, he must have exclusive control of the immediate reaches of the enveloping atmosphere. “Otherwise,” the Court said, “buildings could not be erected, trees could not be planted, and even fences could not be run. . . . The landowner owns at least as much of the space above the ground as he can occupy or use in connection with the land” (citing *Hinman v. Pacific Air Transport, supra note 109*).¹¹⁴

The vigorous dissent of two justices, from the holding of the majority, emphasized even more strongly the public nature of the airspace and indicated an even greater limitation, or virtual abandonment, of the *ad coelum* doctrine. They held it “inconceivable . . . that the Constitution guarantees that the airspace of this Nation needed for air navigation is owned by the particular persons who happen to own the land beneath to the same degree as they own the surface below. No rigid constitutional rule . . . commands that the air must be con-

precise nature or duration of the easement. (An easement is a right, in one person, created by grant, or its equivalent, to do certain acts on or over another person's land.) From this judgment, the Government appealed to the Supreme Court.

113. *Id.* at 261. It was the Government's contention that since the navigable airspace, under the Air Commerce Act of 1926, is subject to a public right of freedom of interstate and foreign air navigation, the flights are therefore an exercise of the declared right of travel through the airspace, and when flights are made within the navigable airspace without any physical invasion of the property of the landowners, there is no taking of property within the 5th amendment to the Constitution, which provides that the United States shall take no private property for public use without just compensation. *Id.* at 260.

114. *Id.* at 264, 266. The Court did not undertake to determine what the precise limits are since the Court of Claims had already established by evidence that there was a diminution in the value of the property brought about by the frequent, low-level flights. It agreed with the lower court that a servitude had been imposed upon the land, but it was uncertain from the record whether it was permanent or temporary, which would affect the amount of damages. The judgment of the Court of Claims was therefore reversed and the case remanded to it for determination whether the easement established was permanent or temporary from which it would be possible to make a more realistic assessment of the damages sustained.

sidered as marked off into separate compartments by imaginary metes and bounds in order to synchronize air ownership with land ownership.”¹¹⁵

In summary, it can be stated that, based on the two cases heretofore discussed, the old maxim that ownership of land extends to the sky has no general applicability in the modern world. At most, it is restricted to as much of the airspace above the ground as the landowner can reasonably occupy or use in connection with the land; the fact that he does not occupy it in a physical sense by erection of buildings and the like is not material. Flights by airplanes of the Federal Government over private lands are not a “taking” under the 5th amendment, so as to entitle the owner to just compensation, unless they are so low and so frequent as to be a direct and immediate interference with the enjoyment and use of the land.¹¹⁶

The doctrine of *United States v. Causby, supra*, was extended in March 1962 to commercial aircraft operating from municipal airports. *Griggs v. County of Allegheny*, 369 U.S. 84 (1962). The county as the owner of the airport was held liable for damages caused to a homeowner as a result of planes flying so low as to make occupancy of the home undesirable and unbearable. The Supreme Court found that the noise, vibration, and fear caused by constant and extremely low overflights had so interfered with the use and enjoyment of the property as to amount to taking of an air easement over it for which

115. *Id.* at 271. As for the case in question, they held the facts insufficient to support a taking of property under the 5th amendment. At most it constituted a nuisance, or the result of negligence, for which the Government had not consented to be sued. These justices would have completely reversed the decision of the Court of Claims. *Id.* at 275. In their view, the Air Commerce Act of 1926, which gave the United States complete and exclusive national sovereignty in the airspace, was passed on the assumption that the commerce clause of the Constitution gave Congress the same plenary power to control navigable airspace as its plenary power over navigable waters. And Congress gave the Civil Aeronautics Authority power to prescribe air traffic rules and these rules, they held, included those prescribing safe altitudes during take-off and landing operations, as well as safe altitudes while on the level of cross-country flight, and that the distinction drawn in the majority opinion between the two is not supported by the legislative history of the act. *Id.* at 272, 273. (The majority opinion considered the rules of safe altitude while on the level of cross-country flight as rules prescribing the safe altitude proper and rules governing take-off and landing as rules of operation. The minimum prescribed for cross-country flight was 500 feet during the day and 1,000 feet at night. This was held to be the navigable airspace which Congress placed within the public domain, and therefore, the flights in question were not within the navigable airspace and not within the public domain.) *Id.* at 263, 264. In the Federal Aviation Act of 1958, take-off and landing operations are specifically included within the definition of navigable airspace (*see note 111 supra*), which manifests an intention on the part of Congress to further circumscribe the *ad coelum* doctrine. The *Causby* decision was brought to the attention of Congress during the hearings on the 1958 act and presumably the spelling out of navigable airspace as including that needed for take-off and landing of aircraft was made with that in mind. *Hearings before Subcommittee on Aviation of the Committee on Interstate and Foreign Commerce on S. 3880*, 85th Cong., 2d sess. 137 (1958).

116. In 1956, a Federal appellate court passed on the extent of ownership of the airspace. The case involved the constitutionality of a village ordinance prohibiting air flights over the village at less than 1,000 feet above the ground. Approved take-off and landing procedures at the nearby airport, under the federal regulations, brought the planes over the village as low as 450 feet. It was held that the federal regulatory system had preempted the field below as well as above 1,000 feet from the ground and therefore the village ordinance was invalid; and that flights over private land are not a “taking” within the 5th amendment unless they are so low and so frequent as to be a direct and immediate interference with enjoyment and use of the land. *Allegheny Airlines v. Village of Cedarhurst, supra* note 109, at 816.

the county must pay just compensation, as required by the 14th amendment to the Constitution. (The slope gradient of the approach area left a clearance of 11.36 feet between the bottom of the glide angle and the chimney.)¹¹⁷

3732. *Below the Surface*

The owner of the surface of land is prima facie the owner of the soil or mineral deposits to the center of the earth, and this ownership cannot ordinarily be interfered with. Any underground encroachment by an adjoining owner is a violation of the surface owner's rights.¹¹⁸ There are, however, certain limitations on the right of enjoyment of possession of all property, one of which is its use to the detriment of or interference with a neighbor. And this has been held to give a court an inherent power to direct a survey to be made of the cave of one owner in order to determine whether the cave extends under the ground of an adjoining owner so as to constitute a violation of his right of ownership of the soil beneath his land.¹¹⁹

The soil beneath the surface may be divided horizontally for purposes of ownership, the surface belonging to one person, and a stratum below the surface to another, this frequently occurring in the case of a conveyance of the minerals separate from the surface.¹²⁰ But it has also been held that the owner's title does not extend beyond a depth which he can reasonably use.¹²¹

117. Two justices dissented from the majority opinion, not on the substantive holding of the right of a landowner to the use of some of the airspace above it, but on the ground that the United States, in its comprehensive plan for national and international air commerce—regulating in minute detail every aspect of air transit—has complete and exclusive sovereignty in the airspace above the United States, and therefore, it, rather than the county, had taken an air easement over the property. On this point the majority believed that the county as the promoter, owner, and lessor of the airport—with power to decide where the airport should be built, what runways it would need, their direction and length, and what land and navigation easements would be needed—took the air easement in the constitutional sense. But in *Batten v. United States*, 306 F. 2d 580 (1962), a Federal Court of Appeals held that property owners whose use and enjoyment of their properties were interfered with by noise, vibration, and smoke from adjacent military jet airport cannot recover for claimed governmental taking of their property without compensation. On appeal, the Supreme Court refused to review the lower court finding. *Batten v. United States*, 371 U.S. 955 (1963).

118. *Langhorne v. Turman*, 133 S.W. 1008 (1911) (Ky.). It is well known that oil has been extracted from wells extending thousands of feet below the surface and dug either by the landowner or by others under lease from him.

119. *Edwards v. Sims*, 24 S.W. 2d 619 (1929) (Ky.). This case involved the Great Onyx Cave of Kentucky. The same principle was applied by the Supreme Court of the United States in upholding a Montana statute authorizing the survey of the mining property of another when necessary to protect or enforce the right of any person owning a mining claim. *Montana Co. v. St. Louis Mining and Milling Co.*, 152 U.S. 160 (1894).

120. *Lee v. Bumgardner*, 10 S.E. 3 (1889) (Va.). Such right of ownership in minerals in place is to be distinguished from rights under a grant merely to take minerals from the land. Such right is not exclusive of the owner of the land also to take them, unless it is so expressed. *Johnstown Iron Co. v. Cambria Iron Co.*, 32 Pa. 241 (1859); 72 Am. Dec. 783.

121. *Boehringer v. Montalto*, 254 N.Y. Supp. 276 (1931).

3733. *Laterally*

A variation of the doctrine of private ownership above the surface of land (*see* 3731) is the case of the extent of lateral ownership. It can be stated as a general rule that the owner of a parcel of land has the right to occupy and use it to the full extent of his boundaries and of this right he cannot be deprived. Any infringement by another person of such right, as by allowing the branches of a tree or the eaves or wall of a building to project over adjoining land, constitutes a violation of his right for which the law would afford a remedy.¹²²

A variant of the "eaves doctrine" arises where land is conveyed and the deed describes one of the boundaries as 4 feet from the "northerly side" of a building. The question here posed is whether the conveyance carries with it the land to the edge of the eaves or only to the side of the building at ground level. In Massachusetts, the court held that the boundary was 4 feet from the extremest part of the building which in that case was the edge of the eaves.¹²³ But the decisions on this point are not uniform, and in a Maine case the court held that a boundary line, which was described as "parallel with and at the distance of eight feet four inches from the south side of the meetinghouse" had to be measured from the corner board of the meetinghouse and not from the edge of the eaves.¹²⁴

374. TRANSFER OF LAND

The usual mode of transferring land from one owner to another is by deed, which is an instrument in writing and under seal.¹²⁵ An essential requirement

122. *Hoffman v. Armstrong*, 48 N.Y. 201 (1872) (overhanging branches). But the court held in this case that the fruit on the overhanging branches belonged to the owner of the land on which the tree stood and not to the adjoining owner, and if the latter interfered with the removal of the fruit (as long as there was no trespass on his land) an action would lie against him. *See also Meyer v. Metzler*, 51 Cal. 142 (1875) (wall of building).

123. *Millett v. Fowle*, 22 Mass. 150 (1851).

124. *Center Street Church v. Machias Hotel Co.*, 51 Me. 413 (1864). However, in a later Maine case involving the lateral extent of a right of way adjacent to a building, the court pointed out the conflict between the *Millet* case, *supra*, and the *Center Street Church* case. Without expressing an opinion as to which rule should be preferred, the court distinguished between a right of way and that of land bounded by a building, as in the *Millet* case. It said: "When land is bounded by a building, it would be unreasonable to assume that the parties to the conveyance intended that the main portion of the building should be on one side of the line, and the cornices, and other projecting finish, on the other. Hence the rule that, in such a case, the line shall be regarded as wholly on one side of every portion of the building. Not so a right of way. There is nothing unreasonable in the assumption that a mere right of way, even if created by an express grant, was intended to extend under the projecting finish of a building." The court held the right of way to extend to the side of the building and not merely to the cornice on the gable, which projected about 8 inches from the building. It therefore reached the same conclusion as in the *Center Street Church* case, but for a different reason. *Farnsworth v. Rockland*, 22 Atl. 394 (1891) (Me.).

125. At common law (*see* 251) a conveyance of land was required to be under seal. This was accomplished by impressing some device upon wax which was made to adhere to the paper. By statute in many states, a mere scroll or any other device marked on the paper on which the conveyance is written, is sufficient, and the writing of the word "Seal" in connection with the signature is regarded as a sufficient sealing. *Cochran v. Stewart*, 59 N.W. 543 (1894) (Minn.).

of a deed is that the subject of the conveyance, the land itself, be fully described in order that it may be properly identified. The importance of the description has been recognized by the courts who have established that a deed to be valid requires, among other things, a thing granted, which must be described with sufficient clearness to set it apart from other things of the same kind.¹²⁶ If the deed does not refer to the land with such particularity as to render this possible then the conveyance is nugatory.¹²⁷

In many of the states there are statutory provisions authorizing an owner of land to have it surveyed and laid off in lots and blocks, and to file in the public records a plat or map of the land as thus laid off, authenticated and certified as may be required. Thereafter, any one of the lots or blocks may be conveyed by reference to the lot or block number. Even without statutory authority, a reference in the conveyance to a particular plat or map for purposes of description makes the plat in effect a part of the conveyance, and it may be utilized to identify the land conveyed.¹²⁸

374I. *Description of Land*

There are various methods of describing real property for transfer purposes. Among the more usual are: (*a*) by reference to the government survey in the public land states, (*b*) by reference to a map or plat which indicates the location of the land, (*c*) by metes and bounds, (*d*) by natural or artificial monuments, and (*e*) by course and distance. The pertinent aspects of these different methods will be briefly considered.

A. BY GOVERNMENT SURVEY

It has been previously noted that one of the early acts passed by the Congress was to provide for a system of rectangular surveys as a preliminary to the disposition of the public domain (*see* 3531). This furnishes one of the simplest methods of land description for all purposes of transfer in those parts of the country in which title to land is derived from the United States. In this method, the description is by reference to township, range, section, and principal meridian, and can apply to only one particular parcel of land. Thus, "the Northeast Quarter of the Southeast Quarter (NE $\frac{1}{4}$ SE $\frac{1}{4}$) of Section

126. *Los Angeles County v. Hannon*, 112 Pac. 878 (1910).

127. *Howard v. North*, 51 Am. Dec. 769, 783 (1849) (Tex.). And even where a description clearly delineates the land to be conveyed, but does not locate it because of its uncertain starting point has been held to be invalid. *Barker v. Southern Ry. Co.*, 34 S.E. 701 (1899) (N.C.).

128. *King v. Sears*, 18 S.E. 830 (1893) (Ga.).

Ten (10), Township Two South (T2S), Range Six East (R6E) of the Meridian of New Mexico" would be a complete description for title purposes (*supra* note 88).¹²⁹

B. BY REFERENCE TO MAP OR PLAT

Where a tract of land has been surveyed and laid off in blocks and lots, any one of the lots or blocks may be conveyed by reference to the map or plat, that is, by the number which it bears on the plat, thus avoiding the necessity of a detailed description of the land conveyed. As a general rule, when maps or plats are referred to in conveyances they are regarded as incorporated into the instrument and are usually held in effect as a part of the conveyance and may be utilized to identify the boundaries of the land conveyed.¹³⁰ This also applies to field notes. If the plat is in conflict with the field notes in an original government survey of the public lands, the plat prevails because it shows the lines that were approved by the Surveyor General and by which the land was sold.¹³¹

C. BY METES AND BOUNDS

Instead of describing land by reference to the township and section as in conveyances of the public lands (*see* 374I A), or by reference to a map or plat (*see* 374I B), it is common to describe it by placing all the data in the description. This is usually termed as a description by "metes and bounds."

129. A unique feature of government public land surveys is their conclusive nature. They cannot be attacked in a suit between private parties. The location of corners and lines established, when identified, are conclusive, and the true corner of a government survey is where the United States surveyors established it, whether such location is right or wrong. *Vaught v. McClymond*, 155 P. 2d 612 (1945) (Mont.). Although not part of the rectangular system, surveys of the Coast and Geodetic Survey have been accorded, at least in the Federal courts, a similar dignity, to the extent of taking judicial notice of the accuracy of such surveys (*see* 412).

130. *Deery v. Cray*, 10 Wall. 263 (77 U.S., 1870). A map or plat is the usual and proper method of making a record of a survey. *Karter v. East*, 125 So. 655 (1929) (Ala.). It is important to note that the Supreme Court of the United States, in the boundary dispute between Arkansas and Tennessee along the Mississippi River, where it was necessary to locate the middle of the main navigable channel as it existed before the avulsion of 1876, accepted the line of the boundary commissioners based on a reconnaissance map of the area prepared by a government engineer in 1874 pursuant to an act of Congress (courses of channel were taken by compass, distances were determined by the speed of the boat, and widths of river were estimated and to some extent checked by triangulation). The use of the map was objected to on the ground that it was not based upon a survey accurately made by measurement and instrumental observations, and therefore valueless to fix the old channel. But the Court held that the standard demanded was not applicable in the circumstances. It said: "The thing to be done must be regarded. It is to locate the boundary along that portion of the bed of the river that was left dry as a result of the avulsion, according to the middle of the main navigable channel at the time the current ceased to flow therein as a result of the avulsion. Absolute accuracy is not attainable. A degree of certainty that is reasonable as a practical matter, having regard to the circumstances, is all that is required." *Arkansas v. Tennessee*, 269 U.S. 152, 157 (1925).

131. *Bilbo Livestock & Land Co. v. Henson*, 71 So. 2d 874 (1954) (Ala.). However, under some authorities the field notes control. *Swarzwald v. Cooley*, 103 P. 2d 580, 589 (1940) (Calif.).

A survey of a tract by metes and bounds is one of the oldest methods of describing land and is the outgrowth of the art of surveying as practiced in olden times and was the method used to transfer lands in the Thirteen Original Colonies.¹³² Metes and bounds mean the boundary lines or limits of a tract. On this there is general agreement, but as to the exact meaning of the term there is variation among text writers and courts.¹³³

Separately, the word "metes" has been defined as the exact length of each line of a tract; whereas "bounds" has been defined as the limiting lines or boundary lines, either real or imaginary, which enclose or mark off a tract of land, or the natural or artificial marks which indicate the beginning and ending.

When used together, it would appear that "metes and bounds" is no more than a contraction for "measurements and boundaries." But the term has been defined variously in the law dictionaries as: the boundary lines of land, with their terminal points and angles (Bouvier); the boundary lines and corners of a piece of land (Ballentine); and the boundary lines of lands with their terminating points or angles (Black).

In an early Maine case, where a statute required metes as well as bounds to be used in describing real property, it was said: "By metes, in strictness, may be understood the exact length of each line, and the exact quantity of land in square feet, rods, or acres. . . . Metes result from bounds; and where the latter are definitely fixed, there can be no question about the former."¹³⁴

In the oft-cited case of *People v. Guthrie*, 46 Ill. App. 124 (1892), it was said: "We understand the phrase 'Metes and bounds,' to mean the boundary line or limit of the tract. This boundary line may be pointed out and ascertained by reference to objects either natural or artificial which are permanent in character and location, and so situated with reference to the tract to be described that they may be conveniently used for the purpose of indicating its extent. . . . The metes and bounds of the tract are definitely fixed by locating its center-line and naming the width of the tract as if the lines of its outer boundary had been given by courses and distances, and a description thus given would in a case of a discrepancy prevail over a description by courses and distances."¹³⁵

132. BOUCHARD AND MOFFITT, SURVEYING (4th ed.) 536 (1959).

133. It has even been suggested that it is one of those linguistic couplets, similar to "will and testament," "give and devise," that crept into the English language after the Norman Conquest, one part of the couplet reflecting Anglo-Saxon influence and the other Norman French, but essentially both have or originally had the same meaning. Adams, *Metes and Bounds*, 11 SURVEYING AND MAPPING 305 (1951).

134. *Buck v. Hardy*, 6 Me. 137 (1829). This would seem to indicate that "metes" being a function of the bounds may be omitted, but never the "bounds" which when set forth with certainty fix the former. See, for example, *Lester v. City of Dallas*, 177 S.W. 2d 231, 234 (1943) (Tex.), where the court said: "We do not think it necessary to a metes and bounds description that length of line be given when, as here, all boundaries of the involved area are fully set forth by calls for course and adjoiner."

135. This definition and the one in *Buck v. Hardy*, note 134 *supra*, are cited in the more recent case of *United States v. 5.324 Acres of Land*, 79 F. Supp. 748 (1948).

In some states, it commonly means a description by reference to adjoining lands;¹³⁶ in others, it is by reference to natural or artificial monuments.¹³⁷ It has also been stated that a description by metes and bounds consists of running out tracts of land by courses and distances and planting monuments at the several corners or angles.¹³⁸

It thus appears from the cases and texts that whatever may have been encompassed originally by the term "metes and bounds," it has been given a construction rather general in scope, and any description that is definite and locatable will be considered as falling within the purview of the term. Therefore, in reconciling conflicting elements in a description (*see* 3742), metes and bounds need not be considered as a distinctive class of calls.¹³⁹

D. BY MONUMENTS—NATURAL AND ARTIFICIAL

Boundaries of land are often described by reference to monuments. A monument, for the purpose of description, may consist of any object or mark on the land which may serve to identify the location of a line constituting a part of the boundary. The monument may be either a permanent natural object found on the land, such as a river, stream, lake, pond, ledge of rocks, or tree; or it may be an artificial object, such as a highway, wall, ditch, or post.¹⁴⁰

Objects, to be ranked as monuments, must have certain physical properties such as visibility, permanence and stability, and definite location, independent

136. *Moore v. Walsh*, 93 Atl. 355 (1915) (R.I.).

137. *Whitridge v. Baltimore*, 63 Atl. 808 (1906) (Md.).

138. CLARK (1959), *op. cit. supra* note 13, at 52. But in *Wood v. Ramsey*, 17 Atl. 563 (1889) (Md.), it was held that metes and bounds always control course and distance, the inference being that the latter is not synonymous with the former.

139. PATTON (1957), *op. cit. supra* note 79, at 314. In the survey of the public lands, metes and bounds surveys are required to define the boundaries of irregular tracts which are nonconformable to legal subdivisions, such as the boundaries of mineral and other claims, grants, and reservations. The fixation of the official survey upon the ground is ascertained by connecting it by course and distance to a corner of the public survey or to a location monument. MANUAL OF INSTRUCTIONS, etc. (1947), *op. cit. supra* note 82, at 349, 450. In the adjudication of water boundaries that are determined by tidal definition, the boundary is often described as following the mean low-water line or the mean high-water line, as the case may be, and "the several courses and distances thereof," instead of resorting to specific courses and distances, which would be awkward for a curving shoreline. This was the method used by the Supreme Court in its decree establishing the boundary between New Jersey and Delaware within the 12-mile circle. *New Jersey v. Delaware*, 295 U.S. 694 (1935). A similar method was used by the Department of Justice in describing the federal-state boundary along the Louisiana coast under the decree of the Supreme Court in the case of *United States v. Louisiana*, 340 U.S. 899 (1950) (*see* Volume One, Part 1, 731). Following the interpretation by the courts of the term "metes and bounds," such description would qualify under that category.

140. Frequently, the corners or lines of a tract of land are defined by reference to adjoining land, or to some adjoining structure, which, in its legal significance, includes the land under it, such as a house or mill. In such a case, the land conveyed extends merely to the side of the land or structure referred to as a monument, while in the ordinary case of a monument, the name of which does not include the ownership of land, such as a wall, a post, or a survey marker, the land conveyed extends to the center thereof. *City of Boston v. Richardson*, 95 Mass. 146, 154 (1866).

of measurements;¹⁴¹ and if the ravages of time destroy these essential elements, the object may lose its dignity as a monument and the boundary would be controlled by an inferior call, such as course and distance, because of its superior certainty.¹⁴²

E. BY COURSE AND DISTANCE

Courses and distances are mathematical descriptions of boundary lines indicating their direction and length. A course is the direction or bearing of a line with reference to the true or magnetic meridian.¹⁴³ Courses determined with a transit or theodolite are related to the true meridian and result in true bearings, whereas those determined with a magnetic compass are related to the magnetic meridian and result in magnetic bearings.

In descriptions by courses and distances, one without the other is meaningless. Only in the case of a triangular tract are distances alone (measured along the boundaries) sufficient to limit its shape and area; in all other figures, both are necessary. Each is an observed quantity and each liable to error in field determination and in recording. Where a conflict exists between the two, and where no superior calls exist, the order of precedence cannot be stated categorically in favor of one over the other. It does not fall in the same category as the rule that gives precedence to physical monuments on the ground over courses and distances, which is a reasonable rule (*see* 3742(b)).

While the reasons sometimes advanced for supporting the rule that courses take precedence over distances—to wit, the greater probability of a chain carrier losing count or reporting distances incorrectly, or the greater the distance the greater the probability of error¹⁴⁴—are valid under certain circumstances, the more technically sound rule would be to prefer neither one over the other, but

141. *Parran v. Wilson*, 154 Atl. 449 (1931) (Md.).

142. Thus, where it was impossible to ascertain even approximately where a fence marking the boundary of a tract of land was, it had lost its location and was therefore of no avail to the court in making its decision. Under these circumstances course and distance established the line. *McNichol v. Flynn*, 153 N.Y. Supp. 308 (1915). (*See also* note 157 *infra* and text pertaining thereto.)

143. The true meridian at a given place is a line that passes through that place and the geographical poles; in other words, it is the observer's plane that passes through the earth's axis of rotation. The magnetic meridian at a given place is defined as a line having the direction of the magnetic needle; that is, a vertical plane fixed by the direction taken by a perfect compass needle. It is sometimes thought that the compass points toward the magnetic pole. This is incorrect. The compass does point in the rather general direction of the magnetic pole over most of the earth—but usually not exactly toward the pole. For example, along the rooth meridian in the United States the north magnetic pole bears due north, but the compass points 10° or more to the east of true north. HOWE AND HURWITZ, *MAGNETIC SURVEYS* 3, SERIAL NO. 718, U.S. COAST AND GEODETIC SURVEY (1956).

144. *Matador Land & Cattle Co. v. Cassidy-Southwestern Commission Co.*, 207 S.W. 430, 432 (1918) (Tex.). Other reasons sometimes mentioned are failure to observe the correct position of the zero-point of the tape, reading the wrong footmark, tape not stretched straight, careless plumbing, and difficulty of the terrain over which the distances are measured, whereas bearings or angles are observed by one man—usually the best trained and most responsible person on the survey party, working under easier conditions and usually keeping the notes.

rather to be guided by the circumstances surrounding each particular case, including methods of survey, character of the terrain, etc. This, in essence, is what the Supreme Court held in an early case, when it said: "It may be laid down as an universal rule, that course and distance yield to natural and ascertained objects. But where these are wanting, and the course and distance cannot be reconciled, there is no universal rule that obliges us to prefer the one or the other. Cases may exist, in which the one or the other may be preferred, upon a minute examination of all the circumstances."¹⁴⁵

Course references in deeds or other instruments sometimes require interpretation. When a boundary line is described as running toward one of the cardinal points (north, east, south, or west), there is no ambiguity. Where either of these words is used without qualification, the meaning is "due north," "due east," "due south," or "due west," as the case may be. Even the words "easterly," "northerly," etc., have been held to mean "due east," "due north," etc., if there is nothing in the description to indicate an intent to limit the exact direction.¹⁴⁶ The same is true of variants of these words, to wit, "eastward," "southward," etc.¹⁴⁷ And by analogy, this general rule would apply to the intercardinal points. For example, northwesterly would mean the exact direction of northwest unless there was language in the instrument that indicated an intent to consider this a general rather than an exact direction.

A common form of limitation is where a water boundary is defined by reference to the tide—for example, the line of mean high water or the line of mean low water. It is customary in these cases to use phraseology such as, "thence along the mean low-water line in a southerly direction," or by a similar reference to the mean high-water line. Such general references to the cardinal

^{145.} *Preston's Heirs v. Bowmar*, 6 Wheat. 580 (19 U.S., 1821). A point of such consideration, although not conclusive, would be that the accepted rule for balancing a survey made with the compass—that is, adjusting for the error of closure—is to assume that the error of closure is as much due to erroneous bearings as to erroneous chaining. On the other hand, if a transit is used for measuring the angles, then the assumption is that the error of closure is due wholly to chaining. JOHNSON AND SMITH, *THE THEORY AND PRACTICE OF SURVEYING* 235 (1913).

^{146.} *Livingston Oil & Gas Co. v. Shasta Oil Co.*, 114 S.W. 2d 378, 381 (1938) (Tex.). But in *Fosburgh v. Sando*, 166 P. 2d 850, 851 (1946) (Wash.), it was held that "northerly" implies only in a general direction and the description of the land was insufficient without recourse to oral testimony which would be violative of the Statute of Frauds. In this case, it was shown that even if "northerly" were assumed to mean "due north," then the next course would not have been sufficiently clear without the introduction of parol testimony. *Ibid.*

^{147.} *Higgins v. Round Bottom Coal & Coke Co.*, 59 S.E. 1064, 1068 (1907) (W. Va.). In determining what was intended by a clause which gave a right to undermine "southward beyond the lines of said tract," the court held the use of the word "lines" instead of "line," and the fact that the residue of the land lay south and west of two lines of the granted tract, clearly indicated an intention not to limit the grant to land immediately and directly south of the granted tract, but rather a grant to undermine south-westward, as well as southward, from the tract granted.

or intercardinal points are controlled by the directions taken by the line of low water or the line of high water.¹⁴⁸

A word of caution is necessary regarding the term "due north." By modern surveying practices, when surveys with the compass are becoming more and more infrequent, this would be interpreted to mean the same as "true north," that is, as referring to the true meridian. But many of the early property boundary surveys in the United States were made with the magnetic compass, such surveys being referenced to the magnetic meridian rather than the true meridian (*see note 143 supra*). Due north and true north must therefore be distinguished. The first (due north) may be magnetic or true, whereas the latter (true north) can only mean geographic or astronomic north and would coincide with the true meridian. The interpretation of the term "due north," or the like, thus depends upon how the surveys in a particular state were referenced. Where the deed or patent does not indicate what meridian is intended, it has been held that courses relate to the magnetic meridian.¹⁴⁹

The value of the magnetic declination on different dates is held to be a matter of proof and not subject to judicial notice (*see 412 note 1*).¹⁵⁰

3742. *Conflicting Elements in Descriptions*

Descriptions in deeds are not always free of ambiguity as to meaning and there may be conflicts between the various provisions which make it difficult to locate the boundaries of the land on the ground. Courts have therefore developed rules of construction for such situations which should be understood in any consideration of shore boundaries. The more common of these will be dealt with.

The cardinal rule for the resolution of ambiguities in conveyances is to determine the intent of the parties as effectively expressed and as inferred from

148. In the New Jersey-Delaware boundary dispute, one of the sections along the eastern bank of the Delaware River was described in the Supreme Court's decree as "Thence (6) along the mean low water line of the eastern bank of the Delaware River, the several courses and distances thereof, the general direction being first, southwestward, second, southeastward and lastly, southward." *New Jersey v. Delaware*, *supra* note 139, at 696.

149. *McKinney v. McKinney*, 8 Ohio St. 423, 427 (1858). It was said in this case that in respect to surveys in Ohio, where two meridians had been adopted for the survey of the public lands, "west" or 'due west,' in one class of original surveys, means a line at a right angle to the true meridian; and in another class 'west' or 'due west' is west according to the bearings of the surveyor's compass at the time of the original survey." But in *Richfield Oil Corp. v. Crawford*, 249 P. 2d 600, 608 (1952) (Calif.), it was held that "due north" must be surveyed on an astronomical basis, unless other terms of a deed or admissible extrinsic evidence show that a different method was intended. For citations to cases defining or construing various compass directions, *see 11 Corpus Juris Secundum*, at 543-545.

150. *Vance v. Marshall*, 6 Ky. 148, 150 (1813). It was considered the universal custom among surveyors at that time to orient surveys with the magnetic meridian, and resurveys had to be executed according to the magnetic meridian at the date of entry and not at the date of resurvey. *Ibid.*

all parts of the instrument, giving each word its due force, and read in the light of conditions and circumstances existing at the time the conveyance was executed.¹⁵¹ Any rules which courts have formulated as to the precedence to be given the elements in the description that may be in conflict are merely intended as aids in arriving at this intention. These same rules of construction, applied to deeds and grants, are applicable in the case of boundaries, a fundamental principle being that the most material, certain, and least liable to error will prevail.¹⁵²

The object of all rules for the establishment of boundaries is to ascertain the actual location of the boundary as made at the time. In resolving conflicts in descriptions, courts have generally agreed upon the following order of precedence: (1) natural monuments or objects, such as mountains, lakes, and streams; (2) artificial marks, stakes, or other objects, made or placed by the hand of man; (3) maps and plats; (4) courses and distances; and (5) recitals of quantity. While these rules of comparative dignity have been said to be not artificial rules, built on mere theory, but rather the result of human experience, they are not conclusive and are merely helpful in determining to which of conflicting locative calls controlling effect should be given.¹⁵³ Preference is given to monuments because they are least liable to error, and the degree of importance given to other calls is in proportion to the liability of the parties to err in reference to them. But the rules are not inflexible, and a call which would defeat the parties' intention will usually be rejected, regardless of the comparative dignity of the conflicting calls.¹⁵⁴

The above stated order which, other things being equal, gives precedence to natural monuments over all other calls, does not obtain where lines and corners of a survey have been run and marked, and can be found. Such lines constitute the true boundaries and prevail over all other calls including those of monuments, provided such lines were intended by the parties as lines of the land

151. *Carlisle v. Graves*, 64 So. 2d 456 (1953) (La.). Ambiguities are either latent or patent. Where the language used is clear and suggests only a single meaning, but some extrinsic fact creates a need for interpretation or a choice between two or more possible meanings, it is termed a *latent*, or hidden, ambiguity. But a *patent* ambiguity is one which appears on the face of the instrument and arises from the use of defective or obscure language. *Petrie v. Hamilton College*, 53 N. E. 216 (1899) (N.Y.). Patent ambiguities cannot generally be cured by outside evidence, and it is in the field of latent ambiguities for which the rules of construction have been established.

152. *Newsom v. Pryor*, 7 Wheat. 7 (20 U.S., 1822).

153. *United States v. Redondo Development Co.*, 254 Fed. 656 (1918) (N. Mex.). Calls are of two kinds—locative and descriptive. Locative calls are specific or particular calls, exactly locating a point or line. Descriptive calls are general or directory calls and merely direct attention to the neighborhood where the specific calls may be found. *Cates v. Reynolds*, 228 S. W. 695 (1921) (Tenn.).

154. *State v. Sulflow*, 128 S. W. 652 (1910) (Tex.). In case of a clear mistake, a call of a lower order will control one of a higher order, as most clearly indicating the intention of the grant.

to be conveyed and reference is made in the conveyance to such lines. This is sometimes referred to as "following the footsteps of the surveyor."¹⁵⁵

(a) *Control of Monuments.*—Monuments are regarded as natural or artificial, these terms referring broadly to the works of nature and the works of man, respectively. The objects that are ranked as monuments and the physical properties they should possess have been described in 3741 D. Except as stated previously that lines actually surveyed and marked take precedence over monuments, calls for monuments ordinarily control other and conflicting calls in a conveyance, natural monuments outranking artificial ones in the order of precedence.¹⁵⁶ So that calls for monuments control courses and distances, maps and plats, and quantity. (Watercourses, such as streams, rivers, and lakes, or the banks and shores thereof, are in the category of natural monuments.) But, as is the case with rules of construction in general, the rule of priority of monuments is not absolute or inflexible. It is still a rule of construction, and as such is adaptable to circumstances, or it is a rule of evidence. Thus, a call for a natural monument will yield to other and conflicting calls when application of the general rule would be contrary to the intention of the parties, or when the call for the natural monument is clearly erroneous.¹⁵⁷

Within these qualifications, monuments, whether natural or artificial, control a conflicting description by course and distance.¹⁵⁸ And the same applies to conflicting calls for quantity. It is immaterial that the boundary of the land as ascertained from the monuments embraces a much larger area than that called for.¹⁵⁹

Monuments of equal dignity stand as equals before the law and one natural monument is entitled to no more respect than another natural monument. However, where there is a conflict between monuments, that which is most certain, least likely to mistake, or better serves to carry out the intention of the

155. *Millerman v. Megarity*, 242 S. W. 757 (1922) (Tex.). In connection with the control of marked lines over courses and distances, it has been said that the reason for the rule is that the marks on the ground constitute the survey while the courses and distances given in the conveyance are only evidence of the survey. *Andrews v. Wheeler*, 103 Pac. 144 (1909) (Calif.).

156. For a list of objects that have been held to be monuments generally or with respect to particular situations, see 11 *Corpus Juris Secundum*, at 545.

157. *Kelekolio v. Onomea Sugar Co.*, 29 Hawaii 130, 134 (1926). It was said in this case that "All of these ordinary rules [that natural monuments control], however, relating to conflicts between areas, courses and distances and natural monuments and between two or more natural monuments, are susceptible of exceptions and need not be followed or may be reversed when under the circumstances and the evidence the contrary rule better serves to carry out the intention of the parties as to the location or extent of the land described in the instrument under consideration."

158. *White v. Spahr*, 59 S. E. 2d 916 (1950) (Ga.). The reason for the rule has been stated to be that monuments or objects afford greater certainty than calls for courses and distances and are less subject to error. *Barker v. Houssiere-Latreille Oil Co.*, 106 So. 672 (1925) (La.).

159. *Daughtrey v. McCoy*, 135 S. W. 1060 (1911) (Tex.). Monuments erected by mutual consent control all statements in the deed including such definite descriptions as containing "exactly one acre and a half." *Emery v. Fowler*, 38 Me. 99 (1854).

parties will be given preference. And one which corresponds with the courses and distances or with quantity will be accepted.¹⁶⁰ The same is true of artificial monuments.

(b) *Control of Maps and Plats.*—Maps or plats referred to in a conveyance of land are generally regarded as furnishing the true descriptions of the boundaries of the land conveyed. And a map or plat so referred, particularly if it is a public record, stands upon the same footing as a monument.¹⁶¹ A map as a monument controls calls for course and distance, in case there is a conflict between them. And it has been said that maps and notes of a survey “are products of technical engineering skill, and practical knowledge gained by laying out the many separate parcels and defining their relations to each other and to the whole section. Therefore, departure from their terms is tolerable only in instances where boundary line and measurements are so inconsistent that one or the other must yield something to perfect or to approximate the identity of the grant.”¹⁶² Maps, plats, and field notes also take precedence over descriptions by area or quantity, the latter being considered the weakest of all descriptions.¹⁶³

(c) *Control of Course and Distance.*—In the absence of any superior calls in a boundary description, calls for course and distance will ordinarily govern. This follows the legal principle that the best evidence of which a case is susceptible must be produced. Thus, where the calls for courses and distances were manifestly erroneous because a survey based upon them failed to close, they were nevertheless accepted because they furnished the only location of the boundary, since the site of the north bank of an old slough as it existed in 1893 could not be determined with certainty.¹⁶⁴ But this does not mean that courses and distances cannot be overcome by other forms of evidence that establish the intent of the parties more certainly, or if the exclusive use of courses and distances would frustrate the grant.

Calls for courses and distances will in cases of conflict control calls for quantity, especially if the latter is qualified by the words “more or less,” unless an unconscionable result would ensue.

The internal conflict between course and distance and its resolution has been previously discussed (*see* 374I E).

(d) *Control of Quantity.*—It has already been noted that a description of land by naming the area it is supposed to comprise is considered in terms of other

160. *Gilbert v. Parrott*, 182 S. W. 859 (1916) (Ky.).

161. *Wilson v. Chicago Lumber & Timber Co.*, 143 Fed. 705 (1906).

162. *In re Tremont Housing Corp.*, 242 N.Y. Supp. 128, 129 (1930).

163. *Wagers v. Wagers*, 238 S. W. 2d 125 (1951) (Ky.).

164. *Armstrong v. Batterton*, 260 S. W. 80 (1924) (Mo.). The course and distance in this case was not only the best but the only evidence available as to the location of the boundary corners.

conflicting descriptions to be the weakest in the determination of boundaries and therefore the last element to be resorted to. But where there is doubt as to the true description, a recital for quantity may be resorted to for the purpose of making that certain which would otherwise be uncertain.¹⁶⁵ And quantity will control where it is made the essence of the contract, or there is a covenant to convey a definite quantity.¹⁶⁶

38. AREA OF THE UNITED STATES (1940)

There have been many determinations of the area of the United States beginning with 1850 when, in the annual report of the General Land Office, total areas were given for the 17 states and 3 territories being surveyed by that agency.¹⁶⁷ For decades, the U.S. Bureau of the Census has given increased attention to the measurement of the areas of the states and counties, in connection with the various censuses of the United States.¹⁶⁸ But, as elsewhere, an accurate measurement had to await the construction of accurate maps.

By 1937, the cartographic picture had improved sufficiently to justify the undertaking by the Bureau of the Census of the remeasurement of the United States, in connection with the Sixteenth Census in 1940.¹⁶⁹

38I. DEFINITIONS FOR MEASUREMENT

Determining the area of the United States is not a simple matter. Many problems are involved that must be resolved in advance, one of the knottiest

165. *Korneman v. Davis*, 219 S. W. 904 (1920) (Mo.).

166. *Doyle v. Mellen*, 8 Atl. 709 (1887) (R.I.). The use of the words "more or less" in connection with quantity is to show that all the land embraced within the description is intended to pass, and in that sense are often important in the construction of the instrument of conveyance. And it has been held that "a deed which describes the land and states the number of acres, although with the words 'more or less,' clearly imports that there is not a great deficiency or excess." *Belknap v. Sealey*, 67 Am. Dec. 120 (1856) (N.Y.). And when used in connection with quantity or distance they are considered words of safety or precaution, intended to cover some slight or unimportant inaccuracy. The same applies to the use of the word "about." *Russo v. Corideo*, 129 Atl. 849 (1925) (Conn.).

167. PROUDFOOT, MEASUREMENT OF GEOGRAPHIC AREA 27, U.S. BUREAU OF THE CENSUS (1946).

168. *Id.* at 65-113. The 1881 measurement was the most comprehensive to that time and gave the land and water areas for the states and territories, with a breakdown for counties, coast waters (bays, gulfs, sounds, etc.), rivers and smaller streams, and lakes and ponds. In addition, it included a table of the principal inland lakes and their areas, and gave, for the first time, an account of the methods and maps employed, the water bodies included, and the outer limits of the United States used as a basis for measurement. *Id.* at 88-95. The 1906 measurement included the areas of the land and water surface of the states and territories of continental United States, and the total areas of the outlying possessions. In addition, the areas of those portions of the Great Lakes allocable to the bordering states were also given. *Id.* at 112-113.

169. Complete coverage of the United States on one single projection had just become available with the completion by the Coast and Geodetic Survey of the sectional aeronautical charts covering the United States. *Id.* at 31.

being that of setting the outer limits of the United States, which in turn involves the adoption of definitions for land and water; establishment of criteria for the inclusion or exclusion of bays, sounds, estuaries, and the Great Lakes; and for the treatment of tidal flats and other surfaces temporarily covered with water.

In resolving these problems, fundamental definitions were established for the first time for *state waters* (waters other than inland) (*see* 3811), *inland waters* (*see* 3812), and *land areas* (*see* 3813).

3811. *State Waters*

For establishing the outer limits of the United States, that is, to determine which waters (coastal and Great Lakes) adjacent to the states should be included or excluded, the following three rules were adopted:

(1) Where the coastline was regular, it was followed directly unless there were offshore islands within 10 nautical miles.

(2) Where embayments occurred having headlands of less than 10 and more than 1 nautical mile in width, straight lines connecting the headlands set the limits; however, the coastline was followed if the indentation of the embayment was so shallow that its water area was less than the area of a semicircle using the said straight line as a diameter.

(3) In cases where there were two or more islands less than 10 and more than 1 nautical mile from shore, they were connected by a straight-line or lines and other straight lines drawn to the shore from the nearest point on each end island.¹⁷⁰

3812. *Inland Waters*

Definitions, in harmony with those established for coastal and Great Lakes water (*see* 3811) and for land (*see* 3813), were established for the treatment of inland waters. The rules for state waters were adopted, but a limit of 1 nautical mile was substituted for the 10 nautical miles; that is, in the case of tributary waterways, to either state waters (*see* 3811) or to the open sea, having headlands of 1 nautical mile or less in width, straight lines connecting the headlands set the

170. BATSCHLET, AREAS OF THE UNITED STATES 2 (Sixteenth Census of the United States: 1940), U.S. BUREAU OF THE CENSUS (1942). These rules are adaptations of the principles urged by the United States, at the 1930 Hague Conference on the Codification of International Law, for determining the status of an indentation *vis-a-vis* inland waters and high seas (*see* Volume One, Part 1, 42, 421, 43, 54). These water areas are not included in the table of areas for the United States (*see* Table 2), but are given in a separate table entitled "Water area, other than inland water, for conterminous United States by primary bodies of water" (*see* Table 3). PROUDFOOT (1946), *op. cit. supra* note 167, at pages 37 to 51, contains a multisectional strip map which traces the outer limits of the United States. It shows in symbolized form the areas of state waters along the entire coast of conterminous United States, including the Great Lakes.

limits of inland waters. In addition, inland water was defined to include the following: permanent inland water surface, such as lakes, reservoirs, and ponds having an area of 40 acres or more; streams, sloughs, estuaries, and canals having a width of one-eighth statute mile or more; and islands having less than 40 acres of area.¹⁷¹

3813. Land Areas

Land was defined to include the following categories: land permanently dry, and land temporarily or partially covered by water, such as marshland, swamps, and river flood plains; streams, sloughs, estuaries, and canals less than one-eighth of a statute mile in width; and lakes, reservoirs, and ponds having less than 40 acres in area. Tidal flats, that is, land between high and low water, were omitted from a consideration of land areas and the mean high-tide line used as the limiting line.¹⁷²

382. TECHNIQUE OF MEASUREMENT

For the actual measurement of the areas, the technique adopted was as follows: The total area of the United States was computed by using the sectional series of aeronautical charts of the Coast and Geodetic Survey on a scale of 1:500,000 in conjunction with the Smithsonian Geographical Tables. Areas of 30 minutes on a side were taken directly from the tables.¹⁷³ Those parts of the United States which did not cover a 30-minute area were measured by polar planimeter.

For the individual states, the same method was used as for the United States and the state areas were then adjusted to the established United States total.

The counties were measured by planimeter, using U.S. Geological Survey state maps on a scale of 1:500,000. The county values were then adjusted to the adjusted state areas.¹⁷⁴

171. *Id.* at 33. These definitions and those for land area (*see* 3813) are in terms of practical limits for planimeter measurement when working on maps with scales varying from 1:62,500 to 1:125,000.

172. *Ibid.* and n. 100.

173. WOODWARD, SMITHSONIAN GEOGRAPHICAL TABLES 146-148 (1918). The values in the tables were adjusted to conform to the legal ratio of 39.37 inches to the meter. BATSCHLET (1942), *op. cit. supra* note 170, at 2.

174. *Ibid.* With the polar planimeter, errors of 0.15 to 1.0 percent result in ordinary hand operations, depending on the size of the area to be measured, the character of the map paper, the skill of the operator, and a number of other possible variables. Under controlled conditions, results are accurate to even less than 10.15 percent. A maximum variation of 0.6 percent was allowed between original and independent duplicate readings. PROUDFOOT (1946), *op. cit. supra* note 167, at 20, 34.

383. DERIVED VALUES

As measured, in accordance with the adopted definitions and techniques, the derived totals in the various categories are as follows (the categories follow the definitions outlined in note 63 *supra*):

INLAND WATER

Conterminous United States=45,259 square statute miles
 Continental United States=60,594 square statute miles
 United States=60,607 square statute miles

LAND AREA

Conterminous United States=2,977,128 square statute miles
 Continental United States=3,548,193 square statute miles
 United States=3,554,619 square statute miles

LAND AND WATER AREA

Conterminous United States=3,022,387 square statute miles
 Continental United States=3,608,787 square statute miles
 United States=3,615,226 square statute miles

STATE WATER

Conterminous United States=74,364 square statute miles

Table 2 shows the land and inland water area by states for the United States. Table 3 shows the state waters by states for conterminous United States only—figures for the then territories of Alaska and Hawaii were not computed in the 1940 Census.¹⁷⁵

175. The Census tables include a breakdown of the land and water area of the United States by counties and by minor civil divisions. See Tables 2 and 3 of BATSCHLET (1942) *op. cit. supra* note 170. Also included are land and water areas of the United States possessions and the Philippine Islands. *Id.* at 3 (Table I).

World Areas.—A value of 135,262,000 square kilometers (52,225,000 square statute miles) has been given for the land area of the world, exclusive of the polar regions and some uninhabited islands, but inclusive of the areas of inland waters. UNITED NATIONS DEMOGRAPHIC YEARBOOK 124 (1962). Since neither the exact method of determining each area nor the precise definition of its composition and time reference is known for all areas, the value may not necessarily be on a comparable basis for all countries. Some area figures are based on recent surveys while others are no more than conjectures based on random items of information. Furthermore, the concept of inland waters varies from country to country, some including the area of coastal bays, inlets, and gulfs, in addition to major rivers and lakes. Apparent inconsistency with previously published figures (for example, 135,369,000 square kilometers in the 1958 Yearbook) may be due to the introduction of improved estimates, to increases in actual land surface by reclamation, or to a change in the unit of measurement used. *Id.* at 14. Based on information furnished by the Hydrographic Office of the Department of the Navy, the area of Antarctica is reckoned as comprising 5,300,000 square statute miles. THE WORLD ALMANAC 594 (1963).

TABLE 2.—Land and Inland Water Area of the United States

State	Areas in square statute miles		
	Total	Land	Inland water
Alabama	51,609	51,078	531
Alaska	586,400	571,065	15,335
Arizona	113,909	113,580	329
Arkansas	53,102	52,725	377
California	158,693	156,803	1,890
Colorado	104,247	103,967	280
Connecticut	5,009	4,899	110
Delaware	2,057	1,978	79
District of Columbia	69	61	8
Florida	58,560	54,262	4,298
Georgia	58,876	58,518	358
Hawaii	6,439	6,426	13
Idaho	83,557	82,808	749
Illinois	56,400	55,947	453
Indiana	36,291	36,205	86
Iowa	56,280	55,986	294
Kansas	82,276	82,113	163
Kentucky	40,395	40,109	286
Louisiana	48,523	45,177	3,346
Maine	33,215	31,040	2,175
Maryland	10,577	9,887	690
Massachusetts	8,257	7,907	350
Michigan	58,216	57,022	1,194
Minnesota	84,068	80,009	4,059
Mississippi	47,716	47,420	296
Missouri	69,674	69,270	404
Montana	147,138	146,316	822
Nebraska	77,237	76,653	584
Nevada	110,540	109,802	738
New Hampshire	9,304	9,024	280
New Jersey	7,836	7,522	314
New Mexico	121,666	121,511	155
New York	49,576	47,929	1,647
North Carolina	52,712	49,142	3,570
North Dakota	70,665	70,054	611
Ohio	41,222	41,122	100
Oklahoma	69,919	69,283	636
Oregon	96,981	96,350	631
Pennsylvania	45,333	45,045	288
Rhode Island	1,214	1,058	156
South Carolina	31,055	30,594	461
South Dakota	77,047	76,536	511

TABLE 2.—*Land and Inland Water Area of the United States—Continued*

State	Areas in square statute miles		
	Total	Land	Inland water
Tennessee.....	42, 246	41, 961	285
Texas.....	267, 339	263, 644	3, 695
Utah.....	84, 916	82, 346	2, 570
Vermont.....	9, 609	9, 278	331
Virginia.....	40, 815	39, 899	916
Washington.....	68, 192	66, 977	1, 215
West Virginia.....	24, 181	24, 090	91
Wisconsin.....	56, 154	54, 715	1, 439
Wyoming.....	97, 914	97, 506	408
Total.....	3, 615, 226	3, 554, 619	60, 607

384. AREA OF THE TERRITORIAL SEA OF THE UNITED STATES

Associated with the outer limits of the United States, as defined in 3811 for area purposes, is the territorial sea of the United States over which this country exercises full sovereignty. As such, it is part of the national territory, subject only to the right of innocent passage of foreign vessels (*see* Volume One, Part 1, 312).

The territorial sea of any nation is an offshore zone measured from the low-water mark along the coast, or from the seaward limits of inland waters where there are embayments that qualify as such. This line, from which the territorial sea is measured, is known as the baseline and its delineation along a coast is dependent upon the application of certain principles that have been accepted in international law (*see* Volume One, Part 1, 33).

The United States has traditionally recognized a zone of 3 nautical miles as the breadth of the territorial sea. Based on this distance, and using principles of delimitation adopted at Geneva on April 27, 1958, at the United Nations' Conference on the Law of the Sea (*see* Volume One, Part 3, 2211), the Department of State has computed the area of the territorial sea for conterminous United

States (*see* note 63 *supra*) to be 17,321 square nautical miles.¹⁷⁶ Since the limiting line for measuring the land and water area of the United States (*see* 3812 and 3813) is not identical with the baseline for measuring the territorial sea, this area cannot be superposed on the area of the United States to obtain a single value which will represent the full areal extent to the outer limit of the territorial sea.¹⁷⁷

The Department of State has also computed the area of the territorial sea of Hawaii—that is, for those islands constituting the State of Hawaii—using the same principles and criteria as used for conterminous United States. This yielded a value of 3,069 square nautical miles.¹⁷⁸

39. SHORELINE OF THE UNITED STATES

In the measurement of any shoreline, an important consideration is the method and unit used. Unless these are known, and the scale of the maps used are given, the significance of the values derived will be lost. Thus, a 1-mile unit stepped off with dividers will give a different result from a 3-mile unit—the larger the unit, the lower will be the value. The result obtained by this method will differ from the result obtained by using an opisometer (recording measure), following all the indentations and sinuosities of the shore. The latter would obviously give the highest value. By contrast, a measurement based on straight lines joining principal headlands only would give the lowest value.

There have been several published tabulations by the Coast and Geodetic Survey beginning with the 1915 tabulation. These will be briefly discussed and significant differences explained.

(a) *The 1915 Tabulation.*—This tabulation included the shoreline of the United States and outlying territories. Unit measures of 30 minutes of latitude, 3 statute miles, and 1 statute mile were used to compute the general coastline, the tidal shoreline (general), and the tidal shoreline (detailed), respectively. Alaska, the Philippine Islands, and the United States Samoan Islands were not measured with a unit measure of 1 statute mile because

176. Percy, *Measurement of the U.S. Territorial Sea*, 40 DEPT. STATE BULLETIN 963 (1959). Separate computations were made for each coastal state, the delineation of the territorial sea being first drawn on the nautical charts of the Coast and Geodetic Survey, using the 1200 series charts (scale 1:80,000) for the Atlantic and Gulf coasts and the 5000 series charts (scale approximately 1:180,000) for the Pacific coast. A total of 89 charts was used.

177. In measuring the land and water area of the United States, the high-water line along the coast is taken as the limiting line, whereas for the territorial sea it is the low-water line. Also, the limit of inland water in the first case is defined by an opening in the coast 1 nautical mile or less across headlands, whereas in the second case it is 10 nautical miles (24 miles according to the 1958 Geneva Convention on the Territorial Sea and the Contiguous Zone) (*see* Volume One, Part 3, 2211 C(c)). Therefore, under certain configurations a hiatus would exist between the two limiting lines.

178. Percy, *Hawaii's Territorial Sea*, 11 THE PROFESSIONAL GEOGRAPHER 2 (Nov. 1959).

TABLE 3.—*Water Area, Other Than Inland Water, for Conterminous United States by Primary Bodies of Water*

[Areas in square statute miles]

State	Total water area other than inland water	At- lantic coastal water	Chesa- peake Bay	Dela- ware Bay	Lake Erie	Straits of Geor- gia and Juan de Fuca	Lake Huron	Long Island Sound
Alabama	560							
California	69							
Connecticut	573							573
Delaware	350			350				
Florida	1,735	37						
Georgia	48	48						
Illinois	1,526							
Indiana	228							
Louisiana	1,016							
Maine	1,102	1,102						
Maryland	1,726		1,726					
Massachusetts	959	959						
Michigan	38,575				216		8,975	
Minnesota	2,212							
Mississippi	556							
New Jersey	384			315				
New York	4,376				594			726
Ohio	3,457				3,457			
Oregon	48							
Pennsylvania	735				735			
Rhode Island	14	14						
South Carolina	138	138						
Texas	7							
Virginia	1,511		1,511					
Washington	2,397					1,610		
Wisconsin	10,062							
Total	74,364	2,298	3,237	665	5,022	1,610	8,975	1,299

TABLE 3.—*Water Area, Other Than Inland Water, for Conterminous United States by Primary Bodies of Water—Continued*

State	Gulf of Mexico coastal water	Lake Michigan	New York Harbor	Lake Ontario	Pacific coastal water	Puget Sound	Lake St. Clair	Lake Superior
Alabama.....	560							
California.....					69			
Connecticut.....								
Delaware.....								
Florida.....	1, 698							
Georgia.....								
Illinois.....		1, 526						
Indiana.....		228						
Louisiana.....	1, 016							
Maine.....								
Maryland.....								
Massachusetts.....								
Michigan.....		13, 037					116	16, 231
Minnesota.....								2, 212
Mississippi.....	556							
New Jersey.....			69					
New York.....			23	3, 033				
Ohio.....								
Oregon.....					48			
Pennsylvania.....								
Rhode Island.....								
South Carolina.....								
Texas.....	7							
Virginia.....								
Washington.....					226	561		
Wisconsin.....		7, 387						2, 675
Total.....	3, 837	22, 178	92	3, 033	343	561	116	21, 118

large sections of these areas were unsurveyed and any detailed measurement would have been very approximate, if not misleading.¹⁷⁹

(b) *The 1948 Tabulation.*—In 1939–1940, a comprehensive remeasurement of the tidal shoreline (detailed) was undertaken using a recording measure. The results of this

179. *Lengths, in Statute Miles, of the General Coast Line and Tidal Shore Line of the United States and Outlying Territories*, Serial No. 22, U.S. Coast and Geodetic Survey (1915). There were two printings of this serial, both dated Nov. 1915, but only one was priced and was for sale by the Superintendent of Documents. The only other difference between the two was that one gave 71 miles for the general coastline of Mississippi, while the other gave 14. However, the total for the Gulf coast was the same in both printings, and since the total agreed with the summation using the value of 14, the 71 must be presumed to be a typographical error.

measurement were combined (with a few differences) with the previously issued 1915 figures for general coastline and for tidal shoreline (general) and published as a leaflet in July 1948.¹⁸⁰

(c) *The 1959 Tabulation.*—In January 1959, another tabulation was issued. This was practically a reissue of the 1948 tabulation except that the shoreline of Alaska was included in the tabulation for the United States, and three island areas added to the listing over which the United States exercises sovereignty—Johnston Island, Navassa Island, and the Swan Islands (*see* 352).

(d) *The 1961 Tabulation.*—The most recent tabulation of shoreline by the Bureau is dated April 1, 1961. Only two categories are included—general coastline and tidal shoreline. In every previous tabulation, except the interim tabulation in 1946 (*see* note 180 *supra*), a category of tidal shoreline (general) was also included. Apart from the difference in the arrangement of totals along the various coasts, the principal change from the 1959 tabulation is the increase in the general coastline of Florida from 1,197 to 1,350 statute miles. This reflects a new approach to the measurement of the Florida Keys. The same approach is reflected in the changes in the lengths of the Atlantic and Gulf tidal shoreline of the state, although the total for both coasts remains the same.¹⁸¹

Table 4 gives the present (1963) values recognized by the Bureau for three categories for the 50 states, based on the 1961 tabulation for the general coastline and the tidal shoreline (detailed), and on the 1959 tabulation for the tidal shoreline (general). The criteria for measurement are as follows:

General Coastline.—The measurements under this heading were made with a unit measure of 30 minutes of latitude (approximately 34.5 statute miles) on charts as near the scale of 1:1,200,000 as possible. The coastline of bays and sounds was included to a point where the waters narrowed to the width of the unit measure, the distance across at such points being included.

Tidal Shoreline (general).—Measurements under this heading (including islands) were made with a unit measure of 3 statute miles on charts of 1:200,000 and 1:400,000 scale when available. The shoreline of bays, sounds, and other bodies of water was included to a point where the waters narrowed to a width of 3 statute miles, the distance across at such points being included.¹⁸²

180. There were differences in the general coastline for Mississippi and California and in the tidal shoreline (general) for the Hawaiian Islands and the Panama Canal Zone. An interim tabulation made in 1946 also embodied the 1939-1940 remeasurement for tidal shoreline (detailed), but this tabulation was superseded shortly thereafter by the 1948 tabulation. The value of 44 miles for the general coastline of Mississippi given in the 1948 tabulation in place of the 14 in the 1915 tabulation (*see* note 179 *supra*) was based on a different approach to the method of measuring an island coastline such as Mississippi's. The value of 840 miles for the general coastline of California, instead of 913 miles given in the 1915 tabulation, resulted from a remeasurement.

181. The general coastline of Alaska was remeasured in 1961 yielding the same 6,640 statute miles carried in all previous tabulations. Christmas Island was omitted from the 1961 tabulation because its sovereignty is in dispute with the United Kingdom. Small differences are noted in the case of Hawaii, due to the separate listing of the Midway Islands, the latter not being a part of the State of Hawaii (*see* 3432 A(a)); and in the case of the Swan Islands and Johnston Island. The change in the shoreline of the Swan Islands is the result of Coast Survey observations in 1960. STEWART, OCEANOGRAPHIC CRUISE REPORT, USC&GS SHIP EXPLORER 127, U.S. COAST AND GEODETIC SURVEY (1960).

182. The figures for Louisiana in this category do not include the shoreline of Lake Maurepas and Lake Ponchartrain. The value for the State of Hawaii was derived by deducing 20 miles (the tidal shoreline (general) of the Midway Islands) (*see* Table 5) from the value of 900 miles given in the 1959 tabulation for the Hawaiian Islands, resulting in a value of 880 miles.

TABLE 4.—Lengths of the General Coastline and Tidal Shoreline of the United States

State	Lengths in statute miles		
	General coastline	Tidal shoreline, general	Tidal shoreline, detailed
Alabama.....	53	199	607
Alaska.....	6,640	15,132	33,904
California.....	840	1,190	3,427
Connecticut.....	96	618
Delaware.....	28	79	381
Florida.....	1,350	2,276	8,426
Georgia.....	100	603	2,344
Hawaii.....	750	880	1,052
Louisiana.....	397	985	7,721
Maine.....	228	676	3,478
Maryland and D.C.....	31	452	3,190
Massachusetts.....	192	453	1,519
Mississippi.....	44	155	359
New Hampshire.....	13	14	131
New Jersey.....	130	398	1,792
New York.....	127	470	1,850
North Carolina.....	301	1,030	3,375
Oregon.....	296	312	1,410
Pennsylvania.....	89
Rhode Island.....	40	156	384
South Carolina.....	187	758	2,876
Texas.....	367	1,100	3,359
Virginia.....	112	567	3,315
Washington.....	157	908	3,026
Total.....	12,383	28,889	88,633

Tidal Shoreline (detailed).—The figures under this heading (including islands) reflect the remeasurement of 1939–1940 (*see text at note 180 supra*) using a recording measure and the largest-scale charts and maps then available. Shoreline of bays, sounds, and other bodies of water was included to the head of tidewater, or to a point where such waters narrowed to a width of 100 feet, but with the following qualifications: Both shores of a stream were measured if over 200 yards wide, but streams between 30 yards (100 feet) and 200 yards

in width were measured as a single line through the middle of the stream.¹⁸³

Table 5 gives the shoreline of island areas under sovereignty of the United States for the three categories used for Table 4 and following the same criteria for measurement.¹⁸⁴

TABLE 5.—*Lengths of the General Coastline and Tidal Shoreline of Areas Over Which the United States Exercises Sovereignty*

Locality	Lengths in statute miles		
	General coastline	Tidal shoreline, general	Tidal shoreline, detailed
Baker Island.....	3	3	3
Guam Island.....	78	84	110
Howland Island.....	4	4	4
Jarvis Island.....	5	5	5
Johnston Island.....	5	5	5
Midway Islands.....	20	20	33
Navassa Island.....	5	5	5
Palmyra Island.....	9	9	16
Panama Canal Zone.....	20	20	126
Puerto Rico.....	311	362	700
Samoa Islands.....	76	91	126
Swan Islands.....	8	10
Virgin Islands.....	117	126	175
Wake Island.....	12	12	20

391. SHORELINE ALONG THE GREAT LAKES

The values given in Table 4 do not include the shoreline of the states bordering the Great Lakes. The Bureau has never measured these shorelines. The following values in statute miles are from a recent measurement by the U.S. Lake Survey and include the main shoreline of the lakes, their outflow rivers, and the islands, but do not include marshy areas, landlocked bays and harbors, and islands of less than 1 mile in perimeter: Illinois=63; Indiana=45;

183. In the 1915 tabulation, the corresponding tidal shoreline was measured with a unit measure of 1 statute mile, rather than with a recording instrument (*see* text at note 179 *supra*). Also, the measurement was stopped when the waters narrowed to the width of the unit measure. These differences in procedure account for the marked increase in length of shoreline for this category in the later tabulation.

184. Kingman Reef (off Palmyra Island) and Sand Island (off Johnston Island) were not included in the tabulation because the shoreline in each case was less than 1 mile.

Michigan=2,790; Minnesota=189; New York=408; Ohio=312; Pennsylvania=51; and Wisconsin=820. The total shoreline=4,678 statute miles, of which 1,092 miles comprise islands.¹⁸⁵ This brings the total tidal shoreline of the 50 states of the United States including the shoreline along the Great Lakes to 93,311 statute miles.¹⁸⁶

185. *Shoreline Measurements—The Great Lakes*, News Letter, American Shore and Beach Preservation Association, Sept. 30, 1960.

186. *World Coastline*.—A measurement made by the Coast Survey in 1955 yielded a value of approximately 280,000 statute miles for the *general coastline* of the world. No other categories were determined. The method of measurement differed somewhat from the method used for measuring the general coastline of the United States (*see* 39). A unit of 50 statute miles was used for the mainland coasts, and units of either 10 or 20 miles for islands of less than 100 miles in circumference. The shoreline of small islands was estimated. Coastal indentations, such as bays, rivers, and inlets, with openings less than 10 statute miles were disregarded; for openings of 10 miles or more the shores of the indentation were measured, the measurements extending inland until the water distance across measured no more than 10 miles. For a breakdown of the coastlines for the various countries of the world and for observations on the method and accuracy of the measurements, *see* Karo, *World Coastline Measurements*, 33 INTERNATIONAL HYDROGRAPHIC REVIEW 131 (May 1956).