# INDEX

(Only the main text has been indexed and only those cases that have had an impact on the development of the law of riparian boundaries and related fields. References are to pages.)

#### Acquisition of territory—Continued Sources of power, 421 "A" and "a" sheets, 88, 267 Texas accession, 422, 427, 444 Abbreviations, bottom, 223, 267 Within states, 422–423 Access to navigable water, right of, 364, By eminent domain, 423 534-535 By purchase, 422 Accretion, 359, 364, 501 Extent of, 423-424 Definition of, 537 Act of Apr. 5, 1960, 28. Refer also to Division of, 540-541 Appendix C. Doctrine of, 364, 534, 536-541 Act of Apr. 29, 1864, 334 Artificial structures, 538 Act of Aug. 6, 1947, 27-28. Refer also to Induced by artificial structures, 364 Appendix C. Laws of, governing, 541 Cooperative agreements, authority for, 28 Ownership of, 490-491, 537 Modifications, 27, 28 Accuracy Act of Feb. 19, 1895, 334-335, 340, 342, 392 Early surveys, 79-80 Act of Feb. 10, 1807, 4-9, 396. Refer also Horizontal control, 36 to Appendix C. Low-water line, 187–188 "Coasts" in, 7, 9 Mean high-water line, 175 Congressional debates, 6-7 Sounding-line crossings, 221, 224 Implementation, 10 Tide Tables, 70, 72 Hassler's plan, 10 Topographic surveys, early, 170, 175 Plans for, 10 Accuracy of surveys, 80-81, 175, 238-239 Interpretation, 7–9 Acoustic methods in hydrographic survey-20-league provision, 7, 8 ing, 277-281 Legislative history, 5-7 Acquisition of territory, 420-425 Report of Feb. 27, 1795, 5 Alaska, 422, 426, 434, 444 Report of May 14, 1796, 5 Constitutionality of, 420–421 Survey of Long Island Sound, 5 Earliest, 420 Survey of North Carolina coast, 5 Florida purchase, 443 Louisiana seaward boundary, 7 Gadsden purchase, 444 Provisions, 4 Guano islands, 421 Revival of, 11 Hawaiian Islands, 422, 434 Treaty of 1783, 6, 7, 8 Louisiana Purchase, 420-421, 442-443 20-league provision, 4, 6 Mexican cessions, 422, 444 Basis for, 6 Modes of, 422-424 Act of Feb. 26, 1845, 521 Oregon Territory cession, 444 Act of Mar. 3, 1871, 33 Power of the United States, 420-422 Act of Sept. 28, 1850, 144, 310

A . t . f C	Aids to payigation Continued
Act of Sept. 24, 1789, 415	Aids to navigation—Continued
Adams, Oscar S., 124, 133, 136, 138, 275,	Buoys, 309–311
299, 435	Colors, 310
Adams, Rear Adm. K. T., 13, 53, 81, 87,	Numbering, 310
212, 240, 244, 248, 257, 265, 282, 465	Shapes, 310
Ad coelum doctrine, 457	Special, 310
Adjustment(s)	Classes, 309
Leveling network, 45-48	Lettering on charts, 321
1929 General, 47	Lighted, 311
1929 Special, 48	New York Harbor, approaches to, 352.
1927 Special, 46-47	See also fig. 88.
Triangulation network, 123-124	Small-scale charts, 311
Eastern half of U.S., 124	Symbolization on charts, 310
Western half of U.S., 123-124	Air Commerce Act of 1926, 458, 460
Administrative agencies of government, 398	Air commerce, definition of, 458
Administrative boundary lines, 392-393	Air easement, 460, 461
Administrative Procedure Act, 398	Airspace
Admiralty jurisdiction, 427	Navigable, 458, 459
Admiralty law, 520	Ownership, 457–461
Admission of new states, 425-427. See also	Sovereignty over, 457
Table 1.	Alabama v. Texas, 446
Alaska, 435. See also Alaska.	Alaska
Conditions attached by Congress, 429	Admission as state, 435
Discretionary power of Congress, 429	Boundary, 435
Enabling act, 426	Chart datums, 307. See also Planes of
Equal-footing clause, 427–431 Political standing and sovereignty, 429–	reference. Geographic datums, 125
-	
430 Property rights, 430	Kelp, 268 Planes of reference, 256
Hawaii, 436. See also Hawaii.	Purchase, 434, 444
Procedure, 426	Surveys, 22
Recent admissions, 434–436	Territorial status, 435
Admission of states to Union (Table 1),	Alden, James, 20
428	Alexander, William D., 314
Advisory opinions, 408	Alexandria, Egypt, 114
Aerial photogrammetry, 277	Alexandria, Va., 513, 515
Aerial photographs, 55, 180	Alidade, 160
Color, 56	Alkali flat, 191. See also fig. 44.
Indexes, 56	
Infrared, 56	Allocation lines, 385
Nine-lens camera, 56	Alluvion, 364, 537
Single-lens camera, 56	Ambiguities in deeds, 469-473
Agassiz, Louis, 20	Latent, 470
Aid Proof File, nautical charts, 101	Patent, 470
Aid proof (nautical charts), definition of,	American Antiquarian Society, 317
101	American constitutional system, 395
Aids to navigation, 276, 309-311	American meridian, 144
Buoyage system in U.S., 309-311	American Philosophical Society, 10
Channels, marking of, 310	American polyconic projection, 138
Lateral, 310	American Samoa, 445
220021019 310	* ******** Aureran LL7

Anacapa Island, Calif., 285. See also fig. 75.	В
Analysis of hydrographic surveys, 211–268.	
See also Hydrographic survey(s).	Bache, Alexander Dallas, 16–21
Analysis of topographic surveys, 159-210.	Administration of, 18–19
See also Topographic survey(s).	Scientific contributions, 19–21 Ancestry, 16
Anderson, Totton J., 398, 416	Relations with Congress, 18
Angell, Joseph K., 519, 520	Scientist and educator, 16
Angle books, 221	Superintendent of Coast Survey, 16, 217,
Annexation of territory, modes of, 422	313
Annual sea level, 63	Backshore, definition of, 345
Antarctica, rights in, 445 Antarctic Ocean, 388	Baffin Bay, boundary of, 388
Antarctic Treaty, The, 445	Bahia de los Temblores, 316
Apparent shoreline, 177	Baker Island, 445
Appellate courts, 399	Baker, Marcus, 314, 505
Arctic Ocean, boundary of, 390	Ballard, Edward, 314
Area of the United States (1940 Census),	Ballentine, James A., 465
473-476. See also Table 2.	Baltimore, Lord, 376, 496, 506
Definitions for measurement, 473-475	Baltimore, sea level changes at, 59
Derived values, 476	Bank, river, 373 Banne River, England, 518
Inland waters, 474, 476	Banne, The Royal Fishery of the, 518–519
Land areas, 475, 476	Bare rocks, 258, 259, 331
State waters, 474, 476. See also Table 3.	Barnegat Inlet, N.J., inlet migration at, 361.
Technique of measurement, 475	See also fig. 91.
Territorial sea, 478–479 Area of the world, land, 476	Base line
Army Map Service, 118	Geodetic, 36
Articles of Confederation and Perpetual	Public land surveys, 448
Union, 394	Baseline, international law, 371, 379, 381
Astronomic azimuth, 123	Basic survey, 240
Astronomic determinations, 119	Basin, definition of, 343
Atlantic coast, historic description, 315	Batschelet, Clarence E., 474, 475, 476
Atlantic Neptune, 275	Batture, 537 Bauche, Philip, 252
Atlantic Ocean, North, boundary of, 390	Bay of Fundy, boundary of, 390
Atlantic Ocean, South, boundary of, 391	Bay of New York, 322
Attorney General v. Chambers, 172. Refer	Bay(s)
also to Appendix D.	Boundaries in, 375, 376
Authority in the judicial system, 412	Boundary at, 367–371
Mandatory, 412	Internationally, 367–370
Persuasive, 412	Locally, 370–371
Primary, 413	Nationally, 370
Secondary, 413	Closing line at, 369
Authority note on nautical charts, 95	Definition, 387
Automatic tide gage, 57, 235	Headland rule for, 367
Avulsion, 539	Semicircular rule, 369-370
Azimuth	Ten-mile rule, 369
Astronomic, 123	True, 371
Laplace, 123	Twenty-four-mile rule, 369

Beach Erosion Board, U.S., 361	Boundaries
Beach evolution studies, 360	Administrative, 392
Beall, Sarah, 144, 145	Alaska, 435
Beaufort Sea, boundary of, 388	Allocation, 385
Bed, river, 373	Bays, at, 367–371
Bench mark(s)	County, 434
Descriptions, 49–50, 51	Descriptions of early, 364
Elevations, 50	Errors in, 433
Establishment, 60–61	Finality of, 433–434
	Restoration of markers, 434
Locations, 43 Record of establishment, 61	High seas. See Boundaries, high seas.
	High-water line, 172
Recovery program, 61 Spacing, 43	Interstate. See Boundaries, interstate.
Tidal, 60–61	Low-water line, 246-247, 248, 250-251
	Derivation from mean lower-low-water
Bering Sea, boundary of, 391	line, 250-251. See also fig. 63.
Bering Sea Fur Seal Arbitration, 386	Maritime. See Boundaries, maritime.
Bering Strait, 385	Oceans and seas. See Oceans and seas,
Bernstein, Marver H., 399, 403	limits of.
Bessel, Friedrich W., 117	Public and private lands, 172
Bessel registers, 147	Rivers, along interstate, 377–378
Bessel spheroid. See Spheroid(s).	Rivers, at, 371
Bilby steel tower, 37	Rules of the Road. See Rules of the Road
Bill of Rights, 395	boundary lines.
"Bis" sheets, 86	Seas and oceans. See Oceans and seas,
Bitner, Harry, 407, 413	limits of.
Black, H. C., 372, 374, 465 Black-Jenkins Award of 1877, 504. See	Semicircular rule, 369, 370, 371
, , , , , , , , , , , , , , , , , , , ,	Shifting or fixed, 501–504
also Maryland-Virginia boundary.	Sinuosities of the shore, 369
Blackstone, Sir William, 457	Submerged Lands Act, 381-382
Blind Pass, Fla., 361	Territorial, effect of Rules of the Road
Board of Surveys and Maps, 206–207	boundary lines on, 341. See also
Board on Geographic Names, U.S. See	Rules of the Road boundary lines,
United States Board on Geographic	Interpretation of.
Names.	Tidal. See Boundaries, tidal.
Boat sheet, 218, 223, 229, 232	Tributary waterways, at, 367
Bolstad, Capt. Roswell C., 232, 512	Water, basis for change of, 363
Bond, Frank, 443	Boundaries, high seas, 378–384
Bonne projection, 135, 141, 301	Allocation lines, 385–386
Bonne, Rigobert, 135	United States-Russian Convention, 385
Bookout, Lt. Col. Hal H., 457	Contiguous zone, 381
Borax Consolidated Ltd. v. Los Angeles, 174,	Continental shelf, 381
345, 365, 413, 453, 490, 503, 541. Refer	Exterior, 378–383
also to Appendix D.	Lateral, 383–384
Borderland, definition of, 342	Territorial sea, 379–381. See also fig. 93.
Borderland slope, definition of, 343	Boundaries, international
Boston State House, 144, 312	United States-Canada, 501
Bottom characteristics, 265-267, 307	United States-Mexico, 501
Abbreviations, 223, 266, 267	Boundaries, interstate, 432–434
Bottom specimens, 220, 234, 266	Alabama-Georgia, 377, 404
Bouchard, Harry, 465	Arkansas-Tennessee, 376, 404, 464, 539
· • • · · · · · • • • • · · · · • · · · · · · · · · · · · · · · · · · · ·	לכל ידיד ידיד יי /טיייייייייייייייייייייייי

Boundaries, interstate—Continued	Boundaries, maritime—Continued
California–Nevada, 431	Lateral, 383–384
District of Columbia-Virginia. See Dis-	Limits at tributary waterways, 367
trict of Columbia-Virginia boundary.	Oceans and seas. See Oceans and seas,
Finality of, 433	limits of.
Florida-Georgia, 377	Boundaries, river, 372, 374-377. See also
Georgia-South Carolina, 374	River(s).
Illinois-Kentucky, 377	Bank or shore, 376–377
Indiana–Kentucky, 377	Ceded territory and, 377
Iowa-Illinois, 374, 376	Delimitation, 372
Kentucky–Ohio, 377	
Louisiana–Mississippi, 376	Geographic middle, 374
Louisiana Tevas and	Medium filum acquae, 374
Louisiana-Texas, 377	Middle of main channel, 375
Maryland-Virginia. See Maryland-Vir-	Shore or bank, 376–377
ginia boundary.	Thalweg, rule of the, 375
Maryland-West Virginia, 377, 501, 506-	Boundaries, tidal, 49
507	Civil law, 365. See also Luttes v. State.
Nebraska-Iowa, 376, 539	Common law, 172, 365. See also Attor-
New Jersey-Delaware, 375-376, 466, 469,	ney General v. Chambers.
503	Data for establishment, 365
New Mexico-Colorado, 433	Demarcation, 364
Ohio-West Virginia, 377	Federal rule, 365. See also Borax Con-
Oklahoma-Texas, 373, 376, 526	solidated, Ltd. v. Los Angeles.
Reasonable certainty doctrine, 464	Boundary rivers, 372
Supreme Court jurisdiction, 432	Bounds, metes and, 464-466
Vermont-New Hampshire, 377	Interpretations, 465–466
Virginia-District of Columbia. See Dis-	Bouvier, John, 465
trict of Columbia-Virginia boundary.	Bowditch, Nathaniel, 310, 347
Virginia-Maryland. See Maryland-Vir-	Bowie, Capt. William, 47, 48, 145
ginia boundary.	Brandeis, Justice Louis D., 410
Virginia-Tennessee, 432	
Virginia–Temiessee, 432 Virginia–West Virginia, 432	Breadth of territorial sea, 365–367
	Recent claims, 366
Washington-Oregon, 376	Bridgeport Harbor, Conn., 13, 89, 276
Boundaries, maritime	Bridges, elevations of, 311
Alaska, 384, 386	Brittain, Capt. John H., 503
Bays, at, 367-371	Bromide prints, 54
Internationally, 367–370	Brown, Curtis M., 540
Locally, 370–371	Brown, Lloyd A., 270
Nationally, 370	Bruder, Wallace A., 286, 355
Claims of nations, 365–366	Buache, Philip, 252
Exterior, 378–383	
Federal-state, 370	Buoyage system in the U.S. See Aids to
Alaska, 383–384	navigation.
California, 493	Buoys. See Aids to navigation.
Louisiana, 466	Burchard, Edward L., 93
Fixed or shifting, 501, 503, 504	Bureau of Land Management, 449, 516
Hawaii, 440	Bureau surveys as evidence, 79
Headland-to-headland, 367	Burmister, Rear Adm. Clarence A., 232
Inland waters, 369	Bush River, Md., 297
Alaska, 383–384	Butte County, S. Dak., 435, 441

C	Charts—Continued
Cable, first transatlantic, 20	Mercator, 299
Cajori, Florian, 16	Adoption in Coast Survey, 301–302
Cambridge Observatory, 146, 147	Scale of, 302–305
Cameras, multilens aerial, 277	Preliminary, 83, 84
Canada, fishing rights of, 366–367	Reconnaissance, 83
Canadian proclamation on fishery zone, 366–	Scale, 103. See also Scale.
	Intermediate, 105
367 Canal Zana 207 200 447	Large, 104-105
Canal Zone, 127, 129, 445	Latitude, 304
Can buoy, 310	Mercator, 302-303
Canton Island, 445	Middle latitude, 302
Cape Henlopen, Del., 359	Small, 104-105
Cape Johnson, U.S.S., 115	Sketches, 83-84
Cardinal points, 468	Symbolization. See Symbol(s), chart.
Caribbean Sea, 391	Tidal Current, 355
Carr, Robert K., 399, 403	Chart(s), nautical, 82, 89-102, 269-355
Case or controversy, 408	Accuracy, 288–290
Cassini, César François, 116	Adjuncts. See Chart adjuncts.
Cassini, Jaques Dominique, 116	Aid Proof File, 101
Castle Rock, S. Dak., 435, 441	Authority note, 95
Catalan mapmakers, 271	Channels, improved, 276, 329-331. See
Catalog of Nautical Charts, 352	also fig. 80.
Certified copies of surveys and data, 55, 488	Classification, 286–288
Chain, surveyor's, 162	Coast, 287
Challenger, H.M.S., 115	General, 287
Chamizal Arbitration, 501	
Chandeleur Island, La., 292	Harbor, 287
Changing datum on survey sheet. See	Intracoastal Waterway, 287
Datum(s), geographic.	Sailing, 287
Channels, improved, 329-331. See also fig.	Small-Craft, 287–288
80.	Compilation, elements of, 282
Character of bottom. See Bottom charac-	Contours, depth, 282–284, 308
teristics.	Early symbolization, 308
Charles I, King, 376, 496, 506	Present practice, 308–309
Chart adjuncts, 352-355. See also fig. 89.	Copper engraved, 285
Catalog of Nautical Charts, 352	Criteria for evaluation, 288
Coast Pilots, 354	Dates on, 92-95, 323
Dates of Latest Editions, 354	Correction, 92–93
List of Lights, 355	Edition, 93
Nautical Chart Manual, 355	New print, 94
Notices to Mariners, 355	Prior to 1915, 94
Tidal Current Charts, 355	Publication, 92-95
Tidal Current Tables, 354	Distinguished from survey dates
Tide Tables, 354	323
Chart classification. See Chart(s), nautical.	Definition, 89
Chart correction books, 98	Definitions relating to, 342–345
Chart letters, 88	Depth unit, 305–306
Charts. See also Chart(s), nautical.	Design, 286-287, 302-303
Finished, 84	Direction on, 346
Gnomonic, 349	Distance measurement on, 347-349
, , , ,	7 7 17 3 77 2

Chart(s), nautical—Continued	Chart(s), nautical—Continued
Distribution File, 102	Position determination—Continued
Evolution, 269–275	By radio bearings, 346–347
Field operations, 276	By submarine valleys, 351
Files, special, 99–102	By visual bearings, 350
Aid Proof, 101	New York Harbor, approaches to, 352.
Distribution, 102	See also fig. 88.
Marine Accident, 102	Preliminary, depth curves on, 308
Record, 102	Projections, 298–305
Standards, 100	Bonne, 135, 301
"Finished," 84	Mercator, 299. See also Mercator pro-
Geodetic base for, 276	jection.
Geographic datum, 312-313	Adoption in Coast Survey, 301–302
Geographic datum changes, 312	Polyconic, 301
Geographic names, 321–323	Publication note, 95
Legal aspects, 322-323	Record File, 102
Lettering, 321	Reliability, 288–290
Placement, 321	Reproduction, 285–286
Graphic (linear) scale, 104	Colors, introduction of, 285
Hand corrections, 101	Copper engraving, 285
High-water line, basis for use of, 171–172	Photolithography, 285
History sheets, 98–99	Plate printing, 285
Intermediate-scale, 105	Revision, 289
Interpretation, 298-332, 342-345. Refer	Rules of the Road boundary lines. See
also to Appendix F.	Rules of the Road boundary lines.
Large-scale, 104, 287	Sanding, 308
Lettering, 321	Scale limitations, 288
Marine Accident File, 102	Scales, 103-105, 287. See also Scale.
Mean high-water line, 311	Shoreline, 311
Modern, 270, 275–288	Significant features on, 305–327
Geodetic base for, 276	Depth contours (curves), 308-309
Hydrographic advances, 277, 279-281.	Geographic names. See Geographic
See also figs. 70 and 71.	names, Charted.
Photogrammetry, 277. See also fig. 69.	Loran lines of position, 327
Names, geographic. See Geographic	Soundings (depths), 305–306
names.	Sketches, 83
National responsibility for publication, 269	Small-scale, 104, 287
New editions, 94	Sounding datums, 306–307
New prints, 94	Alaska, 307
New type, 282–284. See also fig. 74.	Atlantic coast, 306-307
Notes on, 289	Gulf coast, 306–307
Notices to Mariners, 355	Hawaii, 307
Numbering. See Numbering of nautical	Pacific coast, 307
charts.	Puerto Rico, 307
Overhead power cables, identification of,	, 3 ,
294, 297	Soundings (depths), 305–306
Photogrammetry, advent of, 277	Source material, 89, 276
Position determination, 349-352	Special planes of reference, 258
By depth contours, 351	State plane coordinate grids, 305
By latitude and longitude, 349	Symbolization, 327-332. See also Sym-
By Loran lines of position, 351	bol(s), chart.
• • • • • • • • • • • • • • • • • • • •	

---

Chart(s), nautical—Continued	Coast and Geodetic Survey, U.SCon.
Symbols, aids to navigation, 310–311	Expansion and growth—Continued
Tide notes, 323-326	Shoreline to be surveyed, 21
Use of, 269–355	Transcontinental triangulation author-
Using, 346–355	ized, 21. See also fig. 4.
Chart adjuncts, principal, 352–355. See	First hydrographic survey, 13
also Chart adjuncts.	First Superintendent, 10, 11
Direction, determination of, 346	First topographic survey, 13
	Judicial notice of records, 488–490
Distance measurement, 347–349 Views of harbor entrances and headlands,	Legal aspects of work, 486
285	Name changed from "Coast Survey," 22
	Navy Department, in, 11, 13
Charts, surveys, and maps, 81 Chovitz, Bernard, 119	Numbering of publications, 228
	Organic Act. See Act of Feb. 10, 1807.
Christmas Island, 445	Origin and history, 4-25
Christol, Carl Q., 398	
Chronometric method of longitude determi-	Plan of 1843, 9-10
nation, 145	120-fathom provision in, 8, 9
Chuckchi Sea, boundary of, 388	Present functions and organization, 27-29.
Church, Earl, 121, 124	See also fig. 8.
Civil Aeronautics Act of 1938, 458	Legislative basis. See Act of Aug. 6,
Civil law, 365, 413, 416–417	1947, and Act of Apr. 5, 1960.
Application in common-law states, 416-	Removal of geographical limitations, 28,
417	Refer also to Appendix C.
Louisiana, 416	Records as evidence, 487-494
Clarke, Alexander R., 117	Competency, 79
Clarke spheroid (1866), 117, 118, 120, 122,	Judicial notice, 488–490
149, 348	Mare Island case, 492–493
Clark, Frank E., 423, 447, 466, 541	Rockaway Point case, 490–492
Closing line at bays, 369	"Tidelands" controversy, 493
Coastal engineering, use of Bureau surveys	Scientific byproducts and achievements,
in, 360–36r	25-27
Coastal waters of Southeast Alaska and	Figure of earth determination, 25
British Columbia, boundary of, 391	Isostasy, theory of, 25
Coast and Geodetic Survey, U.S., 1–31	Minimum sound velocity layer in ocean,
Broadened scope under Superintendent	26
Bache, 18–21	New theory of tides, 26
Commerce and Labor Department, in, 10	New type of nautical chart, 26
Commerce Department, in, 10	Radio acoustic ranging, 26–27
Director, 11	State Coordinate Systems, 25
Earliest nautical chart, 13	Services, 3
Early designations, 13	Superintendents and Directors, 30-31
Early history, 10–21	Treasury Department, in, 9, 10, 11, 13
Difficulties encountered, 10-11	Triangulation, earliest, 11. See also fig.
Early pioneers, 13-21	2.
Bache, Alexander Dallas, 16–21	Utilization of Bureau services, 494-516
Hassler, Ferdinand Rudolph, 14–16	District of Columbia-Virginia bound-
Expansion and growth, 21–25	ary, 505-515
Act of Mar. 3, 1871, 21	Louisiana coast, low-water line survey,
Alaska cession, 22	516
Coastal waters to be surveyed, 21	Maryland–Virginia boundary, 494–505
Philippine Islands, 22	Work program, 4

Constitutional courts, 403 Coast charts, 287, 303 Coast, definition of, 344 Coast Guard lines. See Rules of the Road Constitution of the United States Articles, various, 399, 403, 408, 422, 424, 425, 431, 446, 517, 520 boundary lines. Coast Guard, U.S., 89, 93, 276, 355, 392 Checks and balances, 398 Coastline, definition of, 345 Commerce clause, 4, 269, 396 Coast line (Submerged Lands Act), defini-Eleventh amendment, 400, 402 Established, 395 tion of, 382 Federal courts, 399 Coastline, world, 485 Federal-state relationship, 395-397 Coast Pilots, 53, 186, 307, 347 Fifth amendment, 423, 460, 527 Coverage, 354 Geographic names, 313, 318 Fourteenth amendment, 423, 461 Land acquisition within states, 422-424 Coast Survey, 13 Coast Survey polyconic projection, 138 Separation of powers, 397–398 Supremacy of, 403-404, 415 Code Napoleon, 416 Supreme Court, 401. See also Supreme Colbert, Rear Adm. Leo Otis, 14, 257 Colombos, John C., 334, 386 Court. Colonial ordinance of 1641-1647, 183, 532, Territories and possessions, 424 Constitutions of the states, rank of, 417 Constructing projection after survey, 154-Color photography, 56, 180 Colors of buoys, 310 Contiguous zone, delimitation of, 381 Columbia River Datum, 258, 307 Continental borderland, definition of, 342 Columbus, Christopher, 113, 271 Combination hydrographic and topographic Continental shelf Convention, status of, 385 surveys, 88–89 Definition, 342, 381 Commerce and Labor Department, creation Delimitation, 381 Edge, 342 Commerce clause of Constitution, 4, 269 Commerce Department, creation of, 10 Continental slope, definition of, 343 Committee of Commerce and Manufactures Continental terrace, definition of, 343 Control data (Fourth Congress), 5, 6, 7 Horizontal. See Horizontal control data. Committee of Twenty (American Associa-Vertical. See Vertical control data. tion for the Advancement of Science), Control tide station, 57 Report of, 18 Conventional signs and symbols, 192-193. Common law, 172, 290, 365, 413, 414-416 See also Symbol(s), topographic. Modification in the states, 414–415 Board of Surveys and Maps (1925 and Origins, 414 1932), 206-207. See also figs. 53, State law in Federal courts, 414-415 54, and 55. Compacts between states, 431–434 Chronology, 193-210 Consent of Congress, 431 Conventional signs (1911), 206 Interstate boundaries, 432 Conventional signs (1905), 203, 206 Maryland-Virginia (1958), 504-505 Earliest Coast Survey (circa 1840), 194-Maryland-Virginia (1785), 496, 504, 506 195, 259, 265. *See also* fig. 46. New York-New Jersey (1834), 322 Origin, 193 Competency of Bureau surveys as evidence, Rules for representation (1860), 195, 197. Compilation of nautical charts, 89, 282. See also figs. 47 and 48. See also figs. 72 and 73. Specimen drawings (1879 and 1883), 197, Concurrent powers, 396–397 Conical projection(s), 134-140. See also Specimen topographic symbols (1865), Projection(s), Conical. 197. See also figs. 49 and 50.

Conventional signs and symbols—Continued	Cruquius, N., 252
Standard symbols (1932), 207	Curves of equal depth. See Depth curve(s).
Standard symbols (1925), 206–207. See	Customs Court, 403
also figs. 53, 54, and 55.	a
Topographical conference (1892), 202-	<del>-</del>
203. See also figs. 51 and 52.	Daily sea level, 63
Topographic symbols (1898), 203	Dall, William H., 314
United States Geographic Board (1911),	Dangers to navigation, 331–332
206	Data, available technical, 32–75
Convention on Fishing, etc., status of, 385	Horizontal control, 33-40. See also Hori-
Conventions on the Law of the Sea (Geneva,	zontal control data.
1958), status of, 384–385	Hydrographic, 51–52, 53–55. <i>See also</i> Hydrographic data, available.
Conversion of fractions (1908), 226	
Cooley v. The Board of Wardens of the Port	Tidal, 72–75. See also Tidal data, available.
of Philadelphia, 441, 518 Coordinates	Topographic, 51–56. See also Topo-
Geographic, 40, 132	graphic data, available.
Rectangular, 40	Vertical control, 42-43. See also Vertical
State plane, 40-42. See also State plane	control data.
coordinates.	Dates on nautical charts, 92-95, 323
Copper plate engraving, 285	Datum corrections, 113
Coral formations, symbolization of, 265	Datum, definition of, 112
Coral reef, symbol for, 332	Datum of a survey sheet, changing the, 151-
Corps of Engineers, U.S., 89, 93, 276, 305,	154. See also Datum(s), geographic.
329, 518	Datum(s), geodetic. See Datum(s), geo-
Corrected Establishment of the Port, 324	graphic.
Correction date on nautical charts, 92-93	Datum(s), geographic, 112-113, 119-129
Correction factor for scale, 107	Alaska, 125
Corrections to projection lines, 148–149	Consolidation of, 126
Example, 149–150	Southeast Alaska, 125
Cosa chart of 1500, 275. See also fig. 66.	Unalaska, 125
Cosa, Juan de la, 271	Valdez, 125
County boundaries, 434	Yukon, 125, 126
Course and distance 465	Astronomic determinations, 119 Changing datum on survey sheet, 151–154
Course and distance, 467–469 Control of, 472	Changing datum on survey sheet, 151-154
Court of Claims, U.S., 403, 405	
3, 403, 403	Graphic method, 153–154. See also
	Graphic method, 153-154. See also fig. 37.
Court of Customs and Patent Appeals, 403	Graphic method, 153-154. See also fig. 37.  Numerical method, 151-153. See also
Court of Customs and Patent Appeals, 403 Court reports, 400, 401, 404, 405, 406–407	Graphic method, 153-154. See also fig. 37.  Numerical method, 151-153. See also fig. 36.
Court of Customs and Patent Appeals, 403 Court reports, 400, 401, 404, 405, 406–407 National Reporter System, 407	Graphic method, 153-154. See also fig. 37.  Numerical method, 151-153. See also fig. 36.  Chart changes in, 312
Court of Customs and Patent Appeals, 403 Court reports, 400, 401, 404, 405, 406–407 National Reporter System, 407 United States Reports, 404–405	Graphic method, 153-154. See also fig. 37.  Numerical method, 151-153. See also fig. 36.  Chart changes in, 312  Charts, nautical, 312-313
Court of Customs and Patent Appeals, 403 Court reports, 400, 401, 404, 405, 406–407 National Reporter System, 407 United States Reports, 404–405 Courts, Federal, 398–401. See also Federal	Graphic method, 153–154. See also fig. 37.  Numerical method, 151–153. See also fig. 36.  Chart changes in, 312  Charts, nautical, 312–313  Definition, 112
Court of Customs and Patent Appeals, 403 Court reports, 400, 401, 404, 405, 406–407 National Reporter System, 407 United States Reports, 404–405 Courts, Federal, 398–401. See also Federal judiciary.	Graphic method, 153–154. See also fig. 37.  Numerical method, 151–153. See also fig. 36.  Chart changes in, 312  Charts, nautical, 312–313  Definition, 112  Elements of, 112
Court of Customs and Patent Appeals, 403 Court reports, 400, 401, 404, 405, 406–407 National Reporter System, 407 United States Reports, 404–405 Courts, Federal, 398–401. See also Federal judiciary. Courts of appeals, 399	Graphic method, 153-154. See also fig. 37.  Numerical method, 151-153. See also fig. 36.  Chart changes in, 312  Charts, nautical, 312-313  Definition, 112  Elements of, 112  Independent, 121
Court of Customs and Patent Appeals, 403 Court reports, 400, 401, 404, 405, 406–407 National Reporter System, 407 United States Reports, 404–405 Courts, Federal, 398–401. See also Federal judiciary. Courts of appeals, 399 Courts, state, 398–399, 405–406	Graphic method, 153-154. See also fig. 37.  Numerical method, 151-153. See also fig. 36.  Chart changes in, 312  Charts, nautical, 312-313  Definition, 112  Elements of, 112  Independent, 121  Luzon (Philippine Islands), 127
Court of Customs and Patent Appeals, 403 Court reports, 400, 401, 404, 405, 406–407 National Reporter System, 407 United States Reports, 404–405 Courts, Federal, 398–401. See also Federal judiciary. Courts of appeals, 399 Courts, state, 398–399, 405–406 Cove flats, division of, 540	Graphic method, 153-154. See also fig. 37.  Numerical method, 151-153. See also fig. 36.  Chart changes in, 312  Charts, nautical, 312-313  Definition, 112  Elements of, 112  Independent, 121
Court of Customs and Patent Appeals, 403 Court reports, 400, 401, 404, 405, 406–407 National Reporter System, 407 United States Reports, 404–405 Courts, Federal, 398–401. See also Federal judiciary. Courts of appeals, 399 Courts, state, 398–399, 405–406 Cove flats, division of, 540 Craig, Thomas, 140 Creasy, Sir Edward S., 374	Graphic method, 153-154. See also fig. 37.  Numerical method, 151-153. See also fig. 36.  Chart changes in, 312  Charts, nautical, 312-313  Definition, 112  Elements of, 112  Independent, 121  Luzon (Philippine Islands), 127  North American, 122-123
Court of Customs and Patent Appeals, 403 Court reports, 400, 401, 404, 405, 406–407 National Reporter System, 407 United States Reports, 404–405 Courts, Federal, 398–401. See also Federal judiciary. Courts of appeals, 399 Courts, state, 398–399, 405–406 Cove flats, division of, 540 Craig, Thomas, 140	Graphic method, 153-154. See also fig. 37.  Numerical method, 151-153. See also fig. 36.  Chart changes in, 312  Charts, nautical, 312-313  Definition, 112  Elements of, 112  Independent, 121  Luzon (Philippine Islands), 127  North American, 122-123  North American 1927, 123-125, 126, 129,
Court of Customs and Patent Appeals, 403 Court reports, 400, 401, 404, 405, 406–407 National Reporter System, 407 United States Reports, 404–405 Courts, Federal, 398–401. See also Federal judiciary. Courts of appeals, 399 Courts, state, 398–399, 405–406 Cove flats, division of, 540 Craig, Thomas, 140 Creasy, Sir Edward S., 374	Graphic method, 153–154. See also fig. 37.  Numerical method, 151–153. See also fig. 36.  Chart changes in, 312  Charts, nautical, 312–313  Definition, 112  Elements of, 112  Independent, 121  Luzon (Philippine Islands), 127  North American, 122–123  North American, 1927, 123–125, 126, 129, 148, 150

j

;

ţ

Datum(s), geographic—Continued San Juan Astronomic (Puerto Rico), 129 Single, 119, 120 Standard, selection of, 121 United States Standard, 122, 142, 148, 149 Datums, tidal. See Tidal datum planes. Davidson, George, 13, 314 Davis, Secretary John, 368 Davis Strait, boundary of, 388 Day letters on hydrographic surveys, 214, 215, 220, 222, 238, 245–246 Dead reckoning, 231 Decisions of Board on Geographic Names. See United States Board on Geographic Names. Decisions of executive departments, 411 Declaration of Independence, 394 Deed, 462–463 Deep, definition of, 343 Deep, greatest known, 115 Deep-sea terrace, definition of, 343 Deetz, Charles H., 133, 134, 136, 138, 140, 270, 275, 299, 313 Definitions relating to nautical charts, 342–345 Ocean bottom features, 342–343 Shore terminology, 344–345. See also fig. 86. Deflection of the vertical, 120 Deily, Rear Adm. Earle A., 25 Delimitation of territorial sea, 379–381. See also fig. 93. Depth contours, 252, 284, 308–309. See also Depth curve(s), 308–309 Bottom features, delineation of, 308 Colors, 220, 225, 226, 227 Contours, similarity to, 252, 284 Definition, 251, 308 Early surveys, 252 Enhance of the servers and and the similar to the servers and and the servers and the servers and and the servers and the serv	Depth units, 305–306 Double, 306 Fractions, 306 Present practice, 306 Dereliction, 538 Des Barres, Joseph F. W., 275 Descriptions of boundaries, early, 364 Descriptions of land, 463–469 Ambiguities, 469–470 Latent, 470 Patent, 470 By adjoining land, 466 By course and adjoiner, 465 By course and distance, 467–468 By government survey, 463 By map or plat, 464 By metes and bounds, 464–465 By monuments, 466–467 Conflicting elements in, 469–473 Course references, interpretation of, 468 Field notes, 464 Rules for resolving conflicts, 469–471 Course and distance, control of, 472 Maps and plats, control of, 472 Monuments, control of, 471–472 Quantity, control of, 472 Thirteen Original Colonies, 465 Descriptive Reports, 85–86, 178 Numbering, 88 Detached surveys, 84 Developable surface, 133 Diagrams, 223, 225 Diamond, T. M., 413 Dicta, 411 Dicta as authority, 412 Direction, problem of, 346–347 Directors and Superintendents, 31 Discretionary function exception (Federal Tort Claims Act.), 290–291 Supreme Court, in, 291–293
Definition, 251, 308	Tort Claims Act), 290–291
Echo-sounding surveys, 308	Distance, course and, 467–469
History of, 251–253	Distance measurement(s)
On new charts, 282-284. See also fig. 74.	Correction factor to be applied, 107
Position determination by, 351	Errors inherent in original surveys, 107-
Smooth sheet, 238	108
Symbolization	From latitude scale, 348
Early, 308	Gnomonic chart, 349
Present, 308	Mercator chart, 347–349
Terminology, 252	Small-scale Mercator charts, 349
Depth measurement, 229–230 Depths, 305	"Distinguishing" a case, 409
Departs, 305	Distortion factor, 151

Distortion of medium, errors due to, 106-	Early surveys
107	Accuracy, 79–81
Distribution File, nautical charts, 102	High-water line, 175
District courts, Federal, 400	Control of soundings, 215
Admiralty jurisdiction, 521	Day letters, 215, 246
Establishment, 400	Geodetic control, 360
District of Columbia, The, 424–425	Hydrographic instructions
Commissioners, 425	Earliest (1844), 215–216
Courts, 425	First published (1860), 217–220
Original limits, 505	Hydrographic survey, first, 214–215
County of Virginia, 505	Instructions for topographic work, earliest
County of Washington, 505	(1840), 165–168
Status, 425	Low-water line, 188
District of Columbia-Virginia boundary, 80,	Position numbers, 214, 215, 246
505-515	Projection constructed after survey, 154-
Act of Oct. 31, 1945, 508–509	158
Authority to survey and mark, 509	Large-scale surveys, 157-158. See also
Boundary description, 509	fig. 39.
Background of controversy, 505-508	Methods, modified, 158
Boundary Commission, 506, 507-508	Small-scale surveys, 155–157. See also
Coast Survey participation, 510-514	fig. 38.
Demarcation of boundary line, 510-512	Projection lines, multiple, 131
Geodetic work, 510	Reasons for, 141–148
Maps, published, 513–515	Horizontal datum, change in, 148
Maryland-Virginia boundary, 513-514.	Longitude values, change in, 144
See also fig. 106.	Spheroid of reference, change in, 142
Oblique boundary at Second St., Alex-	Projections, identification of, 140–141
andria, Va., 513. See also fig. 105.	Symbolization, interpretation of, 189–191.
Tributary waterways, boundary at, 515	See also fig. 44.
Photogrammetric work, 512	Tide observations, 235
Tidal data, 512	Two depth units, 243
Diurnal range of tide, 68	Earth measurement, early, 114
Dock, definition of, 535	Earthquake Bay, Calif., 315, 316
Documentary evidence, 487-488	East Liverpool, Ohio, 447
Documents, authenticated copies of, 487	Echo sounding, 280, 281, 351. See also figs.
Dodd, Walter F., 408	70 and 71.
Domestic Names Committee, U.S. Board on	Edition date on nautical chart, 93-94
Geographic Names, 320	Edmonston, Harold R., 92, 239, 304, 329,
Donn, F.C., 181	331, 340, 372
Douglas, Edward M., 377, 421, 426, 427, 431,	Egress, right of, 364
435, 441, 443, 444, 501, 505	1877 Arbitration, 506
Downway, 375	Electronic methods, 280–281
Drying rocks, 379	Position determination, 232, 280-281
Drying shoals, 379	Electronic Position Indicator (E.P.I.), 232,
Duck Bar Island, 490. See also fig. 100.	281
	Elevations, 43, 311
E	Ellipsoid of revolution, 116
Earliest tide observations, 235	Eminent domain, 422-423
Early maps relating to discovery in America,	Enabling act for admission of new states,
316	426
J-*	

Enderbury Island, 445	Farwell, Raymond F., 332, 334
Engineering aspects of tides, 61–62	Fathograms, numbering, 88
Engineering use of surveys and charts, 102–	Features on nautical charts, significant, 305-
111	327. See also Chart(s), nautical.
Envelope line, 379. See also fig. 93.	Federal Aviation Act of 1958, 458, 460
Equal-footing clause, 427, 429–431	Federal Board of Surveys and Maps, 207
Application to tidelands and submerged	Federal courts, 398-401. See also Federal
1 lands, 430	judiciary.
Limitations, 429	Federal judiciary, 399–405
Origin, 427, 429	Cases considered, 399
Equality of the states, 427, 429-431. See	Civil suits, 406
also Equal-footing clause.	Court of Claims, U.S., 403, 405
Equatorial tides, 324	Court of Customs and Patent Appeals, 403
Equidistance, principle of, 384	Courts of appeals, U.S., 400–401
Equidistant polyconic projection, 139–140	Customs Court, 403
Equipment, hydrographic surveying, 224,	District courts, 400
229, 230, 266, 279, 280. See also under	Diversity of citizenship, 406
name of specific equipment.	Supreme Court, 401–405
Eratosthenes, 113 Ericson, D. B., 363	Appellate jurisdiction, 402 Original jurisdiction, 402
Erosion, 359, 501	Special Master, 402
Definition, 539	Federal jurisdiction, exclusive, 399
Doctrine, 364, 539	Federal land patents, 452–453
Errors due to distortion of medium, 106-	Federal Power Commission, 524
107	Federal Tort Claims Act, 289-298
Errors in boundaries, effect of, 433–434	Applicability, 290, 292–293, 295–296
Errors inherent in original surveys, 107	Background, 290
Establishment of tidal datums, 62–66	Charts, failure to use latest, 296
Estuaries, boundaries in, 375, 376	Claims for injury, 290
Euclid, 113	Coast Pilots, failure to use latest, 296
Evaluation of surveys	Discretionary function exception, 290-
Charting, nautical, 89	291, 295
Early surveys, 215	Dalehite v. United States, 291-292
Factors to be considered, 80–81, 131	Early court cases, 291
Low-water line, 183–184	Indian Towing Co. v. United States,
Evidence, Coast Survey records as, 487–494 Evolution of the nautical chart, 269–275	292, 293, 294, 295
Ewing, Maurice, 363	Interpretation, 291-292, 293
Exceptions in Federal Tort Claims Act, 290–	Operational level, 293, 295
291	Planning level, 291-292, 297
Executive orders, 418	Supreme Court cases, 291–293
Executive powers, 398	Exceptions in, 290–291
Extent of land ownership, 457–462	Implications for federal charting agencies,
Exterior boundaries, 378-383	296–298
Extreme low water, 324, 325-326	Liability, limitation of, 290–291
	Notices to Mariners, failure to use, 296
F	Novel and unprecedented governmental
"Fair Journal," 220, 223, 242	, liability, 296
Fairview, Va., 500	Settlement of claims, 298
Farnham, Henry, 519, 534	Supreme Court decisions, recent, 295-296
	• • •

Federal Tort Claims Act—Continued

Frankfurter, Justice Felix, 297, 403

"Uniquely governmental" activities, 292-Free seas doctrine, 365, 378 Funafuti Island, 445 293 Waiver-of-immunity statute, 290 Fur Seal Arbitration, Bering Sea, 386 Federal Water Power Act of 1920, 524 Fenwick, Charles G., 457 Ferrel Tide Predicting Machine, 70 Gadsden purchase, 444 "Field Examinations," 88 Gallatin, Secretary Albert, 10, 421 Field surveys, copies of, 53-54 Galveston, sea level changes at, 59 Gap, definition of, 343 Field work, general instructions for, 225 Figure of the earth, 113-119. See also Gavit, Bernard C., 413, 415, 416 Spheroid(s). Gee, Col. H. C., 533 As an ovaloid, 119 General charts, 287, 303 Files, special chart, 99-102 General instructions for field work (1908, 1915, 1921), 225-227 Filum acquae, 374 Finality of boundaries, 433-434 General Land Office, 452 "Finished" hydrographic sheet, 220, 222, Genesee Chief, The, v. Fitzhugh, 410, 414, 225, 226, 237, 238 427, 521-522, 527 "Finished" nautical charts, 84 Geodesy, science of, 113 Finnegan, Capt. Henry E., 70, 323 Geodetic azimuth, 123 First Continental Congress, 394 Geodetic base for charting, 276 First hydrographic survey, 13 Geodetic control data, 32-33. See also First published hydrographic instructions Leveling, and Triangulation. (1860), 217-220 Geodetic determination of points, 119–120 First telegraphic message, 19 Geodetic process, the, 120 First topographic survey, 13 Geodetic program of Coast Survey, 33 First transatlantic cable, 20 Geodetic surveys, 32 Fischer, Irene, 119 Geodimeter, measurement of lines with, 36, Fischer level, 45. See also fig. 16. Fish, Capt. Gilbert R., 232 Geographia, Ptolemy's, 270 Fishery zones, recent claims to, 366-367 Geographic Board, U.S., 206-207, 261, 317, Canadian proclamation (1963), 366-367 Fishing in U.S. territorial sea, 1964 Act on, Geographic center of the United States, 435, 378 Fishing Pt., Va., 359 Fixed aids to navigation, 309 Geographic coordinates, 40 Fixed or shifting boundary, 501-504 Geographic datums. See Datum(s), geo-Fleming, Richard H., 387 graphic. Floating aids to navigation, 309 Geographic names, 313-318 Flood control, authority of Congress over, Alaska, 317 526 Antarctica, 320 Florida purchase, 443 As evidence, 490 Flower, George L., 306 Atlantic coast, historic description of, 315-"Following the footsteps of the surveyor," Board on Geographic Names, U.S. See Foreshore, definition of, 345 United States Board on Geographic Fractional scale, 103-104 Names. Fractions California, 317 Hydrographic surveys, 242 Charted, 321-323 Nautical charts, 306 Land features, 321

Geographic names—Continued	Gibbons v. Ogden, 396, 517
Charted—Continued	Gnomonic chart, 349
Legal aspects of, 322-323	Governmental powers, classification of, 396-
Bay of New York, 322–323	397
Lettering, style of, 321	Government survey, 463–464
Placement, 321, 367	Governor's Island, N.Y., first control tide
Removal of, 321	station at, 57
Water features, 321	Grand tides, 324
Definition, 313	Graphic method of changing datum on
Early instructions for, 220	survey sheet, 153–154
Early studies, 313–317	Graphic scale, 104, 304, 347
Kohl collection, 314-317. See also	Grass upon flats, 182
Kohl collection of maps and names.	Grassy shoals, 182
Atlantic coast, 315–316	Great circle, 274, 346, 349. See also fig. 87.
Early maps in, 316–317	Great Lakes
Earthquake Bay, Calif., 316	Pilotage, 518
Gulf coast, 315	Shoreline, 484–485
Western coast, 314-315, 316	Great South Bay, Long Island, 13, 169, 235
Generic terms, 320	Greenwich, meridian of, 40, 132, 144
Gulf coast, historic description of, 315	Grotius, Hugo, 374
Hydrographic surveys, 238	Gruening, Senator Ernest, 366
Investigation, 317-318	Guam, 445
Kohl collection, 314-317	Guano Act, 421
Later studies, 317	Gulatee, B. L., 115
Migrated feature, 321	Gulf coast, historic description, 315
Nautical charts, placement on, 321, 367	Gulf, definition of, 387
Oregon, 317	Gulf of Alaska, boundary of, 391
Persons, living, 320	Cult of Colifornia houndary of and
Philippine Islands, 317	Gulf of California, boundary of, 392
Placement on nautical charts, 321, 367	Gulf of Mexico, boundary of, 390
Study, procedure for, 317–318	Gulf of St. Lawrence, boundary of, 390
Topographic surveys, 85	Gumm, Clark L., 442, 446
Virgin Islands, 317	Guyot, definition of, 343
Washington, 317	**
Western coast, historic description of, 314-	Н
315	Hackworth, Green H., 342
Western coast, hydrographic description	Hague Conference of 1930, 371
of, 316	Hale, Lord Matthew, 519
Geographic Names, U.S. Board on. See	Half tide level (Mean tide level), 62, 68, 324
United States Board on Geographic	
Names.	Hand corrections to nautical charts, 101
Geoid, 115	Handlead, 53, 229, 230, 279
Geoidal surface, 119	"Handy plans," 271
Geological Society of America, 51	Harbor charts, 287
Geological Survey, U.S., 33, 51, 475	Harmonic analysis, 70, 256
Memorandum of Understanding with	Harmonic method of tide prediction, 69-70
Coast and Geodetic Survey, 52	Harmonic tide plane, 256, 257, 307
Geometry of Euclid, 113	Harrison, Alexander M., 160, 164
Georges Bank, first surveys of, 20: See also	Harrison, President Benjamin, 206, 318
	Harris, Rollin A., 13
St. George's Bank.	1 141 110, IVIIIII A., 13

Hassler, Ferdinand Rudolph, 6, 9, 10, 11, 13, 136, 144, 147, 159, 165, 169, 195 Associates, scientific, 14 Difficulties, administrative, 15, 16 "Father of the Coast Survey," 14	High-water line—Continued Determination, 174–175 Infrared photography in mapping, 277 Marshes, in tidal, 176 Navigation, use in, 171
First Superintendent, 11	Outer edge of marsh and, 176
Immigration to United States, 14	Topographic determination, 171, 174
Reports of (1816–1843), 13	High-water lunitidal interval, 324
Scientific foresight, 15	High-water mark. See High-water line.
24-inch theodolite, 11. See also fig. 1.	Hilgard, J. E., 223
Hassler, Steamer, 257	Hinks, Arthur R., 136
Hawaii	Hipparchus, 132, 144
Admission to Union, 436	Hiran, 129
Annexation of, 434	Historical Society of Maine, 317
Areas of territory and state, 439–440 Boundaries, seaward, 440	History of level net, 45. See also fig. 15. History sheets, nautical charts, 92, 98
Islands and reefs, 436–439	Hogan, John C., 457
Republic of, 427	Hog Island, 497, 498
State of, 436, 438	Horizontal control data, 33-40. See also
Territory of, 436, 437, 438, 439	Triangulation.
Hawaiian Archipelago, 438	Accuracy, 36–37
Hawaiian Islands, geographic datum of, 127,	Available types, 40–42
129	Geographic coordinates, 40
Hawley, Rear Adm. Jean H., 246	Index maps, 51
Hayford, John F., 14, 118	State plane coordinates, 40-42
Headlands, termini at, 371-372	Horizontal datum, 112. See also Datum(s),
Headland-to-headland line, 367, 371-372,	geographic.
497, 500, 507	Horrebow-Talcott method of latitude de-
Heezen, Bruce C., 363	termination, 19
Height of tide at any time, method of ascer-	Hourly heights of tide, 75
taining, 68. See also fig. 21. Hergesheimer, Edwin, 164	Howe, H. Herbert, 467
Herrle, Gustave, 259, 263	Howland Island, 445
Hickley, Thomas J., 232	Hudson Bay, boundary of, 388 Hudson River canyon, charting of, 232
Hierarchical arrangement of courts, 398–399	Hudson Strait, boundary of, 390
High- and low-water tabulations, 75	Hunt, Edwin B., 136
High seas	Hurwitz, Louis, 467
Boundaries. See Boundaries, high seas.	Hutchins, Thomas, 447
Convention, status of, 385	Hyde, Charles Cheney, 375
Definition, 378	Hydrographic Conference, Seventh Inter-
High-tide shoreline, 345	national, 172
High water, definition of, 174	Hydrographic data, available, 51–52, 53–55
High-water line, 174–175	Copies of field surveys, 53–55
Accuracy of determination, 175	Indexes, survey, 55
Authority for, 85	Hydrographic description of Western coast,
Bank of river, 373	316
Basis for use, 171–172	Hydrographic instructions
Boundary between public and private	First published (circa 1860), 217–220
lands, 172, 345	Other years (1878, 1883, 1894, 1908, 1915,
Charting, 171, 327–328	1921), 221–227
Demarcation of tidal boundaries, 364	Hydrographic manuals, 228

Hydrographic Office, U.S. Navy, 93, 324. See also Naval Oceanographic Office,	Hydrographic survey(s)—Continued Index, 52, 55
U.S.	Inshore, making an, 228–229. See also
Hydrographic surveying. See also Hydro-	Inshore hydrographic survey.
graphic survey(s).	Instructions
Procedure for inshore, 232–235. See also	Earliest (circa 1844), 215–217
Inshore hydrographic survey.	First published (circa 1860), 217–218,
Scope, 211–212	220
Tide observations, 235, 237	Various dates, 215–228
Hydrographic survey (Register No. H-1392	Interpretation, 81, 211–268
(1878)), 177. See also fig. 43.	Kelp on, 268
Hydrographic survey(s), 51, 53, 82, 87–88	Leadline, 218
"A" and "a" sheets, 88	Ledges, 265
Accretion studies, use in, 538	Low-water line, 183-184, 246-251. See
Accuracy, 211	also Low-water line.
Acoustic methods, effect of, 281	Boundary use, 248, 250–251
Additional work, 243, 267	Mean low-water line from mean
Advances, 277, 279–281	lower-low-water line, 250-251.
Alaska, first, 257	See also fig. 63.
Analysis of, 211–268	Symbolization, 247-248. See also fig.
As evidence, 488–489	62.
Basic, 240	Manuals, 228
Boat sheet, 218, 223, 225, 237	Measurement of depth, 229-230
Bottom characteristics, 265-267	"Minus" soundings, 221, 226, 244–245
Application, 266–267	Miscellaneous features, 267-268
Bottom specimens, 220, 234, 266	Names, placement of, 321
Classification, 240	"No bottom" soundings, 244
Combination topographic and, 88, 243	Notes on, 268
Control points, 221. See also fig. 62.	Planes of reference, 253–258. See also
Copies of, 53-54	Tidal datum planes.
Cross lines of soundings, 218, 234	Alaska, 256–257
Day letters, 214, 215, 220, 222, 238, 245-	Atlantic coast, 254–255
246	Gulf coast, 254–255
Depth units, 226, 243	Pacific coast, 255
Descriptive Report, 85–86	Puget Sound, Wash., 256
Diagrams, 218, 223, 225	Position determination, 218, 231-232
Earliest instructions (circa 1844), 215-	Position numbers, 214, 220, 222, 238, 245-
216	246
Echo sounding, 280, 281	Projection, 138, 139-140
Electronic methods, 280–281	Projection lines, multiple, 131
Essential operations, 229	Projection on early, identification of, 140-
"Fair Journals," 223, 242	141 D
"Field Examinations," 88	Reconnaissance, 82–83, 240
First, 214-215	Register No. H-289 (1851)—"Recon-
First published instructions (circa 1860),	naissance of West Coast," 83
217–218, 220 Examination and accompany	Reefs, 264–265
Fractions on, 226, 242	Registry numbers, 85
Conversion, 226	Resurveys, periodic, 51
Geographic names, 318, 321	Review of, 239
Identification letters and numbers, 245-	Revision, 240
246	Rocks on, 258–264. See also Rocks.

Hydrographic survey(s)—Continued	Hydrographic survey(s)—Continued
Salt domes, 268	Working sheets, 223, 225
Scale, 104, 288	"Zero" soundings, 245
Significant features on, 242–268	I
Bottom characteristics, 265-267	
Depth curves, 251-253. See also Depth	Identification letters and numbers, 245–246
curve(s).	Implied powers, 396
Low-water line, 246–248, 250–251. <i>See</i>	Improved channels, 329–331
also Low-water line.	Incorporated territory, 435
Planes of reference, 253–257. See also	Index(es)
Hydrographic survey(s), Planes of reference.	Aerial photography, 56 "Field Examinations," 88
Reefs and ledges, 264–265	Hydrographic surveys, 52, 55
Rocks, 258–264. See also Rocks.	Photogrammetric surveys, 55
Soundings, 242–245	Tidal bench-mark data, 72. See also fig.
"Minus," 244	23.
"No bottom," 244	Topographic surveys, 52, 55
"Zero," 245	Indian claims to land, 419
Single depth unit, 243	Indian spring low water, 256
Smooth sheet, 87, 226, 238	Indian tide plane, 256, 307
Sounding accuracy, 218	Indian Towing Co. v. United States, 292-
Sounding-line crossings, 218, 234	293, 297
Sounding pole, 218	Indian tribes, land rights of, 419
Sounding records. See Sounding records	Infrared photography, 56, 180, 277
(volumes).	Ingress, right of, 364
Soundings, 242-243. See also Soundings.	Initial points (public land surveys), 448, 449.
Reduction of, 224	See also fig. 97.
Sounding sheet, 223, 225, 237	Inland waters of United States (1940 Cen-
Special, 240	sus), 474-475, 476
Special features on, 268	Inlet migration, 360-361. See also fig. 91.
Kelp, 268	Inshore hydrographic survey, 228–229
Oil well, 268	Depth measurement, 229-230
Salt domes, 268	Position determination, 231-232
Symbolization. See Symbol(s), hydro-	Surveying operation, the, 232-237
graphic.	Instructions for field work, general, 225
Systems of sounding lines, 229. See also	Instructions for hydrographic work, 215.
fig. 57.	See also Hydrographic survey(s), In-
Terms associated with, 237–242	structions.
Basic survey, 240	Instructions for topographic work, earliest
Boat sheet, 237	(circa 1840), 165-168. See also Topo-
Review, 239	graphic survey(s), Instructions.
Smooth sheet, 238	Instruments and equipment, topographic
Sounding record, 240–242	surveying, 159-162. See also under
Verification, 238	name of specific instrument and equip-
Three-point fix method, 222, 231, 233	ment.
Tidal datum planes, 253-258. See also	Instruments, hydrographic surveying, 218,
Tidal datum planes.	229, 232, 233, 280, 281, 327. See also
Tide, corrections for, 235	under name of specific instrument.
Uses of, 89, 212, 276, 277, 363, 538	Insular possessions, U.S., 424
Verification, 238	Intermediate scales, 105

International Committee on the Nomenclature of Ocean Bottom Features, 342 International Conference on Safety of Life at Sea (1948), 334 International ellipsoid of reference, 118. See also Spheroid(s). International Hydrographic Bureau, 275, 387 International Law Commission, 371 International nautical mile, 348 International rivers, 372 Interpretation of Rules of the Road boundary lines. See Rules of the Road bound-Interpretation of surveys and charts, 81 Interstate boundaries, 432-434. See also Boundaries, interstate. Intracoastal Waterway, 310 Intracoastal Waterway charts, 287 Island shelf, definition of, 343 Island slope, definition of, 343 Islands, U.S. sovereignty, 445 Isogonic lines, 352 Isthmian Canal Commission, 129 Jackson, Justice Robert H., 402, 404 Jackson, President Andrew, 13 Jamaica Bay, Long Island, 177 James I, King, 368 Jarvis Island, 445 Jeffers, Capt. Karl B., 10, 81, 88, 218, 222, 227, 229, 232, 233, 238, 239, 244, 248,

263, 264, 265, 267, 268, 320, 379 Jefferson, President Thomas, 4, 8, 10, 420 Jenkins, Walter W., 315 Jervis, Walter W., 193 Jessup, Phillip C., 368, 457 Johnson, Douglas W., 176, 344, 345, 361 Johnson, J. B., 468 Johnson, Martin W., 387 Johnston Island, 438, 439, 444 Jones, Grosvenor M., 518 Jones Point, Va., 495, 502, 505, 510, 513-515. See also fig. 106. Judicial notice, 402, 488-489 Judicial powers, 398 Judicial process, 408-413 Obiter dictum, 411 Rule of property, 410-411 Stare decisis, doctrine of, 409-411

Judicial system
Authority in, 412
Rank of courts, 412
Secondary authority, 413
Judiciary Act of 1789, 400, 402, 406, 415, 522
Judiciary, federal. See Federal judiciary.
Judiciary, primary function of, 398
Judith's Creek, Va., 495, 497
Jurisdiction, original, 402, 404
Justice, Department of, 516
Justinian Code, 416

### K

Karo, Rear Adm. H. Arnold, 16, 485 Kelp, 268 Kent, Chancellor James, 409, 520, 527 Kingman Reef, 438, 439, 444 King's Chambers doctrine, 368 Klein, Herbert D., 457 Kloman, H. Felix, 457 Knox, Rear Adm. Robert W., 20, 148 Kohl collection of maps and names, 314-317 Early maps, 316–317 Earthquake Bay, Calif., 316 Historic description of Atlantic coast, 315 Historic description of Gulf coast, 315 Historic description of Western coast, 314-315 Hydrographic description of Western coast, 316 Kohl, John G., 313, 315, 316 Kort, V. G., 115 Krämer (Mercator), Gerhard, 273

### T.

Labor Department, creation of, 10
Labrador Sea, boundary of, 388
Laguna Madre, Tex., symbolization in, 192
Lambert conformal conic projection, use of,
41
Lambert, Walter D., 142
Land acquisition. See Acquisition of territory.
Land and water areas of the United States,
476. See also Tables 2 and 3.
Land area of the world, 476
Land areas, definition of (1940 Census),
475
Land description. See Descriptions of land.
Land grants to states, federal, 453-455
Landmarks. See Aids to navigation.

Land Ordinance of 1785, 446	Level, Fischer, 45. See also fig. 16.
Land ownership in the United States, 419-	Leveling, 42-44
420	Accuracy, 43
Above the surface, 457–461	Tidal bench marks, 61
Below the surface, 461	Adjustment. See Adjustment(s), Level-
Categories, 420	ing network.
Extent, 457–462	Bench marks, 49–50
Federal, 420, 441–444. See also Acquisi-	Classification, 43
tion of territory.	Data, available, 42, 49–51
Federal ownership within states, 422-424	Definition, 42
Grants by British Crown, 419-420	First-order, 43
Grants by Dutch Government, 420	History, 45–46
Grants by foreign governments, 456	Index maps, 51
Grants by states, 456	Program, 43
Indian claims to, 419	Sea Level Datum of 1929, 48–49
Laterally, 462	Second-order, 43
Private, 420, 455–462	Specifications, 43
Public domain, the, 423-424. See also	United States network, 43. See also fig.
Public domain.	I5.
State, 420, 453–455	Lighted aids to navigation, 311
Transfer, 462–473. See also Descriptions of land.	Light-House Board, 93
Laplace azimuths, 122, 123	Lighthouses, Bureau of, 89, 93, 276 Limits of body of water, defining, 367
Laplace, Pierre–Simon de, 123	Limits of oceans and seas, 386–388. See also
Laplace station, 123	Oceans and seas, limits of.
Large scale, definition of, 104	Lincoln Sea, boundary of, 390
La Salle, Robert de, 443	Linear scale, 104
Las Siete Partidas, 365	Lines of allocation, 385-386
Latchford, Stephen, 457	Lines of equal magnetic declination, 352
Latent ambiguities, 470	List of Lights, 355
Lateral boundaries, maritime, 383–384	Lithography, effect of, on nautical charts,
Lateral ownership of property, 462	311, 329
Lateral system of buoyage, 310	Local Notice to Mariners, 93
Latham, Capt. E. B., 500	Longitude determination
Latitude scale, use of, 304-305	Cable, transatlantic, 20
Law of the Sea Conventions (Geneva, 1958),	Chronometric, 20, 145
status of, 384-385	Eclipses, solar, 144
Laws and their rank, 417-418	Lunar, 145
Leadbetter Point, Wash., changes at, 359.	Radio, 146
See also fig. 90.	Telegraphic, 19, 146
Leadline, use of, 218, 223	Longitude values
Lebanon, Kans., 435	Change in, 144, 146–148
Ledges, definition and symbolization, 265,	New York City Hall, 147
331–332 Left bank of river, 373	Loran lines of position, 327, 351
Legal systems in the United States, 413-417	"Lost" triangulation stations, 154
Legislative courts, 403	Louisiana coast, low-water line survey of, 80, 516
Legislative powers, 398	oo, 510 Louisiana Purchase, 420–421, 442–443
Legislative Reorganization Act (1946), 290	Lowest spring tide observed, 306
Lettering of names on nautical charts, 321	Lowest tide to be expected, 324
	20 West that to be expected, 324

Mapping the shoreline, 163

Lowest water observed during survey, 254 Maps and plats, control by, 472 Low-tide elevations in territorial sea delimi-Maps, charts, and surveys, 81 tation, 379-381 Mare Island controversy, 492-493 Low-tide shoreline, 345 Coast Survey participation, 493 Low-water area, symbolization of, 328 Marginal sea, 365, 378. See also Territorial Low-water datums. See also Tidal datum planes. Mariana Trench, 115 Advantages, 65 Marine Accident File, nautical charts, 102 Early, 254–257, 306 Marine vegetation, 177 Low water, extreme, 324, 325-326 Marinus of Tyre, 270 Low-water line, 183, 189, 226, 243, 244-245, 246-247, 493. See also Topo-Maritime boundaries. See Boundaries, maritime. graphic survey(s), and Hydrographic Maritime cases, jurisdiction in, 399 survey(s). Maritime tort cases in lower Federal courts, Baseline for seaward boundaries, 345, 370, Marmer, Harry A., 59, 60, 61, 63, 66, 69, Boundary purposes, for, 248, 250–251 174, 256, 324, 326, 490 Mean low-water line from mean lower-Marsh, 176–183 low-water line, 250-251. See also Areas mostly flooded at high water, 182fig. 63. Chart symbol, 328 Dividing line between salt and fresh, 181 Demarcation of tidal boundaries, 364 Early stages in development, 182 Determination on topographic surveys, Formation, 176 183-185 Fresh, 329. See also fig. 52. Mapping, aerial, 277 High-water line in tidal, 176, 328 Planes of reference, 185–187 Inner edge, 181–182 Survey of Louisiana coast, 277, 516 Symbolization, 181, 328 Symbolization on hydrographic surveys, Interpretation, 176, 234 247-248 Evidence from collateral sources, 177-Low-water lunitidal interval, 324 Low water ordinary springs, 256 Jamaica Bay, N.Y., 177 Low water spring tides, 254 Legal significance, 191, 364 Loxodromic curve, 273, 299, 346. See also Outer edge, 176 fig. 87. Symbolization, 177, 328 Lunar method of longitude determination, Salt, 364. See also fig. 52. Surveyed line, the, 176–177 Luttes v. State, 345, 365, 413. Refer also to Symbolization on charts, 329 Appendix D. Marsh areas mostly flooded at high water, Lyman, John, 115 182--183 Maryland cession to Federal Government, M Maryland-Virginia boundary, 377, 432, 494-Madison, Secretary James, 8 Magnetic declination, proof of, 469, 490 Magnetic meridian, 467 Award of 1877, 376, 494-497. See also Manby, Point, Alaska, 383 fig. 102. Mandatory authority, 412. See also Au-Charter of 1632, 376, 496 thority in the judicial system. Coast Survey participation, 497-500 Map, definition of, 82 Demarcation of boundary line, 499–500 Map making, problem of, 131-132 Recent involvement, 500

Compact of 1958, 504

Mean sea level, 62-63, 311. See also Sea Maryland-Virginia boundary-Continued level. Compact of 1785, 394, 431, 495, 496, 504, Basis for level net, 62 Definition, 62 Recent developments, 504 Mean tide level (half tide level), 68, 324 Control for, 500 Measurement, definitions for area, 473-475. Dates associated with, 501–502 See also Area of the United States (1940 Demarcation, 499-501 Census). 1877 arbitration, 494-497 Ratification by states and Congress, 495 Measurement of depth, 229-230 Measurements, distance. See Distance High-water mark along Virginia shore, measurement(s). 376 Measurement, technique of area, 475 Map delineation (1927), 499 Measurement, units of Shifting or fixed, 501-504 International foot, 348 Witness monuments, 499 International nautical mile, 348 Maryland-Virginia Compact of 1785, 394, 431, 496, 504, 506. See also Potomac Latitude, minute of, 348 Nautical mile, U.S., 348 River Compact of 1958. Massachusetts ordinance of 1641-1647, 183, Stadia, 114 Yard, 348 Median line, 374 Mathews, Edward B., 495, 497, 498, 499, 500, Medium filum acquae, 372, 374 502, 503, 514 Memorandum of Apr. 18, 1961, from Direc-McGuire, James W., 317 tor, C. & G.S., to Solicitor General, 516 Meade, Buford K., 127, 276 Memorandum of Understanding between Meades Ranch, triangulation station, 122, Geological Survey and Coast and Geo-123, 124 detic Survey, 52 Meander lines, 450-452 Mean diurnal range (tides), definition of, Mendenhall, T. C., 223 Mercator charts, scale of, 104, 303-304 Mercatorial bearings, 346, 351 Mean higher high water, 62, 324 Mercator (Krämer), Gerhard, 273 Mean high-tide line. See Mean high-water Mercator projection, 273-275, 299-305. See also fig. 77. Mean high water, 62, 64-65, 66, 324 Adoption by Coast Survey, 301-302 Mean high-water line, 52, 172-173, 345 Advantages, 273, 299 Determination, 365 Coast Survey, first use by, 301 Mean lower low water, 62, 65, 220, 226, 255, Conformal class, 274, 299 256, 257, 307, 324 Mean lower low water, 3 feet below, 257, Disadvantages, 274-275, 299 Great circle, 346. See also fig. 87. Radio bearings, 274, 346 Mean lower low water, 2 feet below, 256, Rhumb line, 273, 299. See also fig. 87. Scale, 274-275, 302-305. See also Scale. Mean low water, 62, 65, 218, 226, 254, 256, Tables, world, 138 307, 324 Using charts on, 346 Mean low-water line, 247, 345 Mercator World Map of 1569, 273, 275 Mean low water, spring tides, 306 Mean of a few selected lowest lows, 256 Legends, 275 Merchant Shipping Amendment Act of Mean of selected lowest low waters, 256, 307 1862, 332 Mean of the lowest low water of each 24 Meridional parts, 273 hours, 220, 255, 256 Merriman, Mansfield, 119 Mean of the lowest low waters, 220 Mean range (tides), definition of, 67 Merwede River, 252

Nautical Chart Manual, 355

Meteorological effect on sea level, 63 Nautical mile Meter, legal, 106, 137 International, 348 Metes and bounds, 464-466 Length of U.S., 348 Naval Oceanographic Office, U.S., 93, 355. Interpretations, 465–466 See also Navy Hydrographic Office, U.S. Methods of position determination, 350–352. Navassa Island, 445 See also Position determination. Mexican cessions, 444 Navigability. See also Navigable waters. American doctrine, 520-522 Middle of main channel as boundary, 375. See also Thalweg, rule of the. Navigability test, 521-522. See also Midway Islands, 438, 439, 444 Genesee Chief, The, v. Fitzhugh. Migration, inlet, 361. See also fig. 91. Tidal test, 520. *See also* Palmer v. Mile, nautical. See Nautical mile. Mulligan. "Minus" soundings, 185, 221, 226, 242–243, Availability for navigation, 525 Definition, 523 244–245, 248 Mississippi River delta, changes in, 359 Effect of future improvements, 525 Mitchell, Hugh C., 41, 112, 154, 172, 348, English doctrine, 518-519 Banne, The Royal Fishery of the, 518-Moby Dick, 297 519 Indicia of, 528-529 Moffitt, Francis H., 465 Monthly lowest low water, 326 Judicial notice, 529 Law of, summary of development of, 527-Monthly sea level, 63 Monuments, boundary, 466, 471 528 Moore, John Bassett, 8, 368 Legal concept, 523-527 Non-navigable tributary streams, 526. Moore, W. G., ig1 Moot case, 408 See also Oklahoma ex rel. Phillips v. "More or less" in boundary descriptions, 472 Guy F. Atkinson Co. Morrison, Donald H., 399 Prima facie navigable, 528 Morse, Samuel F., 146 Proof of, 529 Mount Everest, 115 Termini, public, 529 Multiple projection lines, reasons for, 141. Navigable waters, 516-530. See also Navi-See also Early surveys, Projection lines, gability. Access, right of, 364, 534-535 multiple. Law of, 517-518 N Navigability test, 521-522 Names, geographic. See Geographic names. Public use, 528, 529-530 Public use of shores, 530 National Academy of Sciences—National State, 524 Research Council, 28 Tidal test, 520-521 National Aeronautics and Space Administra-United States. See Navigable waters of tion, 119 the United States. National Archives, 102 Navigable waters of the United States, 523-National Archives and Records Service, 87 National external sovereignty, 396 Control over, 396. See also Gibbons v. National Government, powers of, 395-396 Ogden. National Intelligencer, 316 Definition, 523 National Reporter System, 407 Natural and ordinary condition, 524 National rivers, 372 Navigation, public right of, 535 Natural scale, 304. See also Charts, Scale. Navy Hydrographic Office, U.S., 93, 324. Nautical chart. See Chart(s), nautical. See also Naval Oceanographic Office,

U.S.

Negative engraving (scribing), 285–286 Negatives, wet-plate glass, 285 Nelson, Wilbur A., 495, 497, 498, 499, 500, 502, 503, 514 Nesbit, D. M., 176 Newcastle, Del., 376 New edition of nautical chart, 94, 100 New Jersey v. Delaware, 466, 469, 503 New print of nautical chart, 94 New River, Va., 524-525 New states, admission of. See Admission of new states. Newton, Sir Isaac, 116 New type nautical chart, 282–284. See also fig. 74. New York Bay, 322 New York City Hall, 144, 147, 312 New York-New Jersey Compact of 1834, New York, sea level at, 59 "No bottom" soundings, 244. See also Soundings, Classification. Nondevelopable surface, 133 Nonharmonic method of tide prediction, 69 Normal baseline, 370 North American Datum, 122, 312 North American 1927 Datum, 112, 123-124, 148, 276, 312 North Atlantic Coast Fisheries Arbitration, North Atlantic Ocean, boundary of, 390 North Pacific Ocean, boundary of, 391 Northwest Ordinance of 1787, 426, 427 Northwest Passages, The, 388. See also fig. Northwest Territory, 377, 425, 441 Notes on hydrographic surveys, 268 Notice to Mariners, 93, 94, 101, 355 Failure to use, 296 Numbering of nautical charts Canal Zone, 91 Numerical order, 92 Past practice, 90 Present practice, 91-92 Previously assigned numbers, use of, 92 Puerto Rico and Virgin Islands, 91 Small-Craft charts, 92 Various coasts, 91–92 Numbering system for Coast Survey publications, 228

Numerical method of changing datum of survey sheet, 151-152 Numerical scale, 304. See also Charts, Scale. Nun buoy, 310

Obiter dictum, 411 Oblate spheroid, 116, 117. See also Spheroid(s). Occultations, 145 Ocean bottom features, 342-343 Ocean Cape, Alaska, 383 Ocean City, Md., 360 Ocean deeps, 115 Ocean, definition of, 387 Oceanic bank, definition of, 343 Oceans and seas, limits of, 386–388 Delimitation by International Hydrographic Bureau, 387–388 Western Hemisphere, 388–392. See also fig. 94, and under specific body of water. Oceans and seas, nomenclature of, 386-387 Odgers, Merle M., 21 Official state law reports, 407 Offshore rocks, changes in, 262 Offshore submerged lands, 455 Offshore wind, definition of, 63 Ohio, admission of, as a state, 426–427 Ohio River, 377, 378, 404 Oil well, 268 Oklahoma ex rel. Phillips v. Guy F. Atkinson Co., 524, 526, 528 Old Hawaiian Datum, 127, 312 141st meridian, boundary along, 126 One-quarter, one-tenth rule, 68 Onshore wind, definition of, 62 Open sea doctrine, 378 Opinions and Award of Arbitrators of 1877 (Md.–Va. boundary), 494–496, 506 Oppenheim, L. F. L., 372 Optional Protocol of Signature, status of, 385 Ordinance of 1641-1647, 326 Ordinary high-water mark, 174, 326, 365 Ordinary high-water mark (river), 373 Ordinary low-water mark, 326 Ordinary low-water mark (river), 374 Ordinary polyconic projection, 138

Oregon Territory cession, 444

Organic Act of Coast Survey. See Act of Photostats of tidal data, 75 Pierce, Rear Adm. Charles, 127, 262, 276 Feb. 10, 1807. Orientation of planetable, 161 Pier, definition of, 535 Pilotage on Great Lakes, control of, 518 Original Thirteen Colonies, 419 Orthodromic curve, 274, 346 Pilots, regulation of, 518 Orthometric correction, 46 Planes of reference, 253–258. See also Tidal Outer space, law of, 457 datum planes. Ovaloid, earth as an, 119 Planetable, 85, 159-163. See also fig. 41. Overflowed lands, 453–455 Overhead power cables, identification of, Alidade, 160 Description, 160 Instructions for surveying with, earliest Ownership of airspace, 458 (circa 1840), 165–168. See also Ozalid prints, 55 Topographic survey(s). Manual, first, 164 P Manuals, published, 164 Mapping, shoreline, 163 Pacific Ocean, North, boundary of, 391 Orientation, 161 Pacific Ocean, South, boundary of, 392 Palmer v. Mulligan, 520, 527 Telemeter rod, 161–162 Using the, 160-161 Palmyra Island, 438, 439, 444 Planimetric maps, 52 Panama-Colon Datum, 129 Plateau, definition of, 343 Partidas, Las Siete, 365 Plotting fractions on hydrographic surveys Patent ambiguities, 470 Patents, federal land, 452-453 (1908), 226 Plotting latitudes and longitudes on nauti-Patterson, Carlile P., 221 cal charts, 349 Patterson, Robert, 5, 10 Plumb-line deflection, 120 Pattison, William D., 447 Pocomoke River, 496, 497 Patton, Rear Adm. Raymond S., 176, 232 Point Manby, Alaska, 383 Patton, Rufford O., 446, 456, 466 Point of beginning for public land surveys, Pearcy, Etzel, 479 Peirce, Benjamin, 21, 314 Pollard's Lessee v. Hagan, 430, 455, 531 Peirce, Charles S., 14 Polyconic projection, 136-138. See also fig. Perigean tides, 326. Refer also to Appendix Tables, 137 Permanent Court of Arbitration, The Hague, Portolano charts, 193, 271 368–369 Perspective projections, 133, 299. See also Position determination, 218, 231-232. See also Chart(s), nautical, Position determination. Persuasive authority, 412. See also Author-Position numbers on hydrographic surveys, ity in the judicial system. Philippine Islands, 422, 424 214, 220, 222, 238, 245–246 Possessions, states, territories, 424-425 Charts, 22, 25 Potomac River. See Maryland-Virginia Geographic datum, 127 boundary, and District of Columbia-Rehabilitation Act of 1946, 422 Virginia boundary. Surveys, 22-25 Photogrammetric surveys Potomac River Compact of 1958, 504 Potter, Pitman B., 457 Index, 55 Powers of National Government, 395-396 Low-water line interpretation, 186 Praetorius, Johann, 277 Photogrammetry in nautical charting, 277 Photolithography in nautical charting, 285 Precedent, doctrine of, 409-410 Photostats of surveys, 54 Precise dead reckoning, 231-232

Precise level net, 43	Projection tables
Prediction of tides. See Tide prediction.	Mercator, 138
Preliminary charts, 83, 84	Polyconic, 137
Preliminary coast charts, 90	Prolate spheroid, 116
Preliminary surveys, 82	Proudfit, S. V., 442, 444
Presidio (San Francisco) tide record, 57	Proudfoot, Malcolm, 473, 475
Pressure tubes, sounding, 229	Ptolemy, Claudius, 134, 270
Price, Miles O., 407, 413	Publication note on charts, 95
Primary authority, 413. See also Authority in the judicial system.	Publications, numbering of Coast Survey,
Primary tide station, 57. See also Tide	Public domain, 424, 441–453
station(s).	Acquisition, 441-444
Principal meridian (public land surveys),	Area, 424
448. See also fig. 97.	Disposition, 446. See also Public land
Print date on nautical chart, 94	surveys.
Printing, nautical chart, 285	Patents, federal, 452–453
Projection lines, multiple, on early surveys,	Maximum extent, 442
131	States outside the, 442
Example of corrections, 149–150	Public domain surveys. See Public land
Reasons for, 141-144, 148-149	surveys.
Projection(s)	Public lands. See Public domain.
Charts, early, 301	Public land surveys, 446–452
Conformal, 133, 274	Chain as unit of measure, 449
Conical, 134–140	Meander lines, 450-452
Bonne, 135	Rectangular system, 446-449. See also
Equidistant polyconic, 139–140	fig. 97.
Polyconic, 136–138. See also fig. 32.	Terms used in, 448, 450. See also fig.
Rectangular polyconic, 138–139. See	97.
also fig. 33.	Sections, 450
also fig. 33. Simple conic, 134–135	Sections, 450 Township, 448, 450
also fig. 33. Simple conic, 134–135 Constructed after survey, 154–158	Sections, 450 Township, 448, 450 24-mile tracts, 449
also fig. 33.  Simple conic, 134–135  Constructed after survey, 154–158  Large-scale surveys, 157–158. See also	Sections, 450 Township, 448, 450 24-mile tracts, 449 Public use of navigable waters, 528, 529–530
also fig. 33.  Simple conic, 134–135  Constructed after survey, 154–158  Large-scale surveys, 157–158. See also fig. 39.	Sections, 450 Township, 448, 450 24-mile tracts, 449 Public use of navigable waters, 528, 529–530 Public use of shores, 530
also fig. 33. Simple conic, 134–135 Constructed after survey, 154–158 Large-scale surveys, 157–158. See also fig. 39. Modified methods, 158	Sections, 450 Township, 448, 450 24-mile tracts, 449 Public use of navigable waters, 528, 529–530 Public use of shores, 530 Puerto Rico, commonwealth status of, 424,
also fig. 33.  Simple conic, 134–135  Constructed after survey, 154–158  Large-scale surveys, 157–158. See also fig. 39.  Modified methods, 158  Small-scale surveys, 155–157. See also fig. 38.	Sections, 450 Township, 448, 450 24-mile tracts, 449 Public use of navigable waters, 528, 529–530 Public use of shores, 530
also fig. 33.  Simple conic, 134–135  Constructed after survey, 154–158  Large-scale surveys, 157–158. See also fig. 39.  Modified methods, 158  Small-scale surveys, 155–157. See also fig. 38.  Cylindrical, 134, 299	Sections, 450 Township, 448, 450 24-mile tracts, 449 Public use of navigable waters, 528, 529–530 Public use of shores, 530 Puerto Rico, commonwealth status of, 424, 445 Puerto Rico Datum, 129, 312 Putnam, G. R., 302
also fig. 33. Simple conic, 134-135 Constructed after survey, 154-158 Large-scale surveys, 157-158. See also fig. 39. Modified methods, 158 Small-scale surveys, 155-157. See also fig. 38. Cylindrical, 134, 299 Definition, 132-133	Sections, 450 Township, 448, 450 24-mile tracts, 449 Public use of navigable waters, 528, 529–530 Public use of shores, 530 Puerto Rico, commonwealth status of, 424, 445 Puerto Rico Datum, 129, 312
also fig. 33.  Simple conic, 134-135  Constructed after survey, 154-158  Large-scale surveys, 157-158. See also fig. 39.  Modified methods, 158  Small-scale surveys, 155-157. See also fig. 38.  Cylindrical, 134, 299  Definition, 132-133  Equal area, 133, 274	Sections, 450 Township, 448, 450 24-mile tracts, 449 Public use of navigable waters, 528, 529–530 Public use of shores, 530 Puerto Rico, commonwealth status of, 424, 445 Puerto Rico Datum, 129, 312 Putnam, G. R., 302 Pythagoras, 113
also fig. 33.  Simple conic, 134-135  Constructed after survey, 154-158  Large-scale surveys, 157-158. See also fig. 39.  Modified methods, 158  Small-scale surveys, 155-157. See also fig. 38.  Cylindrical, 134, 299  Definition, 132-133  Equal area, 133, 274  Gnomonic, 349	Sections, 450 Township, 448, 450 24-mile tracts, 449 Public use of navigable waters, 528, 529–530 Public use of shores, 530 Puerto Rico, commonwealth status of, 424, 445 Puerto Rico Datum, 129, 312 Putnam, G. R., 302 Pythagoras, 113
also fig. 33. Simple conic, 134-135 Constructed after survey, 154-158 Large-scale surveys, 157-158. See also fig. 39. Modified methods, 158 Small-scale surveys, 155-157. See also fig. 38. Cylindrical, 134, 299 Definition, 132-133	Sections, 450 Township, 448, 450 24-mile tracts, 449 Public use of navigable waters, 528, 529–530 Public use of shores, 530 Puerto Rico, commonwealth status of, 424, 445 Puerto Rico Datum, 129, 312 Putnam, G. R., 302 Pythagoras, 113
also fig. 33.  Simple conic, 134-135  Constructed after survey, 154-158  Large-scale surveys, 157-158. See also fig. 39.  Modified methods, 158  Small-scale surveys, 155-157. See also fig. 38.  Cylindrical, 134, 299  Definition, 132-133  Equal area, 133, 274  Gnomonic, 349	Sections, 450 Township, 448, 450 24-mile tracts, 449 Public use of navigable waters, 528, 529–530 Public use of shores, 530 Puerto Rico, commonwealth status of, 424, 445 Puerto Rico Datum, 129, 312 Putnam, G. R., 302 Pythagoras, 113
also fig. 33.  Simple conic, 134-135  Constructed after survey, 154-158  Large-scale surveys, 157-158. See also fig. 39.  Modified methods, 158  Small-scale surveys, 155-157. See also fig. 38.  Cylindrical, 134, 299  Definition, 132-133  Equal area, 133, 274  Gnomonic, 349  Identification, 140-141	Sections, 450 Township, 448, 450 24-mile tracts, 449 Public use of navigable waters, 528, 529–530 Public use of shores, 530 Puerto Rico, commonwealth status of, 424, 445 Puerto Rico Datum, 129, 312 Putnam, G. R., 302 Pythagoras, 113  R Radio Acoustic Ranging (R.A.R.), 26, 212,
also fig. 33.  Simple conic, 134–135  Constructed after survey, 154–158  Large-scale surveys, 157–158. See also fig. 39.  Modified methods, 158  Small-scale surveys, 155–157. See also fig. 38.  Cylindrical, 134, 299  Definition, 132–133  Equal area, 133, 274  Gnomonic, 349  Identification, 140–141  Mercator, 273, 299. See also Mercator projection.	Sections, 450 Township, 448, 450 24-mile tracts, 449 Public use of navigable waters, 528, 529–530 Public use of shores, 530 Puerto Rico, commonwealth status of, 424, 445 Puerto Rico Datum, 129, 312 Putnam, G. R., 302 Pythagoras, 113  R Radio Acoustic Ranging (R.A.R.), 26, 212, 232, 280. See also fig. 7.
also fig. 33.  Simple conic, 134–135  Constructed after survey, 154–158  Large-scale surveys, 157–158. See also fig. 39.  Modified methods, 158  Small-scale surveys, 155–157. See also fig. 38.  Cylindrical, 134, 299  Definition, 132–133  Equal area, 133, 274  Gnomonic, 349  Identification, 140–141  Mercator, 273, 299. See also Mercator projection.  Nautical chart, 298–299. See also Merca-	Sections, 450 Township, 448, 450 24-mile tracts, 449 Public use of navigable waters, 528, 529–530 Public use of shores, 530 Puerto Rico, commonwealth status of, 424, 445 Puerto Rico Datum, 129, 312 Putnam, G. R., 302 Pythagoras, 113  R Radio Acoustic Ranging (R.A.R.), 26, 212, 232, 280. See also fig. 7. Radio bearings, 346 Raisz, Erwin, 114
also fig. 33.  Simple conic, 134-135  Constructed after survey, 154-158  Large-scale surveys, 157-158. See also fig. 39.  Modified methods, 158  Small-scale surveys, 155-157. See also fig. 38.  Cylindrical, 134, 299  Definition, 132-133  Equal area, 133, 274  Gnomonic, 349  Identification, 140-141  Mercator, 273, 299. See also Mercator projection.  Nautical chart, 298-299. See also Mercator projection.	Sections, 450 Township, 448, 450 24-mile tracts, 449 Public use of navigable waters, 528, 529–530 Public use of shores, 530 Puerto Rico, commonwealth status of, 424, 445 Puerto Rico Datum, 129, 312 Putnam, G. R., 302 Pythagoras, 113  R Radio Acoustic Ranging (R.A.R.), 26, 212, 232, 280. See also fig. 7. Radio bearings, 346 Raisz, Erwin, 114 Range lines (public land surveys), 450
also fig. 33.  Simple conic, 134–135  Constructed after survey, 154–158  Large-scale surveys, 157–158. See also fig. 39.  Modified methods, 158  Small-scale surveys, 155–157. See also fig. 38.  Cylindrical, 134, 299  Definition, 132–133  Equal area, 133, 274  Gnomonic, 349  Identification, 140–141  Mercator, 273, 299. See also Mercator projection.  Nautical chart, 298–299. See also Mercator projection.  Perspective, 133, 299	Sections, 450 Township, 448, 450 24-mile tracts, 449 Public use of navigable waters, 528, 529-530 Public use of shores, 530 Puerto Rico, commonwealth status of, 424, 445 Puerto Rico Datum, 129, 312 Putnam, G. R., 302 Pythagoras, 113  R Radio Acoustic Ranging (R.A.R.), 26, 212, 232, 280. See also fig. 7. Radio bearings, 346 Raisz, Erwin, 114 Range lines (public land surveys), 450 Range of tides. See Tide(s), Range.
also fig. 33.  Simple conic, 134–135  Constructed after survey, 154–158  Large-scale surveys, 157–158. See also fig. 39.  Modified methods, 158  Small-scale surveys, 155–157. See also fig. 38.  Cylindrical, 134, 299  Definition, 132–133  Equal area, 133, 274  Gnomonic, 349  Identification, 140–141  Mercator, 273, 299. See also Mercator projection.  Nautical chart, 298–299. See also Mercator projection.  Perspective, 133, 299  State Coordinate Systems, 41	Sections, 450 Township, 448, 450 24-mile tracts, 449 Public use of navigable waters, 528, 529–530 Public use of shores, 530 Puerto Rico, commonwealth status of, 424, 445 Puerto Rico Datum, 129, 312 Putnam, G. R., 302 Pythagoras, 113  R Radio Acoustic Ranging (R.A.R.), 26, 212, 232, 280. See also fig. 7. Radio bearings, 346 Raisz, Erwin, 114 Range lines (public land surveys), 450 Range of tides. See Tide(s), Range. Rank of courts, 412
also fig. 33.  Simple conic, 134–135  Constructed after survey, 154–158  Large-scale surveys, 157–158. See also fig. 39.  Modified methods, 158  Small-scale surveys, 155–157. See also fig. 38.  Cylindrical, 134, 299  Definition, 132–133  Equal area, 133, 274  Gnomonic, 349  Identification, 140–141  Mercator, 273, 299. See also Mercator projection.  Nautical chart, 298–299. See also Mercator projection.  Perspective, 133, 299	Sections, 450 Township, 448, 450 24-mile tracts, 449 Public use of navigable waters, 528, 529-530 Public use of shores, 530 Puerto Rico, commonwealth status of, 424, 445 Puerto Rico Datum, 129, 312 Putnam, G. R., 302 Pythagoras, 113  R Radio Acoustic Ranging (R.A.R.), 26, 212, 232, 280. See also fig. 7. Radio bearings, 346 Raisz, Erwin, 114 Range lines (public land surveys), 450 Range of tides. See Tide(s), Range.

Reclaim land, right to, 536	Riparian rights—Continued	
Reconciling rock symbols, 261–262	Accretion, 534, 536–538, 540–541	
Reconnaissance chart, 83	Division of, 540-541	
Reconnaissance survey, 82	Nature of, 537	
Record File, nautical charts, 102	Avulsion, 539	
Rectangular coordinates, 40	Dereliction, 538	
Rectangular polyconic projection, 138-139.	Erosion, 364, 539	
See also fig. 33.	Federal courts, rule in, 532-533	
Rectangular system of surveys. See Public	Laws, governing, 541	
land surveys.	Nature of, 534	
Red River, 373, 376	Reclaim land, right to, 536	
Reef, 264–265, 331–332	Reliction, 538	
Reference File, nautical charts, 102	Shore lands, 531	
Registry numbers, 85	State laws, diversity of, 531-532, 533-534	
"a" and "b" sheets, 86	Tidelands, ownership of, 531	
"Bis" sheets, 86	Historical background, 531	
Reliability of surveys, 80	Rule in Federal courts, 532–533	
Reliction, 538	Rise, definition of, 343	
Renard, Charles, 169	River boundaries. See Boundaries, river.	
Representative fraction (R.F.), 104, 105,	River(s)	
304	Bank, 373	
Restoration of markers on boundary line,	Bed, 373	
434	Boundaries, 372. See also Boundaries,	
Review of hydrographic surveys, 239	river.	
Revision survey, 240	Boundary at, 371	
Reynolds, Walter F., 41	Headland rule, 371	
"R.F." (representative fraction) of chart,	Termini, 371	
104, 304	Definition, 372	
Rhodes, meridian of, 144	International, 372	
Rhumb line, 273, 299, 346, 349. See also	Interstate, 377. See also Boundaries,	
fig. 87.	interstate.	
Richardson, James D., 506	Boundaries along, 374, 376, 377	
Ridge, definition of, 343	Riparian boundaries along, 377	
Right bank of river, 373	Left bank, 373	
Right of eminent domain, 422-423	National, 372	
Rights in Antarctica, 445	Ordinary high-water mark, 373	
Rikers Island, triangulation station, 147,	Ordinary low-water mark, 374	
148	Right bank, 373	
Rio de La Plata, boundary of, 391	Terms associated with, 373	
Riparian boundaries	Rivers, boundary, 372	
Along interstate rivers, 377–378	Rivers, boundary at, 371	
Changes, 363-364	Roberts, Capt. Elliott B., 10, 11, 13, 27	
Datums used, 65–66	Rockaway Pacific Corp. v. State, 492, 538	
Infrared photography, use of, 277	Rockaway Pt., N.Y., growth of, 359, 490-	
Waterfront property disputes, 363-365	492	
Riparian ownership, 183	Rocks, 258–264. See also figs. 64 and 65.	
Riparian rights, 364, 530-541	Awash, 186, 258, 259–261, 331, 379	
Access, right of, 534	Awash at sounding datum, 331	
Use of shores by riparian owner, 535	Awash ¼ tide, 263, 331	
Wharfing out, 535	Awash 3 tide, 263, 331	
········ · · · · · · · · · · · · · · ·		

Rocks—Continued	Samoa, American, 445
Bare, 258, 259, 331	Sanded areas on early charts, 328–329
Definitions relating to, 258–259	Sanding on hydrographic surveys, 243
Cartographic purposes, for, 263. See	Sand Island, 438, 439, 444
also fig. 65.	San Juan Astronomic Datum, 129
Elevations, 311	San Marcos wreck, 297
Notations, 331	Scale. See also Charts, Scale.
Sunken, 259, 331	Chart catalog, 303
Symbolization, 258–261. See also fig. 64.	Definition, 103
Modern practice, 262–264. See also fig.	Determination, 105–106
65.	Errors due to distortion, 106–107
Reconciling, 261–262	Fractional (numerical), 103–104, 304
Topographic locations, 188	Graphic (linear), 104, 304
Rocky reef, 332	Natural, 304
Rodee, Carlton C., 398, 416	Numerical (fractional), 103–104, 304
Roosevelt, President Franklin D., 207, 319	Representative fraction (R.F.), 103-104,
Roosevelt, President Theodore, 206, 319	105
Rotary lithographic press, 285	Scale of survey or chart, 103
Rottschaefer, Henry, 423	Schott, Charles A., 14, 136, 301
Rule judicially declared, 409–410	Scientific chart making, 282–286. See also
Rule of property, 410–411	figs. 72 and 73.
Rules for representing topographic features	Elements, 282
(1860), 168	New type of nautical chart, 282, 284
Rules of the Road, 333, 334-335	Reproduction process, 285–286
Act of Apr. 29, 1864, 334	Scribing (negative engraving), 285–286
Act of Feb. 19, 1895, 334-335	Sea, definition of, 387
Implementation of, 335	Seahigh, definition of, 343
Boundary lines. See Rules of the Road	Seaknoll, definition of, 343
boundary lines.	Sea level
Great Lakes and tributary waters, 334	Annual, 63
History, 332, 334	Barometric pressure and, 62
International Conference on Safety of Life	Changes, 59, 262
at Sea, London, 1948, 334	Baltimore, 59
Mandatory nature, 332	Cross Sound, Alaska, 262
Rules of the Road boundary lines, 332-342.	Galveston, 59
See also figs. 82, 83, 84, and 85.	Icy Strait, Alaska, 262
Conterminous U.S., 335, 336-339	Juneau, Alaska, vicinity of, 262
Definition, 342	Lynn Canal, Alaska, 262
Designation on charts, 335-340	New York, 59
Established, 334-335	Southeast Alaska, 262
First announced, 335	Daily, 63
Interpretation, 340–342	Mean, 63
Administrativo are are	Monthly, 63
Administrative, 341-342, 392	Variation, 63
Judicial, 340–341	Sea Level Datum of 1929, 48-49, 62
S	Distinguished from local sea level, 49
Sailing charts, 287, 303	Seal fisheries in Bering Sea, 386
	Seamount, definition of, 343
Salt domes, 268	Seapeak, definition of, 343
Salt marsh representation, 191	Seascarp, definition of, 343

Sea water, physical properties of, 280	Shoreline of United States—Continued
Sea water, velocity of sound in, 212	Lengths by states, 483
Secondary authority, 413. See also Author-	Tidal shoreline (detailed), 483. See also
ity in the judicial system.	Table 4.
Semicircular rule, 369, 370, 371	Tidal shoreline (general), 482. See also
Separation of powers, 397-398	Table 4.
Seran, Capt. Harry A., 232	Shore processes, 361–363
Sextant angles, 218, 231, 232	Shore terminology, 344-345. See also fig.
Sextant, principle of, 233	86.
Shalowitz, Aaron L., 118, 125, 127, 244, 264,	Short-series tide stations, 59–60
280, 290, 347	Significant features on nautical charts, 305-
Shelf edge, definition of, 342	313, 323, 327. See also Chart(s), nau-
Shifting or fixed boundary, 501–504	tical.
Shinnecock Bay, N.Y., 359	Sill, definition of, 343
Shively v. Bowlby, 532–533	Sill depth, definition of, 343
Shoals awash, 379	Simmons, Lansing G., 37, 40, 41
Shoran, 232, 280	Sinepuxent Channel, 360 Single depth unit on hydrographic surveys,
Shore, 344, 345 Crown, rights of, 172	_ · · · · · · · · · · · · · · · · · · ·
Use of, right to, 530, 535	243 Skelton, Ray Hamilton, 539
Shore development, study of, 361–363	"Sketches," publication of, 83–84
Shoreline	Slanting lettering on charts, 321
Accuracy, 233–234	Small-Craft charts, 92, 287–288
Apparent, 177	Small-scale charts, distance measurement on,
Changes, 359–360	349
Barnegat Inlet, N.J., 362	Small scale, definition of, 104–105
Cape Henlopen, Del., 359	Smith, Edward S. C., 6
Fishing Point, Va., 360	Smith, Leonard S., 468
Leadbetter Point, Wash., 359. See also	Smith Point, Va., 495, 496, 497, 502
fig. 90.	Smith, Rear Adm. Paul A., 51, 252
Long Island, N.Y., 359	Smith, Walter D., 400, 401, 405, 417
Mississippi River delta, 359	Smooth sheet, 87, 222, 223, 226, 237, 238
	Additional work, 267
New Jersey coast, 360	Day letters, 245-246
Definition, 345	Position numbers, 245–246
Delineation, 163, 174	Review, 239
Emergence, 363	Soundings, 242–243
Mapping, 163	Verification, 238–239
Mean high water, 172-174	S. 1988 (1963), 378 Snyder, Richard C., 399
Determination, 173-174	Sofar, 27
Sandy coast, along, 173	Solicitor General, request of, 516
Stage of development, 363	Sounding accuracy (1860), 218
Submergence, 363	Sounding datums, 53, 253-257, 306, 307.
Shoreline of areas under U.S. sovereignty,	See also Tidal datum planes.
484	Early, 254–257, 306, 307
Shoreline of United States, 479–485	Sounding lead, 230
Coast and Geodetic Survey tabulations,	Sounding lines, systems of, 218, 221, 224.
479–484	See also fig. 57.
General coastline, 482. See also Table 4.	Sounding machine, 229
Great Lakes, along, 484–485	Sounding pole, 218, 224, 229

C	
Sounding records (volumes), 87, 225, 240-	Spheroid(s)—Continued
242, 245	Nondevelopable surface, 133
Boundary delineation, tidal, 248	Oblate, 116
Changes in, 240–242	Prolate, 116
Day letters, 245	Reference, 117-119
Fair Journal, 220, 223, 242	Reference, change in, 142–143
Form, earliest, 240-241	Walbeck (1819), 118
Form, present, 241. See also fig. 61.	Spheroids of reference, 117-119. See also
Leadline survey (1894), 224-225	Spheroid(s).
Original depths, 240	Spike Rock, Alaska, 186
Position angles, 240. See also fig. 61.	Spring range (tides), definition of, 67
Position numbers, 245	Spring tides. Refer to Appendix A.
Soundings, 242–243, 305–306	
Charted 207 206	Stadia (measure), 114
Charted, 305–306	Stadia rod, 161
Classification, 243, 244–245	Stamp, L. Dudley, 191
"Minus," 244	Standard (nautical charts), definition of, 100
"No bottom," 244	Standards File, nautical charts, 100
"Zero," 245	Stare decisis, doctrine of, 409-410
Hydrographic surveys, 242–243	State compacts. See Compacts between
Reduction of (1894), 224	states.
Sounding sheet, 223, 225, 237	State Coordinate Systems. See State plane
Sound velocity in sea water, 212	coordinates.
South Atlantic Ocean, boundary of, 391	State court reports, 406–407
Southeast Alaska	National Reporter System, 407
Datum, geographic, 125–126	Official, 407
Surveys begun, 257	State courts, 398-399, 405-406
Tidal survey, special, 59, 262	State law in Federal courts, 414-415
Southeast Alaska and British Columbia	State ownership of lands, 453-455
(coastal waters), boundary of, 391	State plane coordinates, 40–42, 132, 305
Southeast Alaska Datum, 125–126	Adoption by states, dates of, 42
Southern Ocean, 388	Field use, 42
South Pacific Ocean, boundary of, 392	Scale error, correction for, 42
Sovereign immunity from suit, 290	State regulation, matters of, 397
Sovereignty	States
Dual, 395	Admission of new, 425-427. See also Ad-
Extent of, 367–368	mission of new states.
Territorial sea, 365	Equality of, 427, 429–431. See also Equal-
Special Master (United States v. California),	footing clause.
findings of, 370, 371, 372, 382–383	Powers of, 396
Special-purpose surveys, 80, 240	States, territories, possessions, 424-425
Spheroid(s)	State waters (1940 Census), 474, 476
Army Map Service (1956), 118	Stationary wave theory of tides, 26
Bessel (1841), 117, 118, 147, 149	Station error, 120
Bessel (1837), 118	Statutory law, 415-416
Change of, effect of, 142-143	Categories, 415
Clarke (1866), 117, 118, 120, 122, 149,	Stellwagen, H. S., 20
348	Stewart, Harris B., Jr., 482
Hayford (1909), 118	Stewart, Lowell O., 449
International (1909), 118	St. George's Bank, 5, 6, 8
National Aeronautics and Space Admin-	Storm of March 1962, effect on nautical
istration (1959), 119	charts of, 297–298

2774000	
Story, Justice Joseph, 431	Survey(s)—Continued
Stranded wreck, charting of, 332. See also	Topographic. See Topographic sur-
fig. 81.	vey(s).
Submarine canyon, definition of, 343	Transfer of data, 108-111. See also
Submarine relief, terminology for, 320	Transfer of survey data.
Submarine valley, definition of, 343	Surveys, maps, and charts, 81-82
Submerged Lands Act, 379, 381, 455	Sutherland, O.P., 124
Alaska, applicability to, 435	Sverdrup, H. U., 387
Hawaii, applicability to, 436	Swains Island, 445
Submerged reef or ledge, symbolization of,	Swainson, Capt. Otis W., 161, 164, 173, 181,
222	184, 207, 265
Suits against Government. See Federal	Swamp and overflowed lands, 453-455
Tort Claims Act.	Swamp areas, representation of, 191
Sunken rocks	Swamp Lands Act, 453-454
Definition, 259	Swan Islands, 445
Symbolization, 261. See also fig. 64.	Swanson, Capt. Lawrence W., 81, 86, 163,
Sunken wreck, definition of, 332. See also	177, 182, 185, 186, 192, 512
fig. 81.	Syene, Egypt, 114
Superintendents and Directors, 30-31	Symbolization See also
Supreme Court, 401–405	Aids to navigation, 310-311. See also
Appeals, 402–403	Aids to navigation.
Federal Tort Claims Act, 291-293, 295-	Chart, nautical. See Symbol(s), chart.
296	Hydrographic surveys. See Symbol(s),
Original jurisdiction, 402, 404	hydrographic.
Reports of decisions, 404-405	Topographic surveys. See Symbol(s),
Review of cases, 402	topographic.
Surveying operation, hydrographic. See	Symbol(s), chart. Refer also to Appendix
Hydrographic surveying.	F.
"Survey of the Coast," 4, 11, 13. See also	Channels, improved, 329–331
Coast and Geodetic Survey, U.S.	Coral reef, 332
Survey(s). See also Hydrographic sur-	High-water line, 327, 328
vey(s), and Topographic survey(s).	Ledges, 332
Accuracy, 79-81, 107, 120	Low-water area, 328
Authentication, 488	Low-water line, 328
Certified copies, 55	Marsh areas, 329 Marsh, inner edge, 328
Coastal engineering, use in, 360-361	Marsh, outer edge, 328
Combination hydrographic and topo-	Reefs, 332
graphic, 88–89	Rocks, 331
Copies of, 53-54	Awash at sounding datum, 331
Definition, 82	Sanding, 328–329
Distortion factor, 151	Wire-dragged areas, 329
Early. See Early surveys.	Wrecks, 332
Errors inherent in original, 107	Symbol(s), hydrographic, 223, 225, 229.
Evaluation, 80-81, 131	See also Symbol(s), topographic.
Evidentiary value of, 79	Earliest Coast Survey (circa 1840), 194-
Hydrographic. See Hydrographic sur-	195. See also fig. 46.
vey(s).	Kelp, 268
Number of, 54	Ledges, 265
Reconnaissance, 82	
Scale, definition of, 103. See also Scale	Low-water line 247
Special-purpose, 224	Low-water line, 247, 248

Symbol(s), hydrographic—Continued	Technical data, available—Continued
Reefs, 265	Topographic. See Topographic data,
Rocks, 258–261	available.
Awash, 258, 259, 261. See also fig. 64.	Telegraph Hill, triangulation station, 148
Bare, 258, 259	Telegraphic determination of longitude,
Conflicts in, 261–262	144, 146. See also Longitude determi-
Early practice, 259, 261	
Modern practice, 262–263	nation.
	Telemeter rod, 161–162. See also fig. 40.
Progressive changes in, 259. See also	Ten-mile rule for bays, 369
fig. 64.	Termini at headlands, 371–372
Sunken, 261. See also fig. 64.	Territorial sea, 365, 378
Symbol(s), topographic. See also Sym-	Alaska, 384, 386
bol(s), hydrographic, and Conven-	Area for conterminous United States, 478
tional signs and symbols.	Breadth, 365–367
Alkali flat, 191	Recent claims to, 366
Conference of 1892, 202-203. See also	Convention, status of, 384
figs. 51 and 52.	Delimitation, 379–381. See also fig. 93.
Cypress swamp, 203	Hawaii, 440
Earliest Coast Survey (circa 1840), 194-	Area, 479
195, 259, 265. See also fig. 46.	Submerged Lands Act, 382
Edge of vegetation, 189	United States
French (1775), 193. See also fig. 45.	Area of conterminous, 478–479
Interpretation of 1859 survey, 189, 191.	Fishing in, 1964 Act on, 378
See also fig. 44.	
Low-water line, 189	Territories, states, possessions, 424-425
	Territory, acquisition of. See Acquisition
Marsh areas, 189, 191, 201	of territory.
Field Memorandum No. 1 (1938), 191-	Territory Northwest of Ohio River, 441
192 Want in all 0 0 0	Territory under U.S. sovereignty, 444-445
Marsh, inner edge, 181-182, 189, 192	Texas, admission of, 427, 444
Marsh, submerged, 203	Texas City, Tex., 291
Mean high-water line, 189	Thalweg, rule of the, 372, 375~376
Rocks, progressive changes in, 259. See	In New Jersey-Delaware boundary, 375
<i>also</i> fig. 64.	In various river boundary treaties, 375
Salt pond, 203	Theodolite angles, 218, 231
Salt works, 197	Thirteen Original Colonies, 394, 441, 465,
Special symbolization (Laguna Madre),	531
192	Thirteen Original States, 394
	Thomas, Paul D., 117, 127
T	Three-arm protractor, 233. See also fig. 60.
Tablemount (Guyat) definition of and	Three-point fix, 222, 351
Tablemount (Guyot), definition of, 343	Three-point problem, 161
"Taking" of property under fifth amend-	Tidal bench-mark data, 72, 74. See also
ment, 460	Tidal data, available.
Taubenfeld, Howard J., 457	Tidal bench marks, accuracy of, 61
Technical data, available, 32-75	Tidal characteristics, 57
Geodetic control data, 32-51. See also	
Horizontal control data, and Vertical	Tidal Current Charts, 355
control data.	Tidal Current Tables, 354
	Tidal data, 56. See also Tidal data, avail-
Hydrographic. See Hydrographic data,	able.
available,	Boundaries, use in riparian, 365
Tidal. See Tidal data, available.	Notes on charts, 323–326

	775
Tidal data, available, 72–75	Tidal datum plane(s)—Continued
Averages—monthly, yearly, cumulative,	Puerto Rico, 225, 307
75	Puget Sound, Wash., 256
Bench-mark data, 72. See also fig. 23.	Relationship, 72, 74, 258
Cumulative averages, 75	Rivers and lakes, 258
Highest and lowest tides, 74	Secondary, 62
High-water heights, 75	
Hourly heights, 75	Shoreline, for, 64–65, 311
Index maps, state, 72. See also fig. 23.	Soundings (depths), for, 65
Low-water heights an	Summary of present, 258
Low-water heights, 75	Tide Tables, for, 65
Mean and diurnal ranges, 74	Virgin Islands, 255
Monthly averages, 75	Tidal differences, 67
Photostats of, 75	Tidal program of Coast Survey, 57
Relation between hydrographic datum and	Tidal surveys, special, 60
other tidal datums, 72, 74	Tide gage
Relation between Sea Level Datum of 1929	Automatic, 57, 235
and hydrographic datum, 74. See	Boundary determination, use in, 365
also Sea Level Datum of 1929.	Staff, 61, 235
Yearly averages, 75	Tidelands, 531-533
Tidal datum plane(s), 57, 60–61, 253–254	Boundaries, 66
Alaska, 256–257, 307	Equal-footing clause, applicability of, 430
Alongshore features, 64–65	Ownership, 531
Atlantic coast, 254-255, 306-307	Historical background, 531
Boundaries, for riparian, 65-66	Rule in Federal courts, 532-533
Early, 254-257, 306, 307	State laws, 531-532, 533
Elevations, for, 311	"Tidelands" controversy, the, 493
Establishment, 62–66	Tide notes on charts, 323–326. See also figs.
Short-series observations, 59–60	78 and 79.
Simultaneous observations, 60	Tide observations and a ser
Tabular values, 60	Tide observations, early, 235
Gulf coast, 255, 306–307	Tide Predicting Machine, Ferrell, 70
Harmonic tide plane are are	Tide Predicting Machine No. 2, 70. See also
Harmonic tide plane, 256, 257, 307	fig. 22.
Hawaiian Islands, 255, 307	Tide prediction, 66
Hydrographic studies, use in, 253	Accuracy, 70, 72
Hydrographic surveys, use in, 253, 258	Early tide notes, 323–324
Indian tide plane, 256, 307	Harmonic method, 69-70
Low water, 65	Northarmonic method, 69
Mean high water, 62, 64-65, 66, 311, 324	Tide reducers, 226–227
Definition, 66	Tide(s)
Mean lower low water, 62, 65, 220, 226,	Astronomic, 325
255, 256, 257, 307, 324	Barometric pressure effect, 62-63
Mean low water, 62, 65, 218, 220, 226,	Characteristics, 65
254, 256, 307, 324	New York Harbor, 62
Mean sea level, 62-63, 311	Pensacola, 62
Mean tide level (half tide level), 324	San Francisco Bay, 62
Monthly lowest low water, 326	Corrections to soundings, 235
Nautical charts, 306–397	Engineering aspects, 61-62
Pacific coast, 255, 307	Equatorial, 324
Panama Canal, 255	Grand, 324
Philippine Islands, 255	= ,
Principal, 62	Harmonic analysis, 70, 256
1 incipal, 02	Height at any time, 68. See also fig. 21.

Tide(s)—Continued	Topographic survey(s), 51-53, 81-82, 84-87
Instructions for observing, early, 217	"a" and "b" sheets, 86
Perigean. Refer to Appendix A.	Accuracy and detail, 170
Prediction, 66–70	Analysis, 159–210
Harmonic method, 70	Authority for geographic names, 85, 321
Nonharmonic method, 69	Base for nautical charts, 89
Range, 61-62	"Bis" sheets, 86
Anchorage, Alaska, 62	Copies of, 53–55
New York Harbor, 61	Coverage, 52
Panama Canal, 61-62	Definition, 52, 84
Spring, 326	Descriptive Report, 85–86
Stationary wave theory, 26	Detail and accuracy, 170
Tropic, 324, 326	Drift line, survey of, 174
Types, 173–174	Earliest instructions, 165-168
Wind effect, 62–63	Evidence, 488–489
Tide staff, 61, 235	"Field Examinations," 88
Tide station(s)	First, 169–170
Control, 57	Geographic names, sources for, 318, 321
Establishment, 217	High-water line, 171–172
First establishment in United States, 57	Basis for use, 171-172
Longest operating, 57	Marshes, in tidal, 176–177, 181–183
Primary, 57	Inking of, office, 197–202
Short-series, 59–60	Instructions, 164–168
Tide Tables, 56, 65, 67–68, 254, 325, 354	Earliest (circa 1840), 165–168
Accuracy, 70, 72	First planetable manual, 164
Early, 323–324	Other planetable manuals, 164
Height of tide at any time, determining,	Interpretation, 81, 159–210
68. See also fig. 21.	Low-water line, 183–188
History, 66–67	Accuracy, 187–188
Tidal differences, 67	Determination, 183–187
Tidewater, prima facie navigability of, 528	Planes of reference, 185–187
Tier lines (public land surveys), 450	Marsh areas flooded at high water, 182–
Tiffany, Herbert T., 420, 443, 456, 528	183
Tinted areas on nautical charts, 328, 329	Marsh areas, inner edge, 181
Tittmann, Otto H., 301, 302	Symbolization, 181–182
Topographic Conference of 1892, 181,	Marsh areas, outer edge, 176–177
202–203	Mean high-water line, 172–173
Topographic data, available, 51–53, 54–56	Accuracy of determination, 175
Copies of field surveys, 53-55	Surveyed line, the 173-174
Indexes, survey, 55	Memorandum of Understanding between
Photographs, aerial, 55–56	U.S.C. & G.S. and U.S.G.S., 52
	Original field survey sheet, 84
Topographic manuals, 164	Periodic surveys, 51
Topographic survey No. T-892 (1859), sym-	Placement of geographic names, 321
bolization on, 177, 189, 191. See also	Projections, 139, 140–141
fig. 44.	
Topographic survey No. T-1482b (1878),	Registry numbers, 85
marsh area on, 177. See also fig. 42.	Revision, 86
Topographic survey No. T-1037, projection-	Rocks, 188, 258–259
line corrections on, 149-150. See also	Scales, 104
fig. 35.	Shoreline. See Shoreline.

Topographic survey(s)—Continued	Triangulation—Continued
Significant features on, 171, 172-175, 176-	Arcs, spacing of, 33
177, 181–185, 188	Area, 33. See also fig. 10.
High-water line, 171–173	Base-line measurements, 36
Low-water line, 183	Chart, framework for, 276
Marsh areas, 176–177	Definition, 33
Marsh, inner edge, 181–182	Detached systems, 121
Marsh, outer edge, 176–177	Early, 121
Rocks, 188	First, 11. See also fig. 2.
Symbolization, 188–192. See also fig. 44.	Hydrographic surveys, 228
Early surveys, 189, 191	Monumented points, 34, 36. See also fig.
Marsh areas, 191-192	II.
Special, 192	1927 adjustment, 37, 123–125
Tracings, 86	Spheroids of reference for, 117-119. See
Uses, 51, 89, 363, 538	also $Spheroid(s)$ .
Tort Claims Act. See Federal Tort Claims	Triangle closure, 36
Act.	United States network, 33-36. See also
Township, definition of, 448. See also Pub-	fig. 4.
lic land surveys.	Triangulation station(s)
Tracings of topographic surveys, 86	Descriptions, 180
Transatlantic cable, first, 147	Hydrographic sheets, 221, 224
Transfer of land, 462–463. See also De-	Un recoverable, 154
scriptions of land.	Triangulation, transcontinental, 21. See
Transfer of survey data, 108	also fig. 4.
Method(s) of, 108–111	Trieste, bathyscaph, 115
Pantograph, 111	Trilateration, 127, 276
Photographic, 111	Trinity House, London, 332
Projector, 111	Tripartite system, 397-399
Radial-line, 110. See also fig. 28.	Trolling for rocks, 220
Squares, 109-110. See also fig. 27.	Tropic spring lower low water, 256
Tracing-paper, 108–109	Tropic tides, 324, 326
Transverse Mercator projection, 41	Troughton, E., 11
Treaties of the United States	True meridian, 467
Rank, 417	Trust Territory, The, 445
Treaty of 1819 (Spanish–American), 373,	Twenty-four-mile rule for bays, 369
376	Tyler, President John, 9, 16
Treaty of Guadalupe Hidalgo, 375, 444	Types of projections, 133-134
Treaty of 1908 (Canadian boundary), 375	Types of tidal data, 72
Treaty of Sept. 3, 1783 (United States-	U
Great Britain), 375, 377	O
20-league provision, 7, 8	Unalaska datum, 125
Interpretation, 8, 9	Underwater slopes, study of, 361
Treaty of 1795 (Spanish–American), 375	Unincorporated territory, 435
Trench, definition of, 343	United Nations Conference on the Law of
Trial courts, 398-399	the Sea (1958), 369
Triangle closure, 36	United States, area of. See Area of the
Triangulation	United States (1940 Census).
Accuracy, 36–37	United States Board on Geographic Names,
Adjustment of 1927, 37, 123-125	206, 318–320. See also Geographic
Eastern half of U.S., 124	names.
Western half of U.S., 123-124	Creation, 206

United States Board on Geographic Names— Vertical lettering on charts, 321 Continued Vesconte, Petrus, 271 Decisions, 320 Virginia cession to Federal Government, Principles followed, 319–320 Domestic Names Committee, 320 Virginia-Kentucky compact, 431 Jurisdiction, 319 Virginia v. Tennessee, 431, 432, 433, 434, 500 Names submitted to, 320 Virgin Islands, 445 United States Coast and Geodetic Survey. Vityaz, Soviet ship, 115 See Coast and Geodetic Survey, U.S. United States courts of appeals, 400-401 United States Geographic Board, 206-207, Wainwright, Dallas B., 155, 164, 170, 181, 261, 317, 319 United States-Mexican boundary, 268 Waiver-of-immunity statute, 290. See also United States Reports, 404-405 Federal Tort Claims Act. United States-Russian convention line, 385 Wake Island, 445 United States Standard Datum, 122, 148, 312 Walbeck, H. J., 118 United States treaties. See Treaties of the Waldo, triangulation station, 122, 123, 124 United States. Washington Memorial Parkway, jurisdiction United States v. Appalachian Electric Power over, 509 Co. (1940), 524-526, 528 Washington National Airport, jurisdiction United States v. California (1963), 383 over, 509 United States v. California (Special Mas-Washington, President George, 505–506 ter's proceedings), 382–383 Water areas of the world, division of, 386-United States v. Causby, 458-460 United States v. Louisiana et al., 8, 382 Waterfront property disputes, 363-365 United States v. Newark Meadows Improve-Boundaries, early descriptions of, 364 ment Co., 340, 392 Demarcation of tidal boundaries, 364-365 United States v. O'Donnell, 454, 456, 493 Water, physical properties of sea, 280 United States v. Romaine, 489 Weaver, Samuel P., 424 Unrecoverable triangulation stations, 154 Weazel Mountain, 144 Upland, 364 Weber, Gustavus A., 13 Use of shores by riparian owner, 535-536 Western coast Using nautical charts. See Chart(s), nau-Historic description, 314 tical, Using. Hydrographic description, 316 U.S.S. Texas (San Marcos wreck), 297 Westlake, John, 375 Utilization of Bureau services, 494 Wharf, definition of, 535 Wharfing out, 535 Whistler, James McNeill, 285 Valdez datum, 125 Whiting, Henry L., 13, 195, 197, 497 Willamette River Datum, 258 Veatch, A. C., 51, 252 Willoughby, Westel W., 402, 421, 422, 426, Velocity of sound in sea water, 212 Verification of hydrographic surveys, 238 429, 435 Vermont, admission of, to Union, 426 Wilson, President Woodrow, 206 Vertical control data, 42–43. See also Level-Winsor, Justin, 316, 317 Wire-dragged areas, 329

Available types of, 42–43, 49–5 1

Index maps, 51

Bench marks, descriptions and elevations of, 49-50. See also fig. 17.

Wire-sounding machine, 280

Working sheet, 223, 225, 229

Woodward, R. S., 475

World coastline, 485

World land area, 476
World Map of 1569, Mercator, 275
Wraight, A. Joseph, 10, 11, 13, 27
Wrangell Narrows, 186, 257
Wreck Acts, 293
Wrecks, charted, 332. See also fig. 81.
Wright, Edward, 275

 $\mathbf{Y}$ 

Yakutat Bay, Alaska, 383 Federal–state boundary, 383–384 Yukon datum, 125, 126

7.

"Zero" soundings, 185, 245