

Certified Federal Surveyors Certification Program



Course 5 Introduction to Water Boundaries

Version 3.0
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Course 5: Introduction to Water Boundaries Study Guide

COURSE DESCRIPTION:

This course consists of an interactive course on the basics of water boundaries. It is not intended to make one an expert, but rather, to raise awareness of riparian issues. It is followed by a short field video where a State Cadastral Chief offers advice and help from the BLM whenever you face riparian issues that may involve federal interests.

COURSE OBJECTIVES:

Upon completion of this course, students will be able to:

- Learn basic riparian boundary survey terms
- Identify boundary issues which arise when working on or near bodies of water
- Demonstrate a basic understanding of simple riparian problems









COURSE INSTRUCTOR(S):

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VIDEO LECTURE TITLE:

Water Boundaries – Web-Based Course

ICON LEGEND

 WEB COURSE	 EXERCISE	 DIAGRAM	 READING ASSIGNMENT	 PROBLEM	 HANDOUT	 2009 BLM MANUAL	 QUIZ
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WATER BOUNDARY SURVEYS WEB-BASED COURSE



2009

BLM MANUAL Before you begin this course, read Chapter 7 and 8 of the 2009 BLM Manual.

Introduction

Welcome to the Introduction to Water Boundary Surveys course. This course was created by the Bureau of Land Management (BLM), National Training Center (NTC), Cadastral Survey, for use by entry-level land surveyors.

Identifying boundaries in and near bodies of water is an important task for the cadastral surveyor. Law, geology, and engineering are among the areas of knowledge that will help you make accurate decisions.

This course introduces you to legal issues, water dynamics and natural forces that can change the environment, geological features of bodies of water, and important information about how to meander water bodies. We hope that you enjoy this learning experience and provide feedback as requested at the end. Have fun and good luck!

This course is a production of the Bureau of Land Management, an agency of the Department of the Interior. It was produced specifically for use in the Cadastral Survey Training Program.

We recommend that you have a copy of the current Manual of Surveying Instructions on hand while taking this course. This course is best viewed with the following software and settings:

- Internet Explorer Version 6.0 and higher or Netscape 7.0 and higher.
- A screen resolution setting of 1024 by 768 to maximize non-scrollable content.
- Adobe Acrobat Reader version 5.0 or above.
 - [Click here to download the latest version:](#)

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<http://www.adobe.com/products/acrobat/readstep2.html>

- Macromedia Flash Player plug-in version 6.0 or above. This plug-in must be installed in order to view some key course elements correctly. To test which version of the Flash Player is installed on a system, click here:

http://www.adobe.com/support/flash/ts/documents/test_version.htm.

To download the latest version of the Flash Player, click here:

<http://www.adobe.com/go/getflashplayer> .

- Javascript (for best performance, your browser should be Java enabled). If the calculator opens correctly upon selecting it in the navigation bar, then you have Javascript enabled in your browser. If it doesn't display correctly, please contact your IT department.

In this course you will explore various court cases that have defined navigable and non-navigable waters and the importance of these designations to the cadastral surveyor.

You will also learn about other legal doctrines and how to apply those doctrines. The course provides an overview of the process of meandering, as well as the various kinds of evidence that will help you in that task. In addition, you will learn about the forces of nature that shape the edges of bodies of water.

Objectives

Upon successful completion of this course, you will be able to accomplish the following objectives:

- Explain the role of the cadastral surveyor in water boundary surveying.
- Name and explain the court cases that affect whether a body of water is navigable.
- Define the doctrines of accretion, reliction, and avulsion.
- Identify the surveyor's role in surveying omitted, accreted, relicted, and avulsed lands; islands; coastal areas; and swamp and overflow lands.
- Demonstrate knowledge of how to meander a body of water.

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- Describe the various geological and hydrologic influences that can alter the edges of bodies of water.

Role of the Surveyor

Welcome to The Role of the Surveyor. In this lesson, you will accomplish the following objectives:

- Describe the general history and law of water boundary surveying.
- Identify the role of the cadastral surveyor in determining ownership of land abutting water.
- Ownership questions concerning property boundaries of land abutting water have caused problems since the days of the Egyptian dynasties.

Ownership questions concerning property boundaries of land abutting water have caused problems since the days of the Egyptian dynasties.

Current water boundary law evolved from early Roman laws through English common law to statute law, which, in turn, has been modified and interpreted by state and federal courts. The first U.S. public land surveys created fractional sections wherever the edges of water were surveyed and the land areas were platted.

Land acreages were figured on the basis of a body of water's sinuosity, so the land could be patented and the remaining public land administered. But, water can cause significant and rapid changes in land areas, and the intricacies of riparian area surveys have evolved from the complexity of these changes.

For the land surveyor, the delineation and resurvey of boundary lines related to bodies of water presents a complex set of conditions. You must protect all landowners' bona fide rights by determining if the land was lost or if it was added to by rapid or slow action. You need to have knowledge of law, geology, engineering, and other sciences in advanced surveying.

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In This lesson, you have accomplished the following objectives:

- Described the general history and law of water boundary surveying. Identified the role of the cadastral surveyor in determining ownership of land abutting water.

Riparian Rights

Welcome to Riparian Rights. In this lesson you will accomplish the following objectives:

- Define riparian rights.
- Describe the three U.S. Supreme Court cases that most affected the definitions of navigable and non-navigable waters.
- List the three reasons the date that a state was admitted into the Union is important in determining riparian rights.
- Explain the doctrines of accretion, reliction, and avulsion.
- Identify the various land and water events that can affect rights.

For the cadastral surveyor, riparian rights refers to the rights of the land adjacent to and in a waterway. The following issues should be considered:

- Is the water navigable or non-navigable?
- Has accretion or avulsion taken place?
- Does the state or federal government have sovereignty over the beds?
- What affect do artificial structures, such as dams, have on rights?
- How are reemerged lands, swamps, islands, and tidewaters treated?
- How are lands that were omitted in the original survey treated?

The first question you need to answer concerning a body of water is whether the water is navigable or non-navigable. The issue of navigable waters has been the subject of much discussion, confusion, and legal interpretation.

At best, you can only make a working decision. The ultimate authority is the U.S. court system. See also *Oklahoma v. Texas*, 258 U.S. 574 (1922). Slide the gavel to see the three most important Supreme Court cases affecting the definition of navigability.

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The most important fact about navigable waters is that states acquired sovereignty over the beds on the date they were admitted into the union. Thus, riparian owner's rights below the **ordinary high-water mark** of navigable water bodies are governed by the state law, not federal law.

Note, too, that ownership of the land riparian to a navigable waterway moves as the water shifts its location, but the ownership of the bed does not change

Determining if a water course is **navigable** is not easy. Sometimes navigability is common knowledge, as in the cases of Lake Superior and the Columbia River in Oregon.

Landowners along the waterway also may have a good idea of their rights. In addition, you can ask local residents.

Several facts to keep in mind about **non-navigable** waters are shown below:

- Ownership is to the center of the bed.
- When opposite banks belong to more than one person, the water and the bed are common to both.
- Courts have found that non-navigable waterways cannot be made navigable by artificial means to the detriment of parties holding rights to the waterway bed. The stream's natural condition is the test.
- Beds of non-navigable waters are included when lands are transferred to patentees from the federal government.
- The basis for recognizing some waters as navigable is whether they exist as common highways of commerce.

Once a court has declared a waterway navigable or non-navigable for commercial purposes, a complex question arises if the navigability changes through natural processes.

Research shows varied treatment of riparian property rights in such cases. As a surveyor, you are mainly concerned with the issue of navigability at the time of statehood. The following list shows the factors you need to take into consideration.

Accreted, relicted, and avulsed lands are the focus of legal

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doctrines based on common law principles. This section looks at the doctrine of accretion first (and, where appropriate, reliction), then explores the doctrine of avulsion

Accretion is the slow, imperceptible addition of soil to the uplands. The upland riparian boundary moves as land and water move. However, the bed remains in the ownership of the title holder.

The doctrine of accretion is the common law principle that the owner of riparian land is entitled to any additions caused by the process of accretion.

The doctrine is grounded in two rationales:

- An adjacent landowner's access to water is a proprietary right that should not end because of the slow addition of intervening land.
- Since the riparian landowner can lose land through erosion, the owner should also gain land through accretion.

A special case of accretion occurs when an artificial structure, such as a breakwater or a wing dam, causes the land addition.

The federal rule is to treat an artificial accretion the same as if it were a natural accretion, to the benefit of the adjacent riparian owner, provided that the intent in placing the artificial structure was not to create accretion.

In cases of accretion and reliction, the federal government may survey and plat any lands added to the federal property, whether the adjoining water is navigable or non-navigable. The federal guideline is that the riparian owner is entitled to the area in front of the basic holding.

In certain cases, a meander line can become a boundary line. One such instance is when an accretion or reliction occurs after the survey of a land parcel but before that parcel has been patented by the federal government.

In applying this principle, the accreted land area must be significant (typically more than 50 percent) in absolute and

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relative size when compared to the attached parcel. Extension surveys projecting the regular, rectangular survey lines across the accreted area to form new lots or aliquot parts are used to delineate this new area. The original meander line then becomes a fixed boundary for upland lots adjoining the accreted area.

As a BLM surveyor, you will commonly be involved in the division of accreted or relicited land between adjacent property owners.

The key concept is ownership to the middle of the bed in front of the basic holding.

Avulsion is a river's sudden change in flow alignment out from its previous left and right banks to a new channel, leaving an identifiable upland area between the abandoned channel and the new channel.

In the doctrine of avulsion, also rooted in common law, a sudden and perceptible change in a water course from one bed to a new bed does not change boundaries.

The rationale for this doctrine rests on the idea that it is better for a landowner to lose a riparian right than it is for an opposite, upland owner to suddenly lose land that might contain improvements, such as a house or a barn.

The following sequence illustrates the physical process of avulsion in action. This view of the U.S.G.S. quadrangle map shows that the Kuskokwim River is constrained by the local geology to the west. The flood plain east and south of the mountains shows evidence of past river migration and avulsion. Note the numerous oxbow lakes and curved marsh areas typical of an active river as it migrates back and forth across the flood plain. Also note the tightly formed meanders of the South Fork. The red box shows the area of focus for the following sequence.

The following items are considered guidelines and not rules for when the federally interpreted doctrines of accretion or avulsion may apply to certain classifications of land bordering navigable waters:

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- First, when the United States had original title to these lands.
- Second, if the federal government has obtained title to public domain riparian lands through reconveyance or acquisition.
- Third, if federal lands were patented to a private owner before statehood, the doctrines may apply.

Expert opinion should be obtained before applying any of these three guidelines to federally involved riparian lands.

When the United States acquires lands not originally public domain lands, the question of whether federal or state interpretation applies to accretion or avulsion is a matter for intensive professional research. If state laws subscribe to the federal doctrine, then the question is easily answered.

A **thalweg** is the line that traces the center of the main channel of navigation in a stream. Absent a main navigable channel, the thalweg follows the deepest channel of a water course. The BLM uses the thalweg to delineate boundary lines in some streambeds. The term is commonplace in boundary disputes between riparian states.

Thalweg division evolved in the late 1800s through international law and subsequent cooperation by the United States Supreme Court. More specifically, the thalweg doctrine developed because the basis of recognizing certain waters as navigable is their availability as common highways of commerce.

Consider the case of two states on opposite banks of a navigable river with a navigable channel on one side of the midstream.

Unless otherwise provided for by convention or law, the navigational jurisdiction of one state could be affected in favor of the other state if boundaries were held strictly to a median line.

In some instances, the entire bed of a boundary river is under the sovereign control of only one state, rather than jointly held between two states or more states. This circumstance is predicated on the original act of cession to the United States in most cases.

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Just as accretion and avulsion can raise questions of ownership, so, too, can such things as:

- Non-navigable, non-meandered bodies of water.
- Islands that were not part of an original survey.
- Reemerging land.
- Lands that were omitted by mistake from original surveys.
- Swamp and overflow lands.
- Tidelands.

Wherever a rectangular survey exists, the land titles follow the subdivision lines however they happen to cross a non-meandered, non-navigable body.

In the patent of such subdivisions, the land, the streambeds, islands, and anything else not reserved in a conveyance is transferred to the patentee.

The position of the Department of the Interior is that unsurveyed islands that existed at the time of statehood belong to the federal government.

Islands formed in non-navigable waters after the date of statehood belong to the adjacent upland title holder(s).

Islands formed in navigable waters after the date of statehood belong to the owner of the bed.

Reemerging land is land that existed at one time but has disappeared through erosion and has since reappeared in its original location and on the original side of the river through accretion. The question arises, who now owns the land?

Current federal guidance is that the original riparian ownership is lost forever and the reemerged land is in the ownership of the owners of the once-remote parcel.

The new riparian owner assumes all the benefits and hazards of riparian ownership. This doctrine of “once riparian, always riparian” was formed in *Ralph E. Rosenbaum, et al*, 66 IBLA 374 (1982) and overturns the long held principles of *Towl v. Kelley* and *Blankenship*, 54 I.D. 455 (1934). State law varies on the treatment of re-emerged lands.

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The following sequence illustrates the current federal position on reemerged lands. Reemerged lands are those lands which were originally surveyed, lost by erosion, and then reformed by accretion in the same geographic location.

In this illustration, the aliquot part is patented land and lot 5 is a government lot. As the river moves easterly by erosion, Lot 5 gets smaller and smaller until all traces are lost by erosion. The riparian frontage now attaches to the aliquot part.

At some point in time, the river movement changes from erosion to accretion. As the river migrates back to the west, accretions form along the east bank.

Once sufficient accretions have developed in the same geographic location of Original Lot 5 the question of title to the “reemerged” parcel needs to be addressed. Does the government retain title to the new land or does it accrue to the aliquot part?

Until the 1982 Rosenbaum decision, the Federal government claimed the “reemerged” land under the guidelines of the previous decision of the Interior Department (*Towl v. Kelley and Blankenship* 54 I.D. 455 [1934])

Under the Rosenbaum decision, the parcel that was originally land locked becomes riparian and suffers and gains according to the principles of erosion and accretion.

This gives rise to the statement “once riparian always riparian.” The Rosenbaum decision is the current Federal guidance on “reemerged” lands. The obvious question is what becomes of land that forms in the same geographic position as the original Lot 5 but on the opposite or west bank?

The original riparian owner of the land along the west bank would have continually had land added to the original parcel by accretion. The gain by accretion under riparian law overrides any apparent claim to the reemerged land by the original title holder of Lot 5.

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Erroneously omitted lands are lands proven to have been in place at the time of original survey but were not surveyed. Land may have been erroneously omitted in the following circumstances:

- It was meandered swamplands.
- Several lakes were surveyed as one lake.
- A nonexistent body of water was surveyed.
- There are two general cases when lands omitted from an original survey may remain in federal ownership:
 - The areas were omitted erroneously.
 - Small areas of land were in place and on the water side of original meander lines at the time of survey.
- Swamps or overflow lands are, by definition, unfit for cultivation:
 - Swamps are unfit because they do not drain.
 - Overflow lands are unfit because of the frequency, duration and extent of inundation. Barriers such as levees or embankments are required to keep out the water and render the lands suitable for cultivation.
- Coastal marshes that are not subject to the daily ebb and flow of the tide are swamp and overflowed lands within the meaning of the swamp and overflowed lands grants and are subject to survey.
- Coastal “salt marshes” covered by daily tides are “tidelands” and are not subject to survey.

The intent of the Swamp and Overflowed Land Act of 1850 was for marginal riparian areas subject to periodic flooding to be granted to designated states according to certain guidelines and rules.

The lands were not intended to be segregated by meandering along their margins. Erroneous meandering of this type has resulted in large areas of land falling into the category of omitted land.

The 2009 Manual of Surveying Instructions and *Public Lands Surveying, A Case Book* are good references for swamp and overflowed land cases. There are four key points to remember from the 2009 Manual.

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Surveying Concepts

Welcome to Surveying Concepts. In this lesson, you will accomplish the following objectives:

- Define the ordinary high-water mark and list two types of evidence for finding the ordinary high-water mark.
- Define meandering and describe the circumstances under which you would meander a body of water.
- Describe the various pieces of evidence you should consider when looking for evidence of hydrologic movement.
- Describe the circumstances under which you would survey various land types: islands, seacoasts, and omitted lands.

A key concept in water boundary surveying is **ordinary high-water mark**, which is the edge of the area occupied by the water for the greater portion of each average year. It is the border of land which the water occupies sufficiently long and continuously to wrest it from vegetation and destroy its value for agricultural purposes.

You can find evidence of an ordinary high-water mark by observing:

- Change of vegetation.
- Escarpment or physical markings in the soil.
- Agricultural usage
- Soil types

The area occupied by water for the greater portion of the average year is often well marked by vegetation zones, such as the native trees and shrubs that occupy the uplands.

The zones commonly change from upland type to aquatic type. Absence of vegetation along the upper limits of a shore is an additional criterion.

When using vegetation as a criteria, you will have to research the area to learn what florae are indigenous. If there are periodic overflow areas, you will need to research mixtures that thrive in that environment as well.

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Soil escarpments, an indicator of the ordinary high-water mark for some bodies of water, can be located by visual examination.

In coastal areas, driftwood or other beach debris can indicate an ordinary mean high-water mark suitable for meandering.

For complicated but important situations, you can locate the approximate ordinary high-water mark by running elevations around small inland lakes or by establishing gradient elevations along stream peripheries.

Gradient identification might help you avoid meandering low-water escarpments or flood escarpments if you cannot obviously differentiate them from the ordinary high-water level.

Infrequently, the surveyor in the lower 48 states will need to segregate waters in original surveys by meandering. However, familiarity with the proper procedures for meandering is particularly important for original surveys and dependent resurveys of riparian boundaries in Alaska and for understanding the basis of riparian-related surveys in all states.

A **meander line** is the traverse of the margin of a permanent body of water. BLM guidelines provide for the following types of bodies of water to be meandered:

- All navigable rivers and lakes
- Non-navigable lakes with surface area of at least 50 acres
- Non-navigable streams with an average right angle width of 3 chains or greater
- Tidewater streams as far as navigable even when less than 3 chains wide

However, there are exceptions to nearly every guideline. Water bodies that should not be meandered include:

- Non-navigable tidewater inlets or bayous even when greater than 3 chains in width.
- Shallow or intermittent streams without well-defined channels or banks.
- Artificial lakes and reservoirs, seasonal lakes and tundra ponds, playas, dry lake beds, swamp and overflowed lands. Cadastral survey plats should show the position and extent of these features.

To establish original meander lines, you traverse the margin of a

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water body using the ordinary high-water mark as a guide. When the average right-angle width of the water course is under the 3-chain limit, meandering is discontinued. The 3-chain guideline also applies to tidewater inlets and small tributaries.

A body of water that should have been meandered in an original survey, but was not, should not be meandered during a resurvey.

If the water body is totally surrounded by vacant public-domain land, however, a new, original survey may be authorized. The most important phase in determining the appropriateness of a riparian survey and in selecting the necessary partitioning methods is evidence of hydrologic movements. You can find evidence by examining:

- Historical aerial photographs.
- Witnesses. (Use discretion.)
- Reliable historical documents and original field notes.
- Upland tree species, soil samples, topography, vegetation, and escarpments.

Modern aerial photography was first used in the 1920's in California and elsewhere beginning in the mid-1930's. If aerial photography from the period in question is available, you can sometimes look directly at an area to check for stream shifting or reliction.

If sequential photography is available (for example, at 10-year intervals) you or a photogrammetrist might be able to see if changes in the location of the ordinary high-water mark were the result of erosion, accretion, or reliction, or the result of an avulsive event. Tree growth and species are conclusive types of evidence pertaining to land in place on a given date.

Living upland tree species, such as oak, hickory, and maple, can be dated by ring count and provide evidence of the highest order. In some cases, remains of dead trees can also be used to provide accurate time frames.

Similarities in soil, topography, and vegetation may present good evidence that a land area was contiguous to adjoining surveyed lands. Sometimes BLM may use a specialist to take a soil sample and prepare a report.

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Escarpments are obvious indicators of former stream locations. Use caution, however, when determining whether an actual former stream bank exists or if the escarpment is the edge of a high- or low-water flood plain or a low-water erosion mark.

Flood plain escarpments should not be confused with ancient stream banks. Walking out on an old stream channel will usually indicate an attachment to a present channel as opposed to flood-plane escarpment, which approximately parallels the present channel for an extensive length.

Escarpment lines of relicted bodies are easily identified features of former water levels. As shown by the rocky area, a contour line or line of levels around this body can also substantiate a former lake level. And don't forget the evidence left by preceding surveys in finding former water heights.

Past conditions of a stream shift can be obvious. This scene is the swampy remnant of a former channel. Note the tree stump near the middle of the present channel.

Ownership of the abandoned bed of an avulsed, non-navigable water course can depend on the wording of the original conveyance. Ownership of the bed prior to the avulsion must be determined prior to division of any avulsed beds.

The division of ownership of an avulsed bed of a non-navigable stream will use the outer banks to control a medial line solution if ownership on opposite banks is with multiple owners.

Who owns the new bed of a river body in its new location? Generally, federal law and almost all state laws recognize the owner of the original land that the new channel occupies as being the owner of the bed of the new channel.

However, in the case of navigable rivers, both federal and state courts consider bed ownership in avulsion cases on a case-by-case basis. And, there are exceptions to the general rule.

In cases of accretion and reliction, the federal government may survey and plat any lands added to the federal property, whether

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the adjoining water is navigable or non-navigable. The federal guideline is that the riparian owner is entitled to the area in front of the basic holding.

A survey of these lands is usually made when one or more of the riparian subdivisions has been disposed of and the boundaries of the remaining public lands need to be marked.

In certain cases, a meander line can become a boundary line. One such instance is when an accretion or reliction occurs after the survey of a land parcel but before that parcel has been patented by the federal government.

In applying this principle, the accreted land area must be significant (more than 50 percent) in absolute and relative size when compared to the attached parcel. Extension surveys projecting the regular rectangular survey lines across the accreted area to form new lots or aliquot parts are used to delineate this new area. The original meander line then becomes the boundary for the lot adjoining the accreted area.

As a BLM surveyor, you will commonly be involved in the division of accreted or relicted land between adjacent property owners.

The key concept is ownership to the middle of the bed in front of the basic holding.

Purely mathematical establishment of a theoretical median line is not always mandatory or advisable. Past-approved surveys have established partition lines at approximate right angles to the thread of stream by inspection, rather than strictly mathematical construction of a median line.

If a body of water is meandered, islands within that body are required to be surveyed and meandered, depending on whether they existed before or after the state was admitted to the union:

- An island formed in a navigable body of water after the state's admission to the union does not need to be surveyed and meandered by the federal government.
- An island that existed before the state was admitted but was left out of the original survey is subject to federal survey and

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ownership. This rule applies to both navigable and non-navigable water.

Original meandering along seacoasts can be difficult, because the ordinary high-water mark is not always as obvious as it is along some rivers and small lakes. But since a meander line is not a boundary line, you can follow approximate lines of driftwood arrangement or vegetation perimeters.

Small land areas inadvertently omitted from an original survey are subject to federal survey if they remain in front of government-owned subdivisions. This omitted land condition is not an accretion situation.

The land rights accruing for the federal government are the same as for any adjoining proprietor.

Once the Bureau of Land Management has decided to survey an erroneously omitted area, one of the following two types of surveys is done:

1. If all subdivisions in a section have remained federal, new lottings and areas between original and new meander lines are established if administratively required.

Or

2. If federal and private lands are intermingled in the section, partition lines are run from the original to the new meander lines to protect bona fide rights of the private title holders.

The method for surveying erroneously omitted lands consists of three distinct steps:

- Step 1. Re-establish the original meander line with permanently monumented angle points. Adjust original lines to existent control using the non-riparian meander line, broken-boundary adjustment (Manual 7-53).
- Step 2. Extend the original survey lines across the omitted area if the size of the area warrants it.
- Step 3. Run new meander lines if the omitted tract adjoins or encompasses a meanderable body of water.

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Surveying Methods

Welcome to Surveying Methods. In this section you will accomplish the following objectives:

- Describe how to conduct a meander line survey.
- List the two basic concepts for deciding how to apportion land.
- Name the three methods for apportioning beds of water bodies.
- Describe how to use the colonial, pie, and long-lake methods for figuring perpendicular apportionment.
- List the three reasons you might use longitudinal apportionment.

Meander line surveys begin and end at a meander corner, a special meander corner, or an auxiliary meander corner.

Meander corners are established during a rectangular survey at every point where a standard, township, or section line intersects the bank of a meanderable water body.

Since regular meander corner monuments are especially susceptible to destruction by the elements, consider placing witness meander corner monuments a reasonable distance from water edges.

Special meander corners (SMCs) are used to monument points:

- Where a quarter section line intersects a lake entirely within one section.
- When an island subject to subdivision—that is, 50 acres or larger—is entirely within a section.
- Use auxiliary meander corners (AMCs) to monument points not on a surveyed subdivision of a section line.
- When a meanderable lake is located entirely within a quarter section, then an AMC is established at a suitable place on the lake's margin and a tie is made to a regular corner of the section boundary.

You would also establish an AMC when an island entirely in one section is too small to be subdivided. You can establish an AMC at any suitable place on the island and make a tie to any regular corner on the mainland.

