



Accretions in the Public Land Survey System

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Introduction

Hello and welcome to this course Accretions in the Public Land Survey System produced by the BLM for the Certified Federal Surveyor Program as well as the Public Lands Survey System Foundation. My name is Dennis Mouland and I will be your instructor for this course.

This is a course that limits itself of course to accretions but it is part of a much bigger topic which we cannot avoid and that is the subject of riparian or water boundaries. So this course has been put together for both internal and external use by the BLM and it is filled with a lot of information and a lot of reading. Hopefully you will take it seriously and go after the material, the reading assignment all of those things and really put some effort into it to get to know the subject better.

The textbooks that we will use in this course are of course the *2009 Manual of Surveying Instructions* which most if not all of you already have and have used in other applications including the CFedS Program. If you do not have one or need a new one, we do have the website there where you can go and it will link you to the NSPS site where you can buy those. Also we will be using the *Public Lands Casebook*. For those of you in CFedS got a digital version of that; just scanned images in with your packages. Those of you who do not have it, the pages that we will discuss for Case D3 will be in your package with this training.

The *Casebook* is available through private sources for if you want to buy. Really the full size is no longer available. These things were 25 x 18 or so and just weighed a ton. There are some state associations that produced this in a smaller version as I recall 11 x 17 and then there are some portions of it that are digitally available through other commercial sources, so you can buy the *Casebook* but if you don't need it; well you need it for this course, but if you don't need to buy one that is understood. This case is in the materials you received with this course. We will be going through case number D3 which is about accretions along the Missouri River.

Course Objectives

As with any course we want to have some objectives and here they are simply stated:

- Given accretions have occurred to the bank of a river you need to apportion those accretions, the student will be able to apply the four accepted methods of apportionment.
- Given the results of the four apportionment methods, the student will be able to evaluate the results and select the appropriate method.

So we have two overall goals to understand the methods and then to understand the analysis of them and some of the legal and practical applications of those different methods and where to apply them.

Course Pathway

Now let's look at the course pathway which is a little more detailed outline of what we are going to do. The first thing we will do is have a reading assignment. We will have an exercise then on the terminology and some of the principles that are presented. Then we will go into the project that is in the Case D3 in the *Casebook* and look at the history of that, review why the survey was done.

We will look at the four methods of dealing with accretions and we will have a COGO-based exercise which you can download into your computer or software program whatever it is that you use and experiment with that to see how you come out with the answers that we had. And of course all of this will help us learn which method best protects the bona fide rights of the claimants and of course any rights that the Federal Government has as to location of their properties. Then we will end with a final exam (*which is accessed online from the CFedS Program website*).

Threshold Questions

In order to help us understand what we are about to read, let's go through what we call some threshold questions. In other words questions that has to be asked before you can deal with any water boundary project. Because they set up what the framework is of the project, what laws we will be operating under is important. What situations may influence us as far as state law, Federal law; different applications and so let's take a look at these threshold questions.

The first is the question is, what is the land status of the land involved, including that of the adjoining properties?

Let's understand that the word status is a Federal land management term regarding who owns the land, what rights are there, what rights aren't there; other limitations may be on it and all of that information is called land status. That is what most of the Federal agencies call it.

So we ask what is the land status because: (A) If it is Federal, then is it public domain, in other words its basically always been Federal, or has it been acquired, in other words did it leave Federal ownership for some time and then come back into Federal ownership through a land exchange, through some kind of purchase, donation, whatever. If it is public domain then it will be treated purely by Federal law.

If it is acquired land, then we have to ask the question, how state law will affect it. Because once Federal land goes to private or what the Federal Government calls alienated land, it is no longer part of the Federal public domain, it has been alienated from the public domain then; what happened to it while it was out?

In other words the Federal Government may buy it back, or get it in a land exchange or a donation; but what rights did it gain or lose while it was outside of Federal ownership? The

Federal Government can only buy what the grantor, in this case the person selling it to the Government or however they are conveying it; what the grantor gives to the Federal Government; they can only sell what they have to give. And so there may be some limitations on it and some of those limitations include the effect of state law on the riparian or water boundary rights.

If the land is non-Federal then state law can and will affect the survey and that includes statutory law and in many cases, case law. And we need to recognize that a lot of times the ownership that we are dealing with at any given situation can be quite a mixture of public domain, acquired, and non-Federal lands. So we need to be cautious to how we apply the law and which law and how it affects the different properties that are there.

A second threshold question that must be asked; (2) Is the water body tidally influenced?

That can be both the river or a lake. Is it influenced by the tide, if so, it is guided by a set of laws and principles for what we call littoral water boundaries that is not covered in this course. So we need to realize that it is either tidally influenced or it is an inland water boundary. And of course, this course is talking about inland water bodies. But we should be very cautious that if we are working within a few miles depending on the geography and topography, if we are working within a few miles of the outlet, the mouth of a river that is going into the ocean or even a lake that can sometimes be tidally influenced then they may fall under other laws and other principles. So just the fact that you are working on the Columbia River between Oregon and Washington and you are two or three miles from the ocean doesn't mean you are not tidally influenced if the tide backs up that river for several miles or influences it and so that is why we want to be aware of whether this water body is tidally influenced. And if it is not, then it is what we call an inland water body and that is what we are talking about in this course.

The third question that we want to ask is one that takes us in to some complicated situations, primarily because of the different uses of the term navigable. But what we want to ask this number three:

Is it navigable for title to the bed purposes?

Notice how that question is asked. It is not asking about navigability under the commerce clause or navigability under the Clean Water Act or all these legal principles that apply. We are interested in the title to the bed. We are talking about who owns the surface even though its underwater perhaps or used to be underwater in our case here. The river itself is it navigable or a lake is it navigable for title to the bed purposes? If it is then we need to understand what the states acquired from the Federal Government or actually owned as a sovereign; automatically was from ordinary high water mark to ordinary high water mark; which is what OHWM stands for. But understand that many of the states have claimed to other places. Perhaps the ordinary low water mark or perhaps they have relinquished all of their title to the bed which is the case of several states.

So if it is claimed elsewhere in the high water mark, where is that and if it is nonnavigable for title to the bed purposes is the division of that bed going to be governed by Federal law or state law. These are questions that have to be asked and there is some great write up in the *Manual* regarding some of it in your reading assignment regarding the navigability about applicability of the different laws and the different situations.

Then finally we get to question or point number four and that is recognizing that there may be local understanding or belief that the river or lake is navigable under some other definition that I have already mentioned. Now recognize that the Corps of Engineers can do what they want to rivers without paying people for it as long as it is in the limits of the river under the commerce clause of the constitution but that is a different situation from the property clause and we are actually talking about who owns the bed of the river, not that they can control the water necessarily; not, because water rights differ from the states; not that they can control fish and other issues even in some states access issues.

But understand that what we are talking about here is navigability under the property clause and that is discussed as you see in the sections of the *Manual*. So as we go to our reading, keep in mind these threshold questions and recognize that the number one thing we have to decide when dealing with any kind of water boundary is what is the law that is going to apply. If state law is involved then how does that state recognize, define, and divvy up parcels; that is what we are talking about here.

So a fifth question we are going to ask is then that is particular to this subject of accretion or another course on avulsion. But it focus in on the fact that there can be some confusion which one has occur so we have to ask the question: Is the change in the location of this water (primarily a river in this case) due to accretion and erosion (accretion and erosion are kind of opposite of each other but usually accompany each other) or is it a result of avulsion? Now you will be reading some of that in the information, but let's understand that an avulsion is a sudden move where it completely changes course, usually cuts off a gooseneck, that sort of thing.

The burden of proof is on the person claiming avulsion. Avulsion can be as we will see later; it can be mixed in with accretions so things can be complicated. But the burden of proof is on the person claiming avulsion. If it is avulsion will then an investigation has to be made to figure out the location of the water bodies; the boundaries of those water bodies just prior to the avulsive act. In other words, where did it occur, had it accreted to a certain point then avulsed?

But what we are focusing on in this course is if it was accretion; then did it occur prior to entry on the public domain. Now understand that entry is another one of those Federal terms that means the date that the claimant, the landowner, or the potential homesteader or whatever; the date they entered the land, it doesn't mean they physically entered it although in some cases it does, but it is the day they started their claim, the date they filed their application, and they occupied the land under other laws, whatever they did to qualify it as entry so what was the date

of entry; of the person, the homesteader, the claimant that are in there and then as we will see in this course, that affects whether they have a right to the accretions that have occurred. So if the accretion occurred prior to entry as we have in this case we are going to study then they are probably not going to own it. So if it appears to be accretion was there any fraudulent meanders or omitted lands; we don't cover that but that is in the *Manual*. And if it is accretion; will we apply Federal or state law on the division of the accreted lands? Of course that takes us back to our first threshold question, land status.

So those are the questions that we want to ask and of course there are many others that we ask that might be peculiar or particular to a given project but those are some things that generally occur always and have to be decided before we do anything with the project. Its important obviously to know what laws apply so as you read the *Manual* and the reading assignment, this background I have given you with the threshold questions will help it make more sense.

Accreted Lands and Bona Fide Rights

One of the great things about the 2009 edition of the *Manual* is that it has really some expanded discussion on bona fide rights, help us understand what's going on. Technically the Federal Government doesn't have bona fide rights; it just those that have lands that have been alienated. However when you think about it you can have bona fide rights on Federal lands if it is acquired or under certain situations with trust land, but really when we are talking about the bona fide rights of the claimants we are also talking about the rights of the Government, as what is left, what did not go to patent.

And so let's understand that accreted lands is real property and it is attached to the upland and in almost every jurisdiction the courts have said, both state and Federal, that accreted lands pass with the upland unless language in a deed specifically says it did not. So they are part of the upland except where the accretions occurred prior to entry which is the case that we will see or if there is omitted lands case which is discussed also in chapter 8 (8-166) as you see there on the slide.

So our task in a resurvey is to protect the bona fide rights of alienated lands, to identify the remaining Federal interest lands in the accretions, in the accreted lands, as well as where the upland is. So let's not forget though that bona fide rights, good faith rights, for the alienated lands, we are not really talking about the quality of their lands, the quality of their title; some of the issues of their title, liens against it, whatever, we are not talking about that. The bona fide rights, the good faith rights, that they got from the Federal Government as to survey are limited to the location of whatever rights they do have.

That is why we are always so interested in the record, in the monumentation, and the evidence on the ground and other things in restoring properties to their original position, their original position intended by the Federal Government who granted it to them so bona fide rights, good

faith rights, are all about place. They are all about location and we need to understand that accreted lands if they occur after entry or after patent then they pass with the land automatically. That will be the case with most of the properties that you will survey that are private lands. But this case shows us a very interesting situation with the accretions occurring prior to entry.

Source of Law

So as we discussed in the threshold questions a big issue is the source of law. Here is where this stuff is at in the *Manual*. It is discussed at 1-7 as well as 8-57 through 8-60 which is particular to water boundaries. Again, I am reemphasizing the understanding of the effect of state law on acquired Federal lands; the definition of land status here. Understand that some laws may differ between Federal land and some Indian trust or restricted lands. And as I mentioned earlier, the *Manual* has a discussion now, this in 8-37, understand that the courts have often confused the varying meanings of navigability and that is in both Federal and state statutes and in Federal and state case law, and we are focusing on navigability for title to the bed. That is what we are focusing on and not any of these other definitions. So keep source of law in mind as you do that reading, think about perhaps the riparian water boundary cases you have worked on or just areas that you know and think about how the law would apply in your local area.

Limitations of this Course

As I have already mentioned, there are some limitations on this course and we want to focus on those as you do the reading in the *Manual*. We are talking about rivers that are navigable for title purposes, right I just said that. We will discuss accretions, in this one we will be talking about where the upland, the boundary of the water body with the upland is the with the bed is the ordinary high water mark, but understand that it can be different, and for rivers that are nonnavigable, we will discuss accretions where the boundary of the upland is the medial line of that river. And understand that these processes may differ if the upland property boundary is at some location other than the ordinary high water mark, but this course will give you the principles and applications for how to make all of that happen.

And finally, this course does not address omitted lands, the other definitions of navigable or navigability which are covered in the *Manual*; fraudulent meander lines. This course does not talk about computation of medial lines; we will just provide you one in the COGO exercise. And again, as I just mentioned, this does not discuss the process if the boundary is at other than the ordinary high water mark.

Reading Assignment

So all of this so far has led us up to this reading assignment and I suggest you read it carefully and not glance over anything. First we want you to read all of **Case D3** from the *Casebook* which is the one we are going to go through. And there are some limitations on how much information is given in there or some confusing information and we will try to make that clear as we go through the course.

Then you got these other reading assignments here, and I will leave this up for a few seconds for you to be able to write them down or print it or however you are able to access this:

Manual, sections:

- 8-21 through 8-60;
- 8-74 through 8-89;
- 4-39, 4-40, 4-45, and 4-46 for cap markings; and
- 8-108 through 8-186.

But I do want emphasize that last point there, if you are new to riparian surveys, we call it Appendix A of this course, but it is the introduction information to Chapter D of the *Casebook* which our case D3 comes from (*You can access this document from the course map.*) and is a succinct but well written piece of information about the fundamentals of water boundary law, and a good starter if you are new to it or if you need some kind of review before we go into the details of reading this in the *Manual*. I strongly suggest you take a look at that so that is provided as an option for you if you need it. So this is our reading assignment and then following this we will have an exercise regarding some of the reading assignments.

Exercise 1 Introduction

Now you have a document included in your course materials called Exercise 1 and here are the instructions for that based on the reading assignment and other things that we have discussed so far in the course, answer the 10 questions that are on the Exercise 1 sheet and then upon completion, there is another sheet in there called the answer sheet and you can look at it.

Obviously you can blow this all off or skip it but I really encourage you to make sure you understand it and if you don't understand the answer on the answer sheet it will give you a place in the *Manual* or somewhere in the slide, in the course, to take a look. And if you need to re-read that portion of the *Manual* or Chapter D Intro or even the case D3 to make sure you understand those things. So at this time you want to take exercise I and I'll be back with you after you have taken that and you can start the recording back up again.

Terminology and Principles Exercise #1

1. Referring to figure 3-44 in the *Manual*, the longitudinal centerline of section 22 is to be run on what bearing?
 - a. Parallel to the west section line
 - b. Parallel to the east section line
 - c. Weighted mean of the record bearings of the east and west lines of the section
 - d. Weighted mean of the measured bearings of the east and west lines of the section
2. The gradual deposition of soil on a river bank is called:
 - a. Reliction
 - b. Accretion
 - c. Avulsion
 - d. Reemergence
3. The meander lines of inland water boundaries are best described as:
 - a. Fixed boundaries between uplands and beds of water bodies
 - b. Approximations of the mean low water line
 - c. Approximations of the ordinary high water mark
 - d. Fixed lines for state ownership on navigable streams
4. Partition lines are best defined as:
 - a. Occupation lines within accreted lands
 - b. Approximate lines of ownership in accretions
 - c. Approximate lines of ownership in erosions
 - d. Fixed lines between upland owners within an accretion
5. The title to the bed of a navigable water body is vested in:
 - a. The state
 - b. The upland owners
 - c. The Federal Government
 - d. The state unless reserved or relinquished
6. The term “ancient bank” generally refers to:
 - a. Where the river was at the time of acquisition by the United States
 - b. Where the river was on the date of the original survey
 - c. Where the river was on the date of statehood
 - d. Where the river is as of the date of your survey

7. Referring to figure 3-45 of the *Manual*, section 15 for subdivisional purposes is:
 - a. Fractional in the east half
 - b. Fractional in the NE1/4 only
 - c. Not fractional
 - d. Fractional as is the NE1/4 and the SE1/4

8. A river flowing through its own sediments is called:
 - a. Braided
 - b. Accretive
 - c. Alluvial
 - d. Straight

9. A sudden movement of a river to a new channel is called a (an):
 - a. Avulsion
 - b. Accretion
 - c. Erosion
 - d. Channelization

10. When the runoff in a river rises over its banks, it is a (an):
 - a. Avulsion
 - b. Accretion
 - c. Flood
 - d. Meander

Terminology and Principles Answer Key

1. Referring to figure 3-44 in the *Manual*, the longitudinal centerline of section 22 is to be run on what bearing?
 - a. Parallel to the west section line
 - b. Parallel to the east section line
 - c. Weighted mean of the record bearings of the east and west lines of the section
 - d. Weighted mean of the measured bearings of the east and west lines of the section. See section 3-121 of the *Manual*.
2. The gradual deposition of soil on a river bank is called:
 - a. Reliction
 - b. Accretion. See section 8-76 of the *Manual*.
 - c. Avulsion
 - d. Reemergence
3. The meander lines of inland water boundaries are best described as:
 - a. Fixed boundaries between uplands and beds of water bodies
 - b. Approximations of the mean low water line
 - c. Approximations of the ordinary high water mark. See section 8-2 and others in the *Manual*.
 - d. Fixed lines for state ownership on navigable streams
4. Partition lines are best defined as:
 - a. Occupation lines within accreted lands
 - b. Approximate lines of ownership in accretions
 - c. Approximate lines of ownership in erosions
 - d. Fixed lines between upland owners within an accretion. See section 8-132 of the *Manual*.
5. The title to the bed of a navigable water body is vested in:
 - a. The state
 - b. The upland owners
 - c. The Federal Government
 - d. The state unless reserved or relinquished. See section 8-127 of the *Manual*.
6. The term “ancient bank” generally refers to:
 - a. Where the river was at the time of acquisition by the United States
 - b. Where the river was on the date of the original survey. See section 8-133 of the *Manual*.
 - c. Where the river was on the date of statehood
 - d. Where the river is as of the date of your survey

7. Referring to figure 3-45 of the *Manual*, section 15 for subdivisional purposes is:
- Fractional in the east half
 - Fractional in the NE1/4 only
 - Not fractional
 - Fractional as is the NE1/4 and the SE1/4. See sections 3-118 through 3-122 of the *Manual*.
8. A river flowing through its own sediments is called:
- Braided
 - Accretive
 - Alluvial. See section 8-74 of the *Manual*.
 - Straight
9. A sudden movement of a river to a new channel is called a (an):
- Avulsion. See section 8-81 of the *Manual*.
 - Accretion
 - Erosion
 - Channelization
10. When the runoff in a river rises over its banks, it is a (an):
- Avulsion
 - Accretion
 - Flood. See section 8-89 of the *Manual*.
 - Meander

History of the Project Site

Now that we have gone through the Exercise 1 effort, let's start looking at our project in D3 in particular. First we want to look at the history of the project site from a surveying point of view. Some relevant things to surveying. As you saw in reading D3 the township exteriors were approved in 1892. The original survey of this township was done in 1891, approved in 1893 by Page and Page.

Now let's take a look at what it is they produced then from that survey. Here is the approved plat 1893 by surveyors Page and Page. And this is one of those townships that many of you have seen especially in the West where they didn't survey the entire township because it was unsurveyable. That doesn't mean it can't be surveyed physically, that means it was not suitable for agriculture and the General Land Office was under instructions from Congress not to waste time and money surveying land that nobody would want to homestead, that they couldn't farm. Of course the definition of what somebody might want to homestead or even farm changed over time but at this time in 1893 they limited their survey to just the sections that were along the river; probably for access for water and perhaps that land was more flat, more tillable, more suitable for agriculture, so that is what we are seeing here.

But when we enlarge it we can see where we are going to discuss this case is actually in section 3 and we can see where the Missouri River is running through section 3. They meandered it and I will have the records meander to look at here in a little while. But you can see as we would expect, section 3 is going to be lotted up against that north line anyway because that is where the junior survey is closing in on the senior survey. You generally have lotting on the north and west sides of a normal township. But in this case we also have other lotting and that is because what would have been aliquot has been invaded by a meandered body of water.

So we have some lots that are in there and we will discuss the subdivision of this section and we are going to deal with some accretions that had occurred and we will see more of the history here as we go along. So this is the original plat of the section 3 that we are going to deal with.

Continuing then our discussion of the history. A completion survey which is where the rest of the township was filled in was done by a Mr. Kimmel in 1908. So that was over all of those unsurveyed areas or parts of that township. And in 1947 a dependent resurvey was conducted in 1947 by Andrew Nelson and it was approved in 1949. Now, as it says here, while this survey indicated accretions were present, it did not survey the accreted lands. It did not deal with those accreted lands. So this was the first indication to the GLO and later the BLM that something had changed out there, that something had occurred.

So here is that dependent resurvey plat and we see the river as we thought it would be. It has changed, we will blow that up in a minute, but I just want you to see that the rest of the township was completed with as many normal sections as possible, the usual procedure for a completion survey to finish out the township. As I said earlier the definition of what was surveyable or what

was suitable for agriculture. What people were willing to pay money for to homestead and patent had changed. So just in a few years, in 1908, they went back in and did the completion, so here is a dependent resurvey of all of it.

Now when we enlarge our section 3, we can see the issue that brought this to the now BLM's attention and that was he noted that there was some significant accretions to the Missouri River there in front of and we are talking about section 3, in front of lots 6, 11, 10, 12, and 13. He also indicated in his dependent resurvey that there was this abnormality with that section corner common to sections 2, 3, 10, and 11 and I will discuss that in a little bit. It does affect it how we subdivide section 3, but what we are seeing here is information is given but there is no values. He didn't provide a new meander line or new areas or he didn't deal with the accretions or who owned it and how the Government would divide it up. It didn't deal with that at all. So this was their first indication that something was going on out there and then as we see with the history here, the whole picture comes together.

Reason for the Resurvey

The reason that this survey was done that we are studying is that an application had been received by the BLM (Montana State Office) for a homestead on lot 10 of section 3. And that is one of those lots we noted that had the accretions in front of it. As we just discussed the 1949 resurvey did not return the accreted lands, no acreage provided, no dimensions, no values, but it provided notification to the BLM that accretions were present.

So an investigation was made in 1954 to verify the presence and the timing of those accretions and they were adding some significant acreage to all of the lots including the one that this fellow had applied for in 1949. Special instructions were issued in 1954 to subdivide section 3 and to survey accretion lands to lot 10. As you probably noted in reading case D3, the amended special instructions called for a survey of all the accreted Federal lands in the section. That never got approved, the monuments were removed so the real effort that was made by the BLM wasn't limited to the lot 10 which is what this case is talking about.

A portion of the investigators report is quoted as follows:

“ . . . The investigation shows that some accretion had formed in front of these lots by 1920.

About 300 feet in front of these lots are a number of trees of which borings were taken. These trees were of 27, 32, and 31 years of age. In front of lot 6, section 3, there are many stumps which were cut in the last year. I counted four of these and the count was 26, 33, 34, and 40 years of age. There are some larger trees very near the old meander line. In fact I could not see much difference in the sizes of the trees on either side of the meander line. Where I presumed the old meander line was (the ground) is covered with a thick growth of trees and brush. Part of the

accretion land has been cleaned and the land next to the water is still lower and is covered with a dense growth of willows. This they say is submerged during high water.

Mr. Jack Lawson, who lives in lot 13 says he can remember helping a Mr. Hall, who filed on lot 13 in 1933, clear brush and timber on the accreted land in 1933. He remembers this to be about 350 feet north of Mr. Hall's cabin. This cabin is still there and I think it is right on the meander line.

Mr. John Behlan, a resident of the community since 1909, knows this land very well as having fished and hunted in it for many years. He is sure this land was out beyond the meander line by 350 feet in 1925. He remembers the trees I had taken cores of and said the river was north of there some 50 feet in 1925. This confirms the age of the trees and when a person examines this distance north of the trees, he will see an old river bank approximately five feet high, which shows the river may have been there for a number of years.

Mr. Jesse L. Hall of Culbertson, son of the Hall who homesteaded on lot 13, stated the same as above. He remembers the river north of these same trees at the time his father moved there, for it was his job to dip water out of the river.

*From the above evidence that I have gathered, we can come to the conclusions that the accretion formed onto these lots was by the slow process of reliction (addition) to the right bank of the river. Evidence gathered shows that by 1920 this accretion was out about 350 feet from the meander line. The river apparently was at this point for quite a number of years, for the accretion beyond this point is rather new. There is no trees on this new accretion and from evidence gathered not over 15 years of age. The question arises as to whether it is considered a substantial amount of accretion. If it is not, the Government could not claim the land under the *Madison vs. Basart* (59 ID 415) decision. This would also naturally depend on when the lots bordering the accretion land were filed on, which dates I do not have at this time."*

Key Issues in the Report

Let's review then what the key issues were in that report. The trees were bored to verify their age. If some of them pre-dated the accretion the area may have been due to an avulsion. The neighbors were interviewed to confirm the accretions had partially formed by 1920-1925. The land decision that was referred to, *Madison v. Basart*, is one which was cited in the report and one that surrounded the subject of how much accretion prior to entry is substantial enough for the Federal Government to claim it as theirs.

While there are not strict guidelines on that, it is quite a study of and by itself and the *Manual* discusses some of that. The issue here was the possibility of the accretions forming prior to entry by the applicant for patent for lot 10. Again entry is the date the applicant began his rights by either filing or occupying the land. It was determined through this report and the process to make

it that the accretions predated his entry and were substantial, thereby making the accretions Federal lands, separate from the lot itself. Again this is discussed in the *Manual* in chapter 8, section 179.

So we see here that although this case in the *Casebook* is called nonsubstantial accretions, it is in fact decided that for lot 10 that those accretions were prior to entry and that they were substantial; meaning that he did not have rights to the waterfront, to the edge of the river, to the riparian water boundary because those additions had occurred while it was still Federal land. That made a difference obviously in how this survey would be conducted and where the boundary lines would be determined.

Dependent Resurvey Details

Let's discuss then some of the issues with the dependent resurvey itself and in particular the subdivision of section 3. There is an anomaly as I mentioned earlier that the southeast corner of the section. It in fact was not actually measured, so that made the southeast quarter of the section technically what we call fractional and actually you can read about that in section 3-119 and elsewhere in the *Manual*.

So when the dependent resurvey was done that was going to establish the corner, you notice there is what we call a heavy bearing way out of a cardinal bearing and in this case to $81^{\circ}44'$, it is quite a ways off of due east west, so that anomaly effects the subdivision of section 3. So they dealt with this in the 1954 survey.

Here is a composite drawing that you saw in the *Casebook* D3 which is just a useful tool to see what is going on and kind of combines the data from both the original survey and the dependent resurvey. It also shows the land status. If you notice this it shows what lands are still Federal lands such as at the time of this survey of lot 10. What others have already gone to patent, but what the date was they were entered or filed upon, so you have that information there as well. It also shows the anomaly with the section corner. So again this effects the southeast quarter of section 3 and how we will subdivide it as you will see here in a second.

Record Meanders

We see here the record meanders for both banks of the river and I will remind you that the norm in the public land system is, as you are looking downstream then the left bank to your left and obviously the right bank to your right. I have seen some exceptions to that just so you know but the meanders are there and you can get those out of the *Casebook*.

Order of the Resurvey

Let's discuss what then the resurvey would actually do and of course this is generally the order of any resurvey. We retrace the existing lines, we evaluate the evidence that we find; we restore any lost corners by proper proportionate methods. Then of course we have to run the record meanders between meander corners. Those meander corners have to be found as existent or obliterated corners that we ended up using or they need to be reestablished by the proper method. That is discussed in chapter 7 of the *Manual*. Then we run the records and then we see what the residual error is.

In 7-53 of the *Manual* we have the procedure which is generally outside the BLM called the compass rule adjustment. It shows us how to adjust those meanders because they don't close and we are going to be using that line as the place where the upland of the rectangular system, the subdivisional lines of the section will stop and it will switch to the partition lines or accreted division lines of the accretion. That takes place where the uplands subdivisional lines in the public land system intersect the meander line. Since the meander line doesn't close in the record, we are going to adjust it. And again that is done by what is commonly called the compass rule adjustment. It is assumed that you know how to do that and you know how to make that work in the software that you may have or whatever you use.

Then our sixth step here would be that we would subdivide section 3. Where the subdivisional lines of section 3 intersect the now adjusted meander line, we will set SMCs or special meander corners. At this point in time we need to go out and establish the existing ordinary high water mark. This is done by running an informative traverse in front of the private lands since this is technically how the *Manual* breaks it down or a new meander line in front of the Federal lands. Since this is sort of a mixture of that in this case, but we run that and then we use that and data from the other side as well. Of course this can be done both physically and photogrammetric.

Many cases that you see in the *Casebook* with water boundaries were done photogrammetrically, but what we are doing is determining where the medial line of the river is since it is what we will end up possibly using. Even though this is navigable, we may use normal to that river as our division of the accretion. So that is why we are going to do that. Then the next thing, point nine, here is to establish zero accretion points or what has become to be called ZAPs. A ZAP is where your adjusted record meander and the new ordinary high water mark intersects. So in the case of this section 3 of this township in the northerly part of section 3 is where a ZAP is going to be and down in section 10 and down below another ZAP.

Sometimes you have to go along way for a ZAP and there is some rules in the *Manual* discusses it about artificial ZAPs when necessary. This case is a good one where the ZAPs are normal and natural. So we establish those zero accretion points because that is where apportioning of frontage will begin. That is where we are dealing with accretion. On the other side of the ZAP it is erosion. So we are dealing with accretion here in this survey so then we try the four methods

of dividing up those accreted lands between the ZAPs. That is the order of this survey and of any basic resurvey project that involves water boundaries.

Section 3 Subdivision Procedures

So we have alluded several times to this section 3 subdivision procedures so let's look at that in particular now. The four $\frac{1}{4}$ section corners of section 3 were found or reestablished, and that allowed the center $\frac{1}{4}$ to be determined by the normal process bearing - bearing intersection. The corner common to sections 2, 3, 10, and 11 was set by two-point control. Now I hadn't told you that before but I had mentioned that it was an anomaly there.

What they did was ended up running record, bearing and distance and using two-point control which you can read about in chapter 7. They ran it in from the west and from the south to determine that position because there were no returns; there was no data north of that section corner for the establishment of it in its northerly position. So that is what was done and then the meander corners were restored at the proper proportionate measure.

Note: The resurvey found a north-south error in excess of two chains. By determining the corner point by the two-point method from the south and west the entire error was placed in the line between section 2 and 3. As a result the northing of the line between section 2 and 3 is very nearly the same as the northing of the line between section 3 and 4.

Now the record meanders were calculated between those meander corners and adjusted by the angle points of meander lines method, i.e., the compass rule. Then the present day ordinary high water mark was determined for both the left and right banks with photogrammetry to create a new meander line on the right bank and to compute a medial line of the river.

Then using the new meanders and informative traverse and the adjusted record meanders of the right bank, the ZAPS were determined. Now we have a limitation on where we are working. We are dealing with this accretion that occurred from one ZAP to the next ZAP and that is where we compare the lengths of those lines for the proportionate shoreline method.

Either way because this is a navigable river, the owner of the upland whoever that turns out to be, whatever the decisions are, or whatever kind of parcel you are working on, are going to end in this state at the ordinary high water mark, in Montana. So that is what they are going to; that right bank as it is in present day is very important to us and so is the medial line in case we end up running normals to the medial line. Now the southeast quarter of the section is fractional for subdivision purposes, so the center lines of the southeast quarter were run on mean bearings.

In fact the *Manual*, the 2009 *Manual* says to run them on weighted mean bearings and that is exactly what was done. The east and west center line of the southeast quarter, whether you did a weighted mean or a mean, it comes out the same answer. However for the north and south or

longitudinal center line of the southeast quarter was done by weighted mean. So where they intersect, of course, is the southeast sixteenth of the section. But where those lines intersect the adjusted record meanders; that is where we set our special meander corners.

So what we have done here now, we have properly subdivided section 3 and the uplands - ok we haven't dealt with the accretions yet - but the uplands have now been properly resurveyed and we have retraced or established the data that we will need to look at the four methods. That being the right bank, the medial line, the left bank to compute the medial line as well. So we are all set with all of the data that we have subdivided the section correctly and we are ready to proceed with dealing with the division or apportioning of the accreted lands.

Division of Accretions

So let's look at this drawing from the *Casebook* and just focus in on what it is we just discussed. We have to first of all determine the subdivision of the section, we have to set those meander corners. So as we will see here when we zoom in, you can see the meander corner had to be reestablished proportioned measure. We also see the ZAP, the blue arrow pointing to the ZAP which is where the record adjusted meander intersects the present day meander. We also see where the subdivisional lines of the southeast quarter of section 3 intersect that adjusted record meander and we set SMCs there.

We are dealing with lot 10 here. If you are doing all of this you would have even more. You can also see the other meander corner that was established, and here is our southerly ZAP, which is where again zero accretion point where the river comes back to where it was and crosses over. So south of that is erosion and north of that is accretion. It is between those two ZAPs that we are dealing with this computation for which ever method we end up using those are the limitations of the accretions. So that is just looking at the diagram and seeing what it is we just discussed on the previous two slides.

Here is another diagram that is out of the *Casebook*, just generically showing us the uplands, who owned them and the years they were entered or filed on. It also shows the present day meander line or informative traverse or in other words the ordinary high water mark. It also shows the adjusted meander line from the record. But there is a dashed line showing the approximate high water mark during the 1920-1925 period that the report was making reference to. They are showing that the river accreted, at least a certain amount, by the mid-1920s and then more accretion had occurred, of course that is what the report said.

There are also acreages given to us there in front of those patented lots, showing us how much land had accreted out into that 1920s vintage. But those are just approximates, but they are giving us an idea of the volume and the quantity of land that we are talking about here in the accretions. Especially what may have occurred prior to entry.

Interim Review

Now would be a good time for us to have just a brief interim review of some of the things we have been talking about and just see how you are doing with that. Just four questions here and I will leave them up for you to take a look at; then we will look at the answers.

1. What are the points called where the adjusted record meander line meets the new meander line?
2. What are the corners called where the upland boundaries of lot 10 meet the adjusted meander line?
3. What must be retraced to determine a present day medial line?
4. OHWM stands for what?

So now let's take a look at the answers to those four questions.

1. What are the points called where the adjusted record meander line meets the new meander line or informative traverse, whichever or both? They are called zero accretion points, or ZAPs.
2. What are the corners called where the upland boundaries of lot 10 meet the adjusted meander line? Those are special meander corners, or SMC.
3. What must be retraced to determine a present day medial line? Both the left and right banks can be either retraced physically, manually, or done photogrammetric if you have a good source and it is accurate and up to date.
4. OHWM does stand for ordinary high water mark which of course is what the Federal law calls for and is what we are using for our actual water boundary between the upland or actually the accretion in this case and the bed. Let's remember that it could be at another location based on state law or other issues.

So that is just four questions for us to take a look at. Now let's go look at more details of this case and how to resolve, now that we have collected all of our data. How to resolve the division of the accretions and what method we will probably end up using.

Four Methods to Apportion Accretion

There are four basic methods to apportion or divide up accretion. Here are those four methods:

- Proportionate shoreline;
- Perpendicular (or normal) to the medial line (or thread to the main channel) as the case may require;
- Proportionate area which is an odd one which is used in some parts of the country but has limited applications; and
- Extension of the property lines which is where we would just simply extend the upland lines out into the accretion.

All four of these have very different solutions. The first two are usually a lot closer to each other but what we also see is a little guidance from the courts to help us understand what the really important issues are in the selection of a method to divide up or apportion the accretion.

Proportionate Shoreline Method

So we will start with the proportionate shoreline method which essentially takes the total dimension from ZAP to ZAP along the adjusted record meanders and compares it to the total meanders of the current high water mark and sets up a ratio between them. So, let's just say that the measured ones are ten percent longer and as we zoom in here, we look at lot 10 and we say all right, whatever that frontage is what it computes out to be (the red arrow), the blue arrow will give them ten percent more. So everybody carries in that ratio of ten percent more and that is just a simple example but essentially what the proportionate shoreline method does.

If you notice here, you also have to pay attention to all of them here. You will have to do all of the parcels this way so that you get it centered in the correct position. Being a good surveyor, we want to run it all the way through. We don't want to just do the first couple of lots then get to the lot 10 we want and not close it out. We want to compute them all and make sure they all add up and that it works perfectly. So proportionate shoreline is simply finding the factor from the record to the measured and then applying it to all of the record to each individual record frontage.

Perpendicular Method

The perpendicular method is running normals which is a line that is 90 degrees from some other line and in this case to the medial line. On this slide you can see a blue dashed line on there and that represents the medial line as computed by the BLM. You notice that this is different than the proportionate shoreline because the proportionate shoreline was very much mattered what was the distance in the record and what was the measured from ZAP to ZAP. But here these lines are independent of that ratio of that proportion and they simply run from the SMCs that we set where the subdivisional lines of the section intersected the old record meander that we have adjusted

from those SMCs out to medial line at ninety degrees. But where it intersects the new high water mark, we set another SMC.

The process here is to determine that ninety degree point and come into your SMC that you set on the subdivisional line. Ninety degrees at both of these points as it indicates, and so you see that these lines are not anyway related to the distances, not in any way related to the areas or anything else. It is simply ninety degrees to the medial line and that provides another means of (which is often called the colonial method) apportioning or dividing up these accreted lands. There are some cases where, in a nonnavigable stream where we are going to the center line or the medial line – where we would do this also just one normal all the way out to the medial line or center line. And then of course the property line or property corner would be on the medial line this being navigable at the ordinary high water mark that is where we set the SMC.

Proportionate Area Method

The third method that we want to look at is the proportionate area method. This is a very different and almost bizarre method because it takes the total area of the accreted land and then divides it up based on what the frontages were on the adjusted record meanders. As you can see it drastically changes the outcome of who gets what in the accretions. As we zoom in here, you can see that these lines really go off in really bizarre directions. Basically as you can see, like in lot 10, it had quite a bit of frontage so it gets a bigger section of area, whereas in lot 12 it had very little frontage, so it gets almost nothing. Lot 6 gets this really bizarre big thing because it had a lot of frontage.

So the example that I got on the slide ... this is about how it would compute out, if you did all of these, this is another one of those that you would want to use your COGO program using predetermined area because you can compute up the area of the accretion at each gets based on its percentage of the frontage. If you take an example of an upland part of the parcel and the parcel has half the frontage of all the parcels it is going to get half of the record of the accretions. So it is a very different application. I will just mention that this is not as we will see really in harmony with court cases that we base this work on.

However this is done in areas where the area of the land is more important than the frontage. You will find this to be true, I know that this is done quite a bit in Louisiana and Mississippi and I think a lot of that is because of the old French arpent surveys and just the French customs in that area where frontage was not as important as depth was to the parcel of area was more important for producing crops or whatever. This isn't used a lot but there are some states and some places where that is the custom and if we are falling under state law then we are certainly going to pay attention to that. The proportionate area method is a different; odd one at times and yet it is used in some places.

The Extension of the Property Line Method

Finally, the extension of the property line method and as you can see here, the lines are simply extended from the upland. So the midsection line, and the sixteenth line, and all these things that are part of the section subdivision are just extended out. It is pretty rare that this one works or is acceptable because generally it cuts off the person from their frontage.

Of course one of the primary things about having a riparian right is that you have a right to frontage of some kind. A right to being on the edge of the water. In this case the ordinary high water mark. So this is a case where we would be very very cautious about applying this but it is something that is used in some states. Under state law or certain circumstances, and I recently saw a case where this was applied in Indiana and blessed by their state supreme court. So you never know; so it is certainly something worth thinking about and recognizing that it is a possibility. However, once again cutting people off from their rights is a dangerous situation to get ourselves into.

Comparison of Methods

Now as we compare those four methods we see that they can produce some really different solutions and results. These all certainly impact the rights of the Federal Government's lot 10 and the bona fide rights of the alienated lands, the private adjoiners that we have in the area. We will take a look at some U.S. Supreme Court decisions that help us understand some general guidelines with that, but since we are talking about comparing those methods in any given situation, or any given survey, or any given set of facts, then we should take a look at how they look comparatively. We have looked at them graphically; now let's take a look at all on the same slide.

What we are seeing here is lot 10, the proportionate shoreline, the extension, (let me do them in order) proportionate shoreline, perpendicular to medial line (or normals), proportionate area, and extension of the property lines. Significantly different solutions, so we need to consider these in light of what we are about to look at here with the Supreme Court rulings.

Johnston v. Jones (66 U.S. 209 [1862])

Riparian and water boundaries issues have gone to the courts so many times, and there are so many what ifs that it is still a somewhat dynamic subject on certain things but the U.S. Supreme Court has made it really clear in a number of cases how we should deal with accretions in general and actually other things to abandoned beds like avulsive moves and that sort of thing that are not part of this subject.

This Johnston v. Jones case, this is what set up that the accretions should be "in front of" their upland holdings. That is a significant factor, it is not a real precise exact thing but being in front

of is something to consider. That in front of requirement certainty tells you how a proportionate shoreline is usually the best solution or the normal.

Oklahoma v. Texas (261 U.S. 345 [1923])

In Oklahoma v. Texas, there have been a number of cases that have gone to the Supreme Court there between those two states, but in this particular one in 1923. In the 1923 case it also affirmed the “in front of” issue. Now understand that this is a statutory requirement as well from the Act of May 18, 1796, and it has been around a long time.

That the “in front of” requirement is there so that is one of the biggest things we will consider when we begin to choose a method. Recognizing the effect of state law but also recognizing local customs and situations and how case law has been handled and that might influence us. But the “in front of” issue is probably the biggest one that we need to consider that the solution that we come up with actually fulfills that requirement.

Pros and Cons

So the next few slides simply talk about the pros and cons as you can see here of these different methods. And method one which is our proportionate shoreline, it is most likely to provide the best “in front of” scenario, it seems fair to people and treats reaches of the river separately between ZAPs. In other words, it is dependent on the relationship of the two ZAPs to one another. But the cons are it doesn’t allow for really odd shaped meanders. Sometimes you can have inlets and peninsulas and that type of thing where they get too much frontage. It also doesn’t allow for situations where the amount of land accreted is more important than the frontage. We had mentioned that one regarding the area method. So those are sort of the pros and cons to think of in this one.

As we move to method two which was the perpendicular or normals to the medial line. These pros and cons are pretty much the same as the previous one. As you saw graphically, they are relatively similar in solution. They provide an “in front of” quite strongly; ninety degrees to the medial line definitely provides “in front of”. The one of the cons that is different here is that it requires retracement of both banks and the computation of a medial line. You notice that the proportionate shoreline doesn’t really care about the medial line; it is simply the two dimensions being proportioned against each other. But this one, you have to retrace the other side of the line, or the other side of the river or the opposite bank in order to come up with a medial line.

Method 3 then is the proportionate area, and as we mentioned earlier it is a pretty unique and different situation. It does treat the reaches of the river separately between ZAPs which is an important thing but this is again where land is more important than frontage. And as I have mentioned earlier it has been used in some places in the south along the Mississippi River and it is probably applied in Louisiana more than any other location, so it is a method. But the cons are

important, especially outside where that is the local custom or the state law. It is least likely to provide the “in front of” if you remember how straight and angled that was, and it doesn’t seem very fair to people and in many ways it is not.

Method 4 then the extension of the upland property lines is very easily done when you subdivide the section, you essentially ignore the water body except for its current location. Some states have adopted this through case law. But the cons, it cuts off upland owners from their accretions and denies them their riparian rights. It is very unlikely to provide the “in front of” scenario which the Supreme Court really wants. It does not seem equitable or just to the landowners in the area. And it is something that is just done without regard of where the ZAPs are as you will recall. So it just extends the property lines, that is it.

Sometimes ... and I am going to throw you a curve ball here, but sometimes, there is a fifth method. That fifth method is where you might combine two or more of those four methods because of really complex meanders, large adjustments, strange land ownership patterns. Things where you are wanting to protect people’s riparian frontage water boundary rights and none of the other methods will do it correctly as an application throughout the entire area that you are dealing with. So there are times when you might say well because of the shapes of these meanders, that sort of thing, we are going to use one method here maybe normal and then the rest we will use proportionate shoreline or perhaps there will be a few places where any other combination of these would be wiser in order to not only be equitable but to be in harmony with the general Supreme Court guidance which is the “in front of” requirement.

Preferred Solution

Now when we talk about a preferred solution, you are going to hear and see and I am telling you here that the proportionate shoreline is usually the most equitable and just method. The other methods exist for more complex applications. Now as you have seen and read in Case D3, they chose to use the normals to the medial line and they do not tell us anywhere in the *Casebook* and I can’t tell really why they chose that over the proportionate shoreline but if you remember in the graphics, they were pretty similar. So that is what they chose here, either one of those is usually the best bet. Be careful that you are always protecting everybody not just the piece of land that you are interested in.

Here is that final approved plat where they went perpendicular to the medial line. Because lot 10 existed and was entered and the accretions that occurred before the entry, then lot 10, the meander line in front of lot 10 now becomes a fixed boundary. So the accretions are still Federal land, so they gave them lot 14 gave it an area, gave us all the dimensions and that information. So it technically is a separate Federal parcel that can go to patent or mineral leases or whatever can go out on it. There could be other uses on it and it is not the decision made from the report and the other things that we have gone through this was that these occurred prior to entry and so

he doesn't have any right to those and that's how it was surveyed and a new Government lot was created.

So let's zoom in on that so you can see those particular numbers, notice that lot 14 crosses the midsection line but really understand that the midsection line has no real influence in the accreted lands. The midsection line does influence boundaries up until west of the adjusted record meander where lots 6 and 11 are there. But once it hits that meander line, it controls other parts of the section subs but it does not control the partition lines or the division lines of the accreted land. So again lot 14 is what the Government still owns and can do whatever they want with it.

They have surveyed it and just made it part of lot 14, or made it lot 14, and lot 10 stands alone. So if the fellow who applied for a patent or homestead, or whatever the law he was operating under gets that patent and ownership of lot 10, he will not have water frontage. He will have this chunk of Federal land between him and the present boundary or at least present at the time of the survey was done, at the ordinary high water mark.

And remember this was all because it was decided because the accretions had occurred prior to entry. Had they not occurred or not happened they may not have done this survey, but I guess there are some other Federal holdings in there, so they would extend lot 10 on out and lot 10 and lot 14 would all be combined if you will.

Now this other drawing that you will find in the *Casebook*, it is just showing a plat that was drafted where they were talking about claiming all of the lands in front of those lots as being prior to entry, the accretions prior to entry, so this is how they were going to divvy that all up. But understand that as the memorandum that you see in the *Casebook* and other discussion for whatever reason that was never completed and the monuments were removed and they never did finish that project. I suppose that still stands in limbo somewhat as to who owns what or what was there but the Government never went in and asserted its rights to that accretion prior to entry in those areas except on the new application for lot 10.

COGO Exercise Instructions

It's now time to introduce the COGO Exercise that we have created to help you actually compute one of these projects out and use all four methods and take a look at what you think. The file that exists, it is called accretions.rtf, another one called accretions.pts, or .txt. Depending on what software program you use. You should be able to load that directly into your COGO program in order to complete this exercise.

The following slide will give you the information that you need and it is also printed out in your instructions. It's regarding a navigable river that's in Idaho. Let's take a look at that at the record plat. The subject property that we're going to work on here is lot 4, section 22. This is the Snake River. We're going to say that it's navigable. The state claims to the ordinary high water mark. So lot 4 is public domain and everything else is non-Federal.

The original meanders will be given to you in a minute and again, that information is in these point files that we're going to provide you. And we'll give you the coordinates for the various things that you will need to make this work. As you can see this section 22 would have been a normal section but it's been invaded by this meandered body of water so we have lotting on each side of it. It's flowing north so the right bank, we're only going to deal with lot 4 on that side and it's Federal. Lots 1 and 5 are other than Federal. Here are the record meanders for both sides:

Left Bank

- MC S22/S27 N0-30W 22.00
- N6W 38.00
- N7E 12.00
- N5W 8.40 MC S15/S22

Right Bank

- MC S22/S27 N1E 5.00
- N4E 13.00
- N6-30W 27.00
- N2E 12.00
- N4W 6.00
- N1E 18.2 MC S15/S22

Again, you will find these unadjusted record meander points in the points file that you get, so you don't really need to write all this down except to know that we have provided this information for you in coordinate form. And here is that same plat. But I've drawn in the red dash lines to show you where the new meanders are. So as you can see lot 4 basically has some accretions to it as does lot 1. Lot 1 has quite a bit of erosion also; lot 5, just the corner of it. So we'll have ZAPs that we can compute that are within the section and makes it simple. I've got both banks there of the new meanders, not that you necessarily need the left bank because we have provided you a medial line as well in the coordinate file.

So here is the scope of what you're going to do in the COGO exercise. First of all you're going to take those record meanders, and you're going to have to adjust them. Then you'll have to determine where the ZAPs are. You'll have to subdivide the section. You'll have to set the special meander corners on the adjusted record meander line. And then you can try all four methods of apportioning (and again we have provided you a medial line in the file). Then you can compare all of that to the answer sheet that we have which comes in the same formats: rtf, pts, and txt. Then you can see how you did.

So I suggest you pause the course, download that data or put it into your data collector or computer, or whatever it is that you have, and really practice that, and see if you come up with the same coordinates that we have in that COGO exercise. This really is your one and only opportunity in this course to actually do one of these and to compute it, as we've been discussing these methods in the course so far.

COGO Exercise #2

This exercise is provided to you in three formats (PTS, RTF, and TXT). Download the appropriate file from the course map. Answer keys are also provided in each format and you can also download those from the course map.

Instructions:

This is a navigable river flowing northerly, where the bed between the OHWMs is owned by the State. Lot 4 is Federal, public domain land with the remainder of the land on the east side of the river in private ownership.

You have been given the coordinates for the:

1. aliquot part corners necessary to identify lot 4;
2. original meander corners;
3. angle points on the original meander line;
4. points on the new meanders/informative traverse of the present right bank; and
5. a medial line through the north half of the section.

There are accretions which have built up after lots 1 and 5 were patented.

You must divide the accretions to identify the boundary of the Federal land (lot 4), to do so, you must calculate:

- adjusted record meander line;
- coordinates for the northerly and southerly ZAPs;
- coordinates for the SMC at the intersection of the E-W centerline of the section with the adjusted record meanders;
- coordinates for the SMC at the intersection of the E-W centerline of the NE1/4 with the adjusted record meanders;
- coordinates for the SMC's at the intersection of the division of accretion lines between lots 1 and 4 with the new meanders/informative traverse of the present right bank for **each** of the following methods:
 - Proportionate shoreline method
 - Perpendicular (normal) method
 - Extension of property line method
 - Proportionate area method
- coordinates for the SMC's at the intersection of the division of accretion lines between lots 4 and 5 with the new meanders/informative traverse of the present right bank for **each** of the following methods:
 - Proportionate shoreline method
 - Perpendicular (normal) method
 - Extension of property line method

o Proportionate area method

When you have completed the exercise compare your coordinates with those on the "accretionsanswers" file based on the format that you use. Compare your information based on the answer keys that are downloadable from the course map.

COGO Exercise Review

Now that you have had the opportunity to go through that COGO exercise, let's just review briefly what we learned in that.

- Of the four methods, clearly the proportionate shoreline makes the most sense.
- Although the medial line normals is also reasonable.
- The upland extensions is completely out of reason with the “in front of” requirement, and it cuts off some people's rights.
- The area solution doesn't work in the “in front of” and really is not something used in Idaho at all.
- And there is really no reason to combine those methods.

So, since there are two answers that are acceptable, in this case we would probably choose proportionate shoreline because it seems to be preferred by the courts. But as you can see there is definitely some professional judgment involved in these cases.

Course Review

So with the completion of that COGO exercise we have come to the end of this course. Here on this slide you can see the two course objectives that we had:

- Given accretions have occurred to the bank of a river you need to apportion those accretions, the student will be able to apply the four accepted methods of apportionment.
- Given the results of the four apportionment methods, the student will be able to evaluate the results and select the appropriate method.

We can see we have done just what we said there. We talked about if the fact that there are accretions that we would be able to apply those four methods and be able to evaluate them and the results and select an appropriate method. We also covered a lot of terms and things along the way. We also saw that we have court guidance but complications with what laws Federal, state; different applications. We talked a lot about that in the beginning of the course regarding the source of law and the discussions there. A lot of what we are trying to do here is just to get you used to using the *Casebook*, looking at the cases, understanding what is in there. We expanded on it somewhat in this course. There is a final exercise (exam accessed from the cfeds.org website) that will be given to you and will provide you an opportunity to display what you have learned.

But hopefully we have given you some basics and guidelines as to the apportionment of accretions and in this case, substantial accretions that occurred prior to entry which created an even more complicated situation. But either way we have seen the basic principles and guidelines that are required for the apportionment of accretions. So hopefully it has been of use to you this course and the concepts here and the COGO exercise and those things. An opportunity to do things in a real world application.

Final Remarks/Closing

So we want to thank you for your attention in this course and again hopefully you found it useful and some good foundational information. Remember when it comes to riparian and water boundaries, there's always more complications and more things to learn and so we encourage you to keep your nose stuck in Chapter 8 especially of the *Manual* and use the *Casebook* on some of the other situations that we have plus other courses that we have in both in CFedS and other training that is available to the public. So thank you for your attention and we wish you well and good surveying in all that you do.