BiOS Video Tutorial Script

Video 1 – Starting a Project

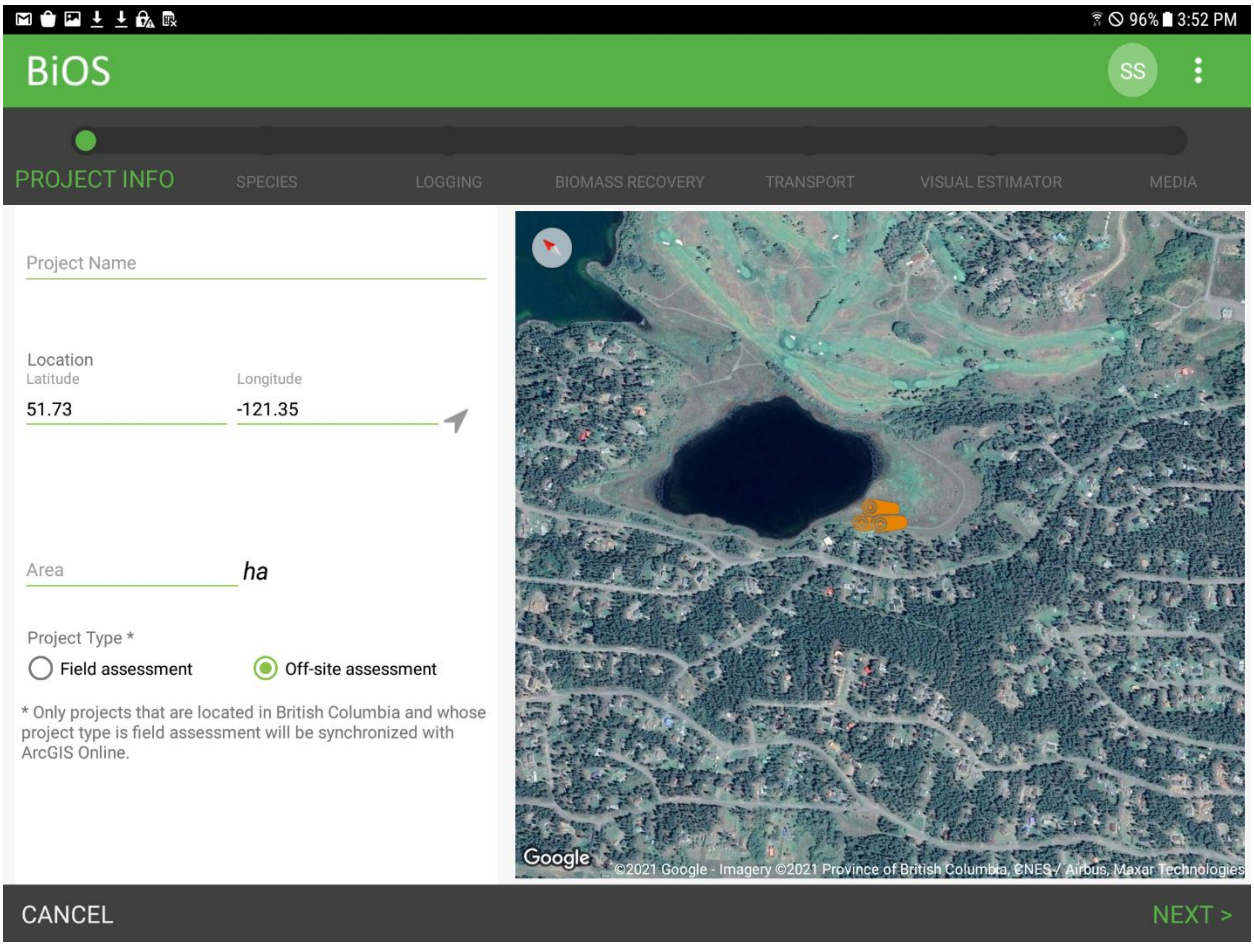
Hello everyone and welcome to the first of seven BiOS tutorial videos. My name is Stu Spencer and I'm a senior researcher at FPInnovations. In this video series we will work through a mock-up scenario with the BiOS App providing step by step direction to assist potential users. For those of you unfamiliar with the BiOS App, it is a program that will calculate the volume of residual fibre available for harvest after the primary harvest is completed.

BiOS is free App designed to work on a single cutblock basis. It can be found in google play or the Apple Store if you search for 'FPInnovations'. I have placed the instruction for download as well as my contact information in the comments section of the video in case you have any questions.

So, lets dive into the App!

To start, click on the on the BiOS icon on your App. When BiOS is loaded you will start on a page that has your projects, if you have any, in a list down the left side. On the right side of the page, you will see a google satellite map.

To create a new project, tap on the green button with the white plus sign on it near the top centre of the page. This will start a blank project which you will then have to populate.



First, create a project name. For this tutorial we will simply call it ‘Tutorial’.

If your tablet is connected to a phone or wifi, the program should automatically be centered on your current location. If you are not connected, you can enter your coordinates manually.

Next, enter the area of your cutblock in hectares. For this scenario we’ll use 27.7 ha.

And lastly for this page you can choose your project type from two options. The Field Assessment option on the left will allow your data to be uploaded to the FLNRO’s Forest Biomass Supply Information System. This system displays aggregate harvest residue availability data which can be helpful in assisting secondary harvest operators in their decision making process as well as de-risk new enterprises that will be dependant on harvest residuals. This option is currently turned off.

The other option is the ‘off-site assessment’ on the right. This option will keep the data private in your tablet.

OK, that’s it for the first video. Tap ‘Next’ in the bottom right of the page to take you to the species page and in the next video we will enter our species information. Thanks very much for watching and we’ll see you in the next video.

Video 2 – Entering Species Information

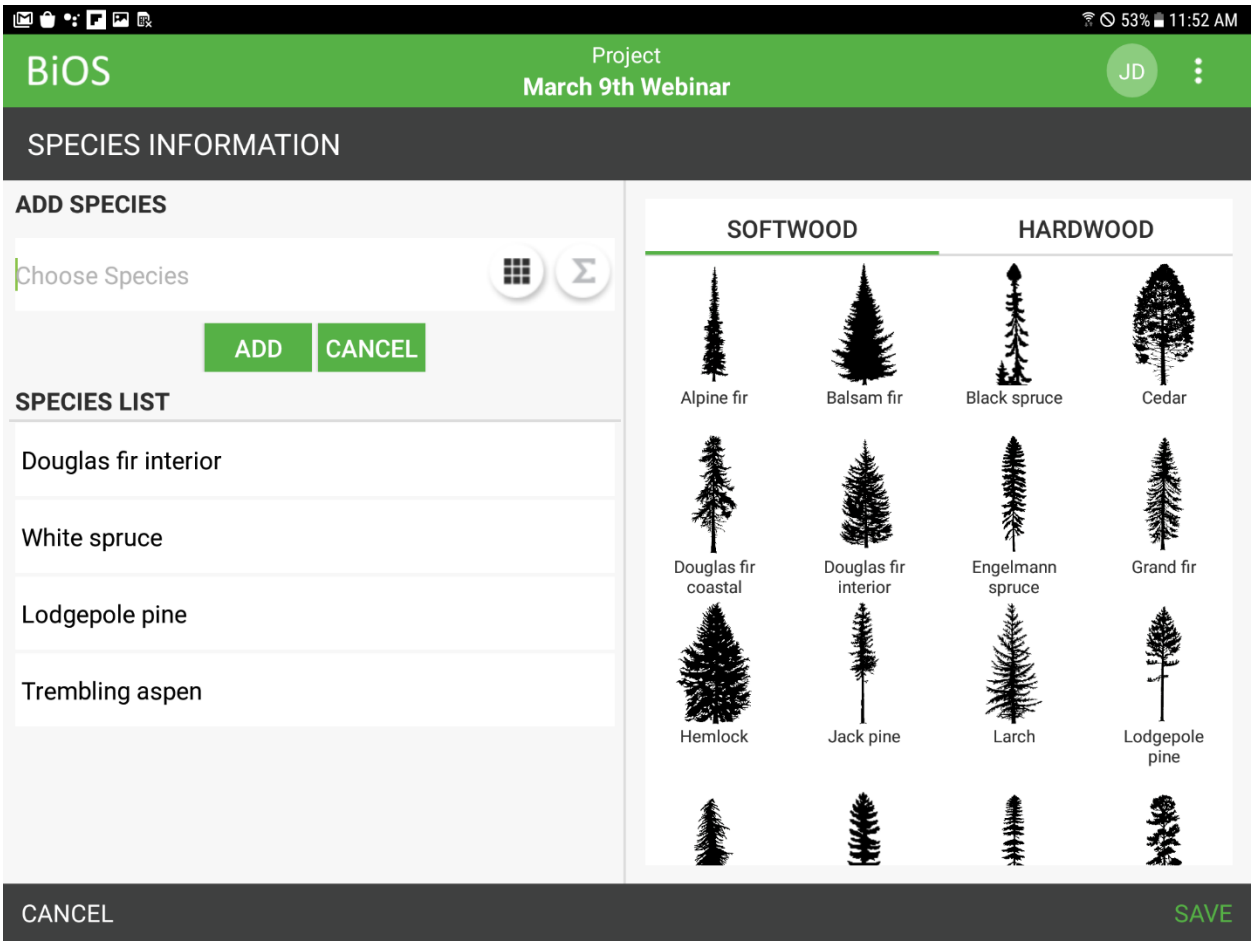
Hello everyone and welcome to the second of seven BiOS tutorial videos. My name is Stu Spencer and I’m a senior researcher at FPInnovations. In this video series we are working through a mock-up scenario with the BiOS App, providing step by step direction to assist potential users. If you have not yet watched the first video, I would highly recommend you do so first.

We’re going to start on the species page of the app and this is where we enter our cruise data by species. All of the major species for BC can be found alphabetically on the right hand side of the screen, although they are split into softwood and hardwood. The App was originally designed in Eastern Canada so you will also find a number of eastern species. (flip between softwood and hardwood).

For our mock-up scenario I will be using a cruise compilation from a cutblock near Williams Lake, BC. It is predominantly Douglas-fir with secondary components of hybrid spruce, lodgepole pine and trembling aspen. I post the data at the end of the video where you can take a screenshot if at some point you’d like to play along.

I’m going to do the full entry for the first species and then do the other species off camera to save time, although I’ll show you the end result before we are finished for this video.

First, we’ll tap one time on the silhouette for Douglas-fir interior and then tap ‘Add’. This will change the right hand side of the screen from the tree silhouettes to the data entry form for the species.



In the ‘volume per ha’ entry spot we’ll enter 109.7. This number was derived from the cruise by taking the ‘Gross merchantable’ volume for Douglas-fir, which is 3038 cubic metres and dividing by the cutblock area, in this case 27.7 ha.

The topping diameter for this cutblock was 12.1 cm. This value was derived by measuring the diameter at the bottom end of the pieces left in the residual piles at roadside. This assures a much higher level of accuracy than using the default ministry’s merchantable specifications.

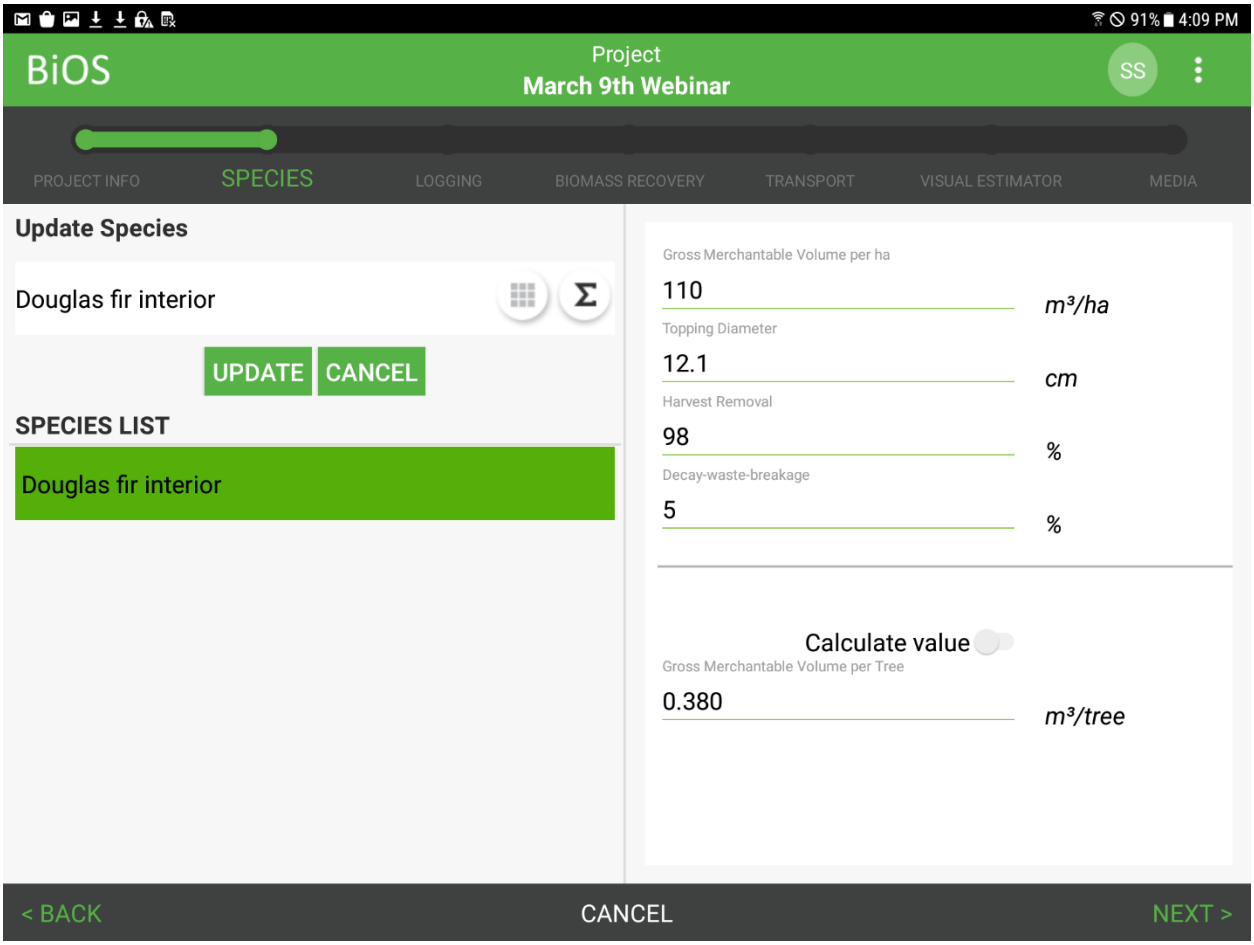
In the harvest removal entry box, simply enter the % of merchantable stems removed during the primary harvest. In many cases this will be 100%, but if stems are left standing, then an assessment needs to be completed to determine the actual stems left standing. This may be a visual assessment, or the user may wish to establish plots. In our mock-up scenario, 98% of the volume

The decay-waste-and breakage value is taken directly from the cruise compilation. In this case the value is 5%.

Gross Merchantable Volume per Stem is taken from the Gross merchantable volume per Tree category in the cruise compilation. If this data is not available, users can also enter tree height and diameter at breast-height and the program will automatically calculate a volume per stem.

So now I’ll enter the other species, but in the video I’ll skip to the end.

Action - Fast forward to all data entered.

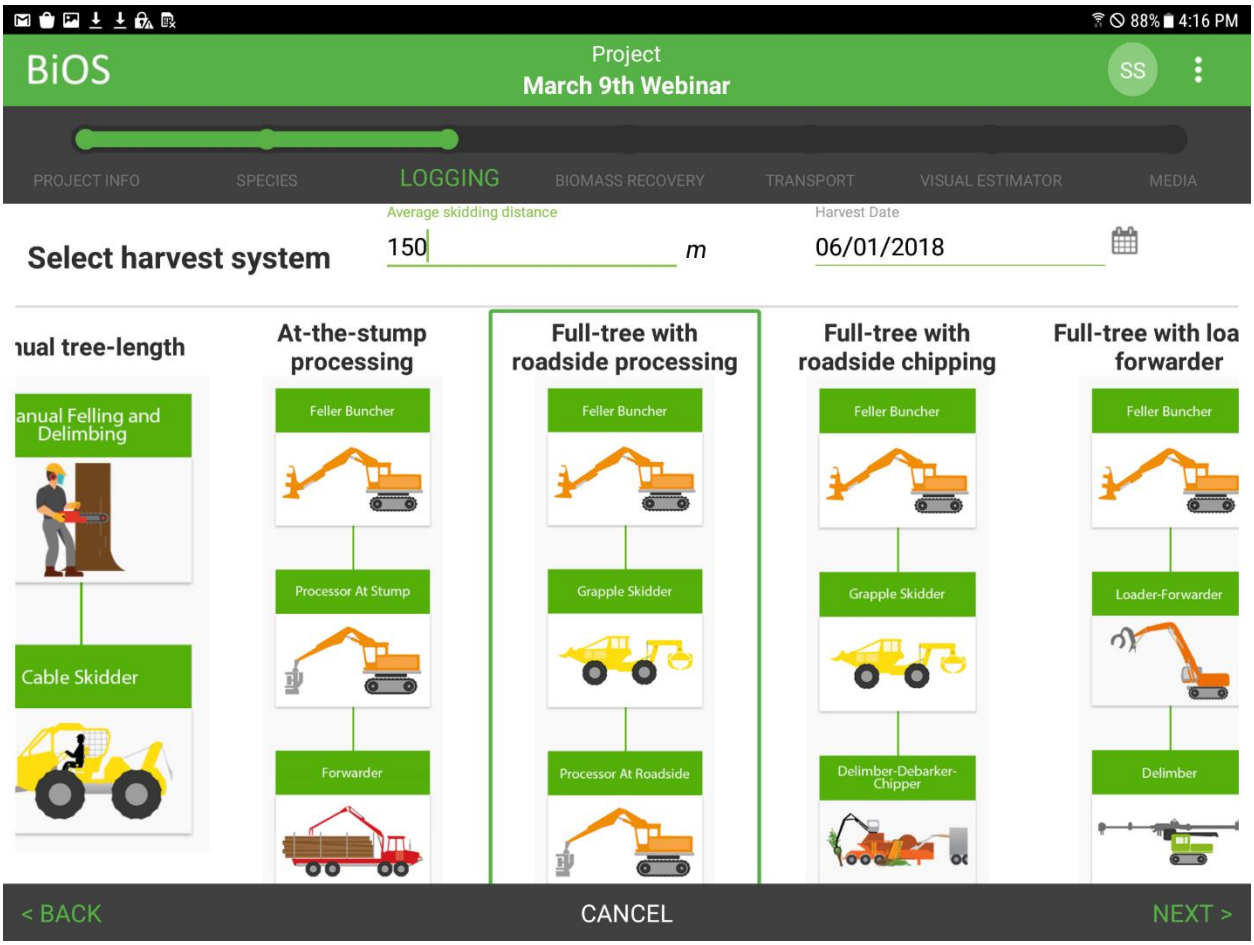


So now all my data is entered. Please note you can go back at any time and update or change the data as needed. When you are finished entering the species, tap ‘Save’ and then ‘Next’ to move to the next page.

OK, that’s it for the second video. So thanks very much for watching and we’ll see you in the next video.

Video 3 – Logging Page

Hello everyone and welcome to the third of seven BiOS tutorial videos. My name is Stu Spencer and I’m a senior researcher at FPInnovations. In this video series we are working through a mock up scenario with the BiOS App, providing step by step direction to assist potential users. If you have not yet watched the first two videos, I would highly recommend you do so first.



First, we'll enter the 'Average Skidding Distance'. This is the average distance the primary harvester needed to transport the logs to roadside.

We will also enter the date the primary harvest occurred. This date and the subsequent secondary harvest date located on the next page allow the program to calculate how many needles and leaves potentially fall off the branches before the secondary harvest occurs.

And finally, we'll choose the primary harvest method which also directs the program how much volume is available for harvest. Currently there are 7.

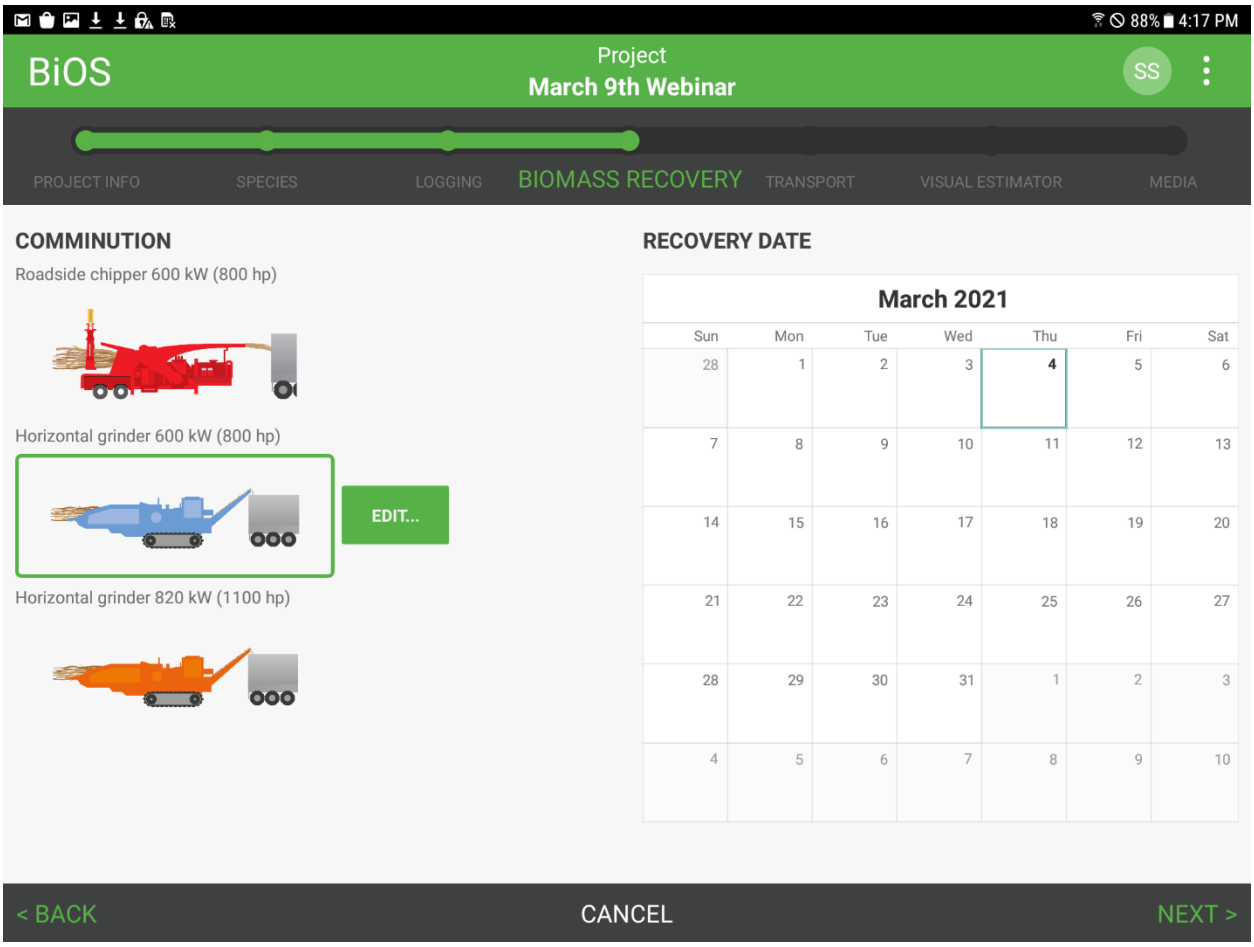
1. Full tree, which is the feller-buncher, skidder and stroker delimber combination.
2. Harvester/Forwarder, which is exactly as it shows.
3. Manual tree length, which is manual falling and bucking, and skidding to roadside.
4. At the stump processing – which is buncher felling, processed at the stump and transport to roadside with a forwarder.
5. Full tree with roadside processing- this is feller bunching, grapple skidding and processing at roadside with a danglehead processor
6. Full tree with roadside chipping – this is feller bunching, grapple skidding and then chipping directly into a chip van
7. And lastly, full tree with loader forwarding – this is feller buncher, loader forwarding (also known as hoe chucking in BC) and then a stroker delimber for processing

In our scenario we are going to choose Full Tree with Roadside Processing.

This ends our 3rd video. In the next video, we will populate the biomass recovery page.

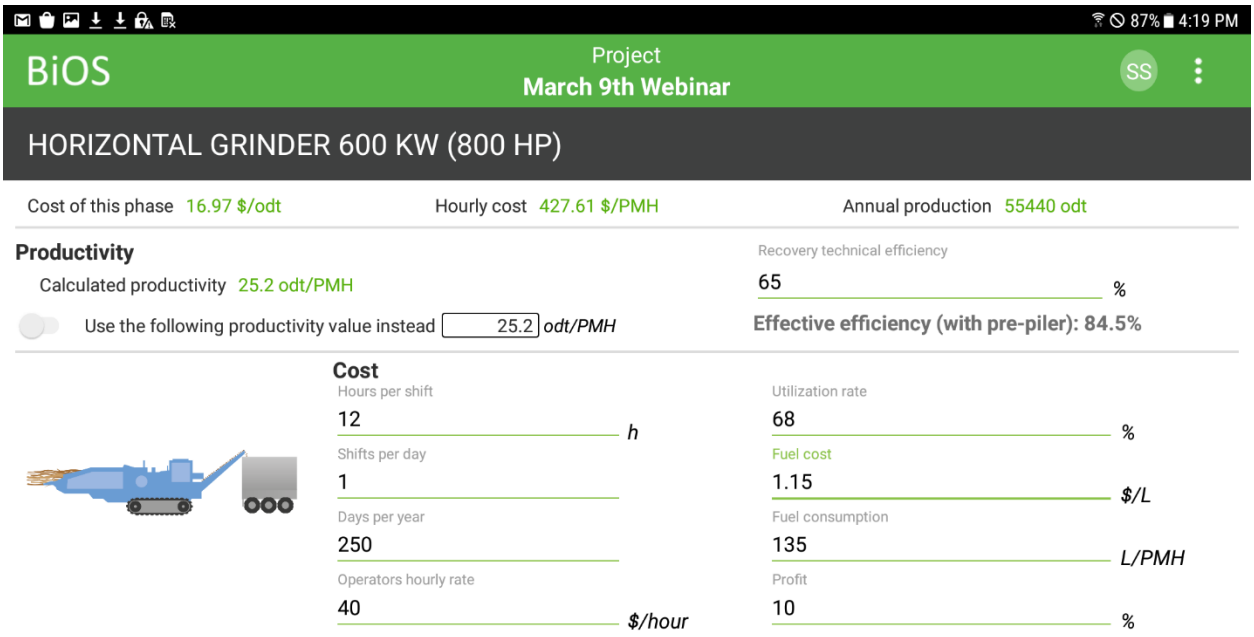
Video 4 – Biomass Recovery Page

Hello everyone and welcome to the fourth of seven BiOS tutorial videos. My name is Stu Spencer and I'm a senior researcher at FPInnovations. In this video series we are working through a mock-up scenario with the BiOS App, providing step by step direction to assist potential users. If you have not yet watched the first three videos, I would highly recommend you do so first.



In this video we are going to populate the type of machine used in the secondary harvest and enter a secondary harvest date.

Currently, there are three pre-set choices for the user, an 800 horsepower roadside chipper, an 800 horsepower horizontal grinder and an 1100 horsepower horizontal grinder. To choose one, simply tap on your machine of choice. You will also see a big green 'Edit' button appear and we'll talk about that in a second, but first go ahead and choice your date of secondary harvest.



Click on the 'Edit' button and it will take you to this page. This page has a number of features and data input fields. What you currently see are the default values in BiOS for productivity and costs.

In the productivity section, there is a default value in oven dry tonnes per productive machine hour, but this can be changed to whatever value best represents your operation.

On the other side of the page, on the right, you will see 'Recovery technical efficiency'. This is a value based on how clean the operator is harvesting at roadside and how much volume is being left behind. The default value for this is 65%, although I usually increase this value because the operators I work with are very thorough. The data box below the recovery technical efficiency 'Effective efficiency (with pre-piler)' is based on a value that can be adjusted when editing, after a report has been generated. The pre-piler assumes that a machine has prepared the residue in the cutblock for the grinder and therefore more volume can be collected. I will show how to change this value in a later video.

In the cost section you can change "hours per shift", "shifts per day", "days per year", and operators hourly rate. The utilization rate, which can be defined as 'productive time, divided by scheduled time. You can also change fuel cost and fuel consumption in litres per productive hour. And lastly, you can change the profit value.

As you change these values, the outputs at the top of the screen will change to represent new values.

If you make changes to any of the values that you wish to keep, tap the ‘Save’ button in the bottom right corner and the App will take you back to the Biomass Recovery Page.

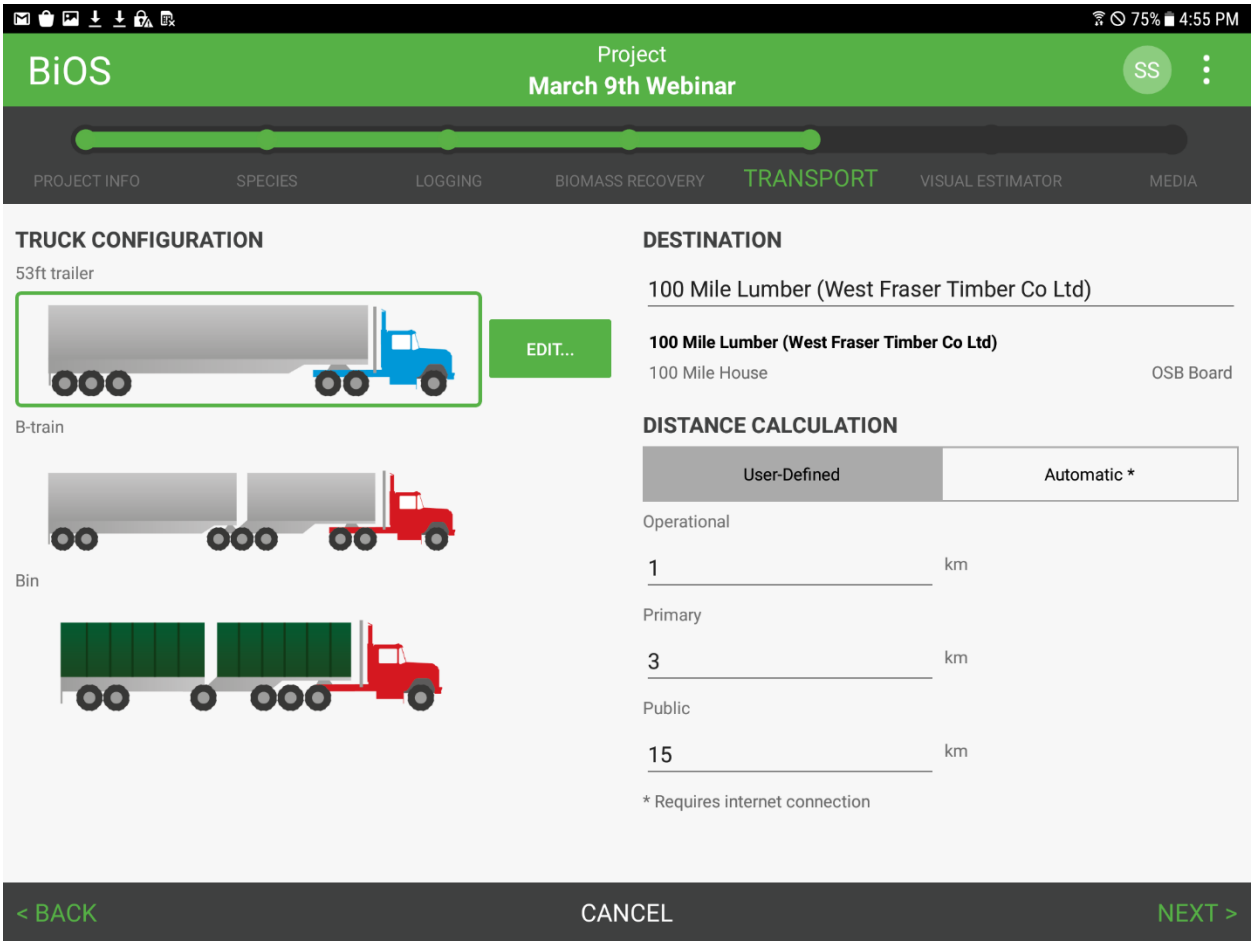
If you are finished with the biomass recovery page, hit Next in the bottom right corner and the App will take you to the Transport Page.

This ends our 4th video.

In the next video we will look at populating the Transport Page.

Video 5 – Transport Page

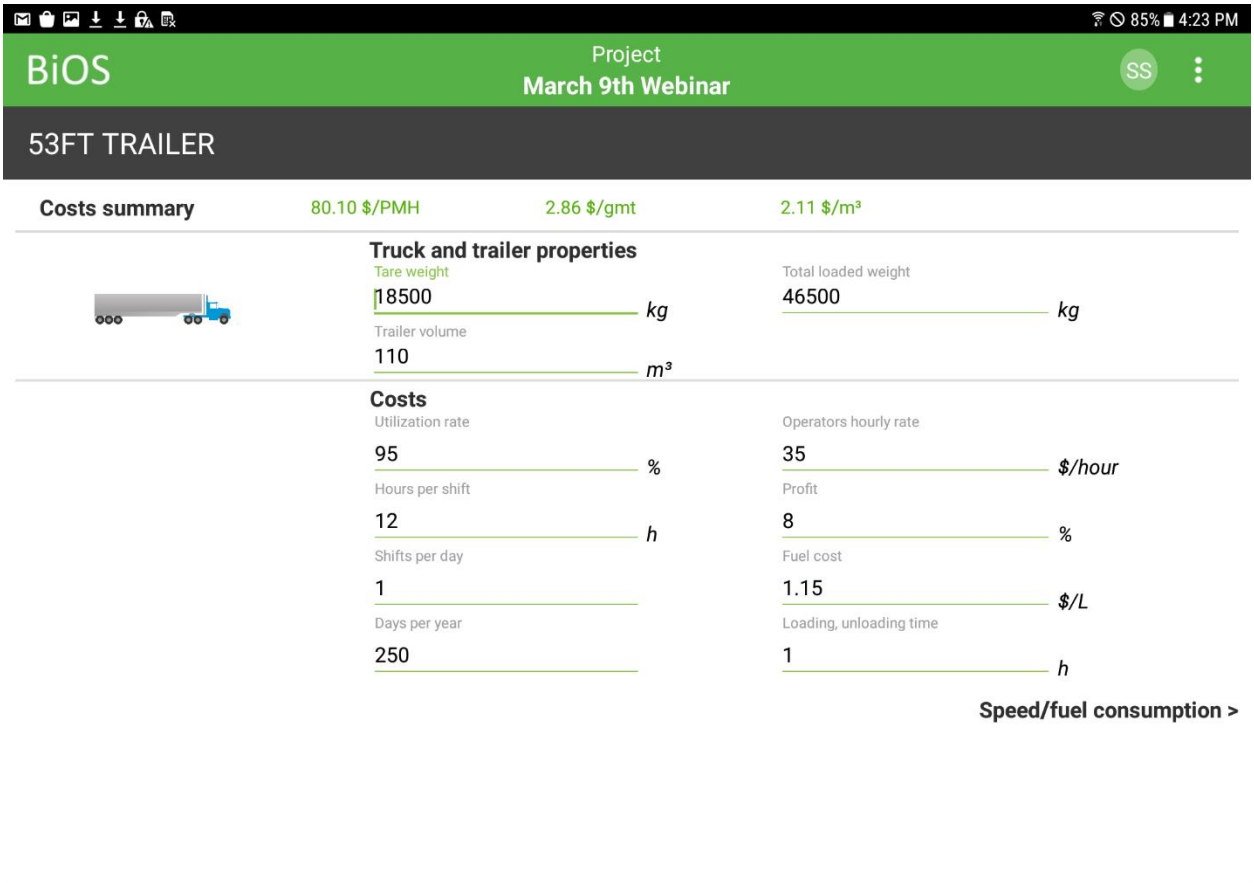
Hello everyone and welcome to the fifth of seven BiOS tutorial videos. My name is Stu Spencer and I’m a senior researcher at FPInnovations. In this video series we are working through a mock up scenario with the BiOS App, providing step by step direction to assist potential users. If you have not yet watched the first four videos, I would highly recommend you do so first.



On the left side of the page, there are 3 truck configurations to choose from. The first is the 53ft trailer, typically a walking floor. The second side is a B-train configuration, with more capacity than the walking floor. And the third is a bin truck, with less capacity than the 53ft trailer and commonly used in areas with steep terrain, like coastal BC.

To choose a configuration, simply tap the graphic. An edit button will appear which will allow you to manage the variables of your truck configuration. We'll go there now to have a look.

Change to Edit Page



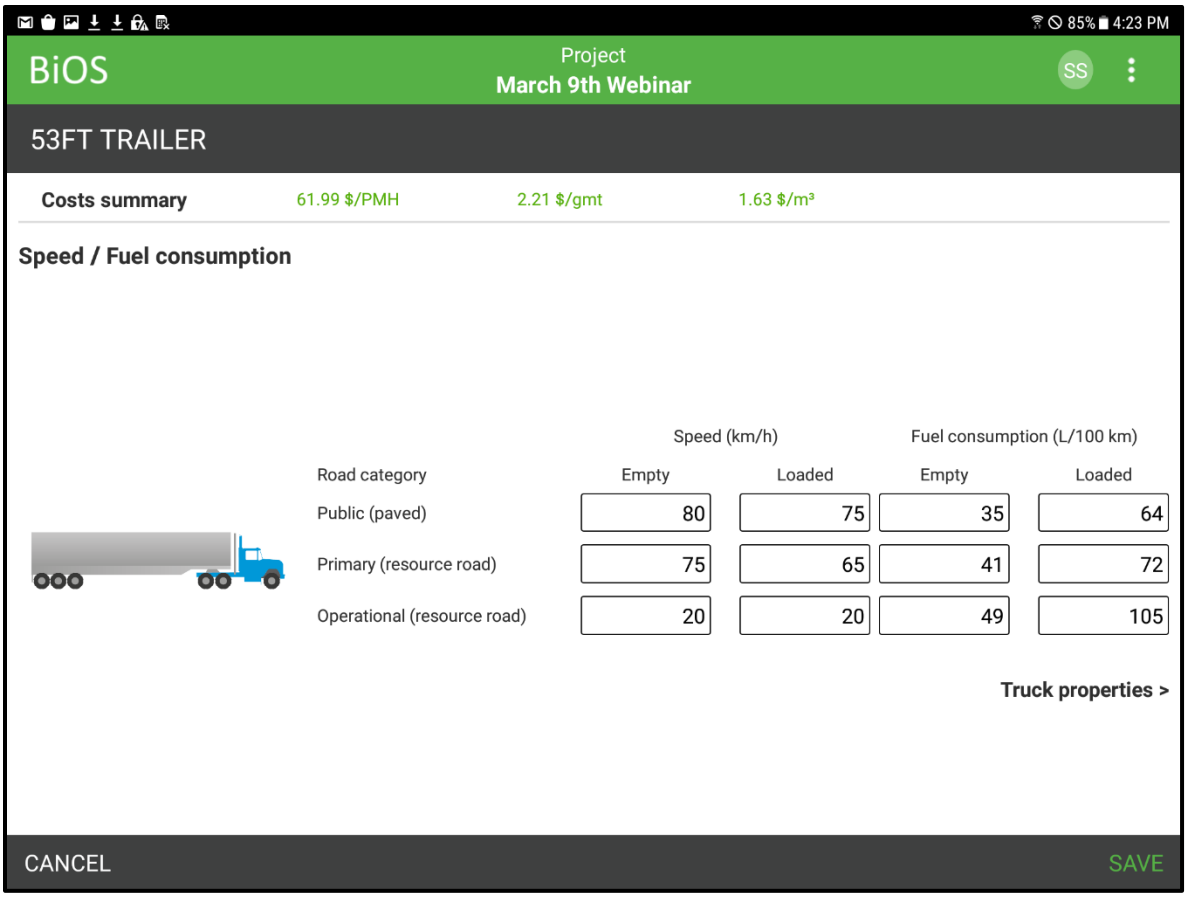
Like with the chipper and grinders on the Biomass Recovery page, the truck configuration are populated with FPInnovations default values but also like the chipper and grinders, you can change the values to better represent your operation.

In the truck and trailer properties section you can change the tare weight of the truck, the maximum loaded weight and the trailer volume.

And like in the biomass recovery edit page, you can change utilization rate, hours per shift, number of shifts per day, number of days per year, operator rate, fuel rate and profit. Different from the biomass recovery page is the loading and unloading time. This is an aggregate of the average time to load and unload your trucks and is used to create a cycle time for the transportation part of your operation.

Another feature of the edit transport function is the ability to change road speeds and fuel consumption. Simply tap the 'speed/fuel consumption' words near the bottom right side of the page.

Tap 'speed/fuel consumption'

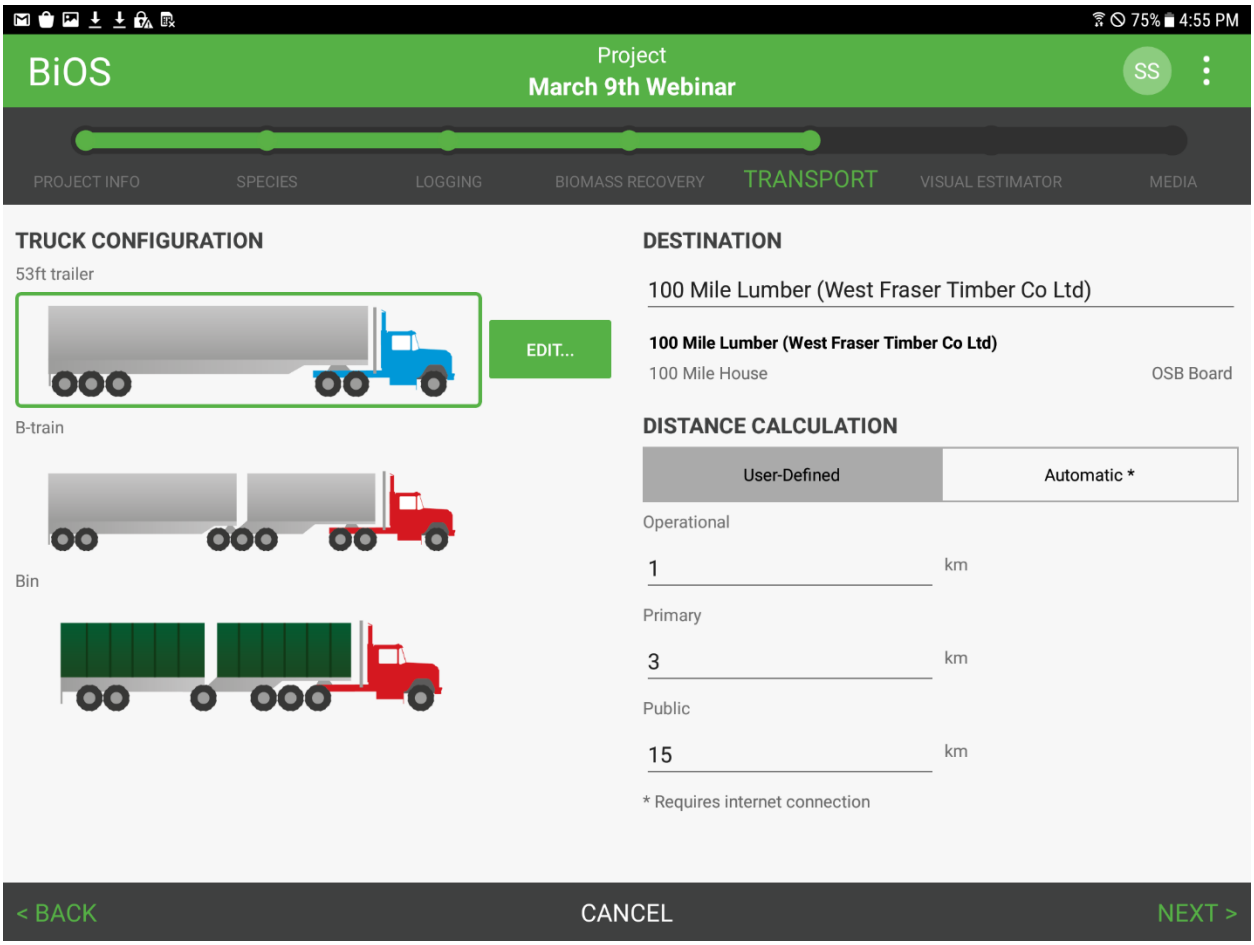


The speed/fuel consumption edit page is based around three different road types. The first is ‘public roads’. These are paved roads and include highways and secondary roads. The second road type is ‘primary roads’ which are larger gravel roads such as larger Forest Service Roads. And lastly, ‘operational roads’, which are the equivalent of a cutblock road.

For each of these road types, you can change the empty and loaded speeds. You can also change the fuel consumption, in litres per 100 kilometres, for empty and loaded trucks, on each of the road types.

When you are finished making changes in either of the edit pages, tap ‘Save’ and you will be directed back to the transport page.

Tap ‘Save’



Now back at the transport page, I'll show you the Destination section and the distance calculator.

To choose the end destination for your product, simply start typing the name of the end user into the field and in most cases it will autofill. If your end user is not in the list, you may need to write the whole name out.

If you are connected to the internet and all of the roads are present in Google maps, the distance may auto-populate. If it does not auto-populate you will need to add the distances for the three road types manually. In many cases you can measure some of the road distances in Google earth, or you may wish to drive the route and record the distances with your odometer.

After the end destination and road distances have been entered, you can press 'Next' to go to the Visual Estimator Page.

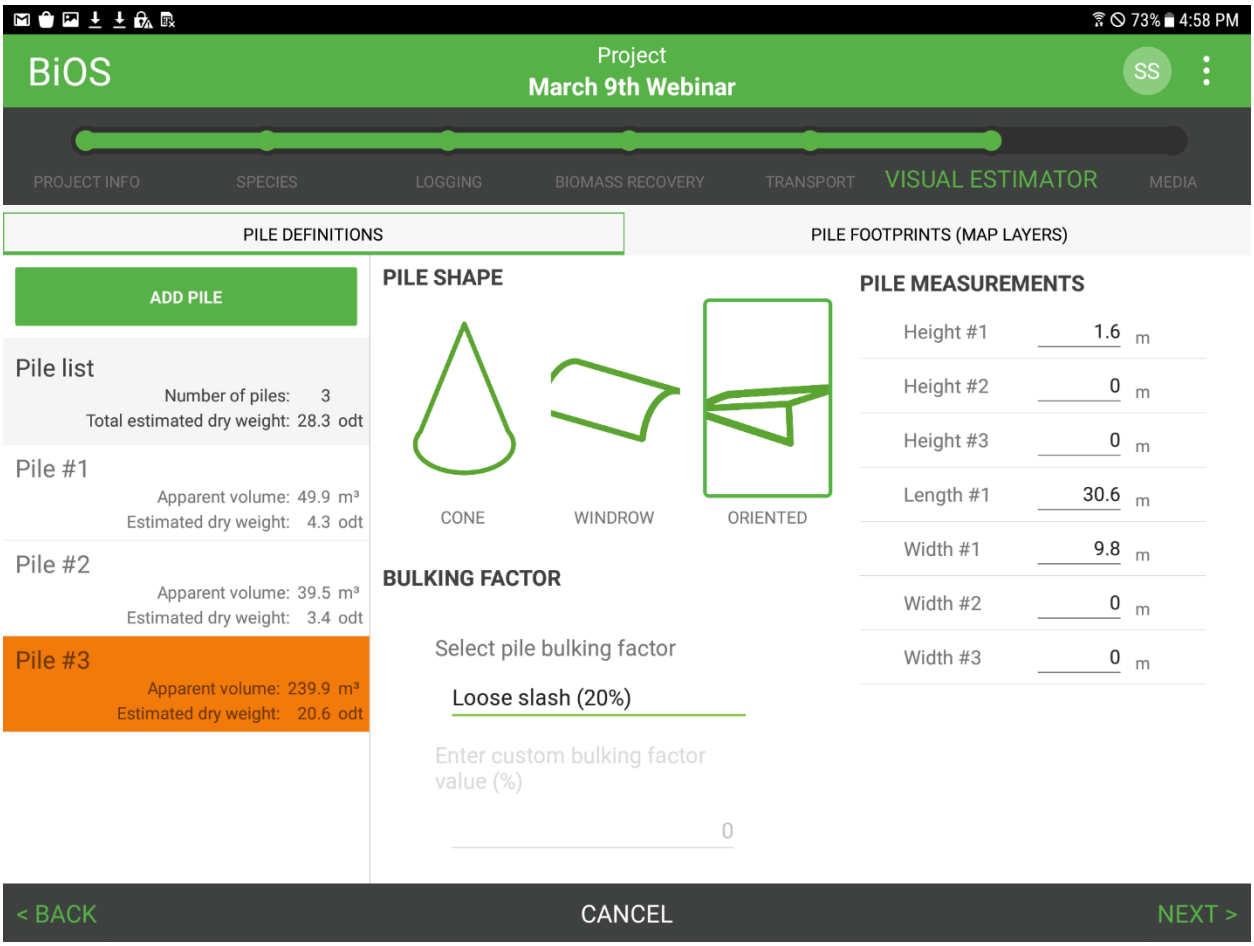
This ends our 5th video.

In the next video we will look at the Visual Estimator page and all of the features associated with it.

Video 6 – Visual Estimator Page

Hello everyone and welcome to the sixth of seven BiOS tutorial videos. My name is Stu Spencer and I'm a senior researcher at FPInnovations. In this video series we are working through a mock-up scenario

with the BiOS App, providing step by step direction to assist potential users. If you have not yet watched the first five videos, I would highly recommend you do so first.



In today's video, we're going to look at the Visual estimator page. This page is purely optional and not filling it out will not affect your report other than leaving one output in the report empty. It does not contribute to the calculations in any way, but is simply a means of reality checking what the App produces as an output volume.

In simple terms, with the visual estimator you can determine total biomass in the residue piles by entering pile shapes, pile dimensions and a bulking factor. It usually will come close to the estimated volume forecasted by the App using its allometric equations. However, visually determining bulking factor, or pile density, is near impossible to determine. At this stage of development, the estimator should not be used to forecast absolute volumes.

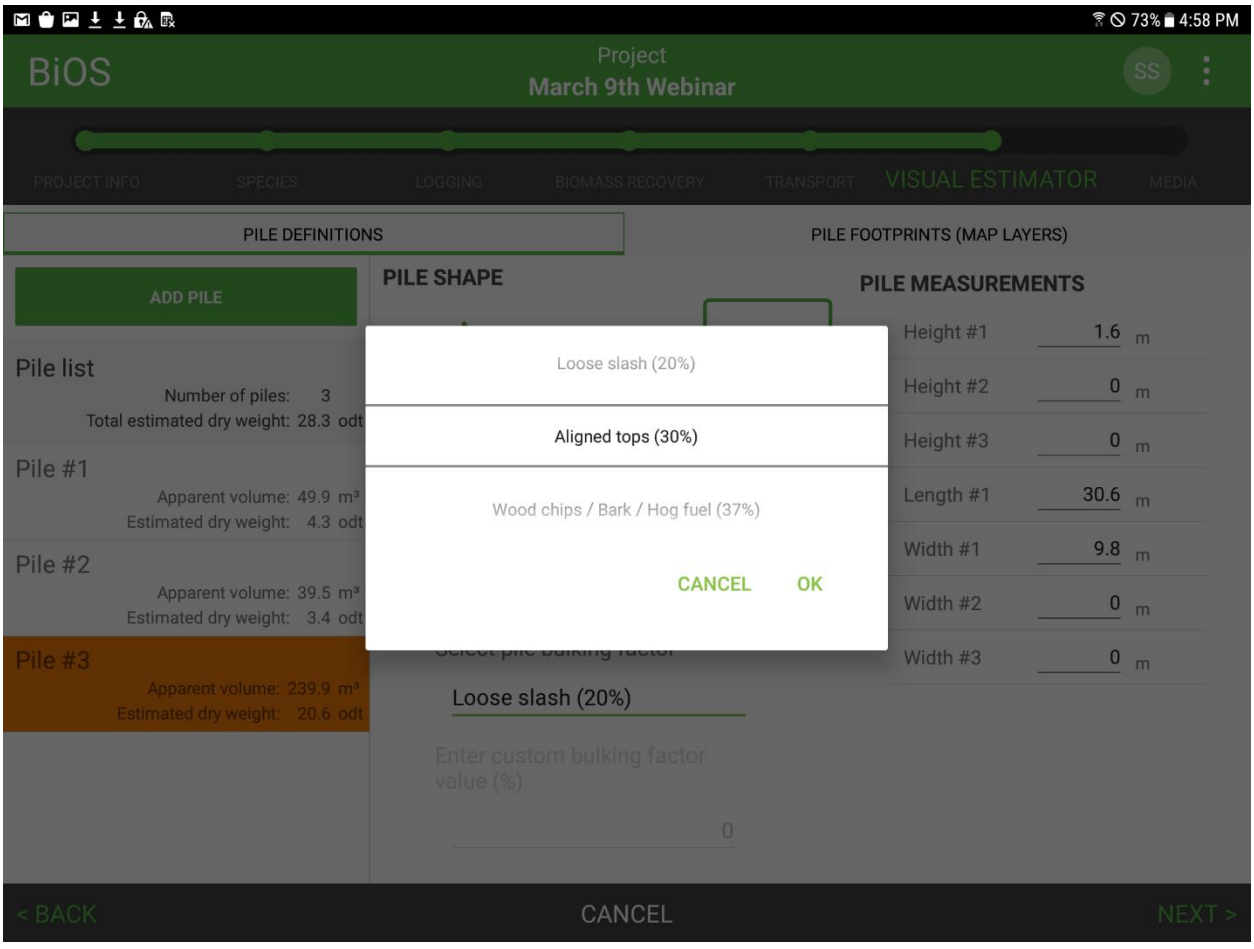
The estimator has two parts, the pile definition page and the pile footprint or map layers page. Let's start with the definitions page.

To begin, you click the add pile button near the top left of the page. This will create a pile and then you will need to pick a pile shape. There are three to choose from, a cone or haystack shape, a windrow shape, or an elongated cone, and an oriented pile shape, which resembles a wedge or a log deck.

After picking the pile shape, enter the piles dimensions. Multiple entries are possible for height, radius and width because residue piles are rarely perfectly formed into on of these shape and dimensions usually vary within piles.

After entering the bulking factor, the user needs to choose a bulking factor from a list of for options, or if the user feels that none of the pre-set options are representative, they can enter one of their own choosing. Bulking factor is expressed in a percentage which represents the solid volume of the fibre within the pile divided by the geometric or apparent volume of the pile. For example, with a 20% bulking factor, if you had a pile that was 10 cubic metres apparent volume, you could expect that 2 cubic metres of solid fibre could be found within it.

There are five pre-set choices of bulking factor: the first is loose slash at 20%. The second choice is aligned tops, where are all the pieces are roughly parallel and commonly found in oriented piles. The third choice is wood chips, bark and hog fuel at 37%. The fourth choice is decked roundwood at 60% and the fifth choice is 'user defined value', which you'll choose if you wish to enter your own value below.

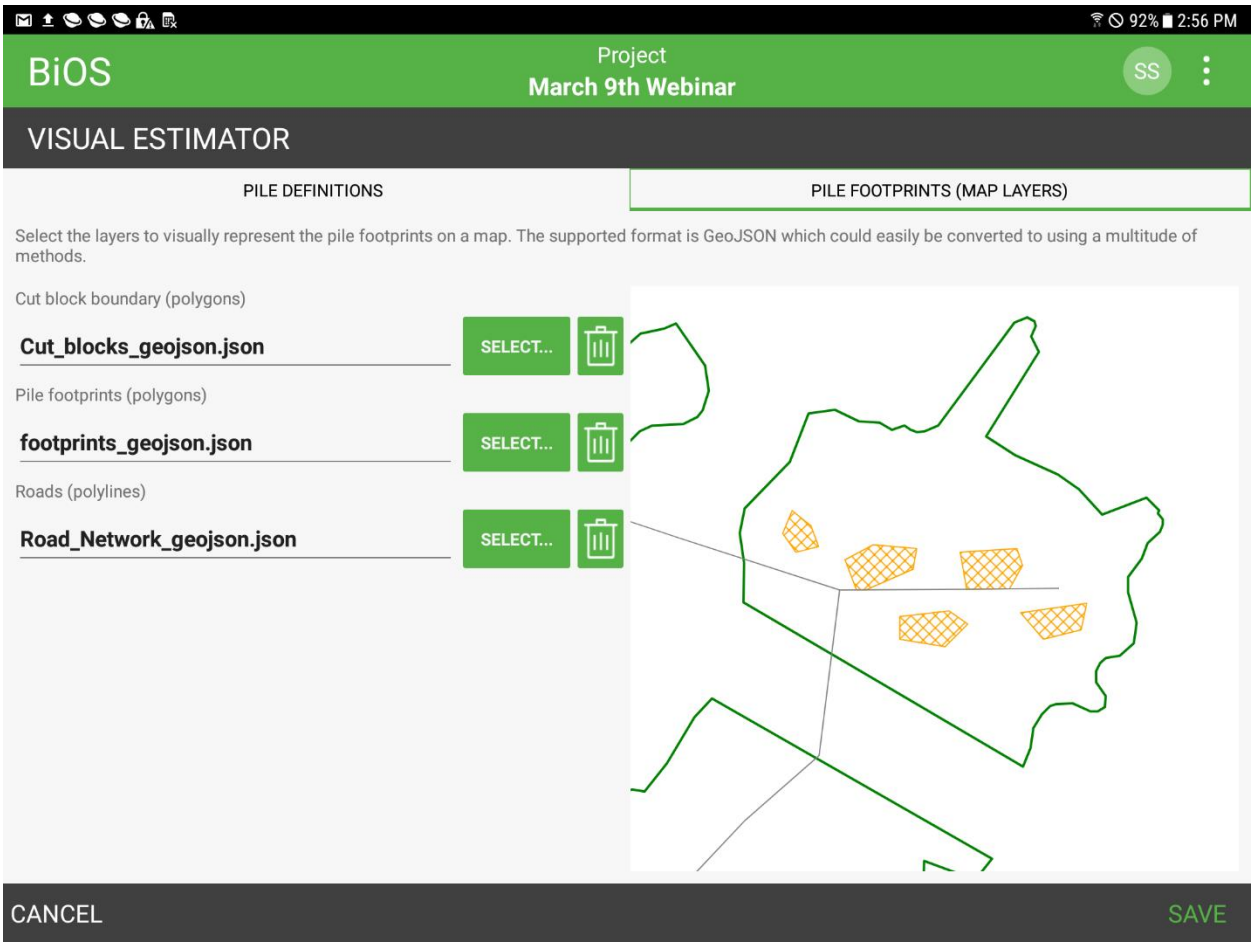


You can enter as many piles as you wish and the App will aggregate the total weight, in oven dry tonnes at the top left under the heading 'Pile List'.

The other page in the visual estimator is the Pile Footprints page. To access it, simply click on the header that says Pile Footprints (Map Layers).

Click Header

On the pile footprints page, you can enter shapefiles for the cutblock boundary, the road network and the pile footprints. These shapefiles will then be used to create a map as seen on the left side of the page.



The shapefiles will need to be in the JSON format and are easy to convert from other shapefiles formats.

After converting your files, simply click the select button and choose the files from a folder on your tablet. If you choose the wrong file, or wish to change the file, simply hit the garbage can icon and replace with the new file.

When you are finished adding your files, tap the 'Save' button and if you are finished with the estimator, tap 'Next' in the bottom right to go to the Media page.

This ends our 6th video.

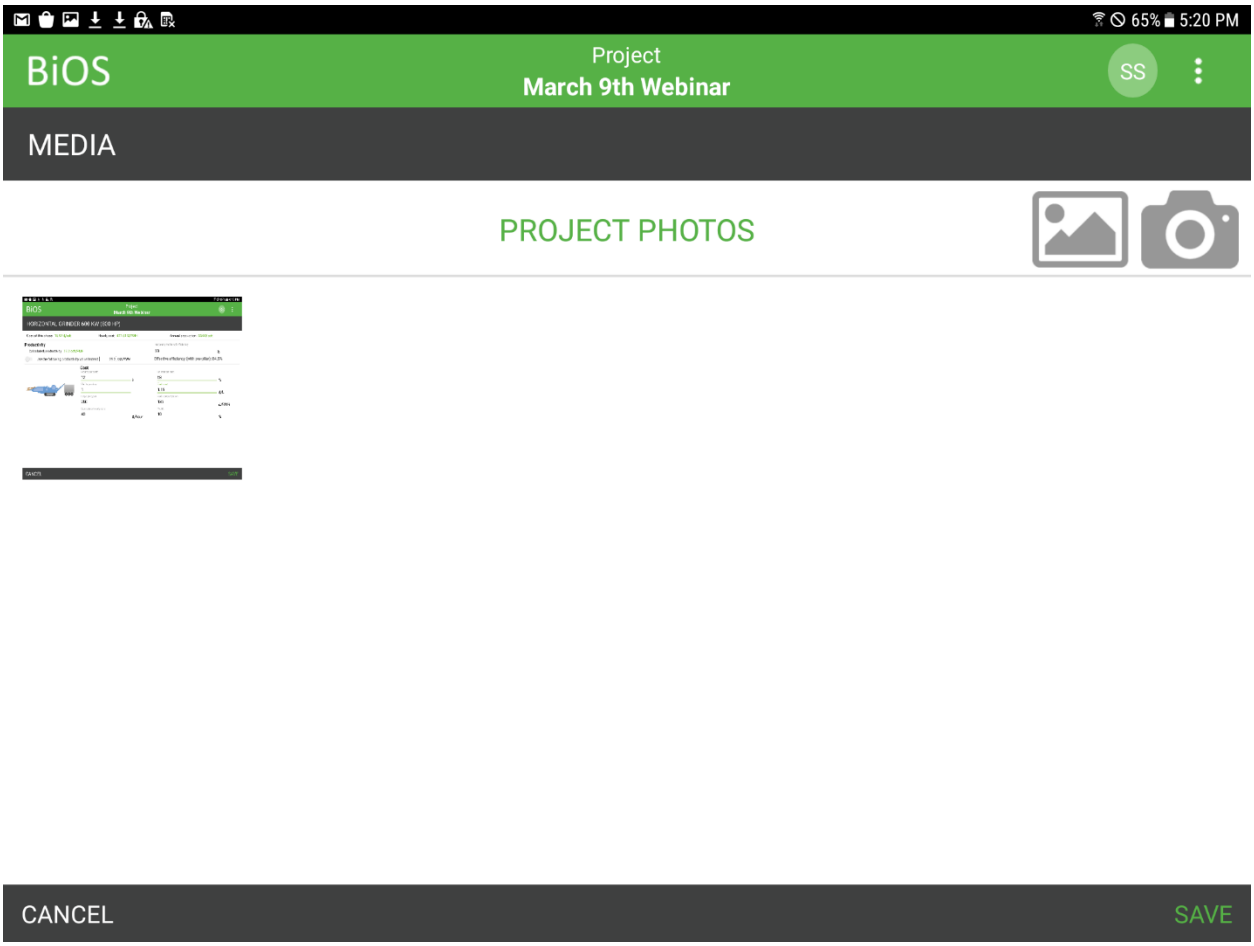
In the next video we will look at the Media Page, the BiOS Report.

Video 7 – Media Page, BiOS Report

Hello everyone and welcome to the seventh and last BiOS tutorial video. My name is Stu Spencer and I'm a senior researcher at FPInnovations. In this video series we are working through a mock-up scenario

with the BiOS App, providing step by step direction to assist potential users. If you have not yet watched the first six videos, I would highly recommend you do so first.

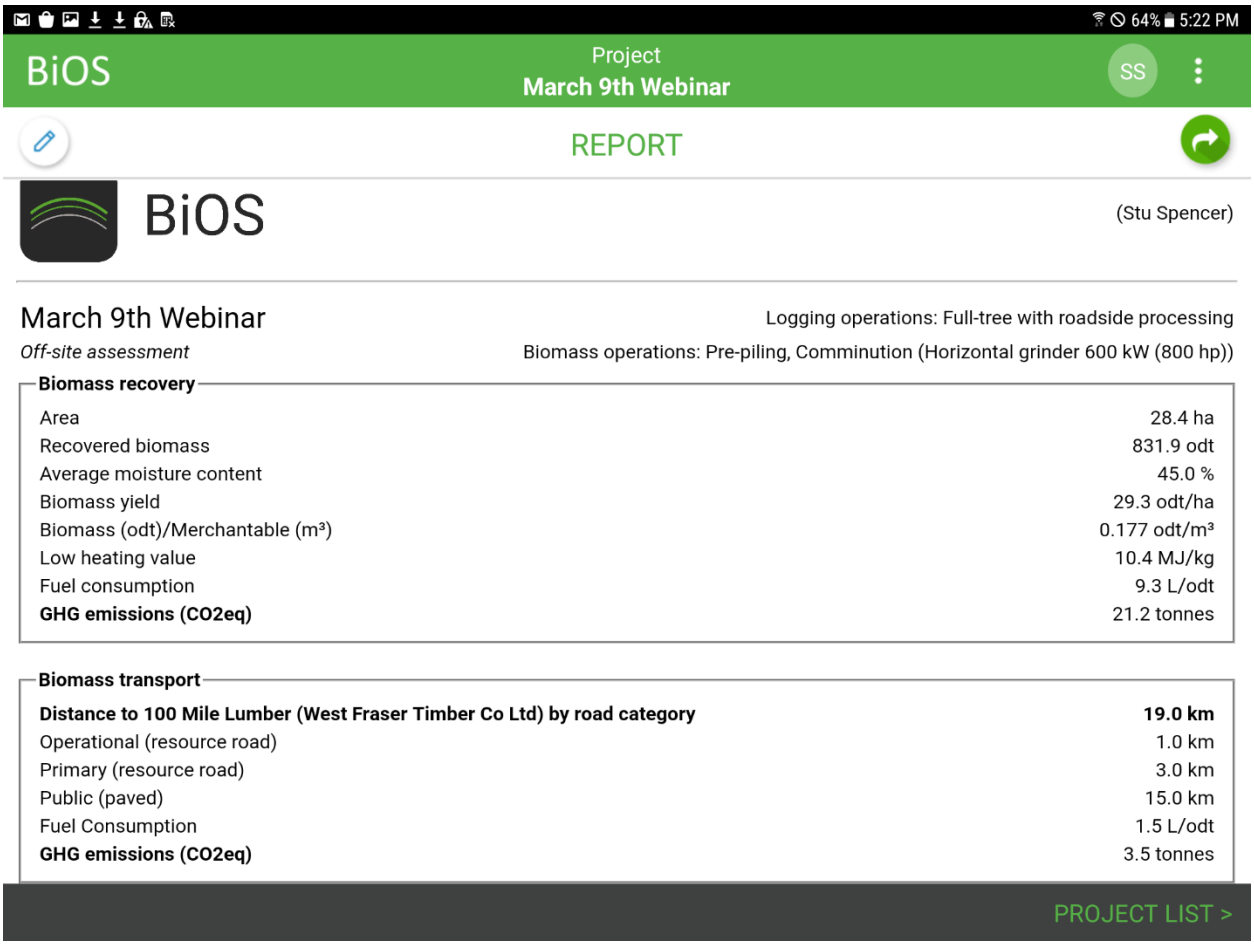
So in this video we'll begin with the media page. With the media page you can take and store pictures while in the cutblock or add maps from outside sources.



Tap 'Save' when you are finished with the Media page and the App will then generate the BiOS Report

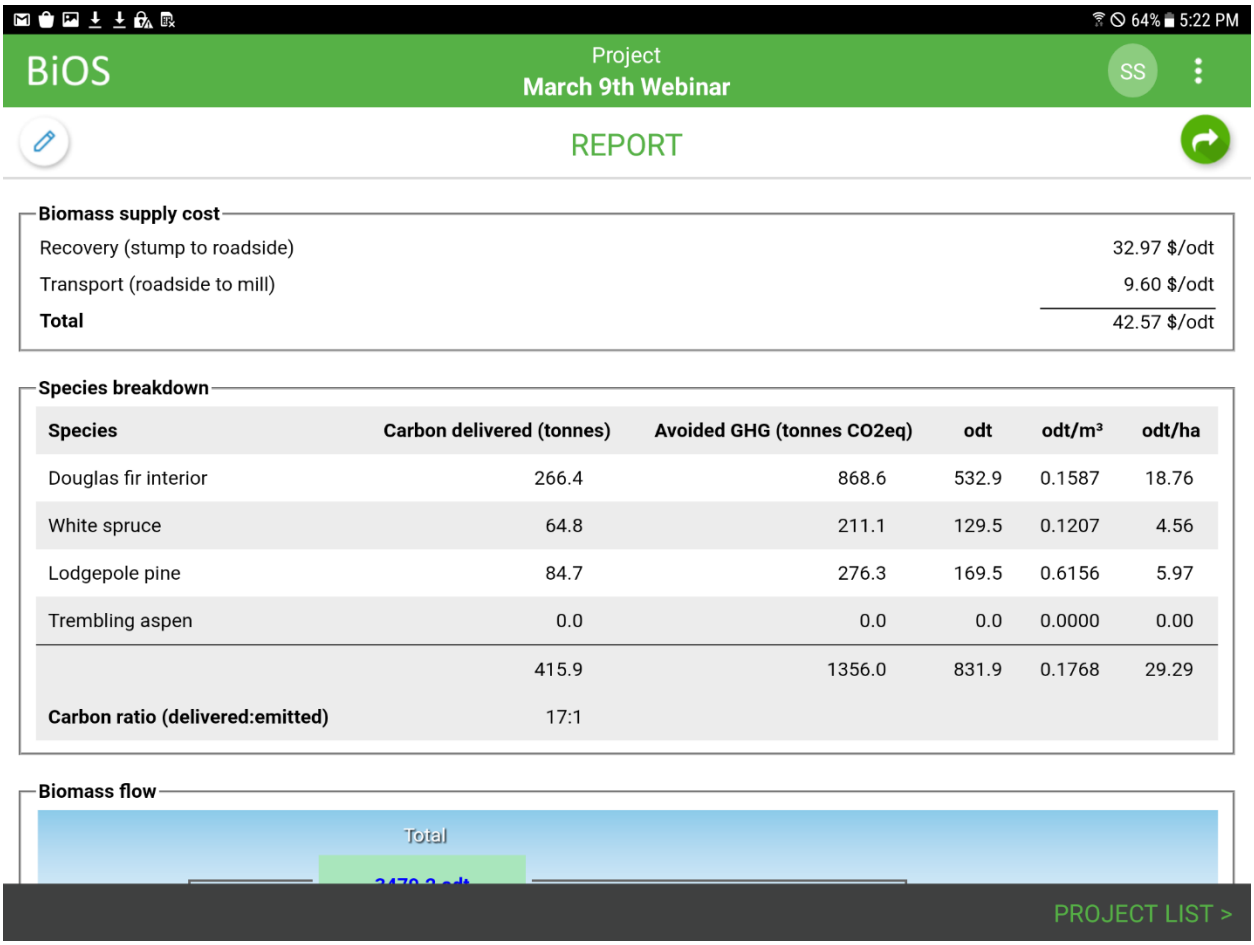
Tap Save

The BiOS App report is broken into five sections. I will go through each of them and then give a short demonstration of Edit and Export functions.



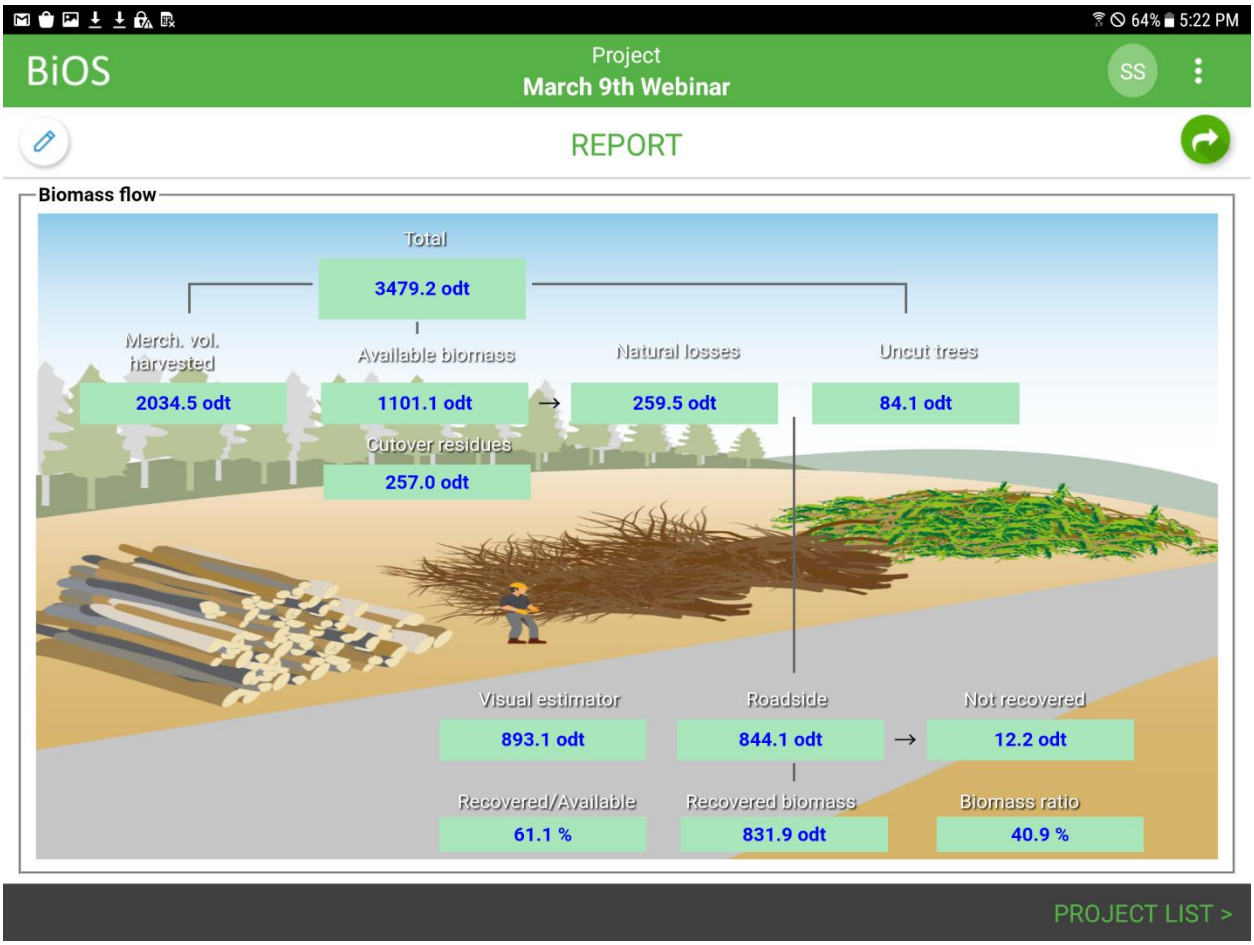
The first section in the report is the Biomass recovery section. This section summarizes: the block area in hectares, the total recoverable biomass for the cutblock in oven dry tonnes, the average moisture content of the feedstock, the biomass yield in oven dry tonnes per hectare, the amount of biomass in oven dry tonnes per cubic metre of merchantable volume, the heating value, fuel consumption for the recovery phase in litres per oven dry tonnes and the greenhouse gas emissions for the recovery phase in CO2 equivalent tonnes.

The second section of the report is the Biomass Transport section. This section will summarize the distance to the end user in total and for each of the road types. It also summarizes the fuel consumed to deliver the feedstock to the user and the greenhouse gas emissions for delivery, measured in greenhouse gas equivalent tonnes.



The third section summarizes the costs associated to the recovery and transport of the feedstock the end user.

The fourth section, called Species Breakdown, summarizes the weight, in oven dry tonnes, the harvested weight per cubic metre and the weight per hectare by species. It also summarizes the amount of delivered carbon and the amount of greenhouse gas created during open burning by species. Lastly, this section provides a carbon ratio, which compares the volume of greenhouse gas delivered versus the amount of greenhouse gas created to harvest and transport the feedstock.



The last section produced in the report is the biomass flow diagram. I will go through the boxes in the flow diagram and explain what each of them means. At the top centre of the flow diagram is the Total box, this represents all of the fibre in the cutblock, including merchantable volume and non-merchantable fibre. Non-Merchantable fibre includes all the branches, needles, bark and pieces that are too small to meet merchantable specifications.

The box on the farthest left side of the page displays the projected merchantable fibre that will be harvested in the primary harvest. This number is deducted from the total fibre volume, and you are left with 'Available Biomass' and 'Natural losses' and 'Uncut trees'. Natural losses include the needles and leaves that fall off between the primary and secondary harvest. If the secondary harvest occurs shortly after the primary harvest, this value will be zero. The Uncut trees box displays the amount of volume left standing. If you enter 100% harvest in the species page, this value will be zero.

Of the available biomass value, a certain amount of the volume will be left in the dispersed area of the cutblock. The cutover residues usually includes all of the small pieces that are too small or too awkward to collect and haul to roadside.

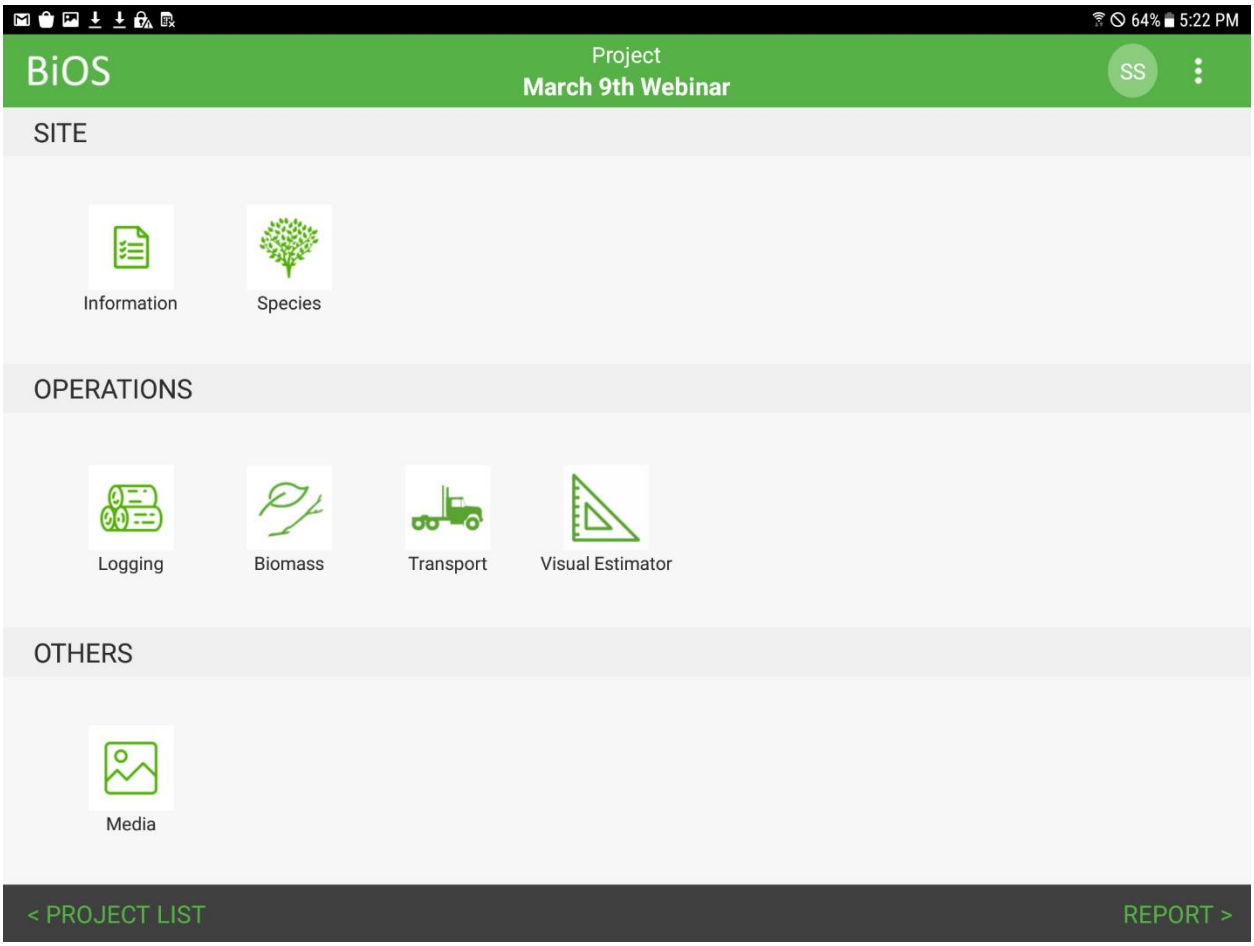
When the cutover residues are deducted from the available biomass you are left with the value in the roadside box *(Highlight box).* Of the volume that makes it to roadside, a small amount will not be harvested. This value is influenced by the recovery technical efficiency value in the edit page for the biomass recovery. When the 'not recovered' volume is deducted from the 'roadside' number you are

left with the ‘recovered biomass’ value. This is the amount of biomass the operator can expect to harvest.

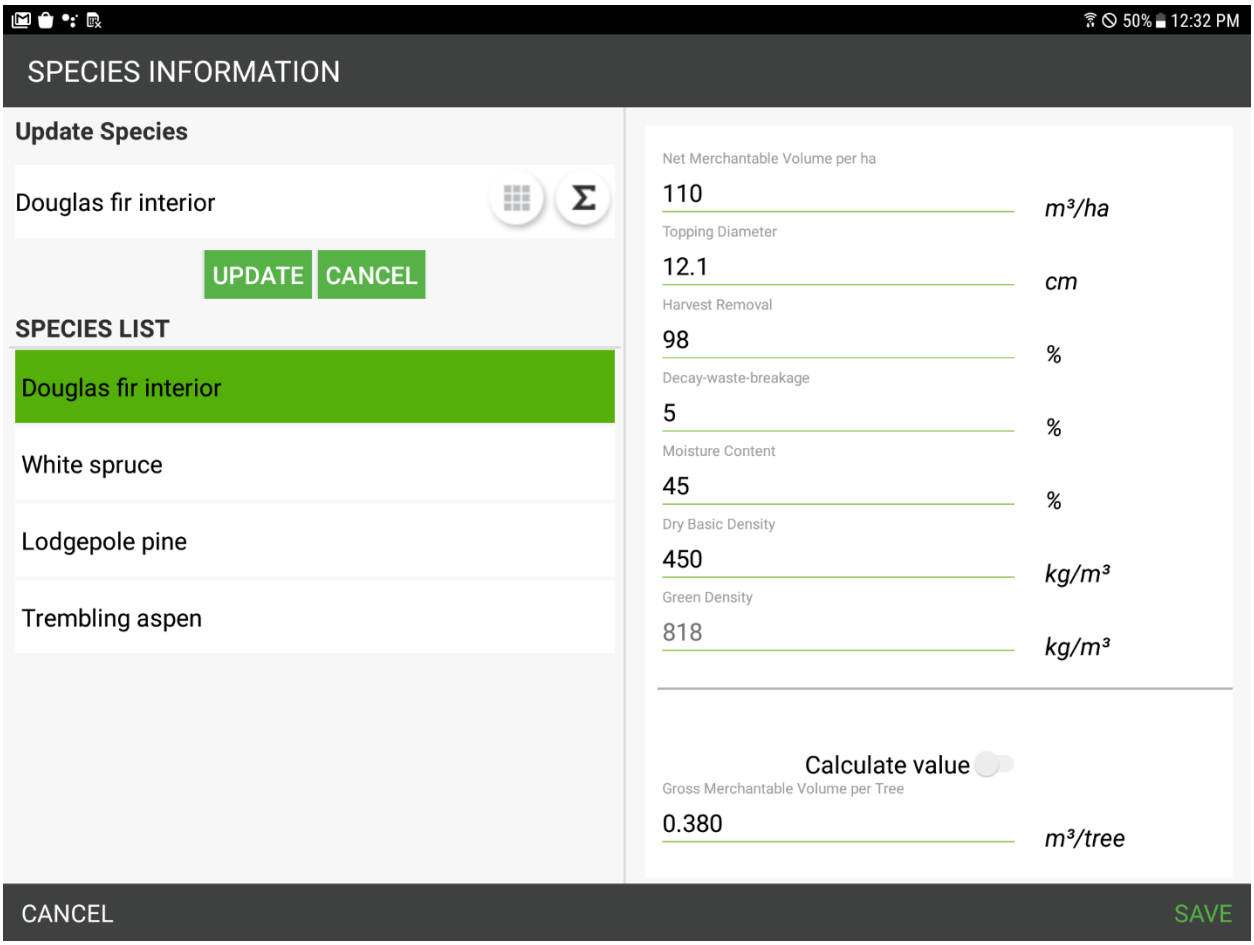
Beside the Roadside box is the summary of piles entered on the visual estimator page.

To the left of the ‘recovered biomass’ is the ‘recovered/available’ box. This value is based on the recovered biomass divided by the available biomass + the natural losses. To the right of the recovered biomass is the biomass ratio. This is the recovered biomass divided by the merchantable volume harvested. These values are useful for comparing different cutblocks.

That finishes the summary of the reports and I will now go through how to edit the project and export the report.

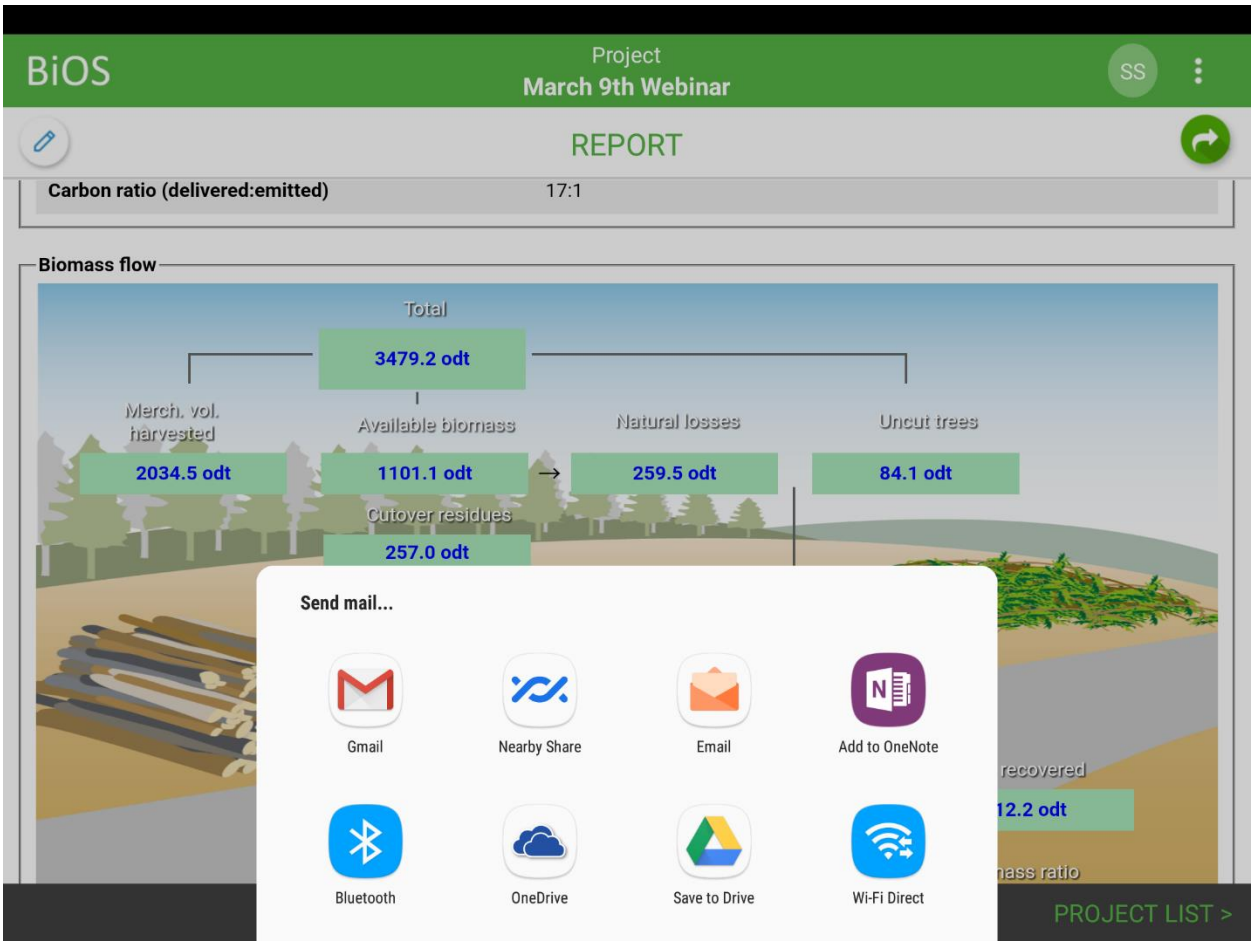


To edit the report, simply tap the little blue pencil icon on the top left of the screen. After you tap, you will be taken to the current page and you will be able to re-enter any of the entry pages. If you make changes to these pages, the report will be re-generated. On a side note, if you wish to change the moisture content for your species, you will need to go back to the species page and change the moisture content from the default value of 45%.



After changing the moisture content, or any other field, tap update and then save.

To export the report, tap the green and white arrow icon on the top left of the screen above the report.



After you tap the button you will be given a wide range of options for exporting. This report will include all of the report section in one document.

That ends our video tutorial series. If you have questions about the App, please feel free to contact me, Stu Spencer @ Stuart.Spencer@fpinnovations.ca.