

Transcript

September 26, 2024, 9:59PM

BS

Bouboulis, Sarah (DNREC) 0:23

Welcome everyone.

We'll start at 6:00. One minute.

OK, we're gonna go ahead and get started.

Welcome. This is a Community information meeting for the economic analysis for shoreline management.

I'm Sarah baboulis.

I'm a planner with our shoreline and waterway management section.

Next slide, Joanna.

Oh. Oh, too many. Oh, OK.

If you need.

Captions during the meeting.

For more accessibility, it's available both on your computer or phone, so if you're on the computer, you can touch the three buttons there at the top language and speech and turn on live captions.

And if you're on your phone, there should be 3 little dots at the bottom of the screen there.

And you can click on live captions. Hopefully that's helpful.

They're pretty accurate.

They're actually pretty good, so.

Next slide, if you have questions or comments during the meeting today, you can just enter them straight in the chat and or you can send an e-mail to shoreline_questions@delaware.gov.

We've had some people some problems with the chat in the past, so either way works.

We have moderators with us who will be gathering the questions and putting them into a central location for us so that we can review them at the end of the presentation.

So either way works.

Chat or shoreline questions at delaware.gov.

All right. So we're here tonight to talk about the economic analysis for shoreline

management.

We're going to present the results of the economic analysis study that was completed and we're going to address your public questions and comments.

At the end.

So the purpose general purpose of this meeting is one.

Next is to just we're going to briefly present the background information, the project methods and outputs of the of the analysis. We did go a little more in depth to these.

Prophecies on our first meeting.

And so we're gonna be a little less on this so that we can focus on the results.

But those slides on the methods and outputs.

Is still available on our on the project website, so you can still access those.

Next and then our IEC and what toll group will present the results of the analysis and these results are really was going to be used to inform future decision making on any sort of cost share that takes place for beach nourishment.

And finally, we will discuss the next steps, what we do with these results and how we kind of move forward with them.

And then finally, we'll answer your questions and comments.

And at the end of the meeting.

In a couple weeks we will have a transcript of the meeting and these slides available as well and I will probably send an e-mail out to everyone with the link to that when it's available. And I also just wanted to let everyone know that throughout this whole process.

Of this study, we have had a work group that we've worked with. We've met several times with them and collected input from them as well. Members of the groups you see on here. Several other sections of Denrec.

Our consultants on the project.

Different Bay and ocean.

Stakeholders and and representatives of those.

Organizations and we will continue to work with them after this to have a final meeting to go through the.

The to get to the final report.

Next.

And finally, just a quick agenda.

We're going to.

Have discuss the introduction project meeting those sorts of things with our denrec staff here, and then the present presentation of the study findings will be from IEC and Woods Whole group and then I'll come back to talk about our next steps and then we'll end with lots of.

Time, hopefully for questions.

Before we're done, all right.

And so now I'm going to throw it over to Joanna French, who is our acting program administrator for the shoreline and waterway.

Section to give a little introduction to the project.

FJ

French, Joanna (DNREC) 5:35

Alright, thank you everyone for joining us tonight.

For our public meeting #2, as Sarah said, we had a public meeting about the economic analysis for shoreline management in January and this is our second and final public meeting on the subject.

Just wanted to add a I'm sorry my promise to slides.

Just wanted to talk to you a little bit about the purpose and the benefits of each nourishment and why we do it. The 1st and probably the most important is for storm protection.

Sure. We want to make sure that.

Infrastructure is protected and that's why we do beach nourishment. Second purpose and benefit is for recreation and tourism.

It's a big industry, especially, you know, at the beach. Everyone loves to go.

And then kind of on a a different type of aspect, there are or there can be some ecological benefits such as the protection of coastal habitats that does occur in some beach darn projects.

Alright, Delaware has been doing beach erosion projects since the 1950s.

We've been doing this for a for a very long time and we've been doing placing sand on Delaware Bay as well as the ocean beaches.

As everything the cost of stuff goes up and the cost right now of nourishment projects are increasing to a level that we don't think we will be able to sustain the B stars from projects at the level that we want to unless something changes.

A little bit of history about each nourishment in Delaware for the Delaware Bay beaches. We have done 71 nurseman projects since the 1950s. And also we have done 59 nourishment projects for the Atlantic Coast beaches since the 1950s. We

have placed over 25,000,000.

Cubic yards of sand on Delaware beaches.

A little bit about the rise in cost of beach nourishment in Delaware since the 1950s.

The state of Delaware has paid \$68 million on urban projects.

One of the reasons that the cost of a nourishment project has increased was that in 2000, the state of Delaware was required to call share with the Army Corps.

Delaware is considered the non federal sponsor and they had to start paying for large federal nursing projects along the Atlantic Coast.

As far as call shares nationally nonfederal call share, which in our case is the state is often divided amongst the state and local entities.

Try to talk a little bit about the different fundings that the state of Delaware gets for these nourishment projects. The first funding source is the state lodging tax.

This is also referred to the accommodations tax.

And the state lodging tax is an 8% tax that is placed on the rental of hotels, motels and tourist homes.

Additionally, very soon we will also include tax on rental properties, which includes your VR.

Bo is another rental type properties.

For planning purposes, we usually say that we will have about 3 1/2 million dollars from accommodation tax.

I think this year we're kind of on par to be getting around \$4 million.

If you look at the pie chart on the right, you'll see how that 8% is divided up.

The large abortion, 5% goes to the state general fund and then 1% goes to each of the following, which is the State Tourism Office to the county or to beach preservation, which is the account that we used to do beach nourishment projects.

Second source of funding are a bond bill appropriations, as you can kind of see from the chart below, this can be a hobby. Highly variable revenue stream.

It all depends on what the the state budget is and what the forecast are for revenue for that year.

On average, we kind of plan for three and a half \$1,000,000 per year from this source three and a half million is actually below the sources, the source that we need or the amount that we need.

And as you can see from below the.

Level of funding is not really guaranteed.

We had high funding in 2020, two \$16,000,000 and then other years such as 2012

and 2013. We did not receive any funding.
Great. And that actually brings me to the end of my presentation.
I would like to pass it on to our consultants IEC and Whitel group.

BS **Bouboulis, Sarah (DNREC)** 10:26

You're muted, Mara.

MF **Maura Flight** 10:28

Hello, my name is Mara Flight.

I'm an economist and I focus on environmental and resource economics.

I'm a principal at industrial Economics incorporated, based in Cambridge, MA, and my work generally focuses on economic dimensions of natural resource and Land Management decisions frequently in the context of species and habitat management in coastal resilience, and I am the project manager for this work.

And working with a broader team of consultants at IEC.

And Edwards, whole group and Doctor Ben Blatchley will be presenting our preliminary results today.

I'll pass it along to him.

BB **Ben Blachly** 11:10

Thank you, Maura. Hi, everyone.

Thank you for coming out tonight and giving us the opportunity to present these results.

As Marc said, my name is Ben Blatchley.

I'm an economist at IUC, so I performed the economic benefits piece of the analysis, and we also partnered with Woods Hole Group, who performed the coastal modelling piece.

The goal of the presentation tonight is going to be to convey the findings from our study, but I'll back up just a bit at first to remind you how we got here.

So what we were asked to do, and the specific research questions that guided our work, then I'll turn it over to Kirk from Woods Hole Group who's going to talk through his process for modelling how the nourishment projects affect coastal processes and also what he found there.

I'll then take back over and talk about how we translate what Kirk tells us about how the projects perform into an analysis of.

Beach nourishment benefits and I'll talk through at a high level what we found in terms of those benefits. And finally, I'll present the ultimate cost share recommendations.

So a quick reminder of our objective here.

Denrech engage with us just over a year ago to provide data and analysis to support development of equitable cost share ratios.

They asked us to look at 11 project sites along the Bay and ocean coasts and to develop cost share recommendations that are equitable in the sense that the groups receiving the benefits pay for the policy in proportion to the benefits that they receive. So, for example, if we

Find that a particular group is receiving 50% of the benefits.

We would go ahead and recommend that they shoulder 50% of the cost burden.

This is a good time to point out that our recommendations, though, do not constitute a cost share policy.

Ultimately, any cost share policy that follows from the study might and is likely to take into account other factors in addition to just the recommendations we provide based on distribution of benefits.

We also note that this analysis is not a cost benefit analysis of nourishment. A cost benefit analysis would be focused on whether the benefits outweigh the costs.

Here what we're focusing on in on is the distribution of benefits across various populations.

Finally, it's important that we capture all of the major benefits here, and we're gonna do so over a 30 year time frame.

The reason for that is because some of the benefits change over time as the beach kind of naturally evolves and Kirk will talk a lot about that.

Basically what we're doing here is comparing 2 hypothetical Futures, 1 where beach nourishment stops tomorrow, and another where the beaches are regularly nourished over the next 30 years.

So here are the sites that we're focusing on. The focus here is on sites that have both public access and development and that gets us to 11 total project sites in general.

We consider anything east of Cape Pendleton as a Bay Beach and anything to the South of Cape Pendlebury as an Atlantic Coast beach.

But there is one exception that I want to point out right at the top here.

You'll notice when we get to the results that we're grouping Lewis with the ocean beaches.

The reason is that we we think that the surrounding development. Recreational profile and just the overall character of that beach more closely resemble the ocean beaches than the the other remaining set of Bay beaches. Next, I'll talk through the following research questions that we use to guide our work. So first, how do beach nourishment projects perform across the sites in terms of from a coastal processes perspective, who benefits from beach nourishment and how much do different groups benefit? How do the relative benefits vary across sites? How do regional economies depend on intact beaches? And finally, what influences the relative social vulnerability of communities that are affected by these projects? And with that, I will turn it over to Kirk Bosma to talk through how the beach nourishment projects perform.

BK **Bosma Kirk** 15:20

Thanks Ben.

Good evening everyone.

My name is Kirk Bosma.

I'm a senior coastal engineer with Woods Hole group.

I have 28 years of experience now.

I got my master's degree from University of Delaware.

Familiar with the Delaware coastline?

I did all my thesis work on the Atlantic Ocean beaches of Delaware.

Dewey, Rehoboth, Bethany S Bethany so.

Good to be back and looking at these again.

So what?

What I'm doing here in in our role in the project was to look at the physical processes in the physics that affect the conditions at the beach, especially related to when you put beach nourishment projects in place and what happens if you didn't or stopped putting them in.

So next slide.

So we looked at a number of different design approaches that had been considered at the various beaches.

And every beach didn't include all four of these different alternatives, but we always looked at a no action alternative.

Which means let's not nourish anymore and see what happens.

But we also looked at, you know, the what has traditionally been done, what's been constructed in the past. If that continued, we looked at what the permitted.

Template of sand placement was and evaluated that and then we looked at a couple of different alternative approaches that have been presented over the past, which involves things like coastal structures integrated in the beach, nourishment, groins and things like that.

Or larger alternative approaches based on beneficial reuse of dredge material.

So there was a broad spread of of potential nourishment conditions that we we looked at to see how they would perform.

Where does the sand move?

What do they do in terms of storm damage?

Protection. Recreational. The changes those types of things. Next slide.

As Ben mentioned, we looked over this 30 year time horizon for us.

What that means is we're looking at kind of ongoing coastal erosion and nourishment performance.

So that's kind of the day-to-day changes that occur.

Obviously, coastal areas are extremely dynamic.

There's a lot going on with energy and waves and tides and winds, storm events, and so we're looking at how that all plays a role over a 30 year time period.

But we also look at this episodic condition.

So some of the biggest impacts you'll see are these storm events.

What happens when a storm hits the shoreline at each of these individual specific locations?

And we didn't just look at one storm, but we looked at a range of storms from kind of a 2% annual exceedance probability level event up to a 20% annual exceedance probability event.

So what that means is looking at big storms like.

One that has only a 2% chance of happen every year, A50 year type level return period storm.

Down to a 20% which is, you know, once every five years or kind of more of a moderate type storm in some of these beach nourishment projects work really well for small storms. But maybe in a bigger storm they don't perform as well or maybe they work.

Really. Well for the big storms as well.

So we looking across all these types of physical scenarios when we evaluate the performance of these nourishment projects. Next slide.

Part of what we did to understand what was happening again it it our approach is, is really founded.

And and and based on the physics of what happens when the ocean moves, what happens when waves come in?

What happens when you do get a storm? What happens when?

Idle currents get across the beach.

What happens during flooding conditions?

And so there's a number of models, numerical models we use to evaluate that, including the hydrodynamics. That means the where the water circulation goes.

What the waves are doing?

How the sediment moves, how the shoreline erodes.

There's a series of models we use for that. One of the foundational models we have is of the waves and hydrodynamics and storm processes in in Delaware Bay, in the Atlantic Ocean.

That's shown here.

And so we can look at those driving processes that will pick up and move sand or flood an area or drive waves into the shoreline.

And that's that's what this model is really based on.

And that's the first piece we really look at when we're evaluating these coastlines next slide.

That model isn't just run and saying, hey, that's great, it works.

We validate that model to actual observed data. So there's eleven different stations up, Delaware Bay and offshore that we validate what's happening with the model.

So we look at our model results and what those show versus the actual observational data and that has to be within a given range or accuracy before we can say that the model.

Is reasonably simulating the physics of Delaware Bay and storm events, and so you can see here.

Here's some comparisons between that model result.

Center figure there that shows the model versus actual measured data.

And then you can look at the error associated with that, which is like 5% or less which is under basically an inch in terms of water level. And then we calibrate to storms of record.

So we look at in this particular case, Hurricane Isabelle, Hurricane Sandy, to make sure the model was replicating the peak that we see during those storm events because that's what's really important what happens during the peak passage of that storm event.

So these models are all validated against actual observations.

The next slide.

We're trying to get out of this and then feed into the economic team so they can do their analysis. Is a number of different data outputs. If we just look at one specific thing like how things flood, that doesn't give you a great picture of what might be. Happening in terms of benefits of these nourishment projects.

So we're looking at a broad range of conditions or results that includes where the shoreline goes over time.

What's that shoreline position it includes?

The flooding extent and depth.

So not just. Hey, you're wet, but how deep is it in that location?

And for the Bay beaches, that includes things that happen both from the Bayside in terms of flooding and from the meaning the backside and the marshes and also from Delaware Bay on the front side, we also look at storm events and episodic coast erosion.

So long term shoreline position is one thing, but also during a storm you can imagine the beach is trying to protect itself. Some of the sand gets eroded off the dunes, impacts further inland and so we're looking at that.

Effect of storm impact as well.

And then we look at wave energy.

So what waves are coming into the shoreline if a wave interacts with infrastructure that's a little bit more troublesome than just water being there? If you can imagine.

And then we look at what the beach itself's doing both in terms of the where the sand is moving is when you put stuff down.

How does that perform?

How long does it last?

Where does it go?

It doesn't disappear, although it may seem like it does.

It actually stays in the system and moves in different locations.

So we're also looking at how the width of the beach and where it spreads to different locations.

Whether it's offshore or alongshore, it goes over time to help us understand the full benefit of these potential projects. Next slide.

So I just run through some examples of these different output types that we get from the physical models or the numerical models.

This first one here is looking at the shoreline position over time, so this is looking at what would happen if you didn't nourish anymore.

And so the blue line is kind of the current mean high water shoreline.

Shown here on Pickering Beach and then Rehoboth Beach. And then if you just stop nourishment, given the ongoing erosion that would occur due over 30 years due to just normal conditions of storm events, you would go back to that yellow position.

After 30 years.

And then if you include incorporate the state standard sea level rise projections, that makes it a little bit worse.

That gets back to the red line.

So that's one piece of information that we provide, which is where would the shoreline be in absence of absence of nourishment that provides added benefit obviously to the nursement because it's actually protecting a lot of situations and a lot of infrastructure, a lot of areas.

A habitat space, a lot of recreational space because the nourishment is there. Next slide.

Then we look at episodic storm events.

And so in addition just to that ongoing erosion, when you get a big storm event on the beach, you'll notice that, wow, we really lost a lot of material. The dune gets eroded.

Sometimes you'll lose a lot of your beach width.

It does come back a little bit over time due to the coastal processes, but we're looking at that immediate impact associated with that storm.

We use models to predict what's gonna happen there.

And so here's an example at Pickering again, where if you look on the right hand side, if we just model the beach without any nourishment on it, what we're looking for is how far back does that erosion during that storm event occur?

And again, we're looking at five year to 50 year type conditions here or 2% to 20% chance of occurrence and that red Arrow there shows basically how far back it goes without.

A nourishment project in place over time.

Next slide. And if we just look at what happens with alternative one and two, which is kind of the historical, what has happened at at Pickering Beach, you can see how much further see where that, that erosional line pushes.

So when we're evaluating that, we can say, hey, here's the additional width of beach that's protected against.

A specific storm level event.

Again, we're looking at that full distribution of storms that may occur.

Next slide.

So what that looks like more in a plan view, and this is an example for Rehoboth Beach.

So I showed you what it kinda looks in a cross-sectional view. If you're looking at the beach.

So that figure on the left, for example, shows the elevation of the beach on the vertical and then horizontal is cross shore. As you go offshore.

So those elevation rises are things like dunes that you put in place and then next slide.

Advance it when you put the nourishment in place, you're pushing all that out seaward.

That add up protection for certain cases. You're actually building a dune in there as well.

And for Rehoboth, it's a big difference in terms of what happens when you have a beach nourishment in place.

So for example, on the right hand side, you'll see again the blue line is kind of the the Today mean high water shoreline and then you look at the red, orange and yellow.

Those are different magnitude storm events and you can see what happens with no beach N.

In place.

How far back that episodic grab of sediment or or you know erosion of sediment occurs?

And then if you have the beach nourishment in place, how protective that that is so? It's a big difference in terms of of what happens during a storm event if the nourishment.

Program continues versus just doesn't next slide.

We're also looking at wave heights and energy, so not just storm protection or long term protection of the beach, but when you do have a big event, you are going to

see water getting in places, especially on the Bay beaches. That is going to flood certain areas both.

Again, and I mentioned, it includes the flooding from the the marsh side as well as the front side. And so you look at we're also looking at how the waves influence those areas.

Both both on the Bay beaches in the Atlantic beaches.

So here's a five year storm event on the right, and just in terms of energy, Reds are fire wave energy, Blues are lower wave heights not going to see huge wave heights back in the marsh.

You still see flooding if you go to the next slide. If you up that storm level now you have waves that are larger.

This is, you know, 50 year or 2% chance of a current storm event. You're getting waves.

That actually progress right over the beach and interact with roads and structures. And so we're looking at not just flooding, but also.

Wave height influences next slide.

And so that changes across the beach.

So with the beach nourishment in place, I just pulled an example here. If we're looking at these specific points as you go across shore for existing conditions, you have wave heights. You know 4 feet kind of up against the beach. But with the beach nourishment in place that.

Means you have.

A reduction in that wave height so that beach provides some physical wave breaking attenuation of that wave energy as it affects the shoreline and advances inland.

XI.

Also looking at flood extent in flood depths during these storm events, so how?

Where does the water go and how deep is it really?

And we have a very robust model to look at those types of things.

And again, I mentioned it's coming from the Bayside or the backside as well as the Delaware front side of of Waters. Next slide.

What that produces just areas where you have water and how deep it is and areas that stay dry.

So in some what? This is kids, humic.

In some locations you know it.

The beach does provide some benefit there.

You're talking about large storms with big surges that come up.

You know, the Peach doesn't necessarily protect everything, but we are looking at areas that remain dry during certain storm conditions based on where the water goes.

That includes the winds, the effects of the surge, effects of tides, all in that numerical approach. Next slide.

And then the last thing, we're kind of evaluating is, OK, when we put the beach down, what happens over this 30 year time horizon so.

This figure here on the horizontal axis shows the time after nourishment in years, so time zero would be when the nourishment was placed, and then as you go further along the axis, you're going out in time.

The vertical axis is the volume remaining in the nourishment template. So just to be clear, that's what.

Is remaining in the placement area that you put the sediment down into.

That doesn't mean the San just completely disappeared, right?

San doesn't disappear, it just means it's moved out of that initial template area, which we'll come back to in a second.

And So what you're seeing here is that movement of sediment.

Through the processes of the waves and tides interacting with that basically irregular bump that gets put on the shoreline and the natural way that the beach is trying to interact with that is to smooth it out.

And so you will see material move out of the nourishment area and then that means overtime you have to come back and replace it depending on how much sand you put down and how you put it down, that varies how long it may last in that template area.

So that blue line, for example, is a very large nourishment here at Pickering, relatively speaking, and that lasts much longer before you see that large jump up in the volume amount.

And that's a renourishment. So that would last about eight years before you have to do renourishment.

The green, smaller nourishment.

More consistent with what historically has happened via truck based fill. Put some down in about every four years or so.

You'd have to go in, depending again on on how stormy it is and those things.

This is just an average condition, so we can use this to basically determine how often

you have to go in and replenish that nourishment based on how the sediment spreads. Next slide.

We can do the same thing with the width of the beach.

So this is slaughter where we're looking at the beach berm or the recreational area. Same type of thing where we're looking at various different alternatives that I talked about at the beginning and then.

How that has to be renourished overtime. And so instead of looking at the volume in the template area, now we're looking at the width in that template area.

That's how wide the beach is.

So you know, the blue starts at 70 feet wide when you put it down, and then it erodes down.

Over time, it becomes more narrow as the sand moves into different locations and you can then say, well, I'm going to renourish after about 10 years here and that pumps it back up.

Again, depending on what condition you were with, the green is more traditionally what has happened.

At Slaughter Beach, with a width of around 30 feet or so additional to what's there, you see the how that trend works so we can look at the relative width of the beach, which provides that recreational benefit, as well as that storm damage benefit to each particular commun.

In in beach setting, next slide.

We don't.

Just so that was the focus on where the sand is in front of where it was placed, but what we are also doing is looking at ancillary benefits to adjacent communities and adjacent areas. And those areas might include both infrastructure or natural resources like salt marsh and beach.

And habitat space.

So, for example, here's Dewey and Rehoboth Beach, and what I'm showing here on the right hand side is.

Initial placement, which looks like a big bump.

On the beach, right.

200 feet extended the berm with out. When you've initially put that big beach nourishment in, obviously the scale makes it look a lot more dramatic in the figure, but I I show you kind of what that looks like on the on the ground in the on the.

Aerial photograph above that. And then what happens is that material because the

beach set in the ocean says, wow, I don't like these big perturbations here.

It's trying to spread it out.

So what happens is that material spreads over time and you can see it spreads into the middle. It spreads to the end.

And so on that top figure there, the yellow is where it's initially placed.

And then the blue is where the area spreads, so you get that movement of sediment along shore to feed into adjacent areas. And that all provides additional benefit to communities where in areas where the material might not be directly placed, it spreads over time. And you can see.

Those different colours correspond to the initial placement one year after placement.

Two year three-year, four year so on and so forth as that material spreads out.

Some of the material also goes offshore during storm events, but a lot of it spreads alongshore next slide.

Just another example of that at Broadkill Beach that gives a little bit more.

Visual reality to that.

So here's an example placement at Broadkill Beach of Beach nourishment.

That's the initial placement in yellow.

Next slide.

What will happen is the waves come in, storms come in that will want to push the material and smooth that bump out, right beaches, anything in nature like to be.

Uniform in some respects.

And so next slide as that saying moves, it actually covers a much greater area than where the sediment was initially placed. And so those blue areas on either end of the the nourishment are where the sand spreads to over time and that again provides additional socio economic benef.

To adjacent areas so that.

Spreading of that sediment is included in the coastal processes analysis analysis that we provide to the economic team.

And I'm gonna turn it back over to Ben to walk through some of the economic stuff.

BB **Ben Blachly** 35:24

Great. Thank you, Kirk.

So now what I'm gonna do is walk through how we translate what Kirk tells us about how those projects perform into an assessment of the benefits and ultimately how we derive cost share recommendations.

So to start off with, we reviewed the literature and we consulted with local experts and stakeholders in order to identify what are the potential categories of benefits and we ultimately determined that there were four potentially important categories. Those are infrastructure resilience and by that we mean protection of both public and private property from storm damage, recreation value, which refers to the enjoyment that recreaters get from taking trips to the beach.

Tourism tourism impacts refer to the economic impacts that result from people coming and visiting the beaches from out of town.

And then spending money at the local hotels, restaurants and shops.

And then in addition, we evaluate how the nourishment projects might benefit ecological resources, including species like horseshoe crabs and also wetland ecosystems.

Then we quantify the benefits in the context of who receives them. The recipients, for example.

We identify how much of the infrastructure resilience benefit is going to private property owners versus state or municipal government owners of infrastructure.

And then finally, we add up the benefits experienced at the state level at the county level and to local populations and that distribution of benefits is what forms the basis of our cost share recommendation.

For each benefit category, we're careful to be using the best available data. To do that, we met regularly with both the work group that Sarah mentioned, which is made-up of State, county and local community representatives, and we also solicited data and feedback from local experts in both.

Government and academia.

The economic benefits are monetized based on well accepted methods, and then we discount those over time based on current guidance from Office of Management and Budget, which is to use a social discount rate of 2%.

The regional economic impacts that we use to measure tourism impacts we quantify using IMPLAN, which is an industry standard input output model.

And ecological benefits are not easily or readily quantified.

So we describe those qualitatively and what that leaves us with is a mixture of qualitative and quantitative metrics.

It's not so simple as just being able to add the dollars together and and determine the distribution.

So what we do is convert each benefit both the qualitative and quantitative benefits

to a common.

In scale ranging from negligible for those benefits that are unlikely to be perceptible at a particular site on up to high, which indicates a significant benefit from beach nourishment at that particular site.

Now I will get into some of the results.

So who benefits from beach nourishment and by how much do they benefit?

And I'll go through category by category here.

So the first is infrastructure resilience.

We found that across all of the Bay project sites.

Remember now this is excluding Lewis.

We found the communities are facing expected annual damages from coastal storm events of about \$18 million in the no nourishment.

Scenario with regular beach nourishment.

We found that the Bay communities are able to avoid between 7 and 85% of these damages.

That range is because it varies by site and due to the makeup of these Bay communities, we found that this benefit is almost exclusively to residential property owners.

Across all of the ocean sites now excluding Lewis or sorry now including Lewis, the communities face expected annual damages from coastal storms of about 33 million without nourishment.

And nourishment avoids between 40 and 100% of these damages, again depending on the site.

On the ocean, it is still primarily private property owners. Now businesses and residents who are receiving the benefit. But we did also identify some city and state owned infrastructure that receives a portion of the benefits as well.

Moving on to recreation here, we found that Delaware residents take about 31,000 trips to Bay beaches at about 3.1 million trips to ocean beaches every year, and depending on the site, we found that nourishing the beaches avoids the loss of up to 23.

Percent of trips at the Bay and up to 36% of the trips at the ocean. That's over the next 30 years, compared to a scenario where no nourishment occurs.

The benefit that local populations gain from these visits gets integrated into the local cost share and the visits.

Made by non local Delaware residents is reflected in the state cost share.

Moving on to tourism impacts here, we measure these in terms of gross domestic product GDP. In total, we found that people coming to visit the beaches, the beaches, in our study from out of town or out of state generate about \$1.1 billion in economic activ.

We also found that ocean beaches account for almost all of those economic impacts related to tourism.

The contribution by Bay beaches is really negligible.

The Bay beaches are just not comparable in terms of the scale of non local recreation.

We also found that nourishment at Ocean Beach sites prevents the loss of up to 17% of the economic activity compared to a scenario with without nourishment and, well, some of those economic impact benefits are experienced outside of the county. We found that most of the Benefits Act.

Remain in the county where the spending originally occurs.

So that's Sussex for the ocean beaches.

So early on in the development of our analysis, the work group that's advising us highlighted a key limitation of previous analysis was that they did not account for potential ecological benefits of nourishment.

It's undeniable that Delaware's coastal ecosystems hold immense ecological value. Their habitat for horseshoe crabs.

Their habitat for sensitive shore bird species, including red knot, and also they contain large areas of wetlands that provide a whole host of ecological services.

Nurse rehabitat for fish and shellfish.

Carbon sequestration.

Water filtration are just a few examples. We did find that nourishment is likely to provide some protection to certain resources over the next 30 years. For example, just by adding sand to the base system, we're likely supporting horseshoe crabs. In addition, maintaining wide sandy coastlines is likely to.

Support shore birds.

At the same time, nourishment is not the primary management strategy for these species. For example, conservation efforts related to shore birds along the Atlantic Coast is currently focused on managing human interaction.

And limiting the effect of development and beach recreation on the species rather than beach nourishment in particular.

So ultimately, based on multiple consultations with local biologists, we concluded

that as long as the projects take measures to avoid potential adverse effects on species, all of the beach nourishment projects are likely to provide some ecological benefit that should be reflected in the cost share recommendation at the.

Same time we think that these benefits are likely lower relative to the other benefit categories.

And the ecological benefits of nourishment at Bay beaches are likely to be higher than than that on ocean beaches, due primarily to the relative presence of sensitive ecological resources on the Bay beaches. For example, horseshoe crabs, and also red knots. And then we assign the ecological benefits from.

Beach nourishment to the state portion of the cost share, and that's because the state holds stewardship responsibilities for the natural resources.

Getting into a little bit more granularity here with some beach by beach results.

Here we have the benefit levels that we found at each of the Bay project sites.

Again, this is the Bay. Excluding Louis, the most significant benefit that we found at Bay beaches is protection of infrastructure.

In terms of beach by beach variation here, there's we found a lesser infrastructure resilience benefit at those sites that experienced damage from something that is not affected by nourishment to a large degree. For example, the flooding from the back marshes that Kirk was talking about.

As you'd expect, the recreation value associated with nourishment is much higher at the Bay. Beaches that have higher visitation rate. And as as I described previously, there's a relatively low level of ecological benefit from these nourishment projects.

And they do not significantly significantly influence the tourism economy.

A little bit of a different story here on the Oceanside.

Here we have high levels of infrastructure resilience across all of the sites.

That's primarily because nourishment does a really good job of reducing what is the primary threat along the Atlantic Coast, damage from episodic erosion. We generally found low recreation values associated with nourishment at the at these sites.

The story here is about really wide beaches in the baseline that remain largely viable and intact for recreation, even if we stop.

Searching tomorrow, Rehoboth Duhi is, of course, an exception here.

Where we found high recreation value that's driven by the exceptionally high level of visitation here and paired with a higher rate of shoreline change compared to other ocean sites.

So we know that the ocean beaches get a lot of visitors from out of town who

contribute to the tourism economy and what we found though is that again here because the beaches are so wide initially actually a relatively low portion of tourist visits are at risk of.

Loss over the next 30 years.

Tourism impacts do register at all of the sites, but they're low with the exception of Rehoboth.

And finally, we found limited ecological benefit at all of the ocean sites relative to the Bay beaches as described.

So that covers the level of each benefit at each site, and then what we do is combine that with information about how the benefits are distributed in order to get us to cost, share recommendations. And what I'm going to present here are at the the recommendations at the.

Highest level, so aggregated at the state, county and local level in the report, we're going to have the local cost share broken down to a much finer scale.

We are identifying particular communities and also public entities that receive each benefit.

So here are some of our key findings.

1st is that all of the sites, the majority of benefits are experienced locally and and it turns out that the local cost share recommendation is actually similar across Bay and ocean beaches.

Ocean Beach sites.

Those projects include a county level cost share recommendation and that's driven by those benefits to the tourism economy that don't register on the Bayside.

On the Bayside, the state cost share recommendation is a little bit higher than it is for ocean and that's primarily due to the higher ecological values we attribute to those projects.

At Oceanside, Natural spreading of the sand over time, the way that Kirk described results and benefits to adjacent communities. In addition to the communities where the sand is initially placed.

And finally, Kirk mentioned that we looked at up to four nourishment alternatives for each site and we developed cost share ratios based on each of those design alternatives.

We found that the results were typically within one or two points. So ultimately the cost share recommendations we provide here are not sensitive to the design or alternative designs.

Here are the actual recommended cost share ratios for the Bay Project sites excluding Lewis.

The first thing that jumps out is the lack of a county share here and.

There are two potential benefits that can result in a county share.

Those are economic impacts from tourism and protection of any county owned infrastructure. As I've been mentioning, the tourism impacts at Bay beaches are negligible, so they don't register, and we also happen to find no county owned infrastructure that would benefit from nourishment over the next 30 years.

So what that means is that we have 3 categories of benefits on the Bayside infrastructure, recreation, and ecological, and those benefits go to the state and local cost share partners.

The the benefits to local beneficiaries account for between 50 and 75% of the total benefits, and that's a little bit variable by site.

Different story at the Ocean project sites.

Here, the tourism impacts do play a role, and since a large portion of those impacts are experienced at the county level.

This leads ocean beaches to also include a county cost share recommendation.

Local cost shares are similar to what we found on the Bay about 50 to 70% of the total benefits from Beach Nurseman projects from at these sites are local.

And finally, we recognize that the distribution of economic benefits is not the only factor that's relevant to developing a cost share policy and at the recommendation of the advisory group, we additionally are including an assessment of the relative vulnerability of the populations that benefit from these projects, the.

Purpose is for that to be considered alongside the economic benefits analysis.

So factors influence influencing vulnerability that we considered include income, health, race, age, education and access to services.

What we found is that ability to pay peroxide by income is not a particular vulnerability of the beach communities. The most important factor contributing to vulnerability is the at these communities is age and that can contribute to isolation.

Health deficits.

Difficulty accessing services and a limited ability to respond to.

Or recover from storm events.

Excuse me.

2nd, we reiterate that our recommended cost shares do not prescribe a specific policy mechanism on the Bay. For example, we say there's no county share of

benefits, but we recognize that these are generally unincorporated communities that are managed at the county level.

Also important to note that we went into this exercise to expand on existing research by including a more complete accounting of nourishment project benefits.

And our findings are generally consistent with other similar research.

Specifically consistent with other research, the overarching finding is that the majority of benefits from beach nourishment projects along developed recreational beaches are experienced locally.

And lastly here we did evaluate nourishment costs for for each project site and for each design alternative we do provide that information in the report for context, but costs have no actual bearing on the cost share findings since they're based purely on the magnitude and distribution of benef.

And with that, I will turn it back over to denrek before we get to the Q&A. Thank you.

BS

Bouboulis, Sarah (DNREC) 50:44

Thanks Ben.

I'm just gonna share real quick.

OK.

So thanks Sarah.

I just want to go over a quick timeline before we get to questions and kind of what happens now.

So we're having this community meeting here with you today and after this we're going to take your questions and comments and review them as as we're able early October, we're going to present a draft report to that work group that we mentioned earlier.

We're going to meet with that work group again to discuss.

Their thoughts on it and again take their questions and comments for review.

And then by late 2004, we should have a final report that will be publicly available on our on our website. And then after that this is going to be one piece of information that we take to generate leadership to discuss what, if anything we want to.

Do with this information and how we move forward from here.

So that's so that's the timeline and now we're going to open it up to questions.

Again, if you have a question, feel free to put it in the chat.

If if that's not working, you can e-mail shoreline questions at delaware.gov. If we need clarification, we can ask you to unmute, but so far all these questions look

good.

I think we can go with those, but feel free to keep putting questions in the chat and if there's any media outlets, we do want them to go through the regular Dun rec channels and not ask questions here that that would be appreciated, OK.

I'm going to stop sharing now, and if Ben Kirk.

Or maybe you wanna come on camera and we can go through some of these questions.

So far, they're in pretty good order of.

Modeling questions and then economic questions.

So we'll try to do that as best we can and then we'll then we'll probably be free for all after that a little bit, but.

So first I think couple for Kirk.

Kirk, what is the amount of sea level rise that is assumed over the 30 year period?

BK **Bosma Kirk** 53:10

Yeah, good question. So.

For the Bay beaches, we assume 1.5 feet of sea level rise over 30 years, which is consistent with the 50th percentile intermediate high projection of sea level rise OK.

So there's a lot of words there.

What does that mean?

That means that basically we assume that the.

Emission standards kind of continue or improve a little bit from where they are today.

So the rate of emissions drops slightly.

It's not kind of business as usual.

It does actually get better. Better a little bit.

And so over 30 years, that's a 1.5 that comes from the national NOAA assessment on sea level rise in was checked with the state of Delaware, and that's consistent with the values they use.

So that's for the Bay beaches is 1.5 feet the same projection, 50th percentile intermediate high projection under an IRCP 8.5 scenario was used for the.

Atlantic Ocean beaches and that's 1.6 feet over 30 years. So 1.5 for the Bay and 1.6 for the Atlantic Ocean.

BS **Bouboulis, Sarah (DNREC)** 54:21

Thanks Kirk.

Next question is how accurate is the 30 year storm models?

Is there anything more objective that could be used cause storms keep changing over time as well?

BK **Bosma Kirk** 54:35

Right. So we use increasing intensity and frequency of storms in all our models, specifically for tropical cyclones or hurricanes.

So that is inherently included in that mix. I will tell you from the work we've done all the way from Massachusetts to Florida that around 2050 or so based on the various global climate models, that's when.

You really start to see a shift in the intensity and frequency of these type of storm events.

So a 30 year time horizon is a little bit short of that window, but right around the edge.

But we include it anyway, so the intensity and frequency piece is included in that. The models that we run.

BS **Bouboulis, Sarah (DNREC)** 55:24

How applicable is a model derived from stations in and up the Delaware Bay as far as trend to Oceanside locations?

So using the stations that are used.

BK **Bosma Kirk** 55:36

Yeah. So I only showed you part of the model.

The model that we have that this is based off of covers the entire Atlantic Ocean.

It is calibrated and validated up and down the entire Atlantic coastline, including Delaware Bay stations.

We then submodel that to higher resolution specific areas, in this case Delaware, and so we do look we wanna get accurate all the way up into Philadelphia, but we also calibrate it to stations right along the Atlantic Ocean, so.

The actual model domain at which I didn't show today goes over the entire Atlantic Ocean, and that's the forcing model that we drive and get all the physical processes like waves and water levels too.

We then create smaller models at your site of interest. So say kids humic or Dewey Beach and we're looking at how those, then those processes then advance and affect

even more specifically.

Your your beaches and your communities.

BS **Bouboulis, Sarah (DNREC)** 56:42

Wait. OK. Do you have?

What is the statistical confidence of the results?

Particularly, how confident are you of the three measures of predicted beach erosion?

Do you have those off the top of your head?

BK **Bosma Kirk** 56:57

Yeah. So our models are all calibrated and validated at you know, I didn't go into, you know we have limited time.

I didn't go into this really significant detail on that, but we get everything into a 95% confidence interval on the processes.

So we feel pretty confident on that.

I mean, you know, there's obviously going to be what nobody can predict is how many storms you're going to see every year or over a two year period, right?

So that you can have variations in that where you have a much more.

Period. And then a more quiescent period. But the models in terms of the governing equations and the physics of the water movement, that's really the foundation of what we're doing is, is all calibrated to a 95% confidence interval when we do that.

BS **Bouboulis, Sarah (DNREC)** 57:45

Great. All right.

I hope this one you understand.

How are these analytical queuing models?

If not, what are the models being used?

How is the simulation being used?

BK **Bosma Kirk** 57:57

Yeah. So we're we use a whole series of models.

They're 90% of them are numerical.

So they're they're the computer running, you know, calculations over and over again.

Those models are all physics based, which is really important from our perspective.

They're based on the governing equations of water movement and sediment transport.

Some of the model types we use are are they're all government.

Utilized models in most cases so you know circulation and storm surge is an add circle model.

We use unswan.

It's called for wave propagation and transformation.

X Beach is the model we use for sediment movement in the cross shore direction.

So some of those figures you saw where we're looking at erosion, how it spreads that's that's X beach.

And then there's some additional one line modeling approaches we use for this. The spreading of the beaches. So again.

The big model that's calibrated and set up is.

Giving you the physical processes driving information for the site specific models and that gives us the information on how storms work and water moves and all those types of things.

So hopefully that answered the question, but it's basically numerical models, not analytical.

BS **Bouboulis, Sarah (DNREC)** 59:18

And I think and at some point you were talking about with the wave modeling Marsh side versus Bayside.

And just to clarify, there's the Bayside is the Delaware Bay or the Oceanside Atlantic Ocean. And then most of them have a backside which you called I think the marsh side in some instances, yeah.

BK **Bosma Kirk** 59:36

For the confusion on that, so so you know on the Delaware Bay beaches, we tend to talk about 'cause, it's Delaware Bay, we talk about the marsh side being kind of the backside of the barrier beach and the Bayside being the front for the Atlantic Ocean beaches, you.

BS **Bouboulis, Sarah (DNREC)** 59:44

Yeah.

Yeah, yeah, yes.

BK **Bosma Kirk** 59:52

Know it'd be the Oceanside and kind of the Bayside on the backside if there is one in specific cases. But the marsh side is always kind of the backside of the landward or inland side of the of the beach is what I was referring to.

BS **Bouboulis, Sarah (DNREC)** 1:00:08

And then we got Mark.

You send me according to the form that I got.

I think it applicable, so I'll just answer it, but.

It was wide as delivered, not use groins or jetties, as have been demonstrated in New Jersey as being very resilient, and I would just say as far as this particularly particular study goes, we're just looking at beach nourishment.

That's a thing we've done for a long time, and that will probably continue to do. But in far as other methods, those are you know.

Always being talked about always being considered and thought about as alternatives to beach nourishment.

But for this project, we're just we're just talking about beach nourishment. But why?

We haven't used them, you know, in time have to maybe get back to you about that as I'm not. Haven't been around them.

OK.

So now we'll go to more economic related questions.

So Mara and Ben?

First one is about the ecological benefits and how they were monetized.

But are they all they were?

All qualitatively rated low, but they were all low or limited.

But talk about monetizing them.

MF **Maura Flight** 1:01:18

That's right.

It's a good question.

We didn't monetize ecological benefits.

There's a lot of uncertainty associated with those benefits and we include a qualitative characterization of those benefits and how they compare to other categories of benefits.

It's why we apply to a mixed methods approach in our analysis and why we described each category of benefit for each beach, ultimately along a spectrum of negligible to low, to medium to high.

Because there are some.

Are quantified, like the economic benefits and some that are qualitative.

BS **Bouboulis, Sarah (DNREC)** 1:01:58

And I think it's all this question twice a little bit, but can we do you define private property owners versus local and how those terms were kind of used?

MF **Maura Flight** 1:02:08

Sure. So private private property, which I think we refer to in the description of the infrastructure protection benefits, first to infrastructure, that's not public.

So this is residential homeowners, would that would be private property.

As opposed to.

Government buildings, whether it's state, county, municipal buildings that would be public infrastructure.

So that's how we're using public versus private in, in the context of infrastructure protection benefits.

Local populations is the other thing you mentioned, Sarah.

So local populations is is a term we use in referring especially to the recreation benefits.

I think this is where the question came up.

Who counts as local for the recreation analysis. And so the answer for that is a little bit different for Bay and ocean beaches.

And it's a function of the data that was available. The research that we had on beach visitation.

On the Bayside, the existing research on recreational activity levels focuses on.

On Sharefront property owners as local versus other visitors on the Oceanside, the local beach visitors are described as the visitors that reside within 5 miles of the Ocean Beach.

So they're all counted as local beach visitation, and outside of that.

Area that's described as non local beach visitation.

BS Bouboulis, Sarah (DNREC) 1:03:38

Next one is how was the number of trips lost due to lack of nourishment calculated?

BB Ben Blachly 1:03:47

Sure. So the, the, It's basically a functional relationship between beach width and visitation.

How much you enjoy or visit a beach based on on how wide it is.

It's no, it should be no surprise that people prefer more space, right?

They like to spread out.

They like less congestion and So what we do is we derive that relationship between width and number of trips from stated preference survey research that's been published and actually was performed at.

At some of these sites, the themselves, both on the Bay and along the Ocean coast. So paired with a baseline estimate for visitation that So what?

How many people visit the the beach in the baseline? We then get changes to width both without nourishment and with nourishment.

Those from come from Kirk and then we have this, this relationship that we've developed from based on existing literature for how those visits would change over time based on changes to beach width.

BS Bouboulis, Sarah (DNREC) 1:04:53

One of the slides said.

You lose one overall was one to 17% of tourism was lost or something like that.

You remember that slide, Ben, and the question is how do you, how is it that low of a number if you have no beach?

BB Ben Blachly 1:05:10

The answer is that at the ocean sites, a lot of the beaches don't go away after 30 years.

So if you if you saw in one of Kirk's slides, he showed shoreline change for I I think it was Rehoboth in the 30 year shoreline change even with the sea level rise projection does not take out the entire beach.

So it it's a really wide beach initially and it it's still capable of supporting significant

recreation even in the absence of nourishment that's different than on the Bay where some of the beaches do actually go away completely.

BS **Bouboulis, Sarah (DNREC)** 1:05:48

And I was talking about how benefits to residents outside of Delaware who travel to the beaches were included.

BB **Ben Blachly** 1:05:56

So benefits to the recreators themselves are actually excluded from the analysis. So this is a cost share that's going to be supposedly applicable to just the non federal portion of costs.

So we didn't think it was appropriate to, you know, include people coming from out of state and the value that they're deriving from these beach nursery projects to any of the cost share partners, the state, local or county.

Where those do come in, though, are in the we're out of state.

Visitors do enter the equation.

Just through the tourism impacts.

So they are included in that portion, but not the value to the recreators themselves.

BS **Bouboulis, Sarah (DNREC)** 1:06:39

And I think you answered this one.

How do residents in state just outside the beaches get figured? But you're looking at 5 miles as considered local to the Atlantic, to the Atlantic beaches at least?

Anything to add to that?

MF **Maura Flight** 1:06:56

That.

BS **Bouboulis, Sarah (DNREC)** 1:06:57

OK.

OK.

Let me just see if I can.

Can you pull up Ben?

Can you pull up the slide with the actual cost share recommendations? It seems like it went a little fast just so people could actually see those numbers for a little longer.

Right.

It kinda went over this, but how do the current cost these cost?

Your recommendations differ from the other cost. Your recommendations that have been proposed previously.

MF **Maura Flight** 1:07:39

Well, I I'm not sure if we have access to all of cost share recommendations that might have been proposed for these beaches to generate that wasn't that wasn't part of our analysis, although our literature review did review previous studies that were focused on this question or similar quest.

About the distribution of benefits and ultimately our results are are very similar to what those other studies found.

BS **Bouboulis, Sarah (DNREC)** 1:08:02

OK, a couple more.

Housekeeping things. So the draft report, the question is about will the draft report be available to the public?

And it will only go to our work group members.

It's just generally not denied practice to give.

We can't get.

It's hard to get comments into a report for not for not.

This isn't a regulatory thing.

This isn't. We aren't implementing anything at this point.

So now is your time for questions and comments.

But we won't be making the draft report public, but the final report will be public, and you'll then free to make comments on that as well if you'd like.

Why did? OK, so why did this report not include contractual obligations by denrec to those Bayshore homeowners for public access to the general public?

I'm going to try to feel how you're asking this question, but in general we only nourish beaches that have public access.

That's a requirement to get nourishment, and as far as how that tourism and recreation benefits the state that is included.

And however, if there was no public access, then we would not be nourishing the beaches at all.

So I think that is kind of where that where you were headed with that. But feel free to

clarify if that wasn't where you where you're going.

Right. I think we have.

I guess I'll go back to Kirk.

There's a couple more modelling questions came in.

How does the model look at catastrophic storms?

The analysis is based on increment incremental impact year by year.

What about a catastrophic storm?

How does nourishment affect the impacts, including potential loss of life for our catastrophic storm like Sandy?

BK **Bosma Kirk** 1:09:52

Yeah. So I can't speak to how you know the whole year by year assessment piece that's on the economic side.

I can only speak to the fact that we do look at episodic storms in the coastal processes.

BS **Bouboulis, Sarah (DNREC)** 1:09:59

OK, OK.

BK **Bosma Kirk** 1:10:04

You know, pretty big storms. If you had something like a Black Swan event, which is a massive event.

I I can pretty much guarantee you that with or without a beach nourishment, it's not going to matter.

It's it's going to be really significantly a problem.

But we do look at episodic conditions.

We're looking both from our spec perspective on the coastal side, we're looking at both.

30 year time horizon but also direct episodic impact events that includes 'cause. I saw another question there, both Nor'easters and extra tropical cyclones and tropical cyclones are hurricanes.

So all those storms are included in our overall mix to get the distribution of conditions that might occur.

In fact, we model 10,000 plus events in the larger model to get that overall distribution.

These models, like calibrated to you know, actual measured events. That's how we determine.

Their relative accuracy.

So we have measured data from events. We then simulate that event or model, that event where we are using that word interchangeably and then that is compared.

That's how you get this performance or the statistical accuracy, or the bias, or the, you know, the way how how well the model is simulating reality. That's what that statistic is.

BS **Bouboulis, Sarah (DNREC)** 1:11:23

So Marvin, anything to add to that as far as the year to year?

Loss of fun.

MF **Maura Flight** 1:11:30

We use the outputs that Kirk provides, which includes episodic events, episodic storm events and episodic erosion in our analysis of of the infrastructure protection benefits and the benefits of the beach.

So they are.

They are integrated in terms of their annual exceedance probability in each year and cumulatively over the time frame of the analysis that's reflected in the benefits.

BS **Bouboulis, Sarah (DNREC)** 1:12:01

OK.

So you kind of answered about the North Northeasters curve.

Can you talk about were using the words model and simulation? Are they interchangeable?

BK **Bosma Kirk** 1:12:15

Yeah, I kinda talked a little bit about that.

So what we're what we're doing is we we, you know, Model 10s and thousands of storm conditions and normal conditions. But the real way that.

Coastal models are determined in terms of their accuracy.

We're not.

We're not just randomly simulating things. We're we're simulating historical storm events and other things that have occurred and comparing that to the actual

observations of water levels waves.

Term in how accurate our models are projecting those specific conditions.

So when we're looking at statistical accuracy of our models, we're comparing observed conditions to model conditions and we want those to match as closely as possible.

Hopefully that answers the question.

BS **Bouboulis, Sarah (DNREC)** 1:13:06

Can you Mara and Ben on the one slide you touch on it briefly, but a lot of the beaches except Rehoboth had low tourism or one of or one of them recreation impacts?

Can you say again why that is?

BB **Ben Blachly** 1:13:22

So again, that's really due to the fact that the the beaches don't completely go away. So they they sort of erode over time over the 30 year analysis and we're discounting those future impacts, so that they just don't.

They're just not of the magnitude that that honestly, we really expected going into it.

BS **Bouboulis, Sarah (DNREC)** 1:13:43

So yeah, I'll just point out, like I said, it's only a it's a 30 year look over 30 years. And so over 30 years, some you know they'll still be beach. It seems in some of these places.

OK, I'm gonna. I'm gonna answer a few.

What what will happen to route one between Dewey and Fenwick if beach replenishment stops?

And what category does this benefit fall under?

So kind of the same thing over 30 years, we're not getting anywhere near route one, so is not included in this analysis.

And that's even if there's no nourishment with no nourishment.

Is Dell dot funding being included as a funding source since roads and bridges will be preserved by the nourishment program?

So there was Maran Ben.

Correct me. There's some some roads and things are included in the analysis,

correct?

If they were impacted.

BB **Ben Blachly** 1:14:48

That's right.

And they were, if they were impacted and what we really found is that we're talking about kind of marginal changes in in wave height impacts over relatively short stretches of roads.

So in in terms of a dollar damages amount, they sort of pale in comparison to the the larger pieces of infrastructure.

BS **Bouboulis, Sarah (DNREC)** 1:15:06

Yep, Yep.

And so I will add to that, if they were impacted, that would be the state share.

So they are included in that and then as far as who's paying for it within the state, I'll say from all these benefits, this is not a study looking at who's paying for these things.

We're not at that step yet.

It's just where the benefits are. So within the state share, we would also be looking for different avenues to fund that share. And within the, I think that's another question as well within the local.

Share we're again not saying how it would be paid or who would be paying it.

It's just who kind of has the benefit?

So the mechanisms are not completely there, but we're not, are not being recommended, but from the, you know state would look at all possible avenues as I assume the other two entities would as well.

Is there an ecological negative impact at the dredge cutter head?

So is there? Well, just, I'll just take this as is there negative ecological impacts to beach nourishment. And that answers certainly yes to some extent and that is kind of why the ecological benefits that went into the analysis are.

Are on the lower end compared to the other benefits that beach nourishment.

Applies, but it was those. Those negative benefits are not.

Quantified or included in this analysis.

Then Mara anything to add to that one?

MF Maura Flight 1:16:38

That's correct.

BS Bouboulis, Sarah (DNREC) 1:16:45

OK, this one for Mar and Ben have benefits to the state in terms of taxes.

Taxation on economic activity has been calculated or considered.

MF Maura Flight 1:16:56

We we didn't directly quantify changes in tax revenues.

We did do the the regional economic impact analysis, which leads to the tourism benefits analysis.

Does reflect?

All manner of of tourism related benefits. So we focused on value added or GDP, but but that analysis also considers other other categories of economic benefits generated by tourism and taxes is one of those things.

But that's not explicitly modelled in the analysis.

We it's reflected in the tourism benefits.

BS Bouboulis, Sarah (DNREC) 1:17:34

I think we got that one.

Has it been kind of what I just talked about a little bit?

Had there been any discussion to generate more revenue by taking a portion of the revenue for parking or paying people to sit on the beaches if something like this were to be implemented, all possible options for revenue would probably be looked at and will probably be looked at.

Before anything like this is actually implemented, and whether those type of things you mentioned, I don't think those specific ones would be from the state, but they might be, but they might be local.

Options, but yeah, everything would be would be looked at.

Who foots the bill for the ecological benefits? Local or state?

All ecological benefits were in this are in the state portion.

As stewards of the natural our natural resources.

If a local community did.

So far, not contribute to nourishment.

Will it be under the cost share? So currently if I'm taking your question correctly, currently no beaches except one.

Have ever contributed monetarily to beach nourishment, and so this this is for all of them.

This would be new for everybody.

So I'm actual like an example of a project and what the actual cost would be at the end.

I don't think I have those numbers off the top of my head and it would depend on what the federal federal versus non federal ratio is for the Army Corps on an Army Corps project and that varies by beach and it varies over time.

The federal non federal ratio and so I could give you an example of a specific beach, but I'd have to look up the numbers.

So if you wanna e-mail follow up with that I can.

Get you those numbers and what that would look like, but I don't have that right here.

What I guess Marvan talk about the grouping of the beach towns.

They were Bay communities were grouped together and beach communities were grouped together and kind of why.

Why did we do that, and how did that differ or separate them?

Or Ben, whoever.

BB **Ben Blachly** 1:20:13

Sorry, I I think that question may be about the the combined modeling of Rehoboth and Dewey versus Pickering or or katzomick.

BS **Bouboulis, Sarah (DNREC)** 1:20:20

OK.

BB **Ben Blachly** 1:20:23

So I don't know.

Do you wanna take a stab at that one, Kirk?

BK **Bosma Kirk** 1:20:29

Yeah, I can.

I just wanna make sure I understand the question correctly.

Sarah, can you just repeat the question?

BS **Bouboulis, Sarah (DNREC)** 1:20:33

Yeah, I'll read you the whole question, but why were beach towns grouped together when Bay communities were studied separately?

And how did grouping beach towns affect the results?

Oh, I do.

I do think that's what they're talking about, Kirk.

Maybe I can just answer this because at Dewey Rehoboth it's a single nourishment project that has happened under the Army Corps.

It's one project Bethany South.

Bethany are one project.

Dewey are one project.

I think that's the answer.

You wanna add to that?

BK **Bosma Kirk** 1:21:05

Yeah. The other piece of that is that they're close enough in proximity and the volume sediment that is getting placed indicates that they definitely are gonna interact with each other.

So they spread and interact into communities in between and adjacent, whereas the Bay beaches have much smaller nourishment volumes and are generally spread further apart.

And so they don't necessarily interact with each other at all.

So they can be looked at separately.

BS **Bouboulis, Sarah (DNREC)** 1:21:34

And so when, oh go ahead.

MF **Maura Flight** 1:21:34

Yeah.

I'm sorry. I was just going to add to that based on the how does that affect the results part, even though in this graphic that's showing and shared right now, those are grouped together in the report. We do separate out also.

The the benefits at those separate beaches, even if even though the project is modelled as one.

BS **Bouboulis, Sarah (DNREC)** 1:21:59

Run.

So are we saying going back to the loss of beach that Rehoboth will lose more beach in 30 years than Bethany Beach or Fenwick? And so that has more impact on tourism, I guess because they have probably more tourism maybe to begin with.

They're our biggest tourism beach, but also we'll have less beach in 30 years.

BB **Ben Blachly** 1:22:24

Both of those answers are essentially correct.

I mean, there's a lot of moving pieces, but those are those are the two big ones.

BS **Bouboulis, Sarah (DNREC)** 1:22:30

And I guess Kirk or someone, Rehoboth loses beach faster than the other Atlantic beaches.

Is that 'cause?

It said it's much bigger now at the moment.

BK **Bosma Kirk** 1:22:42

No, I don't think that's necessarily true.

They they lose beach with at the same rate.

I think that reference there is relative to the high recreational value and that is more of a question for Ben where that comes in in terms of the coastal processes, the beach losses rates are about the same.

BS **Bouboulis, Sarah (DNREC)** 1:23:04

Yeah.

It is located. Why? Is local caution required on publicly owned and maintained Bay Beach?

They're all publicly maintained as a local cost share partner.

Again same. I think we kind of I kind of answered this but as you said the benefits at the beaches.

Are probably #1 protection of infrastructure and #2 recreation and tourism.

So both those things were included. And so we're looking to a local cost share because many of the benefits are to the private property, local entities in these areas. And not just the recreation and tourism.

And how we factor in the replenishment at Bethany Beach benefits Sussex Shores, Sea Colony, private beaches.

And we we did that as far as the the sand spreading models.

Of Kirk has anything that?

BB **Ben Blachly** 1:24:07

That's right.

So. So so Kirk showed us where the sand spreads and where the where the benefits accrue in terms of infrastructure protection. What we haven't been able to do is incorporate recreational value to those beaches, although I would assume since the private beaches, the recreation value is going to.

Really pale in comparison to the infrastructure. It also in comparison to the recreation value of the public beaches nearby.

BS **Bouboulis, Sarah (DNREC)** 1:24:34

And I will say in the final report, it does in these kind of.

It's broken down by community where applicable. When there's other communities that are are impacted, it is broken down by that.

I did see one question in here that I think is not on the list.

So how we how we separated Cape Shores from Lewis? So Lewis was treated as a Atlantic Beach more because of its recreational.

Value and in that way that is more like an Atlantic Beach, while Cape Shores is on the Bay and does not have nearly the recreation that Lewis does.

And so that's why it was mostly kept as a Bay Beach.

Is that Mara? Ben got that? I got that.

BB **Ben Blachly** 1:25:25

That's right.

I mean, Louis is a is a very popular beach, much more akin to the other ocean beaches than than the Bay beaches and Cape Shores has really limited parking for those who don't reside there.

So yeah, you have that. That exactly right, Sir.

BS **Bouboulis, Sarah (DNREC)** 1:25:44

I was just talking about.

I wanted some. I had thought about jetties and someone else made a comment about jetties too.

That, like I said, this isn't about jetties, but we have used jetties, maybe not as much as New Jersey before, but we have used jetties and there was at least one model that was a jetty beach nourishment combo that was used in in this as because it was.

A. It was what was what we had available and what has been proposed so.

Was that Kirk?

Do you know which one that was?

BK **Bosma Kirk** 1:26:15

There's more than one, actually.

BS **Bouboulis, Sarah (DNREC)** 1:26:16

01, OK.

BK **Bosma Kirk** 1:26:18

Kids, Homicide was one picker in was another.

There's a couple others too.

So again, there was multiple alternatives for each beach that were evaluated.

BS **Bouboulis, Sarah (DNREC)** 1:26:25

Mm hmm mm hmm.

BK **Bosma Kirk** 1:26:25

Some of them did include structural coastal structural elements as well.

BS **Bouboulis, Sarah (DNREC)** 1:26:41

Contribution.

I'm not sure.

Sure. So talking about funding, again, I think this is referring to.

The federal the cost share with the Army Corps has dropped for some projects.

I think that's what you're talking about and the that, so that doesn't change the

results of this study, right?

It doesn't matter what the non non federal cost share is, this ratio is going to stay the same.

The ratio of benefits does not change based on the cost of the project or the.

Non federal cost share, what will change is that is the final number of what what the local or the state share finding. You know the actual number of money at the end of the day would be.

So that's what will change and that will change based on the non federal cost share, which changes all the time.

It in upcoming projects it did.

It has gone down and it could go back up, though it changes. It changes all the time and is different for each beach.

OK. We are coming up at the end here.

And and yes, I did hold on my last slide. Actually this does not.

This does not impact any current projects or any.

Anything really in the near future at all, this is going to be information that we use to, you know, guide us into the future with how we want to deal with these issues. But nothing's changing imminently.

And OK, we'll take one more and then and we'll pack to call in the night after that.

Ben, can you talk anymore about the contribution between Bethany and Rehoboth?

What are the quantitative differences that drive the difference between the two beaches?

BB Ben Blachly 1:28:45

I.

I don't have the numbers in front of me.

I'll I'll have to get back to you on that if you wanna follow up.

Happy to look into that more.

BS Bouboulis, Sarah (DNREC) 1:28:55

OK. And sorry. OK.

I see your update there about the cost share. I think I understand.

So if it went from zero to 50 to 75%, does that mean that the state will simply fund less dollars and replenishment?

Honestly, no, we don't think that will happen.

We think our our shares will also continue to go up. Our total will continue to go up because these projects are getting so much more expensive over time.

So we will.

I think I think our dollars.

We'll say the same is my is my guess.

Or go up as well as as with everybody else is because all of this is all this is increasing.

Again, the can you stop sharing Ben and I'll just share my final slides.

All right, so final.

Hopefully the takeaways I want you to take from that. This in general is that nourishment is getting more expensive. And so we're just looking at all our options and their state funding opportunities can fluctuate and change all the time as well. So we're looking at the benefits, the direct benefits of beach nourishment that are directly attributed to to beach nursery and recommending this recommending a possible local cost share.

Again, I mentioned it doesn't affect current projects.

This study is just a first step.

No immediate changes are happening now.

And the report will go from once it's once it's done to department leadership.

For whatever happens next, and I will say this will not be your only time if anything is ever able is ever going to be implemented or something put into place, there will be more opportunities for public input, I assure you.

So this is this is not it. If this any you know not the end.

So if anything does happen, there'll be more opportunities and when the report is published, we will take, you know, if you have input on that.

Welcome to share with us as well.

So thank you so much for attending.

We really appreciate you coming.

The slides transcript of the presentations and other materials like last time, we made an FAQ after the meeting with frequently asked questions. We may do that again as well.

And so all those will be available. I think it was like a week, two weeks or so after the meeting.

It'll be available on the meeting website and I'll I will send an e-mail out to everybody who registered when those.

Materials are available and if you have any other direct questions, you feel free to e-mail me sarah.babulas@delaware.gov and thank you so much for attending and have a great night.

- **Bouboulis, Sarah (DNREC)** stopped transcription