

From: [So, Khem](#)
To: [BrownScott, Jennifer](#)
Cc: [Maty, Kendra](#); [James, Brenda J](#); [Norton, Kirk W](#); [Hoy, David](#)
Subject: Re: DNGNWR Bathymetry
Date: Monday, November 22, 2021 4:34:14 PM
Attachments: [image.png](#)

Hi all,

Jennifer & I talked last week. I just wanted to send along some notes & thoughts on the way forward:

Background

- The bathymetry request is primarily related to an aquaculture economic use request. The area under consideration is shown below. If approved, the use description (to be described in a special use permit) would be based on the following tidal elevations (relative to MLLW): 7', 5', -1', and -2'. Work could start as early as spring 2022.



- Bathymetry would also be useful for the monitoring of biological resources, e.g., eelgrass.
- More recent bathymetry would be ideal since the spit and inner bathymetry are dynamic.
- Resolution would need to provide $\leq 1'$ contours.

Alternatives for bathymetry acquisition

- Look at 2007 Parametrix data first. Brenda is looking for this data.
- Compare Parametrix data with USGS CoNED 2020 combined topobathy ([NOAA: Data Access Viewer](#), [ScienceBase metadata](#)). There are likely artifacts from the combining of different datasets (2016 WA coast El Nino LiDAR, 2015 NOAA Puget Sound 1/3 arc-second digital elevation model, and 2007 NOAA hydrographic survey. [See spatial metadata](#)) but this is USGS's "best available" combined topobathy.
- Compare both Parametrix and CoNED data with Ian Miller (WA Sea Grant) data. His group surveyed elevations down to -1'.
- Kendra & I looked at the following LiDAR data sets and determined that they either did

not cover the inner bay or captured water: 2001 PSLC, 2002 Clallam, 2008 Dungeness River, 2012 Jefferson Clallam, 2016 Dungeness topobathy (only covers the river and river mouth), 2016 WA coast El Nino, 2017 WA Olympic Peninsula, and 2019 Olympics South OPSW.

- Bathymetry from Rensel Associates (2003) based on soundings from 2000 is probably too old.
- If the 2007 Parametrix data or the 2020 USGS CoNED data are not sufficient, then look into options for acquiring new bathymetry. Realty Mapping & Survey branch to assist with acquisition/contract management? I&M branch to assist with data management/analysis?
 - If soundings are used, then the timing of boat activity needs to avoid or minimize wildlife and habitat (e.g., eelgrass bed) disturbance. E.g., restricted dates.
 - Aircraft (either to acquire LiDAR and/or orthophotos for photogrammetric elevations) would need to minimize wildlife and habitat disturbance. E.g., minimum AGL.
 - UAS acquisition not possible due to current DOI restrictions.

Jennifer, did I miss anything?

Everyone, what are your thoughts?

Thanks,
Khem

From: So, Khem <khem_so@fws.gov>

Sent: Monday, November 15, 2021 3:31 PM

To: BrownScott, Jennifer <jennifer_brownScott@fws.gov>

Cc: Maty, Kendra <kendra_maty@fws.gov>; James, Brenda J <brenda_james@fws.gov>; Norton, Kirk W <kirk_norton@fws.gov>; Hoy, David <david_hoy@fws.gov>

Subject: Re: DNGNWR Bathymetry

Sorry for another email. I forgot another reference that examined Dungeness Bay bathymetry. It's an older study (2003) but looked at bathymetry and tidal flushing in relation to water quality: <https://jamestowntribe.org/wp-content/uploads/2018/08/3-Dungeness-Bay-Study.pdf> Maybe conditions have changed a bunch in the intervening 18 years and these questions deserve another look? Regardless, the contractors did produce a bathymetric map with 1' contours (current to 2000).

Khem So

U.S. Fish and Wildlife Service

Columbia-Pacific Northwest (R9) and Pacific Islands (R12)

National Wildlife Refuge System, Branch of Refuge Biology

911 NE 11th Ave., Portland, OR 97232
Regional Office phone: (503) 231-6839
Willapa NWR Complex phone: (360) 484-3482
mobile: (971) 282-2193

From: So, Khem <khem_so@fws.gov>
Sent: Monday, November 15, 2021 3:23 PM
To: BrownScott, Jennifer <jennifer_brownScott@fws.gov>
Cc: Maty, Kendra <kendra_maty@fws.gov>; James, Brenda J <brenda_james@fws.gov>; Norton, Kirk W <kirk_norton@fws.gov>; Hoy, David <david_hoy@fws.gov>
Subject: Re: DNGNWR Bathymetry

Hi Jennifer,

Kendra looped me into the conversation about Dungeness bathymetry. A couple of questions:

- What do you need the 1' or 0.5' contours for? Is it for legal purposes (i.e., delineating boundary)? Or are you needing to model inundation areas? Or some other reason?
- See the attached PDF. Back in 2007, we contracted with Parametrix to locate the -4' MLLW line (even though they didn't actually map a boundary). Looks like Parametrix did a bathymetric survey (soundings for depths, RTK GPS for horizontal position). If we were to get the source data from Parametrix, do you think this would meet your needs?

I did a bit of searching of existing, publicly available LiDAR data sets on the [Washington Lidar Portal](#), [NOAA: Data Access Viewer](#), USGS 3DEP [LidarExplorer \(prd-tnm.s3.amazonaws.com\)](#), and [nationalmap.gov](#). Bottom line is that while some datasets are topobathy, none of them go to -4' MLLW at the desired resolution. (Also, as an additional note: the LiDAR are primarily referenced to NAVD88, not MLLW. The nearest tidal stations with datums are in Port Angeles - [1](#), [2](#).)

Hope everyone on this email thread are well

Best,
Khem

Khem So

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911 NE 11th Ave., Portland, OR 97232
Regional Office phone: (503) 231-6839
Willapa NWR Complex phone: (360) 484-3482
mobile: (971) 282-2193

From: Maty, Kendra <kendra_maty@fws.gov>

Sent: Thursday, November 4, 2021 2:58 PM

To: So, Khem <khem_so@fws.gov>

Subject: Fw: DNGNWR Bathymetry

Hi Khem,

Long time no talk/see..hope you are doing well. I am sure you are extremely busy but I am hoping you may provide some guidance on this topic? It looks like Jennifer Brown-Scott is looking for some LiDAR data for Dungeness Bay. I have done some research, but am not really seeing anything that may fit her needs. Brenda James (our Land Surveyor) has been in contact with Parametrix who can collect this data for \$\$, but I am not sure it is necessary...Do you have any knowledge or ability to help with researching this. I have also talked with Kenny Elsner who showed me websites to check, but I am so unfamiliar with LiDAR that I really have no idea what I am looking at or for...Kenny referred me to 3DEP which I poked around then got lost, quickly. Any thoughts, suggestions, etc? Thank you so much for any help you can provide!

K

Kendra Maty

Lead Realty Cartographer

USFWS-NWRS-Realty-Mapping & Survey Branch

Columbia Pacific Northwest - Pacific Islands

Portland, OR

Office: 503.231.6841

Cell: 503.201.9040

From: James, Brenda J <brenda_james@fws.gov>

Sent: Wednesday, October 6, 2021 7:19 AM

To: Norton, Kirk W <kirk_norton@fws.gov>; Hoy, David <david_hoy@fws.gov>; BrownScott, Jennifer <jennifer_brownScott@fws.gov>

Cc: Maty, Kendra <kendra_maty@fws.gov>

Subject: RE: DNGNWR Bathymetry

Hi Jennifer,

We do have an IDIQ contractor that has a fully equipped and very experienced bathymetric group.

We do quite a bit of work with them and I'm sure we can get you what you need.

Please let me know if and how we can help you.

Thanks

Brenda

From: Norton, Kirk W <kirk_norton@fws.gov>

Sent: Monday, October 4, 2021 1:01 PM

To: Hoy, David <david_hoy@fws.gov>; BrownScott, Jennifer <jennifer_brownScott@fws.gov>

Cc: James, Brenda J <brenda_james@fws.gov>; Maty, Kendra <kendra_maty@fws.gov>

Subject: Re: DNGNWR Bathymetry

Hi Jennifer

Brenda James, our senior surveyor, is going to contact one of our survey contractors to see if they can do this. We'll be in touch when we hear from them.

Kirk W. Norton, PLS
Regional Land Surveyor
U.S. Fish and Wildlife Service, Pacific Region
National Wildlife Refuge System, Interior Regions 9 & 12
Mobile Phone: (916) 206-1581

From: Hoy, David <david_hoy@fws.gov>
Sent: Friday, October 1, 2021 1:06 PM
To: BrownScott, Jennifer <jennifer_brownScott@fws.gov>
Cc: Norton, Kirk W <kirk_norton@fws.gov>; James, Brenda J <brenda_james@fws.gov>; Maty, Kendra <kendra_maty@fws.gov>
Subject: RE: DNGNWR Bathymetry

Jennifer,

It's been awhile since I've looked into that but I have to assume that due to the rapid changes in technology and data collection tools that how ever much it cost to perform a lidar based bathymetric survey 5 years ago is now probably cheaper. It's probably drone based, so after you set up some type of control network or base station you just program the drone's flight path and then go eat a sandwich or something while it goes and collects the data. However, that is an awful lot of data, probably a pretty hefty drone. I have to pass your request on to the R1 team to figure out, I'm sure someone in FWS has contracted this service out recently. Obviously, NOAA and the Corps both have this capability but I'm not sure if they would enter into a IAA or something. A private vendor/surveyor might be the best route.

From: BrownScott, Jennifer <jennifer_brownScott@fws.gov>
Sent: Friday, October 1, 2021 10:27 AM
To: Hoy, David <david_hoy@fws.gov>
Subject: DNGNWR Bathymetry

Happy Friday David!

Do you folks have any data regarding the bathymetry of Dungeness Bay? Any thoughts on what it would cost to complete a bathymetric survey at least of the north side of the bay (up against Dungeness Spit) out to -4ft mllw? With at least 1ft intervals (1/2 foot would be better).

Hope you are having a fabulous Friday,

Jennifer

Jennifer Brown-Scott
Project Leader
Washington Maritime National Wildlife Refuge Complex
715 Holgerson Road
Sequim, WA 98382
(360) 457-8451

[~~Dungeness NWR](#)~[Protection Island NWR](#)~[San Juan Islands NWR](#)~[Copalis NWR](#)~[Flattery
Rocks NWR](#)~[Quillayute Needles NWR](#)~~