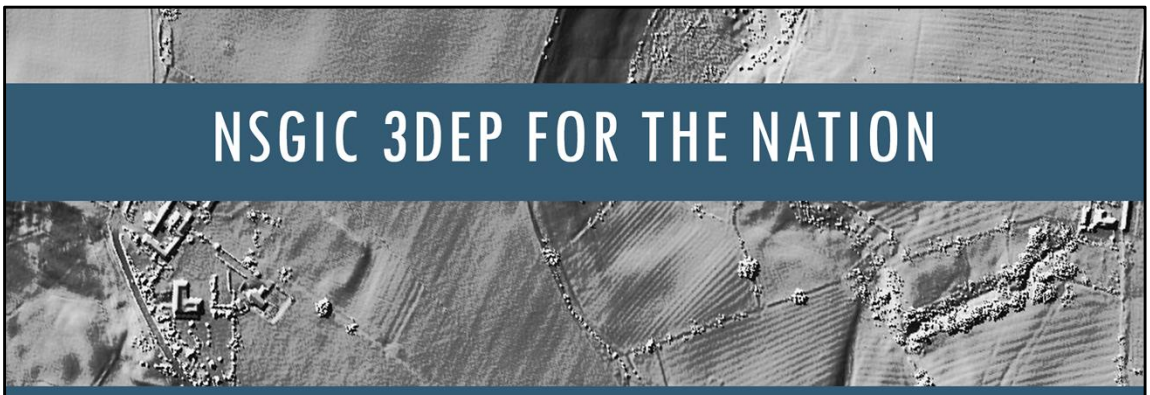


NSGIC 3DEP FOR THE NATION

3DEP GAP ANALYSIS WORKSHOP SERIES

WORKSHOP TWO:
GAP REASONS AND ANALYSIS PROCESS

APRIL 13, 2021

NSGIC 3DEP FOR THE NATION

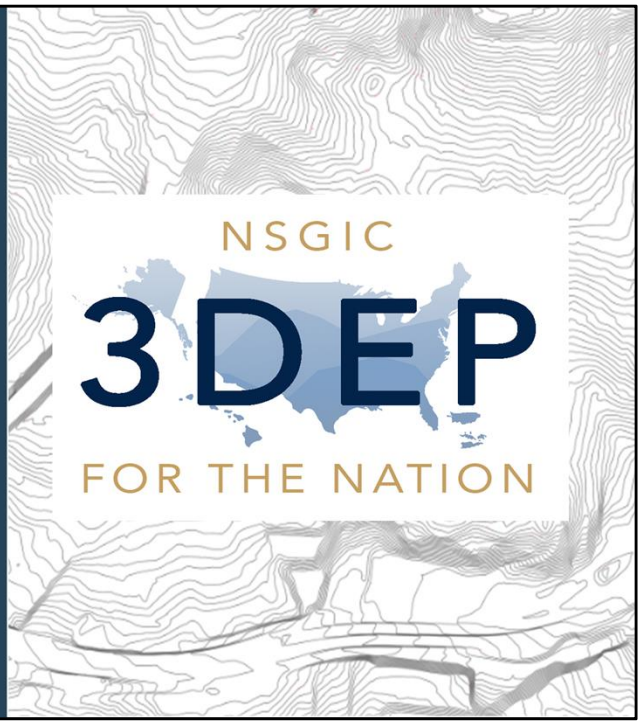
WELCOME TO THE WORKSHOP

Facilitators:

Lynda Wayne
NSGIC Data for the Nation Project Manager

Phil Worrall
NSGIC Data for the Nation Project Engineer

Logistics
- Workshop is being recorded
- Add your name and organization into the chat
- Enter questions into the chat



WHAT IS DATA GAP ANALYSIS?

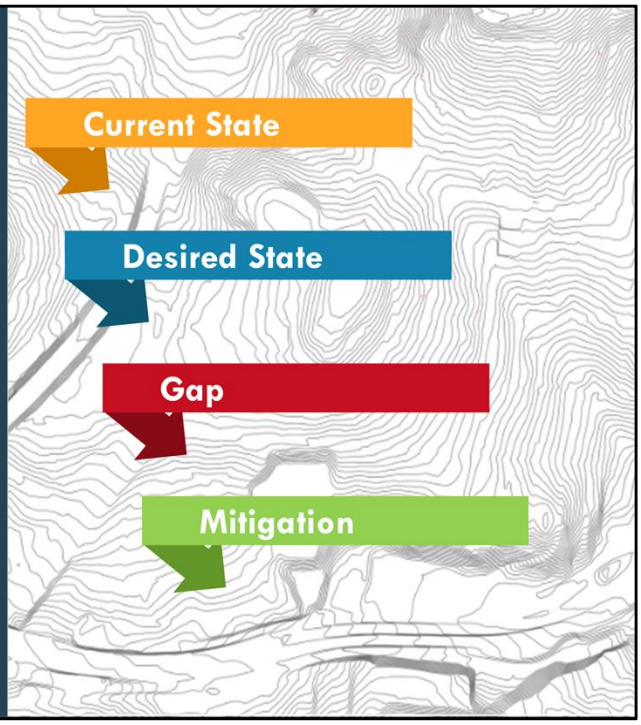
Data gap analysis is the:

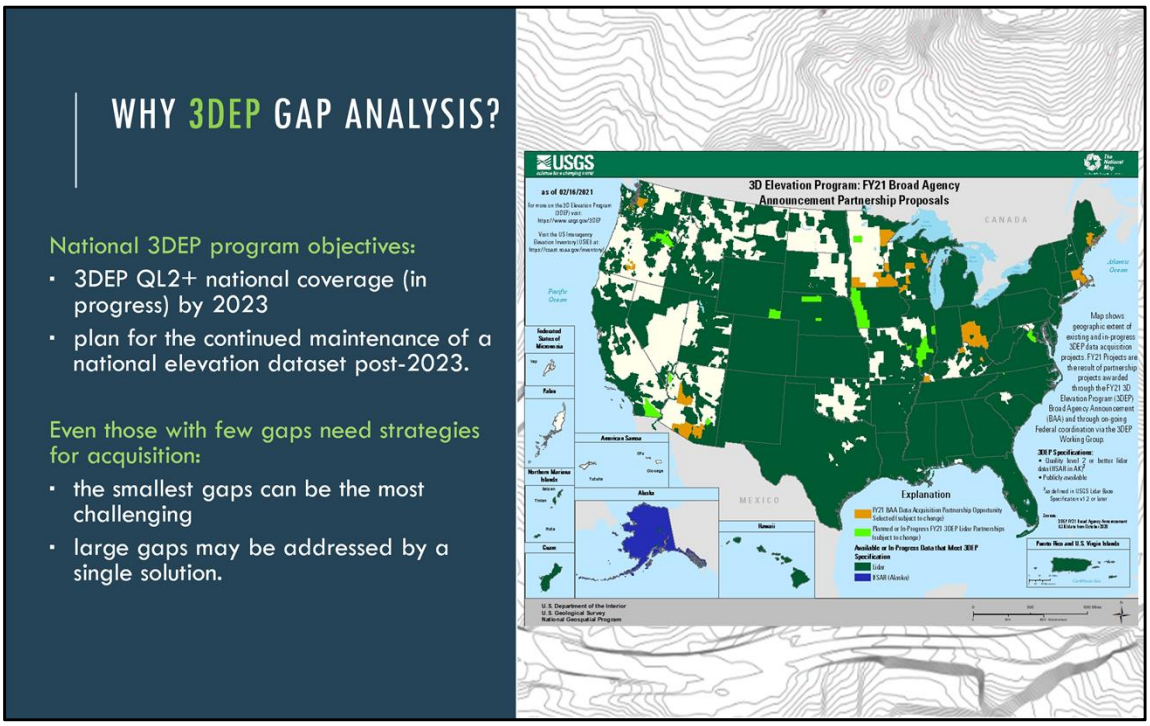
- identification
- assessment and
- addressing

of areas with no coverage for a specific data theme.

Data gap analysis enables you to:

- develop site specific strategies for completing data coverage.



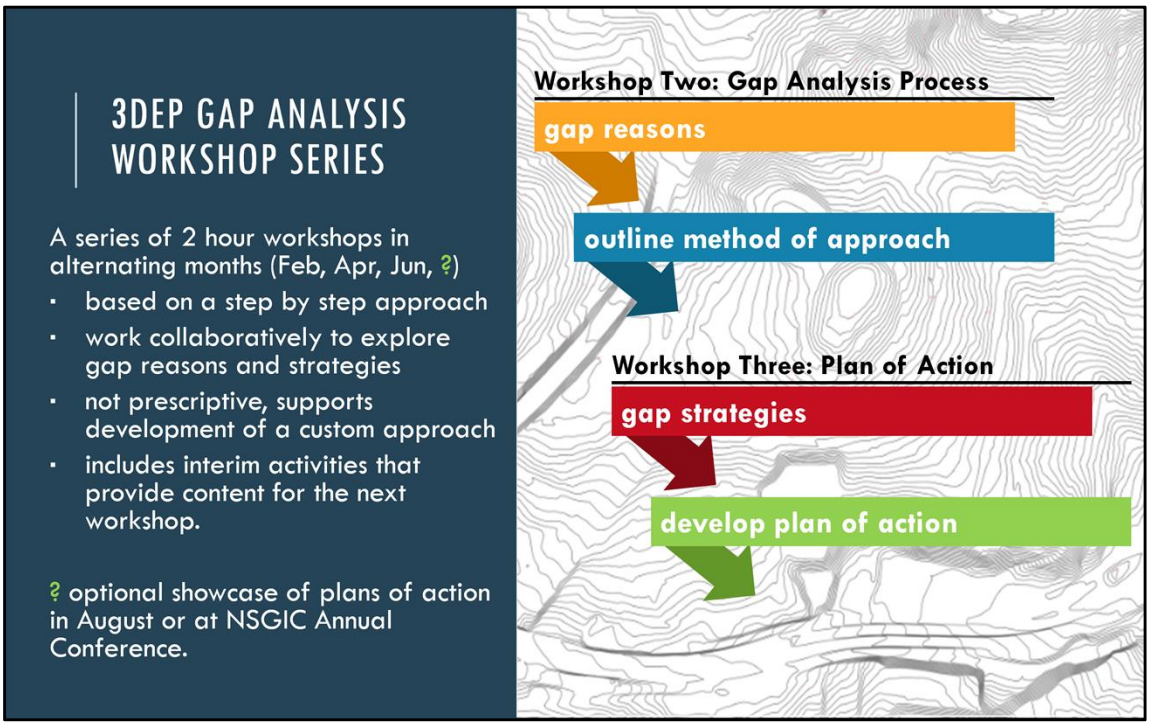


National 3DEP Program Objectives

- national QL2+ coverage or in progress by 2023
- things will not simply end at that point, we need to begin planning now for what the next phase of 3DEP data maintenance and updates looks like

Even those with few gaps need strategies for acquisition:

- sometime the smallest gap can be the most challenging
- large gaps may be resolved with a single solution
- therefore the amount of white space does not necessarily drive the need



This is the first in a series of workshops intended to be held bimonthly
<review bullets>

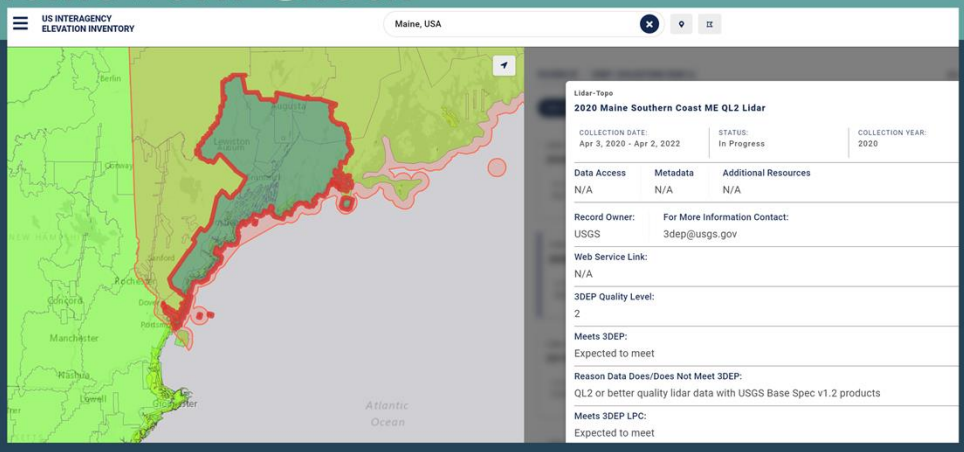
Participant engagement will be important to the success of the workshop series.

Workshop One
- an overall introduction

Workshop Two
- focus on the process of gap analysis and compile the reasons into common issues

Workshop Three
- work collectively to derive strategies to address the issues
- compile strategies into a plan of action

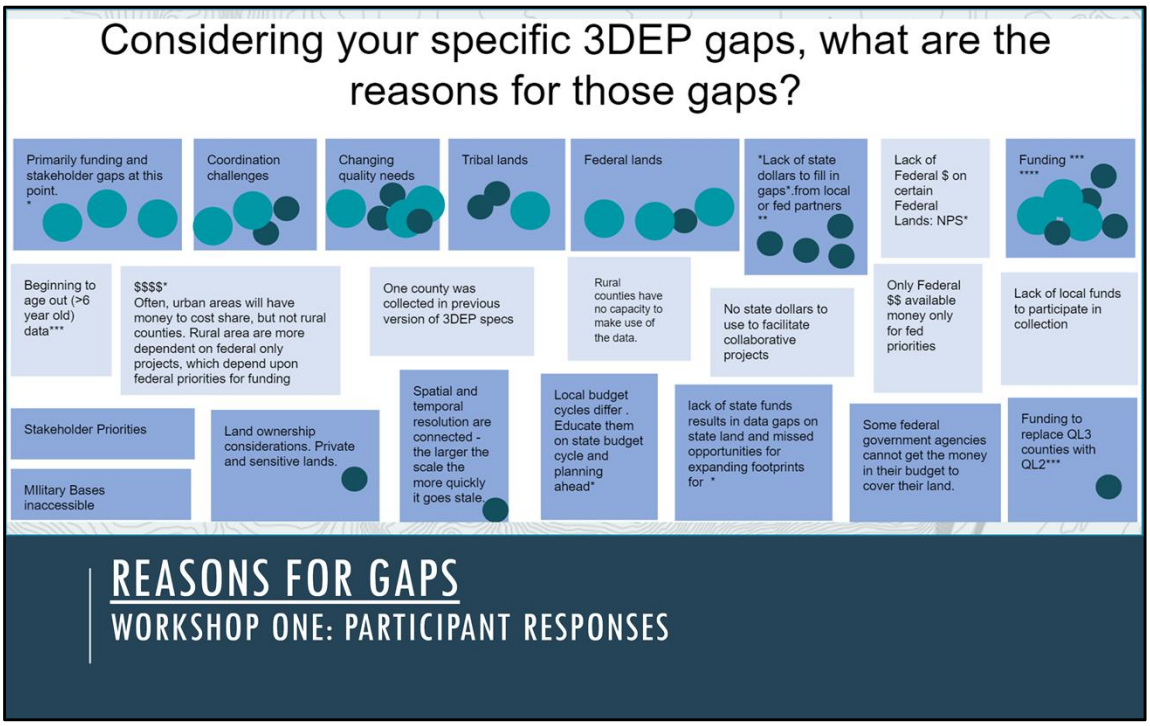
Homework Check



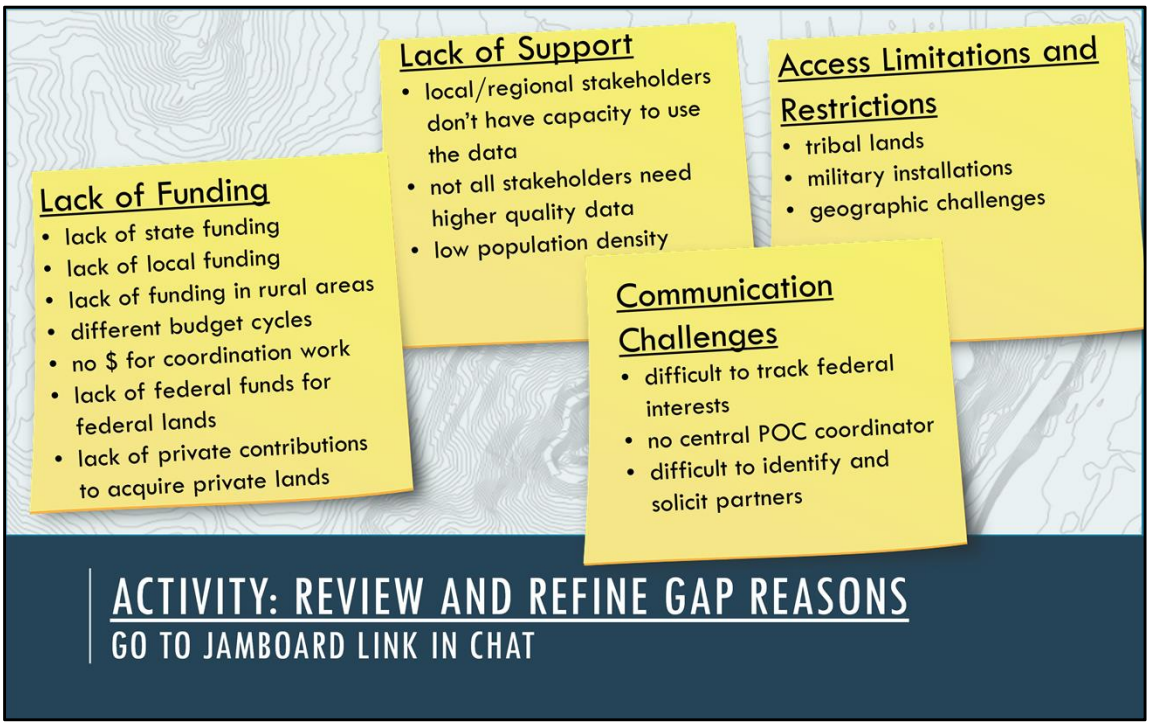
US Interagency Elevation Inventory (USIEI) Update (https://coast.noaa.gov/inventory/)

- Does the information reflect your understanding or your 3DEP coverage?
- If not, what differences did you find and why do you think there are differences?

For those that participated in the first workshop, you were asked to visit the US Interagency Elevation Inventory and review your existing 3DEP coverage.

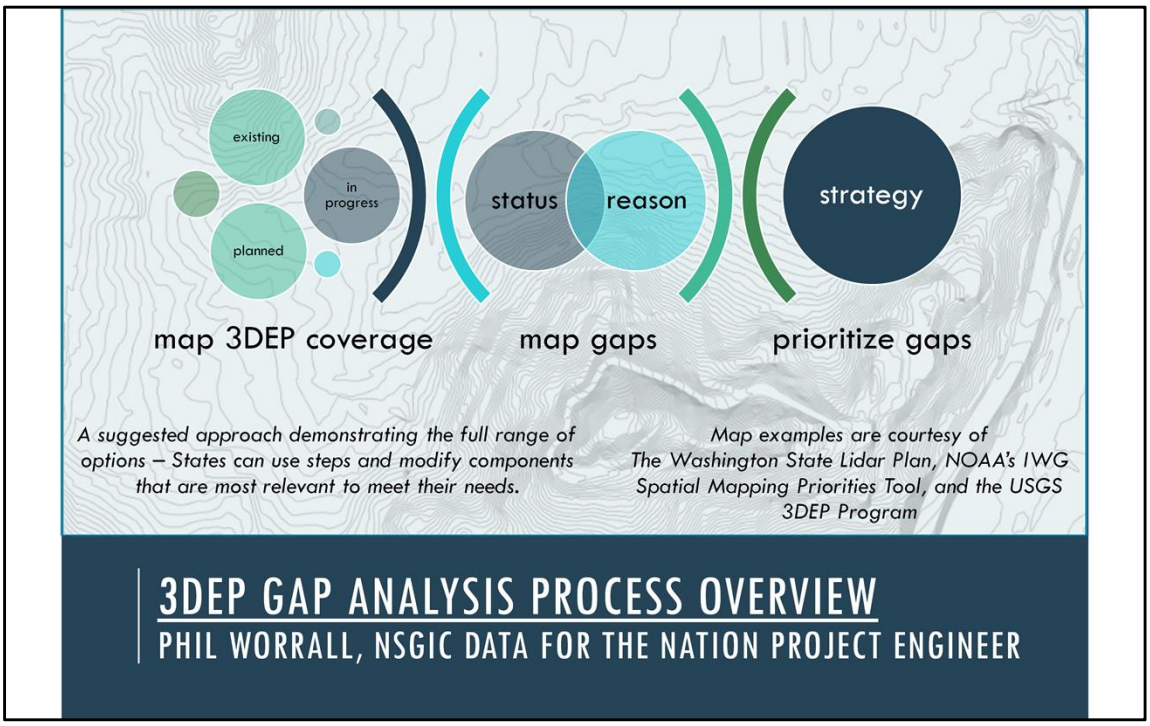


During the last workshop we generated reasons for gaps in 3DEP coverage.



The reasons generated during the workshop have been compiled into categories. Let's take a quick review and refine as a group.

3DEP Gap Reasons Review Activity
https://jamboard.google.com/d/1obLoOIRBzdJYK6HF3m9ZUSoO5A57qA4JN6XtK1LBvKg/edit?usp=sharing
We'll use the final list as a template for generating strategies.


existing
in progress
planned
status
reason
strategy
map 3DEP coverage
map gaps
prioritize gaps
A suggested approach demonstrating the full range of options – States can use steps and modify components that are most relevant to meet their needs.
Map examples are courtesy of The Washington State Lidar Plan, NOAA's IWG Spatial Mapping Priorities Tool, and the USGS 3DEP Program
3DEP GAP ANALYSIS PROCESS OVERVIEW
PHIL WORRALL, NSGIC DATA FOR THE NATION PROJECT ENGINEER

3DEP GAP ANALYSIS PROCESS OVERVIEW – STEPS 1-5

Step 1. Create a Statewide Lidar Coverage Map (Map 1)

Step 2. Create a Statewide 3DEP Gap Map (Map 2)

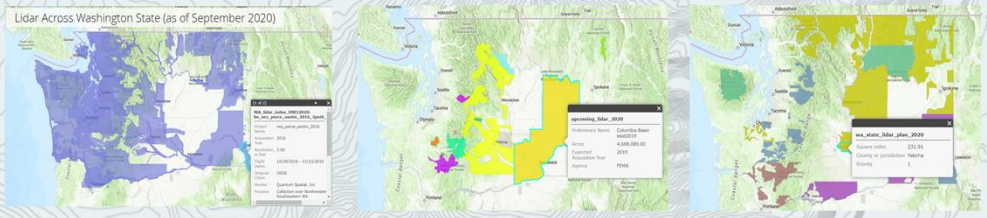
Step 3. Conduct a Statewide 3DEP Gap Prioritization Survey (App 1)

Step 4. Create your State's 3DEP Gap Action Plan

Step 5. Update your State's 3DEP Plan

Step 1: Create Statewide Lidar Coverage Map (Map 1)

1. **Identify and attribute:**
   - **(Layer 1)** Existing Lidar data collections (3DEP & Other)
   - **(Layer 2)** In-progress Lidar data collections (3DEP & Other)
   - **(Layer 3)** Planned Lidar data collections (3DEP & Other)



3DEP GAP ANALYSIS PROCESS OVERVIEW – STEP 1

Step 1: Create Statewide Lidar Coverage Map (Map 1)

2. Recommend using the following information sources:

a. USIEI Inventory Map [LINK]
b. USGS 3DEP Current Program Year Status Maps [LINK]
c. SeaSketch Status / Planning Map [LINK]
d. Your own "State 3DEP Status & Planning Map[s]

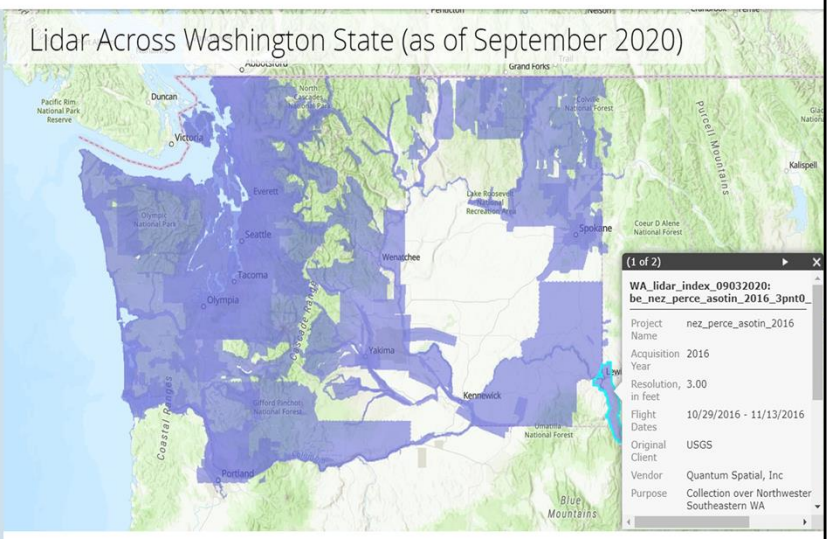
3DEP GAP ANALYSIS PROCESS OVERVIEW – STEP 1

Step 1: Create Statewide Lidar Coverage Map (Map 1)

Example: Washington State was a fairly early adopter of lidar data and has worked on collecting data for various purposes since the late 1990s.

Technology enhancements and environmental change have spurred the need for repeat collections and there are now dozens of lidar collections across the state for everyone to use.

Even though there are a lot of lidar data available across the state, statewide coverage has not yet been achieved. Lidar data can also vary in quality, and some areas only have lower quality data and cannot meet all of the requirements of the applications the data need



Map Layer showing all existing Lidar Data in your state (**3DEP & Other**)

Step 1: Create Statewide Lidar Coverage Map (Map 1)

Example: Washington State was a fairly early adopter of lidar data and has worked on collecting data for various purposes since the late 1990s.

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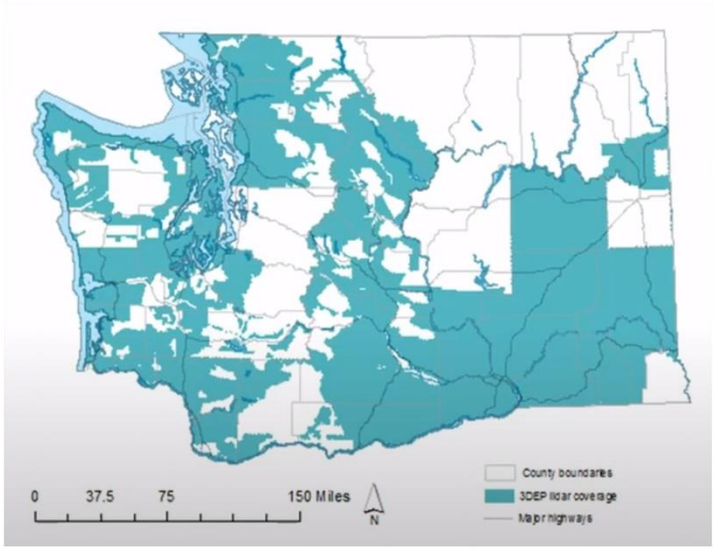

Map Layer showing all existing Lidar Data in your state (**3DEP** & Other)

Step 1: Create Statewide Lidar Coverage Map (Map 1)

Example: Washington State was a fairly early adopter of lidar data and has worked on collecting data for various purposes since the late 1990s.

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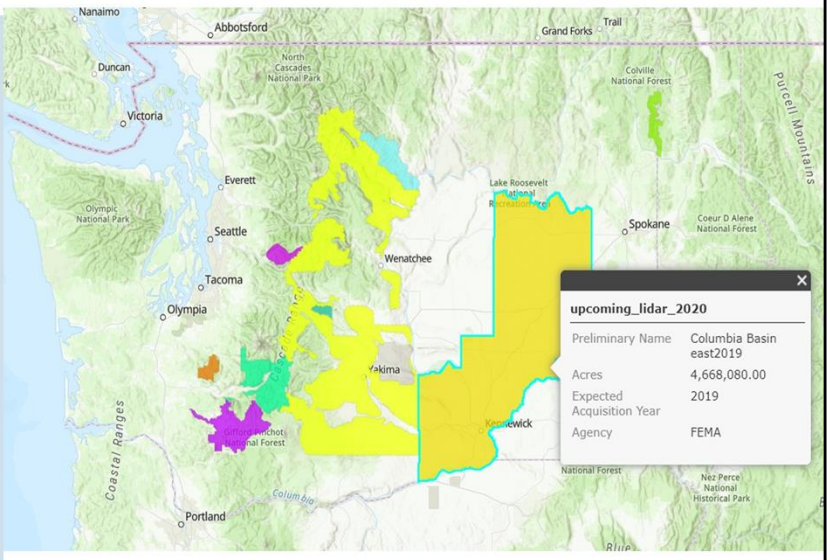


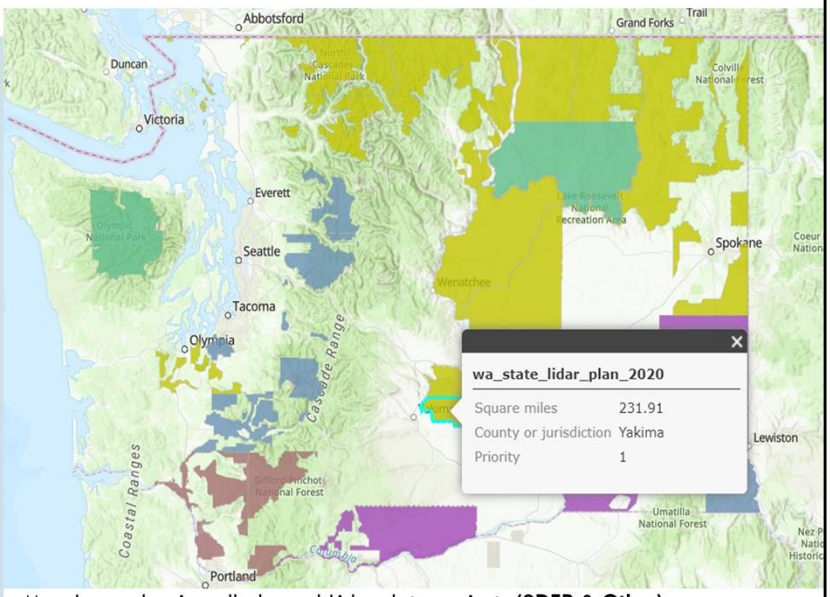
Map Layer showing all in-progress Lidar data projects **(3DEP & Other)**

Step 1: Create Statewide Lidar Coverage Map (Map 1)

Example: Washington State was a fairly early adopter of lidar data and has worked on collecting data for various purposes since the late 1990s.

Technology enhancements and environmental change have spurred the need for repeat collections and there are now dozens of lidar collections across the state for everyone to use.

Even though there are a lot of lidar data available across the state, statewide coverage has not yet been achieved. Lidar data can also vary in quality, and some areas only have lower quality data and cannot meet all of the requirements of the applications the data need



a Map Layer showing all planned Lidar data projects **(3DEP & Other)**

Step 2. Create a Statewide 3DEP Gap Map (Map 2)

1. **Create a Gap Layer (Layer 4) to identify and attribute all statewide 3DEP gaps by type:**
   a. Where no Lidar data exists
   b. Where existing Lidar data is out of date
   c. Where higher quality Lidar data is needed (QL2 or better data to provide greater accuracy and point density)
   d. Where state Lidar data exists, but has not been submitted / certified to meet 3DEP standards
2. **Assign gap reasons (attributes) to each gap polygon**
   (Split / combine gap polygons [if needed] based on common / different attributes and political or geographic boundaries occurring within the gap areas.)
   a. geographic challenges (steepness, forest cover, land cover)
   b. land ownership
   c. low population density
   d. potential stakeholder boundaries
      Lidar QL quality requirement

3DEP GAP ANALYSIS PROCESS OVERVIEW – STEP 2

Step 2. Create a Statewide 3DEP Gap Map (Map 2)

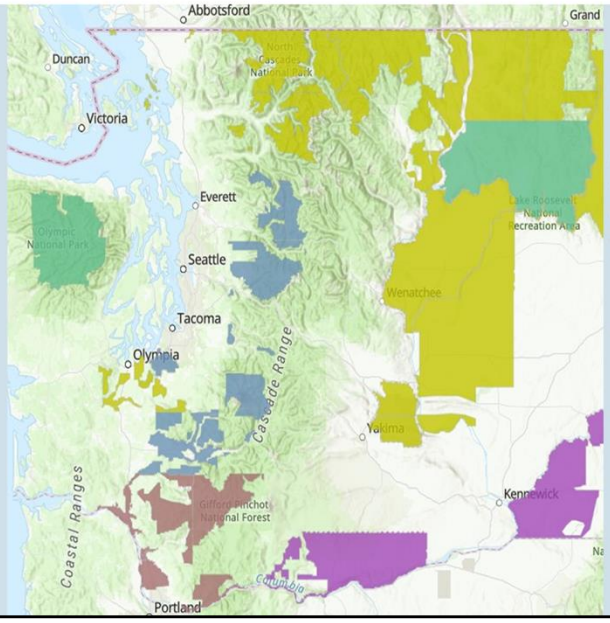
1. **Create a Gap Layer (Layer 4) to identify and attribute all statewide 3DEP gaps by type:**

a. Where no Lidar data exists

b. Where existing Lidar data is out of date

c. Where higher quality Lidar data is needed (QL2 or better data to provide greater accuracy and point density)

d. Where state Lidar data exists, but has

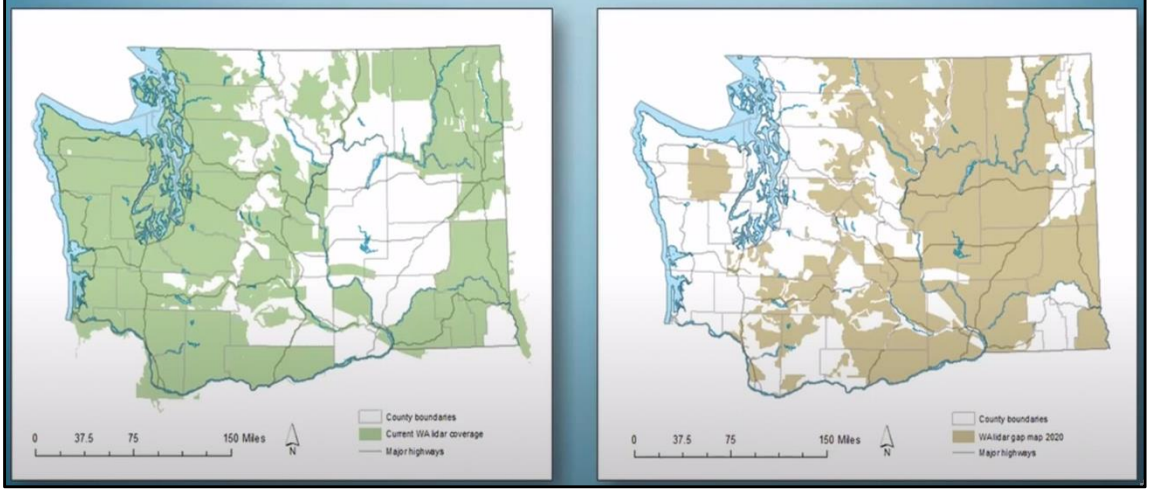


2. Assign gap reasons (attributes) to each gap polygon. Split / combine gap polygons [if needed] based on common / different attributes and political or geographic boundaries occurring within the gap areas. Some examples include:

- geographic challenges (steepness, forest cover, land cover)
- land ownership or management is not in the state purvey
- low population density
- potential stakeholder boundaries
- Lidar QL quality requirements
- no pressing state/local interest (geophysical, cultural, other) for which

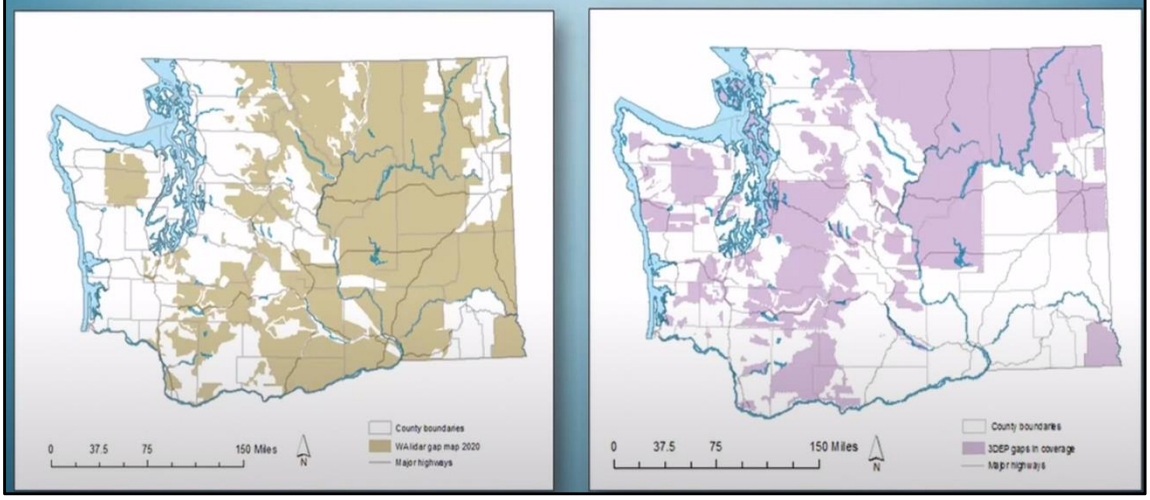
Step 2. Create a Statewide 3DEP Gap Map (Map 2)

Coverage vs. Gaps



Step 2. Create a Statewide 3DEP Gap Map (Map 2)

Gap Analysis - Gap Map Comparison



Step 3. Conduct a Statewide 3DEP Gap Prioritization Survey (App)

(App 1)

(A Statewide 3DEP Gap Prioritization Survey allows partners and end-users to review and vote to help prioritize filling in your state's remaining 3DEP gaps.)

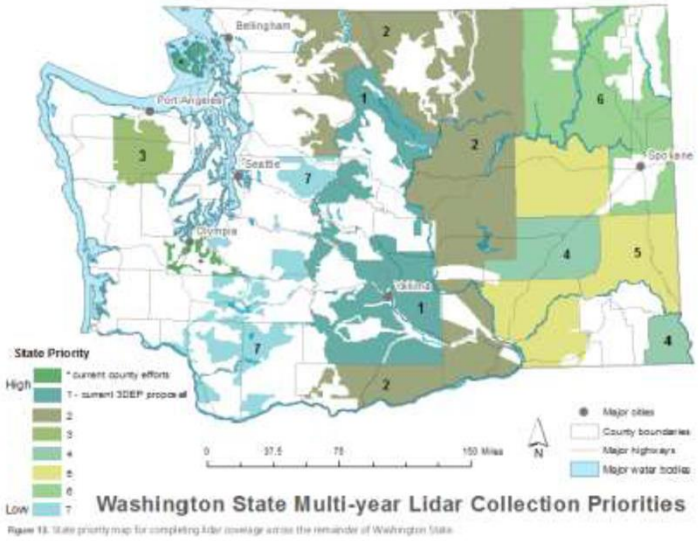
1. Survey respondents assign a Low (1), Medium (2), or High (3) priority score to individual gap polygons
2. Accumulate prioritization score totals for each gap polygon
3. Update Statewide Gap Layer (Layer 4) with prioritization survey results and map results

3DEP GAP ANALYSIS PROCESS OVERVIEW – STEP 3

Step 3. Conduct a Statewide 3DEP Gap Prioritization Survey (App)

A Statewide 3DEP Gap Prioritization Survey allows partners and end-users to review and vote to help prioritize filling in your state's remaining 3DEP gaps.

1. Survey respondents assign a Low (1), Medium (2), or High (3) priority score to individual gap polygons
2. Accumulate prioritization score totals for each gap polygon
3. Update Statewide Gap Layer (Layer 4) with prioritization survey results



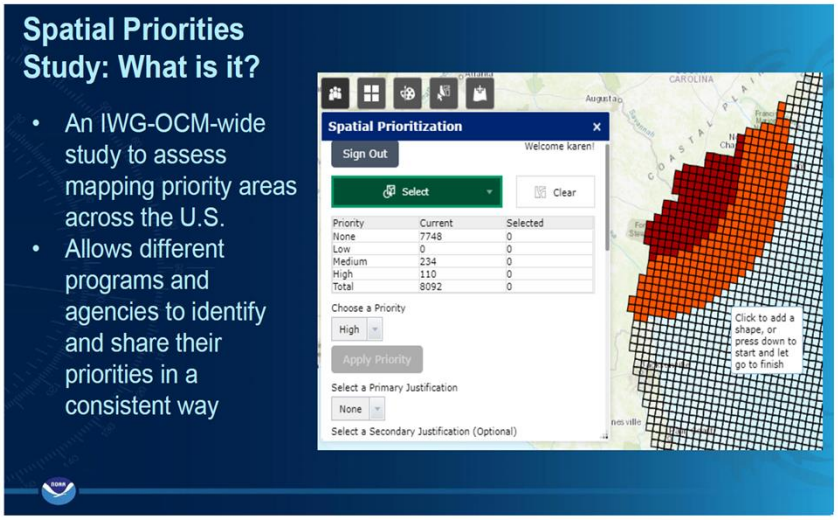
Step 3. Conduct a Statewide 3DEP Gap Prioritization Survey (App)

NOAA's IWG Spatial Mapping Priorities Tool

(Optional)

Create prioritization grid cells (e.g. 100, 10, 1 SQ KM) that overlay all polygons shown on the Statewide Gap Prioritization Base Map.

Votes cast are compiled and used by your state's Lidar Planning team to rank and plan new projects to fill in all remaining gap areas in your state.



(Optional): An advanced Spatial Prioritization Tool like this one may not be needed if all the remaining gaps in the state are well defined and how to fill them is understood.

Step 3. Conduct a Statewide 3DEP Gap Prioritization Survey (App)

NOAA's IWG Spatial Mapping Priorities Tool

(Optional)

Create prioritization grid cells (e.g. 100, 10, 1 SQ KM) that overlay all polygons shown on the Statewide Gap Prioritization Base Map.

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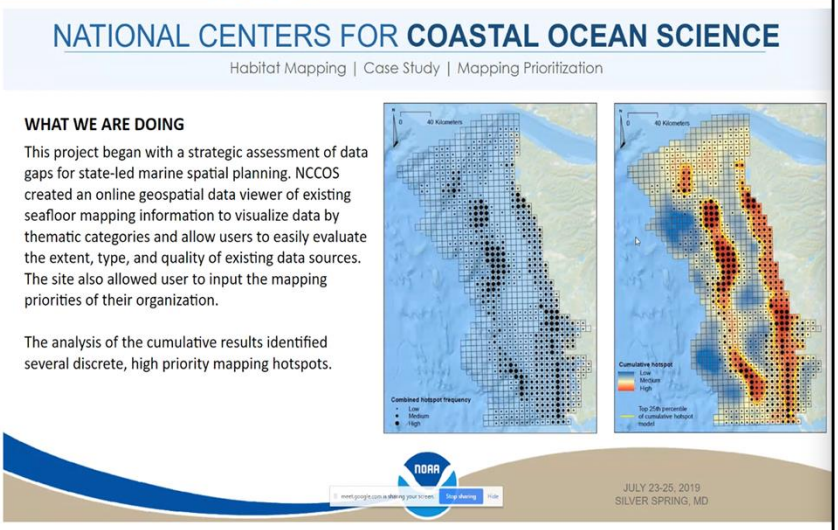


(Optional): An advanced Spatial Prioritization Tool like this one may not be needed if all the remaining gaps in the state are well defined and how to fill them is understood.

Step 4. Create your State's 3DEP Gap Action Plan

1. Develop a budget to complete your state by creating an initial cost estimate for all gaps
2. Develop approaches for addressing gap acquisition issues
3. Assess acquisition activities/approaches based on feasibility and impact (e.g. implemented with existing resources, implemented with additional resources, implemented by others, etc. ?)
4. Assign final gap area priority rankings for acquisition based on feasibility of approach and other factors (contiguity, federal interest, ?)
5. Update Layer 3: Update your state's planned Lidar data projects layer to reflect all of the new gap projects planned

3DEP GAP ANALYSIS PROCESS OVERVIEW – STEP 4

Step 4. Create your State's 3DEP Gap Action Plan

1. Develop a budget to complete your state by creating an initial cost estimate to fill all gaps
2. Develop approaches for addressing gap acquisition issues
3. Assess acquisition activities/approaches based on feasibility and impact (e.g. implemented with existing resources, implemented with additional resources, implemented by others, etc. ?)

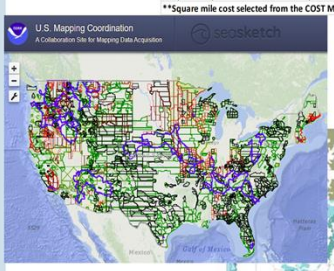
MyState 3DEP GAP COST ESTIMATE

Gap Area	Gap Area Sqaure Miles*	Terrain & Land Cover	Quality Level (QL) Lidar	Cost Per Square Mile**	Gap Area Estimated Cost
1. Upper Range	1,000	1. Level & Ag, Range, Baren	QL2	$150	$150,000
2. Capitol City Metro Area	600	2. Level & Urban	QL0	$500	$300,000
3. Long State Forest Region	500	3. Level & Forest or Wetland	QL1	$300	$150,000
4. Eastern Farm Belt	7,000	4. Rolling & Ag, Range, Baren	QI2	$250	$1,750,000
5. Second City Metro Area	400	5. Rolling & Urban	QL2	$300	$120,000
6. Western Hills National Forest	250	6. Rolling & Forested	QL1	$630	$157,500
7. Mount Evans Foothills	300	7. Mountainous & Agriculture	QL2	$400	$120,000
8. Mount Evans Urban Area	150	8. Mountainous & Urban	QL1	$720	$108,000
9. Mount Evans State Froest	1,000	9. Mountainous & Forested	QL1	$840	$840,000
TOTALS:	11,200		Average Square Mile Cost>	$330	$3,695,500

FOOTNOTES:

*Gap Area Square Miles come from Layer 4 in your Statewide 3DEP Gap Map (Map 2)

**Square mile cost selected from the COST MATRIX Tab, based on the Terrain & Land Cover type assigned to each gap area, and the Lidar Quality Level desired for each gap.



Washington State Multi-year Lidar Collection Priorities

4. Assign final gap area priority rankings for acquisition based on feasibility of approach and other factors (contiguity, federal interest, ?)

Step 4. Create your State's 3DEP Gap Action Plan

5. Update Layer 3: Update your state's planned Lidar data projects layer to reflect all of the new gap projects planned

Table 1. Priority areas and a description of how the areas were ranked.

	PRIORITY AREA	PRIORITY DETERMINATION AND DESCRIPTION
0	San Juan and Thurston County	Both counties are pursuing lidar collection at this time
1	Eastern Cascades	Continuation of collection that has started in 2017–2018 by the USFS and WGS to address wildfire and forest health concerns, agricultural needs, hazard mapping, and to maintain mapping consistency
2	Okanogan and Western Columbia Basin	Addresses forest health, wildlife habitat, hazard mapping concerns, agriculture, and civil planning projects
3	Olympic National Park	Many stakeholder groups in Washington require high-quality lidar data for Olympic National Park for water quality concerns, salmon restoration, and hazards mapping
4	Adams and Asotin Counties	Currently, Adams and Asotin Counties have little or no lidar coverage. Lidar data in these counties will help address water quality, hazards mapping, and civil planning projects
5	Whitman, Eastern Columbia Basin	Given the current outlook for FEMA, lidar coverage may soon be collected in these areas, though much of it may be lower quality. This priority is set to ensure the lidar data is refreshed at a higher quality to be consistent across the region
6	Northeast Washington	Lower quality data exists for much of this region and has been used for understanding forest health. However, there are concerns about using this data for hazard mapping. Updated data will be needed to complete hazard mapping and maintain data consistency in the region
7	Remaining Western Cascades	Areas in the western Cascades are generally of lower data quality, making it of limited use. New data collection is necessary for hazard mapping.

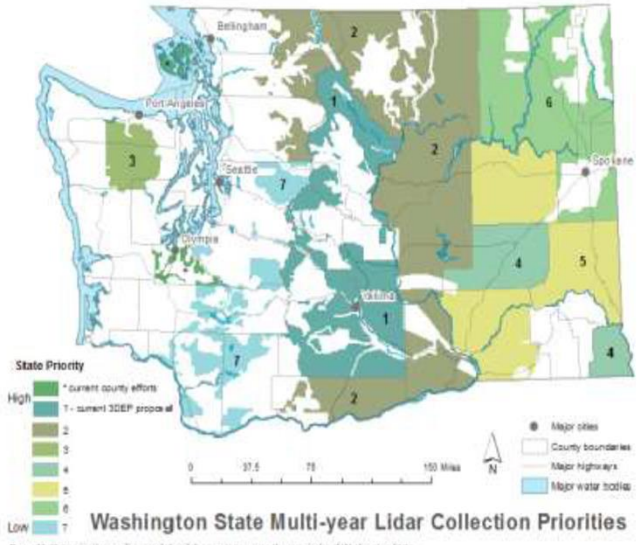


Figure 13. State priority map for completing lidar coverage across the remainder of Washington State.

Step 5. Update your State's 3DEP Plan

1. Publish Map layers 1-4 to your state's Lidar Plan
2. Revisit / repeat this process until your state initial 3DEP Lidar acquisition is complete
3. Ongoing - Collect information about other AOI and new Lidar data collection types in your state

3DEP GAP ANALYSIS PROCESS OVERVIEW – STEP 5

Step 5. Update your State's 3DEP Plan

1. Publish Map layers 1-4 to your state's Lidar Plan

2. Revisit / repeat this process until your state initial 3DEP Lidar acquisition is complete

Step 5. Update your State's 3DEP Plan

GEOLOGY AND EARTH RESOURCES

How to Get Involved

3. Ongoing - Collect information about other* AOI and new Lidar data collection types in your state

*Other new Lidar collection types (e.g. Bathymetric, QL1 / QL0), and also help identify other (non-Gap) Areas Of Interest (AOI) in your state, and map these responses.

See the "3DEP Lidar Acquisition Planning Mapping Application Implementation Guide" for more details [LINK]

If you, your organization, or agency are interested in lidar data and collection or have examples of how lidar data are needed in Washington, please feel free to contact us! Additionally, if you have a collection area in mind, please link to the survey below to help us get an idea of where new lidar is needed next. We'll compile the areas to help update the priority maps, as well as get in contact with you regarding ways we can acquire lidar for your area of interest.

Suggested lidar collection for Washington survey

Suggested lidar collection for Washington

Accurate and up to date elevation data are essential for natural hazard mitigation, resource and conservation management, infrastructure development, and many other applications. The purpose of this survey is to help identify where lidar (light detection and ranging) data are needed either where the data currently does not exist or needs to be updated. The areas of interest and feedback provided here is intended for use in the Washington State Lidar Plan, setting priority collection areas, and identifying if there are opportunities for the State, local, tribal, and federal governments to form funding partnerships. Interested parties are encouraged to share their potential project AOI's through this system. Projects should represent geographic areas under consideration in the next 1 to 3 years. To submit your AOI, please answer the following questions:

Name*
Please enter the name of the respondent or the Point of Contact for the proposed lidar collection

Organization or Agency*
Please enter the organization or agency requesting collection

Contact information*
Please send your business contact information so that we can contact you if needed

Description of Area of Interest (AOI)*
Please include and counties, cities, parks or identifiers to describe the AOI where lidar is needed


Questions / Comments
3DEP GAP ANALYSIS PROCESS OVERVIEW – STEPS 1-5

Homework for June 8, 3-5 pm (E) Workshop:

Map you State's Lidar Coverage and Gaps

Step 1.Create a Statewide Lidar Coverage Map (Map 1)

(Layer 1) Existing Lidar data collections (3DEP & Other)

(Layer 2) In-progress Lidar data collections (3DEP & Other)

(Layer 3) Planned Lidar data collections (3DEP & Other)

Step 2. Create a Statewide 3DEP Gap Map (Map 2)

(Layer 4) Create a Gap Layer to identify and attribute all statewide 3DEP gaps by type:

- Where no Lidar data exists
- Where existing Lidar data is out of date
- Where higher quality Lidar data is needed (QL2 or better data to provide greater accuracy and point density)

https://www.menti.com/ code: 8750 5716

Roundup

June 8, 3-5 pm ET Workshop:
Developing 3DEP Gap Strategies and Plan of Action

Homework:
Map and attribute 3DEP coverage and gaps

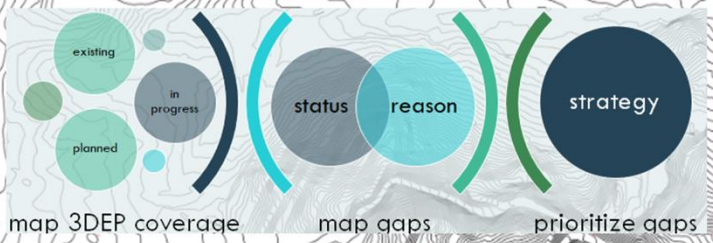
Workshop recordings to be published at NSGIC Learning Link and announced via 3DEP Interest Group

Thank you

NSGIC

3DEP

FOR THE NATION



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PHIL WORRALL, NSGIC 3DEP LIAISON AND PROJECT ENGINEER
PHIL.WORRALL@NSGIC.ORG