

The NCI/NAACCR Cancer Reporting Zone Project: Selecting the Preferred Zone Geography Alternative in Idaho

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Acknowledgments and Disclaimer

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- The findings and conclusions in this presentation are those of the authors and do not necessarily represent the official position of the National Cancer Institute or the Centers for Disease Control and Prevention.

Outline

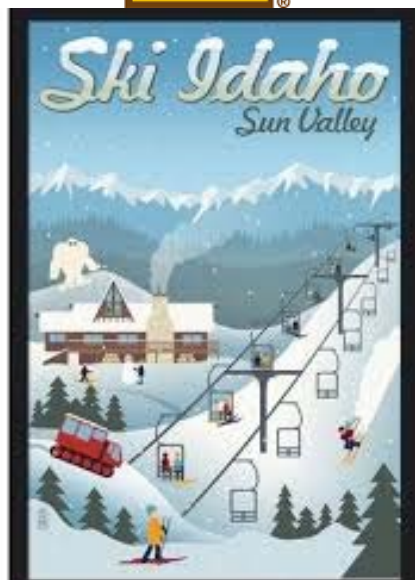
1. Idaho Geography and Population
2. Motivation: Idaho County-Level Cancer Incidence Rates
3. Step 1
4. Step 2
5. Cancer Statistics for Idaho Reporting Zones
6. Next Steps



1. Idaho Geography and Population



“Idaho” - the *what* state?
What do you think of?

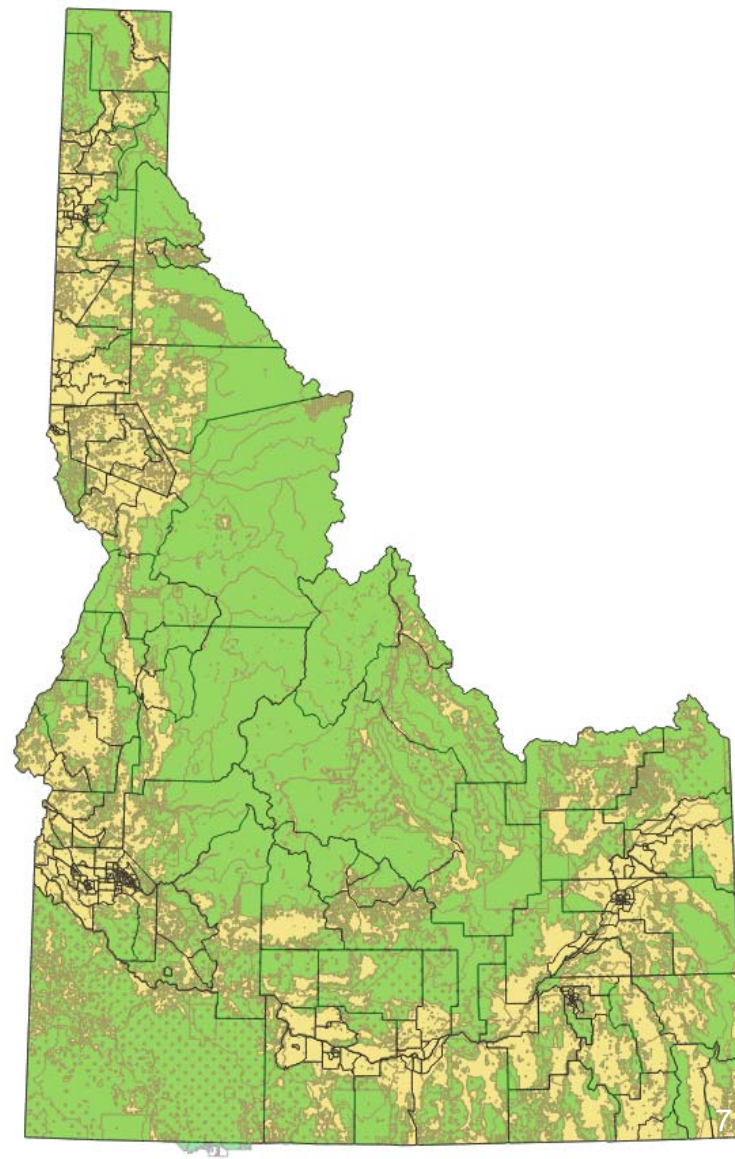


Where is Idaho?



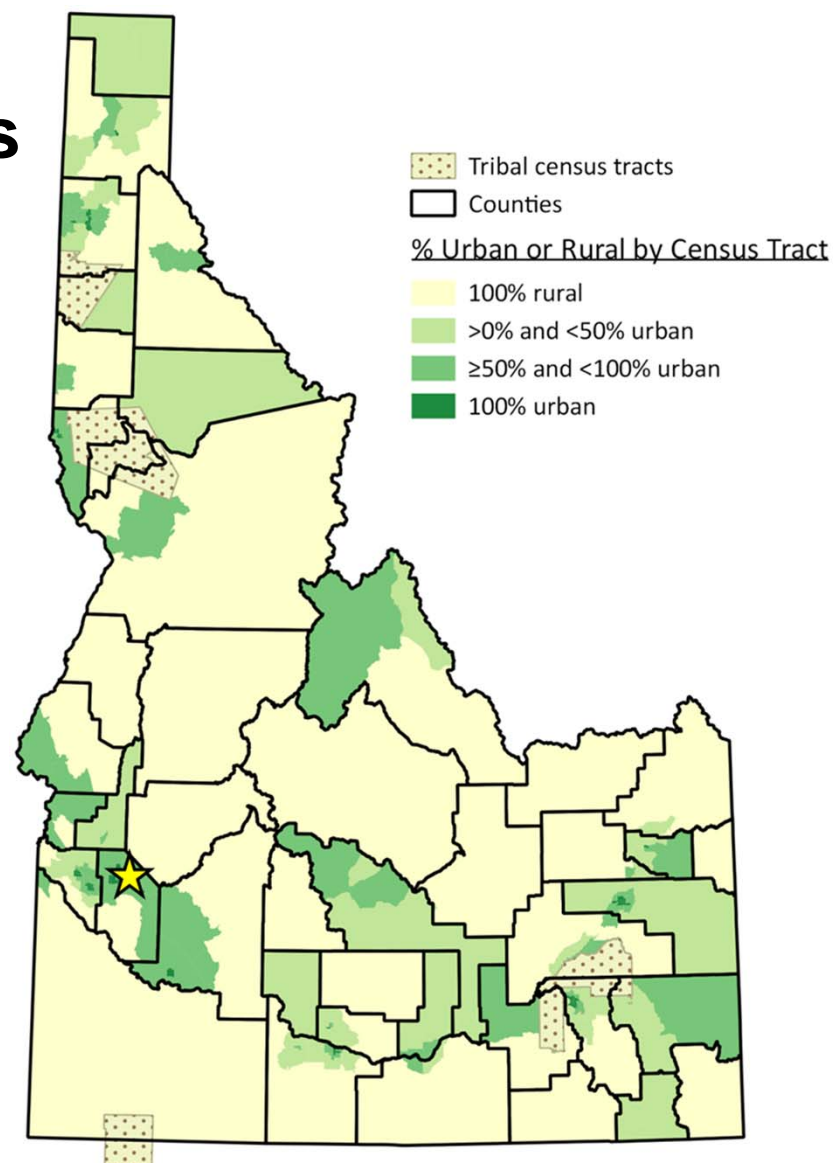
Idaho Geography

- Ranks 14th of 50 states in land area
- Topography includes deserts, snow-capped mountain ranges, rapids, vast lakes and steep canyons
 - Hells Canyon
 - 7,993' deep, deeper than Grand Canyon [6,093']
 - Largest roadless area in lower 48
 - Frank Church—River of No Return Wilderness Area
 - 2.4 million acres (CT is 3.5 million acres)

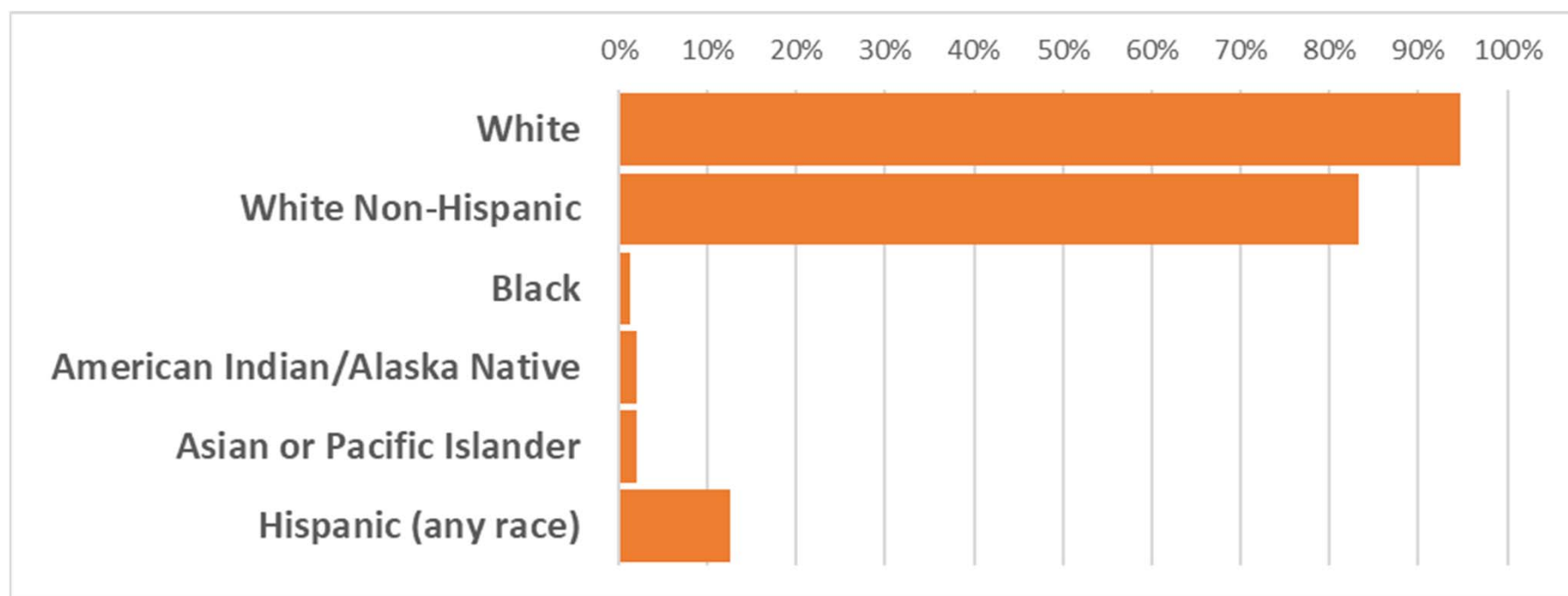


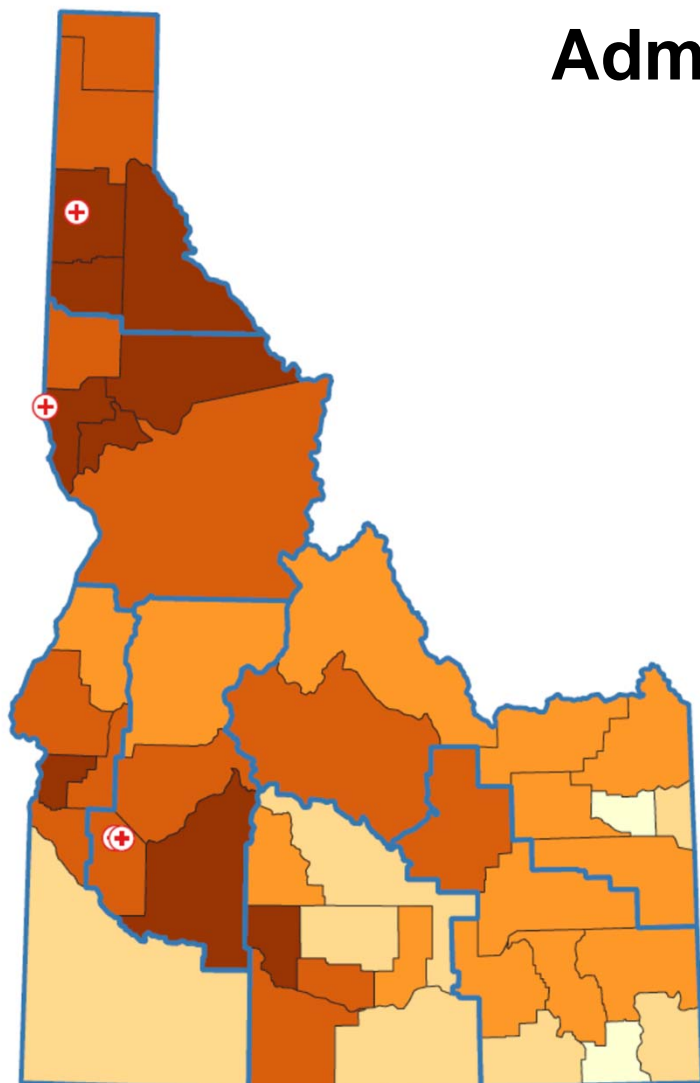
Idaho Population Demographics

- Ranks 39th of 50 states in population
- 1.8 million (2019)
 - 14% increase since 2010
 - Fastest-growing state



Population Demographics by Race/Ethnicity

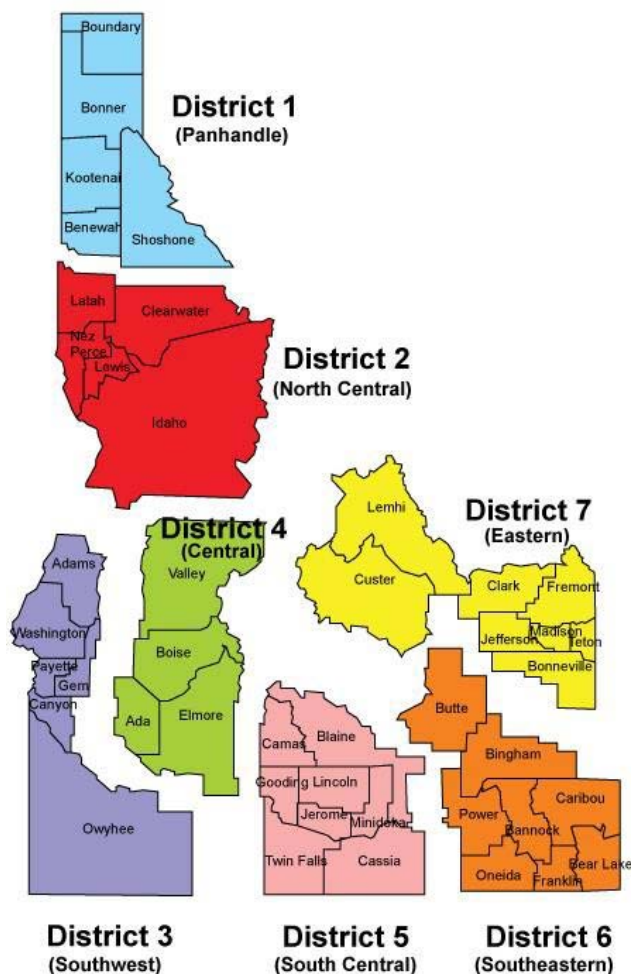




Administrative Boundaries

- **44 Counties**
 - Population <1000 to over 450,000

Idaho Public Health Districts



- **7 Public Health Districts**
 - Major population center
 - Major cancer treatment center

District	Name	Population 2017
1	Panhandle	234,737
2	North Central	109,017
3	Southwest	321,366
4	Central	501,733
5	South Central	197,412
6	Southeastern	172,751
7	Eastern	220,013

2. Motivation: Idaho County-Level Cancer Incidence Rates

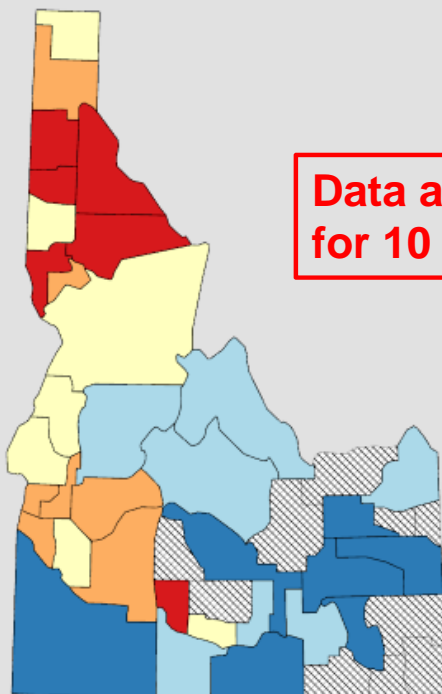


Public Tools for County-Level Cancer Statistics, U.S.

- United States Cancer Statistics: Data Visualizations
- State Cancer Profiles
- Environmental Public Health Tracking Network
 - For each, counts are suppressed if fewer than 16 cases were reported in a specific category, such as cancer type, race, and ethnicity.

County-Level Data Suppression State Cancer Profiles

Incidence Rates[†] for Idaho by County
Lung & Bronchus, 2012 - 2016
All Races (includes Hispanic), Both Sexes, All Ages



**Data are suppressed
for 10 of 44 counties**

Age-Adjusted
Annual Incidence Rate
(Cases per 100,000)

[Quantile Interval](#)

- 31.7 to 37.3
- > 37.3 to 46.9
- > 46.9 to 54.5
- > 54.5 to 60.7
- > 60.7 to 88.0

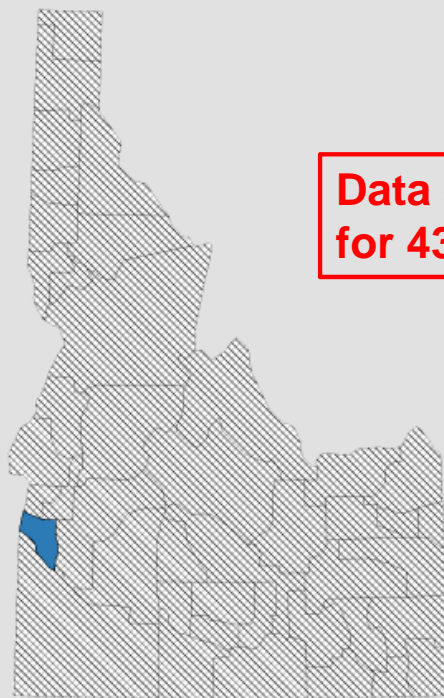
Suppressed * / **

US (SEER + NPCR)
Rate (95% C.I.)
59.2 (59.1 - 59.4)

Idaho
Rate (95% C.I.)
50.3 (48.9 - 51.9)

County-Level Data Suppression State Cancer Profiles

Incidence Rates[†] for Idaho by County
Lung & Bronchus, 2012 - 2016
Hispanic (any race), Both Sexes, All Ages



**Data are suppressed
for 43 of 44 counties**

Age-Adjusted
Annual Incidence Rate
(Cases per 100,000)
[Quantile Interval](#)^Δ

■ 48.8

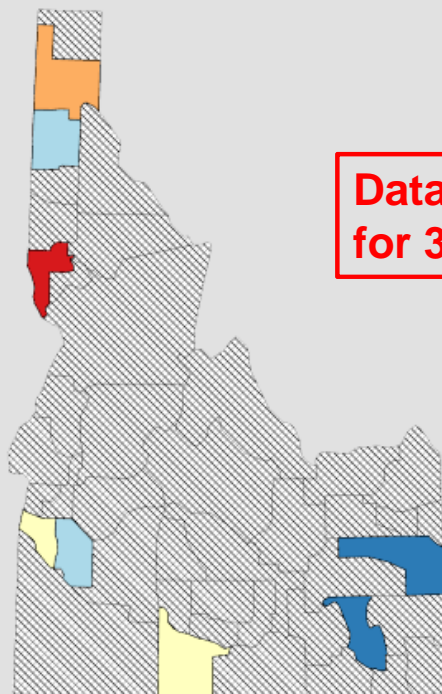
▨ Suppressed * / **

US (SEER + NPCR)
Rate (95% C.I.)
30.2 (29.9 - 30.5)

Idaho
Rate (95% C.I.)
38.9 (31.9 - 46.7)

County-Level Data Suppression State Cancer Profiles

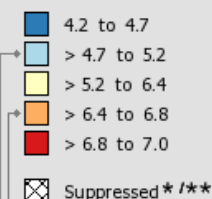
Incidence Rates[†] for Idaho by County
Stomach, 2012 - 2016
All Races (includes Hispanic), Both Sexes, All Ages



**Data are suppressed
for 36 of 44 counties**

Age-Adjusted
Annual Incidence Rate
(Cases per 100,000)

[Quantile Interval](#)



US (SEER + NPCR)
Rate (95% C.I.)
6.6 (6.5 - 6.6)

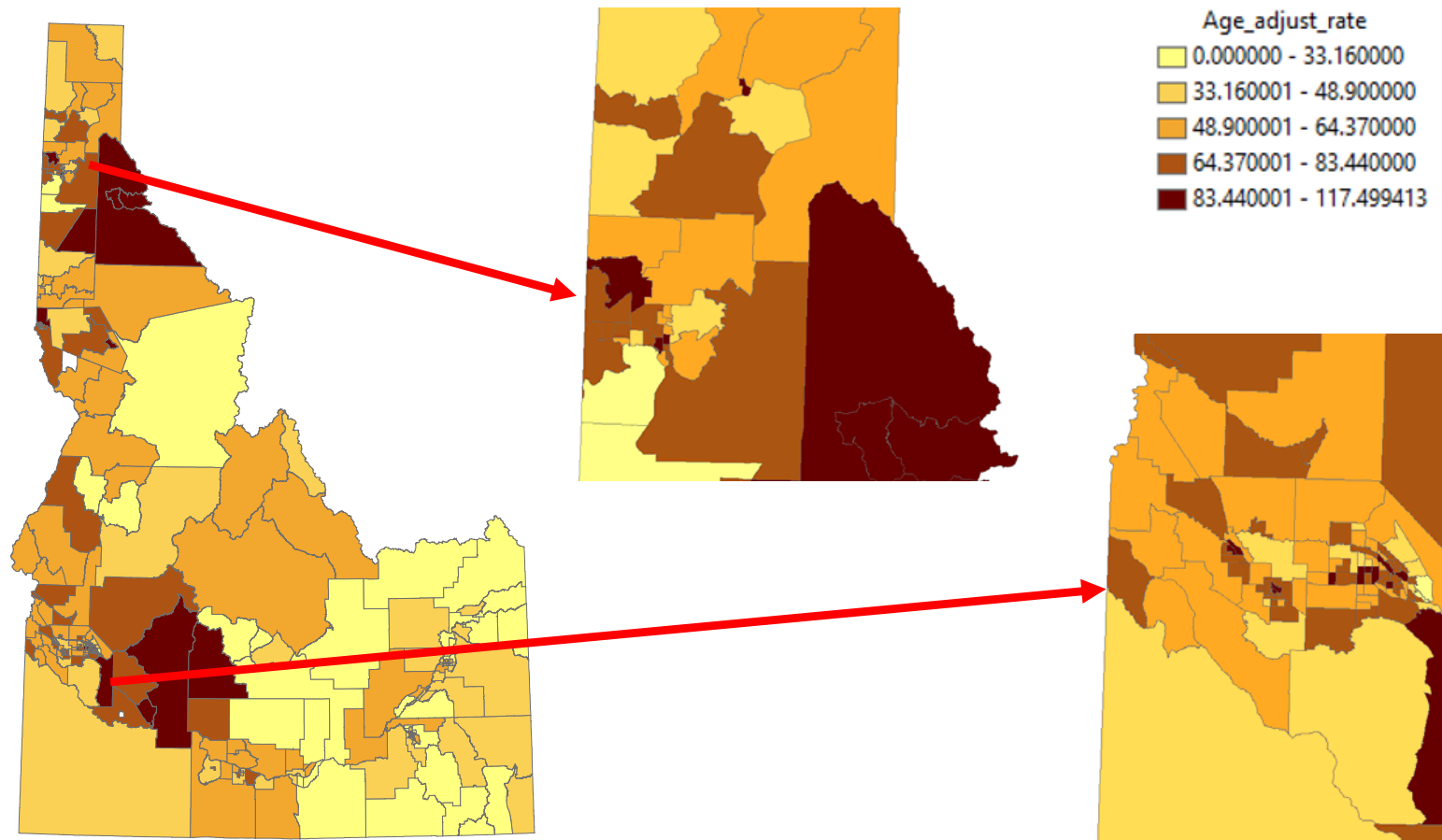
Idaho
Rate (95% C.I.)
5.2 (4.7 - 5.7)

Sub-County Variation in Cancer Burden

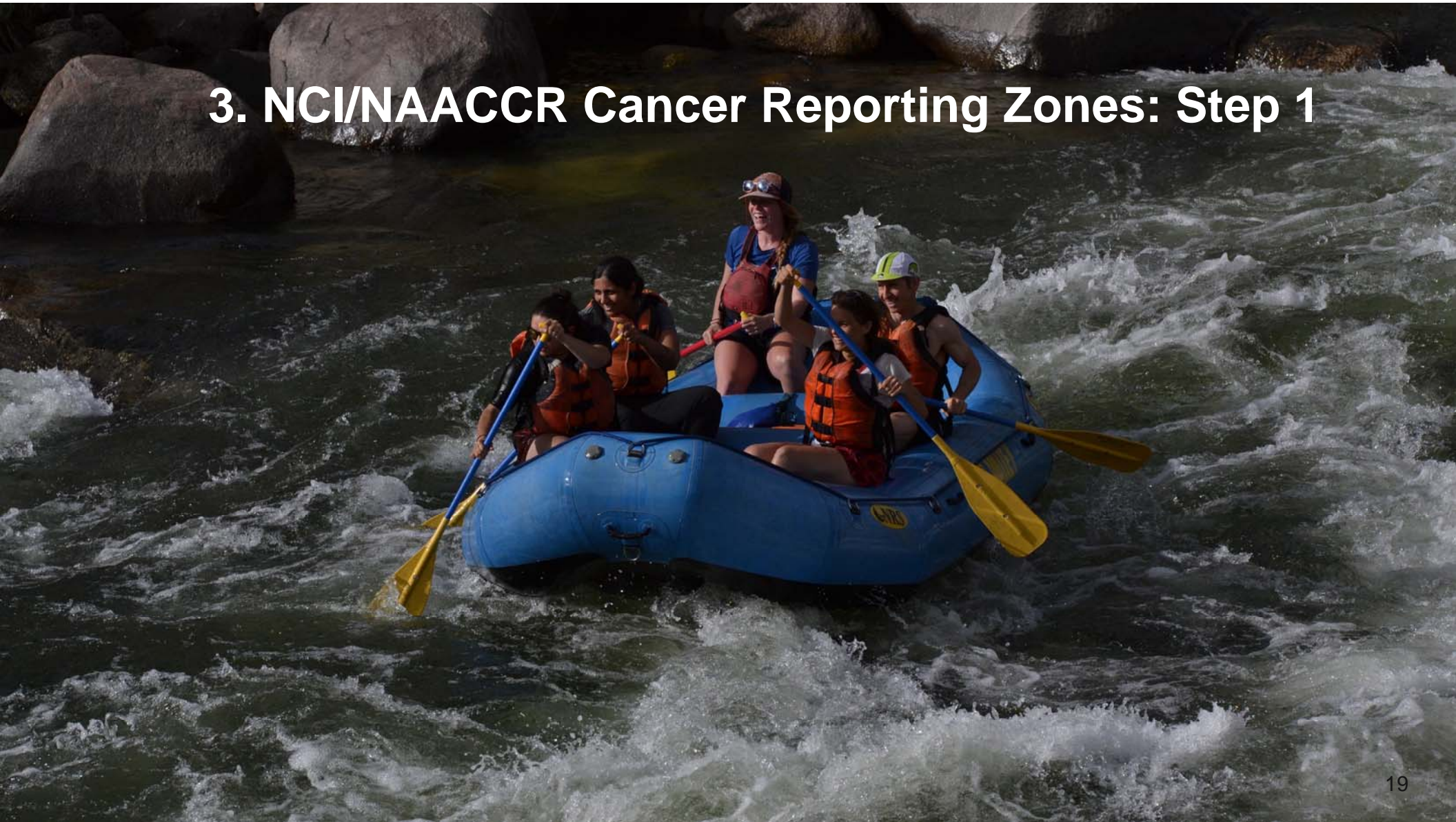
- Census Tract
 - Subdivision of county
 - Roughly equivalent to a neighborhood
 - Population usually 2,500 to 8,000 people
 - Relatively permanent, may be modified each decennial census
- There is no publicly-available federal source for census tract-level cancer incidence statistics
 - Some states publish sub-county cancer statistics
- 298 census tracts in Idaho 2010 census

Lung Cancer Incidence 2006-2015

Census Tract

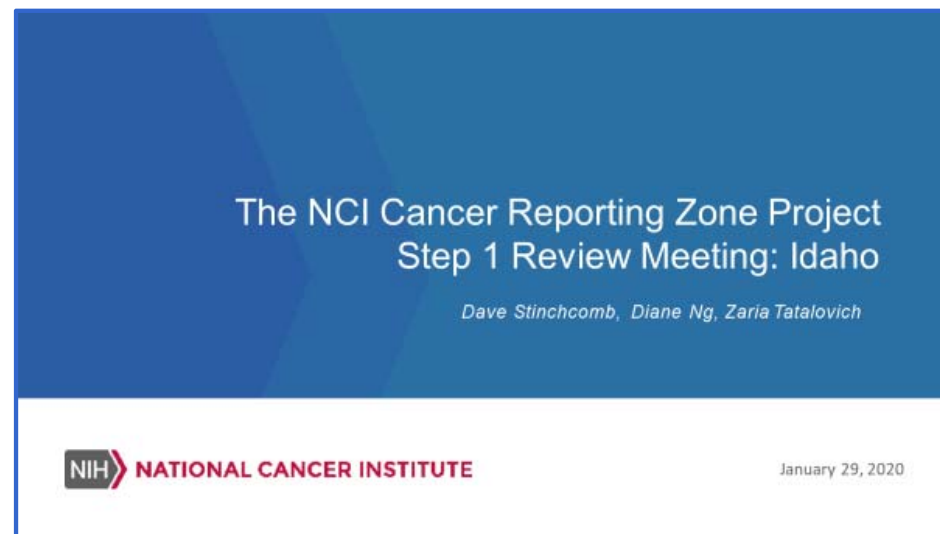


3. NCI/NAACCR Cancer Reporting Zones: Step 1



Step 1 – Choose Preferred Alternative for 4 Large Counties

- November 2019
 - Conference call with NCI, Westat, Georgia, Idaho, Iowa
- January 2020 – CDRI received Step 1 Zone alternatives for the 4 largest counties in Idaho

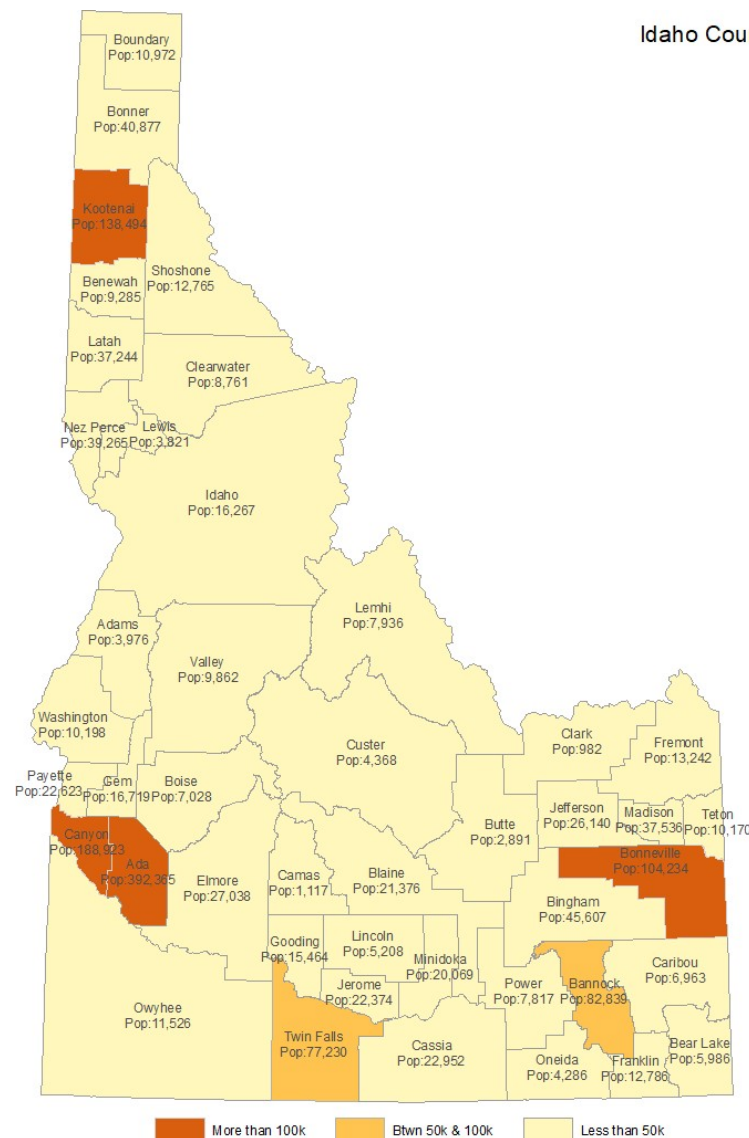


Step 1 Zone Alternatives

- Step 1: Aggregate census tracts in the large counties (populations over 100,000)
 - Zones cannot cross county boundaries
 - 10 repetitions – registry to review and select preferred alternative

State	Counties > 100k	Counties < 100k
Idaho	4	40

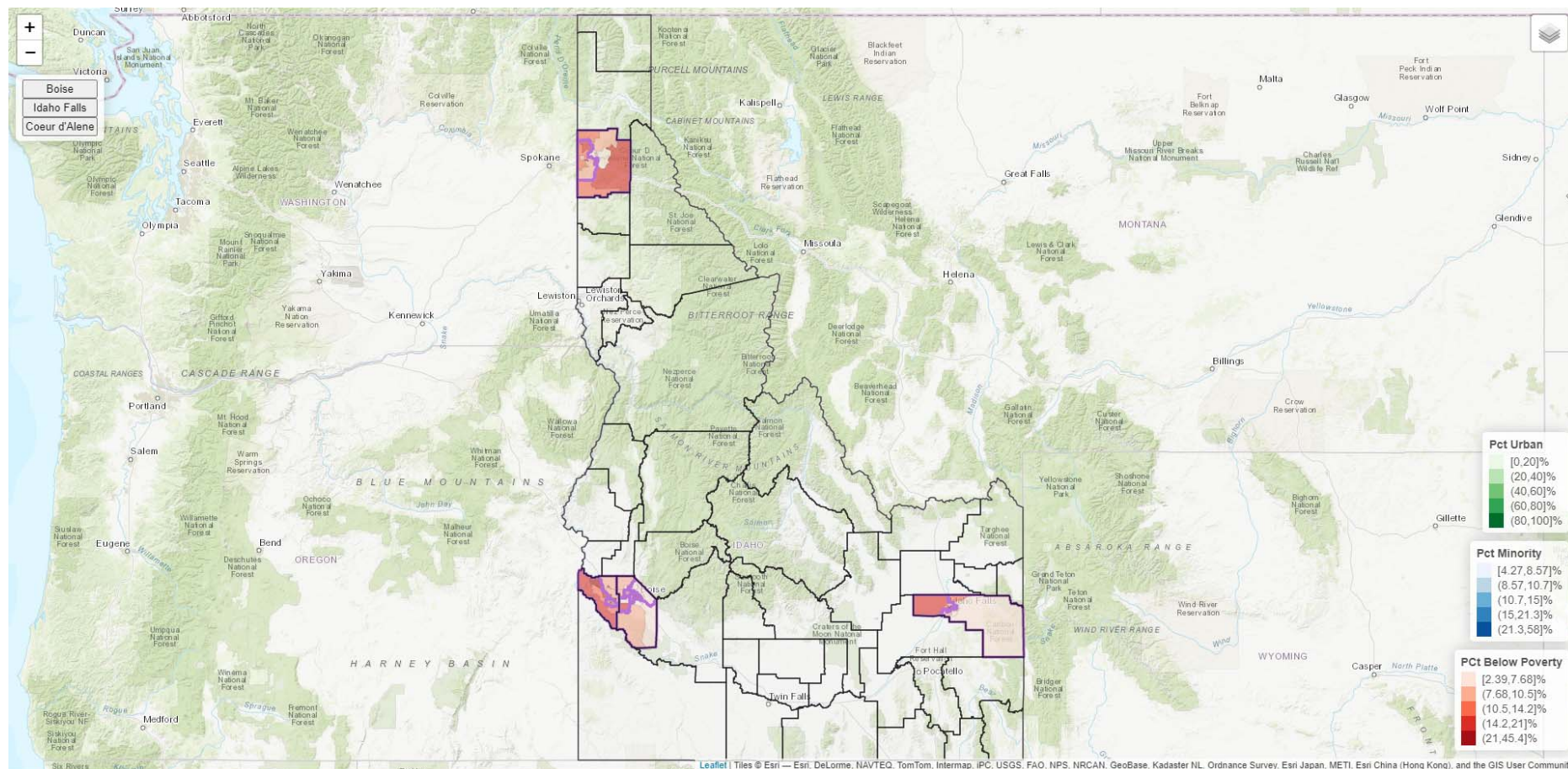
Idaho Counties



Step 1 Results Summary: 10 Alternatives / 4 Large Counties

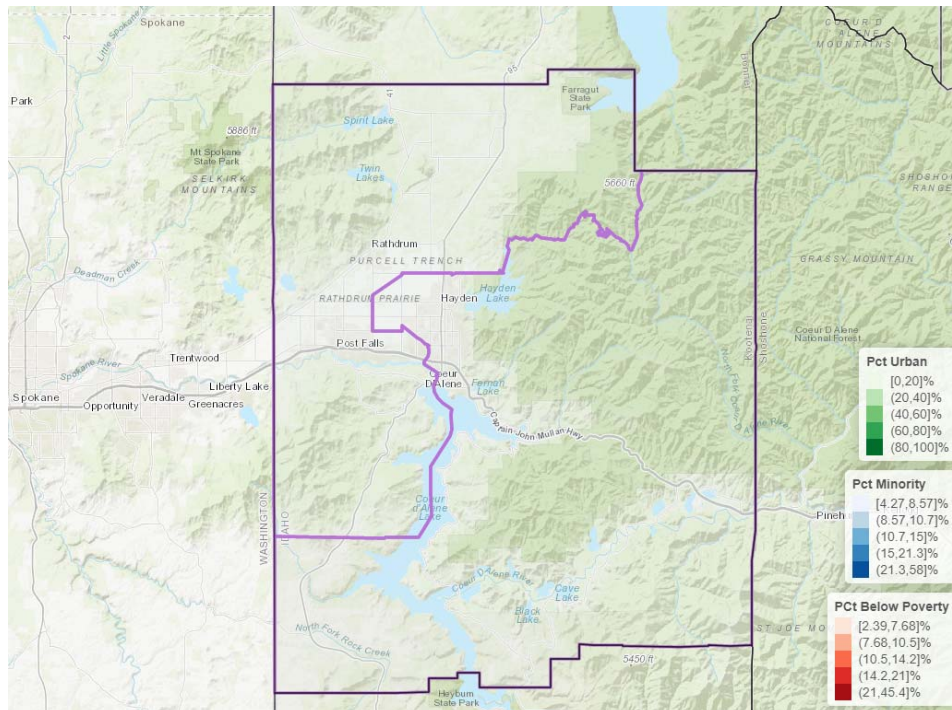
<u>RunNum</u>	<u>Rep</u>	<u>Relative Score</u>	<u>Relative Rank</u>	<u>Number of Zones</u>	<u>Pop2010 Min</u>	<u>Pop2010 Mean</u>	<u>Pop2010 Max</u>
ID01S1	a	1.0000	4	14	50,994	58,858	70,007
ID01S1	b	1.0039	2	14	51,457	58,858	69,493
ID01S1	c	0.9899	6	14	50,277	58,858	70,414
ID01S1	d	1.0069	1	14	50,416	58,858	69,287
ID01S1	e	0.9778	8	14	50,565	58,858	69,605
ID01S1	f	0.9741	9	14	51,715	58,858	70,414
ID01S1	g	1.0039	3	14	50,330	58,858	69,493
ID01S1	h	0.9946	5	14	51,953	58,858	70,373
ID01S1	i	0.9714	10	14	52,037	58,858	70,618
ID01S1	j	0.9857	7	14	51,246	58,858	69,715

HTML Leaflet of Idaho Step 1 Zone Alternatives

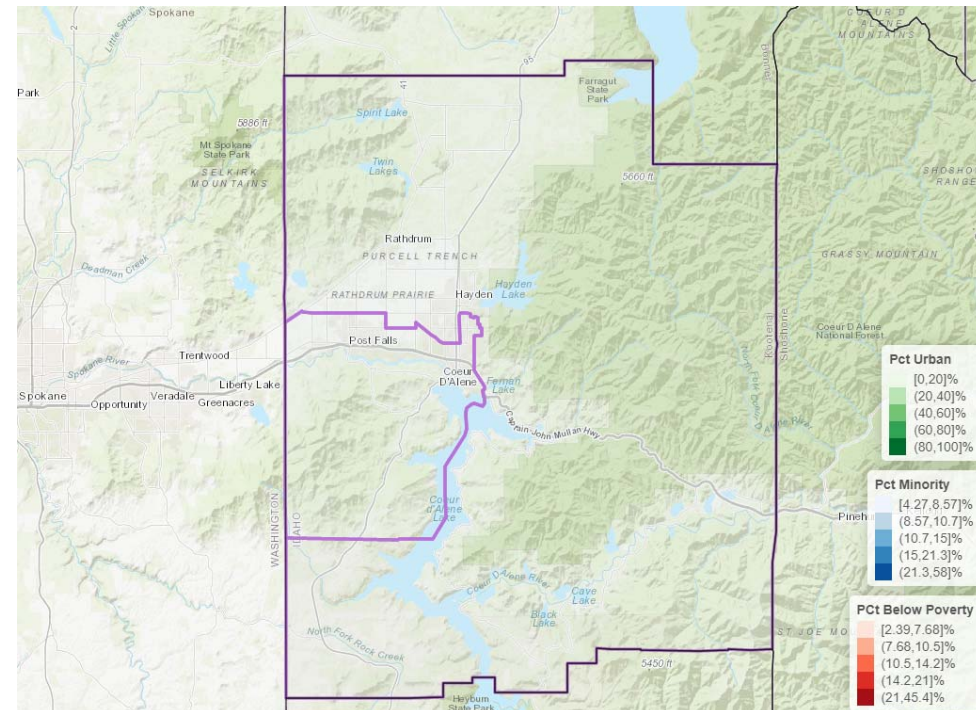


HTML Leaflet of Idaho Step 1 Zone Alternatives Kootenai County

Zone Alternative B



Zone Alternative C

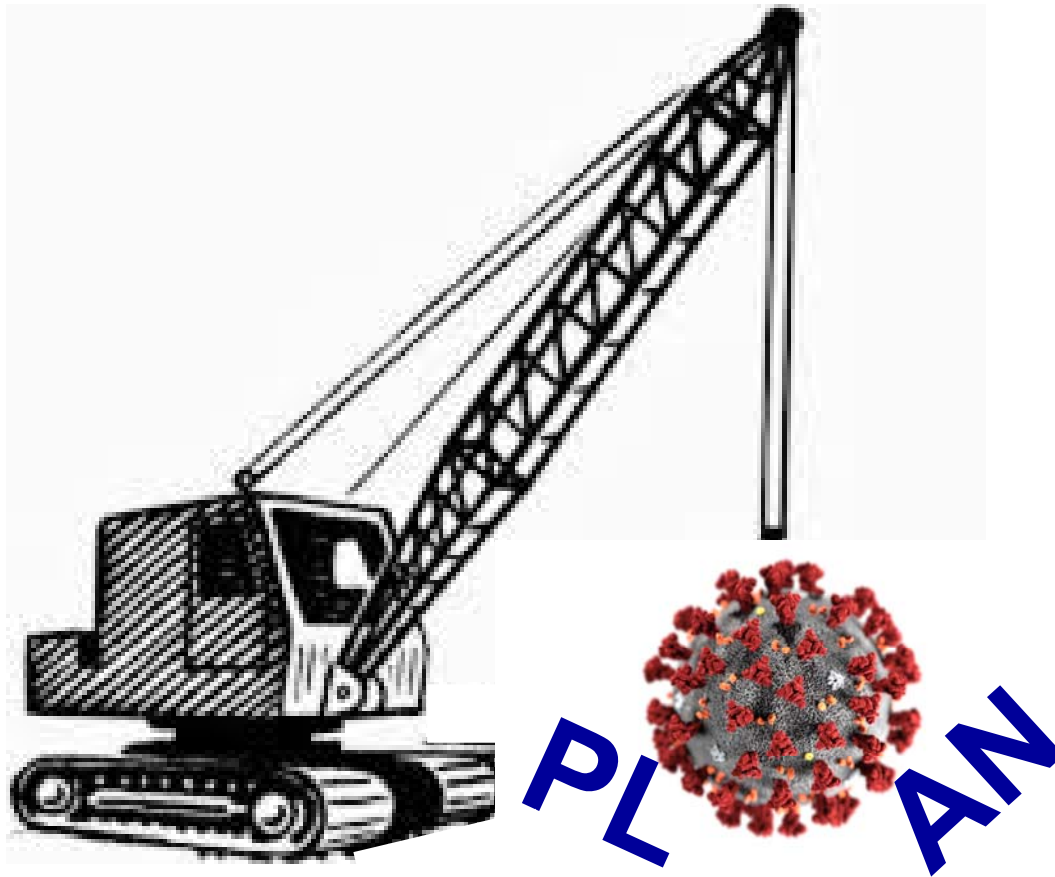


Step 1 - The PLAN

“This presentation will describe how the Cancer Data Registry of Idaho engaged public health practitioners and policy makers to select the final Idaho Zone geography from multiple alternatives.”

- Engage stakeholders
 - State comprehensive cancer control staff
 - Other state experts
 - Local public health
 - Hospital administration
 - County commissioners & city government

So much for the **PLAN**...



Choosing Preferred Alternative in 4 Large Counties

Plan B

- Quantitative Approach
 - Relative Scores
 - Variation in Cancer Incidence Rates
 - Variation in Cancer Mortality Rates
- Expert Stakeholders
 - Comprehensive Cancer Control Program Manager
 - Health Data Analytics Program Manager

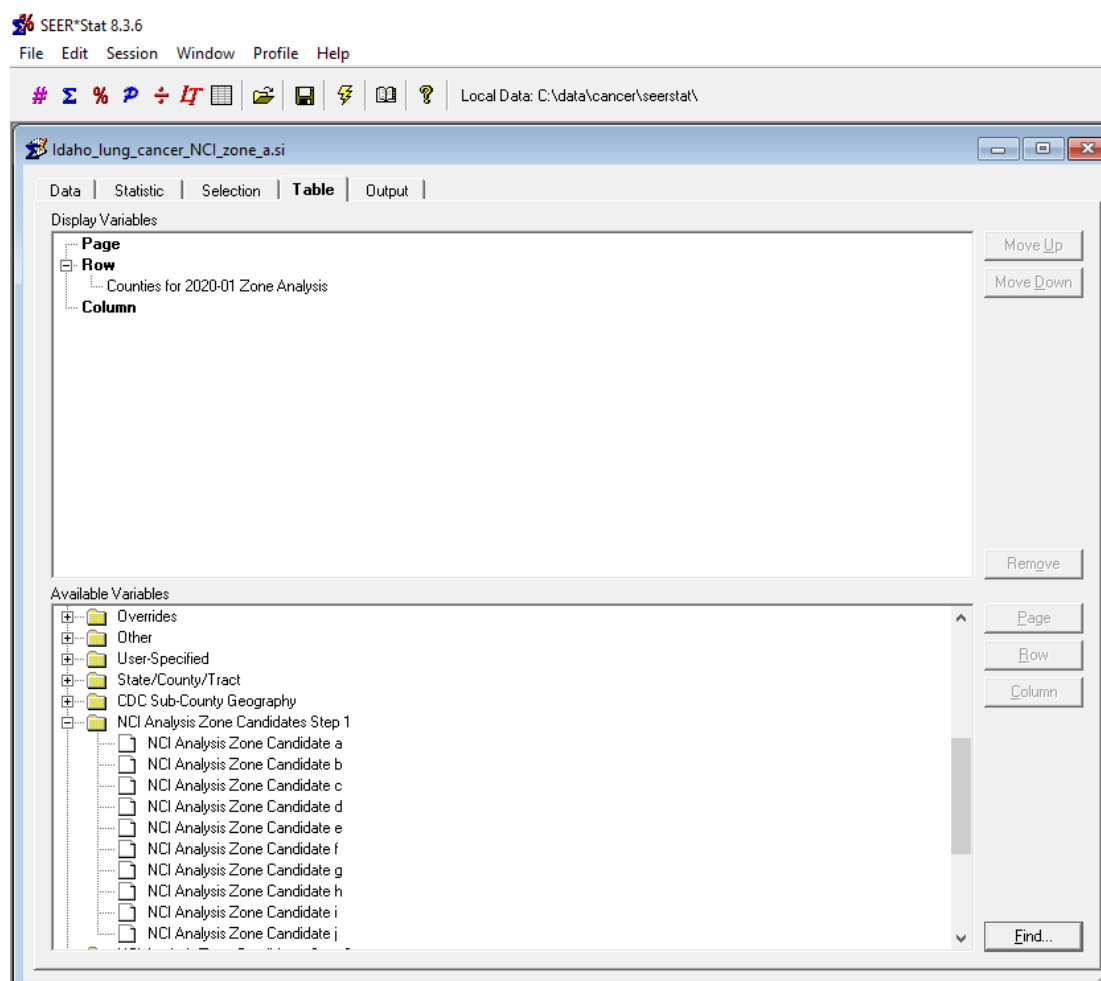
Optimizing for Cancer Variation

Primary Site Category	Mean Intra-County Incidence Rate Variation
Colorectal	1.5-fold
Liver & Intrahepatic Bile Duct	2.3-fold
Lung & Bronchus	1.5-fold

- Idaho Reporting Zones *could* be designed to have similar cancer rates.
 - Does not help prioritize resources
- We were interested in maximizing variation in cancer rates across Zones.

Intra-County Rate Variation

- ***Linked census tract attribute database***
 - 10 NCI/NAACCR Zone alternatives
 - CDC Sub-County 5k and 20k Geographies
 - (next talk)



Hone the Zones from 10 to n

“Having more options doesn’t always lead to better or happier decisions.”

Shankar Vedantam, Hidden Brain, May 4, 2020: The Choices Before Us: Can Fewer Options Lead To Better Decisions?

- Weighted sum of ranks (higher = better)
 - (0.4 x) Relative Scores
 - (0.3 x) Incidence Rate Sums of Squares (measure of variability)
 - Lung & Bronchus, Colorectal (late stage), Breast (female, late stage)
 - (0.3 x) Mortality Rate Sums of Squares (measure of variability)
 - Lung & Bronchus, Colorectal, Breast (female)
- Honed to 2 or 3 choices in each county.

Expert Stakeholders

- Comprehensive Cancer Control Program Manager
- Health Data Analytics Program Manager
- Sent email providing instructions: ... ***We are soliciting your help in selecting the preferred solution from among candidate solutions for each of the large counties....***

Reasoning for Choices from Expert Stakeholders

- *“The lines flowed with existing neighborhoods/geographic personalities.”*
- *“... Zone F does a better job of capturing the actual ‘city limits’ of Idaho Falls and the area between Idaho Falls and Shelley...”*
- *“... makes sense from a program administration approach.”*
- *“I do think it would be helpful for other issues beyond cancer... because of reduced heterogeneity... but granular enough to make meaningful decisions.”*

Step 1 Preferred Alternatives

Quantitative Approach

+

Expert Stakeholder

+

Tiebreaker from Idaho Hospital Association (if needed)

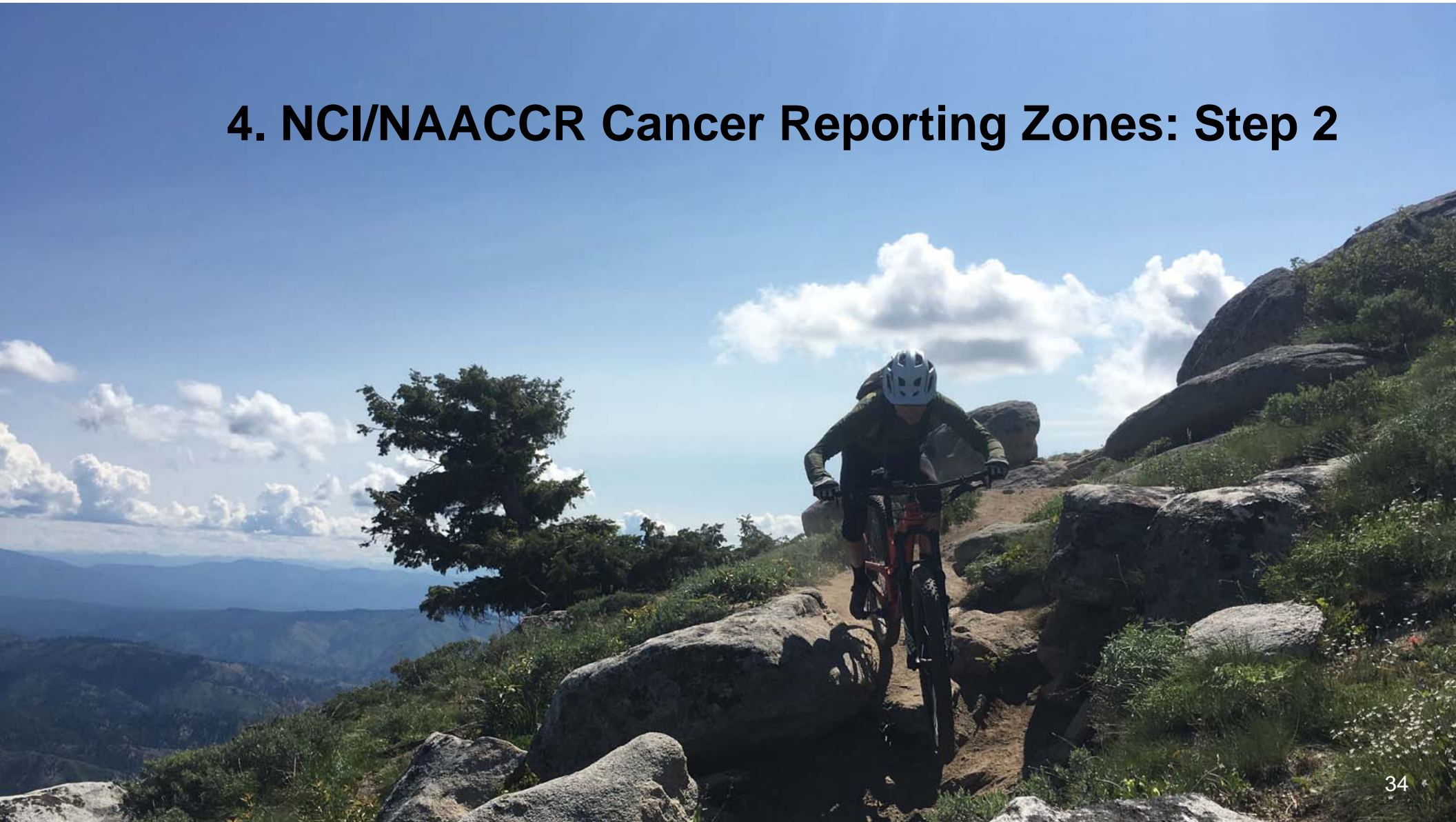
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Idaho Preferred Alternatives for Step 1



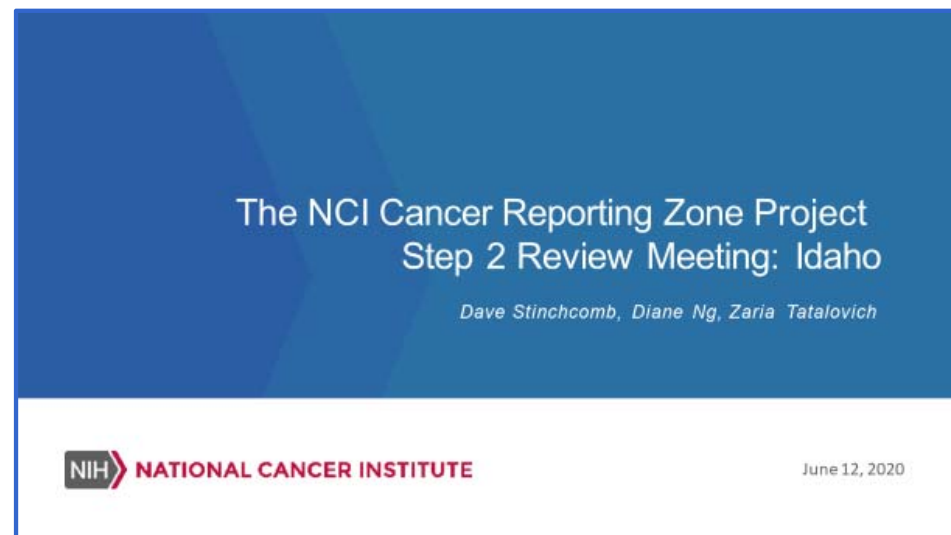
Sent to Westat May 2020

4. NCI/NAACCR Cancer Reporting Zones: Step 2

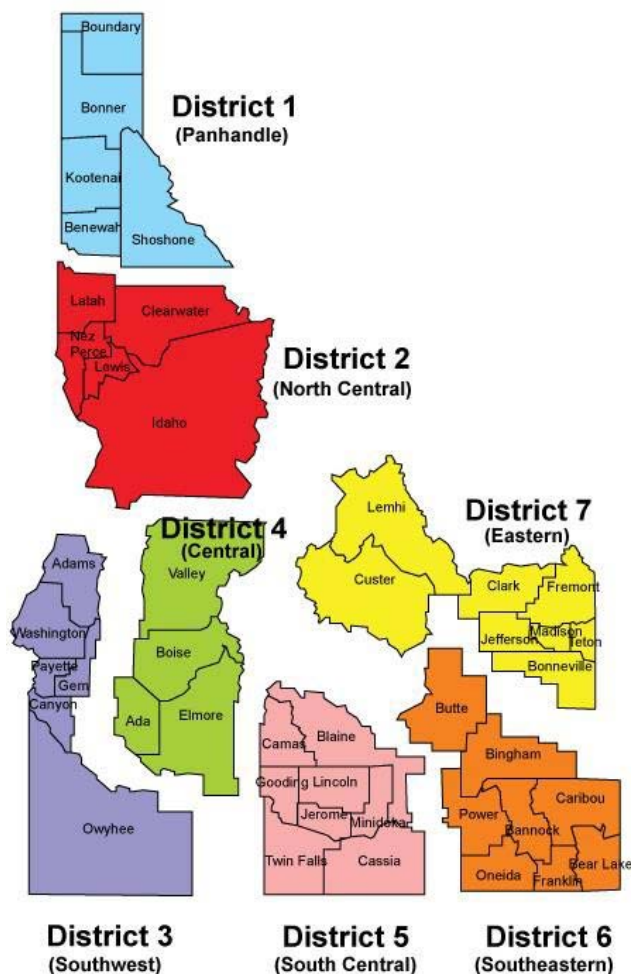


Step 2 – Choose Preferred Alternative for Other 40 Counties

- June 2020 – CDRI received Step 2 Zone alternatives for the remaining 40 counties in Idaho
- Two Approaches
 1. Public Health District constraints
 2. No constraints



Idaho Public Health Districts



- **7 Public Health Districts**
 - Major population center
 - Major cancer treatment center

District	Name	Population 2017
1	Panhandle	234,737
2	North Central	109,017
3	Southwest	321,366
4	Central	501,733
5	South Central	197,412
6	Southeastern	172,751
7	Eastern	220,013

Step 2 result summary – ID01S2 (with constraints) by region

- 1 Solution
- 23 Zones for Idaho
- 1-7 Zones in each Public Health District
- 5-27 census tracts in each Zone

Region	Name	Pop2010 Total	Number of Zones	Zones Pop2010 Min	Zones Pop2010 Mean	Zones Pop2010 Max
01	Panhandle	212,393	3	68,080	70,798	73,899
02	North Central	105,358	1	105,358	105,358	105,358
03	Southwest	253,965	4	53,516	63,491	75,152
04	Central	436,293	7	53,254	62,328	98,707
05	South Central	185,790	3	50,653	61,930	77,230
06	Southeastern	169,175	2	82,839	84,588	86,336
07	Eastern	204,608	3	52,519	68,203	77,855

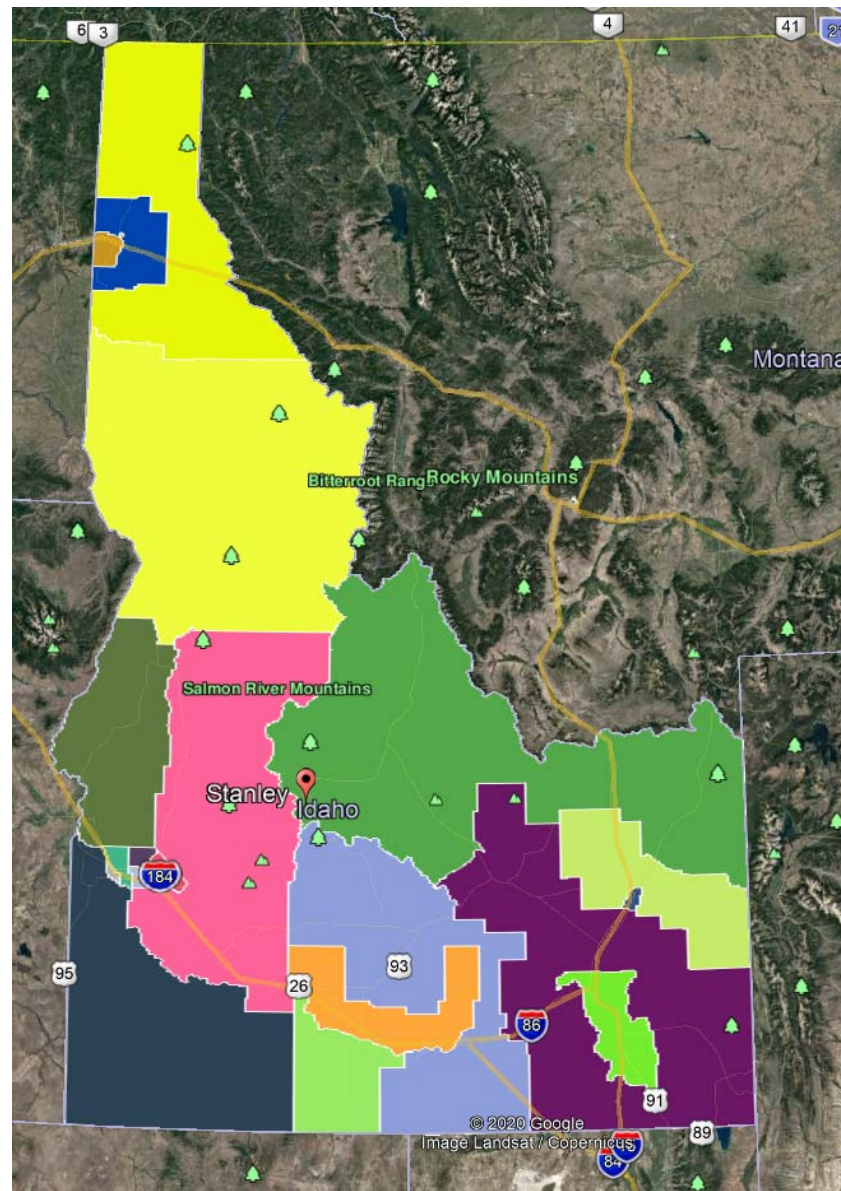
Step 2 result summary – ID02S2 (without constraints)

- 6 Solutions
- 26 Zones for Idaho in each Alternative
- 5-22 census tracts in each Zone

RunNum	Rep	Relative Score	Relative Rank	Number of Zones	Pop2010 Min	Pop2010 Mean	Pop2010 Max
ID02S2	za	1.0000	1	26	51,849	60,292	82,839
ID02S2	zb	0.9993	2	26	51,715	60,292	82,839
ID02S2	zd	0.9975	6	26	51,715	60,292	82,839
ID02S2	ze	0.9952	8	26	51,715	60,292	82,839
ID02S2	zj	0.9934	9	26	51,715	60,292	82,839
ID02S2	zg	0.9768	10	26	50,899	60,292	82,839

Step 2 – Zones with Constraints for Health Districts

(1 of 1)

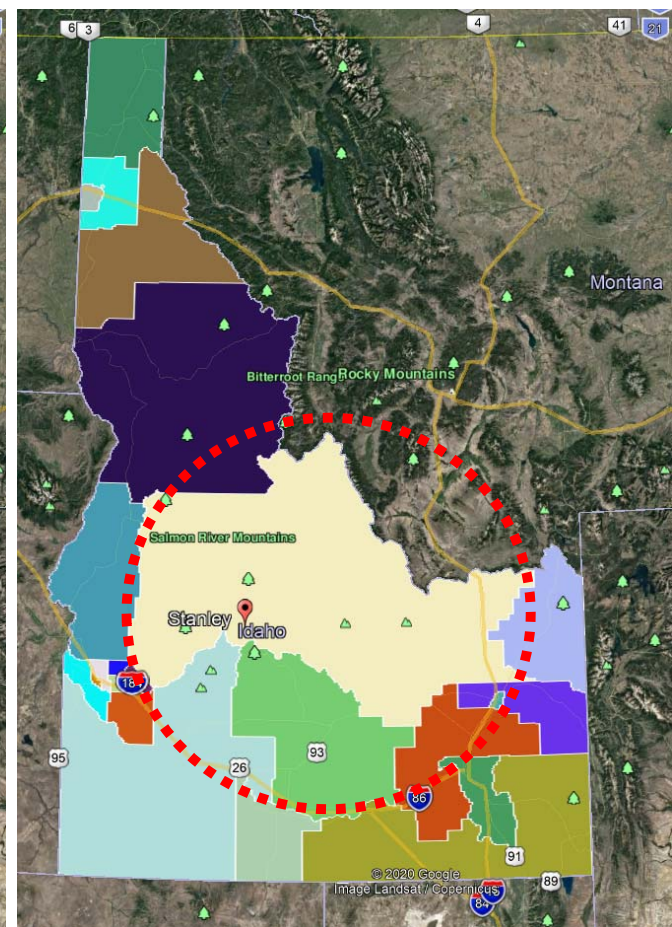
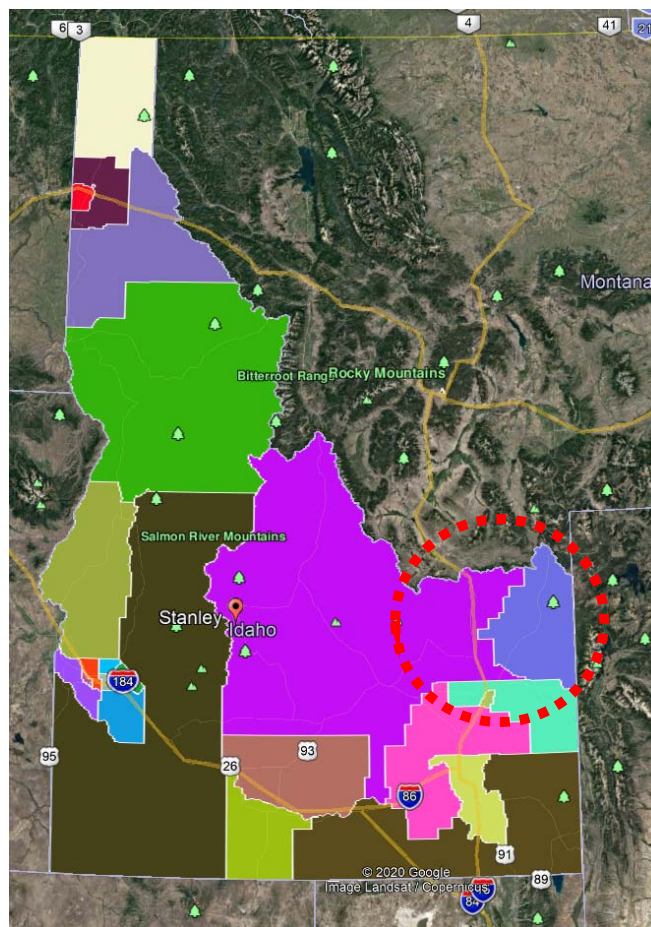
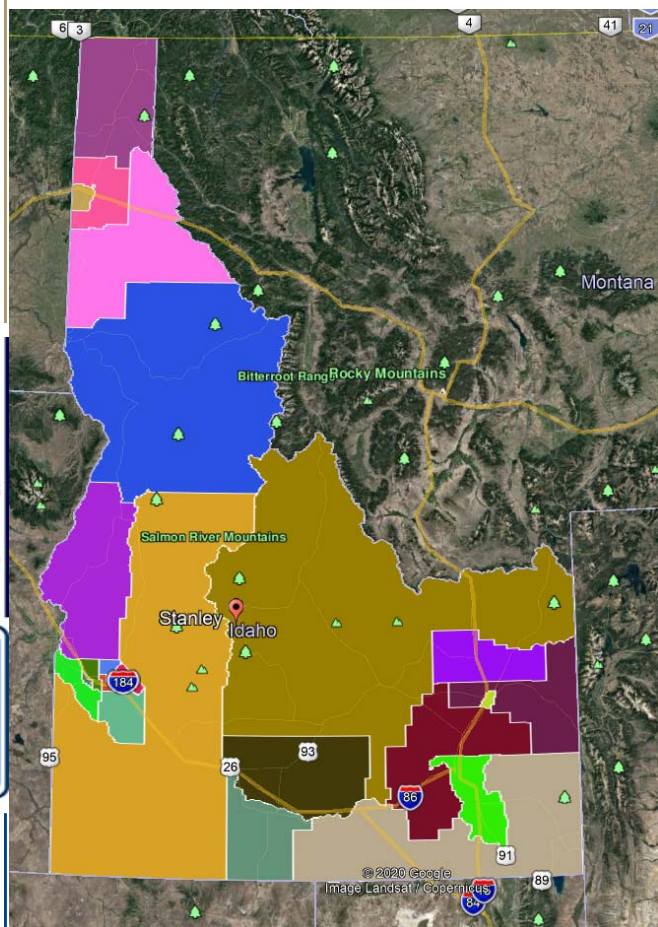


Step 2 – Zones without Constraints (1-3 of 6)

a

b

d

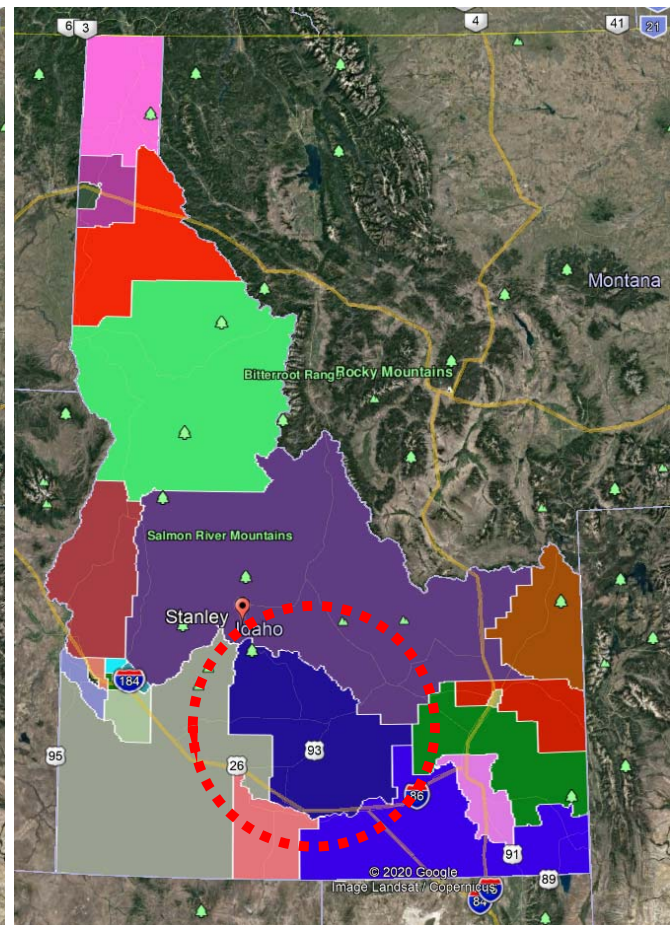
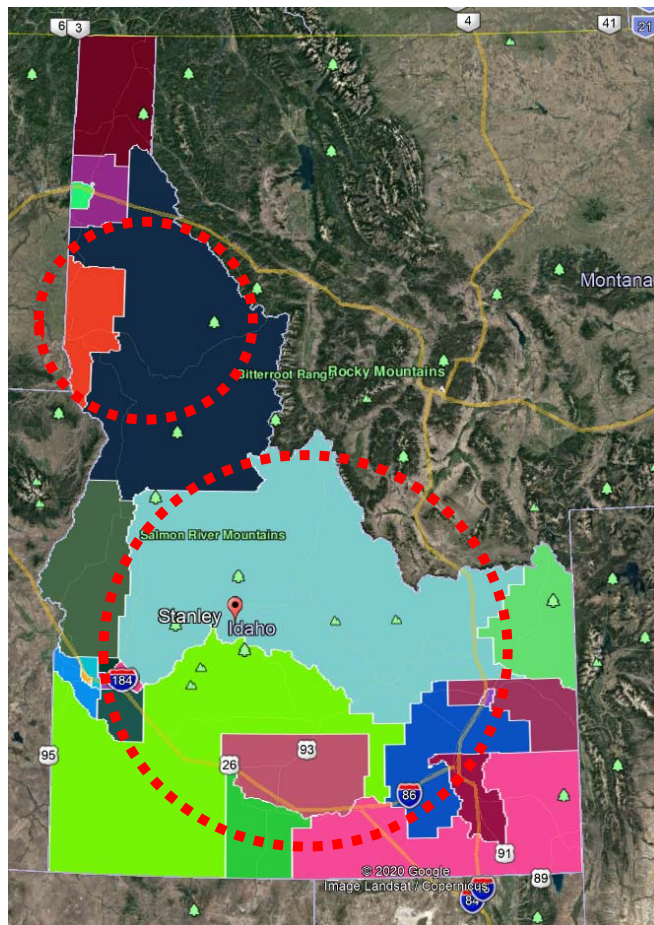
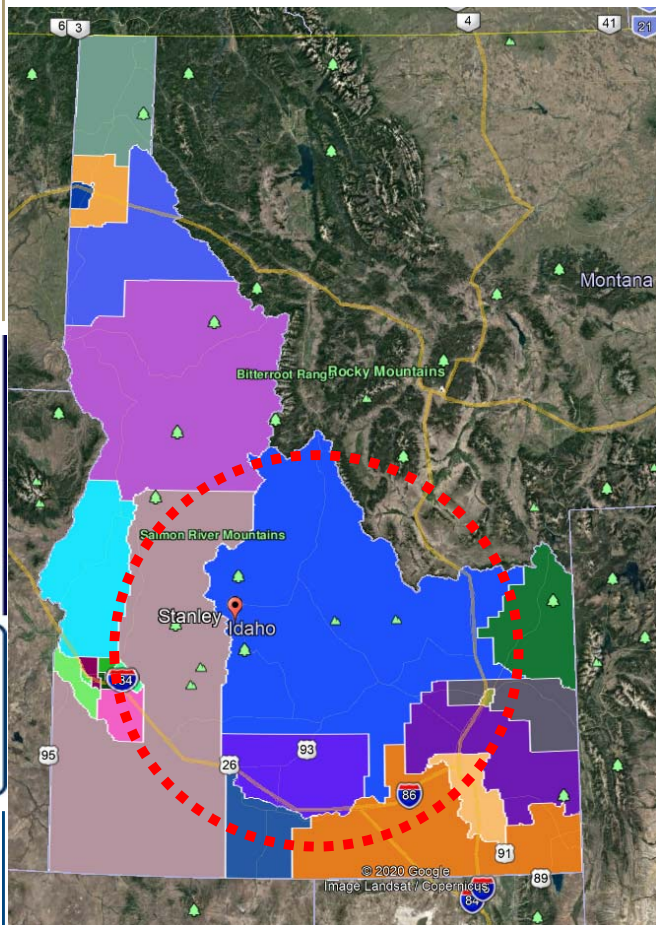


Step 2 – Zones without Constraints (4-6 of 6)

e

g

j



Choosing Preferred Alternative in 40 Remaining Counties

Plan B

- Quantitative Approach
 - Relative Scores
 - Variation in Cancer Incidence Rates
 - Variation in Cancer Mortality Rates
- Expert Stakeholders
 - Comprehensive Cancer Control Program Manager
 - Health Data Analytics Program Manager

Expert Stakeholders

- Sent email providing instructions:

“...We are soliciting your help in selecting the preferred solution from among candidate solutions for the remainder of Idaho....”

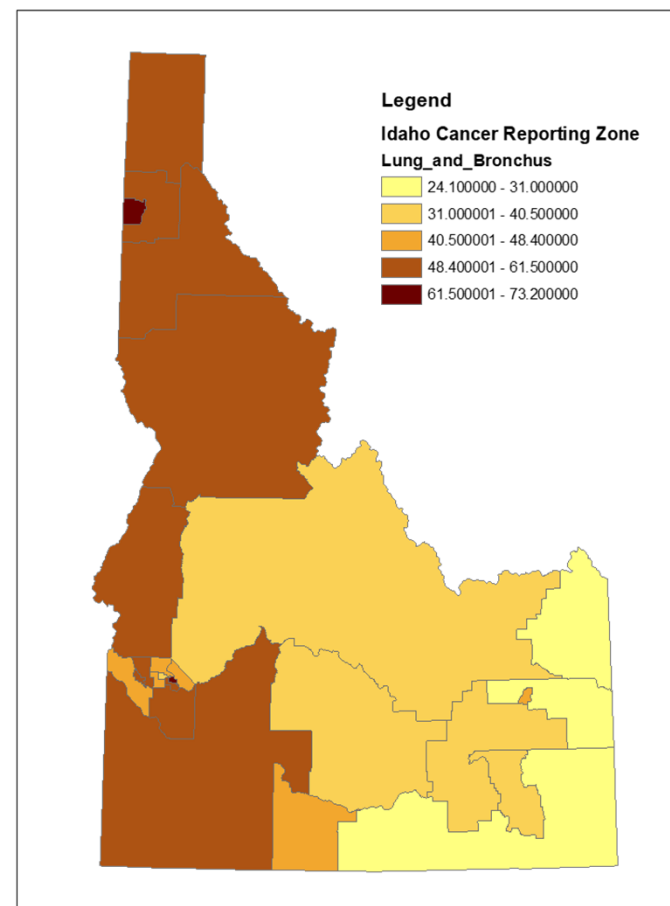
- KML file to open in Google Earth Pro
 - 7 alternatives

Reasoning for Choices from Expert Stakeholders

- Neither Expert Stakeholder chose the alternative that respected public health district boundaries.
- *“the zones make sense to me from both a service delivery and ‘community’ perspective.”*
- *“... it captures the cities and towns that are alike enough and share similar access to services...”*
- *“... across the board we are working more and more with non-PHD clinics and health providers so no reason to stick to the PHD constraint.”*
- *“It would help us, potentially, address more disparate and unique populations that a single district wouldn’t have enough of a reach to become a priority.”*

Idaho Preferred Alternative = Alternative D

- Selected as 1st choice by one Expert Stakeholder
- Selected as 2nd choice by other Expert Stakeholder
- Alternative D had the highest variability in cancer incidence and mortality rates.
- Compared to its nearest competitor, J, the only differences are in SE Idaho.
 - D keeps Fort Hall Indian Reservation more intact and joins two related communities that are split in J.



Idaho Cancer Reporting Zones

ZoneNum	ZoneName	ZoneTractCnt	ZoneCoCnt	ZonePop
1	Ada 1	11	1	58032
2	Ada 2	11	1	53254
3	Ada 3	10	1	56459
4	Ada 4	11	1	55090
5	Ada 5	6	1	54779
6	Ada 6	5	1	55260
7	Ada 7	5	1	59491
8	Adams, Gem, Payette, Washington	12	4	53516
9	Bannock	22	1	82839
10	Bear Lake, Caribou, Cassia, Franklin, Oneida	13	5	52973
11	Benewah, Latah, Shoshone	12	3	59294
12	Bingham, Power	10	2	53424
13	Blaine, Camas, Jerome, Lincoln, Minidoka	16	5	70144
14	Boise, Butte, Clark, Custer, Jefferson, Lemhi, Valley	14	7	59207
15	Bonner, Boundary	11	2	51849
16	Bonneville 1	10	1	51715
17	Bonneville 2	11	1	52519
18	Canyon 1	10	1	62317
19	Canyon 2	10	1	63626
20	Canyon 3	9	1	62980
21	Clearwater, Idaho, Lewis, Nez Perce	20	4	68114
22	Elmore, Gooding, Owyhee	10	3	54028
23	Fremont, Madison, Teton	10	3	60948
24	Kootenai 1	11	1	70414
25	Kootenai 2	14	1	68080
26	Twin Falls	14	1	77230

5. Cancer Statistics for 26 Idaho Reporting Zones



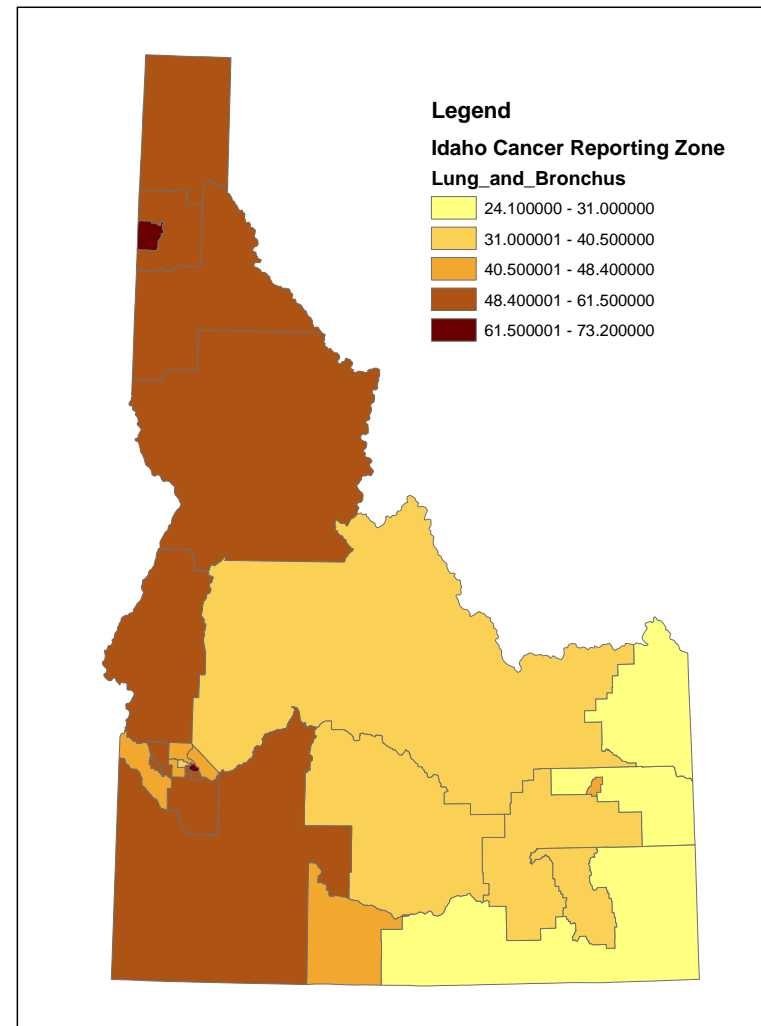
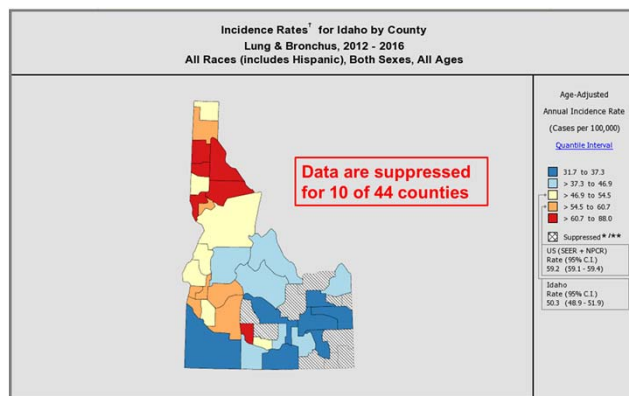
Assessed Suppression due to Counts < 16

- SEER*Stat census tract-level db linked to tract attributes
- Cancer incidence, 2013-2017

Primary Site Category	Subgroup	Zones Suppressed % (of 26)	Counties Suppressed % (of 44)
All Sited Combined	All	0%	2%
All Sited Combined	Hispanic	0%	55%
Oral Cavity and Pharynx	All	4%	66%
Liver & Bile Duct	All	12%	80%
Stomach	All	27%	82%
Esophagus	All	38%	84%
Breast	Hispanic	77%	91%
Cervix	All	92%	91%
Colorectal	Hispanic	96%	95%
Lung & Bronchus	Hispanic	96%	95%

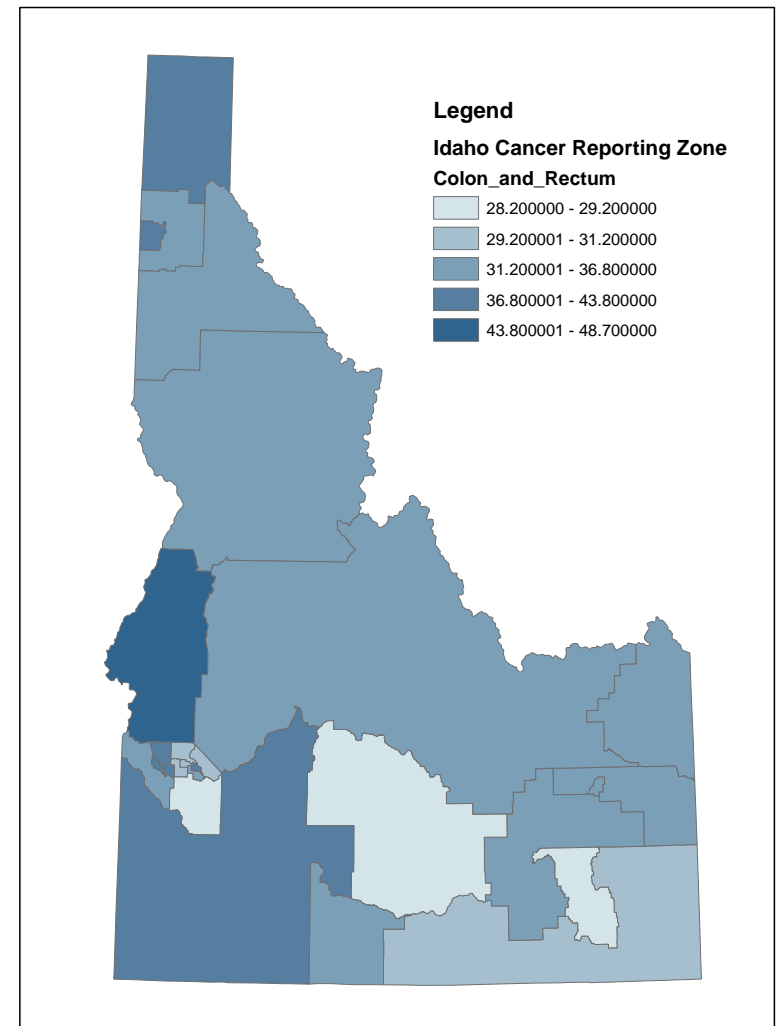
Lung & Bronchus Incidence 2013-2017 By Idaho Cancer Reporting Zone

- Rates ranged from 24.1 – 73.2 cases per 100k
- Max/Min = 3.04



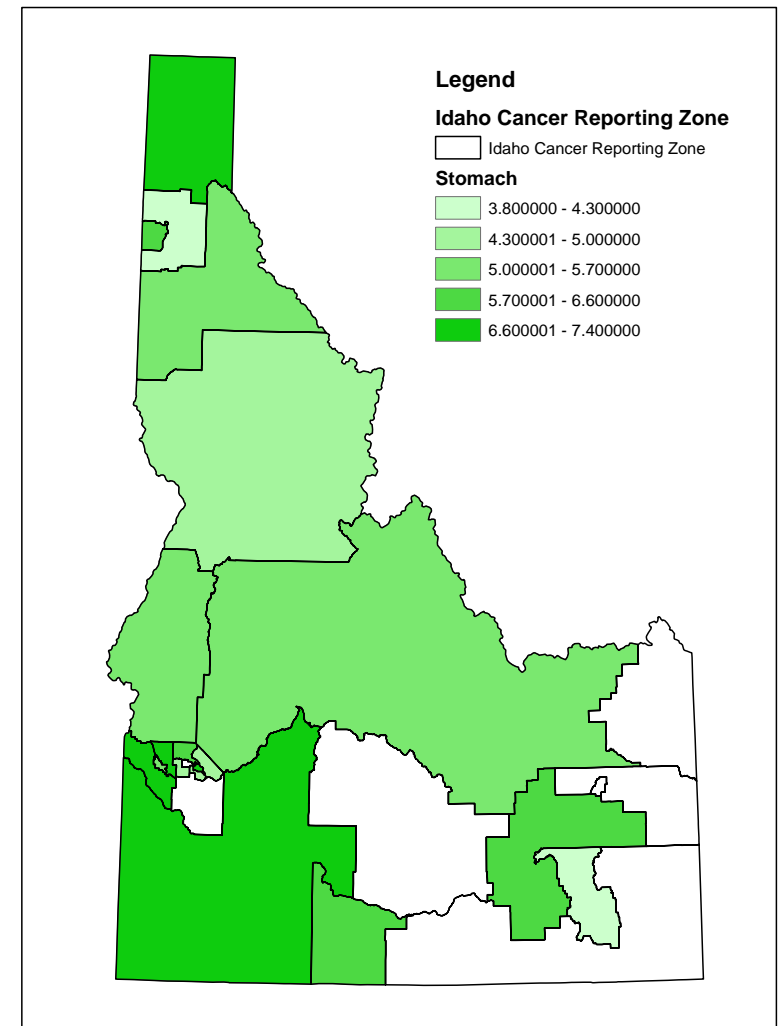
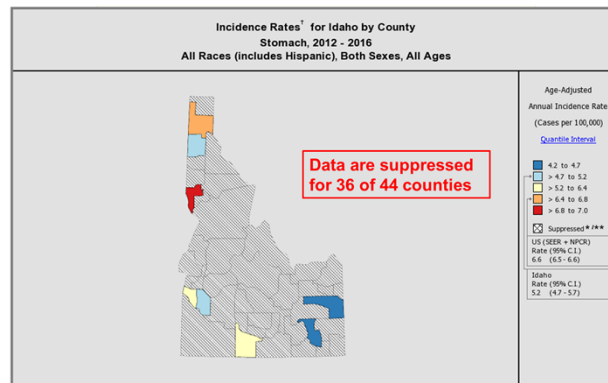
Colorectal Cancer 2013-2017 By Idaho Cancer Reporting Zone

- Rates ranged from 28.2 – 48.7 cases per 100k
- Max/Min = 1.73



Stomach Cancer 2013-2017 By Idaho Cancer Reporting Zone

- Rates ranged from 3.8 – 7.4 cases per 100k
- Max/Min = 1.94
- Suppressed in 7 Zones (n < 16)



6. Next Steps



6. Next Steps

1. Name the Idaho Cancer Reporting Zones
2. Consider suppression rules and data for choosing which cancer sites can be reported by Zone
3. Westat will assist with web template to display cancer incidence rates

Special Thanks

- Expert Stakeholders

- Charlene Cariou, MHS, CPH, CHES

- Health Program Manager, Idaho Comprehensive Cancer Control Program

- Joseph Pollard, BS

- Health Data Analytics Program Manager, Idaho Division of Public Health

- Steve Scoppa, IMS, for advice on potential strategies for adding aggregated census tract-based geographies to SEER*Stat and assistance in implementation of the linked attribute strategy.

Thank you.