

COPY

Christopher H. Meyer [ISB No. 4461]

Michael P. Lawrence [ISB No. 7288]

Jack W. Relf [ISB No. 9762]

GIVENS PURSLEY LLP

601 West Bannock Street

P.O. Box 2720

Boise, Idaho 83701-2720

Office: (208) 388-1200

Fax: (208) 388-1300

www.givenspursley.com

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APR 04 2018

DEPARTMENT OF
WATER RESOURCES

Attorneys for Applicant SUEZ Water Idaho Inc.

BEFORE THE IDAHO DEPARTMENT OF WATER RESOURCES

IN THE MATTER OF INTEGRATED
MUNICIPAL APPLICATION PACKAGE
("IMAP") OF SUEZ WATER IDAHO INC.,
BEING A COLLECTION OF INDIVIDUAL
APPLICATIONS FOR TRANSFERS OF
WATER RIGHTS AND APPLICATIONS
FOR AMENDMENT OF PERMITS.

**FOURTEENTH AFFIDAVIT OF JACK W.
RELF (BSU WHITEPAPER)**

State of Idaho)
) ss.
County of Ada)

JACK W. RELF, being first duly sworn upon oath, deposes and states:

1. I am an associate attorney with the above-captioned firm, Givens Pursley LLP. I am one of the attorneys representing SUEZ Water Idaho Inc. in the above-entitled action and am duly licensed to practice law in the state of Idaho.

2. I make this affidavit based upon my personal knowledge of the facts set forth in this affidavit and to the best of my information and belief.

3. A true and accurate copy of the document Projecting Urban Expansion in the Treasure Valley to 2100 (October 2017), as obtained from Boise State University, is attached hereto as Exhibit A.

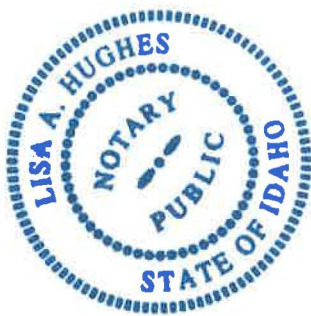
4. This document is also available at <https://cid.boisestate.edu/hes/wp-content/uploads/sites/5/2017/10/Whitepaper-Projecting-Urban-Expansion-in-the-Treasure-Valley-to-2100.pdf>.

DATED this 4th day of April, 2018.

GIVENS PURSLEY LLP

By 
Jack W. Relf

Subscribed and sworn to before me this 4th day April, 2018.




Notary Public for Idaho
Residing at: Boise Idaho
My Commission Expires: 3-22-2019

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that on this 4th day of April, 2018, the foregoing was filed, served, and copied as shown below. Service by email is authorized by the Hearing Officer's Order of September 11, 2017 at page 3. Due to the size of the exhibit, a courtesy copy of the foregoing without the exhibit attached was emailed to all parties noted below, and a physical copy of the same with the exhibit has been placed on a disk and mailed as indicated below.

DOCUMENT FILED:

IDAHO DEPARTMENT OF WATER RESOURCES
P.O. Box 83720
Boise, ID 83720-0098
Hand delivery or overnight mail:
322 East Front Street
Boise, ID 83702

☐ U. S. Mail
☒ Hand Delivered
☐ Overnight Mail
☐ Facsimile
☐ E-mail

SERVICE COPIES TO PROTESTANTS, INTERVENORS, AND INTERESTED PARTIES:

Stephan L. Burgos
Director
Public Works Department
CITY OF BOISE
PO Box 500
Boise, ID 83701-0500
Facsimile: 208-433-5650
sburgos@cityofboise.org

☒ U. S. Mail
☐ Hand Delivered
☐ Overnight Mail
☐ Facsimile
☒ E-mail

Hand delivery or overnight mail:
150 N Capitol Blvd, City Hall #1
Boise, ID 83702
(For the City of Boise, intervenor in support)

Abigale R. Germaine, Esq.
Assistant City Attorney
City Attorney's Office
CITY OF BOISE
PO Box 500
Boise, ID 83701-0500
Facsimile: 208-384-4454
agermaine@cityofboise.org

☒ U. S. Mail
☐ Hand Delivered
☐ Overnight Mail
☐ Facsimile
☒ E-mail

Hand delivery or overnight mail:
150 N Capitol Blvd
Boise, ID 83702
(For the City of Boise, intervenor in support)

Chris M. Bromley, Esq.
McHugh Bromley PLLC
380 S 4th St, Ste 103
Boise, ID 83702
Facsimile: 208-287-0864
cbromley@mchughbromley.com
(For the City of Boise, intervenor in support)

☒ U. S. Mail
☐ Hand Delivered
☐ Overnight Mail
☐ Facsimile
☒ E-mail

John Roldan, P.E.
Strategic Water Resources Manager
Public Works Department
CITY OF BOISE
PO Box 500
Boise, ID 83701-0500
Facsimile: 208-433-5650
jroldan@cityofboise.org
Hand delivery or overnight mail:
150 N Capitol Blvd
Boise, ID 83702
(For the City of Boise, intervenor in support)

☒ U. S. Mail
☐ Hand Delivered
☐ Overnight Mail
☐ Facsimile
☒ E-mail

Warren Stewart, P.E.
City Engineer
Public Works Department
CITY OF MERIDIAN
33 E Broadway Ave, Ste 200
Meridian, ID 83642
Facsimile: 208-898-9551
wstewart@meridiancity.org
(For the City of Meridian, intervenor in support)

☒ U. S. Mail
☐ Hand Delivered
☐ Overnight Mail
☐ Facsimile
☒ E-mail

Dale Bolthouse
Director
Public Works Department
CITY OF MERIDIAN
33 E Broadway Ave, Ste 200
Meridian, ID 83642
Facsimile: 208-898-9551
dbolthouse@meridiancity.org
(For the City of Meridian, intervenor in support)

☒ U. S. Mail
☐ Hand Delivered
☐ Overnight Mail
☐ Facsimile
☒ E-mail

Warren Stewart
Engineering Manager
Public Works Department
CITY OF MERIDIAN
33 E Broadway Ave, Ste 200
Meridian, ID 83642
Facsimile: 208-898-9551
dbolthouse@meridiancity.org
(For the City of Meridian, intervenor in support)

☒	U. S. Mail
☐	Hand Delivered
☐	Overnight Mail
☐	Facsimile
☒	E-mail

Kyle Radek, P.E.
Assistant City Engineer, Engineering Division
Public Works Department
CITY OF MERIDIAN
33 E Broadway Ave, Ste 200
Meridian, ID 83642
Facsimile: 208-898-9551
kradek@meridiancity.org
(For the City of Meridian, intervenor in support)

☒	U. S. Mail
☐	Hand Delivered
☐	Overnight Mail
☐	Facsimile
☒	E-mail

Garrick Nelson
Staff Engineer II
Public Works Department
CITY OF MERIDIAN
33 E Broadway Ave, Ste 200
Meridian, ID 83642
Facsimile: 208-898-9551
gnelson@meridiancity.org
(For the City of Meridian, intervenor in support)

☒	U. S. Mail
☐	Hand Delivered
☐	Overnight Mail
☐	Facsimile
☒	E-mail

Charles L. Honsinger, Esq.
HONSINGER LAW, PLLC
PO Box 517
Boise, ID 83701
Facsimile: 208-908-8065
honsingerlaw@gmail.com
(For the City of Meridian, intervenor in support)

☒	U. S. Mail
☐	Hand Delivered
☐	Overnight Mail
☐	Facsimile
☒	E-mail

Brent Orton, P.E., MSC
Public Works Director, City Engineer
CITY OF CALDWELL
621 East Cleveland Blvd.
Caldwell, ID 83605
Facsimile: 208-455-3012
borton@cityofcaldwell.org
(For the City of Caldwell, intervenor in support)

☒	U. S. Mail
☐	Hand Delivered
☐	Overnight Mail
☐	Facsimile
☒	E-mail

Christopher E. Yorgason, Esq.
Middleton City Attorney
YORGASON LAW OFFICES, PLLC
6200 N Meeker Pl
Boise, ID 83713
Facsimile: 208-375-3271
chris@yorgasonlaw.com
(For the City of Middleton, protestant)

☒	U. S. Mail
☐	Hand Delivered
☐	Overnight Mail
☐	Facsimile
☒	E-mail

Cherese D. McLain, Esq.
MOORE, SMITH, BUXTON & TURCKE, CHARTERED
950 W Bannock St, Ste 520
Boise, ID 83702
Facsimile: 208-331-1202
cdm@msbtlaw.com
(For the Star Sewer & Water District, intervenor in support, and for the City of Eagle, interested party)

☒	U. S. Mail
☐	Hand Delivered
☐	Overnight Mail
☐	Facsimile
☒	E-mail

S. Bryce Farris, Esq.
Andrew J. Waldera, Esq.
SAWTOOTH LAW OFFICES, PLLC
PO Box 7985
Boise ID 83707
Facsimile: 208-629-7559
bryce@sawtoothlaw.com
andy@sawtoothlaw.com
Hand delivery or overnight mail:
1101 W River St, Ste 110
Boise ID 83702
(For Nampa & Meridian Irrigation District and Settlers Irrigation District, protestants)

☒	U. S. Mail
☐	Hand Delivered
☐	Overnight Mail
☐	Facsimile
☒	E-mail

Albert P. Barker, Esq.
Shelley M. Davis, Esq.
BARKER, ROSHOLT & SIMPSON, LLP
PO Box 2139
Boise, ID 83701-2139
Facsimile: 208-344-6034
apb@idahowaters.com
smd@idahowaters.com

Hand delivery or overnight mail:
1010 W Jefferson, Ste 102
Boise, ID 83702
*(For Boise Project Board of Control, Big Bend
Irrigation District, Boise-Kuna Irrigation District,
and Wilder Irrigation District, protestants)*

☒	U. S. Mail
☐	Hand Delivered
☐	Overnight Mail
☐	Facsimile
☒	E-mail

Richard T. Roats, Esq.
City Attorney
CITY OF KUNA
PO Box 13
Kuna, ID 83634
Facsimile: 208-922-5989
rroats@kunaID.gov
kunaattorney@icloud.com
(For the City of Kuna, interested party)

☒	U. S. Mail
☐	Hand Delivered
☐	Overnight Mail
☐	Facsimile
☒	E-mail

Bob Bachman
Public Works Director
CITY OF KUNA
PO Box 13
Kuna, ID 83634
Facsimile: None
bbachman@kunaID.gov
Hand delivery or overnight mail:
6950 S Ten Mile Rd
Meridian, ID 83634
(For the City of Kuna, interested party)

☒	U. S. Mail
☐	Hand Delivered
☐	Overnight Mail
☐	Facsimile
☒	E-mail

COURTESY COPIES TO IDWR AND OTHER NON-PARTIES:

James Cefalo
Hearing Officer
Eastern Regional Office
Idaho Department of Water Resources
900 North Skyline Dr., Ste. A
Idaho Falls ID 83402-6105
Facsimile: 208-525-7177
james.cefalo@idwr.idaho.gov

☒ U. S. Mail
☐ Hand Delivered
☐ Overnight Mail
☐ Facsimile
☒ E-mail

Sharla Cox
Administrative Assistant
Eastern Regional Office
Idaho Department of Water Resources
900 North Skyline Dr., Ste. A
Idaho Falls ID 83402-6105
Facsimile: 208-525-7177
sharla.cox@idwr.idaho.gov

☒ U. S. Mail
☐ Hand Delivered
☐ Overnight Mail
☐ Facsimile
☒ E-mail

Kimi White
Paralegal
IDAHO DEPARTMENT OF WATER RESOURCES
PO Box 83720
Boise, ID 83720-0098
Facsimile: 208-287-6700
kimi.white@idwr.idaho.gov
Hand delivery or overnight mail:
322 E Front St
Boise, ID 83702

☒ U. S. Mail
☐ Hand Delivered
☐ Overnight Mail
☐ Facsimile
☒ E-mail

Garrick L. Baxter, Esq.
Deputy Attorney General
IDAHO DEPARTMENT OF WATER RESOURCES
PO Box 83720
Boise, ID 83720-0098
Facsimile: 208-287-6700
garrick.baxter@idwr.idaho.gov
Hand delivery or overnight mail:
322 E Front St
Boise, ID 83702

☒ U. S. Mail
☐ Hand Delivered
☐ Overnight Mail
☐ Facsimile
☒ E-mail

Emmi Blades, Esq.
Deputy Attorney General
IDAHO DEPARTMENT OF WATER RESOURCES
PO Box 83720
Boise, ID 83720-0098
Facsimile: 208-287-6700
emmi.blades@idwr.idaho.gov
Hand delivery or overnight mail:
322 E Front St
Boise, ID 83702

☒ U. S. Mail
☐ Hand Delivered
☐ Overnight Mail
☐ Facsimile
☒ E-mail

Nick Miller, P.E.
Manager
Western Regional Office
IDAHO DEPARTMENT OF WATER RESOURCES
2735 Airport Way
Boise, ID 83705-5082
Facsimile: 208-334-2348
nick.miller@idwr.idaho.gov

☒ U. S. Mail
☐ Hand Delivered
☐ Overnight Mail
☐ Facsimile
☒ E-mail

Sarah A. Klahn, Esq.
White & Jankowski, LLP
511 Sixteenth St, Ste 500
Denver, CO 80202-4224
sarahk@white-jankowski.com
Facsimile: (303) 825-5632
(For the City of Pocatello, withdrawn)

☒ U. S. Mail
☐ Hand Delivered
☐ Overnight Mail
☐ Facsimile
☒ E-mail

Kathleen Marion Carr, Esq.
Office of the Field Solicitor
U.S. DEPARTMENT OF THE INTERIOR
960 Broadway Ave, Ste 400
Boise, ID 83706
Facsimile: 208-334-1918
kathleenmarion.carr@sol.doi.gov
(For the U.S. Bureau of Reclamation, withdrawn)

☒ U. S. Mail
☐ Hand Delivered
☐ Overnight Mail
☐ Facsimile
☒ E-mail

E. Gail McGarry
Program Manager, Water Rights & Acquisitions
U.S. BUREAU OF RECLAMATION
Pacific Northwest Regional Office
1150 N Curtis Rd
Boise, ID 83706-1234
Facsimile: 208-378-5305
emcgarry@ usbr.gov
(For the U.S. Bureau of Reclamation, withdrawn)

☒	U. S. Mail
☐	Hand Delivered
☐	Overnight Mail
☐	Facsimile
☒	E-mail

Matt J. Howard, Esq.
Water Rights Analyst
U.S. BUREAU OF RECLAMATION
Pacific Northwest Regional Office
1150 N Curtis Rd
Boise, ID 83706-1234
Facsimile: 208-378-5305
mhoward@ usbr.gov
(For the U.S. Bureau of Reclamation, withdrawn)

☒	U. S. Mail
☐	Hand Delivered
☐	Overnight Mail
☐	Facsimile
☒	E-mail

Paul L. Arrington, Esq.
Director
Idaho Water Users Association
1010 W Jefferson St, Ste 101
Boise, ID 83702
Facsimile: 208-344-2744
paul@iwua.org

☒	U. S. Mail
☐	Hand Delivered
☐	Overnight Mail
☐	Facsimile
☒	E-mail


Jack W. Relf

Exhibit A **PROJECTING URBAN EXPANSION IN THE TREASURE VALLEY TO 2100**



**BOISE STATE
UNIVERSITY**

MANAGING IDAHO'S LANDSCAPES FOR ECOSYSTEM SERVICES | **MILES**
IDAHO EPSCOR
NATIONAL SCIENCE FOUNDATION

HUMAN ENVIRONMENT SYSTEMS CENTER

Projecting Urban Expansion in the Treasure Valley to 2100

October 2017



Projecting Urban Expansion in the Treasure Valley to 2100

**A publication of the MILES program
Boise State University
October 2017**

**Jenna Narducci
Christian Sprague
Dr. Jodi Brandt
Dr. Jen Schneider
Dr. Jillian Moroney
Dr. Michail Fragkias
Dr. Shawn Benner**

INTRODUCTION



Most residents of the Treasure Valley in Southwestern Idaho will not be surprised to learn that urban development is rapidly affecting agricultural land, wetlands and forested areas. Between 2001-2011, over just a ten-year period, urban land area in the Treasure Valley increased by 10%, while agricultural land decreased by 5%. We can expect to see a continued decline in agricultural areas but what is not well understood is the rate at which they might continue to happen into the future. If we stay on our current path, what will the Treasure Valley look like in 25 years? 75? 100?

Humans are notoriously bad at visualizing future scenarios and engaging in long-term planning; this paper is an attempt to counter those tendencies, and to provide citizens and decision makers in the Treasure Valley with data regarding land use change. Population growth will continue, but there are a range of possibilities for what that growth will look like. Similarly, planning and zoning decisions may contain some variability--will we develop land in high, medium, or low density ways? The scenarios below aim to capture and graphically represent the range of possibilities decision makers may face.

HISTORIC URBAN GROWTH IN THE TREASURE VALLEY

Since its settlement in the late 19th century, the Treasure Valley has undergone episodic periods of rapid population growth. First, thousands of miners flocked to the region, creating the need for a steady source of food, goods and services. The Boise River and floodplain provided plentiful water and fertile soil for farming. Agricultural infrastructure within the valley quickly expanded as canals, dams, and reservoirs were built to accommodate the influx of new residents. Soon after, the establishment of amenities such as electricity and telephone services led to explosive population growth in the greater Boise area and along rivers and canals. In the 1950's, with the completion of Lucky Peak Dam and the expansion of highway networks, suburban development spread into agricultural areas as developers bought up cheap land with existing infrastructure. Throughout the 1990s, the Treasure Valley became known nationally as a region with high quality of life, and corporations like Albertson's, Morrison Knudsen Corporation, J.R. Simplot, Micron, and Boise Cascade in the region drew new residents. From 1990-2000, the Boise-Nampa metropolitan area was one of the fastest growing areas in the country, with a 45% growth rate.

Such rapid growth could be viewed through a variety of lenses. On the one hand, economic growth provides jobs and increases opportunities for economic advancement. On the other hand, some are rightly concerned about the changing biophysical and social character of the Valley as a result of this population growth.

Cultural tensions between "insiders" (long-time residents) and "outsiders" (new arrivals) persist. Cities are experiencing growing pains, particularly related to infrastructure,

such as traffic and parking. Continued growth may place increasing pressures on land and water resources, which have been relatively abundant up to now. In this project, our research team modeled future urban expansion scenarios as a first step in understanding the impact of future growth on local, highly valued resources.



MODELING LAND USE CHANGE

Based on historical LULC change in the Treasure Valley we determined two main drivers of urban expansion: (1) total population within an area and (2) population density (i.e. how tightly concentrated population is within the urban area).¹ Table 1 details the five scenarios we explored using these two drivers.

Table 1: Urban Expansion Scenarios		
Scenario	Population 2100	Population Density
Low Population Growth	1.25 million	4.14 people/acre
High Population Growth	1.75 million	4.14 people/acre
Business as Usual	1.5 million	4.14 people/acre
Low Population Density	1.5 million	3.78 people/acre
High Population Density	1.5 million	5.41 people/acre

Population growth as a driver

Population growth is an important driver of urban development. Using local population growth rates in tandem with national population growth patterns, we applied regression techniques² to determine three plausible scenarios of population in the year 2100:

- (1) Low Population Growth: 1.25 million people in 2100
- (2) Business as Usual (moderate growth): 1.5 million people in 2100
- (3) High Population Growth: 1.75 million people in 2100

Population density as a driver

Population density has a significant impact on how urban expansion occurs. By population density, we mean how many people per unit area, which can be driven by zoning decisions — for example restrictions on house lot sizes in a new development. We analyzed three different scenarios of density based on historic, local density trends, and nation-wide density trends:

- (4) High Population Density: 5.41 people/acre
- (5) Business as Usual (no change): 4.14 people/acre
- (6) Low Population Density: lot size of 3.78 people/acre

IMPACTS OF URBAN GROWTH ON FARMLAND, FORESTS AND WETLANDS

Figure 1 summarizes the different scenarios of urban growth in 2100 based on population growth. The first panel shows the “current” (2011) extent of urban development, and the next three panels show the Low Population Growth, Business as Usual, and High Population Growth scenarios, respectively. The High Population Growth scenario is the most impactful of the scenarios in terms of total acreage converted to urban (280,000 acres), compared to 220,000 acres converted to urban under the Business as Usual scenario.

¹ To see how our projections compare with others, see appendix.

² For more information on methods used, visit http://scholarworks.boisestate.edu/miles_data/23/

Figure 1: Population growth as a driver of urban expansion

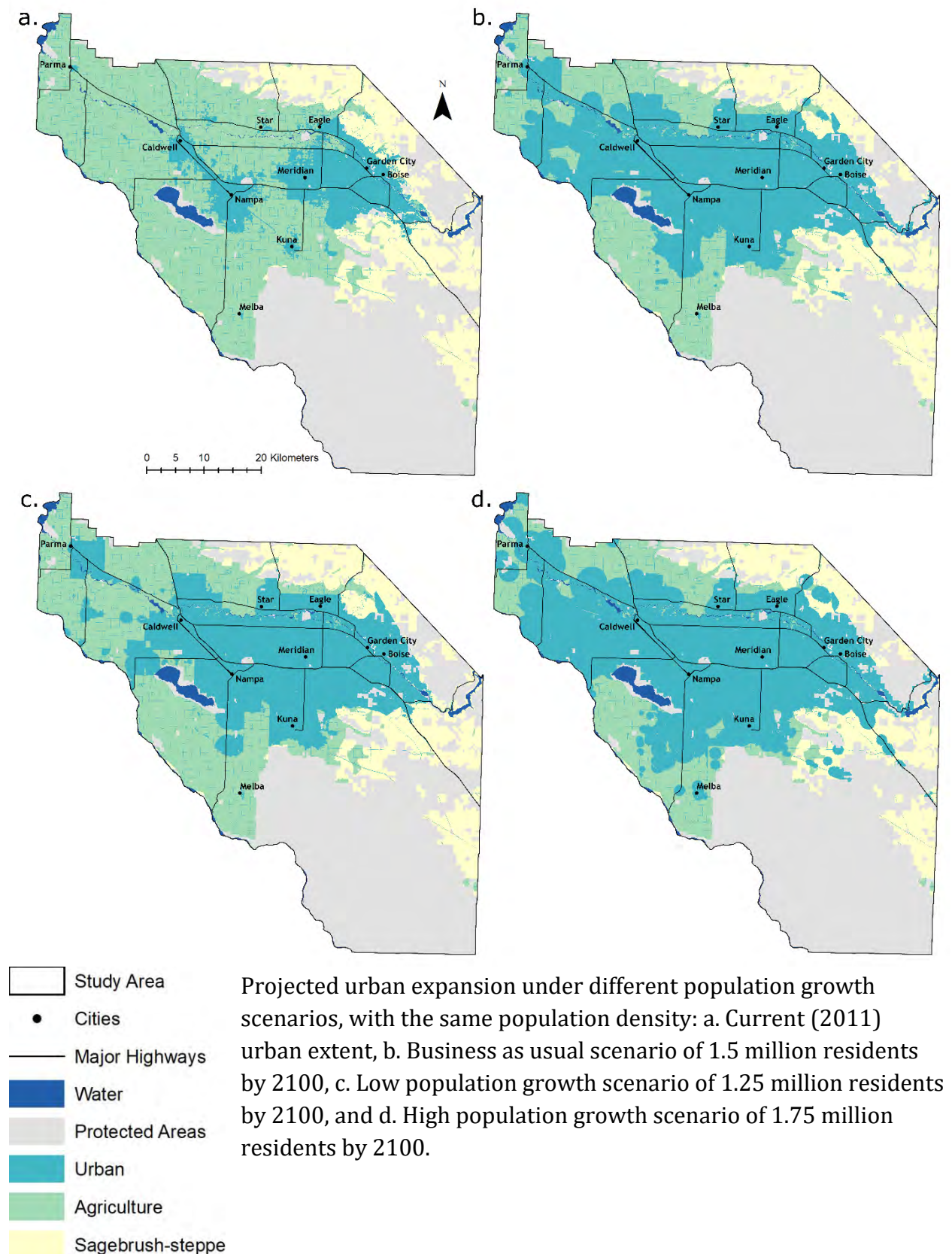


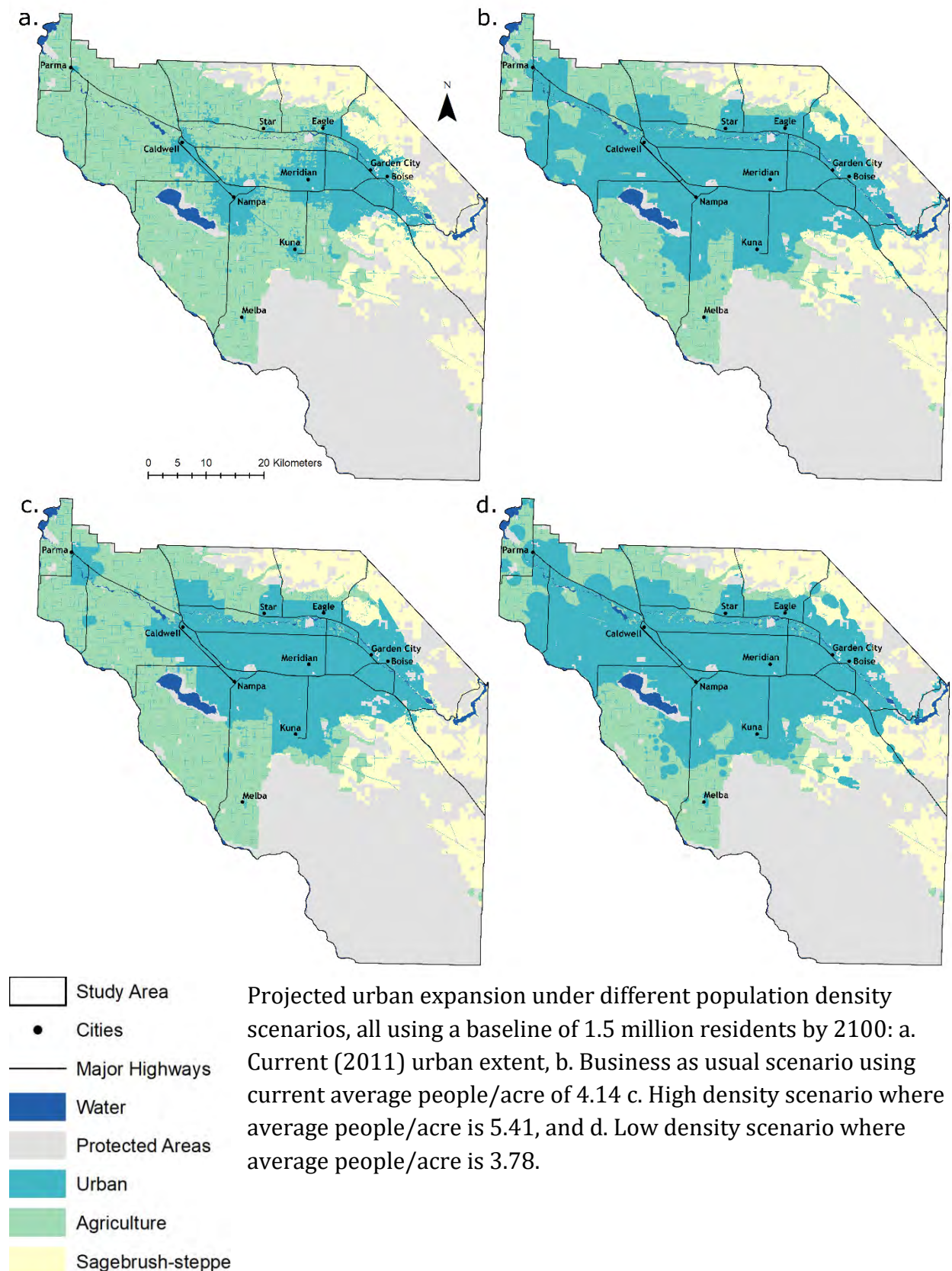
Figure 2 (page 7) summarizes the different scenarios of urban growth in 2100 based on development density. The first panel shows the “current” (2011) extent of urban development, and the next three panels show the Low Population Density, Business as Usual, and High Population Density scenarios, respectively. Under the High Population Density scenario, loss is minimized because growth is tightly clustered around existing city centers. Under the Business as Usual and Low Population Density scenarios urban areas expand in all directions, with development primarily occurring on agricultural land and some expansion into the eastern foothills. Of these scenarios, the Low Population Density scenario represents the largest area converted to urban (260,000 acres), compared to 220,000 acres converted to urban under the Business as Usual scenario.

Table 2: Comparison of urban expansion impacts to land use-land cover					
Scenario	Urban Gain (acres)	Agriculture Loss (acres)	Forest Loss (acres)	Wetland Loss (acres)	Sagebrush-Steppe Loss (acres)
Low Population Growth	160,000	-140,000	-730	-490	-22,000
High Population Growth	280,000	-240,000	-860	-980	-44,000
Business as Usual	220,000	-190,000	-820	-590	-30,000
Low Population Density	260,000	-220,000	-840	-800	-38,000
High Population Density	140,000	-110,000	-700	-460	-20,000

Our projections demonstrate that urban expansion replaces agriculture, wetlands, forested areas, and sagebrush-steppe, with the largest losses occur in agricultural areas. In the High Population Growth and Low Population Density scenarios, our model predicts that 59-64% of current agricultural land will be lost by 2100, amounting to 190,000-220,000 acres. In contrast, if high density development occurs, about half as much — 31% — agricultural land would be lost by 2100, amounting to 110,000 acres.

Our model predicts that wetlands and forested areas will also be significantly impacted by urban development. In our High Population Density scenario, our model predicts a 12% loss of forests and a 13% loss of wetlands. The High Population Growth scenario results in a 15% loss of forests and a 28% loss of wetlands. Sagebrush-steppe remains relatively unchanged, largely due to much of it being protected under different levels of public ownership.

Figure 2: Population density as a driver of urban expansion



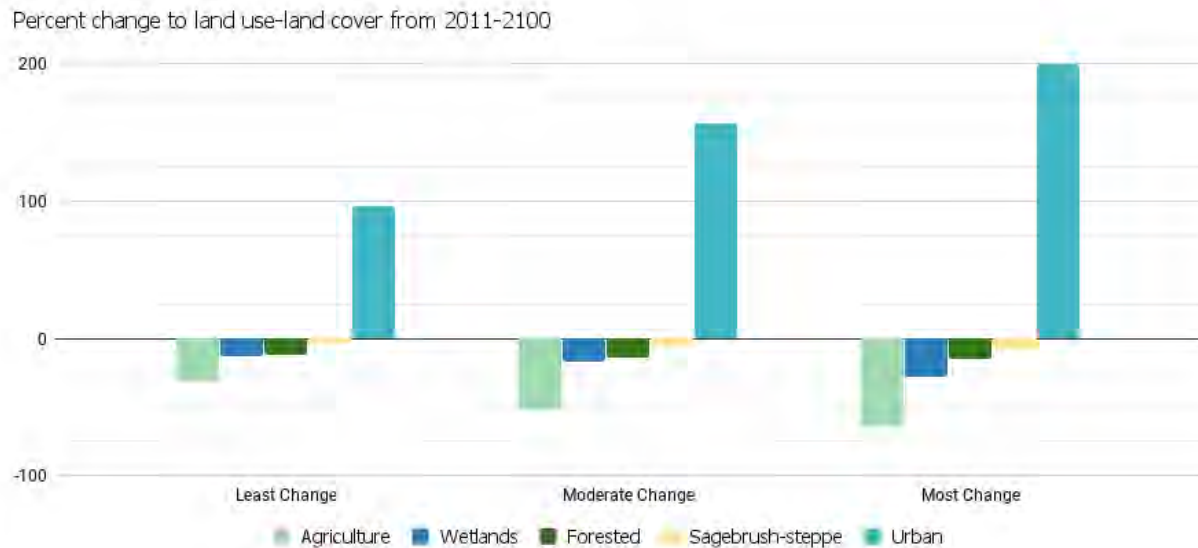


Figure 3: A comparison of three scenarios representing the least amount of change (High Population Density), moderate change (Business as Usual), and most amount of change (High Population Growth).

CONSIDERATIONS

In summary, the future of farmland, forests and wetlands in the Treasure Valley will be greatly influenced by how much population grows, as well as the decisions made about housing density. This envisioning exercise gives important insights about potential future development patterns in the Treasure Valley and will be used to help us understand the impacts of future development on farmland, water supply, habitats, recreational opportunities, and quality of life. These implications and more should be considered when planning for the future.

APPENDIX

How do our projections compare with others'?

Due to concerns about changes in water demand the Idaho Water Resource Board (IDWR) also projected population growth for the Treasure Valley in [2010](#) and [2015](#). While there were many similarities in expected changes (Table A1), all three groups had different estimates for population growth. For instance, our estimate for our High Population Growth scenario still falls short of estimated population totals given by the IDWR reports. We also had more conservative estimates concerning density; in our scenarios we estimate ~14-20 households (HH)/acre while the 2015 IDWR report estimates ~34 HH/acre. However, we used the current average for household size for all projections. Lastly, overall land use-land cover change is similar to the 2010 IDWR report with no significant differences between projections. The largest difference found is between urban acreages, which may be partially explained due to differences in land use-land cover categorization and defined study areas.

Table A1: Comparison of projected population and land use change reports			
	BSU 2017	IDWR 2015	IDWR 2010
2060 Population (million)	1.23	1.57	1.65
2070 % population Ada County	43	63	
2011 Business as Usual HH/acre	16.7		
2070 Low Density HH/acre	14.3		
2070 High Density HH/acre	20		
2015 HH/acre		14.6	
2065 HH/acre		34	
2011 People/HH	2.7		
2070 People/HH	2.7		
2015 People/HH		2.66-2.97	
2065 People/HH		2.43-2.51	
2060 Urban (acres)	343,237		286,095
2060 Agricultural (acres)	197,280		193,307
2060 Native* (acres)	500,231		525,337
2060 Rural (acres)			40,651
2060 Riparian (acres)	2,854		6,446
2060 Other (acres)	21,303		26,816

*Comparison to sagebrush-steppe

REFERENCES & CREDITS

Photos

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Introduction: Leo A. Geis: <http://www.idahoairships.com/>

History: Water Archives: <https://www.flickr.com/photos/waterarchives/5646730044/>

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