

# Salt Lake Countywide Watershed Symposium Growing Numbers: Density and Land Use Impact

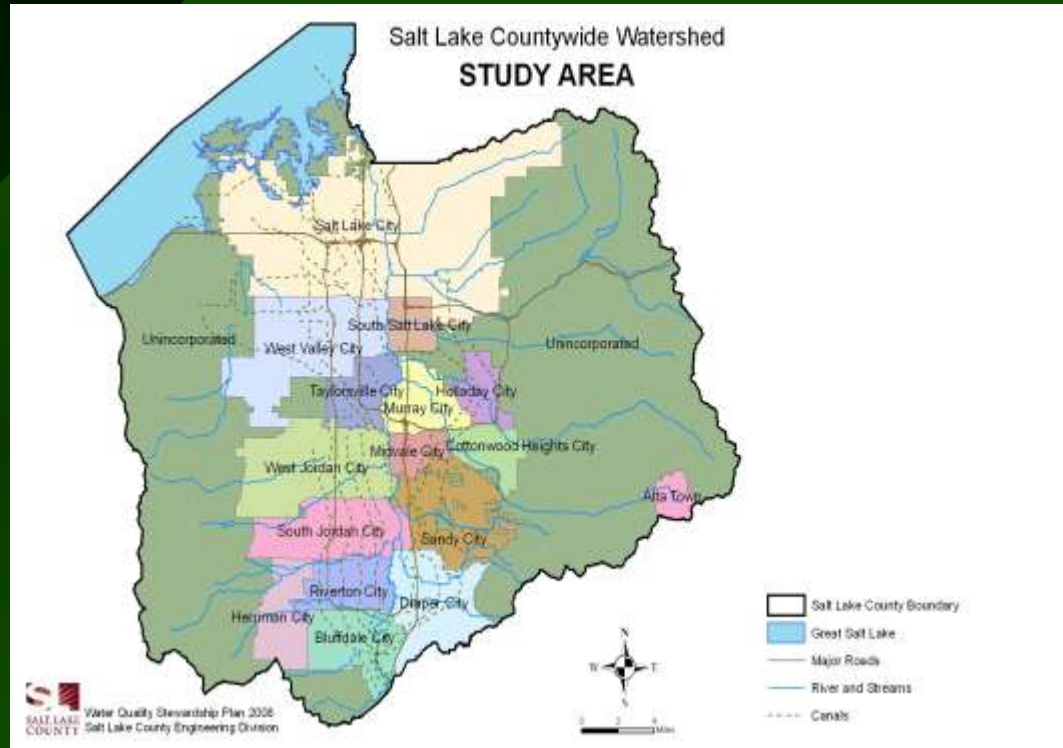


Cal Schneller; Water Resources Planner  
Salt Lake County Flood Control & Engineering Division

# Description of Watershed

- Salt Lake Countywide Watershed encompasses all of Salt Lake County
  - Drains 805 square miles or 515,200 acres.
  - Approximately 370 square miles or 46 percent are rugged mountain and largely undevelopable.

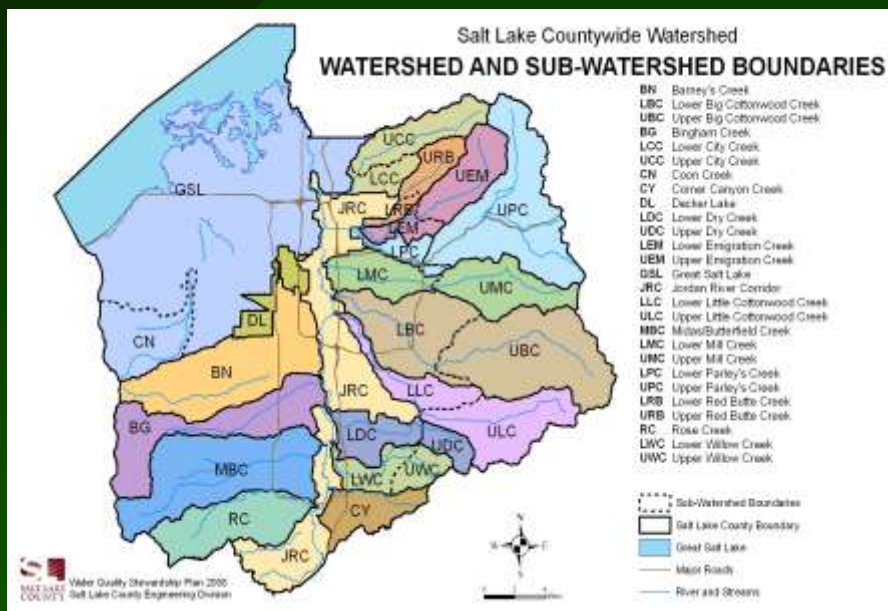
# Study Area



- County boundary and 16 incorporated cities.
  - The largest city in land area and population is Salt Lake City with 110 square miles and 178,178 population.
  - The unincorporated County has the majority of land with 461 square miles.

# Watershed and Sub-watershed Boundaries

- For the purposes of this Water Quality Stewardship Plan (WaQSP), Salt Lake County has been divided into seventeen (17) watersheds. These delineations were based on topography in the mountains and stormwater drainage areas in the valley. In order to provide increased resolution the 17 watersheds were divided into 27 sub-watersheds based on management practices and jurisdictions.
- The largest watersheds are the Great Salt Lake (215 miles<sup>2</sup>) followed by Big Cottonwood (81.5 miles<sup>2</sup>)



# Land Use

## Existing and Future

Land use is an important factor contributing to existing and projected water quality conditions of surface waters. In reviewing existing and future land uses, development strategies may be evaluated and implemented to protect surface water quality.

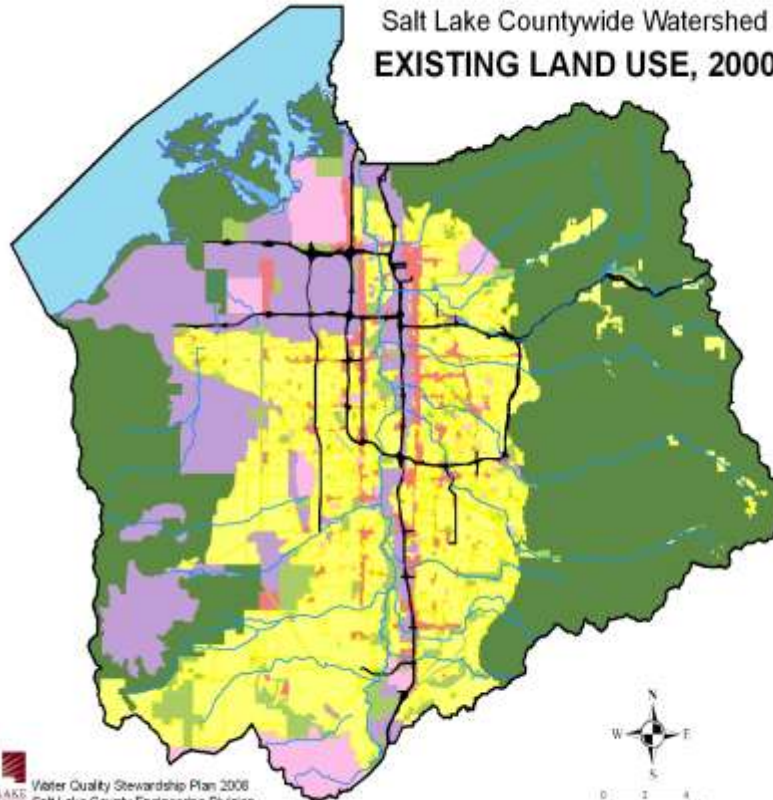
# Existing Land Use

- Existing Land Use map shows Countywide Land Use in 2000
  - Land Use is based on existing land use plans and drawings obtained from individual municipalities by Stantec in 2000.
  - WFRC did not collect data showing existing land use. Stantec had prepared a existing land use map for all of Salt Lake County in 2000. This information was modified and updated to be compatible with WFRC's future land use.
  - Land Use categories from WFRC and Stantec were combined to produce a map called Future Land Use.
  - By comparing existing and future land use information, areas anticipated to experience changes in population, population density and land use were identified.

# Combined Land Use Categories

WFRC Land Use Category	Stantec Consulting Land use Category	Combined Land Use Category
Commercial Mixed Use	Commercial	Commercial
Undevelopable	Mountain	Forest/Wetlands/Salt Flats (Environmental Sensitive Areas)
Industrial	Industrial	Industrial
N/A	Lake	Water
Residential	Residential	Residential
Agriculture	Park and Range	Parks, Agriculture, Open Space
Public Facility/Institutional	Public Facility/Utility	Public Facility/Institutional
Transportation	Transportation	Transportation – All roads with an Annual Average Daily Traffic greater than 40,000 as published by UDOT

## Salt Lake Countywide Watershed EXISTING LAND USE, 2000



### Notes:

Land use data is based on land use plans and drawings obtained from individual municipalities by Statlec in 2000.

Data has been modified in order to compare existing and future land uses:

- All residential densities (low, medium, high, etc.) were combined to form one residential category.
- All industrial types (light, heavy, etc.) were combined to form one industrial category.
- Parks, open space and agriculture categories were combined to form one category.
- The transportation category does not represent all roads and highways, but rather only those road segments in 2005 with annual average daily traffic (AADT) greater than 40,000.

### Land Use Categories

- Commercial
- Forest/Wetlands/Salt Flats
- Industrial
- Water
- Parks/Agriculture/Open Space
- Public/Institutional
- Residential
- Transportation (AADT > 40,000)
- River and Streams
- Salt Lake County Boundary



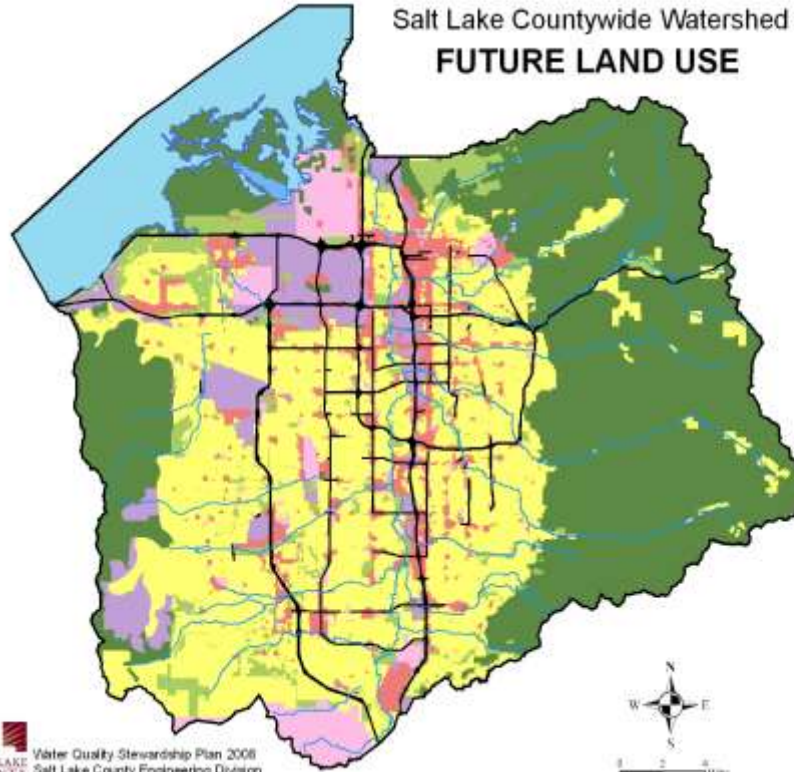
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# Future Land Use

- Wasatch Front compiled city future land use plans to create a map showing future land use for Salt Lake County including planned growth from the West Bench General Plan.

## Salt Lake Countywide Watershed FUTURE LAND USE



### Notes:

Land use data is based on projected land use developed by Wasatch Front Regional Council (WFRC), land use plans and drawings obtained from individual municipalities by Stantec in 2000, and projected West Bench full buildout from the West Bench General Plan.

The data had been modified in order to compare existing and future land uses:

- The Residential category on the west side of the county was extended to the West Bench full buildout.
- Agriculture and Open Space categories were combined to form the category Parks/Agriculture/Open Space.
- The Public Facility and institutional categories were combined to form one category.
- The category Undevelopable was assigned to the Forest/Wetlands/Salt Flats category.
- The Mixed Use category was assimilated into the Commercial category.
- The Transportation category does not represent all roads and highways, but rather represents those road segments with Annual Average Daily Traffic (AADT) greater than 40,000 based on WFRC traffic projections for 2000.

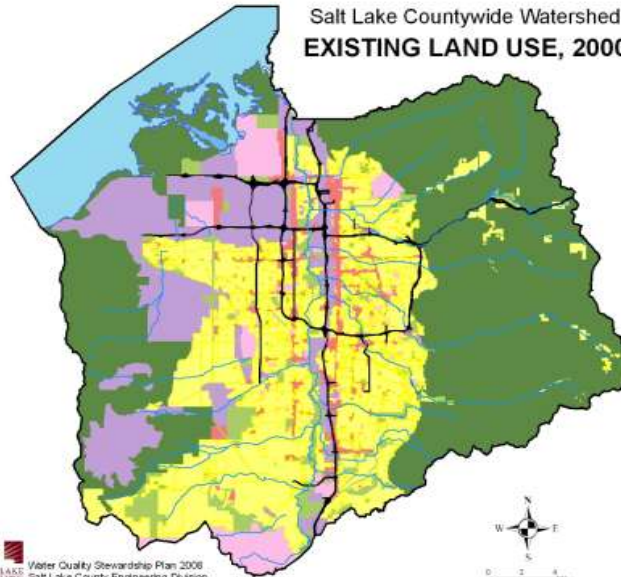
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### Land Use Categories

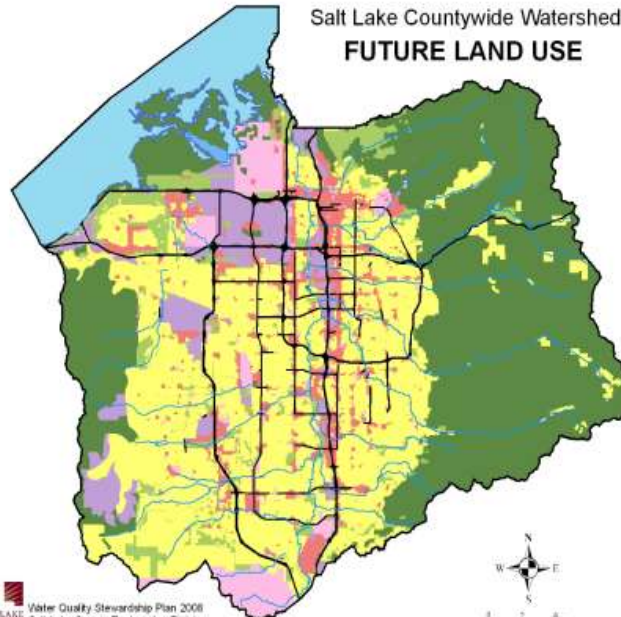
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# Population

- Population projections prepared by WFRC includes population figures beginning in 2005 and ending in 2030.
- Population and land use data used in this analysis was prepared by Wasatch Front Regional Council for each city and the unincorporated County from 2006 Traffic Analysis Zones (TAZ).
- Salt Lake City and the Unincorporated County are anticipated to continue as the most populous areas, cities in the southwest region are anticipated to experience the highest percent of population change by 2030. e.g.. Bluffdale 441%, Herriman 295%, Riverton 161%.

# WFRC Population Projections 2005 - 2030

Salt Lake County Population by City and Unincorporated Areas						
Cities	2005	2010	2015	2020	2025	2030
Town of Alta	Population data not available through WFRC					
Bluffdale	12,005	28,720	36,595	4,3091	48,227	52,900
Cottonwood Heights	36,016	36,187	37,970	39,816	41,950	43,991
Draper	34,146	38,341	40,550	42,800	44,559	46,256
Herriman	15,507	23,933	31,977	38,303	42,142	45,686
Holladay	25,685	29,045	30,294	31,606	32,256	32,891
Midvale	27,182	35,816	39,552	43,126	43,876	44,610
Murray	46,021	54,568	58,976	63,199	67,041	70,693
Riverton	32,104	35,447	40,460	45,080	48,541	51,793
Salt Lake	178,178	191,386	192,986	195,263	197,681	200,051
Sandy	89,641	88,350	89,534	91,023	92,613	94,170
South Jordan	40,318	57,631	70,407	81,393	90,105	98,105
South Salt Lake	21,421	22,722	25,023	27,232	29,187	31,031
Taylorsville	58,035	39,657	62,255	64,981	66,061	67,119
Unincorporated Co.	138,390	125,526	147,028	166,319	192,478	215,603
West Jordan	97,044	101,477	110,208	118,738	125,909	132,730
West Valley	118,917	124,452	131,582	138,847	146,543	153,890
<b>Total</b>	<b>970,612</b>	<b>1,053,258</b>	<b>1,145,337</b>	<b>1,230,817</b>	<b>1,309,169</b>	<b>1,381,519</b>
Notes/sources: Wasatch Front Regional Council, October 2006						

# Sub-watershed Population

- WFRC population data was broken down into sub-watersheds.
- Where a TAZ crossed a sub-watershed boundary the population was divided proportionally between the two.
- The change in population for each sub-watershed will be used to evaluate the potential impacts on sub-watershed health.

# Population change by sub-watershed 2005 - 2030

Change in Population by Sub-watershed 2005 - 2030				
Sub-Watershed	2005	2030	Population Change	Percent Change
Barney's Creek	129,731	200,377	70,646	35.3
Upper Big Cottonwood Creek	65	124	59	47.6
Lower Big Cottonwood Creek	92,257	118,722	26,465	22.3
Bingham Creek	46,710	83,162	36,452	43.9
Upper City Creek	1,352	1,585	223	14.8
Lower City Creek	11,727	13,427	1,700	12.7
Coon Creek	4,228	8,551	4,328	50.5
Corner Canyon Creek	16,645	32,658	16,013	49.1
Decker Lake	60,561	67,262	6,701	10
Upper Dry Creek	748	1,541	793	51.5
Lower Dry Creek	48,460	63,344	14,885	23.5
Upper Emigration Creek	239	282	43	15.3
Lower Emigration Creek	20,717	22,526	1,809	8.1
Great Salt Lake	123,546	171,983	48,436	28.2
Jordan River Corridor	200,236	257,465	57,229	22.3
Upper Little Cottonwood Creek	1,072	1,904	831	43.7
Lower Little Cottonwood Creek	31,303	42,728	11,425	26.8
Midas/Butterfield Creeks	39,750	140,594	100,844	71.8
Upper Mill Creek	423	476	53	11.2
Lower Mill Creek	76,222	88,286	12,064	13.7
Upper Red Butte Creek	379	422	42	10
Lower Red Butte Creek	8,111	8,519	408	4.8
Upper Parley's Creek	267	308	41	13.4
Lower Parley's Creek	22,817	25,260	2,443	9.7
Rose Creek	12,550	48,218	35,668	74
Upper Willow Creek	1,196	2,343	1,147	49
Lower Willow Creek	17,283	27,112	9,829	36.3

Wasatch Front Regional Council TAZ Data, 2006

# Change in Population Density by sub-watershed

- In addition to city and sub-watershed population projections, percent population change and change in density were analyzed by sub-watershed.
- The areas that are anticipated to experience the highest percent change in population over the next 30 years are: Rose Creek (74%), Midas/Butterfield Creeks (71.8%), Upper Dry Creek (51.5%), Coon Creek (50.5%), and Upper Big Cottonwood Creek (47.6%) sub-watersheds.

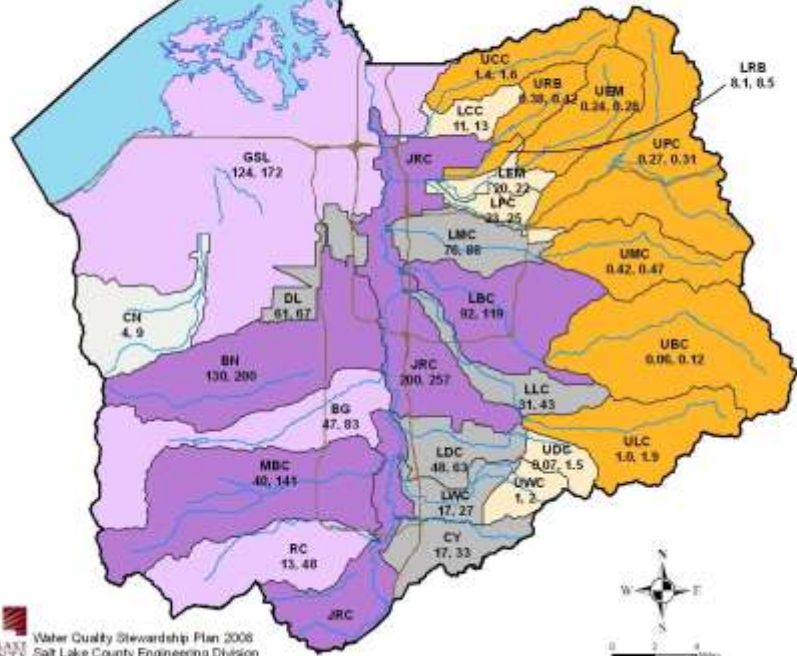




# Percent change in population by sub-watershed

- The percent population change in the sub-watersheds of Salt Lake County is anticipated to vary between 4.8% in Lower Red Butte sub-watershed to 74% in Rose Creek sub-watershed.

## Salt Lake Countywide Watershed CHANGE IN POPULATION, 2005 TO 2030



Change in Population from 2005 to 2030. Numbers are based on population projection TAZ data from Wasatch Front Regional Council.

Source: Wasatch Front Regional Council (October 2006)

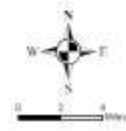
DL Sub-Watershed  
2005 Pop., 2030 Pop.  
(in thousands)

Change in Number of People  
by Sub-Watershed

- 41 - 1,000
- 1,001 - 2,500
- 2,501 - 5,000
- 5,001 - 20,000
- 20,001 - 50,000
- 50,001 - 100,844

Major Roads  
River and Streams  
Great Salt Lake  
Salt Lake County Boundary

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# Change in Impervious Surface Area by sub-watershed

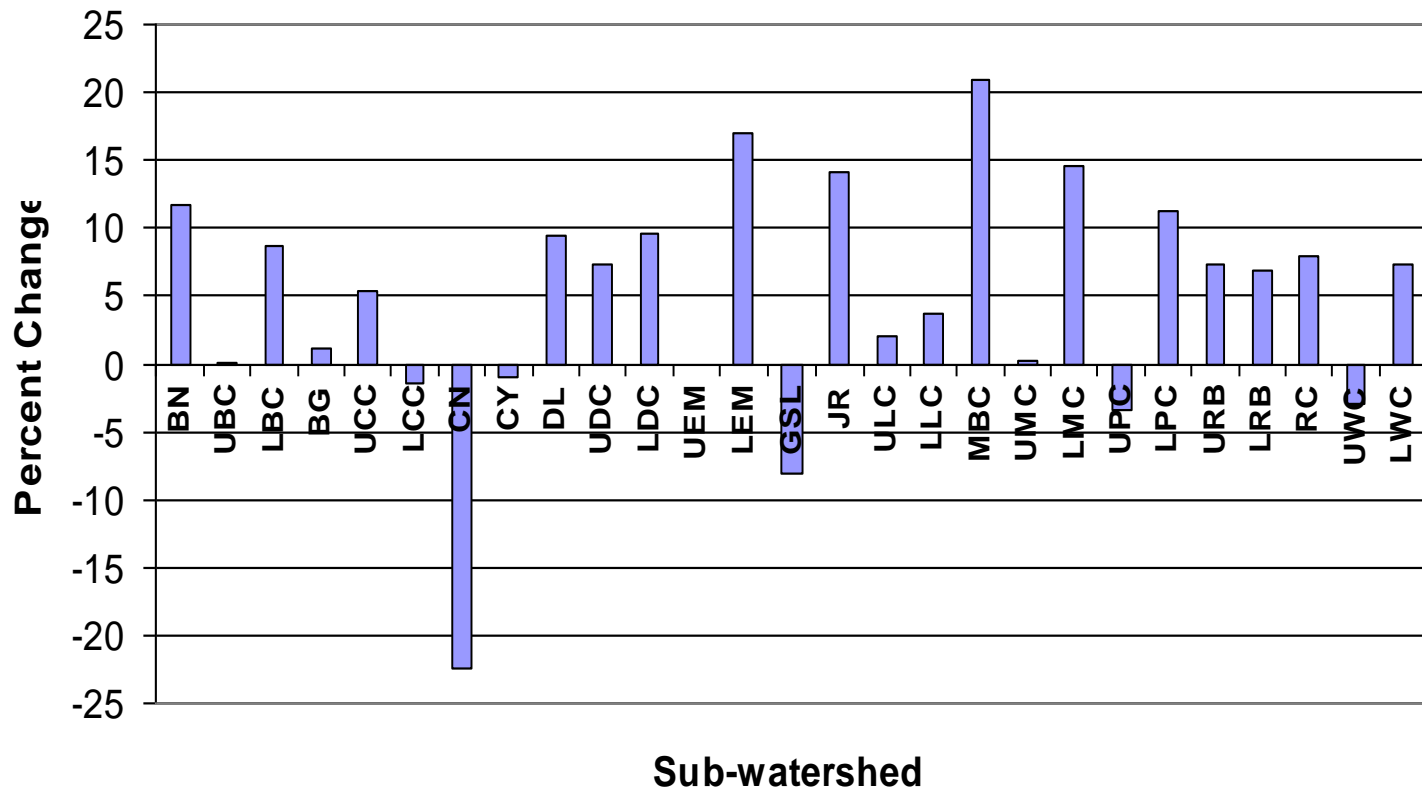
- Imperviousness, or percent impervious surface area, is a measure of water infiltration capacity. For example, an aspen forest will allow for greater infiltration of water into the ground than a parking lot.
- Potential impacts of increasing percent impervious surface area in a watershed are:
  - Reduced groundwater recharge
  - Reduced groundwater storage capacity
  - Increase runoff into streams that may increase flood potential
  - Increases in urban pollutants discharged into streams from storm water runoff
  - With the expansion of urban development into previously undeveloped areas, and increasing population densities, there is expected to be an increase in impervious surface area throughout the County.

# Percent Impervious Surface Area Values Based on Land Use Types

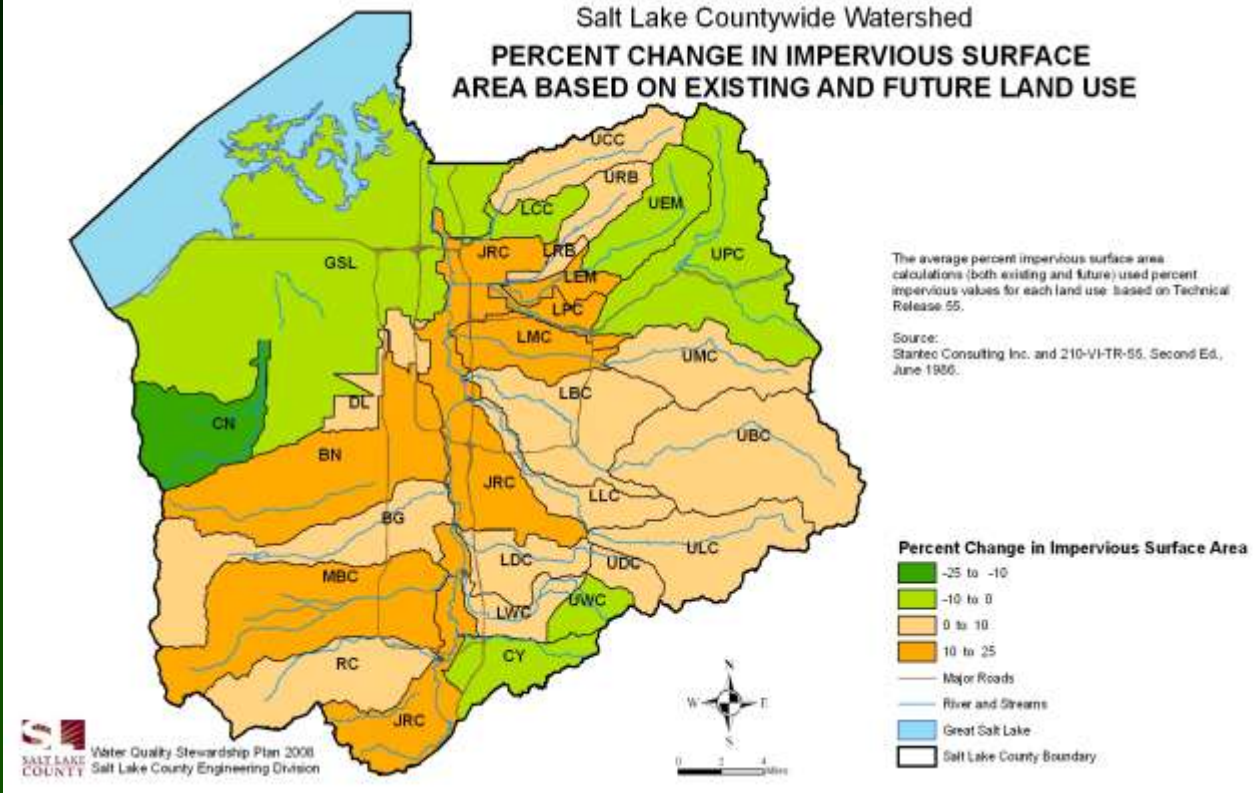
In order to calculate the total percent impervious surface area in a given sub-watershed , land use categories were assigned percent impervious surface area values.


<b>Land Use</b>	<b>%Impervious</b>
Public/Institutional (Source USGS)	51%
Commercial & Transportation	85%
Industrial	72%
Residential	32%
Open Space/Ag/Parks	12%
ForestWetlands/Salt Flats	9%
US Soil Conservation Service, 1986	

## Percent Change in Impervious Surface Area (2005-2030)



## Salt Lake Countywide Watershed PERCENT CHANGE IN IMPERVIOUS SURFACE AREA BASED ON EXISTING AND FUTURE LAND USE




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# Change in Open Space

- In addition to the impervious surface area the current and future land use, datasets were used to project potential changes in open space in Salt Lake County.
- The open Space in each sub-watershed was calculated by summing the forest/wetlands/salt flats and open space/ agriculture/parks land use categories.
- This was done for both existing and future land uses and was subsequently compared to determine percent change in open space for sub-watershed.

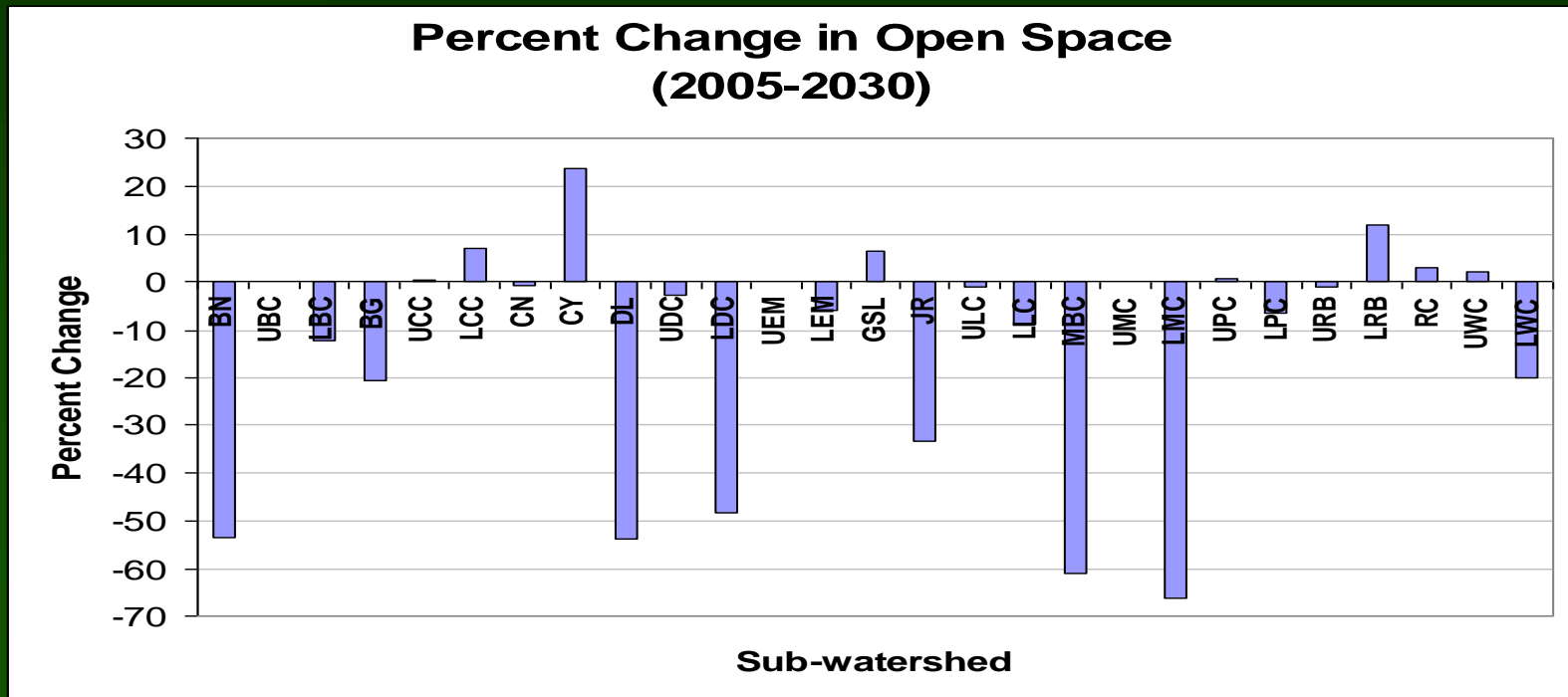


This analysis indicates that by 2030, 13,707 acres, or 6 percent open space that currently exists in Salt Lake County will be developed.

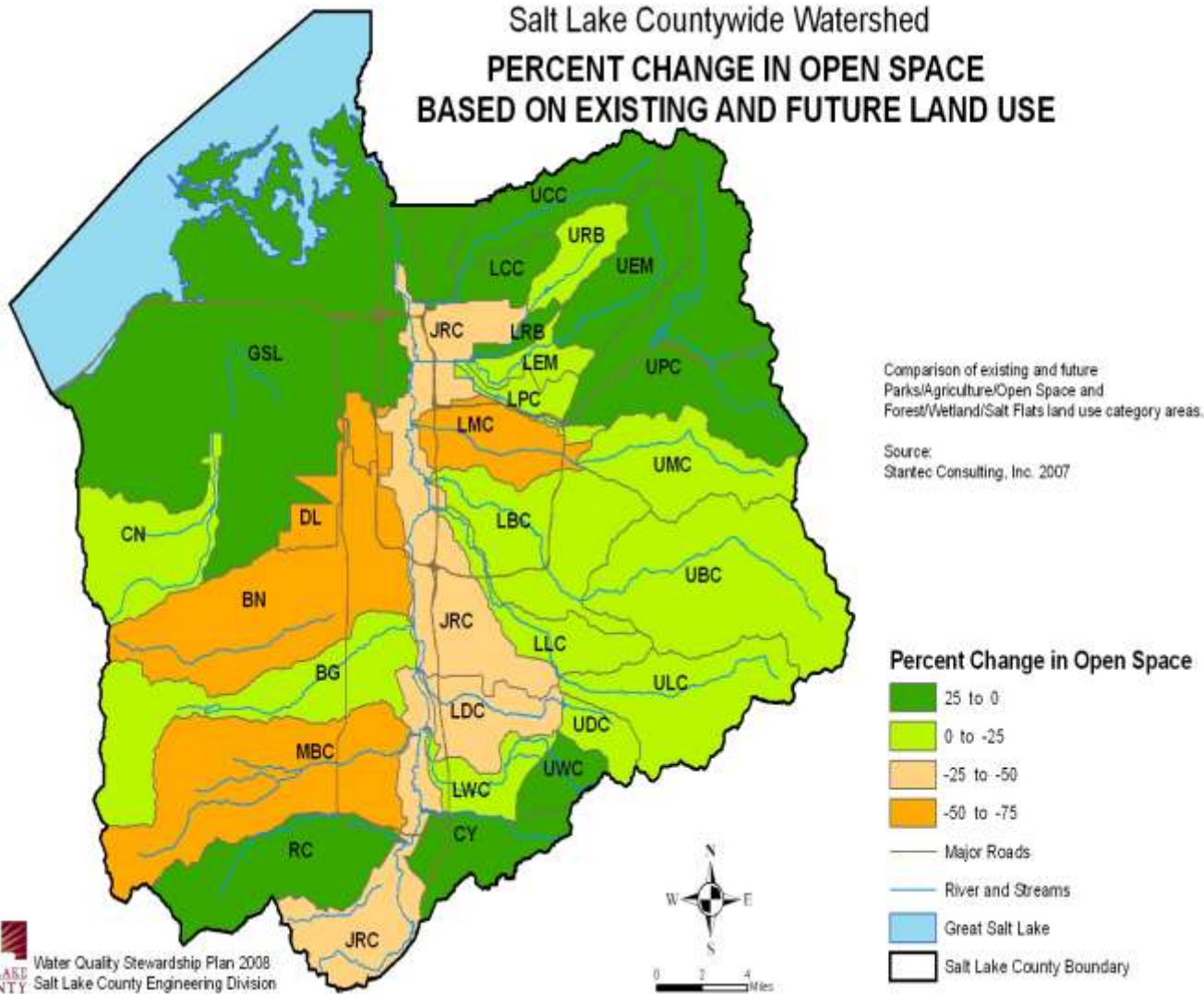
Sub-watershed projected to have the greatest percent loss of open spaces include: Lower Mill Creek 66%, Midas/Butterfield Creek 60.8%, Decker Lake 54% and Barney's Creek 54%.

Eight sub-watersheds are anticipated to see an increase in open space.

This increase is the result of open space designations and land set aside for recreational use. It may be a result of discrepancies between the methodologies used to characterize existing and future land use.



# Salt Lake Countywide Watershed PERCENT CHANGE IN OPEN SPACE BASED ON EXISTING AND FUTURE LAND USE



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# Conclusions

- As the population in Salt Lake County continues to grow the demand for water will increase.
- The percent of open space will be reduced Countywide.
- The percent of impervious acreage will increase.
- Protecting our water resources and maintaining a healthy watershed is possible. Implementing smart land use practices will help. By growing smarter future needs can be accommodated and our watershed can be protected.
- Using smart growth techniques such as:

- Compact Community Design/Cluster Design (Reduces infrastructure costs and reduces water use)
- Sustainable Design (Green Building)
- Transit Oriented Development (Encouraging higher density adjacent to transit centers)
- Open Space Residential Design (Site design that preserve sensitive land)
- Walkable Community Design (Encouraging higher density, bringing buildings closer to the street)
- In-fill and Re-Use (Re-developing under-utilized properties and rehabilitating existing buildings or converting to a new use)
- Agriculture Preservation
- Mixed Use Development

See [www.waterresources.slco.org](http://www.waterresources.slco.org) Watershed Characterization, Chapter 4 for details.