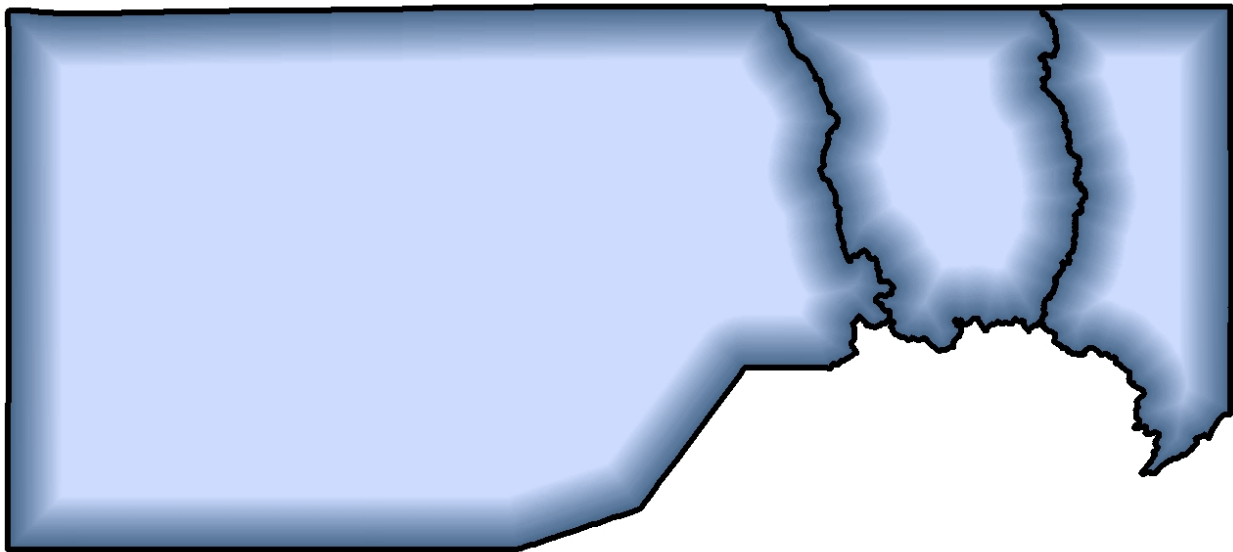
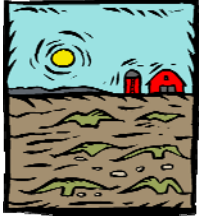


SECTION 5:
BEAR RIVER REGION RISK ASSESSMENT





DROUGHT, SEVERE WEATHER, AND AGRICULTURAL HAZARDS

Background

Severe weather, drought, insect infestation and invasive noxious weeds all have had significant harmful impacts on the Bear River Region. While these factors impact the general public regarding safety and income, the negative impacts are most substantially experienced by those in the agricultural sector. The agricultural sector is critical to the economies of Box Elder, Cache and Rich Counties. In May 2003, Governor Leavitt signed a Declaration of Agricultural Disaster for the state of Utah because of extreme drought. According to the Utah Division of Water Resources, during the years 1999 to 2003, the Bear River Basin had the lowest 5-year average flow in recorded history (2007).

Certainly, the drought cycle has exacerbated the insect infestation problem. In 2006, Box Elder County had the worst infestation of Mormon Crickets in the state. The western side of the county, including Grouse Creek was sprayed with pesticide, which protected thousands of acres (Utah Department of Agriculture and Food, 2007b). Another important industry to consider in crop production in the region is bee colonies. There are currently 33 registered beekeepers in the Bear River Region, as of December of 2007 (Utah Department of Agriculture and Food, 2007a). Bee colonies can become susceptible to various diseases which can decimate populations, decreasing the pollination needed for crops in the region. Livestock can also be lost to disease and during severe weather events, which could also impact local economies.

Severe weather can also impact agricultural crop production. Increased risks are associated with certain periods in the crop growth cycle. These vary depending on the crop. In general, many crops can be damaged by heavy rainstorm, hail or high winds. Unusually late frost can damage some crops. Fruit production, located mostly in eastern Box Elder County and along the east benches of Cache County, can be significantly damaged by late frosts as well as other severe weather events.

Not only can severe weather negatively affect agricultural production and resources in the region, but lives can be put in danger. Heat, cold, lightning, snow, ice, wind (including tornados), avalanche, micro bursts, and other types of severe weather are common in the Bear River Region. Emergency Response and Search and Rescue efforts are utilized every year to combat the effects of these natural hazard events. Avalanches are particularly difficult to find regional data for specific events. However, in the Bear River and Wellsville Mountain Ranges specifically, avalanche potential can be high with the right conditions including slope, aspect, snow type, layer composition, temperature, and other environmental factors. Three major historical avalanches occurred in Logan Canyon in Cache County in 1884, 1889, and 1971. There were two deaths in the 1884 avalanche, one death in 1889, and the avalanche of 1971 damaged Logan City water supply, telephone lines, and summer homes (State of Utah, 1976). More recently, an avalanche at Willard Peak in Box Elder County occurred in December of 2000, and one at Logan Peak in Cache County in December of 2008; both with casualties.

History of Severe Weather in the Bear River Region

Box Elder County	Cache County	Rich County
1900-1903	1900-1903	1900-1903
1953-1960	1933-1935	1931-1935
1976-1977	1959-1961	1976-1979
1989-1992	1987-1992	1987-1992
1999-2001	1999-2001	1999-2001

Palmer Drought Severity Index Chart from 1895-2001

Inj = Injuries, PrD = Property Damage, CrD = Crop Damage, Mag = Magnitude, Dth = Deaths								
Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
<u>Brigham City/Willard</u>	8/6, 8/8/1947	-	Cloudburst flooding, fruit orchard damages	-	-	-	-	-
<u>Perry</u>	5/17/1949	-	Flash Flood, Mt. Baldy, 50 farms, orchards, roads damaged	-	-	-	-	-
<u>Willard</u>	8/10/1952	-	Cloudburst east of Willard Mtn., hail, US 91 covered with mud	-	-	-	-	-
<u>1 Box Elder</u>	5/11/1958	1600	Tstm Wind	0 kts.	0	0	0	0
<u>2 Box Elder</u>	5/30/1958	1600	Tstm Wind	0 kts.	0	0	0	0
<u>3 Box Elder</u>	6/12/1958	1130	Hail	0.75 in.	0	0	0	0
<u>4 Box Elder</u>	6/12/1958	1130	Hail	0.75 in.	0	0	0	0
<u>5 Box Elder</u>	7/30/1958	1500	Hail	1.00 in.	0	0	0	0
<u>6 Box Elder</u>	7/30/1958	1500	Hail	1.00 in.	0	0	0	0
<u>7 Box Elder</u>	6/9/1960	1600	Hail	1.00 in.	0	0	0	0
<u>Brigham City</u>	6/14/1960	-	Heavy rain storm, large hail stones, crop damage	-	-	-	-	-
<u>8 Box Elder</u>	7/9/1962	1530	Tornado, Grouse Creek	F	0	0	OK	0
<u>Howell</u>	8/8, 8/9, 8/10/1968	-	Cloudburst in Blue Creek/Howell area, flooding, farmland damage	-	-	-	-	-
<u>9 Box Elder</u>	8/14/1968	1435	Tornado, Collingston	F	0	0	OK	0
<u>Brigham City</u>	6/24/1969	-	Cloudburst Flooding, local businesses damaged	-	-	-	-	-
<u>10 Box Elder</u>	6/5/1970	1620	Tornado	F	0	0	OK	0
<u>11 Box Elder</u>	4/28/1979	1540	Tstm Wind	0 kts.	0	0	0	0
<u>12 Box Elder</u>	7/24/1982	2115	Tstm Wind	0 kts.	0	0	0	0
<u>13 Box Elder</u>	7/24/1982	2200	Tstm Wind	65 kts.	0	0	0	0
<u>14 Box Elder</u>	3/15/1984	1815	Tstm Wind	60 kts.	0	0	0	0

<u>15 Box Elder</u>	6/29/1984	1500	Tstm Wind	56 kts.	0	0	0	0
<u>16 Box Elder</u>	8/16/1984	1725	Tornado, between Tremonton and Snowville	F0	0	0	0K	0
<u>17 Box Elder</u>	8/16/1984	1729	Tornado, between Tremonton and Snowville	F0	0	0	0K	0
<u>Box Elder County</u>	10/22/1985	-	Waterspout, Great Salt Lake	-	-	-	-	-
<u>18 Box Elder</u>	7/26/1986	1830	Tstm Wind	52 kts.	0	0	0	0
<u>19 Box Elder</u>	7/26/1986	1830	Tstm Wind	52 kts.	0	0	0	0
<u>20 Box Elder</u>	9/8/1986	1744	Tstm Wind	56 kts.	0	0	0	0
<u>21 Box Elder</u>	9/9/1986	1055	Hail	1.00 in.	0	0	0	0
<u>22 Box Elder</u>	9/9/1986	1100	Hail	1.00 in.	0	0	0	0
<u>23 Box Elder</u>	8/25/1987	1235	Tornado, Plymouth	F0	0	0	0K	0
<u>24 Box Elder</u>	7/27/1988	1625	Tstm Wind	52 kts.	0	0	0	0
<u>25 Box Elder</u>	8/19/1989	1500	Hail	0.75 in.	0	0	0	0
<u>Box Elder County</u>	8/24/1989	-	Waterspout, Willard Bay	-	-	-	-	-
<u>26 Box Elder</u>	8/23/1990	1905	Tstm Wind	60 kts.	0	0	0	0
<u>27 Box Elder</u>	3/5/1991	55	Tstm Wind	70 kts.	0	0	0	0
<u>28 Box Elder</u>	9/10/1991	1300	Tornado, Brigham City	F0	0	0	0K	0
<u>29 Box Elder</u>	5/8/1992	1615	Tstm Wind	60 kts.	0	0	0	0
<u>30 Box Elder</u>	8/16/1992	1945	Tstm Wind	65 kts.	0	0	0	0
<u>31 Box Elder</u>	9/23/1992	1750	Tstm Wind	75 kts.	0	0	0	0
<u>32 Lakeside</u>	4/1/1993	1600	Tstm Wind	50 kts.	0	0	0	0
<u>33 Lakeside</u>	4/1/1993	1645	Tstm Wind	52 kts.	0	0	0	0
<u>34 Tremonton</u>	4/1/1993	1730	Tstm Wind	52 kts.	0	0	0K	0
<u>35 Lakeside</u>	5/3/1993	1855	Tstm Wind	50 kts.	0	0	0	0
<u>36 Salt Lake City</u>	5/3/1993	1855	Tstm Wind	56 kts.	0	0	0	0
<u>37 Box Elder</u>	8/11/1993	1900	Tstm Wind	50 kts.	0	0	0	0
<u>38 Brigham City</u>	4/23/1994	1535	Tstm Wind	0 kts.	0	0	0	0
<u>39 Brigham City</u>	5/22/1995	1615	Hail	1.00 in.	0	0	0	0
<u>40 Yost</u>	6/5/1995	1508	Hail	0.75 in.	0	0	0	0
<u>41 Box Elder</u>	7/21/1995	1950	Hail	1.00 in.	0	0	0	0
<u>42 Brigham City Area</u>	5/16/1996	9:35 PM	Urban/sml Stream Fld	N/A	0	8	40K	0
<u>43 Promontory</u>	6/9/1997	9:29 AM	Funnel Cloud	N/A	0	0	0	0
<u>44 Yost</u>	7/10/1997	2:22 PM	Hail	1.75 in.	0	0	30K	30K
<u>45 (Bmc)Brigham City Ar</u>	8/10/1997	7:40 PM	Tstm Wind	58 kts.	0	0	5K	0
<u>46 Thatcher</u>	9/6/1997	8:20 PM	Hail	0.88 in.	0	0	0	0
<u>47 Riverside</u>	9/11/1997	1:30 PM	Hail	0.75 in.	0	0	5K	0
<u>48 Promontory</u>	6/3/1998	3:15 PM	Funnel Cloud	N/A	0	0	0K	0K
<u>49 Promontory</u>	6/3/1998	3:15 PM	Hail	0.75 in.	0	0	0K	0K
<u>50 Thatcher</u>	8/26/1998	3:00 PM	Hail	0.75 in.	0	0	0K	2K
<u>51 Countywide</u>	4/27/1999	12:00 PM	Heavy Rain	N/A	0	0	0	0
<u>52 Central</u>	8/30/1999	2:00 PM	Dry Microburst	N/A	0	0	0	0

<u>Portion</u>									
<u>Box Elder County</u>	9/19/1999	-	2 Tornadoes near Park Valley	-	-	-	-	-	-
<u>53 Lakeside</u>	7/14/2001	5:00 PM	Tstm Wind	50 kts.	0	0	0	0	0
<u>54 Central Portion</u>	8/14/2001	3:35 PM	Hail	0.75 in.	0	0	0	0	0
<u>55 Countywide</u>	8/20/2001	4:45 PM	Tstm Wind	53 kts.	0	0	0	0	0
<u>56 Central Portion</u>	6/2/2002	1:00 PM	Tstm Wind	70 kts.	0	0	2K	2K	
<u>57 Snowville</u>	9/6/2002	8:00 PM	Hail	0.75 in.	0	0	0	0	0
<u>58 Kelton</u>	9/12/2002	6:00 PM	Funnel Cloud	N/A	0	0	0	0	0
<u>59 Lakeside</u>	9/16/2002	10:30 AM	Tstm Wind	63 kts.	0	0	0	0	0
<u>60 Tremonton</u>	6/20/2003	4:50 PM	Tstm Wind	52 kts.	0	0	10K	0	
<u>61 Countywide</u>	8/22/2003	1:45 PM	Tstm Wind	62 kts.	0	0	0	0	
<u>62 Brigham City</u>	6/21/2004	2:00 PM	Hail	0.01 in.	0	0	24K	0	
<u>63 Lucin</u>	8/1/2004	10:45 AM	Tstm Wind	58 kts.	0	0	0K	0	
<u>64 Lakeside</u>	8/1/2004	12:15 PM	Tstm Wind	66 kts.	0	0	0K	0	
<u>65 Promontory</u>	8/2/2004	3:37 PM	Tstm Wind	58 kts.	0	0	0K	0	
<u>66 Brigham City</u>	4/27/2005	12:00 PM	Heavy Rain	N/A	0	0	0	0	
<u>67 Etna</u>	5/16/2005	4:15 PM	Tstm Wind	63 kts.	0	0	0	0	
<u>68 Lakeside</u>	7/29/2005	4:30 PM	Tstm Wind	61 kts.	0	0	0	0	
<u>69 Promontory Pt</u>	9/23/2005	7:15 PM	Tstm Wind	64 kts.	0	0	0	0	
<u>70 Lakeside</u>	6/7/2006	4:45 PM	Tstm Wind	65 kts.	0	0	0	0	
<u>71 Lakeside</u>	6/9/2006	4:15 PM	Tstm Wind	73 kts.	0	0	0	0	
<u>72 Brigham City</u>	7/4/2006	5:00 PM	Tstm Wind	72 kts.	0	0	0	0	
<u>73 Lakeside</u>	4/8/2007	12:30 AM	Tstm Wind	53 kts.	0	0	0K	0K	
<u>74 Saline</u>	4/8/2007	12:30 AM	Tstm Wind	53 kts.	0	0	0K	0K	
<u>75 Willard</u>	6/16/2007	21:31 PM	Tstm Wind	56 kts.	0	0	0K	0K	
<u>76 Promontory Pt</u>	7/7/2007	20:45 PM	Tstm Wind	51 kts.	0	0	0K	0K	
<u>77 Saline</u>	7/15/2007	17:00 PM	Tstm Wind	57 kts.	0	0	0K	0K	
<u>78 Grouse Creek</u>	7/17/2007	16:42 PM	Tstm Wind	55 kts.	0	0	0K	0K	
<u>79 Plymouth</u>	7/25/2007	12:00 PM	Tornado	F0	0	0	0K	0K	
<u>80 Honeyville</u>	8/5/2007	17:00 PM	Tstm Wind	50 kts.	0	0	15K	0K	
<u>81 Lucin</u>	8/22/2007	15:10 PM	Hail	1.00 in.	0	0	0K	0K	
<u>82 Promontory</u>	9/4/2007	17:15 PM	Tstm Wind	53 kts.	0	0	0K	0K	
<u>83 Lakeside</u>	8/31/2008	14:00 PM	Tstm Wind	56 kts.	0	0	0K	0K	
<u>84 Lakeside</u>	8/31/2008	14:15 PM	Tstm Wind	69 kts.	0	0	5K	0K	
TOTALS:					0	8	136K	34K	

Sources: Numbered events from the National Climatic Data Center (2008), 1950-2008 data; Other data from the State of Utah Office of Emergency Services (1976), 1939-1976 data, and from the Utah Center for Climate and Weather (2005).

Table 5-3: Cache County Severe Weather Events 1950-2008								
Inj = Injuries, PrD = Property Damage, CrD = Crop Damage, Mag = Magnitude, Dth = Deaths								
Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
<u>Cache County</u>	3/4/1907	-	Tornado, near Lewiston	-	-	-	-	-

<u>Young Ward</u>	1/22/1943	-	Tornado	F2	-	-	-	-
<u>Logan</u>	5/30/1958	-	Wind/Hail Storm, windows, road rails, and crops damaged	-	-	-	-	-
<u>Clarkston</u>	8/22/1958	-	Cloudburst storm, flooding, homes/roads damaged	-	-	-	-	-
<u>Providence</u>	8/18/1959	-	Heavy cloudburst, damage to property and homes, also rock and mud slides in Logan Canyon	-	-	-	-	-
<u>Smithfield</u>	6/6 – 6/7/1964	-	Intense storm, town flooded by Summit Creek, houses damaged	-	-	-	-	-
<u>1 Cache</u>	6/20/1969	1900	Hail	0.75 in.	0	0	0	0
<u>2 Cache</u>	6/14/1979	2230	Tstm Wind	61 kts.	0	0	0	0
<u>3 Cache</u>	8/15/1980	1300	Tstm Wind	50 kts.	0	0	0	0
<u>4 Cache</u>	5/6/1981	1245	Tornado, near Newton	F1	0	0	0K	0
<u>5 Cache</u>	11/14/1981	1652	Tstm Wind	54 kts.	0	0	0	0
<u>6 Cache</u>	4/11/1982	2030	Tstm Wind	50 kts.	0	0	0	0
<u>7 Cache</u>	7/4/1986	1410	Tstm Wind	64 kts.	0	0	0	0
<u>8 Cache</u>	2/13/1987	2147	Tstm Wind	61 kts.	0	0	0	0
<u>9 Cache</u>	5/29/1987	1245	Tornado, south of Lewiston	F2	0	0	3K	0
<u>10 Cache</u>	8/25/1987	1305	Tornado, east of Benson	F0	0	0	0K	0
<u>11 Cache</u>	9/8/1987	1736	Tstm Wind	55 kts.	0	0	0	0
<u>12 Cache</u>	11/1/1988	2335	Tstm Wind	64 kts.	0	0	0	0
<u>13 Cache</u>	9/17/1989	1630	Tornado, Cornish	F1	0	0	25K	0
<u>14 Cache</u>	5/7/1992	1908	Tstm Wind	75 kts.	0	0	0	0
<u>15 Cache</u>	6/12/1992	1935	Tstm Wind	0 kts.	0	0	0	0
<u>16 Cache</u>	10/6/1992	1345	Hail	1.00 in.	0	0	0	0
<u>17 Cache</u>	1/2/1993	530	Heavy Snow	N/A	0	0	0	0
<u>18 Cache</u>	1/11/1993	200	Heavy Snow	N/A	0	1	1K	0
<u>19 Cache</u>	1/14/1993	2200	Ice Storm	N/A	0	0	0	0
<u>20 Cache</u>	2/20/1993	1230	Heavy Snow	N/A	0	0	0	0
<u>21 Cache</u>	2/24/1993	1900	Heavy Snow	N/A	0	0	0	0
<u>22 Wellsville</u>	4/1/1993	1730	Tstm Wind	57 kts.	0	0	0	0
<u>23 Utz001</u>	4/12/1993	300	Heavy Snow	N/A	0	0	0	0
<u>24 Cache</u>	2/17/1994	600	Heavy Snow	N/A	0	1	0	0
<u>25 Cache</u>	2/17/1994	1800	High Winds	0 kts.	0	0	0	0
<u>26 Cache</u>	2/17/1994	2300	Flash Flood	N/A	0	0	0	0
<u>27 Logan</u>	4/23/1994	1500	Tstm Wind	58 kts.	0	0	0	0
<u>28 Logan</u>	7/5/1994	1710	Tstm Wind	52 kts.	0	0	0	0
<u>29 Lewiston</u>	7/5/1994	1715	Tstm Wind	57 kts.	0	0	0	0
<u>30 Cache</u>	2/21/1996	9:00 PM	Heavy Snow	N/A	0	0	100K	0
<u>31 Cache</u>	2/25/1996	5:00	Heavy Snow	N/A	1	1	10K	0

		PM						
<u>32 Cache</u>	3/5/1996	12:00 PM	Heavy Snow	N/A	0	1	20K	0
<u>33 Cache</u>	10/24/1996	11:00 AM	Winter Storm	N/A	0	20	1.0M	0
<u>34 Cache</u>	11/15/1996	12:00 PM	Heavy Snow	N/A	0	0	100K	0
<u>35 Cache</u>	12/1/1996	8:00 AM	Winter Storm	N/A	0	30	1.0M	0
<u>36 Cache</u>	12/3/1996	4:00 PM	Heavy Snow	N/A	0	25	0K	0
<u>37 Cache</u>	12/5/1996	1:00 PM	Heavy Snow	N/A	1	20	300K	0
<u>38 Cache</u>	12/20/1996	6:00 PM	Heavy Snow	N/A	0	3	50K	0
<u>39 Cache</u>	1/22/1997	9:00 PM	Heavy Snow	N/A	0	10	1K	0
<u>40 Cache</u>	3/31/1997	4:00 AM	Winter Storm	N/A	3	60	2.0M	0
<u>41 Cache</u>	4/23/1997	11:00 AM	Winter Storm	N/A	0	0	40K	0
<u>42 Cache</u>	5/15/1997	2:00 PM	Flood	N/A	0	0	120K	50K
<u>43 Cache</u>	9/6/1997	9:40 PM	Hail	1.00 in.	0	0	10K	0
<u>44 Cache</u>	10/23/1997	4:00 AM	Winter Storm	N/A	0	0	30K	0
<u>45 Cache</u>	12/7/1997	4:00 AM	Winter Storm	N/A	1	20	200K	0
<u>46 Cache</u>	12/23/1997	7:00 PM	Winter Storm	N/A	0	2	80K	0
<u>47 Cache</u>	1/4/1998	10:00 PM	Winter Storm	N/A	0	6	30K	0
<u>48 Cache</u>	1/11/1998	3:00 PM	Urban/sml Stream Fld	N/A	0	0	30K	0
<u>49 Cache</u>	1/15/1998	2:00 AM	Heavy Snow	N/A	2	18	200K	20K
<u>50 Cache</u>	1/19/1998	6:00 AM	Winter Storm	N/A	0	2	30K	5K
<u>51 Cache</u>	2/7/1998	1:00 AM	Heavy Snow	N/A	2	20	80K	20K
<u>52 Cache</u>	2/21/1998	6:00 AM	Winter Storm	N/A	0	40	900K	200K
<u>53 Cache</u>	3/5/1998	9:00 PM	Winter Storm	N/A	0	8	95K	5K
<u>54 Cache</u>	4/11/1998	11:00 AM	High Wind	52 kts.	0	0	0K	0K
<u>55 Cache</u>	4/12/1998	4:00 AM	Winter Storm	N/A	0	3	30K	3K
<u>56 Cache</u>	5/21/1998	2:50 PM	Tstm Wind	53 kts.	0	0	3K	2K
<u>57 Cache</u>	8/20/1998	5:15	Funnel Cloud	N/A	0	0	0K	0K

		PM						
<u>58 Cache</u>	8/26/1998	1:30 PM	Tstm Wind/hail	0 kts.	0	0	10K	5K
<u>59 Cache</u>	11/5/1998	12:00 PM	Winter Storm	N/A	0	0	90K	0
<u>60 Cache</u>	11/8/1998	12:00 PM	Winter Storm	N/A	0	10	500K	0
<u>61 Cache</u>	11/23/1998	12:00 PM	High Wind	0 kts.	0	0	100K	0
<u>62 Cache</u>	12/4/1998	6:00 AM	Winter Storm	N/A	0	0	50K	0
<u>63 Cache</u>	12/19/1998	6:00 PM	Winter Storm	N/A	0	10	100K	0
<u>64 Cache</u>	12/21/1998	6:00 AM	Extreme Cold	N/A	0	0	20K	0
<u>65 Cache</u>	1/20/1999	12:00 PM	Winter Storm	N/A	0	0	10K	0
<u>66 Cache</u>	1/23/1999	7:00 PM	Heavy Snow	N/A	0	0	0	0
<u>67 Cache</u>	1/26/1999	12:00 PM	Winter Storm	N/A	0	4	50K	0
<u>68 Cache</u>	4/1/1999	12:00 AM	Winter Storm	N/A	0	35	170K	0
<u>69 Cache</u>	4/8/1999	9:00 PM	Winter Storm	N/A	0	19	10K	0
<u>70 Cache</u>	4/27/1999	12:00 PM	Heavy Rain	N/A	0	0	0	0
<u>71 Cache</u>	8/11/1999	2:00 PM	Funnel Cloud	N/A	0	0	0	0
<u>72 Cache</u>	11/21/1999	9:00 AM	Heavy Snow	N/A	0	0	0	0
<u>73 Cache</u>	12/2/1999	6:00 PM	Heavy Snow	N/A	0	2	200K	0
<u>74 Cache</u>	12/7/1999	10:00 AM	Heavy Snow	N/A	0	0	0	0
<u>75 Cache</u>	12/10/1999	3:00 AM	Heavy Snow	N/A	0	0	0	0
<u>76 Cache</u>	12/13/1999	6:00 PM	Heavy Snow	N/A	0	0	0	0
<u>77 Cache</u>	12/20/1999	12:00 PM	Heavy Snow	N/A	0	0	0	0
<u>78 Cache</u>	1/1/2000	12:00 PM	Winter Storm	N/A	0	2	20K	0
<u>79 Cache</u>	1/4/2000	9:00 AM	Heavy Snow	N/A	0	5	30K	0
<u>80 Cache</u>	1/11/2000	3:00 PM	High Wind	78 kts.	0	0	10K	1K
<u>81 Cache</u>	11/14/2000	9:00 PM	Heavy Snow	N/A	0	6	50K	0
<u>82 Cache</u>	4/28/2001	7:30 PM	Dry Microburst	N/A	0	0	100K	5K
<u>83 Cache</u>	10/23/2001	9:00	High Wind	62 kts.	0	0	0	0

	1	AM						
<u>84 Cache</u>	12/2/2001	12:00 PM	Winter Storm	N/A	0	0	50K	10K
<u>85 Cache</u>	1/27/2002	7:00 AM	Winter Storm	N/A	0	38	720K	0
<u>86 Cache</u>	4/17/2002	6:00 PM	Heavy Snow	N/A	0	0	0	0
<u>87 Cache</u>	6/2/2002	2:40 PM	Tstm Wind	60 kts.	0	0	1K	1K
<u>88 Cache</u>	7/18/2002	1:00 PM	Funnel Cloud	N/A	0	0	0	0
<u>89 Cache</u>	1/10/2003	9:00 AM	Heavy Snow	N/A	0	0	0	0
<u>90 Cache</u>	3/1/2003	8:00 AM	Winter Storm	N/A	0	0	0	0
<u>91 Cache</u>	8/22/2003	2:50 PM	Tstm Wind	60 kts.	0	0	50K	0
<u>92 Cache</u>	10/30/2003	6:00 AM	Heavy Snow	N/A	0	0	0	0
<u>93 Cache</u>	11/21/2003	8:00 AM	Winter Storm	N/A	0	0	550K	0
<u>94 Cache</u>	12/25/2003	6:00 AM	Winter Storm	N/A	0	0	1.5M	0
<u>95 Cache</u>	12/28/2003	12:00 PM	Winter Storm	N/A	2	0	320K	0
<u>96 Cache</u>	4/28/2004	5:00 AM	Heavy Snow	N/A	0	0	1K	0
<u>97 Cache</u>	5/10/2004	11:00 AM	Strong Wind	49 kts.	0	0	1K	0
<u>98 Cache</u>	7/9/2004	3:00 PM	High Wind	77 kts.	0	0	82K	0
<u>99 Cache</u>	1/7/2005	2:00 PM	Heavy Snow	N/A	0	0	0	0
<u>100 Cache</u>	2/14/2005	9:00 PM	Heavy Snow	N/A	0	0	0	0
<u>101 Cache</u>	3/18/2005	6:00 AM	Heavy Snow	N/A	0	0	0	0
<u>102 Cache</u>	4/8/2005	6:00 PM	Strong Wind	55 kts.	0	0	20K	0
<u>103 Cache</u>	4/27/2005	12:00 PM	Heavy Rain	N/A	0	0	0	0
<u>104 Cache</u>	4/28/2005	3:00 PM	Flash Flood	N/A	0	0	0	0
<u>105 Cache</u>	4/28/2005	11:00 AM	Flood	N/A	0	0	0	0
<u>106 Cache</u>	6/6/2005	11:00 AM	Heavy Rain	N/A	0	0	0	0
<u>107 Cache</u>	1/1/2006	10:00 PM	Flash Flood	N/A	0	0	0	0
<u>108 Cache</u>	2/15/2006	1:50 AM	Heavy Snow	N/A	0	0	0	0
<u>109 Cache</u>	3/18/2006	5:00 AM	Heavy Snow	N/A	0	0	0	0

<u>110 Cache</u>	4/6/2006	8:00 AM	Heavy Snow	N/A	0	0	0	0
<u>111 Cache</u>	2/27/2007	6:00 AM	Heavy Snow	N/A	0	0	0K	0K
<u>112 Cache</u>	8/5/2007	17:15 PM	Tstm Wind	50 kts.	0	0	0K	0K
<u>113 Cache</u>	8/19/2007	13:37 PM	Tstm Wind	52 kts.	0	0	0K	0K
<u>114 Cache</u>	9/4/2007	16:36 PM	Flash Flood	N/A	0	0	0K	0K
<u>115 Cache</u>	1/31/2008	18:00 PM	Heavy Snow	N/A	0	0	0K	0K
<u>116 Cache</u>	1/31/2008	18:00 PM	Winter Storm	N/A	0	0	0K	0K
<u>117 Cache</u>	2/1/2008	12:00 AM	Heavy Snow	N/A	0	0	0K	0K
<u>118 Cache</u>	2/1/2008	12:00 AM	Winter Storm	N/A	0	0	0K	0K
<u>119 Cache</u>	2/3/2008	2:00 AM	Heavy Snow	N/A	0	0	0K	0K
<u>120 Cache</u>	2/3/2008	2:00 AM	Winter Storm	N/A	0	0	0K	0K
<u>121 Cache</u>	2/13/2008	11:00 AM	Winter Storm	N/A	0	0	0K	0K
TOTALS:					12	422	11.25 1M	327K

Sources: Numbered events from the National Climatic Data Center (2008), 1950-2008 data; Other data from the State of Utah Office of Emergency Services (1976), 1939-1976 data, and from the Utah Center for Climate and Weather (2005).

Table 5-4: Rich County Severe Weather Events 1950-2008								
Inj = Injuries, PrD = Property Damage, CrD = Crop Damage, Mag = Magnitude, Dth = Deaths								
Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
<u>1 Rich</u>	5/25/1954	1300	Tornado, Laketown	F1	0	0	25K	0
<u>2 Rich</u>	6/23/1965	1644	Tornado, Woodruff	F1	0	0	3K	0
<u>3 Rich</u>	7/21/1987	1330	Hail	1.25 in.	0	0	0	0
<u>4 Randolph</u>	5/27/1994	1807	Tstm Wind	56 kts.	0	0	0	0
<u>5 Randolph</u>	7/5/1994	1636	Tstm Wind	50 kts.	0	0	0	0
<u>6 Randolph</u>	7/5/1994	1738	Tstm Wind	56 kts.	0	0	0	0
<u>7 Rich</u>	3/11/1995	1040	Flooding	N/A	0	0	0	0
<u>8 Bear Lake</u>	9/17/1996	7:45 AM	4 Waterspouts	N/A	0	0	0	0
<u>Bear Lake</u>	5/26/1998	-	Waterspout	-	-	-	-	-
<u>9 Randolph</u>	6/28/1998	9:55 PM	Tstm Wind	61 kts.	0	0	0K	1K
<u>10 Laketown</u>	10/4/1998	12:00 PM	Waterspout	N/A	0	0	0K	0K
<u>11 Countywide</u>	4/27/1999	12:00 PM	Heavy Rain	N/A	0	0	0	0
<u>12 Woodruff</u>	8/14/1999	9:30 PM	Dry Microburst	N/A	0	0	2K	2K
<u>13 Randolph</u>	7/16/2002	3:15 PM	Hail	0.75 in.	0	0	0	0
<u>Woodruff</u>	5/21/2004	-	Tornado	-	-	-	-	-
<u>14 Randolph</u>	6/28/2005	3:10 PM	Tstm Wind	58 kts.	0	0	0	0
<u>15 Garden</u>	9/3/2007	16:45 PM	Tstm Wind	51 kts.	0	0	0K	0K

<u>City</u>								
<u>16 Garden City</u>	9/4/2007	17:45 PM	Tstm Wind	52 kts.	0	0	2K	0K
TOTALS:					0	0	32K	3K

Sources: Numbered events from the National Climatic Data Center (2008), 1950-2008 data; Other data from the Utah Center for Climate and Weather (2005).

Table 5-5: Grasshopper Infested Acreage by Year							
	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>
Box Elder County	120,400	120,000	94,710	6,570	15,200	15,270	13,644
Cache County	64,500	17,000	2,200	26,380	2,170	10,490	10,616
Rich County	12,400		32,140	68,830	4,000		

Source: Utah Department of Agriculture and Food, 2007a

Table 5-6: Mormon Cricket Infested Acreage By Year							
	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>
Box Elder County		108,300	125,900	276,620	499,550	966,340	98,276
Cache County	8,100	4,400	8,400	8,260			
Rich County					2,530		

Source: Utah Department of Agriculture and Food, 2007a

Regional Hazard Assessment

Table 5-7: Drought Hazard Profile

Frequency	Frequent
Severity	Severe mostly for agricultural producers
Location	Un-irrigated areas are most impacted
Seasonal Pattern	Water supply dependent on winter snowfall. Summer is when impact is realized.
Duration	As many as 10 years
Speed of Onset	Incremental with impact increasing
Probability of Future Occurrences	High

Table 5-8: Severe Weather Hazard Profile

Frequency	Frequent
Severity	Severe mostly for agricultural producers
Location	Everywhere (Some areas have more inherent risk due to geographic conditions)
Seasonal Pattern	Summer severe thunderstorms/hail & wind, Late spring freezing, and heavy winter storms
Duration	Days
Speed of Onset	Immediate
Probability of Future Occurrences	High

Table 5-9: Agricultural Hazards Profile

Frequency	Sporadic
Severity	Severe mostly for agricultural producers
Location	Everywhere
Seasonal Pattern	Spring & early summer
Duration	Months
Speed of Onset	Days
Probability of Future Occurrences	High

Assessing Vulnerability: Identifying Assets & Estimating Losses

Table 5-10: Bear River Region 2007 Agriculture Statistics

County	Number of Farms	Acres in Farms	Crop Sales	Animal Sales Including Products	Value of Ag Land Including Buildings
Box Elder	1,113	1,320,177	\$50,497,000	\$90,747,000	\$1,210,612,000
Cache	1,195	251,550	\$24,335,000	\$111,728,000	\$789,983,000
Rich	167	363,567	\$782,000	\$16,190,000	\$294,087,000

Source: U.S. Department of Agriculture, 2007

For 2007, the USDA Crop Insurance Program paid indemnity in the amount of \$736,376 to farmers with crop insurance in Box Elder County. Since these indemnities (payouts) only represent a portion of actual damages, losses could have been much higher. For Cache County in 2007, indemnity totaled \$189,629, and Rich County did not suffer any losses for the same year (Utah State University, 2008). These agricultural losses in the Bear River Region can come from many sources including severe weather, insect infestation, and drought.

Assessing Vulnerability: Analyzing Development Trends

The urbanization of eastern Box Elder County and Cache Valley means access to irrigation water for agricultural purposes will become increasingly more difficult. In terms of competition for limited water resources, agricultural uses often lose out to increasing urban demands. This problem is likely to get worse for agricultural users and especially becomes evident during a drought period. In general, as population increases in the Bear River Region, risk will most likely increase to people and property from drought, severe weather, and agricultural hazards. The more people that live in an area, the more people that are potentially exposed to hazards.