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*Working Draft*

# **North Santiam Watershed Drought Contingency Plan**

Prepared for  
**North Santiam Watershed  
Drought Contingency Plan Task Force**

April 2017

Prepared by  
GSI Water Solutions and David Evans and Associates

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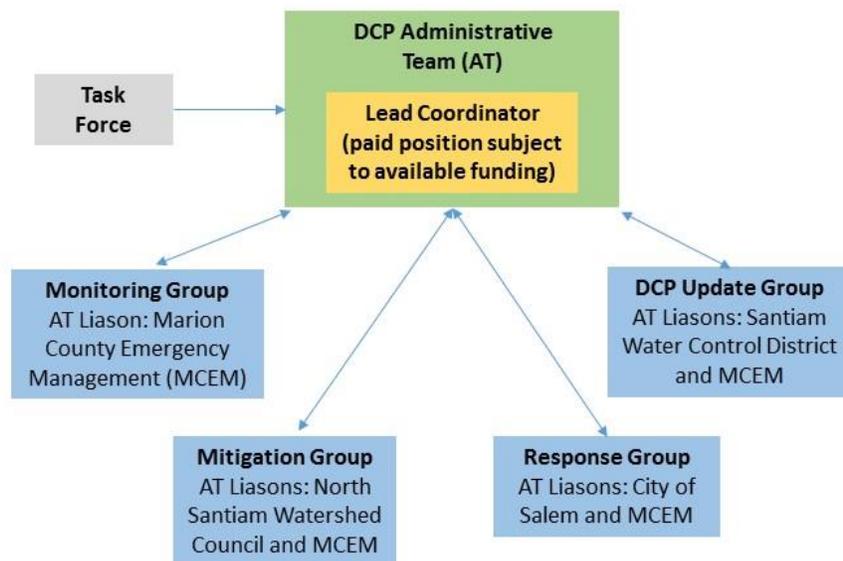
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## Executive Summary

This Drought Contingency Plan (DCP) was developed by the North Santiam Watershed (NSW) Task Force to foster a collaborative approach to drought planning and response within the watershed. The DCP is intended to be a “living plan” that should be reviewed and adjusted based on new information and how well it serves the needs of decision makers and their constituents. The DCP was funded in part by a Drought Contingency Planning WaterSMART grant from the Bureau of Reclamation (Reclamation). It follows Reclamation’s guidance for DCP preparation, as well as the NSW DCP Work Plan approved by Reclamation in March 2016.

The overarching goal of this DCP is to build long-term resiliency to drought in order to minimize impacts to the communities, local economies, and the critical natural resources within the watershed. The process will seek to develop consensus among stakeholders to manage water before and during drought.

The NSW DCP addresses Reclamation’s six required elements. Each requirement was developed and completed as part of a collaborative process, and will be implemented as designated in the NSW DCP Operational and Administrative Framework (shown below and discussed in Chapter 6).



An overview of each planning element, and the annual schedule for implementation under this DCP, are summarized as follows:

1. **Chapter 2** – The **Drought Monitoring** Framework is used to calculate and recognize four stages of drought; the results are used to identify which response actions should be used to reduce impacts during each of these four stages. The Framework includes a current drought conditions table, a future drought trends table, a reporting form, and a monthly schedule. These tables, forms and schedule are presented in Chapter 2, with instructions for gathering the necessary data to complete them **on a monthly basis (or weekly starting in Stage 2)**.

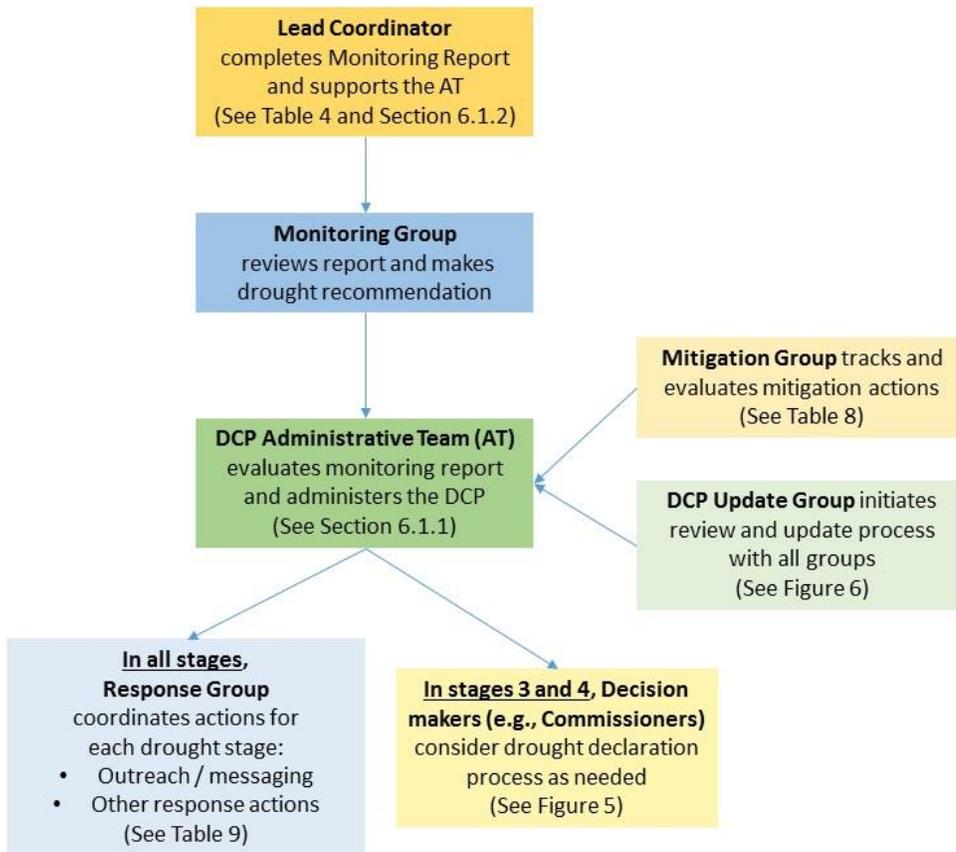
2. **Chapter 3 – The Vulnerability Assessment** identifies and evaluates the impacts of drought on the assets and resources within the watershed, under current and future conditions. The underlying causes of impacts are also identified. The assessment was used to identify mitigation and response actions that would help reduce impacts on the assets. The results of the assessment are presented in Chapter 3, and are scheduled to be evaluated **on an annual basis** during the DCP Update process.
3. **Chapter 4 - Mitigation Actions** reduce risks and impacts before drought. They are projects and programs implemented by individual organizations within the watershed, or collectively by the Task Force. Recommended steps for implementing the eight newly identified collective mitigation actions are provided in a separate document entitled, *Joint Mitigation Actions for Water Supply Resiliency - Implementation Plan* (JMAP); the steps are expected to be completed in the first two years of DCP implementation. All proposed mitigation actions, their lead entities, and a schedule, are listed in Chapter 4. They are **implemented on an on-going basis by the designated responsible party, and evaluated on an annual basis** during the DCP Update Process.
4. **Chapter 5 - Response Actions** reduce impacts during each of the four stages of drought. They are actions and programs that are implemented on a collaborative, voluntary, and watershed-wide basis. Response actions and the drought stage in which they are recommended for implementation, are described in Chapter 5. They are **implemented during each drought stage, and evaluated on an annual basis** during the DCP Update Process.
5. **Chapter 6 – Operational and Administrative Framework.** This DCP provides a process for facilitating a quick and efficient response to drought. When monitoring results are reported on a monthly basis, communication to the watershed community is triggered as a response action. In addition, if advanced stages of drought are identified, county and public officials will be involved to request a drought declaration of the Governor. This process is discussed in Chapter 6, and **evaluated on an annual basis** during the DCP Update Process.
6. **Chapter 7 – The DCP Update Process** conducts **annual evaluation** of each of the planning elements to ensure effectiveness and improve future implementation and response. This process is presented in Chapter 7.

These planning elements are discussed in detail in the DCP chapters that follow. A checklist indicating the planning elements that need to be completed at each drought stage, and a figure summarizing the flow of planning elements are provided on the following pages. Additional information about development of the elements, background research, and the public input process, are provided in the appendices.

NSW DCP Checklist

In All Drought Stages: Monitoring and Response	
	Monthly. Lead coordinator prepares a monthly monitoring report for submittal to the Monitoring Group during the first week of the month. (See Section 6.2.1)
	DCP Administrative Team evaluates the monthly report and submits the evaluation to the Response Group by the 15 <sup>th</sup> of the month. (In Drought Stages 3 and 4, see Additional Response below.)
	Response Group initiates public messaging (See Section 6.2.2) and response actions corresponding to drought stage detailed in Table 9 and Section 5.1.4.
	Individual Task Force members align their individual water management plans and actions with the NSW DCP.
In Drought Stages 3 and 4: Additional Response	
	Complete all preceding steps.
	In Stages 3 and 4, the DCP Administrative Team will confer with decision-makers (e.g., boards, councils, commissioners) within 72 hours as to whether to recommend an ORS 536 drought declaration. (See Section 6.2.2)
	If decision-makers recommend a drought declaration, County/Public Officials will pursue from the Governor.
	Implement emergency response actions in Table 9 and individual water management plans.
On-going and annual actions	
	Mitigation actions as identified in Table 8 will be implemented and completed on an on-going basis by the Mitigation Group or individual Task Force members.
	By November 1 of each year, the DCP Update Group will commence the annual DCP Update Process by sending an information request email to the Task Force. (See Figure 6, Table 10, and draft email in Appendix G.)
	By November 15 of each year, the Task Force will submit requested information to the DCP Update Group. (See Figure 6, Table 10)
	By November 22 of each year, the DCP Update Group will review and update the Vulnerability Assessment with information provided by the Task Force. (See Figure 6, Table 10)
	By December 1, the Monitoring, Mitigation and Response Groups will evaluate and recommend changes regarding their respective planning elements to the DCP Administrative Team. (See Figure 6, Table 10)
	By December 15 of each year, the DCP Administrative Team will compile and document recommendations in an annual report. Task Force feedback may be solicited. (See Figure 6, Table 10)
	Every 5 years, The DCP Update Group will compile the annual reports and update the DCP document. (See Figure 6, Table 10)

NSW DCP Process Overview



# Table of Contents

## Contents

<b>1</b>	<b>INTRODUCTION</b>	<b>1</b>
1.1	PLANNING AREA	1
1.2	NSW DROUGHT CONTEXT	2
1.3	APPROACH	2
1.3.1	Planning Process	2
1.3.2	Collaboration and Review	3
1.3.3	Joint Mitigation Actions Implementation Plan	3
1.3.4	Communications and Outreach Plan	3
<b>2</b>	<b>ELEMENT #1: DROUGHT MONITORING</b>	<b>1</b>
2.1	DROUGHT MONITORING ELEMENTS	1
2.2	NSW DCP PROPOSED MONITORING FRAMEWORK, VERSION 1.0	2
2.2.1	Stages, Indices/Indicators, and Thresholds for the NSW DCP Framework	4
2.2.2	Additional Indicators to Consider	6
2.2.3	Drought Monitoring Reporting Steps	6
2.2.4	Monitoring Schedule and Responsibilities	7
2.3	POTENTIAL CHALLENGES TO DROUGHT MONITORING IN THE STUDY AREA	8
<b>3</b>	<b>ELEMENT #2: VULNERABILITY ASSESSMENT</b>	<b>9</b>
3.1	WATERSHED ASSETS/RESOURCES PRIORITIZATION	9
3.2	VULNERABILITY ASSESSMENT FRAMEWORK	9
3.3	VULNERABILITY NOW AND IN THE FUTURE	10
3.3.1	Current Vulnerability Results	10
3.3.2	Future Vulnerability Results	11
3.3.3	Evaluate Underlying Causes of Vulnerability	14
3.4	RECOMMENDATIONS AND DATAGAPS	14
<b>4</b>	<b>ELEMENT #3: MITIGATION</b>	<b>16</b>
4.1	NSW DCP MITIGATION ACTION GOALS	16
4.2	DCP MITIGATION ACTIONS	16
4.3	JOINT MITIGATION ACTIONS IMPLEMENTATION PLAN	17
4.4	RECOMMENDATIONS AND DATA GAPS	17
<b>5</b>	<b>ELEMENT #4: RESPONSE</b>	<b>22</b>
5.1	RESPONSE ACTIONS	22
5.1.1	Goal	22
5.1.2	Objectives	22
5.1.3	RESPONSE ACTIONS	23
5.1.4	RESPONSE ACTION DESCRIPTIONS	23
5.2	RECOMMENDATIONS AND DATAGAPS	32
<b>6</b>	<b>ELEMENT #5: OPERATIONAL AND ADMINISTRATIVE FRAMEWORK</b>	<b>33</b>

6.1	NSW DCP FRAMEWORK, ONGOING ROLES AND RESPONSIBILITIES.....	33
6.2	EFFICIENT RESPONSE TO DROUGHT CONDITIONS.....	36
6.2.1	Monitoring and Reporting.....	37
6.2.2	Response and Drought Declaration Recommendations.....	37
<b>7</b>	<b>ELEMENT #6: DCP UPDATE PROCESS.....</b>	<b>39</b>
<b>8</b>	<b>REFERENCES.....</b>	<b>43</b>
	<b>APPENDICES.....</b>	<b>44</b>

## Figures

1	North Santiam Watershed
2	Current Vulnerability
3	Future Vulnerability
4	Operational and Administrative Framework
5	Communications and Drought Declaration Recommendation Process
6	Overview of DCP Update Process

## Tables

1	NSW DCP Current Conditions Monitoring Table
2	Monitoring Trends
3	Monitoring Indicators
4	Drought Stage Calculator
5	Prioritized NSW Grouped Assets at Risk due to Drought
6	Vulnerability Assessment Risk Evaluation Factors and Criteria
7	Underlying Causes of Vulnerability
8	Prioritized Current Mitigation Actions
9	Response Actions
10	DCP Update Process

## Appendices

A	Task Force and Working Group Members Lists
B	Monitoring Working Group Chapter
C	Vulnerability Assessment Working Group Chapter
D	Mitigation Actions Working Group Chapter and Potential Mitigation Actions
E	Response Actions Working Group Chapter
F	Operational and Administrative Framework Working Group Chapter
G	DCP Update Working Group Chapter and Kick-off Email

# 1 INTRODUCTION

This Drought Contingency Plan (DCP) was developed by the North Santiam Watershed (NSW) Partners to foster a collaborative and non-regulatory approach to drought planning and response within the watershed. The DCP is intended to be a “living plan” that should be reviewed and adjusted based on new information and how well it serves the needs of decision makers and their constituents. The DCP was funded in part by a Drought Contingency Planning WaterSMART grant from the Bureau of Reclamation (Reclamation). It follows Reclamation’s guidance for DCP preparation, as well as the NSW DCP Work Plan approved by Reclamation in March 2016.

The overarching goal of this DCP, as defined by the Partners is as follows:

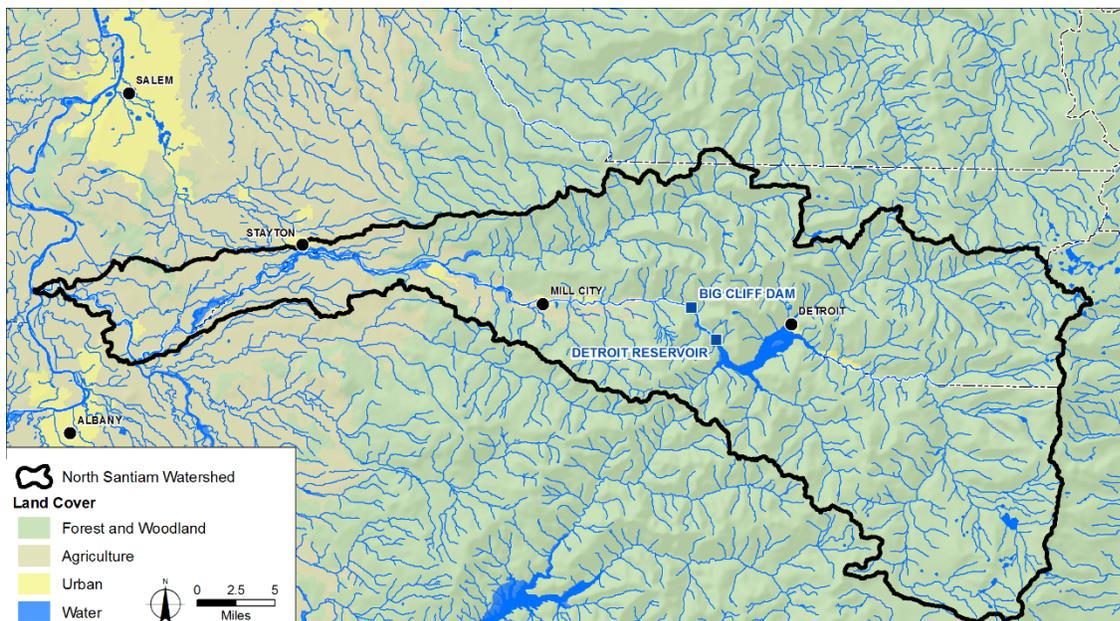
*“Build long-term resiliency to drought in order to minimize impacts to the communities, local economies, and the critical natural resources within the watershed. The process will seek to develop consensus among stakeholders to manage water before and during drought.”*

## 1.1 PLANNING AREA

The NSW DCP addresses the entirety of the NSW as well as water users outside the basin that obtain their water from the NSW, such as the City of Salem. Communities, businesses, and threatened fisheries (Upper Willamette River Chinook and winter steelhead) inside and outside of the watershed depend upon the North Santiam River for drinking water, commercial uses, irrigation, instream flows, and water quality needs (e.g., temperature management).

A major feature of the NSW is Detroit Lake, formed by Detroit Dam and its re-regulating structure Big Cliff Dam. These facilities are operated by the U.S. Army Corps of Engineers (USACE) as part of the Willamette Basin project (Contracts #140510W0675 and #140510W1118).

Figure 1: North Santiam Watershed



Geographically, the NSW is a fourth field watershed within the Willamette River Basin (Figure 1). It covers approximately 766 square miles (approximately 500,000 acres) from the western slopes of the Cascade Mountains to the Willamette Valley floor. The North Santiam flows westerly, and below the confluence with the South Santiam River, joins 12 miles of the mainstem Santiam before reaching the Willamette River. Together, the North Santiam River and the mainstem Santiam River are approximately 100 miles long and enter the Willamette River at River Mile 108. The NSW is characterized by steep forested uplands and flat alluvial lowlands.

## **1.2 NSW DROUGHT CONTEXT**

In 2015, the headwaters of the NSW experienced “severe drought”, and the western portion of the watershed experienced “moderate drought”. The Governor declared a state of drought emergency for both counties that comprise the watershed (Linn and Marion Counties) due to drought, low snowpack levels, and low water conditions (Executive Orders 15-11 and 15-19). In June 2015, Detroit Lake levels were 60 feet below normal, and storage was 33 percent of normal. Air temperatures were approximately 5-10 degrees Fahrenheit (°F) above normal at the beginning of the year, and the warmest on record for June (7.7 °F above average).

The Oregon Climate Change Research Institute (2013) has predicted temperature increases of 0.2 to 1 °F per decade through 2100 in the Oregon Cascades, where the NSW is located. Annual precipitation patterns are expected to change, resulting in winters with more rainfall, reduced winter snowpack, and longer dry seasons.

Releases from Detroit Lake are managed according to federally mandated regulations that provide for flood protection and control of flows to foster recovery of salmon and steelhead listed as threatened under the Endangered Species Act. As a result, most stakeholders have little control over the amount of water stored or available downstream of Detroit Lake. This lack of control over water availability creates significant uncertainty. Changes in reservoir storage and releases during drought conditions could impact many stakeholders.

It should be noted that this DCP does not supersede Oregon water law. Under Oregon law, water is publicly owned, and most uses must be authorized through a water right issued by the Oregon Water Resources Department (OWRD). Under OWRD’s administration of these water rights, in times of shortage, the earlier obtained water rights (senior rights) must be fully satisfied before the recently obtained water rights (junior rights) can take water. The DCP works within this framework and recommends voluntary actions to build resiliency and minimize impacts of drought.

## **1.3 APPROACH**

### **1.3.1 Planning Process**

The NSW DCP addresses Reclamation’s six required elements necessary to complete a DCP:

1. **Drought Monitoring** involves predicting and recognizing drought conditions
2. **Vulnerability Assessment** identifies and evaluates the risks and impacts of drought
3. **Mitigation Actions** reduce risks and impacts before drought
4. **Response Actions** reduce impacts during drought

5. **Operational and Administrative Framework** identifies roles and responsibilities for implementation of this DCP

6. **DCP Update Process** conducts evaluation to ensure effectiveness and improve future implementation and response

The chapters that follow address each planning element. Additional details are provided in the appendices.

### **1.3.2 Collaboration and Review**

A two-part project structure was used to complete each DCP element:

- A **Drought Planning Task Force** (Task Force) composed of individuals with interest and technical expertise led the process.
- **Working Groups** supported development of the individual planning element chapters of the DCP.

Volunteers from the Task Force participated in the Working Groups. For each DCP element, Working Group members provided technical and “on the ground” knowledge by participating in two in-person workshops for each planning element, and also provided feedback on each draft DCP planning element chapter (Appendices). After completion of every two DCP elements, results were presented to the larger Task Force for feedback and concurrence. On-going feedback was solicited in person and via email after each workshop and Task Force meeting. The process was supported by a consultant team, which prepared for and facilitated each workshop and Task Force meeting, prepared the chapters, and incorporated feedback from participants. The Task Force and Working Group members are listed by DCP element in Appendix A.

A compiled draft version of the DCP was circulated, and a joint Task Force and Basin Summit (including the public) was convened to provide feedback. After this joint meeting, feedback was incorporated and the final draft DCP circulated. Task Force members were asked for concurrence to submit the final draft document to Reclamation.

### **1.3.3 Joint Mitigation Actions Implementation Plan**

Several mitigation actions were identified for the Task Force as part of the Mitigation plan element. To support implementation of these actions, a *Joint Mitigation Actions for Water Supply Resiliency - Implementation Plan* (JMAP) has been prepared as a separate document. The JMAP includes detailed recommendations for carrying out the the joint actions. The JMAP is discussed more in Chapter 4.

### **1.3.4 Communications and Outreach Plan**

During development of the DCP, information was also provided to a broader range of stakeholders within the planning area that are not necessarily represented by the Task Force and Working Groups. Tools used include a website, emails, newsletter articles, conference presentations, NSW Watershed Council meeting updates and a mailed annual report, and the 2016 and 2017 North Santiam Basin Summits. A Communication and Outreach Plan was included in the NSW DCP Work Plan, which identified the opportunities for stakeholders, including the general public, to seek information and provide input during the DCP planning process.

## **2 ELEMENT #1: DROUGHT MONITORING**

This chapter presents the Drought Monitoring Framework (Framework) that will be used to confirm existing drought and assess the likelihood of future drought in the NSW. The Framework defines the data sources and indices, thresholds, and stages of drought. The stages will be used to define which mitigation actions (Chapter 4) and response actions (Chapter 5) should be implemented at any given time specifically for the NSW DCP area.

The Framework provides a streamlined, common view of watershed conditions, based upon discussions among the Working Group, Task Force, and 2016 Basin Summit participants that comprises a variety of climatologic, hydrologic, environmental, and socio-economic indicators. It consists of a series of tables and reporting forms, discussed in the following sections. It is not intended to supersede monitoring conducted by individual stakeholders within the NSW. Each entity should continue to monitor water availability conditions as required or desired by their own rules or guidance documents. As part of the annual DCP Update Process (Chapter 7), the Framework may be adjusted with new or more useful information.

A full description of the collaborative Monitoring Working Group and Task Force review process, existing monitoring processes used in the watershed, and current data sources, used to provide background for this planning element are provided in Appendix B.

### **2.1 DROUGHT MONITORING ELEMENTS**

To develop an effective Framework, an entity needs to identify and integrate the use of indices, indicators, and triggers to define drought stages (Reclamation 2015).

**Indices** effectively integrate drought variables into a single index number. At a minimum, a primary index should be chosen or developed for drought monitoring. However, the trend is to rely on multiple drought indices to trigger mitigation and response actions, which are calibrated to various intensities of drought. Commonly used indices include the U.S. Standardized Precipitation Index and the U.S. Drought Monitor, however, these are typically used for planning across large geographic extents and may not be entirely useful at the scale of the NSW DCP.

**Indicators** are specific measures that can be used to assess drought conditions. They are dependent on local climate and data availability. Example indicators include precipitation, streamflows, reservoir levels, groundwater levels, and snow pack. Indicators are used to establish triggers. Repeated testing of the Framework under different scenarios revealed that drought conditions were experienced in the upper watershed before they were experienced in the lower watershed, below Detroit Dam. This resulted in including a range of indicators in the Framework, as well as a narrative reporting form, to reflect watershed wide conditions.

**Triggers** are indicator threshold values or ranges that can be used to define the drought stage, or to trigger a specific response or mitigation action. Example triggers include specific reservoir levels on certain dates, streamflows falling below certain levels, etc.

**Drought stages** represent the severity of drought (e.g., moderate, severe, extreme; Stages 1-4). Defining drought stages is a crucial step to later implementing drought response actions.

## **2.2 NSW DCP PROPOSED MONITORING FRAMEWORK, VERSION 1.0**

The NSW DCP Monitoring Framework consists of a current drought conditions table (Table 1), a future drought trends table (Table 2), additional indicators and key information to consider, a reporting form, and a schedule. The current conditions table is presented below, with instructions for gathering the necessary data to complete it.

Table 1 NSW DCP Current Conditions Monitoring Table [TABLE CURRENT AS OF SEPTEMBER 13, 2016]

Date:		Indicators and Indices											
		National Indices	NSW Climate Indicators		NSW Hydrologic Indicators					NSW Environmental Indicator	NSW Socioeconomic Indicator		
NSW Drought Stage	Definition/Possible Impacts	<a href="#">US Drought Monitor (Weekly Update)</a>	<a href="#">Air Temperatures (1 month departure from normal, °F)</a>	<a href="#">Precip. (% of Normal for Water Year)</a>	<a href="#">Snow Pack (% normal SWE)</a>	<a href="#">Detroit Reservoir (Percent above water control diagram)</a>	<a href="#">USGS 7-day Flow (drought), N. Santiam @ Greens Bridge near Jefferson (Class, Percentile)</a>	<a href="#">USGS 7-day Flow (drought), N. Santiam @ Mehama (Class, Percentile)</a>	<a href="#">USGS 7-day Flow (drought), N. Santiam @ Below Boulder Creek (Class, Percentile)</a>	<a href="#">Stream Water Temp. N. Santiam @ Greens Bridge near Jefferson (°C above TMDL threshold, Sept 1 – June 15 = 13.0°C June 16 – Aug 31 = 16.0°C)</a>	<a href="#">Wildfire Hazard (ODF/National Fire Danger Rating System)</a>	<a href="#">Detroit Reservoir --Boat Ramps Served (key elevations, feet)</a>	<a href="#">Salem Water Supply Availability (7-day discharge in cfs at Mehama gage)(also record percent of normal-mean as supplemental info)</a>
	Indicator Monitoring Period	All Year	All Year	All Year	Dec 1 – May 1	All Year	All Year	All Year	All Year	All Year	All Year	All Year	All Year
Enter Data in This Row													
(Stage 1) Heads Up – Potential for Drought	Current conditions (e.g., low snowpack) point to the potential for upcoming drought conditions.	DO	0 to 2	80 to 71	70 to 61	-3 to -10	Below Normal (24 to 10)	Below Normal (24 to 10)	Below Normal (24 to 10)	-1.0 to 0.0	Low	1,558 to > 1,556 (based on 2 ft above highest boat ramp elevation --State Park Boat Ramp D)	<= 1,000 cfs
(Stage 2) Moderate Drought	Some damage to crops, pastures Streams, reservoirs, or wells low. Some water shortages developing or imminent Voluntary water-use restrictions may be requested	D1	2 to 4	70 to 61	<b>60 to 51</b>	-11 to -30	Moderate Hydrologic Drought (9 to 6)	Moderate Hydrologic Drought (9 to 6)	Moderate Hydrologic Drought (9 to 6)	0.1 to 2.0	Moderate	1,555 to 1,540 (State Park Boat Ramp D to Mongold East Boat Ramp)	<= 900 cfs
(Stage 3) Severe Drought	Crop or pasture losses likely Water shortages common Water restrictions imposed	D2	4 to 6	60 to 41	50 to 21	-31 to -50	Severe Hydrologic Drought (<=5)	Severe Hydrologic Drought (<=5)	Severe Hydrologic Drought (<=5)	2.1 to 4.0	High	1,539 to 1,450 (Mongold main boat ramp to State Park Boat Ramp G)	<= 800 cfs
(Stage 4) Extreme Drought	Widespread crop/pasture losses Shortages of water in reservoirs, streams, and wells creating water emergencies	D3 or 4	6 or greater	40 or less	20 or less	-51 or less	Extreme hydrologic drought (New low)	Extreme hydrologic drought (New low)	Extreme hydrologic drought (New low)	4.1 or greater	Very high or Extreme	<= 1,450 (below Mongold low-water boat ramp)	<= 700 cfs
<p><b>Note:</b> Most indicator headings are hot linked to take you to the appropriate website. Hovering over each indicator heading will provide instructions for gathering the relevant information from the associated website.</p>													

Table 2 Future Trend Indicators Table

Category	Description	<a href="#"><u>1-Month Temp. Outlook</u></a>	<a href="#"><u>3-Month Temp. Outlook</u></a>	<a href="#"><u>1-Month Precip. Outlook</u></a>	<a href="#"><u>3-Month Precip. Outlook</u></a>	<a href="#"><u>NRCS Summary Report, Detroit Lake Inflow Forecast (Current month thru September, % Avg)</u></a>
+1	Trend Improving	Below mean temps predicted	Below mean temps predicted	Below mean precip predicted	Below mean precip predicted	>115
0	Trend Neutral or Mixed	Normal temps predicted	Normal temps predicted	Normal precip predicted	Normal precip predicted	115 to 85
-1	Trend Worsening	Above mean temps predicted	Above mean temps predicted	Above mean precip predicted	Above mean precip predicted	<85

### 2.2.1 Stages, Indices/Indicators, and Thresholds for the NSW DCP Framework

Four stages of drought have been developed for the NSW DCP. As a comparison, many of the NSW DCP stakeholders include four stages of drought as part of their Water Management and Conservation Plans (WMCP) water curtailment programs. The early “heads up” warning stage was also considered beneficial for planning purposes. The drought stages are defined in the first column of Table 1 (Heads up, moderate, severe and extreme drought).

The second column of Table 1, “Definition/Possible Impacts”, defines the drought stages based on potential impacts that could occur at each stage. These descriptions generally follow the generic descriptions used by the US Drought Monitor. A detailed review of potential impacts specific to the NSW is provided in the Vulnerability Assessment (Attachment B to Appendix C).

The majority of Table 1 reflects the indices/indicators (across the top of Table 1) selected to measure drought, and the threshold triggers (within the cells of Table 1) that define the drought stage. The indicators cover a range of climatic, hydrologic, environmental, and socioeconomic (including agriculture) aspects of drought, as well as to cover a range of short-term, mid-term, and long-term data trends. No individual indicator is weighted at this time. Indicator data are gathered from the Internet and compared to the trigger values, and then aggregated to determine drought stage. The indicators are hyperlinked to their respective websites in Table 1, and are listed below in Table 3. Detailed instructions for how to acquire data for the indices/indicators on the websites to populate the drought monitoring tables for current and future conditions are provided in Appendix B. Appendix B also contains background information about the rationale for selecting each indicator and how the triggers were developed.

Table 2 provides information regarding potential future conditions within the watershed. The combination of the overall drought stage, future trend indicator, plus the supporting individual data points should provide monitoring results that give a good collective understanding of conditions within the watershed.

Table 3 Indicators and Source Data Website for Thresholds

Indicator	Website
<b>Current Conditions</b>	
US Drought Monitor Index	<a href="http://droughtmonitor.unl.edu/">http://droughtmonitor.unl.edu/</a>
Air Temperature (1 month departure from normal)	<a href="http://www.nwrfc.noaa.gov/water_supply/wy_summary/wy_summary.php?tab=6">http://www.nwrfc.noaa.gov/water_supply/wy_summary/wy_summary.php?tab=6</a>
Precipitation (% of normal for the Water Year)	<a href="http://www.nwrfc.noaa.gov/water_supply/wy_summary/wy_summary.php?tab=4">http://www.nwrfc.noaa.gov/water_supply/wy_summary/wy_summary.php?tab=4.</a>
Snow Pack (% of normal Snow Water Equivalent)	<a href="http://www.wcc.nrcs.usda.gov/basin.html">http://www.wcc.nrcs.usda.gov/basin.html</a>
Detroit Lake (percent above water control diagram)	<a href="http://www.nwd-wc.usace.army.mil/nwp/teacup/willamette/">http://www.nwd-wc.usace.army.mil/nwp/teacup/willamette/</a>
USGS 7-day Flow (drought) measured on North Santiam River at Greens Bridge near Jefferson, Mehama, and Below Boulder Creek	<a href="http://waterwatch.usgs.gov/index.php?mt=pa07d_dry&amp;usst=or&amp;ushuc=&amp;go=GO&amp;st=or&amp;id=wwgmap_viewer">http://waterwatch.usgs.gov/index.php?mt=pa07d_dry&amp;usst=or&amp;ushuc=&amp;go=GO&amp;st=or&amp;id=wwgmap_viewer</a>
Stream Water Temperature at Greens Bridge near Jefferson (°C above key threshold)	<a href="http://waterdata.usgs.gov/nwis/uv?cb_00010=on&amp;format=gif_stats&amp;site_no=14184100">http://waterdata.usgs.gov/nwis/uv?cb_00010=on&amp;format=gif_stats&amp;site_no=14184100</a>
Wildfire Hazard (Oregon Department of Forestry rating based on National Fire Danger Rating System)	<a href="http://nfdrs.smkmgmt.com/sfp/ODF_Significant_Fire_Potential.htm">http://nfdrs.smkmgmt.com/sfp/ODF_Significant_Fire_Potential.htm</a>
Detroit Reservoir Elevations Relative to Boat Ramps and Marinas	<a href="http://www.nwd-wc.usace.army.mil/nwp/teacup/willamette/">http://www.nwd-wc.usace.army.mil/nwp/teacup/willamette/</a>
Salem Water Supply Availability (7-day discharge at Mehama)	<a href="http://waterwatch.usgs.gov/index.php?id=pa07d&amp;sid=w_gmap&amp;r=or">http://waterwatch.usgs.gov/index.php?id=pa07d&amp;sid=w_gmap&amp;r=or</a>
<b>Future Conditions</b>	
One- and Three-Month Temperature and Precipitation Outlooks	<a href="http://www.cpc.ncep.noaa.gov/">http://www.cpc.ncep.noaa.gov/</a>
NRCS Summary Report, Detroit Lake Inflow Forecast (% Average, Current month –September)	<a href="http://www.wcc.nrcs.usda.gov/basin.html">http://www.wcc.nrcs.usda.gov/basin.html</a>

## **2.2.2 Additional Indicators to Consider**

In addition to the indicators in Tables 1 and 2 above, basin stakeholders may choose to also consider the following water supply factors.

### **2.2.2.1 Willamette Project System Forecasts and Water Year Determination**

Operational planning for the Willamette Project's conservation release season begins with the USACE's January forecast and continues through October (USACE 2015). The conservation release season plan identifies flow and storage needs for each tributary and reservoir in the Willamette Basin, based on the anticipated total system storage in mid-May, from the April forecast. The plan is fine-tuned in early June after spring refill.

The Willamette Basin Project Biological Opinion (Bi-Op) characterizes water year types based on historic data (USACE, BPA, and BOR 2007). The USACE uses this information to meet mainstem Willamette River flow objectives based on the mid-May system-wide storage forecast. If the storage forecast results in a water year type designation of "insufficient" or "deficit" then there is the potential for flow releases in the Willamette system to be modified, including from Detroit Lake, which may be of concern to NSW DCP stakeholders.

### **2.2.2.2 Detroit Lake Inflows and Outflows**

Detroit Lake inflows and outflow data can be found at the Willamette Project's teacup diagrams website. If lake outflows are notably greater than inflows and lake water surface elevations are below the rule curve, then this could be of concern particularly during the conservation storage and conservation release seasons.

### **2.2.2.3 Big Cliff Dam Outflows Relative to BiOp Minimum Flow Requirements**

Big Cliff Dam outflow data can be found in a similar manner as described above for Detroit Lake inflows and outflows. If Big Cliff Dam outflows are below the minimum outflows specified in the BiOp, then this could be of concern.

### **2.2.2.4 Other Relevant Data**

In addition to the above listed additional indicators, other relevant information may be reviewed. Such information may include formal or informal reporting of crop losses, recreation impacts, or other environmental and socioeconomic impacts that may be experienced.

## **2.2.3 Drought Monitoring Reporting Steps**

The NSW DCP Monitoring Framework consists of the following steps:

1. Gather drought indicator data (as explained above) and fill out the current conditions and future trend monitoring tables (Tables 1 and Table 2 respectively).
2. Aggregate the current conditions data and the future trend data, as described below, to arrive at a NSW DCP drought stage and trend for the current monitoring period.
3. Gather the additional indicator and key information described in Section 2.2.5.

4. Develop a brief monitoring report noting the drought stage and trend, along with a brief discussion of pertinent individual data points from Table 1 and Table 2, and the additional indicators discussed in Section 2.2.2.
5. Share results among NSW DCP stakeholders consistent with the Operational and Administrative Framework (Chapter 7).
6. Repeat according to the schedule in Section 2.2.4.

The current conditions data can be aggregated by using Table 4 below, which essentially provides the average drought stage value recorded for each indicator that has been included for the monitoring period. A written narrative is included to distinguish between drought conditions in the upper and lower watershed and explain future trends, and can be used in press releases and other communications to expand upon the drought stage number. The future trends data (Table 2) can be aggregated by adding the plus, neutral, or minus values recorded for each indicator and then recording if the trend is positive, neutral, or negative.

Table 4 Drought Stage Calculator

Column 1	Column 2	Column 3
Drought Stage	Enter # of Indicators Per Stage from Table 1	Multiply Column 1 x Column 2
1		
2		
3		
4		

(a) Total of Column 3 = \_\_\_\_\_

(b) #of indicators recorded this monitoring period = \_\_\_\_\_

Divide (a) by (b) and then round to whole number = Drought Stage \_\_\_\_\_

**EXAMPLE: NSW DCP Summary Statement for [insert date] Monitoring Period:**

- NSW DCP monitoring stage is at Stage 1-Heads Up Potential for Drought.
- Indicators fairing the worst for drought include:
  - Detroit reservoir levels in general, and also as they relate to recreational facilities
  - Wildfire hazard is high
  - Stream temperature on N. Santiam is moderately above TMDL threshold; however, temperatures appear to be trending in a positive direction.
- Future trend indicators continue to point to the potential for drier conditions ahead.

### 2.2.4 Monitoring Schedule and Responsibilities

Monitoring is intended to occur on a monthly basis during the first week of the month, since some of the indicators are reported on the first of each month. Beginning in Stage 2, monitoring should be conducted weekly. The proposed monitoring frequency is based in part on polling during the 2016 NSW Basin Summit that showed a clear preference for year round monitoring.

It is also recommended that at the beginning of each new water year the stakeholders look back at the monitoring data that were recorded and inquire whether any adjustments are needed to the framework. For example, should any indicators be removed, new indicators added, or threshold values shifted up or down. Additional details regarding monitoring roles and responsibilities, communication protocols, and framework revisions are provided in Chapter 7.

### **2.3 POTENTIAL CHALLENGES TO DROUGHT MONITORING IN THE STUDY AREA**

The NSW DCP study area is fortunate to have a wealth of information to support drought monitoring. However, the following are some potential challenges that stakeholders should keep in mind when applying the Monitoring Framework:

- Flows in the North Santiam River are highly dependent on management of Detroit and Big Cliff Dams. Management decisions are partly based on clear indicators such as the rule curve and the Willamette Project water year determination; however, particularly during drought conditions management decisions are typically based on daily meetings/conversations between the USACE and resource and regulatory agencies as they review conditions at a given moment.
- Late season large snow or heavy rain events during the critical Detroit Lake filling period can notably improve hydrologic conditions.
- As climate changes, indicators that are based on percent of normal or similar comparisons to historic conditions may become outdated or less valid if they look too far back into the past.
- Thresholds for several indicators were noted as being based on informal review of data or based on best professional judgment. These indicators in particular should be reviewed closely at the end of each water year to assess suitability of the thresholds.
- The NSW DCP monitoring framework and the DCP stakeholders are highly reliant on the availability of data provided by others, particularly federal agencies such as USGS and NOAA. It is important that the data continue to be readily available in a consistent and easy to interpret manner.

### **3 ELEMENT #2: VULNERABILITY ASSESSMENT**

The vulnerability assessment provides the necessary information to inform future mitigation and response actions that will improve resiliency to drought. To assess vulnerability, watershed assets and resources at risk in the event of water shortage, and the impacts that may occur, were inventoried. Then the extent to which the assets are vulnerable to drought now and into the future was evaluated. Finally, the underlying causes of the vulnerability were examined.

A full description of the collaborative Working Group and Task Force review process, the asset/resource and impacts inventory, evaluation, and prioritization for this planning element is provided in Appendix C.

#### **3.1 WATERSHED ASSETS/RESOURCES PRIORITIZATION**

Assets and resources (assets) for the NSW were identified, grouped, and prioritized based on research and Working Group discussion of the environmental, economic and social consequences of drought impacts. Prioritized grouped assets are presented in Table 5 (see Appendix C for a detailed list of assets and impacts, and discussion about the prioritization process). The current and future vulnerability of prioritized grouped assets were assessed as described in Section 3.2 below.

*Table 5: Prioritized NSW Grouped Assets at Risk due to Drought*

- Municipal water uses
- Instream natural resources
- Commercial crop irrigation
- Commercial/industrial uses
- Fire suppression<sup>1</sup>
- Individual domestic water
- Water oriented recreation
- Non-commercial irrigation
- Hydropower
- Upland natural resources
- Other irrigation/watering

#### **3.2 VULNERABILITY ASSESSMENT FRAMEWORK**

The vulnerability of NSW prioritized grouped assets was evaluated using a risk management matrix<sup>2</sup> weighing two factors: consequences of impacts and sensitivity. These risk factors and their criteria are presented in Table 6. (These criteria were also used to prioritize the assets and resources in Table 4.) The criteria were not weighted or placed in any priority order:

<sup>1</sup> This asset represents municipal fire suppression and non-municipal fire suppression (i.e. agricultural ponds).

<sup>2</sup> Matrix format was utilized for evaluation based upon communication with E. Flick, Marion County Emergency Manager (2016).

Table 6: Vulnerability Assessment Risk Evaluation Factors and Criteria

Matrix location	Risk Factors	Evaluation Criteria
<b>Y-axis</b>	Environmental, economic and social consequences of impacts	<ul style="list-style-type: none"> <li>• Public health, safety and welfare impacts</li> <li>• Economic impacts</li> <li>• Watershed health (environmental) impacts</li> </ul>
<b>X-axis</b>	Sensitivity of asset/resource	<ul style="list-style-type: none"> <li>• Is there a backup water source?</li> <li>• Is there adaptability?</li> <li>• Is there (assumed) importance to the public?</li> </ul>

### 3.3 VULNERABILITY NOW AND IN THE FUTURE

As a baseline exercise, water rights information from OWRD for the North Santiam River (surface water/natural flow/priority dates) was used to identify possible regulatory measures that could create vulnerability for municipal water providers and irrigators, two of the main water users in the NSW. Findings indicated that under current conditions (e.g. current reservoir management and regulatory framework, and typical or low streamflows), it is unlikely that North Santiam surface water rights holders would be regulated (i.e., use curtailed or shut off by the OWRD Watermaster) due to insufficient flow. There are two reasons for this: (1) there are no instream water rights on the mainstem North Santiam River below Detroit Lake, and (2) the majority of the stored water being released from Detroit Lake is not covered by a water right and is therefore available for appropriation by existing water right holders. Therefore, the amount of water in the river (even during very low flows) has been sufficient to meet the demands of all out-of-stream users.

#### 3.3.1 Current Vulnerability Results

Baseline water conditions (i.e., current water rights and regulatory structure) and input from the Working Group and Task Force members knowledgeable about environmental, economic, and social drought impacts, were used to evaluate current vulnerability. The grouped and prioritized list of assets and resources (Table 5) was used as a starting point to qualitatively rank consequences of drought. Then, the sensitivity of the assets were distributed on the vulnerability matrix based upon the criteria in Table 6. This positioning of the assets relative to one another were adjusted based upon Working Group discussion of the criteria.

Results indicate that most assets are either higher in consequences or higher in sensitivity, which results in an overall moderate to high vulnerability. A few assets are within the moderate range for both consequences and sensitivity, which results in an overall moderate vulnerability. No assets are considered low consequences and low priority (i.e., low vulnerability). Results are shown in Figure 2, which indicates that the most vulnerable assets under current conditions are:

- Municipal water users: Detroit, Idanha, Lyons-Mehama, Gates, Stayton, and Salem
- In-stream natural resources (e.g, endangered species, water quality and wetlands)
- Commercial irrigation
- Municipal-supplied commercial/industrial use

- Water oriented recreation

### **3.3.2 Future Vulnerability Results**

Future conditions that could impact water availability in the future include:

- Willamette Project Biological Opinion (Bi-Op) implementation
- Willamette Basin Review (reallocation of stored water)
- Population growth
- Climate change

Uncertainties can produce a range of future conditions, such as how regulatory decisions will be implemented, or how multiple factors interact within the North Santiam basin to produce a specific change. Background information used to evaluate each of these future conditions is provided in Appendix B. Generally speaking, the evaluations utilized a qualitative approach as opposed to a more intensive quantitative approach.

The “current condition” locations of the assets on the vulnerability matrix were used as the starting point, and shifted to show the change in consequence and sensitivity as future conditions arise. For example, under the Bi-Op implementation and stored water reallocation scenario, municipal water rights with priority dates junior to 1964 may be subject to regulation, and therefore, the asset becomes more sensitive. As a consequence, a “less certain” water supply is very likely to have public health, welfare, and economic impacts on a community, therefore the consequences also become higher. Conversely, actions that may result in protecting more of the released stored water instream (and converting administratively established Minimum Perennial Streamflows (MPSF) to instream water rights with a 1964 priority date) would provide more certain flow for in-stream natural resources (e.g, endangered species, water quality, and wetlands) that are downstream of the dam. However, climate change may have higher watershed health consequences on upstream flow and other in-stream assets due to warmer water, changes in timing of flow, etc., so these assets also shift under future conditions.

The future condition scenarios that may potentially affect watershed assets are noted within the circles on Figure 3. Results indicate that almost all assets become more sensitive and vulnerable, though some shifts have a slightly greater magnitude than others (predominantly due to interactions of multiple variables). Emphasis was placed on those assets that are directly reliant on water in the North Santiam River and where the implementation of actions can reduce drought vulnerability. Overall, the most vulnerable assets under future conditions are the same as under current conditions.

Figure 2. Vulnerability Assessment - Current Conditions

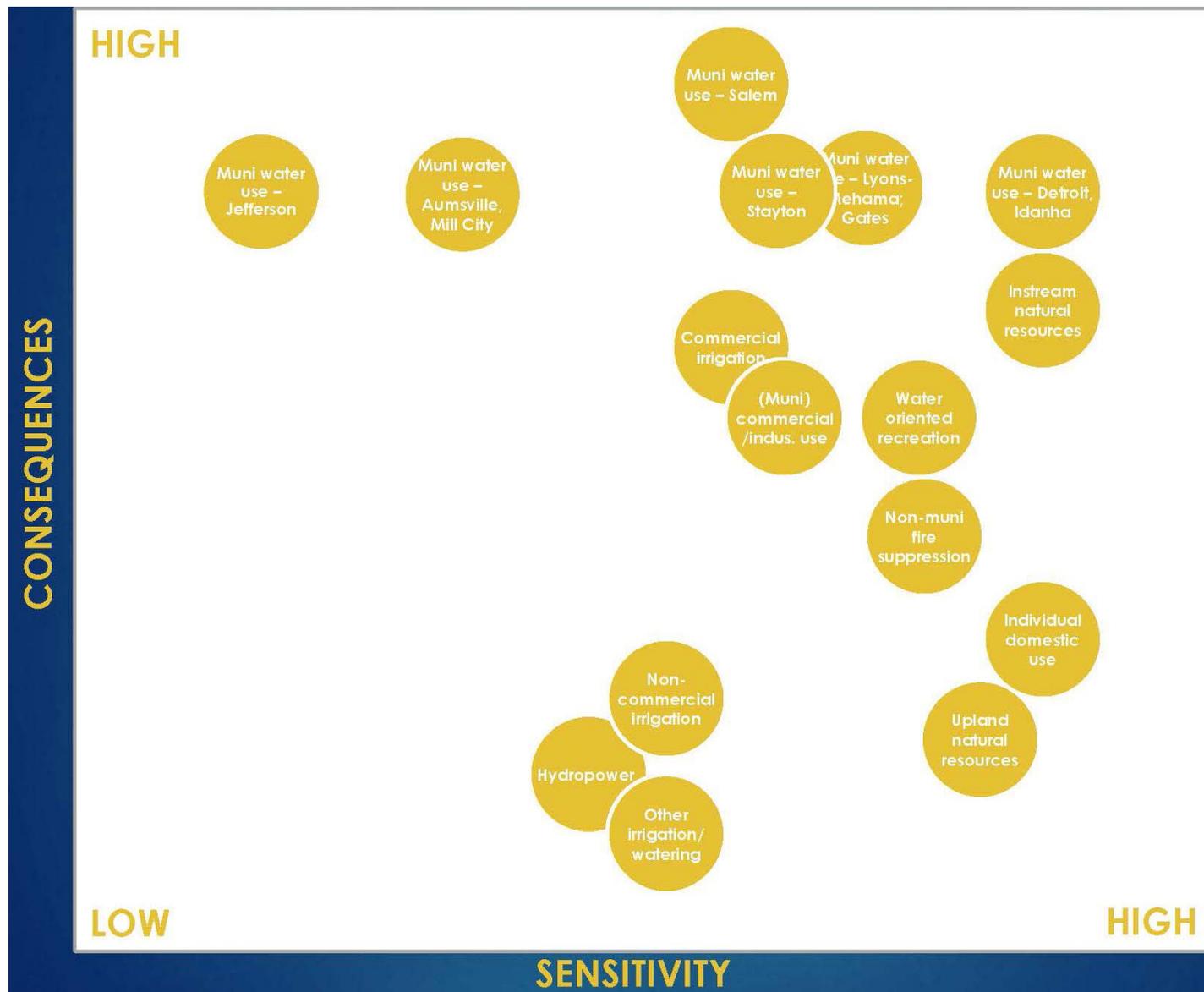


Figure 3. Vulnerability Assessment - Future Conditions



### 3.3.3 Evaluate Underlying Causes of Vulnerability

Every prioritized asset showed some level of current and/or future vulnerability, therefore, each was evaluated to detail the underlying causes of vulnerability. The most vulnerable assets are highlighted in blue (Table 7). For the municipal water users (including municipal fire suppression), underlying causes of vulnerability were generally related to having a single source of water that may be inadequate under future conditions. Municipal water intakes at Salem, Detroit, and Idanha could experience difficulties receiving sufficient water at low flow.

Table 7. Underlying Causes\*\*\*

Asset/resource	Underlying causes
Municipal water – Salem	Below reservoir, intake limitations, insufficient backup, reliant on single source to large degree
Municipal water – Lyons-Mehama	Below reservoir, single source, no backup, no interconnection, all water rights junior* to large downstream water users
Municipal water – Gates	Below reservoir, all but .10 cfs junior to potential future instream water right, all water rights junior to large downstream water users, no interconnection
Municipal water – Detroit, Idanha	Above reservoir, supply from small tributaries, single source, no backup, no interconnections
Instream natural resources	Below reservoir**, subject to prior out of stream appropriation, no backup, “single source”
Food crop production	Below reservoir, insufficient backup
Muni commercial/industrial use	Below reservoir**, insufficient backup, potentially subject to municipal curtailment
Water oriented recreation - <i>River</i> boating/fishing	Below reservoir**, subject to prior out of stream appropriation, no backup, “single source”
Water oriented recreation - <i>Reservoir</i> recreation	USACE operations (ie., rule curve/Bi-Op implementation), infrastructure limitations (eg., parks, ramps, docks)
Municipal water – Aumsville	No backup, no interconnections, single source (groundwater)
Municipal water – Jefferson	Single source, no interconnections
Upland natural resources	Insufficient precipitation/ “single source”
Individual domestic use	Likely no backup, no interconnections, likely single source
Muni fire suppression	(See individual municipal water supplier causes)
Other commercial irrigation; Other irrigation/watering	Below reservoir, insufficient backup
Hydropower	USACE operations (ie., rule curve/Bi-Op implementation), SWCD dams below reservoir

\*Junior water rights are prior to 1964 MPSF, and junior to Salem and SWCD water rights.

\*\* These assets may occur above the reservoir, but actions to address water resiliency in these areas are limited.

\*\*\* The most vulnerable assets are highlighted in blue.

## 3.4 RECOMMENDATIONS AND DATAGAPS

Uncertainties exist that could interact to produce a range of future conditions, such as how regulatory decisions will be implemented to affect each asset, or how multiple future scenarios interact within this watershed to produce a specific change. The following recommendations are made to document and account for these uncertainties and address them within future iterations of this vulnerability assessment.

- Track the Willamette Project Bi-Op implementation and stored water reallocation efforts to understand changes in regulatory structure, water rights and future availability of water to existing water right holders.
- Track USACE decision making regarding altering the rule curve to adjust to future conditions (i.e., to capture water earlier).
- Begin to gather quantitative data to assess the consequences of drought on watershed assets as they specifically relate to the underlying causes, such as gathering information on economic losses, community responses to manage water supply, and impacts on watershed resources such as water quality or salmonid redd (spawning nest) survival.
- Examine and agree upon how groundwater interacts with surface water in this watershed, and the effects the interaction may have on low summer flow and individual domestic well users.
- Track the natural resource assessment in GIS being conducted by Partners of the North Santiam Resiliency Action Planning Process to see how it may be used to evaluate future potential drought effects on watershed health (e.g., current cold water refugia, predicted change in mean August temperature).
- Track future population growth forecasts, specifically with respect to future economic development within the Santiam canyon.
- Track adaptive responses and their success.

## **4 ELEMENT #3: MITIGATION**

The mitigation planning element identifies, evaluates, and prioritizes actions to conserve water and improve resiliency before drought conditions, for the critical assets identified during the vulnerability assessment.

A full description of the mitigation action development process and collaborative Working Group and Task Force review process is provided in Appendix D.

### **4.1 NSW DCP MITIGATION ACTION GOALS**

The following goal was established by the Task Force to inform the general types of mitigation actions and roles and responsibilities of participants.

*Through a combination of individual and collective mitigation actions NSW DCP mitigation actions will:*

- *Reduce the severity of potential drought risks and impacts, thereby decreasing sector vulnerabilities and the need for response actions.*
- *Lay the groundwork for effective response to drought should they need to occur.*
- *Consist of short term and long term activities carried out by individual organizations according to each entity's needs and abilities.*
- *Assist watershed wide programs such as monitoring, messaging, and funding of important key watershed actions.*

In addition to the overall goal provided above, goals have been developed for each vulnerable sector. These goals are included in Appendix D.

### **4.2 DCP MITIGATION ACTIONS**

A brainstormed list of current and future potential mitigation actions for each sector was compiled, and is included in Appendix D Table 1. Generally speaking, mitigation actions fell into the following categories:

- Improve understanding of an organizations system risks and inefficiencies (i.e., by understanding the system as a whole, improvements can be made strategically to gain greatest benefit per dollar)
- Improve system efficiencies (i.e., implementing specific projects as opposed to studies)
- Increase natural system resiliency (i.e., adaptability and functionality)
- Improve resiliency of water dependent recreation providers
- Collective or multi-sector efforts:
  - Drought monitoring
  - Public education programs

- Preparing for response actions (i.e., messaging and mechanisms in place so ready when drought hits)
- Securing funding for priority collective actions and NSW DCP organizational structure

From the list of current and future potential actions provided in Appendix D Table 1, key actions were prioritized by the respective organization(s) for the short term (i.e., one to three years) and for the long term (equal to or greater than four years), that will be implemented by those organizations. Combined, the individual actions cover the range of vulnerable sectors identified in the watershed. Similarly, eight joint (i.e., multi-sector) actions were identified as important tools that do not currently exist in a programmatic form specific to this basin. These are discussed in Section 4.3.

Group consensus was used to review and confirm that each action included in the priority list should indeed be included as a priority. Discussion about each project focused on factors including costs relative to drought resiliency benefits, technical and regulatory complexity, community support, and potential co-benefits (e.g. developing an alternate municipal water source would also provide resiliency to earthquake hazard). Resulting priority short and long term mitigation actions are provided in Table 8.

### **4.3 JOINT MITIGATION ACTIONS IMPLEMENTATION PLAN**

Eight new joint water supply management tools (i.e., mitigation actions) were identified and prioritized that do not currently exist within the watershed. These actions will be developed and implemented cooperatively by Task Force members representing many different sectors, and are therefore considered a joint responsibility. To facilitate their development and implementation, a separate document, the *Joint Mitigation Actions for Water Supply Resiliency - Implementation Plan* (JMAP) was developed to provide recommended steps for establishing the new joint actions. The JMAP identifies the purpose, process, and steps, as well as potential funding sources and a schedule, to complete each joint action.

The joint actions will be developed before drought, and are therefore considered mitigation. The resulting programs (e.g., education and outreach, water rights management tools) will be used during drought, and are also discussed in Chapter 5, response actions.

### **4.4 RECOMMENDATIONS AND DATA GAPS**

Uncertainties exist that could interact to produce a range of future conditions. Likewise, there is currently some uncertainty as to how some mitigation actions intended to benefit one water user could affect other water users. During preparation of this DCP, several entities were in the midst of their organizational planning processes that will prioritize their future actions including those related to water use and drought management. The following are some of the uncertainties or data gaps that should be taken into consideration as mitigation actions are planned for and implemented:

#### Uncertainties

- How will lining irrigation canals affect groundwater recharge, hydrologically connected wetlands, and nearby wells and properties.
- How might stakeholders get recognition for their actions during future Biological Opinion updates and other potential regulatory negotiations.

- How can small communities be supported to ensure involvement in future iterations of this DCP.

Adding future actions

- If needed to improve prioritization efforts, a draft (qualitative) screening criteria matrix was developed. The draft matrix is provided in Appendix D.
- The City of Salem is conducting its Water Supply Master Plan update, which will be completed in 2018. Priority projects for the City will result from this effort. Several anticipated projects have been included in this DCP.
- The North Santiam River Watershed Council is leading the Partners of the North Santiam Resiliency Action Plan, to be completed by the end of 2017. Priority actions will result from this plan.

**Table 8 Priority Drought Mitigation Actions by Entity <sup>1</sup>**

Mitigation Actions	Reclamation Drought Funding Objectives Directly Addressed <sup>2</sup>	Lead Entity and Partners	Brief Description	Short/Long Term Action
Marion Canal Piping Project	<ul style="list-style-type: none"> <li>reliability of water supplies and sustainability</li> <li>increase water management and operational flexibility</li> <li>increase natural system resiliency (e.g. habitat improvements)</li> </ul>	Santiam WCD	Design and construct Marion Canal piping project to reduce system water loss. Design analysis should review potential changes to groundwater recharge that results from the existing unlined canal and potential effects to nearby wells. Also, canal return flow feeds Marion Creek, which is 303d listed for temperature.	Short term = planning and design Long term = construction
Coates Canal Piping Project	<ul style="list-style-type: none"> <li>reliability of water supplies and sustainability</li> <li>increase water management and operational flexibility</li> <li>increase natural system resiliency (e.g. habitat improvements)</li> </ul>	Santiam WCD	Design and construct Coates Canal piping project to reduce system water loss.	Short term = planning and design Long term = construction
Santiam WCD SCADA Phase Two	<ul style="list-style-type: none"> <li>increase water management and operational flexibility</li> </ul>	Santiam WCD	Measure and better manage water withdrawal and delivery through the SWCD system. Phase 1 is underway. Phase 2 would expand the system.	Short term
Santiam WCD WMCP Update	<ul style="list-style-type: none"> <li>reliability of water supplies and sustainability</li> <li>increase water management and operational flexibility</li> </ul>	Santiam WCD	Update SWCD Water Management and Conservation Plan, including incorporation of NSW DCP monitoring and other relevant elements.	Short term = planning and design Long term = construction
Santiam WCD System Improvement Plan	<ul style="list-style-type: none"> <li>reliability of water supplies and sustainability</li> <li>increase water management and operational flexibility</li> <li>benefits for fish and wildlife and the environment</li> </ul>	Santiam WCD	Review SWCD water delivery system as a whole in order to strategically make improvements, including reducing systems losses. The study would also evaluate potential affects to adjacent interests, including the environment.	Short term = planning and design Long term = construction
Soil Moisture Monitoring Program	<ul style="list-style-type: none"> <li>reliability of water supplies and sustainability</li> <li>increase water management and operational flexibility</li> </ul>	Santiam WCD	Establish program for monitoring soil moisture conditions in agricultural areas. Information to be used to improve irrigation efficiency.	Short term = planning and design Long term = implementation
Upper Bennett Dam Diversion Improvements	<ul style="list-style-type: none"> <li>reliability of water supplies and sustainability</li> <li>increase water management and operational flexibility</li> </ul>	Santiam WCD, Salem, NSWC	Improve diversion facility to allow for low water operation. Improve/modify intakes to provide for low water operation.	Short term = planning and design Long term = construction
Lower Bennett Dam Diversion Improvements	<ul style="list-style-type: none"> <li>reliability of water supplies and sustainability</li> <li>increase water management and operational flexibility</li> </ul>	Santiam WCD, Salem, NSWC, ODFW	Improve diversion facility to allow for low water operation. Improve/modify intakes to provide for low water operation and allow for fish passage.	Short term = planning and design Long term = construction
Salem Water Supply Master Plan Update	<ul style="list-style-type: none"> <li>reliability of water supplies and sustainability</li> <li>increase water management and operational flexibility</li> </ul>	Salem	Complete master plan update in 2018. This will recommend system improvements that may include securing alternate water sources, improving system efficiency, and reducing system losses.	Short term = plan update Long term = projects prioritized in plan
Salem Water Transmission Line Main Evaluation	<ul style="list-style-type: none"> <li>reliability of water supplies and sustainability</li> </ul>	Salem	Evaluate lining a leaking water main that was built in the 1930's.	Short term
Salem Geren Island Intake Evaluation	<ul style="list-style-type: none"> <li>reliability of water supplies and sustainability</li> <li>increase water management and operational flexibility</li> </ul>	Salem	Evaluate alternatives to City's Geren Island intake to facilitate low water withdrawals	Long term

Mitigation Actions	Reclamation Drought Funding Objectives Directly Addressed <sup>2</sup>	Lead Entity and Partners	Brief Description	Short/Long Term Action
Salem Geren Island Groundwater Enhancement Evaluation	<ul style="list-style-type: none"> <li>reliability of water supplies and sustainability</li> <li>increase water management and operational flexibility</li> </ul>	Salem	Evaluate opportunity to enhance groundwater use at City's Geren Island facility that could be an alternative to surface water diversion during low flows or inoperable surface water intake.	Long term
Detroit Lake Low Water Marina Excavation Project	<ul style="list-style-type: none"> <li>increase water management and operational flexibility</li> </ul>	Marinas, Detroit Lakes Federal Lakes Comm., Marion County, USACE, USFS	Excavate the area around existing marinas to allow their use during low water periods. The existing marinas at Detroit Lake become unusable when managed lake levels get too low. This results in loss of recreational opportunities and associated economic activity. The USACE has limited flexibility to manage lake levels for recreation use given other requirements (i.e., flood control and ESA requirements).	Short term = planning and design Long term = implementation
Mongold State Park Floating Boat Ramp	<ul style="list-style-type: none"> <li>increase water management and operational flexibility</li> </ul>	OPRD, Detroit Lakes Federal Lakes Comm., Marion County, USACE, USFS	Improve recreational access to Detroit Lake during low water periods.	Short term
Detroit Lake Recreation Master Plan	<ul style="list-style-type: none"> <li>increase water management and operational flexibility</li> </ul>	OPRD, Detroit Lakes Federal Lakes Comm., Marion County, USACE, USFS, others	Prepare plan to evaluate potential improvements and expansion of recreational facilities associated with Detroit Lake, including providing for opportunities during periods of low lake levels.	Long term
Partners of the North Santiam Resiliency Action Plan	<ul style="list-style-type: none"> <li>benefits for fish and wildlife and the environment (e.g. water quality, groundwater recharge)</li> </ul>	Partners of the North Santiam	Incorporate restoration projects identified in this plan (upon completion in 2017) that would support drought resiliency, such as floodplain reconnection, and riparian and wetland enhancements.	Short term = plan completion Long term = implement projects prioritized in plan
Establish Drought Contingency Plan Task Force <sup>3</sup>	<ul style="list-style-type: none"> <li>all Reclamation Drought Objectives</li> </ul>	NSW DCP Task Force <sup>3</sup>	Establish a formal group to oversee implementation of the NSW DCP.	Short term
NSW DCP Education and Outreach Partnership	<ul style="list-style-type: none"> <li>all Reclamation Drought Objectives</li> </ul>	NSW DCP Task Force <sup>3</sup>	Establish partnership to develop and implement outreach and common messaging (ie., templates), prepare press releases, and engage the media. Create common "brand" for watershed-wide dissemination of drought stages and voluntary conservation efforts. Tell the story of the good things the community is doing.	Short term
Water Supply Option Agreements	<ul style="list-style-type: none"> <li>systems to facilitate the voluntary sale, transfer, or exchange of water</li> </ul>	NSW DCP Task Force <sup>3</sup>	Evaluate feasibility of using water supply option agreements. If deemed feasible, then a program will be developed.	Short term = study Long term = implementation
Water Rights Management Program	<ul style="list-style-type: none"> <li>systems to facilitate the voluntary sale, transfer, or exchange of water</li> </ul>	NSW DCP Task Force <sup>3</sup>	Evaluate feasibility of establishing a water rights management program (e.g., leasing, transfers). If deemed feasible, then a program will be developed.	Short term = study Long term = implementation
WMCPs for Small Communities and Large Water Users	<ul style="list-style-type: none"> <li>reliability of water supplies and sustainability</li> <li>increase water management and operational flexibility</li> </ul>	NSW DCP Task Force <sup>3</sup>	Work with small communities and water users to seek funding and technical assistance to complete WMCP's to improve their understanding of water usage and opportunities to increase efficiencies.	Short term = funding and WMCPs Long term = projects prioritized in WMCPs

Mitigation Actions	Reclamation Drought Funding Objectives Directly Addressed <sup>2</sup>	Lead Entity and Partners	Brief Description	Short/Long Term Action
Critical Infrastructure Improvements for Small City's	<ul style="list-style-type: none"> <li>reliability of water supplies and sustainability</li> </ul>	NSW DCP Task Force <sup>3</sup>	Work with small communities to identify and implement water system infrastructure improvement projects that improve drought resiliency, including reducing system water losses.	Short term = study Long term = implementation
NSW Water Budget Study	<ul style="list-style-type: none"> <li>all Reclamation Drought Objectives</li> </ul>	NSW DCP Task Force <sup>3</sup>	Prepare a study to improve baseline understanding of water movement through the watershed, including surface water and groundwater movement, withdrawals and returns, which could inform a water management framework.	Short term = funding and scoping Long term = conduct study
Incorporate NSW DCP efforts into Future Willamette Basin Project Bi-Op Reviews	<ul style="list-style-type: none"> <li>all Reclamation Drought Objectives</li> </ul>	NSW DCP Task Force <sup>3</sup>	Engage the Willamette Basin Project and associated regulatory agencies. Goal is to get NSW DCP Partners' mitigation actions recognized in future Willamette Basin Project BiOp updates.	Short term = early engagement Long term = recognition in updated BiOp
Expand Emergency Drought Tool Usage	<ul style="list-style-type: none"> <li>all Reclamation Drought Objectives</li> </ul>	NSW DCP Task Force <sup>3</sup>	Support legislation and administrative rules that allow the use of OWRD Emergency Drought Tools when a DCP has been approved by the state	Short term
<ol style="list-style-type: none"> <li>Note that several of the mitigation actions listed in this table, particularly those with NSF DCP Task Force noted as lead, are intended to lay the ground work for response actions. The link between mitigation and response actions is detailed in the response action chapter of this report.</li> <li>Although all projects listed meet at least one of Reclamation's drought funding objectives, not all projects listed would necessarily qualify for funding under Reclamation's drought program.</li> <li>The NSW DCP Task Force listed in this table refers to a permanent task force to be developed as an outcome of this project. It does not refer to the current NSW DCP task force that is supporting development of this plan; however, it is anticipated that many of the same entities will be part of the permanent task force.</li> </ol>				

## 5 ELEMENT #4: RESPONSE

Response actions reduce risks to critical assets and resources by identifying, evaluating, and prioritizing actions to improve resiliency during drought conditions. Response actions are planned actions that are implemented in a step-wise manner, based on the specific stages of drought identified in the monitoring framework. They are not intended to be crisis driven (i.e., in response to unanticipated circumstances); such actions are implemented by emergency response programs. In the pre-drought stage (Stage 1 – “Heads up”), response actions are interrelated with mitigation actions, which conserve water and improve resiliency before drought conditions. This relationship between mitigation and response, the process used to identify the NSW DCP response actions, and the final response actions matrix, are described in more detail in this chapter.

A full description of the response action development process and collaborative Working Group and Task Force review process is provided in Appendix E.

### 5.1 RESPONSE ACTIONS

#### 5.1.1 Goal

The following goal was established by the Task Force for implementing response actions:

*As participants of the NSW DCP, drought response actions in the North Santiam Watershed will be implemented on a collaborative, voluntary, and watershed-wide basis. Response efforts will be directed by the overarching operational framework outlined in Chapter 7 of the DCP. It is the intent that all sectors and local water users, regardless of vulnerability, will participate in the response actions identified in this DCP to reduce impacts to the health, safety, and welfare of communities; economies; and the critical natural resources within the watershed.*

Currently, the possibility of regulatory action by OWRD to curtail existing water right holders is small because a sufficient amount of “public water” is available to all water users. Stored water released from Detroit Lake without an associated water right is considered “public water” and available for appropriation by downstream water right holders. However, junior water right holders could be at risk for regulation in favor of senior water right holders in the event of multiple years of drought, and water dependent businesses above the reservoir experience drought conditions sooner than lower areas in the watershed. In the future, the amount of “public water” is likely to be reduced after the issuance of water rights to protect stored water releases from Detroit Dam and the conversion of minimum perennial streamflows to instream water rights. In the longer-term future, climate change and population growth are expected to exacerbate these conditions and impact everyone to varying degrees. “We all rely on one river” is a possible message to help explain to residents that we must all look out for one another and protect our critical natural resources within the watershed during drought.

#### 5.1.2 Objectives

All response actions will be implemented on an as needed, collaborative, voluntary, and watershed-wide basis. For example, if additional streamflow is needed in Drought Stages 3 or 4, a water rights holder may voluntarily forebear (i.e., stop) use, or switch to an alternate source. Response actions included in this DCP do not include numeric objectives for water conservation (e.g., 10 percent reduction at a specific

flow measurement location). This was a conscious decision by the Task Force members for the following reasons: political, budgetary, lack of enforcement capacity (even if objectives are voluntary), inability to quantify the benefits, and insufficient infrastructure to currently measure baseline withdrawal accurately for some water users. On-going collaboration with state and federal natural resource managers is needed to provide guidance on the appropriate numeric objectives for meaningful conservation. As an alternative, voluntary reduction objectives will be included in outreach messaging (see Step 4, Stages 2, 3 and 4). If voluntary measures do not increase resiliency, numeric objectives may be considered in future plan iterations.

### **5.1.3 RESPONSE ACTIONS**

The response actions matrix (Table 9) identifies five categories of response actions that are prioritized based upon the Monitoring Framework's four progressive stages of drought (i.e., public education begins in Stage 1, whereas emergency response begins in Stages 3 and 4):

- Public education and relations
- Monitoring and evaluation
- Water rights management
- Water conservation
- Emergency response

Each category includes specific response actions, and identifies the relevant sectors, and relevant stage of implementation for each action. Implementation of each response action may correspond to one or more stages of drought.

Response actions focus on those actions that can be conducted on a watershed-wide basis, and provide flexibility for water users to continue to use their existing plans. For example, one NSW DCP response action is to "Practice 'wise water use'". For the SWCD, this may mean "Decrease operation and management spills to near zero", whereas for the City of Salem, this may mean "Discontinue operating City decorative fountains that do not recirculate water". For those entities that do not have existing response plans, their final local response actions should be determined by their planning and governing bodies with the specific intent to conserve water and protect vulnerable assets and resources within the watershed.

Some of the response actions, such as education and outreach, are also noted as mitigation actions. In Stage 1, response actions are interrelated with mitigation actions. For the purpose of this DCP, the distinction is drawn between preparing for drought (mitigation) and implementing preparations (response). For example, the education and outreach program is developed as a mitigation action, but implemented as a response action for all drought stages.

### **5.1.4 RESPONSE ACTION DESCRIPTIONS**

The response actions presented in Table 9 are discussed in more detail in this section.

**Table 9 Actions and Triggers for Watershed-Wide Coordinated Drought Response**

Actions	Related Multi-Sector Mitigation Action	Sectors	Triggers			
			Stage 1: Heads up	Stage 2: Moderate Drought	Stage 3: Severe Drought	Stage 4: Extreme Drought
<b>Conservation Messaging, Public Education and Outreach</b>						
Carry out response messaging (as developed during mitigation) (e.g., newspapers, websites).	NSW DCP Education and Outreach Partnership	Municipal, Agriculture, Natural Resource Mgrs., Recreation, Marion County Emergency Mgt.	x	x	x	x
<b>Monitoring and Evaluation</b>						
Continue to track and report drought monitoring framework indicators	Establish DCP Group	Municipal, Agriculture, Natural Resource Mgrs.	x	x	x	x
Coordinate among N. Santiam Watershed water providers, managers, and users to promote voluntary withdrawal reductions		Municipal, Agriculture, Recreation, Natural Resource Mgrs., Commercial/Industrial	x	x	x	x
Compile socioeconomic and environmental impacts of drought (ie. local data) for use in funding applications, messaging, and refinement of the vulnerability assessment		Municipal, Agriculture, Recreation, Natural Resource Mgrs.		x	x	x
<b>Water Rights Management</b>						
Forebear use (e.g., stop using during the season)	Water Rights Management Program	Municipal, Agriculture, Natural Resource Mgrs.	x (Planning step for this response)	x	x	x
Switch to an alternate water source (eg., wells)		Municipal, Agriculture, Commercial/industrial	x (Planning step for this response)	x	x	x
Lease water rights for instream use	Expand Emergency Drought Tool Usage	Municipal, Agriculture, Natural Resource Mgrs.	x (Full or split-season)	x (Full or split-season)	x (Split-season)	x (Split-season)
Full lease (1 year)						
Split-season lease (less than one year, need to measure)						
Implement drought emergency water rights tools (eg., transfers, permits) available during governor declared drought		Municipal, Agriculture			x	x
<b>Water Conservation</b>						
Implement strategies identified in Water Management and Conservation Plans (WMCPs) for voluntary conservation and to implement curtailment when water supply is inadequate.	WMCPs for Small Communities and Large Water Users	Public water providers	x	x	x	x

Emergency Response						
Seek local, state and federal assistance		Municipal, Agriculture, Natural Resource Mgrs., Recreation, Marion County Emergency Mgt.			x	x
Implement Marion County Disaster Recovery Plan		Municipal			x	x
Carry out water hauling programs		Municipal				x
Dredge intakes, move diversions		Municipal, Agriculture				x

## **Stage 1: Heads Up**

### Response Category: Conservation messaging, public education and outreach

- **Action 1: Carry out response action messaging for each drought stage.**

Watershed-wide response action messaging (developed as part of JMAP) will be communicated in a stylized, branded manner (also developed as a mitigation action), using partner websites, newspapers and press releases. The need to communicate: (1) how upstream areas of the watershed will be in drought before downstream areas, (2) how all residents within the watershed are conserving water (e.g., “shared sacrifice”), and (3) why conservation is important, are key ideas for messaging. Both instream flow and supply may be communicated, as well as potential effects on well-owners. Example messages include:

- The watershed is in Stage 1/Heads up drought.
- Many people—residents, businesses, farmers and recreationists—depend on the N. Santiam River.
- Here’s how others in the watershed are affected by drought. Practice using water wisely.
- Here’s how. (Provide examples of wise water use).

Municipal, agricultural, natural resource managers, and recreation owners will collaborate on and benefit from this response action. Marion County Emergency Management, Marion County department public information officers (PIO) and City emergency response managers will participate in this effort as they already engage in hazard mitigation, preparedness, response, and recovery. Resulting messages will be shared with other agencies and sectors within the watershed.

### Response Category: Monitoring and evaluation

- **Action 1: Continue to track and report drought monitoring framework indicators.**
- **Action 2: Coordinate among N. Santiam Watershed water providers, managers, and users.**

Both of these response actions are critical for preparing for and responding to drought by using the appropriate response actions for each drought stage. Using the NSW DCP monitoring framework to track drought stage is critical to triggering coordinated implementation of actions. Coordination is necessary to prepare for and implement response actions watershed wide, and promote voluntary withdrawal reductions to reduce vulnerability to key assets. Municipal, agricultural, natural resource managers, recreation and commercial/industrial users are expected to collaborate on these response actions to benefit all water users in the watershed.

### Response Category: Water rights management

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<sup>3</sup> A detailed approach to developing this messaging and branding, with press release templates, is provided in the *Joint Mitigation Actions Implementation Plan*.

- **Action 1: Forebear use**

Water rights owners currently have the ability to forbear use of any portion of their water at any time. That is, they can voluntarily stop or reduce their water use during the season to leave more water instream during critical periods to protect vulnerable instream natural resources. In early drought stages, this action is most likely a planning step to prepare for implementation in more severe drought stages, and may not apply to all sectors at the same time.

- **Action 2: Switch to an alternate water source**

A separate, or complimentary, option that is currently available is to leave water instream and switch to an alternate water source, such as groundwater or impounded water. This response action provides the same benefits as forbearing use, though in certain areas, groundwater withdrawals could also impact water levels in neighboring wells or reduce groundwater contributions to instream flow. It may be best to implement this response action only after consulting local natural resources managers (i.e., NRCS, watershed council). In early drought stages, this action is most likely a planning step to prepare for implementation in more severe drought stages, and may not apply to all sectors at the same time.

- **Action 3: Lease water rights (full or split-season leases)**

An option that is currently available but not used very often in the N. Santiam is leasing instream of certificated water rights. Water rights leasing provides water right holders with a voluntary opportunity to leave water instream to protect natural resources when needed, but still protect rights for future beneficial out-of-stream use. (Leasing a water right instream is considered a beneficial use and protects the water right from forfeiture due to non-use). There are two different types of water rights leases: full and split-season. As part of the full lease, a water rights owner would indicate a specific number of acres that they voluntarily elect not to irrigate for the full season. A split-season lease requires an owner to measure the amount of water used so that the amount of water remaining for instream use can be quantified.

Municipal, agricultural, natural resource managers, and commercial/industrial users are expected to collaborate<sup>4</sup> on and benefit from this response action. Developing and seeking funding to incentivize a water rights leasing program is a high priority mitigation action in this plan.

Response Category: Water conservation [Note: Municipal WMCPs were moved to Stage 2. This action is specific to Agriculture WMCPs]

- **Action 1: Implement strategies identified in Water Management and Conservation Plans (WMCPs) - Irrigation**

As discussed in Section 2.2.3, WMCPs for water users include curtailment plans that identify their own response actions for implementation at each curtailment stage. Due to the advance planning required for agriculture to use less water, implementing WMCP actions would be triggered for this

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<sup>4</sup> A detailed approach to developing a leasing program is provided in the *Joint Mitigation Actions Implementation Plan*.

sector sooner than for some other large water users, so that crops are not damaged. Examples of local response actions for irrigated agriculture include:

Potential WMCP actions

- Delay delivery to users to conserve water for the peak consumptive use period based on a shortened estimated water delivery season.
- Engage Oregon State University and NRCS in providing technical assistance to users on how to reduce on-farm water use, including critical plant water use periods.

## **Stage 2: Moderate Drought**

All Stage 1 response actions should be implemented in Stage 2. The following additional actions also can be implemented:

Response Category: Conservation messaging, public education and outreach [Note that this action is also conducted in Stage 1. This section explains messaging specific to Stage 2.]

- **Action 1: Carry out response messaging (as developed during mitigation action development), using partner websites, newspapers and press releases.** Messaging will convey how upstream areas of the watershed may be in drought before downstream areas, how all residents within the watershed are conserving water, and why conservation is important. More information is provided in Stage 1 above. Example messages in Stage 2 could include:
  - The watershed is in Stage 2/Moderate drought.
  - Some areas in the watershed are experiencing drought and drought impacts (e.g., recreation is slow because reservoir levels are low; green bean yield is low because growers are water less).
  - Here's how everyone is saving water (provide examples).
  - Please voluntarily reduce water by 5 percent. Here's how you can do it (provide examples).

Response Category: Monitoring and evaluation

- **Action 3<sup>5</sup>: Compile socioeconomic and environmental impacts of drought (i.e. local data) for use in funding applications, messaging, and refinement of the vulnerability assessment**

As noted in the Vulnerability Assessment (Appendix C), local data quantifying impacts of drought on each of the sectors are a data gap. This information is needed to refine the assessment, as well as for messaging, identifying future effective actions to build resiliency, and “making the case” in grant applications to obtain funding to implement these actions. Municipal, agricultural, natural resource managers, and the recreation sector (the most vulnerable sectors) would be expected to collaborate on and benefit from this response action.

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<sup>5</sup>Note that this is the third action under the Monitoring and Evaluation category.

Response Category: Water conservation [Note: this action was moved from Stage 1 for municipalities]

- **Action 1: Implement strategies identified in Water Management and Conservation Plans (WMCPs) - Municipalities**

This action at Stage 2 is specific to municipalities. Municipal WMCPs include curtailment plans that identify their own response actions for implementation at each curtailment stage. Actions may be for the entity itself and/or its customers. Though entity-defined curtailment stages may not exactly align with watershed-wide defined DCP drought stages, some parallels can be drawn. One suggested mitigation action is to align stages in curtailment plans with the DCP monitoring framework stages<sup>6</sup>. Examples of local response actions from the City of Salem curtailment plan include:

City actions

- Reduce watering at City facilities and/or parks as determined by the City Manager.
- Discontinue operating City decorative fountains that do not recirculate water.
- Limit City hydrant and water line flushing to essential needs for safety and human health.
- Prohibit City-staff from washing sidewalks, walkways, streets, driveways, parking lots, or other hard surfaces except where necessary for public health or safety.
- Discontinue washing City vehicles.

Water customer actions

- Request that City water customers voluntarily reduce outdoor water uses such as lawn watering, car washing, patio cleaning, etc.

### **Stage 3: Severe Drought**

All Stage 1 and Stage 2 response actions can be implemented in Stage 3. The following additional actions also can be implemented:

Response Category: Conservation Messaging, Public Education and Outreach [Note that this action is also conducted in Stages 1 and 3. This section explains messaging specific to Stage 3.]

- **Action 1: Carry out response messaging (as developed during mitigation action development), using partner websites, newspapers and press releases.** More information is provided in Stages 1 and 2 above. Example messages in Stage 3 could include:
  - The watershed is in Stage 3/Severe drought.
  - All areas in the watershed are experiencing drought and drought impacts.
  - Conservation is important to help prevent Stage 4.
  - Here's how everyone is saving water (provide examples).
  - Please voluntarily reduce water by 10 percent. Here's how you can do it (provide examples).

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<sup>6</sup> An approach is provided in the *Joint Mitigation Actions Implementation Plan*.

Response Category: Water rights management

- **Action 4: Implement drought emergency water rights tools (i.e., temporary transfers of water rights, emergency water use permits, and use of existing right option/agreement) available during governor declared drought**

A Governor's drought declaration enables water users within the subject county to benefit from emergency streamlined water rights programs, groundwater usage, and other programs<sup>7</sup>. These programs include the ability to obtain: an emergency water use permit to replace water not available under an existing water right; temporary drought transfers to temporarily change water rights type of use, place of use and point of diversion; temporary drought instream leases; and temporary substitution of a supplemental groundwater right for a primary surface water right. In addition, under a Governor's drought declaration, it is possible to exercise a pre-approved agreement or option for moving water use from one location to another or for use by another entity. Municipal and agricultural sectors are expected to collaborate on<sup>8</sup> and benefit from this response action. The ability to use these tools prior to a Governor's drought declaration (and based on having an approved DCP) is a mitigation action.

Response Category: Emergency response

- **Action 1: Seek state and federal assistance for emergency response actions**

Federal. Drought declaration may be granted at the federal level if the U.S. Drought Monitor (<http://droughtmonitor.unl.edu/>), indicates that a county is under intensity value D2 (Severe Drought) for eight consecutive weeks. The following federal drought benefits may be granted:

- NRCS – Technical and financial assistance
- Farm Services – Loan program to establish wells and overcome financial difficulties
- Rural Development – Loan programs to alleviate water shortages in rural areas
- American Red Cross – Technical assistance to distribute water and first aid from central sites to the municipal sector
- Department of Defense – Transport water for 30 days, drill wells for human consumption (after all other assistance is exhausted)
- Department of Health and Human Services – Technical, medical, and financial assistance
- Small Business Administration – Loans to homeowners and businesses to restore damaged property

State. Drought declaration may be granted at the state level<sup>11</sup> when:

- County commissioners request by letter that the Governor declare a “drought emergency” “due to severe and continuing drought conditions”.
- Copies of county requests are then forwarded to the Office of Emergency Management who forwards to the State Drought Council to provide recommendations and action.

<sup>7</sup> [https://www.oregon.gov/OMD/OEM/fin\\_rec/docs/drought/drought\\_procedures.pdf](https://www.oregon.gov/OMD/OEM/fin_rec/docs/drought/drought_procedures.pdf) (2014)

<sup>8</sup> An approach is provided in the *Joint Mitigation Actions Implementation Plan*.

- A State Drought Council meeting is then held to discuss climate and water conditions and to make a recommendation on the county request. Recommendations are then submitted to the Governor to approve or deny, or continue monitoring.

Assistance requests at the state level should be directed to the Oregon Emergency Management office in Salem (503-378-6377), or OWRD (503-378-8455). The Department of Administrative Services may authorize agencies to purchase without competitive bidding, and may purchase emergency supplies or equipment on behalf of agencies.

Additional details about federal and state agencies, and the assistance they can provide, is found at: [https://www.oregon.gov/OMD/OEM/fin\\_rec/docs/drought/drought\\_info\\_sheet\\_OEM.pdf](https://www.oregon.gov/OMD/OEM/fin_rec/docs/drought/drought_info_sheet_OEM.pdf)

Local. Ultimate responsibility for providing water service to citizens lies with the local water providers. Each jurisdiction is responsible for its own water supplies and maintenance of facilities. Assistance from the County and State will be in the form of personnel and equipment as requested by the affected area. Examples of emergency response assistance at the county level include:

- Submitting a request for emergency/disaster declaration
- Identifying and securing alternative drinking water supplies
- Providing emergency response messaging for radio and television
- Identifying contractor and vendors
- Coordinating with state and local supporting agencies

Assistance requests at the local level should be directed to Marion County Emergency Management Services (503-588-5108) or Linn County Sheriff's Office (541-967-3950), which is responsible for its Emergency Management Program.

- **Action 2: Implement Marion County Disaster Recovery Plan**

Marion County is working on completing a Disaster Recovery Plan that comprises the short and long term steps the County will take after an emergency to restore government function and community services to levels existing prior to the emergency. Short-term operations seek to restore vital services to the community and provide for the basic needs of the public (e.g., power, communication, water and sewage) to an acceptable standard while providing for basic human needs (e.g., life safety, food, clothing, and shelter). Once stability is achieved, long-term recovery efforts focus on restoring the community to a normal or improved state of affairs. Currently, the County's Emergency Action Plan Annex ESF-18, Community Recovery and Economic Stabilization summarizes specific procedures and plans to support recovery, mitigation, and economic stabilization following a disaster.

### **Stage 4: Extreme Drought**

All Stage 1 through 3 response actions can be implemented in Stage 4. The following additional actions also can be implemented:

Response Category: Conservation Messaging, Public Education and Outreach

- **Action 1: Carry out response messaging (as developed during mitigation), using partner websites, newspapers and press releases.** More information is provided in Stages 1 and 2 above. Example messages in Stage 4 could include:
  - The watershed is in Stage 4/Extreme drought.
  - The watershed is in extreme drought.
  - Here's how everyone is saving water (provide examples).
  - Only use water for essential purposes (provide examples).

Response Category: Emergency response

- **Action 3: Carry out water hauling programs**

Assistance requests at the local level should be directed to Marion County Emergency Management Services. Local governments may request emergency water transportation from the following state departments: Department of Forestry (non-potable), when not being used for firefighting, Department of Transportation, Department of Fish and Wildlife, Military Department (National Guard). The municipal sectors are expected to benefit from this response action.

- **Action 4: Dredge intakes, alter diversions**

Municipal water supplies are sourced from the North Santiam by intakes; agricultural water supplies are sourced by intakes and diversions. Poor water quality (ie., algae) due to low water may foul intakes; low water itself may disable both intakes and diversions. Dredging intakes and altering diversions may allow them to access water at lower flow. Because these activities are in-water actions, permits and consultations with federal and state agencies are required, and should only be considered as emergency actions or permitted in advance, such as to protect health, safety and welfare.

Municipal and agricultural sectors are expected to collaborate on and benefit from this response action. Two related projects are long-term mitigation actions in this plan: Seeking funding for the design and implementation of upgrades to the Upper and Lower Bennett Dams (for irrigation and flow maintenance), and evaluating alternatives to the Geren Island intake to access water at low flow (City of Salem).

## **5.2 RECOMMENDATIONS AND DATAGAPS**

Marion County Emergency Management is working with the University of Oregon to inventory drought (and other threats and hazards) concerns of the smaller cities within the watershed. The Marion County Multijurisdictional Hazard Mitigation Plan will identify action items for future implementation, including infrastructure upgrades. Actions and projects in the Plan should be evaluated for inclusion as mitigation or response actions in this DCP.

## **6 ELEMENT #5: OPERATIONAL AND ADMINISTRATIVE FRAMEWORK**

The objectives of the NSW DCP Operational and Administrative Framework are to “clarify the ongoing roles and responsibilities for the DCP, and to facilitate a quick and efficient response to drought conditions”. Section 6.1 explains the roles and responsibilities for the DCP Administrative Team, Task Force, a lead coordinator, and four planning element groups, as well as how these groups will work together to carry out the DCP. Section 6.2 explains the on-going process to efficiently monitor, evaluate, and respond to drought conditions in order to ensure resiliency within the watershed.

Background research, and a full description of the collaborative Working Group and Task Force review process for this planning element are provided in Appendix F.

### **6.1 NSW DCP FRAMEWORK, ONGOING ROLES AND RESPONSIBILITIES**

The on-going NSW DCP Operational and Administrative Framework consists of a DCP Administrative Team, technical advisory Task Force, and four planning element groups (Figure 4). In the short term, the Framework will include a Lead Coordinator to facilitate efficient operation and updates to the DCP. Each group will include one or two liaison(s) to/from the DCP Administrative Team, to ensure thorough communications and on-going development of the DCP. More information about each group is provided in the following sections.

#### **6.1.1 DCP Administrative Team**

The DCP Administrative Team is responsible for the overall administration of the DCP, and is anticipated to be convened monthly at least for the first year of the DCP, and have the following roles and responsibilities:

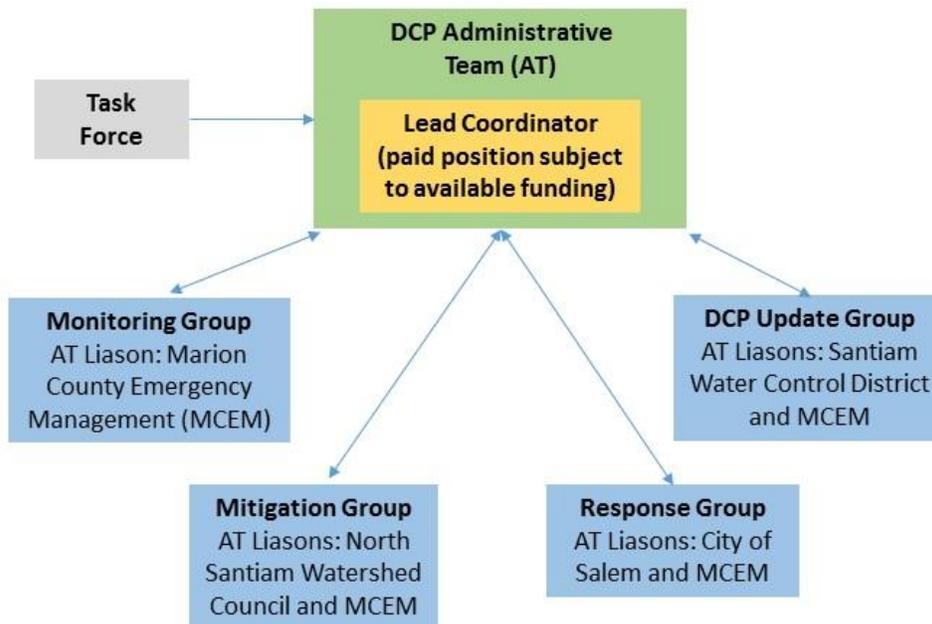
- Evaluate monitoring reports. Depending upon drought stage, submit to Response Group or County/Public official recommendations regarding drought declaration. Additional detail is provided in Section 6.2.
- Ensure that progress is being made on the Joint Actions Implementation Plan<sup>9</sup>.
- Review proposed changes to monitoring, vulnerability assessment, mitigation and response actions and approve periodic updates to the DCP.
- Coordinate with the Governor’s Water Supply Availability Committee.
- Provide annual updates to the Task Force.
- Provide fiscal oversight of Lead Coordinator and joint actions.

Initially, the DCP Administrative Team is proposed to consist of representatives from North Santiam Watershed Council, City of Salem, Santiam Water Control District, and Marion County Emergency Management.

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<sup>9</sup> A *Joint Actions for Water Supply Resiliency Implementation Plan* was developed to describe the scope for the joint Task Force mitigation and response actions described in the DCP.

Figure 4: DCP Operational and Administrative Framework



### 6.1.2 Lead Coordinator

The Lead Coordinator is paid position (based on available funding) to support the DCP Administrative Team with coordination of the Framework groups and processes. The roles and responsibilities of the Lead Coordinator are to:

- Collect monitoring data and complete the monthly monitoring report. Submit to Monitoring Group. Train Monitoring Group member to continue monthly monitoring reporting function in the event the Lead Coordinator position is not funded. (Additional detail provided in Figure 5.)
- Coordinate monitoring and drought declaration recommendations process (discussed in Section 6.2).
- Collect environmental and socioeconomic data for use in periodic updates to the vulnerability assessment.
- Track and report on effectiveness of individual and joint mitigation actions to Mitigation Group.
- Track and report on effectiveness of response actions to Response Group.
- Make recommendations to the DCP Administrative Team for how to incorporate new information into the DCP. Lead the Update process.
- Implement the Joint Action Implementation Plan and report progress to the DCP Administrative Team.

- Track funding sources for implementing actions and pursue grants, as feasible. Track grants being pursued for all Mitigation Action projects, and reports to the DCP Administrative Team (and Task Force as needed).
- Provide administrative assistance to the DCP Administrative Team.

### **6.1.3 Task Force**

The Task Force will provide technical input to the DCP Administrative Team or groups as requested. It is anticipated that this group will be convened at least annually to receive updates from the DCP Administrative Team, and will be comprised of the same local, state and federal agencies; municipalities; and stakeholders that comprised the Task Force during development of the DCP.

### **6.1.4 Monitoring Group**

The Monitoring Group will support the DCP Administrative Team and fulfill the following roles and responsibilities:

- Compile monthly monitoring report (Lead Coordinator to conduct initially, with responsibility eventually transitioned to the Monitoring Group). Starting in Stage 2, monitoring would be conducted weekly.
- Review monthly monitoring report and make drought stage recommendations for DCP Administrative Team review.
- Revise report based upon DCP Administrative Team evaluation.
- Provide review of monitoring efficacy at the end of each water year and makes recommendations for DCP Update.

The liaisons to the DCP Administrative Team will be: Marion County Emergency Management.

### **6.1.5 Mitigation Group**

The Mitigation Group will support the DCP Administrative Team and fulfill the following roles and responsibilities:

- Coordinate on the Joint Action Implementation Plan and provide support as needed for implementation of mitigation actions.
- Provide periodic review of other DCP mitigation actions.
- Provide periodic review of the status and effectiveness of joint mitigation actions and other mitigation actions and make recommendations for DCP Update.

The liaisons to the DCP Administrative Team will be: North Santiam Watershed Council and Marion County Emergency Management.

### **6.1.6 Response Group**

The Response Group will support the DCP Administrative Team and fulfill the following roles and responsibilities:

- Distribute monitoring stage information and messaging to the public.

- Coordinate on existing response actions, and those to be developed under the Joint Action Implementation Plan and provide support as needed, such as to update NSW DCP Education and Outreach communication tools.
- Provide periodic review of the status and effectiveness of response actions and makes recommendations for DCP Update.

The liaisons to the DCP Administrative Team will be: City of Salem and Marion County Emergency Management.

### **6.1.7 DCP Update Group**

The DCP Update Group will support the DCP Administrative Team and fulfill the following roles and responsibilities:

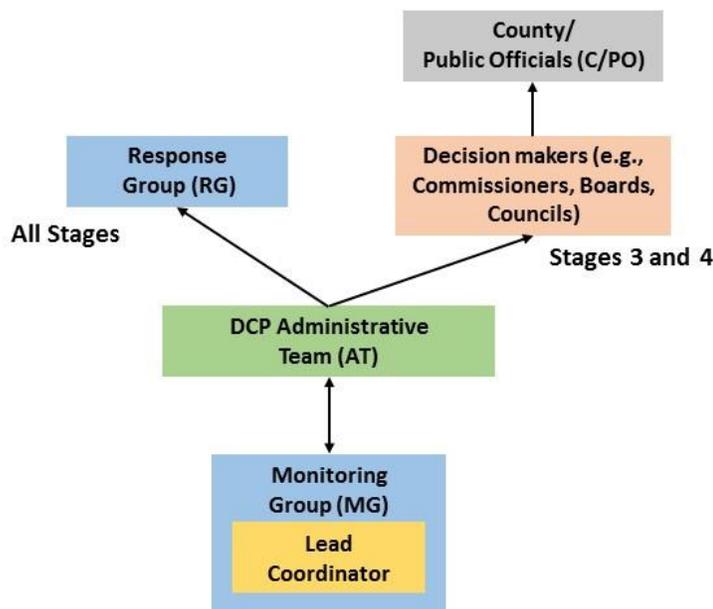
- Track new technology, research, and legal requirements for periodic updates to the DCP and its actions.
- Track environmental, social and economic consequences of local drought to identify strengths and weaknesses in response for potential changes to the DCP.

The liaisons to the DCP Administrative Team will be: Santiam Water Control District and Marion County Emergency Management.

## **6.2 EFFICIENT RESPONSE TO DROUGHT CONDITIONS**

The second objective of the NSW DCP Operational and Administrative Framework is to facilitate a quick and efficient response to drought conditions. Therefore, the DCP Administrative Team, Monitoring Group and Response Groups will be part of an on-going process to evaluate and respond to drought conditions in order to ensure preparedness within the watershed. In advanced stages of drought, county and public officials will be involved to request a drought declaration of the Governor (Figure 5). More information about the monitoring process and recommendation for a drought declaration is provided in the following sections.

*Figure 5: Communications and Drought Declaration Recommendation Process*



### 6.2.1 Monitoring and Reporting

The Lead Coordinator, Monitoring Group, DCP Administrative Team, and Response Group will perform the following actions (coordinated by the Lead Coordinator) on at least a monthly basis:

- Using the monitoring framework developed in Chapter 2 of this DCP, the Lead Coordinator (as a Monitoring Group member) will prepare a monitoring report during the 1<sup>st</sup> week of each month and submit to the DCP Administrative Team.
- The DCP Administrative Team will review the report and make changes or comments if needed. The DCP Administrative Team may consult one or more members of the Task Force for technical input.
- The DCP Administrative Team will then submit the monthly monitoring report to the Response Group by the 15<sup>th</sup> of each month.
- The Response Group will issue the monthly monitoring report for broader communications to the public in accordance with the DCP Education and Outreach Partnership (See Joint Action Implementation Plan).

### 6.2.2 Response and Drought Declaration Recommendations

The findings of the monthly monitoring report will trigger one of the following two processes, depending upon the recommended drought stage in the report:

- At all Drought Stages, the Monitoring Group will forward the monthly monitoring report to the Response Group for action, as appropriate (Figure 5) (See Chapter 5, Response Actions).

- If the Drought Stage = 3 or 4, then DCP Administrative Team members will submit the monthly monitoring report to, and seek input from, its council/commissioners/boards, etc. within 72 hours, as to whether to recommend an ORS 536 drought declaration.
- If DCP Administrative Team council/commissioners/boards recommend an ORS 536 drought declaration, they will request that County/Public Officials review the monthly monitoring report and pursue a drought declaration from the Governor (Figure 5). County/Public Officials and state agencies<sup>10</sup> may also provide messaging guidance to the DCP Administrative Team for outreach to stakeholders. The DCP Administrative Team will also submit the resulting County/Public Officials decisions and guidance, to the Response Group for action.

If the County does not elect to request a drought declaration from the Governor, cities are able to declare drought within their communities. Local declarations enable cities to obtain hazard mitigation funding from their county emergency management programs.

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<sup>10</sup> OWRD is the lead state agency for coordinating and communicating information regarding water supply shortages. Other state agencies can also contribute information or guidance, such as ODFW, ODF, Oregon Parks and Recreation Department, and the Oregon State Marine Board. These agencies, for example, will inform the public of any fishing restrictions, parks-related closures or operational changes, boater and recreational access to waterbodies, and any fire-related restrictions, closures, or general information. State agencies will develop or routinely update their communications plan to help alleviate drought-related risks. (Oregon Drought Annex 2016)

## **7 ELEMENT #6: DCP UPDATE PROCESS**

The NSW DCP Update Process is to “evaluate and update the DCP on an ongoing basis to ensure its effectiveness.” Updates are necessary to incorporate new science, regulations, legislation, and stakeholder information; reassess vulnerability of critical resources; and incorporate improvements in monitoring, mitigation and response actions. Post-drought evaluation ensures that pre-drought planning was effective, and identifies and corrects issues to improve future implementation and response. Section 7.1 presents an annual evaluation process to identify new information, assess post-drought response, and suggest ways to improve effectiveness. Every five years or as determined necessary by the DCP Administrative Team, annual results will be reviewed and the DCP document will be revised.

Background research and a full description of the collaborative Working Group and Task Force review process are provided in Appendix G.

### **7.1 NSW DCP UPDATE PROCESS**

To begin the Update Process, in November of each year, the DCP Update Group will request information from Task Force members that will be used to help review the effectiveness of the DCP and make future adjustments. The Task Force members represent all sectors, and are knowledgeable about changes in their respective fields that may affect future drought planning and response. Members will submit environmental and socio-economic drought impact information from the preceding year, as well as new regulatory and technical information, to the DCP Update Group. The DCP Update Group will use this information to review the Vulnerability Assessment, and recommend any changes in vulnerability to the DCP Administrative Team and the Monitoring, Mitigation and Response Groups. (After the first year, the DCP Update group will also review this process.) The groups will then consider this information in their annual evaluations of their respective drought planning elements, and send recommended changes to the DCP Administrative Team. The DCP Administrative Team will review, evaluate and compile update recommendations from the groups and may seek feedback from the Task Force. Every five years, the DCP Update Group will review the annual evaluations, and recommend updates to the DCP document for DCP Administrative Team comment and formal revision.

An overview of this process is provided in Figure 6. Greater detail is presented in Table 10, which includes the timeline, responsible parties (as identified in the Operational and Administrative Framework), and more responsibilities needed to complete annual/post-drought evaluation and 5-year plan revision. The schedule for the process may be adjusted to align with the Marion County Multijurisdictional Hazard Mitigation Planning process. A suggested process kick-off email from the DCP Update Group to the Task Force is provided in Appendix G.

**Figure 6: Overview of DCP Update Process**

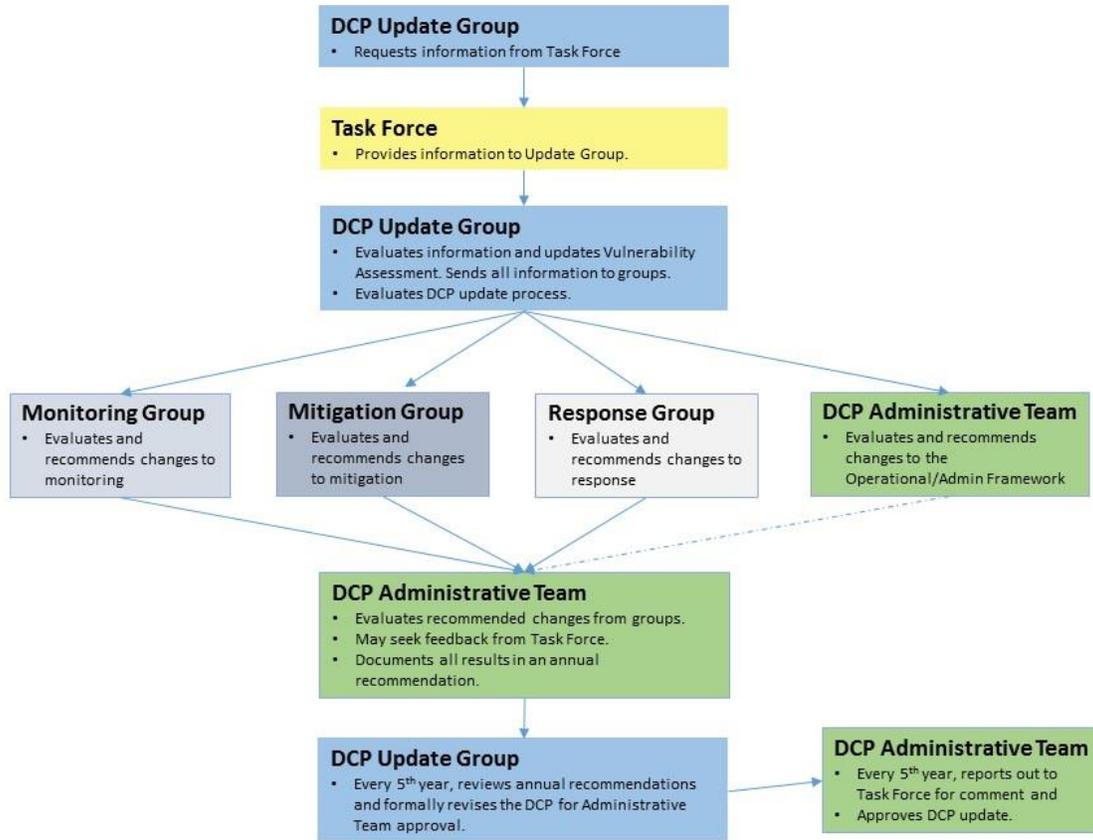


Table 10: DCP Update Process

<b>NSW DCP Update Process:</b> Conduct the following tasks annually/post-drought:			
<b>Timeline</b>	<b>Responsible Group</b>	<b>Responsibilities</b>	<b>Provide information annually to</b>
By Nov. 1	DCP Update Group will	<ul style="list-style-type: none"> <li>Send an email request to the Task Force requesting annual review information for their areas of expertise.</li> </ul>	N/a
By Nov. 15	Task Force members will  (by email or meeting)	<ul style="list-style-type: none"> <li>Communicate the following watershed-specific annual review information:               <ul style="list-style-type: none"> <li>Environmental, economic and social impacts of drought within the NSW. Address each sector to the extent information is available.</li> <li>New regulations and legislation (e.g., Bi-Op/Reallocation), climate change data and population growth data that may affect water supply resiliency for each sector.</li> <li>New technology or research that may be useful.</li> </ul> </li> </ul>	DCP Administrative team and DCP Update Group
By Nov. 22	DCP Update Group will	<ul style="list-style-type: none"> <li>Update the Vulnerability Assessment               <ul style="list-style-type: none"> <li>* Gather and review watershed-specific annual review information from the Task Force.</li> <li>* Update the Vulnerability Assessment as needed, document findings, and communicate to the Monitoring, Mitigation and Response Groups for use in their evaluations.</li> </ul> </li> <li>Evaluate how the DCP Update Process is functioning</li> </ul> <p><i>Note additional DCP Update Group responsibilities on following page.</i></p>	DCP Administrative Team and groups
By Dec. 1	Monitoring Group will	<ul style="list-style-type: none"> <li>Evaluate existing indicators and triggers at each stage, and add new or replace if needed. Incorporate new science or watershed information as necessary.</li> <li>Evaluate process for data collection and monthly reporting to the DCP Administrative Team</li> </ul>	DCP Update Group
By Dec. 1	Mitigation Group will	<ul style="list-style-type: none"> <li>Evaluate information from the DCP Update Group regarding new regulations and legislation, and changes in vulnerability that may affect mitigation needs in the watershed</li> <li>Track status and update each DCP Table 2 Priority Mitigation Action</li> </ul>	DCP Update Group

<b>NSW DCP Update Process:</b> Conduct the following tasks annually/post-drought:			
<b>Timeline</b>	<b>Responsible Group</b>	<b>Responsibilities</b>	<b>Provide information annually to</b>
		<ul style="list-style-type: none"> <li>As Priority Mitigation Actions are completed, evaluate Table 1 Potential Mitigation Actions to elevate to priority status. Identify lead entity, funding sources, etc.</li> <li>Gather information from all sectors to identify new Table 1 Potential Mitigation Actions</li> </ul>	
By Dec. 1	Response Group will	<ul style="list-style-type: none"> <li>Evaluate information from the DCP Update Group regarding new regulations and legislation, and changes in vulnerability that may affect response needs in the watershed</li> <li>Review each DCP Figure 3 Response Action and evaluate effectiveness at improving resiliency in the watershed. Gather information from all sectors.</li> <li>Propose new, changes, or removal of actions as needed. Identify lead entity, funding sources, etc.</li> </ul>	DCP Update Group
By Dec. 15	DCP Administrative Team will	<ul style="list-style-type: none"> <li>Evaluate how the Operational and Administrative Framework is functioning</li> <li>Review and evaluate all group recommendations for the vulnerability assessment, monitoring, mitigation, response and the DCP update process.</li> <li>Consult Task Force if needed.</li> <li>Document results in annual evaluation.</li> </ul> <p><i>Note additional DCP Administrative Team responsibilities below.</i></p>	DCP Update Group
By Dec. 15	DCP Update Group will	<ul style="list-style-type: none"> <li>Every 5 years, evaluate annual documentation for the last 5 years and prepare updated DCP document.</li> <li>Identify funding needs for the next update cycle so that the necessary resources are in place in advance of the update year. Coordinate with Lead Coordinator to pursue and track funding.</li> </ul>	DCP Administrative Team
By Jan. 15	DCP Administrative Team will	<ul style="list-style-type: none"> <li>Every 5 years, present updated DCP to the Task Force for comment, receive comments, and revise/approve the DCP.</li> </ul>	DCP Update Group and Task Force

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## **APPENDICES**