

## **FRESHWATER PREPARATION/ADAPTATION WORK GROUP (PAWG) RECOMMENDATIONS**

### **Key Impacts and Issues for Water Resources**

The most important climate impacts on water supply, fisheries, agriculture, flood and storm preparation, and hydropower are from changes in the timing and availability of water. Management systems for each of these sectors rely on past patterns of temperature and precipitation which are now changing and will continue changing for the next half a century or more. The past is no longer a reliable predictor of the future. Climate change will force water resource managers and planners to evaluate complex tradeoffs and to adapt their systems in a changing and unprecedented environment.

While climate change may impact the net amount of water that a basin receives, it is the uncertainty, variability and timing that have the greatest impact on water supply infrastructure. Furthermore, the impacts of climate change will be compounded by increasing urban and suburban populations which will continue to stress water resources and water management systems. Adaptation will take time, and planning and adaptation need to begin now.

A reliable supply of water is crucial for the communities, businesses, and industries of Washington. Major water supplies in Washington rely on storage from surface water reservoirs, snowpack, or groundwater to supplement the water available from streams. As climate change shifts the timing and volume of streamflows, and reduces snowpack, more frequent low flows during the summer will make it more difficult to meet both in-stream and out-of-stream needs. Reduced groundwater recharge will also make it more difficult for water suppliers to meet the needs of consumers and preserve in-stream values in snowmelt-fed watersheds. Dry and/or warm conditions during the summer are also likely to increase water demands.

It is highly likely that projected increases in air temperature will lead to warmer stream temperatures, especially during the summer. Temperature changes and changes in the volume and timing of streamflows could create environmental conditions that are detrimental to Pacific Northwest cold water fish populations. Salmon are at particular risk. While increasing temperatures and rising CO<sub>2</sub> levels may enhance potential crop production, soil moisture is projected to decrease, and crops could suffer more days of heat and moisture stress. Increased winter flows and lower summer flows are likely to reduce the availability of irrigation water when it is needed the most.

Increases in temperature can cause more precipitation to fall as rain instead of snow, leading to an increase in flooding in winter even if total precipitation remains the same. If winter precipitation increases in the future, as some models suggest, the risk of flooding would be compounded. Likely climate change impacts on urban stormwater flooding are not well understood and require localized assessments and modeling. Shifts in the amount and timing of streamflow will likely reduce winter electricity demands and increase winter electricity generation; summer demands are likely to increase overall at the same time summer hydroelectric generation is likely to decrease.

Between June and December 2007, the Freshwater PAWG, representing state agencies, local and tribal governments and various water resource interests, met to discuss preparation and adaptation to climate change in relation to the needs for water resources in Washington State. The PAWG developed four priority recommendation strategies to address the potential impacts of climate change. Additional priority areas, such as stormwater, hydropower, water quality, and flood management, were not discussed due to time constraints. The Freshwater PAWG suggests that the

state authorize its continuation through 2008 to refine the four recommendations and provide additional recommendations for other priority areas. In addition, the PAWG suggests providing a long-term venue for further comprehensive discussions about strategies for addressing climate change impacts on freshwater in Washington.

The Water PAWG offers the following recommendations, organized as four main strategies:

1. Water resource management strategy
  - 1.1 Evaluate and modify state water policies
  - 1.2 Evaluate options to meet water demand (considering potential climate change effects)
  - 1.3 Restore natural watershed functions
  - 1.4 Create programs and incentives to encourage the consolidation or cooperative management of public water systems
2. Water conservation and efficiency strategy
  - 2.1. Establish and fund a statewide water conservation program
  - 2.2. Define guidance or standards for water conservation and related energy efficiency
  - 2.3. Provide educational outreach on water conservation
3. Emergency preparedness and drought management strategy
  - 3.1 Fund the drought preparedness and emergency water supply projects accounts and modify the utilization requirements therein
  - 3.2 Remove the 10% allocation cap for non-agriculture uses for emergency drought relief
  - 3.3 Create Appropriate State-Wide Drought Management Strategies that Account for Evolving Drought Risks in a Warmer Climate
4. Water resources planning and information strategy
  - 4.1 Fund additional research and monitoring programs to improve understanding of available water supplies (surface and groundwater), water use, and linkages to climate variability and climate change.
  - 4.2 Incorporate climate change considerations into long range and emergency planning
  - 4.3 Provide outreach to the public and others to plan and prepare for climate change

Comment [NT1]: Wait on this until have broader language

Because the strategies overlap to some extent, the recommendations are separated in the interest of identifying specific discrete steps. Implementation steps for recommendations to address the strategies are described below. No priority is assigned by the numbering. The Water PAWG believes that preference should be given to actions likely to have the lowest cost and least environmental impact. Such actions generally can be implemented more quickly, with more consensus, and they are less likely to be regretted at a later date. The Washington state Legislature and Departments of Ecology and Community, Trade, and Economic Development will play significant roles in implementing the following recommendations, in cooperation with local governments and watershed or other planning groups.

Comment [R&A2]: Michael Garrity

## 1. WATER RESOURCE MANAGEMENT STRATEGY

### Description of the Strategy

This strategy focuses on addressing current approaches to water resource management and allocation within Washington in preparation for and adaptation to the impacts of climate change. It addresses current barriers as well as identifies potential new approaches and means for sustainable water management in relation to the challenges of climate change.

### Goal of the Strategy

The UW CIG report on impacts in Washington from climate change has identified water and water management as one of the most profoundly-affected sectors. Given the significant potential effects of climate change on water availability (including timing and amount), many existing serious challenges in appropriate allocations of water are likely to be exacerbated. Access to water in the state is governed by various laws, regulations, programs, and policies that have divided the resource among many competing uses including municipal drinking water supplies, energy and agricultural production, tribal rights, and fish habitat. The major push in the past ten years to develop watershed plans in basins across the state, while beneficial, has not resulted in comprehensive water management strategies that account for climate change impacts. Even without specific effects of climate change, in many parts of the state, the demand for water has exceeded available supplies. This situation is likely to grow worse and require increasingly rapid and adaptable responses to water management. The state’s current management structures and decision-making processes are likely to be inadequate for the magnitude, scope and speed of water management decisions necessary to address climate change impacts. The goal of the strategy is to examine various approaches to manage water supplies in creative ways to meet both in-stream and out-of-stream, including, public health and safety demands, in an increasingly unpredictable future.

The specific recommendations of the Water PAWG are:

- 1.1 Evaluate and modify state water policies**
- 1.2 Evaluate options to meet water demand (considering potential climate change effects)**
- 1.3 Restore natural watershed functions**
- 1.4 Create programs and incentives to encourage the consolidation or cooperative management of public water systems**

### Recommendation Implementation Steps

#### Recommendation 1.1 Evaluate and Modify State Water Policies

The Departments of Ecology, Health, and Community Trade, and Economic Development, as well as representatives of various sectors and interests, should address current barriers in Washington water policy to the sustainability of surface and groundwater resources. In particular, the agencies and representatives should consider and address as appropriate (using adaptive management techniques where practicable), the impacts of:

- Continued and increasing (in some areas) inappropriate reliance on exempt wells to supply water for development needs in rapidly growing areas
- Current relinquishment statutes in relation to water conservation and wise management – and the potential of current law (including the water trust program) to encourage or to inhibit good stewardship
- Unpermitted water uses

**Comment [NT3]:** Consider whether this is really needed

**Comment [R&A4]:** Mike Petersen - I am very concerned that some on the call seemed to want to eliminate most of the first section and questioned a connection between supply (exempt well, water rights, relinquishment, etc) and global warming. In my opinion we have to know what is being used, what the demands will be in the future, and what the opportunities for conserving water are (especially ag improvements) or we will have no baseline with which to plan for projected changes in water.

**Comment [R&A5]:** Michael Garrity

To do this, the agencies and representatives should evaluate existing implementation authority/mechanisms that can be strengthened or adapted to promote sustainability and collaborative decision-making, including the following:

- Watershed plans and planning groups under 90.82 and 77.85
- Columbia Basin Water Management Program authorized in 2006
- Local or regional water management groups (e.g., Cedar River IFC; Green River Refill Committee; Yakima Basin groups; Walla Walla)
- Groundwater management plans
- State authorities (water masters; metering; enforcement/compliance; utility planning and service area obligations; trust water program)
- Local authorities (GMA; flood management plans; emergency response plans)
- Water conservation and efficiency statutes:
  - Plumbing Code (RCW 19.27.031)
  - Water Supply Facilities – Referendum 38 (Chapter 43.99E RCW)
  - Water Use Efficiency Rule (RCW 70.119.180)
  - Reclaimed Water Act (Chapter 90.46 RCW)

**Recommendation 1.2 Evaluate Options to Meet Water Demand (considering potential climate change effects)**

The Department of Ecology should conduct/sponsor a study or evaluation, including cost and environmental impact, that examines various options in use in Washington and elsewhere that improve the ability to meet demands for water. These may include examining approaches to flexibly transfer water among different users and uses of water, including pros and cons of water markets that create equity in the ability of various sectors to purchase water; and options for addressing water supplies, including above and below ground to meet both in-stream and out-of-stream uses. The study should consider the potential development of an overarching infrastructure that provides a context and guidelines for water transfers and water supply development that supports the widest range of in-stream and out-of-stream uses.

Comment [R&A6]: Michael Garrity

Various storage studies—including the 2001 Report to the Legislature, *Artificial Storage and Recovery of Groundwater* and those done as part of Chapter 90.82 RCW planning should be expanded to account for climate change impacts. Other options to be investigated as means to meet water needs should include:

- Modification of existing infrastructure to meet multiple purposes (e.g., water supply, flood control, in-stream flows)
- New and expanded incentives for water conservation
- New water storage options, whether in-stream or off-channel, above or below ground, through techniques such as:
  - aquifer recharge
  - natural water storage (e.g., beavers, wetlands)
  - new impoundment structures (e.g., new storage facilities currently being assessed through the Columbia River Water Management Program)

**Recommendation 1.3 Restore Natural Watershed Functions**

The Departments of Ecology; Community, Trade, and Economic Development; and Natural Resources should use the tools they have available for planning and habitat restoration and protection to restore natural watershed functions that decrease peak flows and increase base flows.

The Departments should work together to identify the minimum flows necessary to restore and protect habitat and aquatic resources. This may entail setting in-stream flows for targeted watersheds and establishing specific strategies to improve and protect flows. Depending on the watershed, this may have connections to the water supply options in Recommendation 1.2. Some potential options for restoring natural watershed functions may include

- Restoring flood plain connectivity,
- Continue to support the upgrading of roads to current standards, abandonment of roads not needed or that need to be move out of floodplains and replacement of undersized culverts or fish passage barriers,
- Allowing floodwaters to inundate the surrounding land to recharge soil, and
- Property acquisition.

**Recommendation 1.4 Create Programs and Incentives to Encourage the Consolidation or Cooperative Management of Public Water Systems**

State agencies should create programs and incentives to encourage the consolidation or cooperative management of public water systems. If these strategies lead to an increase in water conservation and system efficiencies they would help systems to meet climate change, public health and safety, and water supply challenges.

## **2. WATER CONSERVATION AND EFFICIENCY STRATEGY**

### **Description of the Strategy**

The state should develop and implement a coordinated program of water conservation and efficiency activities targeting multiple water use sectors within the state - agriculture, municipal water supply, wastewater, and public sector supply.

### **Goal of the Strategy**

The goal of the conservation and efficiency strategy is perennial efficiency and a system of water use that rewards consistency, as well as adaptability. The state should reduce water and related energy demands and replace existing practices over time with “more” and “most efficient” practices and infrastructure. The net efficiency savings can provide a buffer for those years where climate change and related water supply variability stress the state’s capacity and resources. As conservation and efficiency are incorporated into normal practices, the state will be better positioned to balance or adapt to changes in water supply or demand. The goal of the strategy is to develop a coordinated program that will:

- Reduce overall water use by targeted water use sectors,
- Increase water use efficiency and related energy efficiency,
- Support the development of water and energy efficient infrastructure [\(link to planning strategy\)](#),
- Provide funding and support for conservation initiatives,
- Include regulatory support with standards, targets and where appropriate enforcement,
- Provide the public with a common vision for water conservation and efficiency across the state and across multiple sectors of government and businesses [\(link to outreach strategy\)](#).

The following are recommendation of the Water PAWG:

### **2.1 Establish and fund a statewide water conservation program**

## 2.2 Define guidance or standards for water conservation and related energy efficiency

### 2.3 Provide educational outreach on water conservation

#### **Recommendation Implementation Steps**

##### **Recommendation 2.1: Establish and Fund a Statewide Water Conservation Program**

The Legislature should appropriate \$10 million to fund conservation activities. With this funding a Cooperative Statewide Conservation Program would be established to competitively disperse funds, evaluate and track performance of expenditures, and disseminate lessons learned. State agencies would pool their resources and efforts to provide a coordinated front for all sectors and users of water resources. Water conservation and efficiency activities to be supported and funded may include the following:

- Market initiatives and tax credits
- Conservation incentive programs
- Infrastructure development or redevelopment
- Compliance and enforcement strategies against water mis-use
- Development and application of new technologies and techniques
- Improved agricultural techniques
- Landscaping techniques (such as urban forests, xeri-scaping)
- On-site use of stormwater and rainwater and low impact development techniques
- Retrofits of existing development for on-site use of stormwater and rainwater
- Use of basic service meters in communities
- Use of reclaimed water, grey water, industrial re-use

**Comment [R&A7]:** Denise Clifford to provide clarifying language to explain that the recommendation applies across sectors, including agriculture.

Additionally, the state should aggressively pursue federal resources to support management strategies and decisions [e.g., Senate bill, S. 1766, “The Low Carbon Economy Act,” which includes the creation of a Climate Adaptation Fund to facilitate planning, design, and construction of projects to conserve water and improve water use efficiency]

##### **Recommendation 2.2 Define Guidance or Standards for Water Conservation and Related Energy Efficiency**

State agencies should develop rules to establish and enforce standards for water conservation and efficiency across a range of sectors. Examples include:

- State agencies should promote standards for sustainable development such as plumbing for appropriate use of reclaimed water;
- The state should explore options/standards for decreasing energy and water use for wastewater treatment;
- The state should support stronger federal and state appliance efficiency standards;
- **State agencies should provide incentives and support for agricultural efficiencies.**

##### **Recommendation 2.3 Provide Educational Outreach on Water Conservation**

State agencies should provide education on water conservation and efficiency tools and techniques to a variety of audiences from a range of sectors.

- Outreach programs should encourage the adoption of more efficient water conservation equipment across a range of sectors.
- Agencies should provide incentives and education for communities to use less water and energy.

### 3. EMERGENCY PREPAREDNESS AND DROUGHT MANAGEMENT STRATEGY

#### Description of the Strategy

This strategy revitalizes the drought preparation account and actively markets preparation for drought in all sectors. It also recognizes a need to re-think the definition of drought.

**Comment [NT8]:** Alan suggests this should include emergency management strategies related to flooding. -

**Comment [R&A9]:** Dave and Ginny will work on some language about flooding and emergency “preparedness”

#### **Goal of the Strategy:**

Climate change is expected to result in increased frequency, severity, and persistence of low or drought level water supply conditions in Washington State. The goal of the strategy is to enhance the state’s capacity to adapt to emergency water supply conditions by shifting emphasis from emergency response to proactive preparation and management. The recommendations of the Water PAWG are to:

- 3.1 Fund the drought preparedness and emergency water supply projects accounts and modify the utilization requirements therein**
- 3.2 Remove the 10% allocation cap for non-agriculture uses for emergency drought relief**
- 3.3 Create Appropriate State-Wide Drought Management Strategies that Account for Evolving Drought Risks in a Warmer Climate**

**Comment [NT10]:** Wait on this until have broader language

#### **Recommendation Implementation Steps**

##### **Recommendation 3.1 Fund the Drought Preparedness (DPA) and Emergency Water Supply Projects Accounts and Modify the Utilization Requirements Therein**

The Legislature should authorize bonding for \$10 million to fund the accounts. This would allow bonds to be sold on an “as-needed” basis to support a multi-year preparation and response. Use of the account would not require new legislation if applied within existing statutes and intent.

Management and rule making authority for account use is delegated to Ecology per [RCW 43.83B](#). Based on prior uses of the account, adequate guidance is available ([Chapter 173-166 WAC](#)) to provide for early and effective use. Per that guidance, funds could be distributed to public bodies for agricultural, municipal, and fish and wildlife water infrastructure improvements to facilitate operation during drought water supply conditions. A significant number of smaller infrastructure improvements could be completed within an initial 5-year period. Examples include:

- Agriculture – Emergency wells, improved water diversion and delivery
- Municipal - Small municipal systems upgrades, emergency wells and interties
- Fish and Wildlife - Hatchery water supply, fish collection and passage facilities

Other considerations for the drought preparation funding should include options for loan programs for non-municipal supplies. Many water supplies in the state are non-profit but not legally a public entity these include homeowner and community associations. A “refillable” source of low cost funds targeted for emergency preparedness would encourage small utilities to make the needed infrastructure adaptations. Existing funding programs do not preclude these types of projects but they often fail to score high enough on the funding priority lists. Operator owned utilities and other small non-municipal utilities have a very limit set of funding resources. Long term infrastructure improvements often get overlooked for more immediate needs. A source of low interest loans can be an important incentive to encourage better long term assessments and preparations.

##### **Recommendation 3.2 Remove the 10% Allocation Cap for Non-Agriculture Uses for Emergency Drought Relief**

[WAC 173-166-090](#) (6) states that “no more than 10% of total available funds will be allocated for nonagricultural drought relief purposes, including the preservation of the state's fisheries during a biennium.” Stakeholders other than agriculture require emergency relief from drought. In the past,

Ecology has dealt with the issues this cap creates by overriding this cap via an emergency rule and/or by transferring funds to the DPA, which does not contain such limitations. Removing the 10% cap will ensure all stakeholders are assisted during a drought emergency and will eliminate the need to expend valuable agency time on procedural tactics used to circumvent the cap. The Washington Legislature should remove this cap via an amendment to [WAC 173-166-090](#)

**Recommendation 3.3 Create Appropriate State-Wide Drought Management Strategies that Account for Evolving Drought Risks in a Warmer Climate**

The Department of Ecology should research the appropriate definition for “normal” to better define drought. Currently, per [RCW 43.83B.400](#) a “drought condition means that the water supply for a geographical area or for a significant portion of a geographical area is below 75% of normal and the water shortage is likely to create undue hardships for various water uses and users.” In a pre-climate changed water policy world, it was easy to calculate “normal” – it was simply the mean of the historic record. As climate changes, historical records are less predictive of water availability. This recommendation would require further research to create a formula that would define drought to remove the bias associated with older historic data that is unrepresentative of typical conditions, even seen today. A new definition of drought would also be flexible. This flexibility will allow the state to declare drought in some regions and not in others based on different definitions of supply. Clarifying what “normal” means would not remove this flexibility. A rule that goes through the public process would demystify how the 75% of normal supply determination is calculated. Furthermore, such a rule would help push the trend away from emergency-based drought responses toward adaptive management-based planning.

**Comment [NT11]:** Wait on this until have broader language

## 4. WATER RESOURCES PLANNING AND INFORMATION STRATEGY

### Description of the Strategy

The strategy promotes the need to plan for and gather better data about the effects of climate change on water resources. It recommends the integration of climate change into a variety of planning environments, including long-range water resource and emergency planning, and the conduct of science and information gathering research.

### Goal of the Strategy

The strategy recognizes that the profound effects of climate change require planning from every perspective. The goal of the strategy is to incorporate climate change into long-range and emergency planning through mandates. Additionally, improved monitoring, scientific information gathering, and data management will be implemented. The strategy also aims to engage and educate a cross-section of entities that will be affected by climate change, including the public, planning groups, and local governments, with the intent of helping them plan for the future. The Water PAWG recommends the following:

**4.1 Fund additional research and monitoring programs to improve understanding of available water supplies (surface and groundwater), water use, and linkages to climate variability and climate change.**

**4.2 Incorporate climate change considerations into long range and emergency planning**

**4.3 Provide outreach to the public and others to plan and prepare for climate change**

### Recommendation Implementation Steps

**Recommendation 4.1 Fund additional research and monitoring programs to improve understanding of available water supplies (surface and groundwater), water use, and linkages to climate variability and climate change**

The Legislature should augment current scientific research efforts, to establish a credible infrastructure of hydrologists and climate change scientists to provide increasingly finer resolution data and understanding (e.g., at watershed scales) of effects of climate change on water resources. This scientific infrastructure can also be used to study and develop data on hydrologic changes related to large-scale disturbances, such as fire and forest die-back.

The Legislature should direct state agencies to organize data, about water resources – including water use, water quality, return flows, extent of exempt wells, ground water availability, etc. and make this information available to a broad cross-section of users. A monitoring and data management program should be established to improve the monitoring of water rights, water use, water quality, ground water resources, return flows, exempt wells, and other areas, through improved metering and reporting. Agencies, in coordination with academic institutions, should monitor ice resources, such as glaciers, temperature, and precipitation in high elevations, and quantify their influence on the hydrologic cycle at the watershed scale. Better data such as floodplain maps should be developed for siting public and private infrastructure. Comprehensive data can provide the basis for water management decisions (e.g., work in Columbia basin and Walla Walla Subbasin). Methodologies for predicting outcomes related to climate change need to be developed and used by agencies in their work, such as for the engineering of infrastructure, and the development of TMDLs, for example.

**Recommendation 4.2 Incorporate Climate Change into Long-Range Planning**

State and local agencies and others with responsibilities for planning should examine where climate change strategies can be incorporated.

**(Make sure this agrees with TWG recommendations to the CAT on GMA).** State agencies including, Departments of Health; Community, Trade, and Economic Development; Ecology; and Fish and Wildlife should review and recommend to the legislature modifications based on water issues to the Growth Management Act (GMA), State Environmental Policy Act (SEPA), Shoreline Management Act (SMA), State Wildlife Management Plans, Coordinated Water System Planning to require the incorporation of climate considerations if needed. These state agencies will identify needed changes and the Legislature should provide funding to address the changes. For example, the agencies should revise the assessments done in watersheds to account for climate change impacts on both supply and demand sides, include climate change as an element in studies supported by state funding and in planning activities (e.g. related to water permitting).

Local governments and planning groups should be required to review and comment on existing comprehensive plans to identify, prioritize, and address issues related to climate change. Local drought response plans should be developed that include approaches for water use savings (including curtailment) during low supply periods. These could be incorporated into existing planning such as water utility planning and local government comprehensive plans. Assessment of potential changes in flood risk should be incorporated into land use planning. Water supply, watershed, and other significant water resource related planning activities should consider incorporating both “likely” and “worst case” scenarios relative to water availability and water demand.

**Recommendation 4.3 Provide outreach to the public and others to plan and prepare for climate change**

State agencies should ensure that information gathered as part of planning and water resources investigations is made accessible to the broadest audience possible. Planning will be required by many organizations to adapt to climate impacts and the more accurate the information and robust the tools, the more effective the planning. Agencies can do this by engaging more actively with watershed planning groups, as well as developing tools, fact sheets, and brochures and conducting training with local groups, schools, local governments, and others.

NOT SURE HOW TO HANDLE THESE *[I feel like they could be deleted – they’re either tangential or addressed adequately elsewhere]*

- Agriculture
  - The commitment to agricultural drought relief should be maintained. Agriculture is the last bastion of family business and people in those professions are sensitive to the financial consequences of drought.
  - Preparedness will happen most easily in municipalities and irrigation districts, but this will not address farmers who are direct irrigators.
- Planning
  - This recommendation should include language about using conservation policies and growth management planning to ensure that the effects of drought are not exacerbated by a lack of planning.

**Comment [R&A12]:** Dave Montic: Draft Tech Memo on climate change and water supply, produced by the Climate Change Tech Committee note the quote on page 12, from Miller and Yates 2006, Might be helpful in rewording that sentence in the draft report that Paul Fleming had some concerns about.

“To plan effectively for the future, utilities should assess the potential impacts of a range of plausible climate change scenarios on their ability to meet customer needs and comply with quality standards and environmental objectives in a cost-effective manner. This requires rethinking traditional approaches to the planning process that rely on assumptions such as climate stationarity.”

**Comment [R&A13]:** Michael Garrity

- Drought is considered a natural event, but there is also human-made drought. There are many small utilities up against their water rights, but they are under development pressure. Having a drought planning component as well as a future availability component in a water system plan would help to flag points where issues might arise.
- Drought, by statute, is about the net input into the system. A planning and preparation approach can consider this, whereas waiting until an emergency could have dire consequences.
- Drawbacks to this Approach
  - Not all emergency need can be offset by preparation.
  - Simply changing the definition of drought will not change the approach to drought; it simply modifies the trigger for the release of drought funds.