

**ANDREWS & KURTH CLIMATE CHANGE OUTLINE** © 2010



**TABLE OF CONTENTS**

1. Endangerment Finding..... 4

    A. The Mixing Effect on Endangerment ..... 4

    B. Considerations ..... 5

        (1) changes in air quality ..... 5

        (2) increases in temperatures: mortality and mortality can be adversely affected by temperature increases (heat waves) ..... 5

        (3) changes in extreme weather events: the impacts can be great even though the extreme weather events are small. Hurricanes, floods, and severity of coastal storm events due to rising sea levels can occur. .... 5

        (4) increases in food-and-water borne pathogens: ..... 5

        (5) changes in aeroallergens while there are many uncertainties in this area, there is some evidence that elevated CO<sub>2</sub> can lead to weather changes that result in increased aeroallergens ..... 5

    C. Water Issues..... 5

    D. Sea Level Issues..... 6

        (1) *Coastal community flooding* ..... 6

        (2) *Coastal Zone Development*..... 6

        (3) Coastal erosion and landslides..... 7

        (4) Seawater well intrusion..... 7

        (5) Lost wetlands and estuaries. .... 10

        (6) Electrical Consumption ..... 11

**LIST OF FIGURES**

Figure 8. Snow Depth Changes ..... 7

Figure 9. Natural System Water Interface ..... 8

Figure 10. Seawater Intrusion Phase 1 ..... 9

Figure 11. Seawater Intrusion Phase 2 ..... 9

Figure 12. Seawater Intrusion Phase 3 ..... 10

## 1. ENDANGERMENT FINDING<sup>1</sup>

[T]he Administrator finds that greenhouse gases in the atmosphere may reasonably be anticipated both to endanger public health and to endanger public welfare.<sup>2</sup>

This determination was made by considering both observed and projected effects of GHGs in the atmosphere, their effects on climate, and the public health and welfare risks and impacts associated with climate change.

Generally, this is a two-step process:

Whether the air pollution at issue may reasonably be anticipated to endanger public health or welfare, and whether emissions of particular air pollutants cause or contribute to that air pollution.<sup>3</sup>

EPA notes that the issue of whether GHGs should be addressed individually or as a group. The decision affects the PSD review process: whether the PSD (pre-permitting) new source review process must address the pollutants individually or as a group. Part of the problem is that different source categories emit different GHGs.<sup>4</sup>

### A. The Mixing Effect on Endangerment

GHGs typically remain in the atmosphere for decades to centuries. Thus, once emitted, GHGs become well mixed throughout the global atmosphere so that the average concentrations over the U.S. are roughly the same as the global average. And, it means that current GHG concentrations are a result of past as well as ongoing emissions.<sup>5</sup>

Greenhouse gases trap some of the Earth's heat that would otherwise escape to space. The additional heating effect caused by the buildup of anthropogenic GHGs in the atmosphere enhances the Earth's natural greenhouse effect and causes global temperatures to increase, with associated climatic changes (e.g., change in precipitation patterns, rise in sea levels, and changes in the frequency and intensity of extreme weather events).<sup>6</sup>

EPA found further evidence of the mixing effect in the simple organization of available data:

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<sup>1</sup> Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 Fed. Reg. 66496 (Dec. 15, 2009).

<sup>2</sup> Endangerment Finding at 66497.

<sup>3</sup> ANPR at 44421.

<sup>4</sup> ANPR at 44421.

<sup>5</sup> ANPR at 44423.

<sup>6</sup> ANPR at 44423.

The scientific literature that assesses the potential risks and end-point impacts of climate change (driven by the accumulation of atmospheric concentrations of GHGs) does not assess these impacts on a gas-by-gas basis.

\* \* \*

Likewise, the future projections of climate change that have been done are driven by emission scenarios of all six GHGs, as well as other pollutants, many of which are already regulated in the U.S. and other countries.<sup>7</sup>

EPA therefore believes it appropriate to define “air pollution” as it relates to GHGs on the combined current and projected atmospheric concentrations.

### **B. Considerations**

Specifically, the analysis focused on public health and public welfare impacts within the U.S.<sup>8</sup> EPA considered how the well-mixed GHGs and associated climate change affect public health by evaluating the risks associated with:

- (1) changes in air quality
- (2) increases in temperatures: mortality and mortality can be adversely affected by temperature increases (heat waves)
- (3) changes in extreme weather events: the impacts can be great even though the extreme weather events are small. Hurricanes, floods, and severity of coastal storm events due to rising sea levels can occur.
- (4) increases in food-and-water borne pathogens:
- (5) changes in aeroallergens while there are many uncertainties in this area, there is some evidence that elevated CO<sub>2</sub> can lead to weather changes that result in increased aeroallergens<sup>9</sup>

### **C. Water Issues**

The Endangerment Finding indicated that [t]he evidence concerning adverse impacts in the areas of water resources and sea level rise and coastal areas provides the clearest and strongest support for an Endangerment Finding, both for current and future generations.”<sup>10</sup>

Water resources across large areas of the country are at serious risk from climate change, with effects on water supplies, water quality, and adverse effects from extreme events such as floods and droughts. Even areas of the country where an

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<sup>7</sup> ANPR at 44424.

<sup>8</sup> Endangerment Finding at 66497.

<sup>9</sup> Endangerment Finding at 66497.

<sup>10</sup> Endangerment Finding at 66498.

increase in water flow is projected could face water resource problems from the supply and water quality problems associated with temperature increases and precipitation variability, as well as the increased risk of serious adverse effects from extreme events, such as floods and drought.<sup>11</sup>

#### **D. Sea Level Issues**

The most serious potential adverse effects are the increased risk of storm surge and flooding in coastal areas from sea level rise and more intense storms. Observed sea level rise is already increasing the risk of storm surge and flooding in some coastal areas. The conclusion in the assessment literature that there is a potential for hurricanes to become more intense [and even some evidence that Atlantic hurricanes have already become more intense] reinforces the judgment that coastal communities are now endangered by human-induced climate change, and may face substantially greater risk in the future.<sup>12</sup>

Rising sea levels can cause:

(1) *Coastal community flooding*

Melting glaciers, ice fields and polar ice caps, plus warming ocean waters all contribute to rising sea levels.

(2) *Coastal Zone Development*

Coastal population growth in deltas, barrier islands and estuaries has led to conversion of natural coastal landscapes to agriculture and aquaculture, industrial and residential uses. Since 1980, 33 million more people live in these areas. The areas contribute more than \$1 trillion to the economy. An acceleration of sea level rise may impair the ecosystem benefits of these areas. Also, land will be lost, affecting the area's productivity.<sup>13</sup>

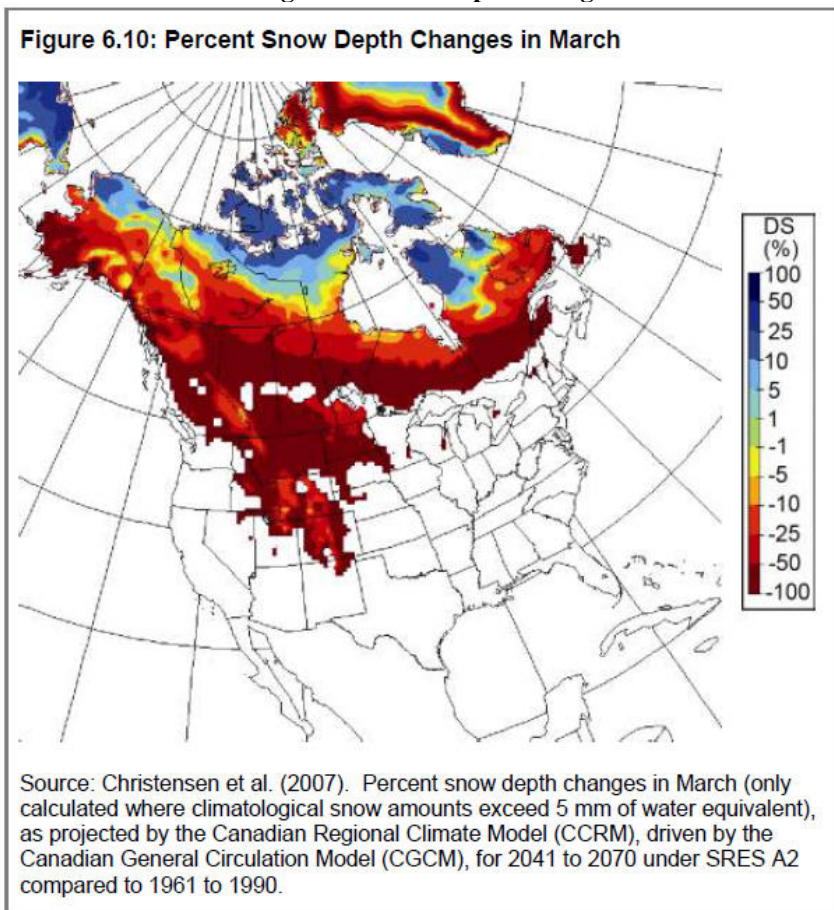
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<sup>11</sup> Endangerment Finding at 66498.

<sup>12</sup> Endangerment Finding at 66498.

<sup>13</sup> TSD at 118-119.

**Figure 1. Snow Depth Changes**



14

(3) Coastal erosion and landslides

Climate change is predicted to bring stronger storms with heavier precipitation and higher wave conditions. Climate change is predicted to increase storm intensities and wave height in the Pacific Ocean. More frequent, intense storms combined with higher overall sea levels will result in higher coastal erosion rates and more storm damage. Coastal communities will face increased property damage to infrastructure (such as roads and water treatment systems). Erosion, washouts and landslides can destroy property and transportation systems.

(4) Seawater well intrusion

A higher sea level means saltwater may penetrate wells in low-lying communities. This will reduce the availability of freshwater for coastal communities.

Islands pose unique challenges for ground water management. Island County's ground water aquifers are recharged only by rainfall. This area is in the rain-shadow of the Olympic Mountains, and areas of Island County receive between 17 to 40 inches annually. Some aquifers (such as those at or below sea level near shorelines) are connected to Puget Sound

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<sup>14</sup> TSD at 73.

saltwater. Portions of these aquifers may contain saltwater. Seawater intrusion, the movement of marine saltwater into freshwater aquifers, could become a serious problem.

**Figure 2. Natural System Water Interface**

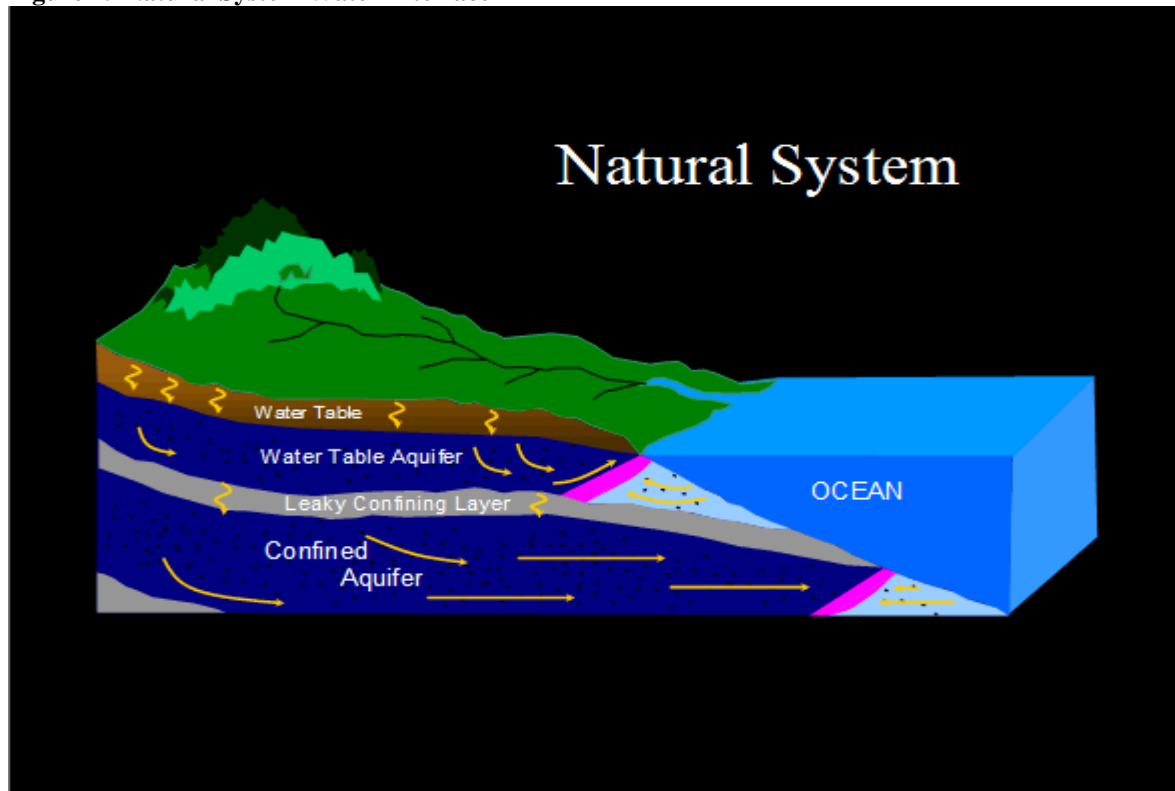


Figure 3. Seawater Intrusion Phase 1

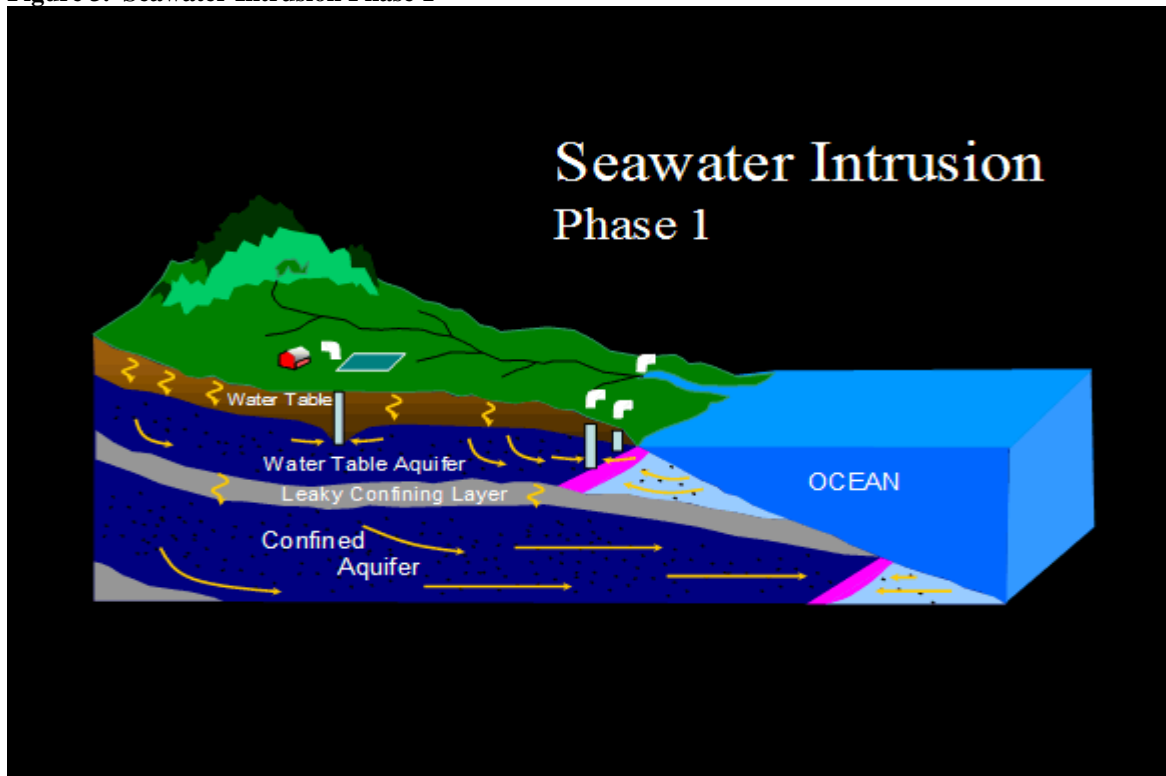


Figure 4. Seawater Intrusion Phase 2

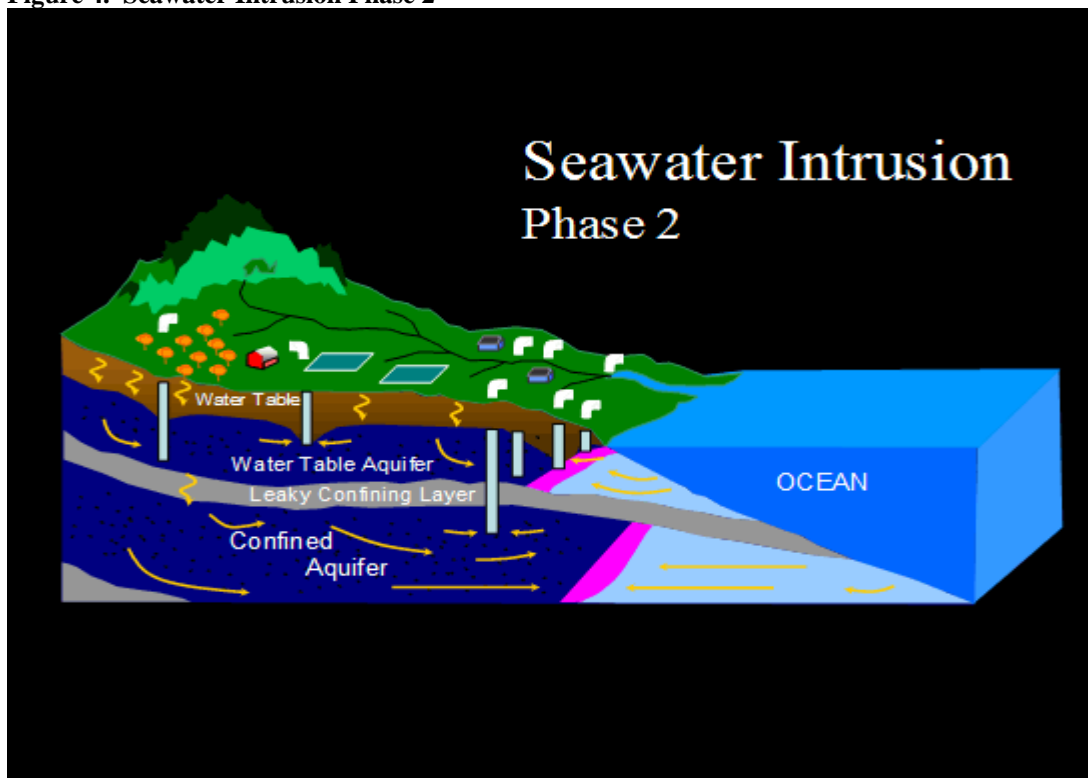
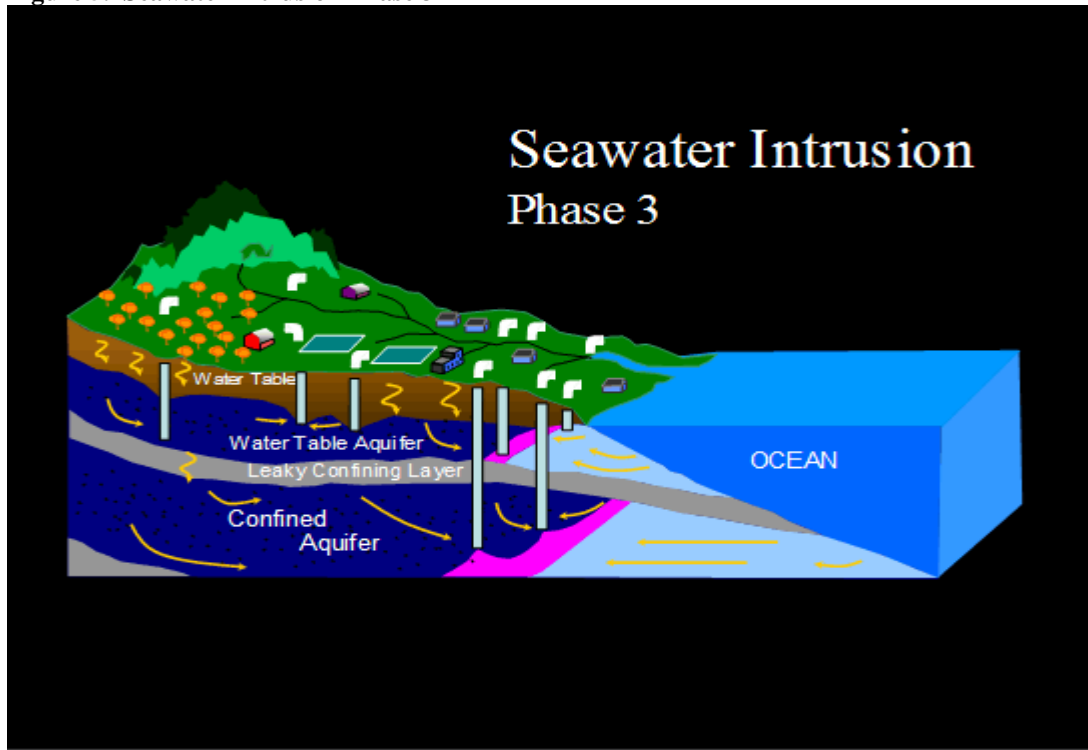


Figure 5. Seawater Intrusion Phase 3



(5) Lost wetlands and estuaries.<sup>15</sup>

Wetlands often occur in low-lying areas and rising sea levels may convert these valuable habitats to deep water.

Wetlands and estuaries:

- protect against flooding by absorbing excess water
- filter out pollutants
- stabilize shorelines, and

provide important habitat for wildlife such as salmon and waterfowl (in freshwater wetlands) or shrimp, crabs, salmon, terns and herons (in salt water estuaries).<sup>16</sup>

<sup>15</sup> State of Washington Department of Ecology, "Rising Sea Level," [http://www.ecy.wa.gov/climatechange/risingsealevel\\_more.htm](http://www.ecy.wa.gov/climatechange/risingsealevel_more.htm), viewed February 11, 2010.

<sup>16</sup> State of Washington Department of Ecology, "Rising Sea Level," [http://www.ecy.wa.gov/climatechange/risingsealevel\\_more.htm](http://www.ecy.wa.gov/climatechange/risingsealevel_more.htm), viewed February 11, 2010.

(6) Electrical Consumption

Electricity generation is the largest cause of CO<sub>2</sub>. Yet, if there is more global warming, there will be increased demand for electricity, potentially creating a vicious cycle.