IDAHO Department of Water Resources

Hydrologic considerations for the possible establishment of a Ground Water Management Area for the eastern Snake Plain Aquifer

Presented by Sean Vincent, P.G.
July 25, 2016

Key Questions

1. For the eastern Snake Plain Aquifer (ESPA), are conditions approaching those of a Critical Ground Water Area (CGWA)?
   - What is a CGWA and what is a Ground Water Management Area (GWMA)?
   - Where are the CGWAs and GWMAs?
   - What are the physical characteristics of the eastern Snake River Plain and the ESPA?
   - What are the hydrologic trends in the ESPA?
   - Why are the trends downward?
   - What has been the impact of downward trends?

Key Questions

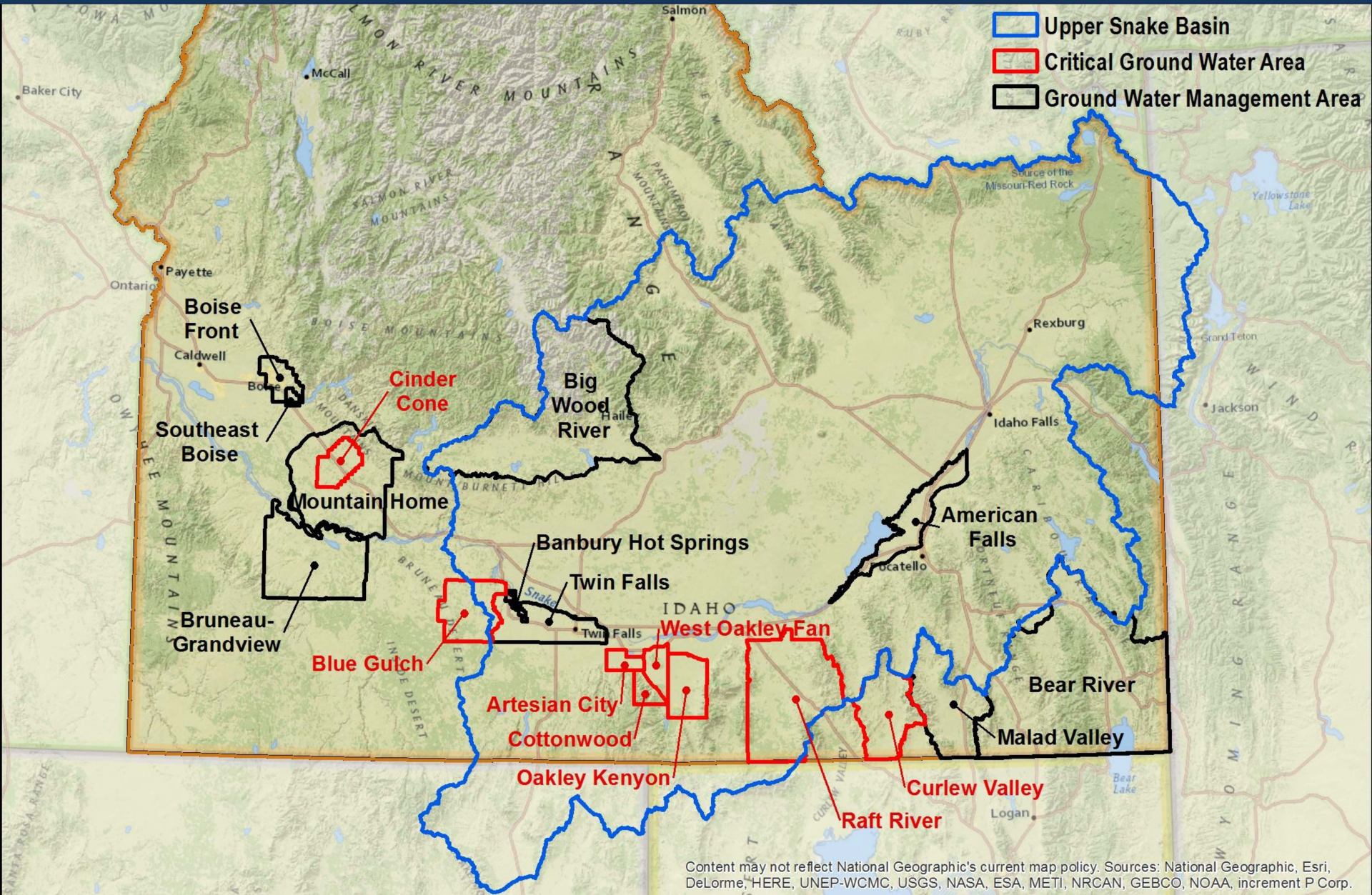
2. Should a GWMA, if formed, include tributary basins?
   - What is a tributary basin?
   - How do we know the boundaries of tributary basins?
   - How much ESPA water comes from tributary basins?
   - What generally are the hydrologic impacts of consumptive groundwater pumping in tributary basins?
   - What specifically are the hydrologic impacts of consumptive groundwater pumping in this area?

What is a CGWA and a GWMA?

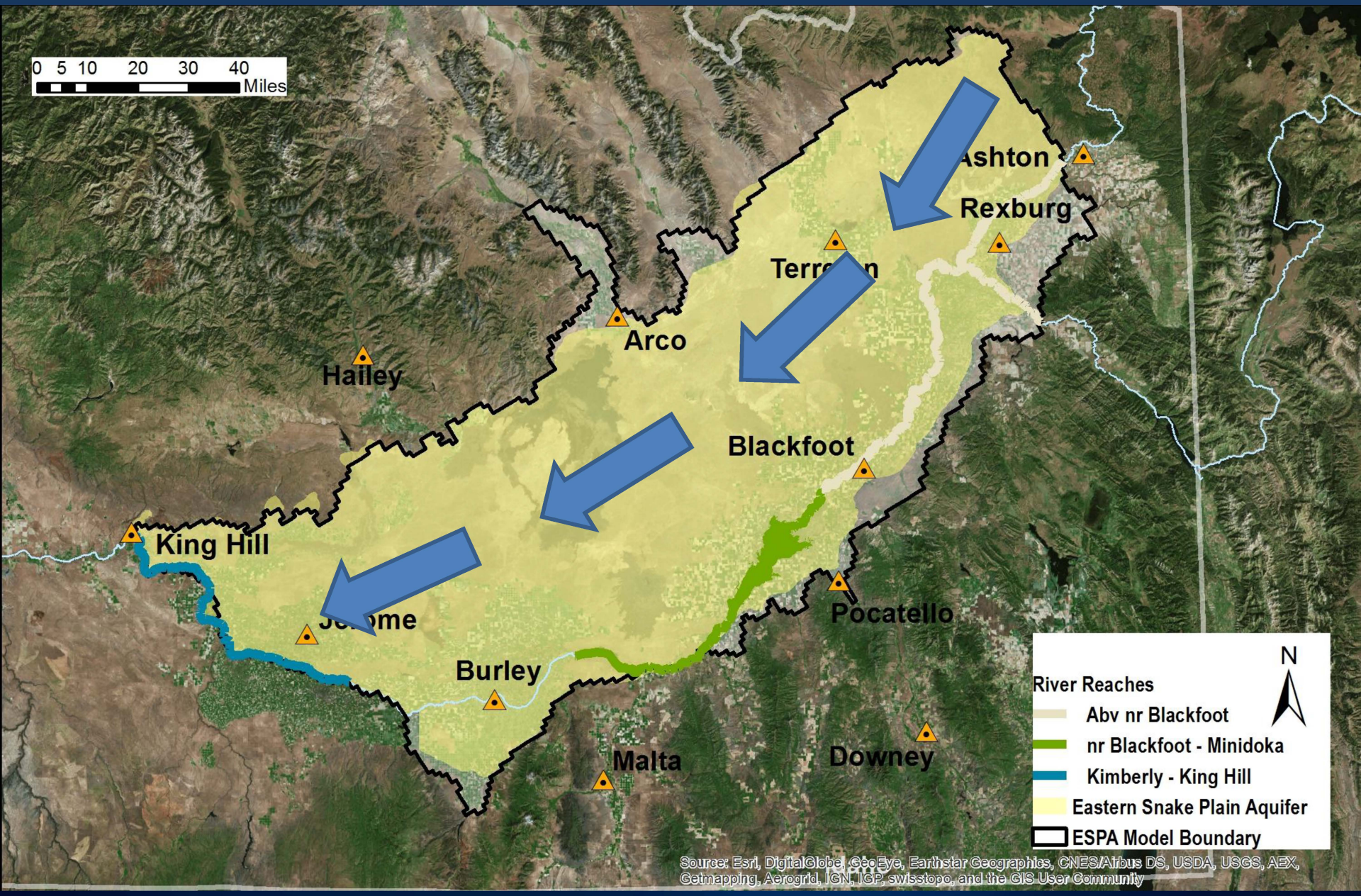
- Critical Ground Water Area
  - I.C. §42-233a: "*any ground water basin, or designated part thereof, not having sufficient ground water to provide a reasonably safe supply for irrigation of cultivated lands, or other uses in the basin at the then current rates of withdrawal or rates of withdrawal projected by consideration of valid and outstanding applications and permits, as may be determined and designated, from time to time, by the director of the department of water resources.*" (emphasis added)

- Ground Water Management Area
  - I.C. § 42-233b: "*any ground water basin, or designated part thereof, which the director of the department of water resources has determined may be approaching the conditions of a critical ground water area.*"

Where are the CGWAs and GWMAs?



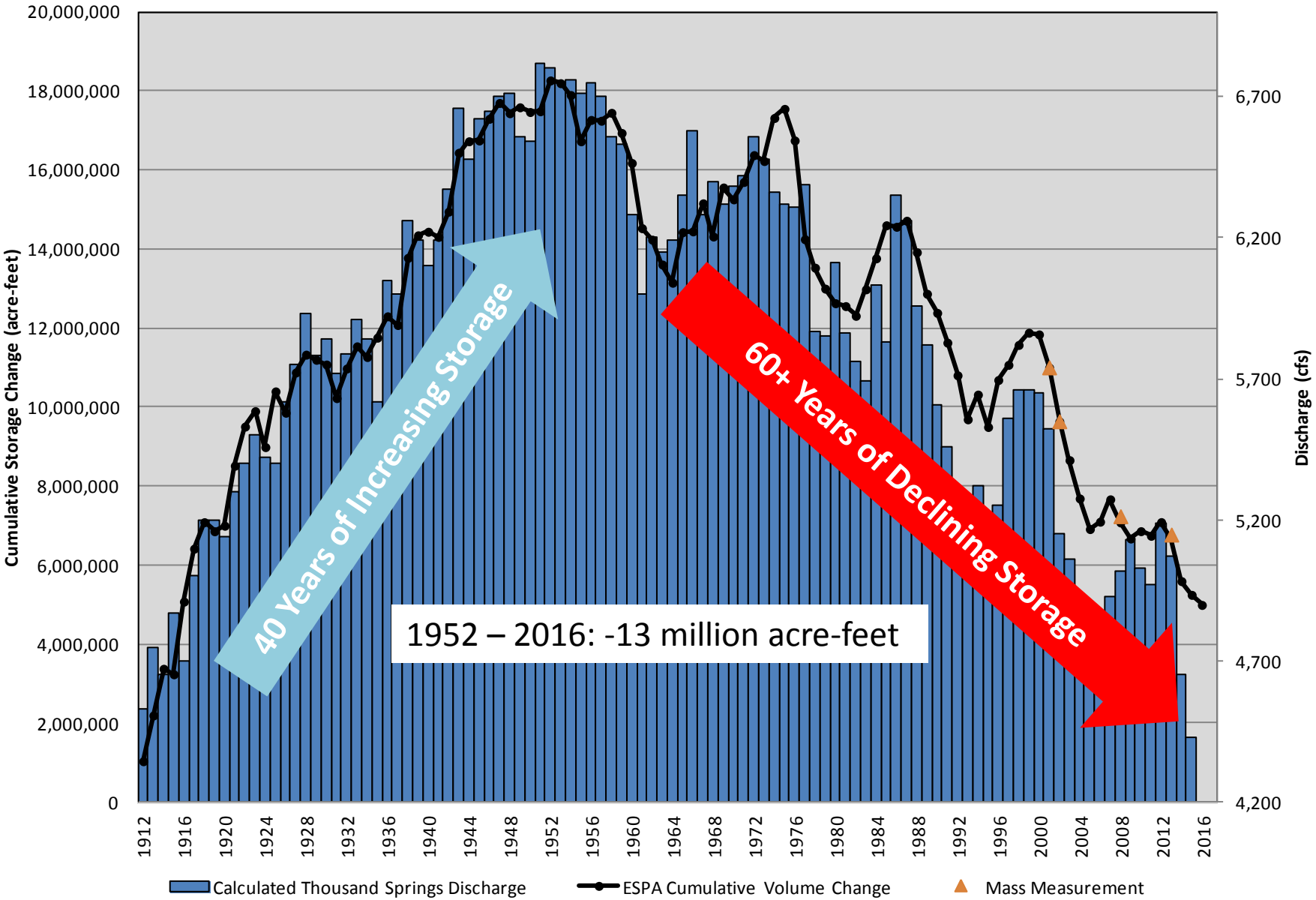
What are the physical characteristics of the ESRP and the ESPA?



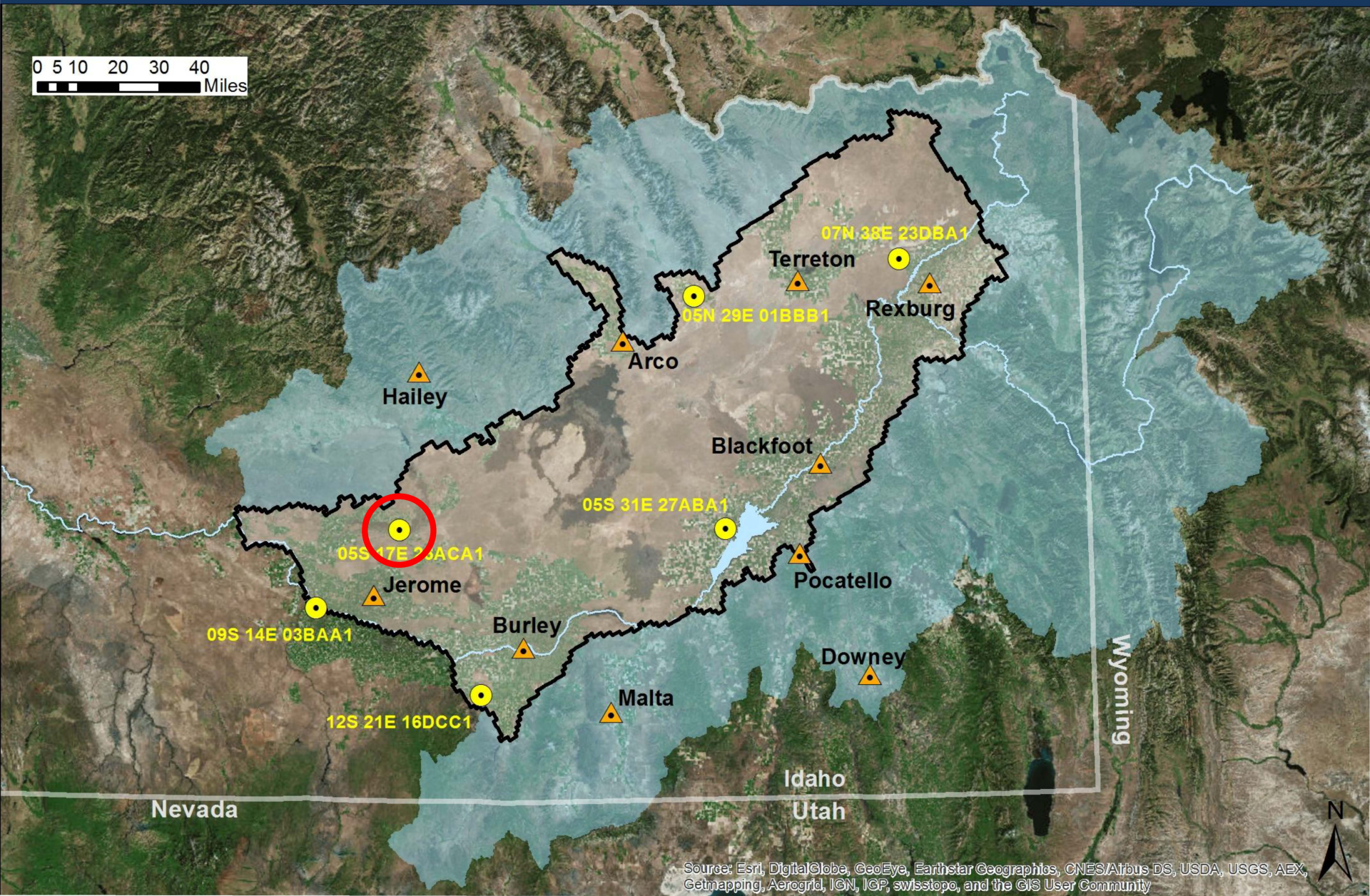
Niagara Springs

Blue Heart Springs

What are the hydrologic trends?



ESPA Water Levels



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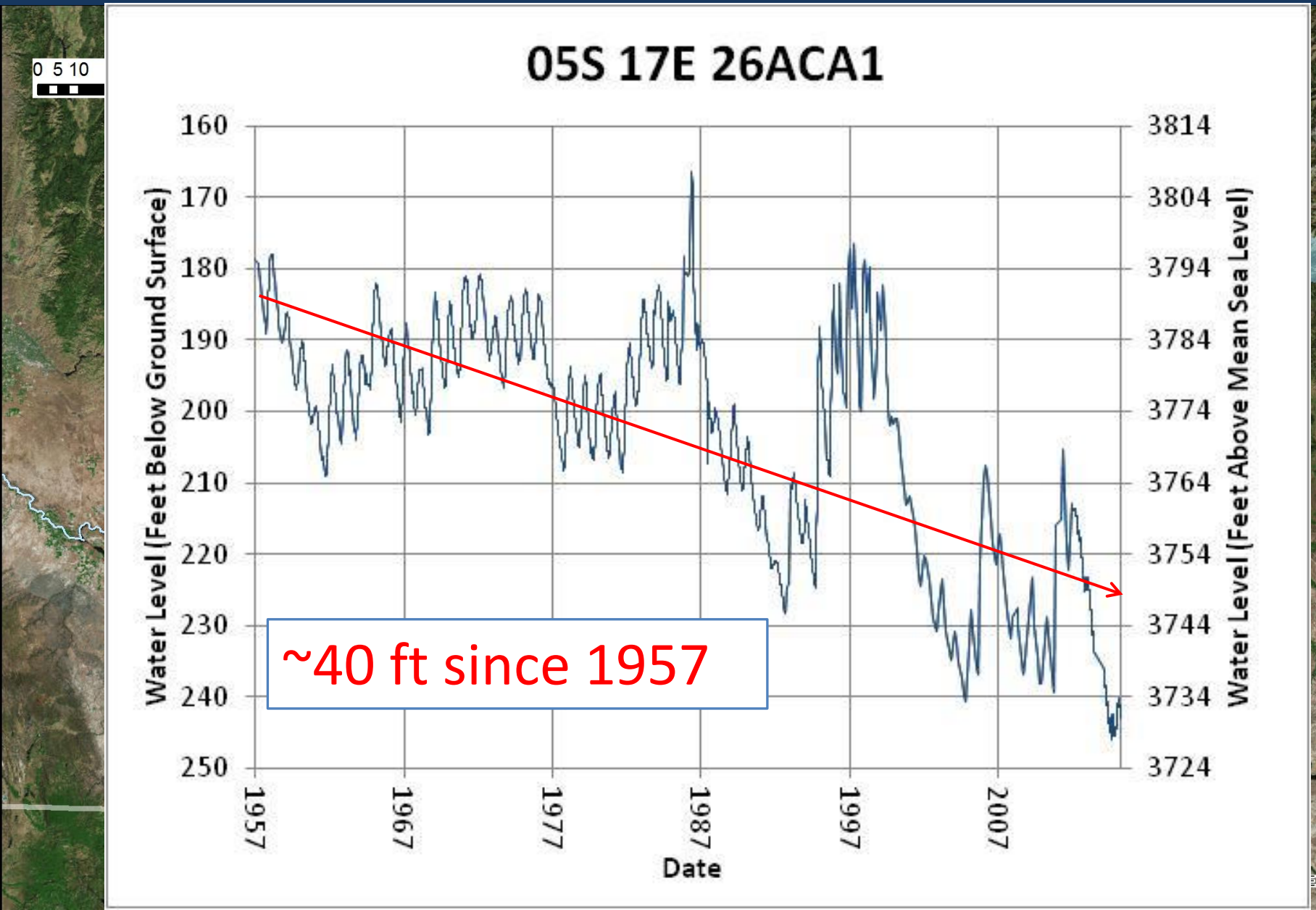

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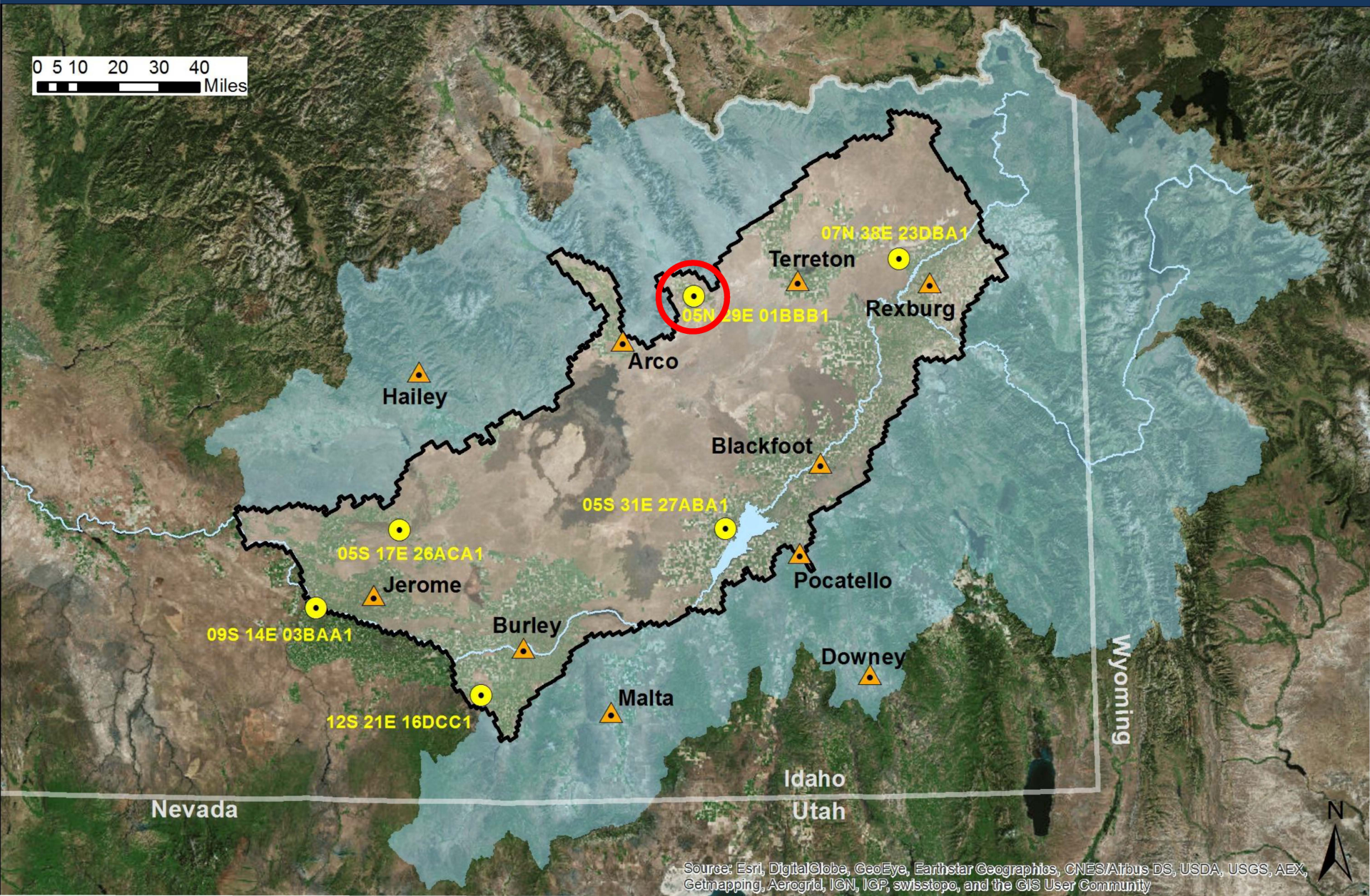

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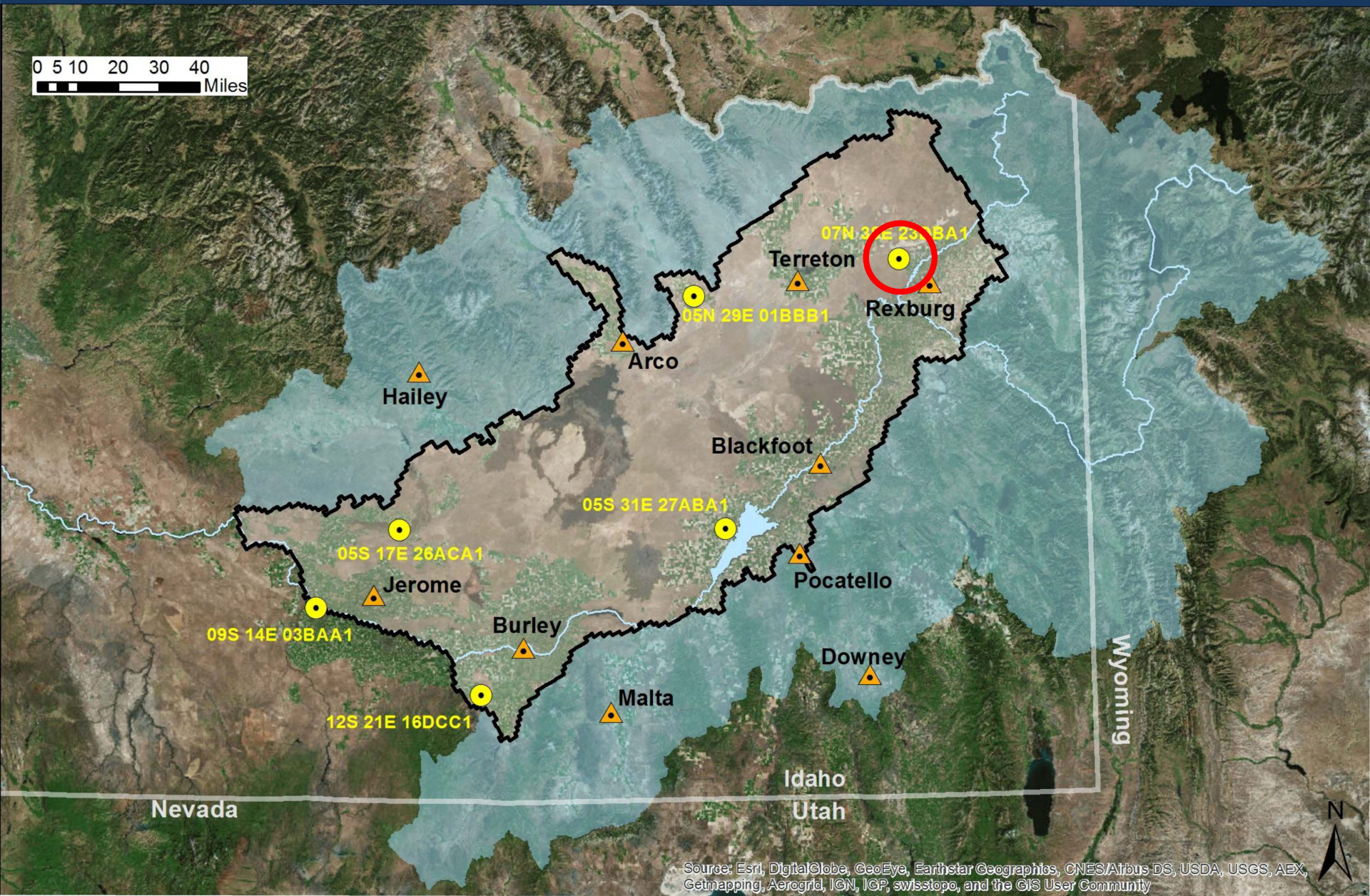

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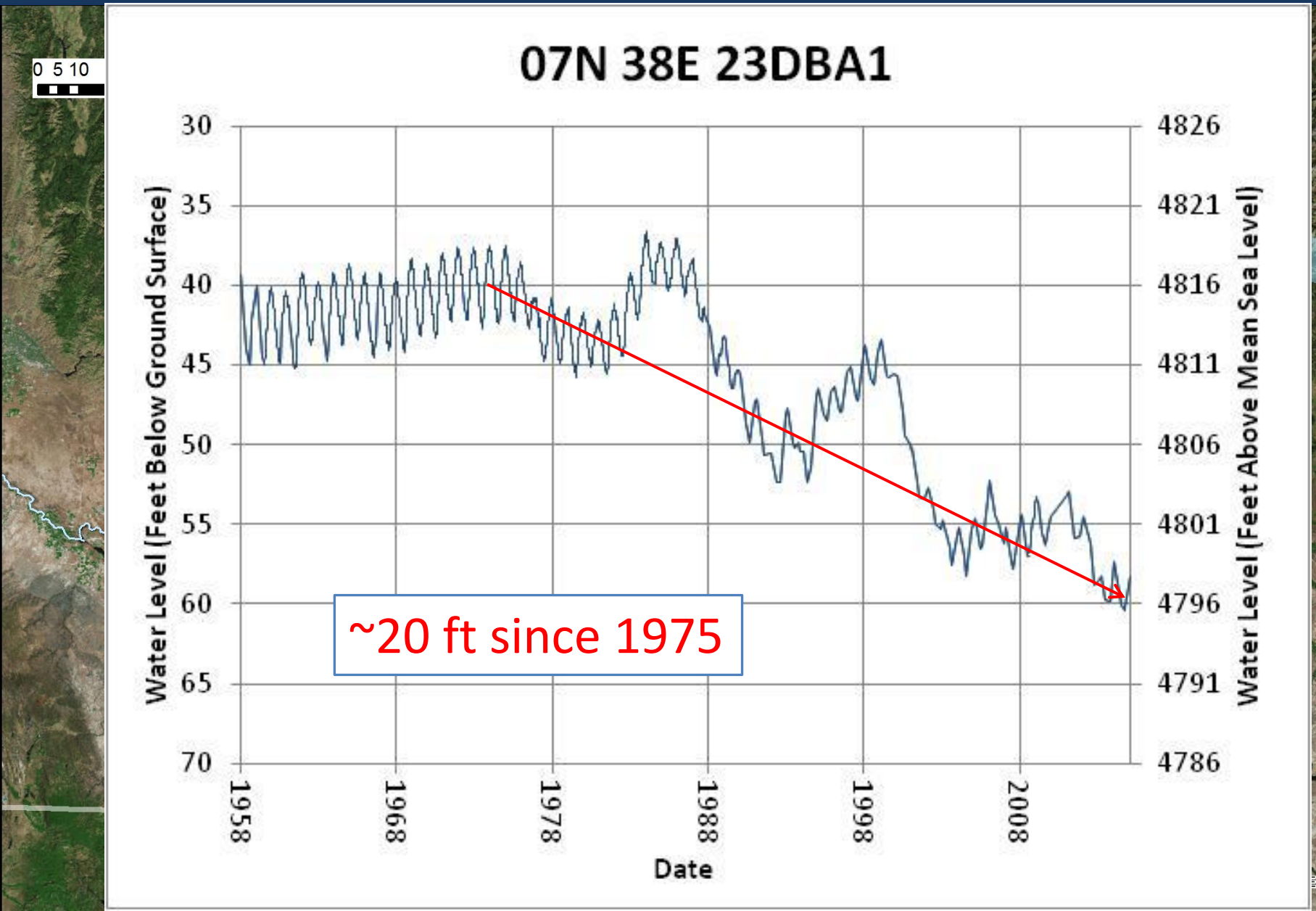

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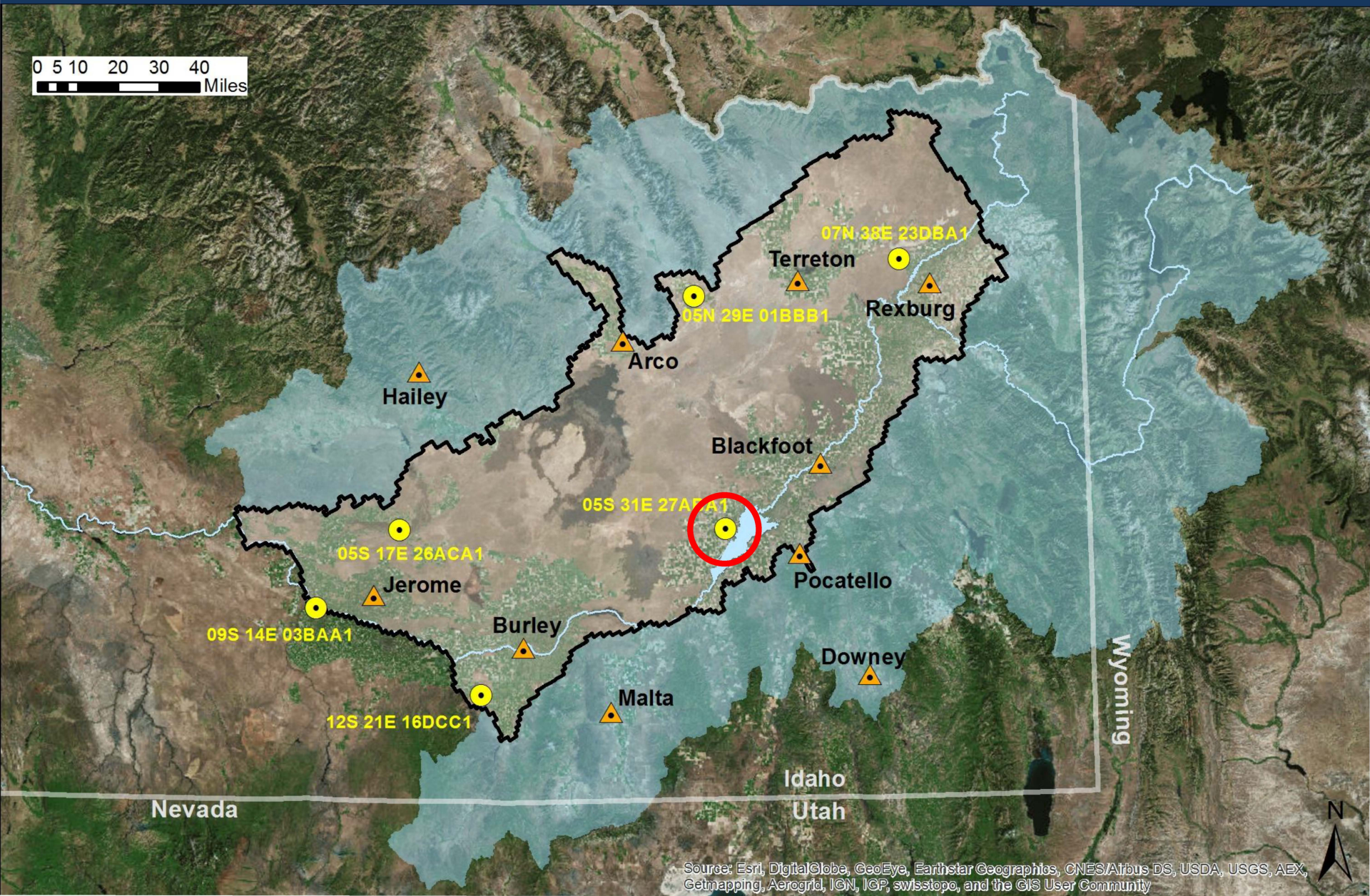

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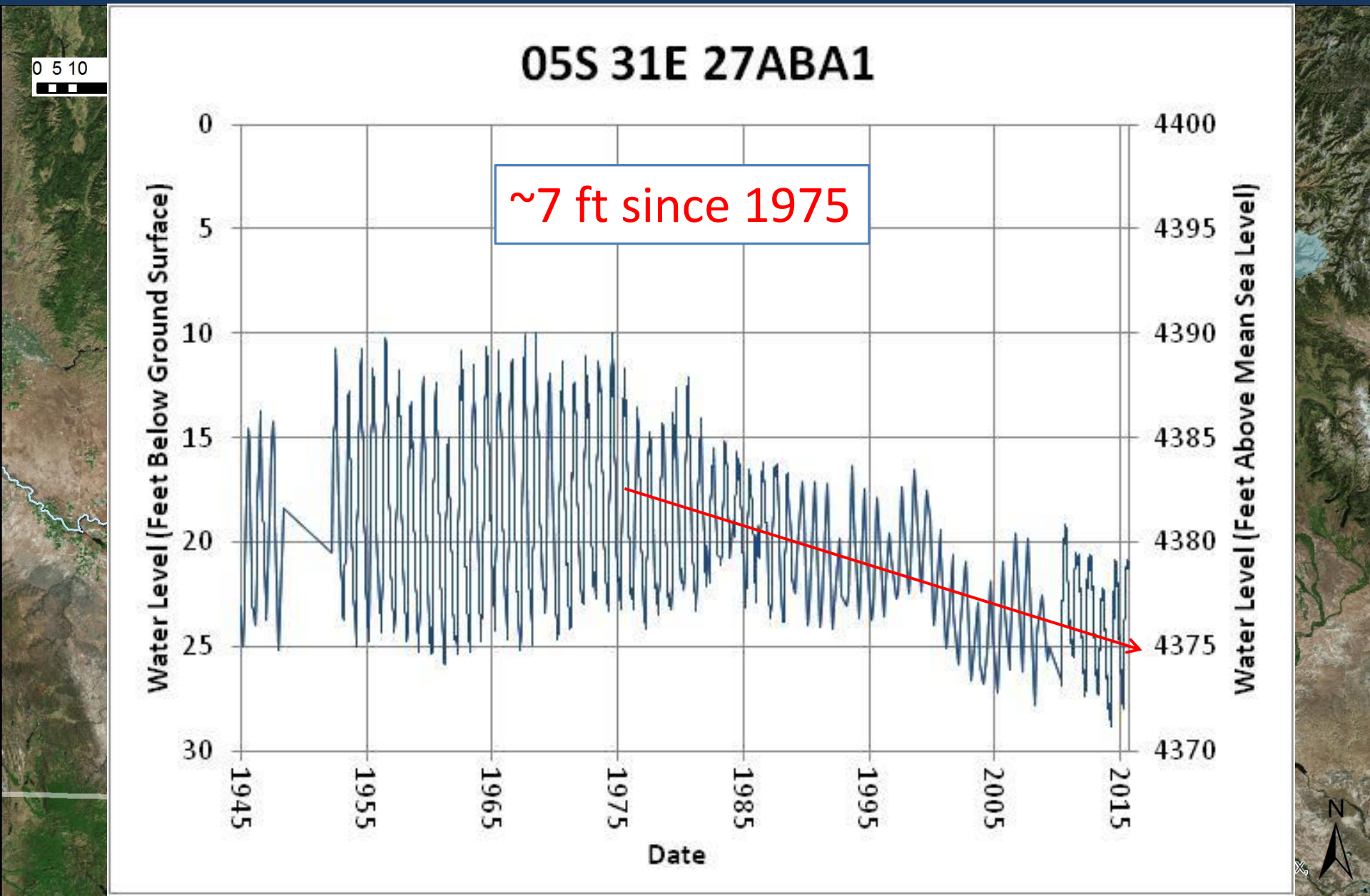

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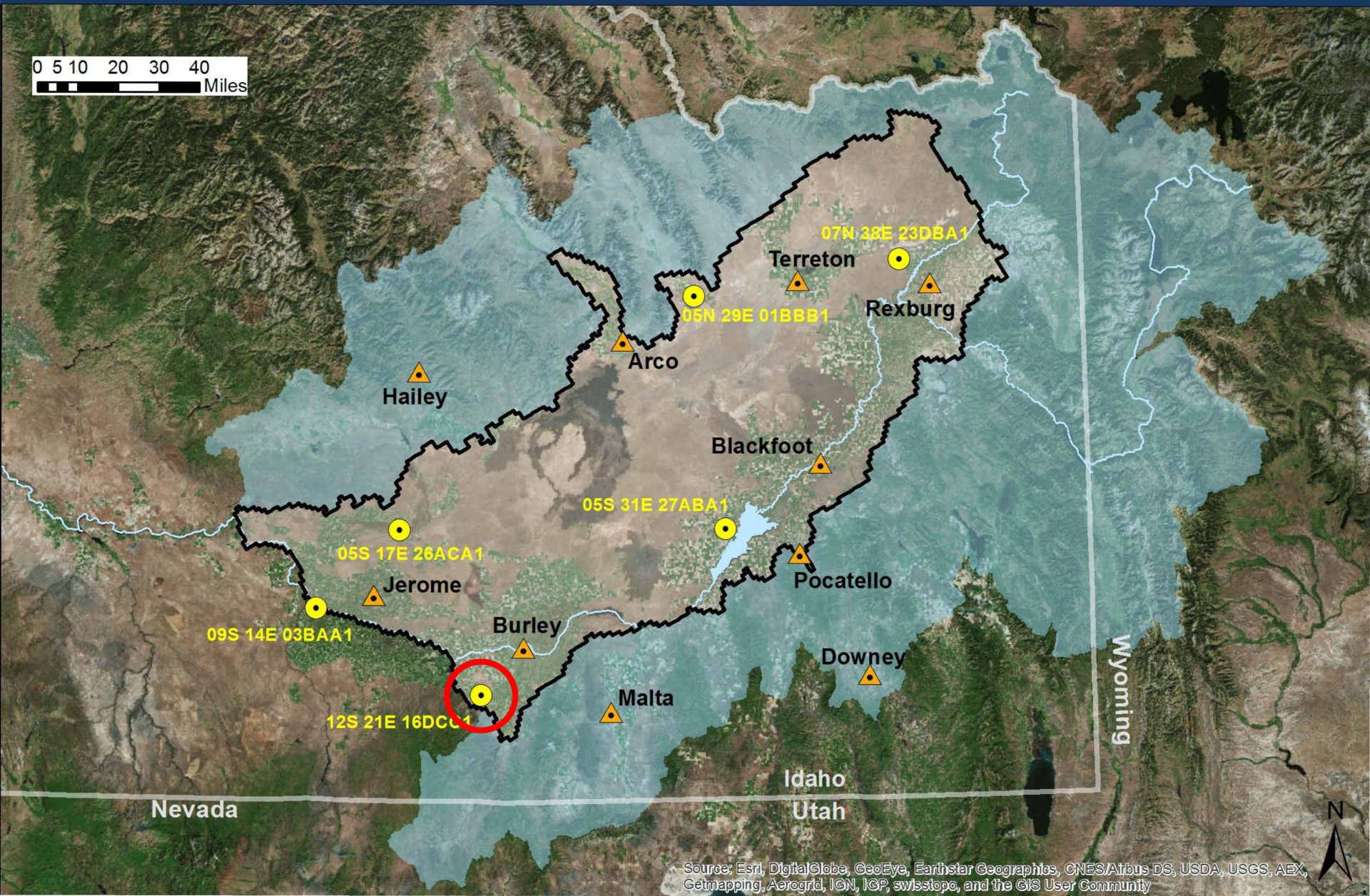

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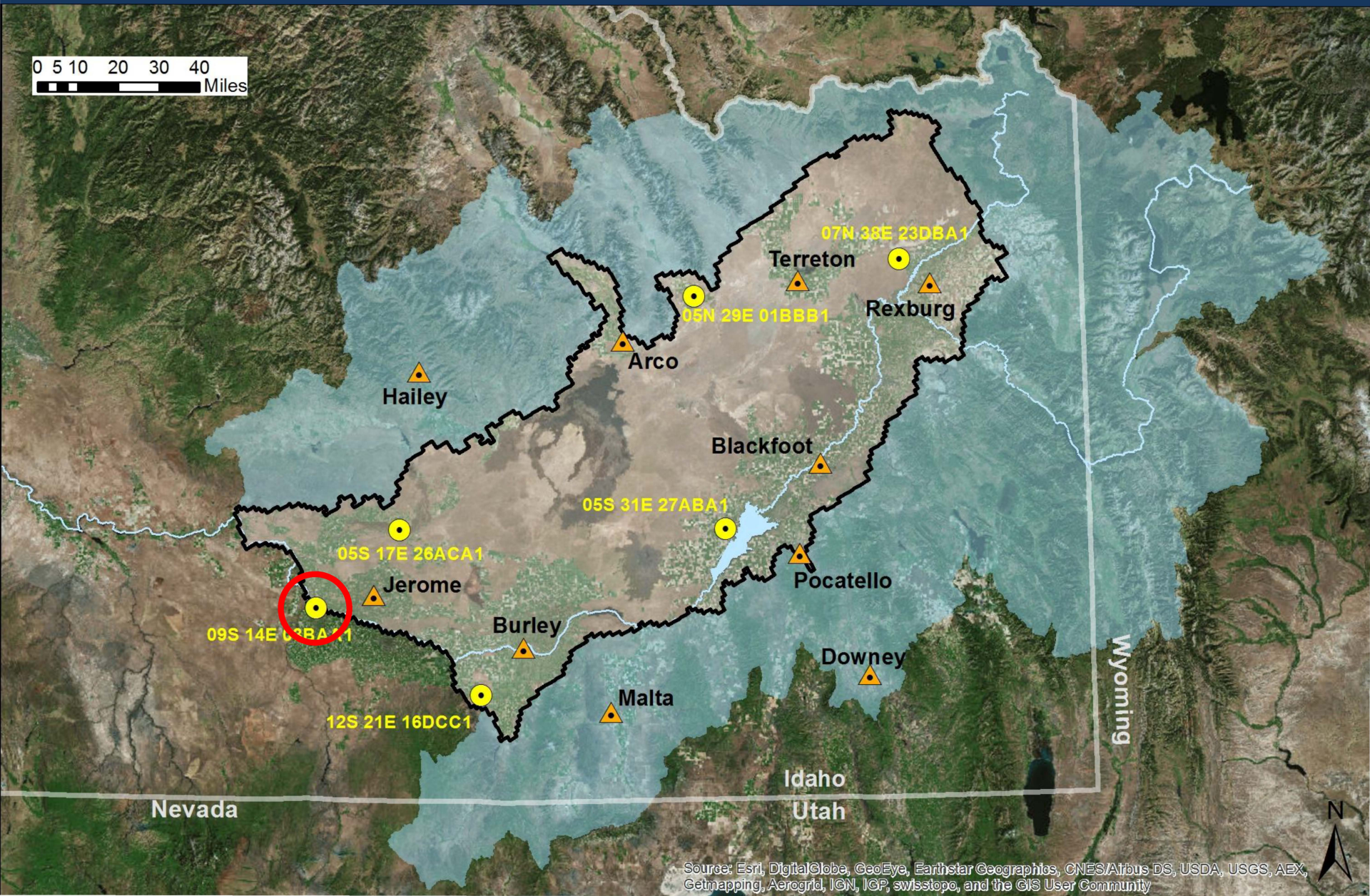

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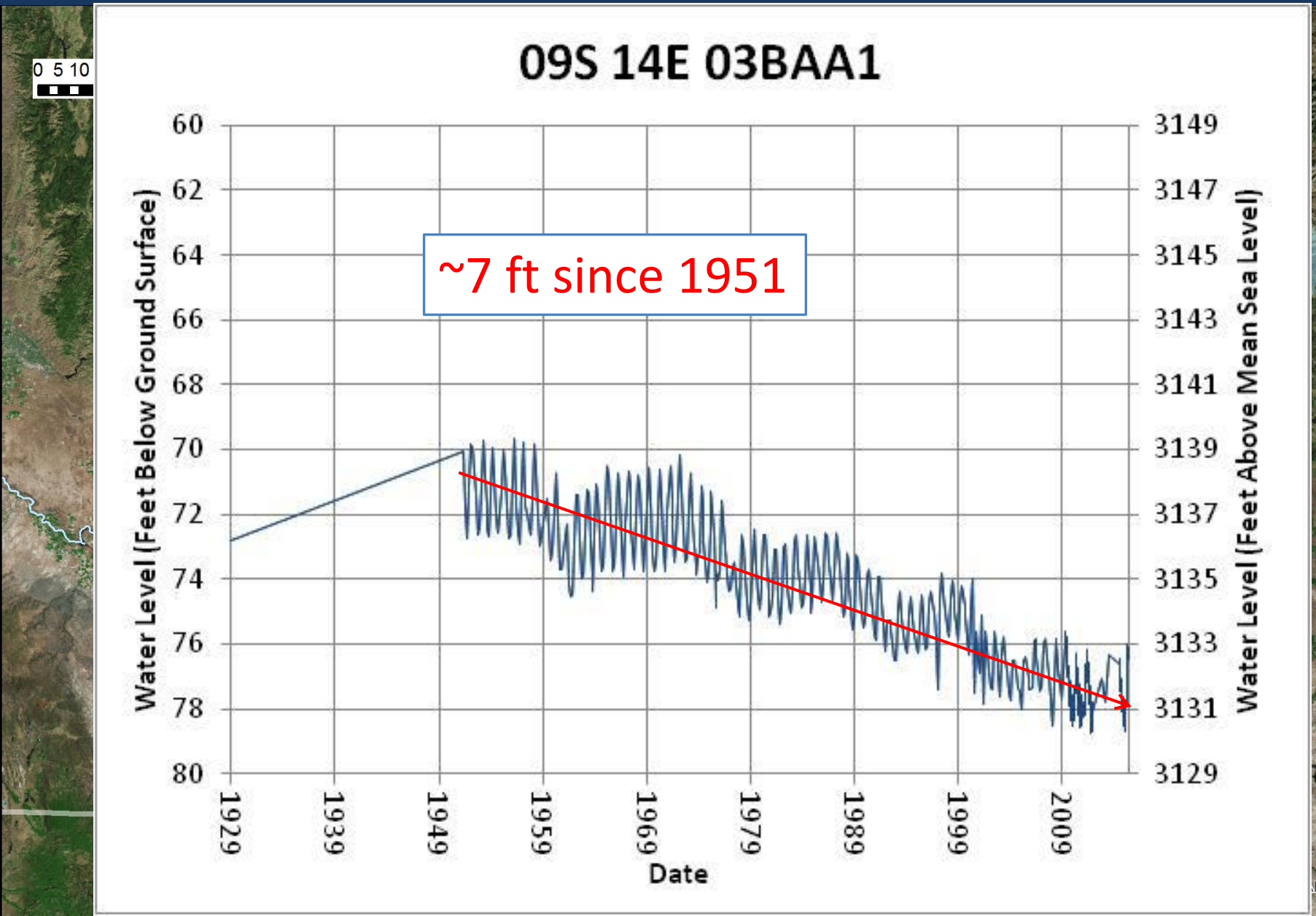
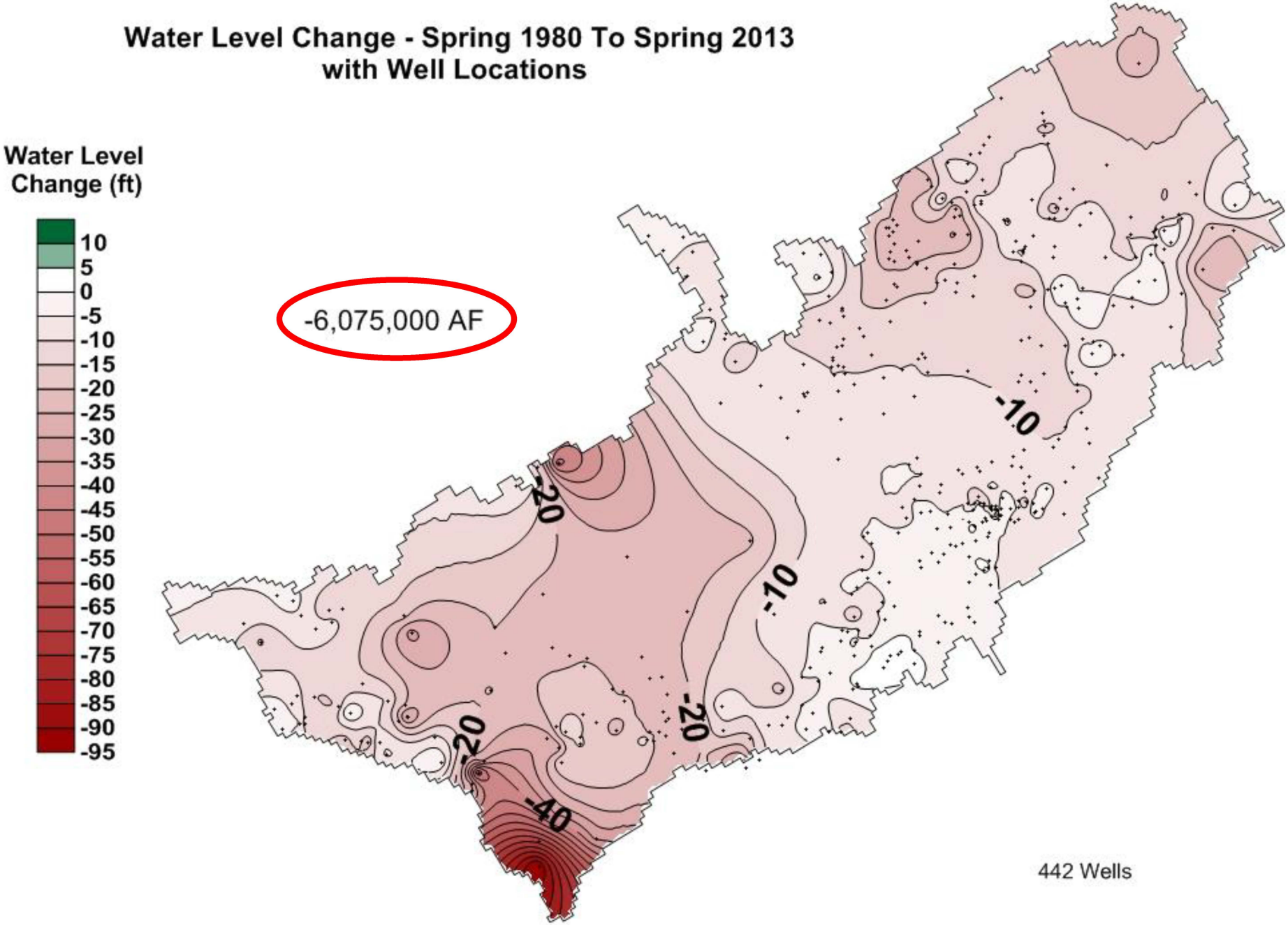
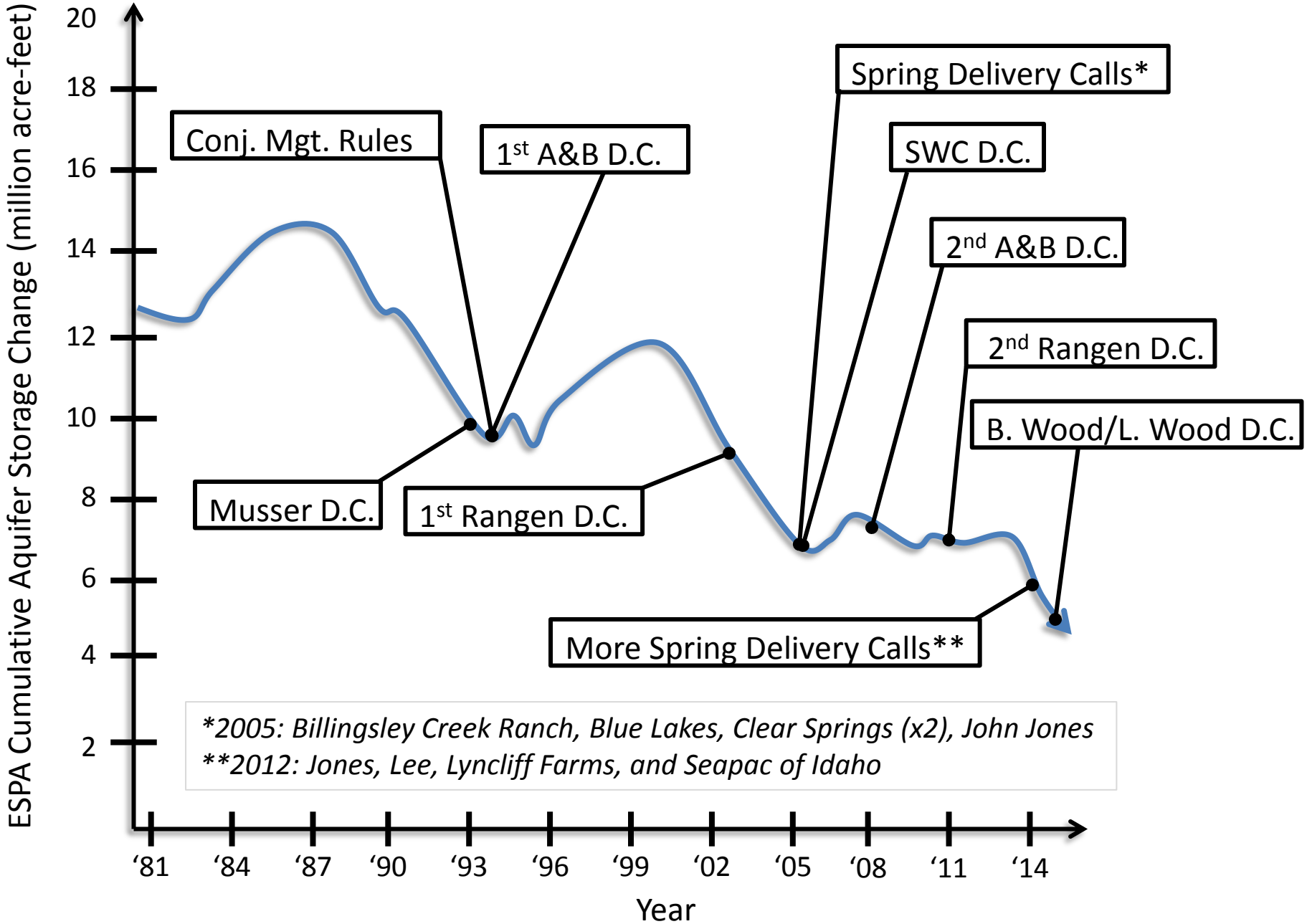



Water Level Change - Spring 1980 To Spring 2013
with Well Locations
Water Level Change (ft)
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
-55
-60
-65
-70
-75
-80
-85
-90
-95
-6,075,000 AF
-10
-20
-10
-20
-20
-40
442 Wells

Why are aquifer trends since the 1950s downward?

- Declining water levels and aquifer discharge are attributed to three primary factors:
  1. The onset of significant groundwater irrigation.
  2. More efficient surface water irrigation practices.
  3. Periods of drought.

What has been the impact of downward trends?



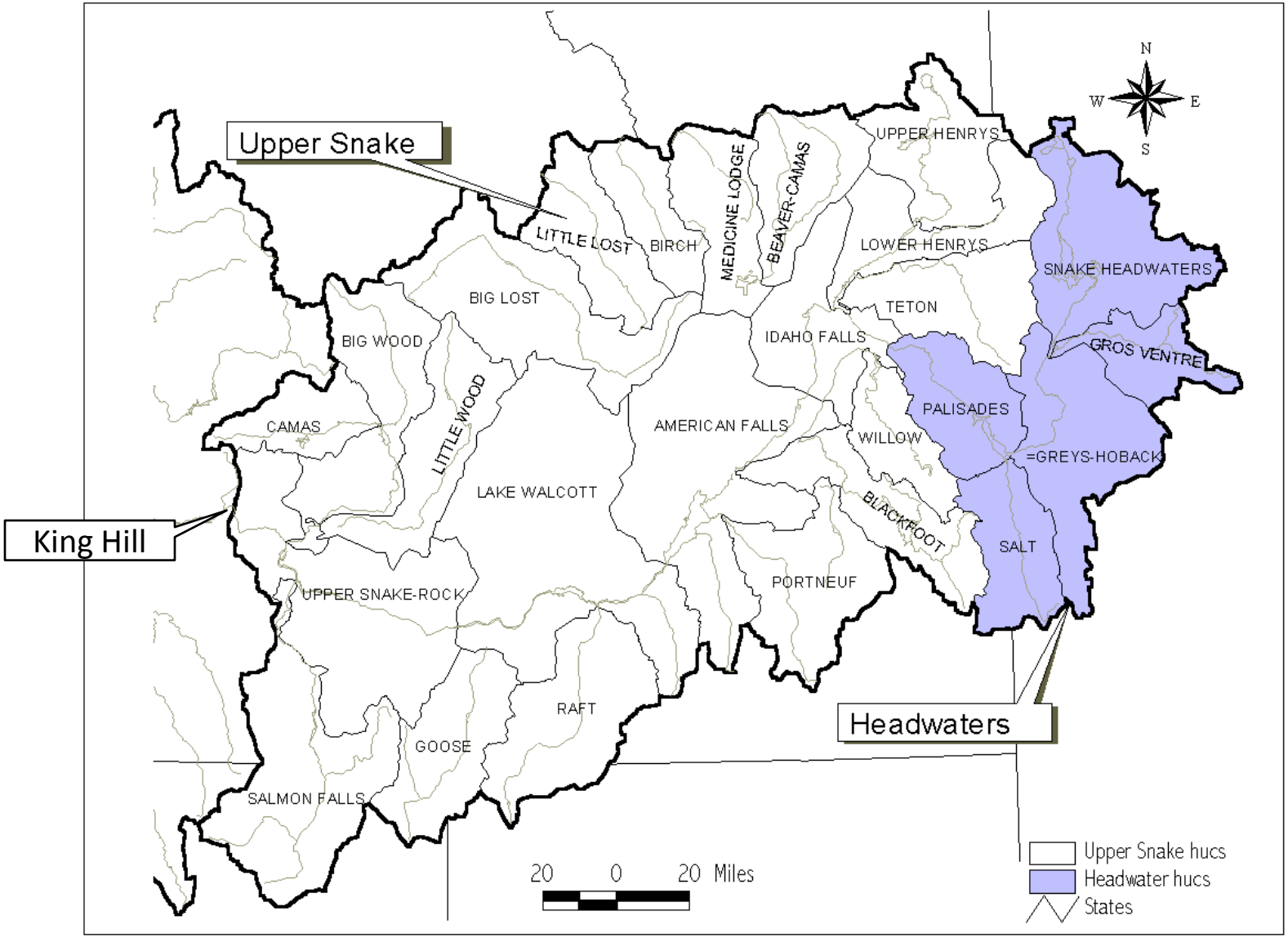
What is a tributary basin?

"…*a basin tributary to the Snake River represents a geographical area with a stream or other body of water, surface or underground, that* <u>*contributes water*</u> *to the Snake River, even in small or intermittent quantities*." (emphasis added, Lovell and Johnson, 1999, p. 21)

How do we know tributary basin boundaries?

- We know the surface water basin boundaries because the U.S. Geological Survey mapped drainage basins across the United States in the 1970s and 1980s.

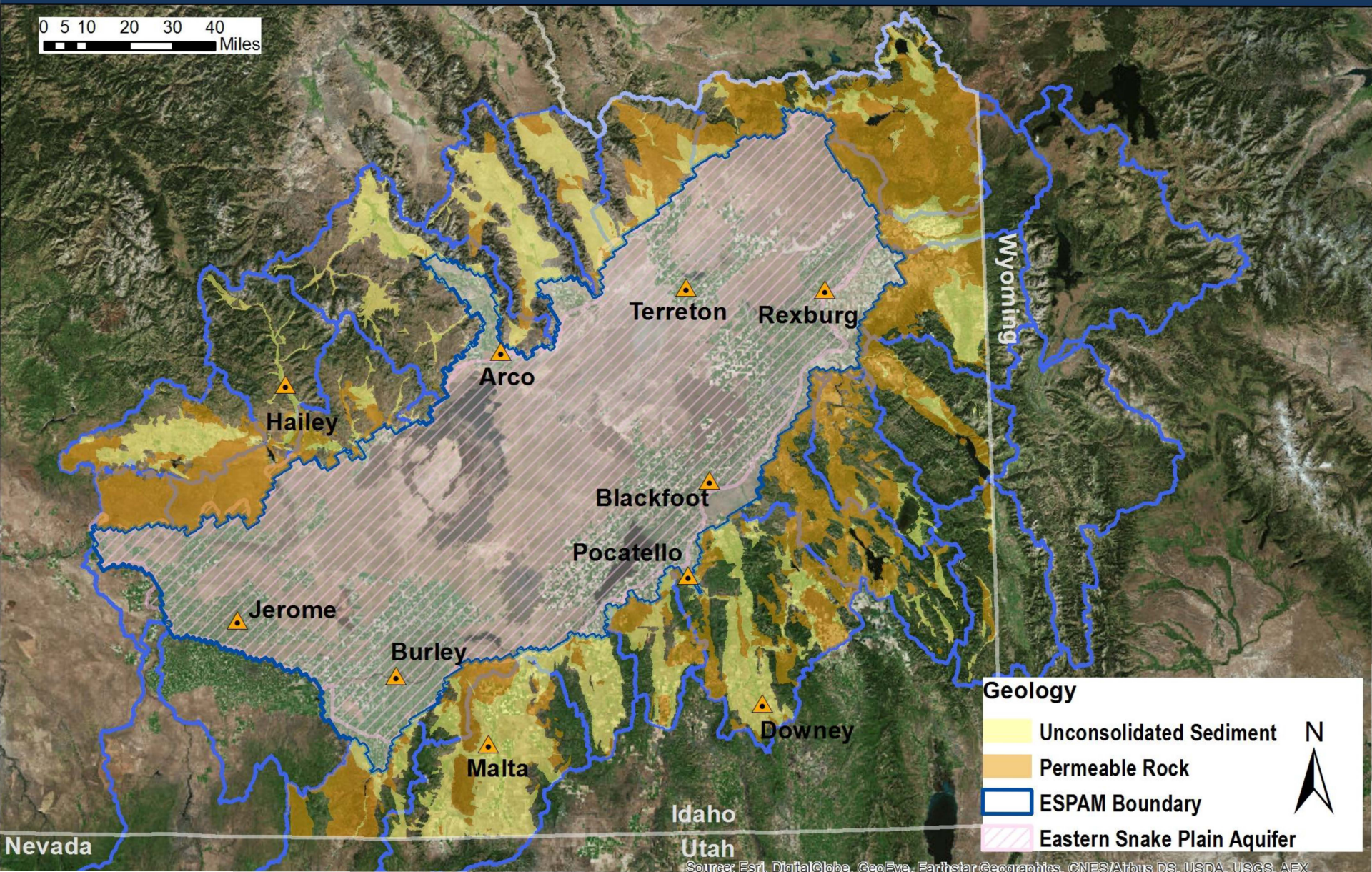
Upper Snake River Basin (Lovell and Johnson, 1999)



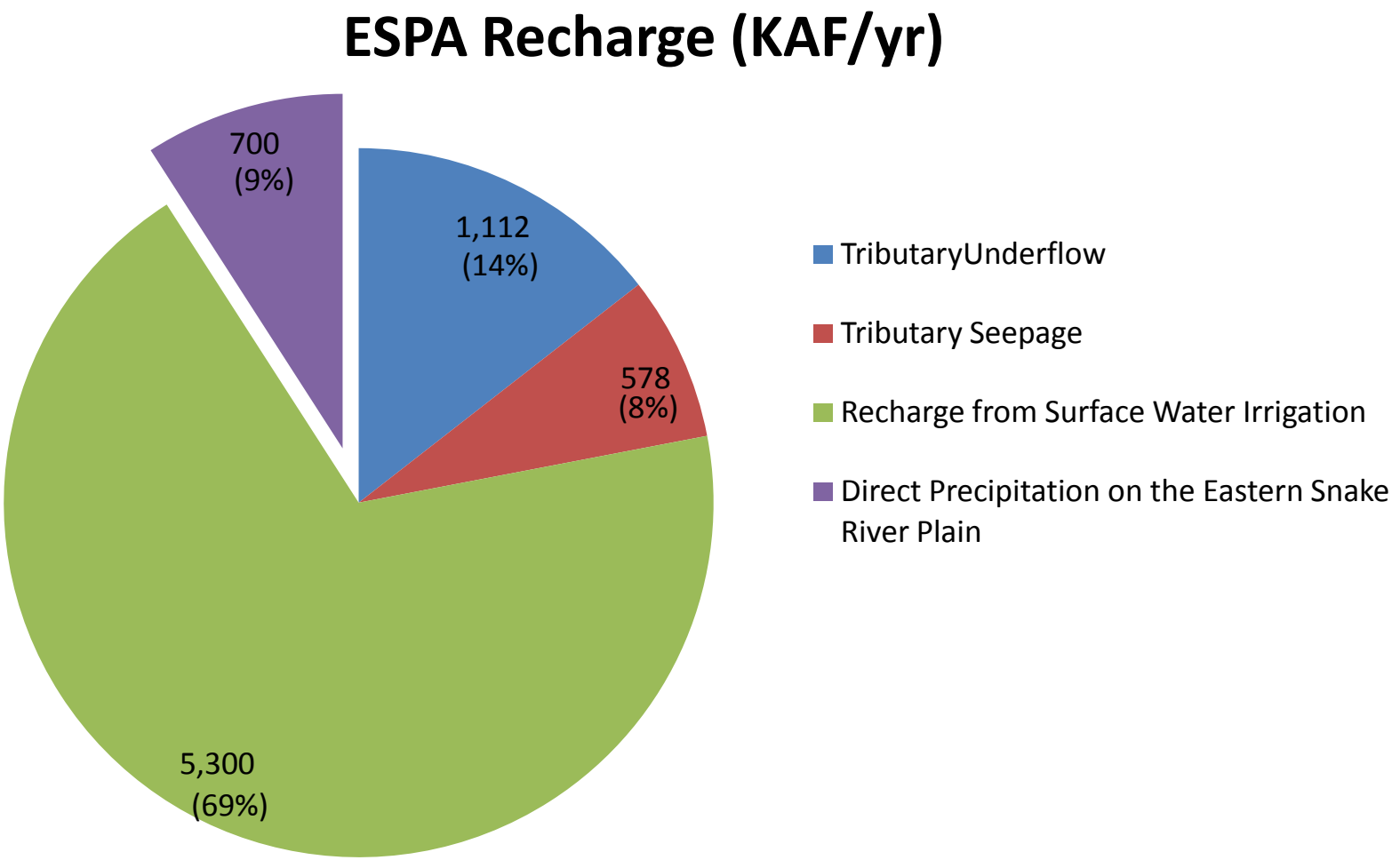
How do we know tributary basin boundaries? (cont'd)

- We know the groundwater basin boundaries because surface and groundwater basin boundaries generally coincide in the upper Snake River Basin.

Tributary basin geology (adapted from Lewis & Others, 2012)



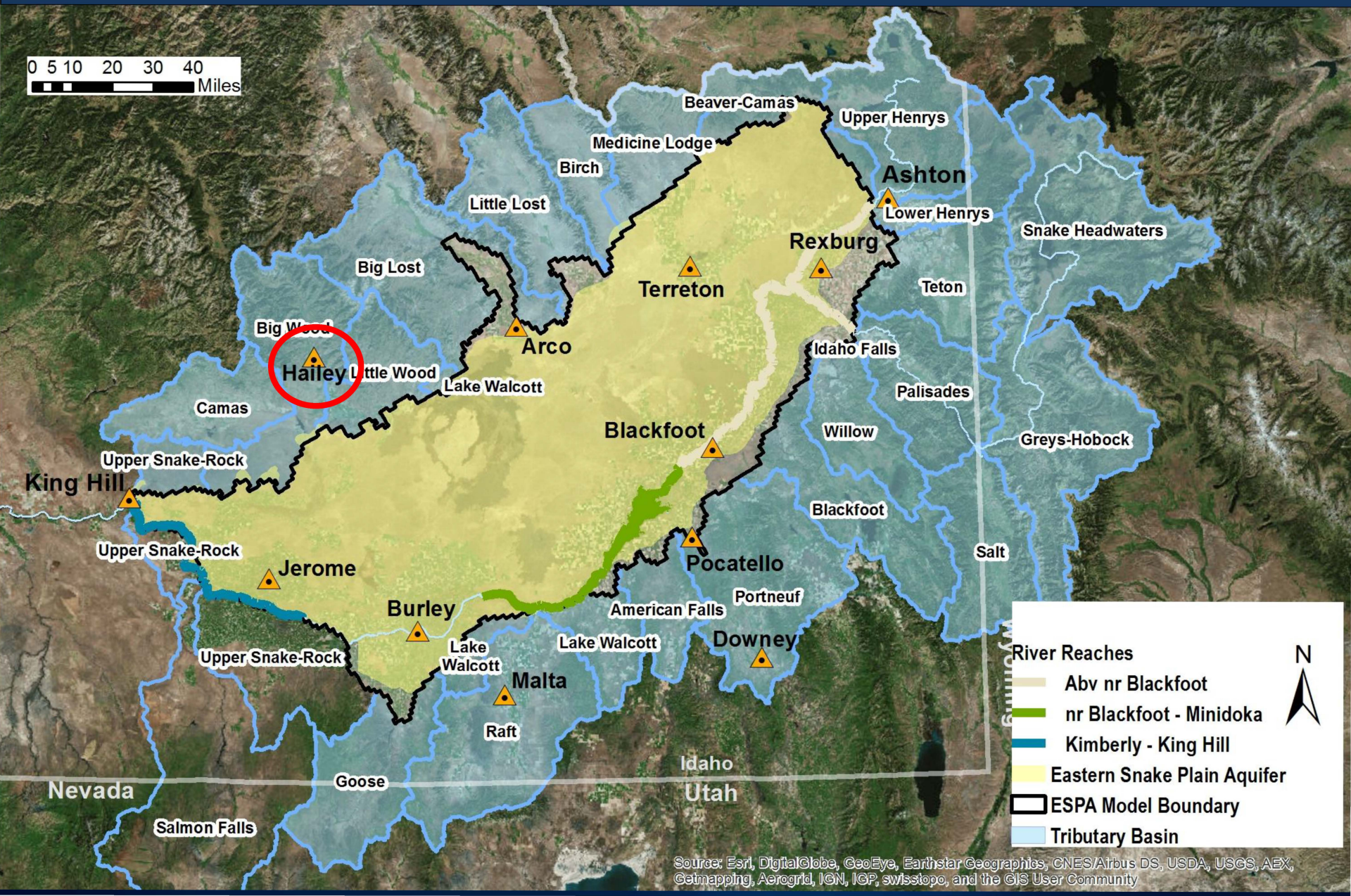
How much ESPA water comes from tributary basins? (from IDWR, 2013)



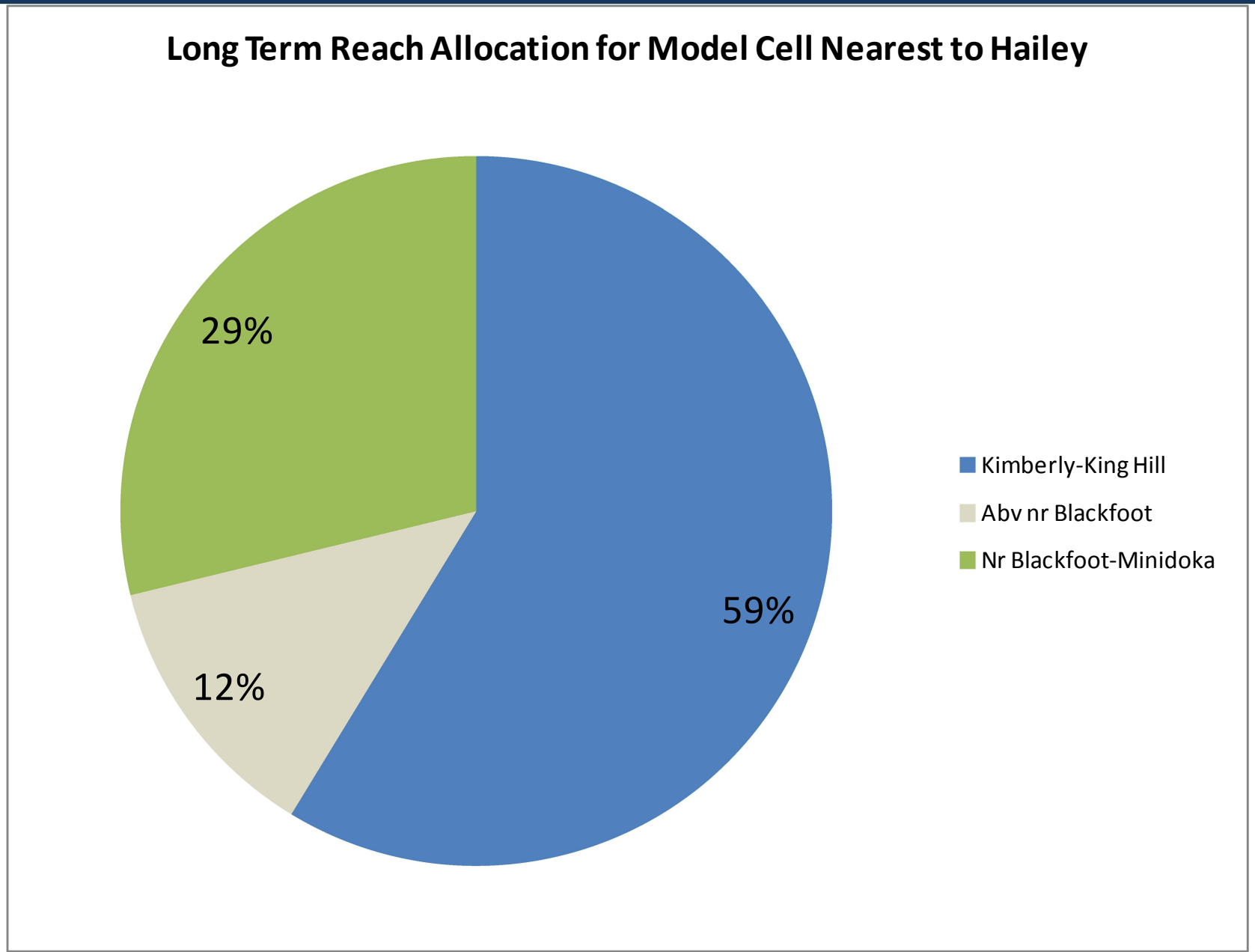
What are the hydrologic impacts of consumptive groundwater use in tributary basins?

"*Every acre-foot of water consumptively used in basins tributary to the Snake River ultimately reduces the flow of the Snake River*" (Ralston and others, 1984, p. 10)

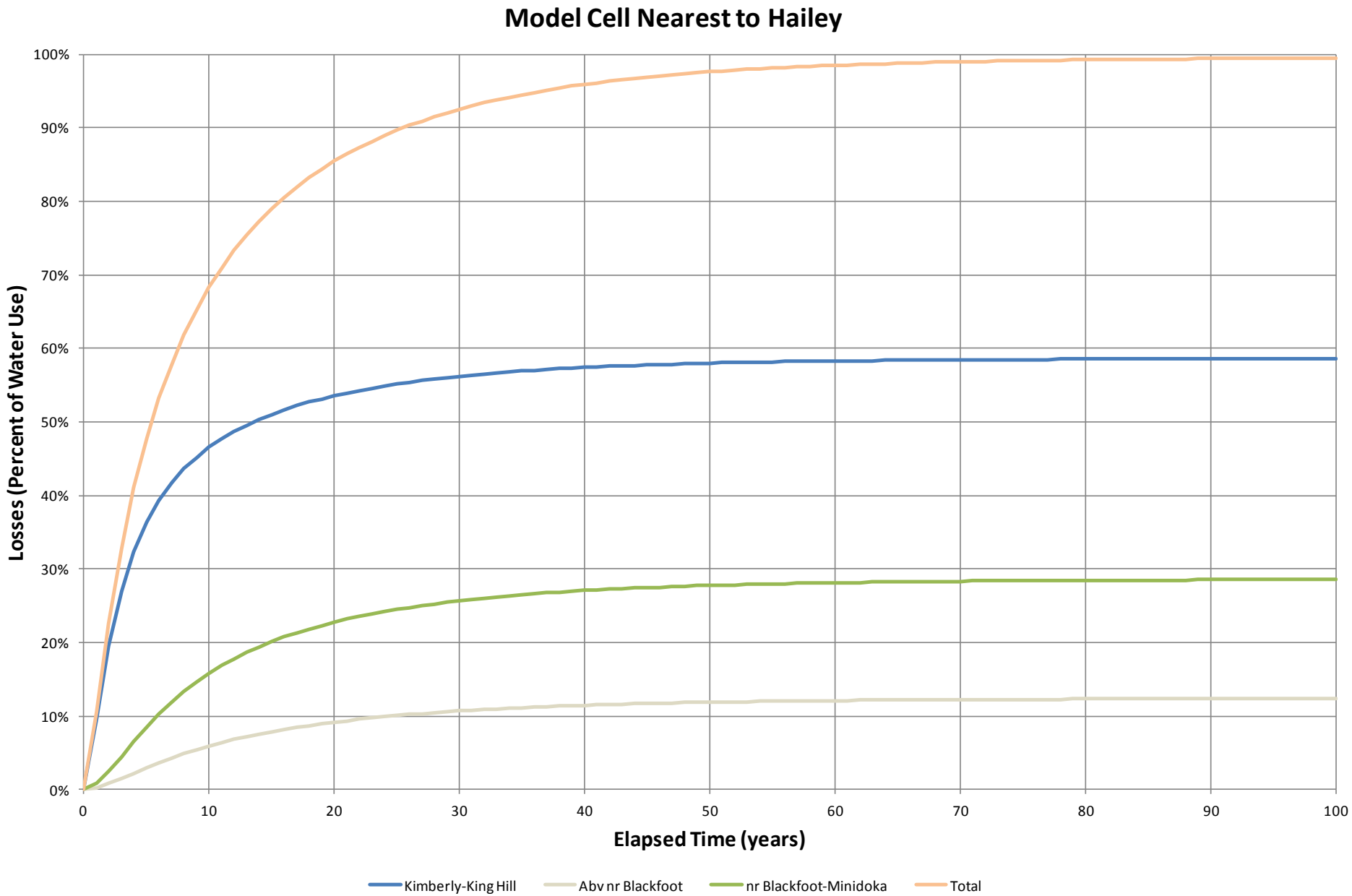
What are the hydrologic impacts of consumptive groundwater pumping in this area? → magnitude, location, timing



What are the hydrologic impacts? → magnitude and location



What are the hydrologic impacts? → timing

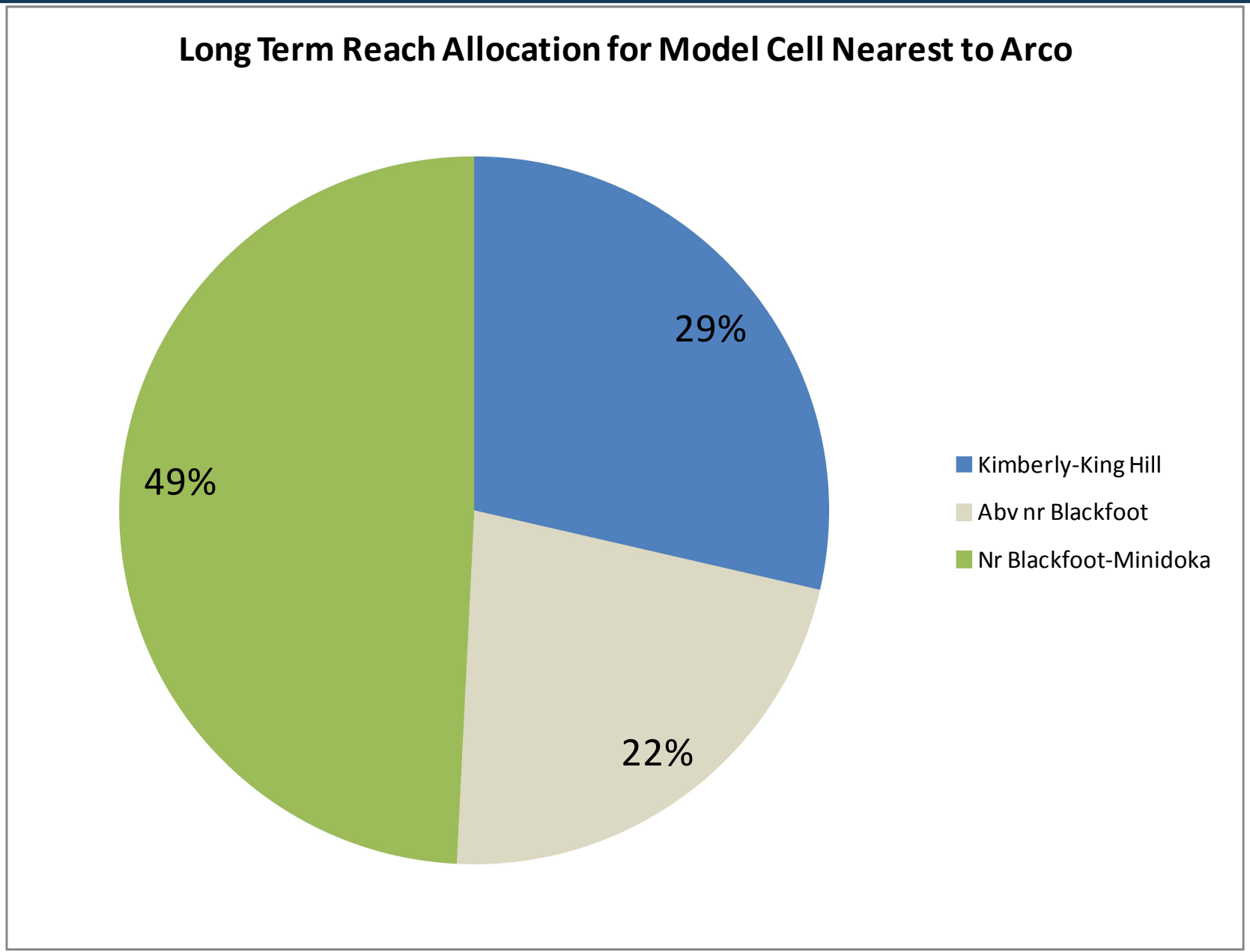


Summary

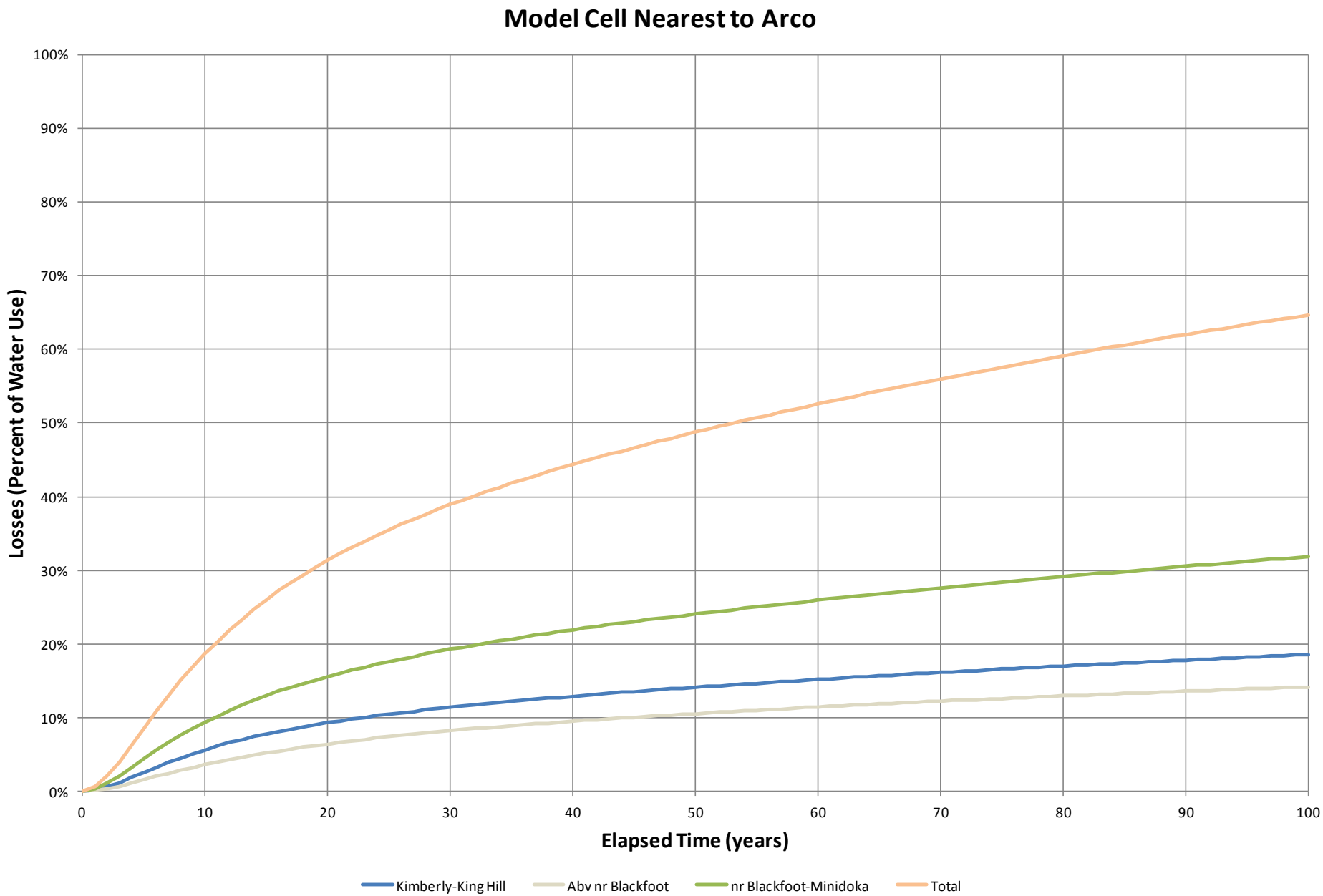
- The vast majority of the water in the ESPA comes from tributary basins.
- Consumptive groundwater use in a tributary basin either reduces flow in the tributary stream or underflow to the ESPA.
- ESPA water levels and discharge have been trending downward since the 1950s.
- Starting in 1993, water delivery calls have been filed by senior ESRP water users alleging insufficient water supplies.

Questions?

What are the hydrologic impacts? → magnitude and location



What are the hydrologic impacts? → timing



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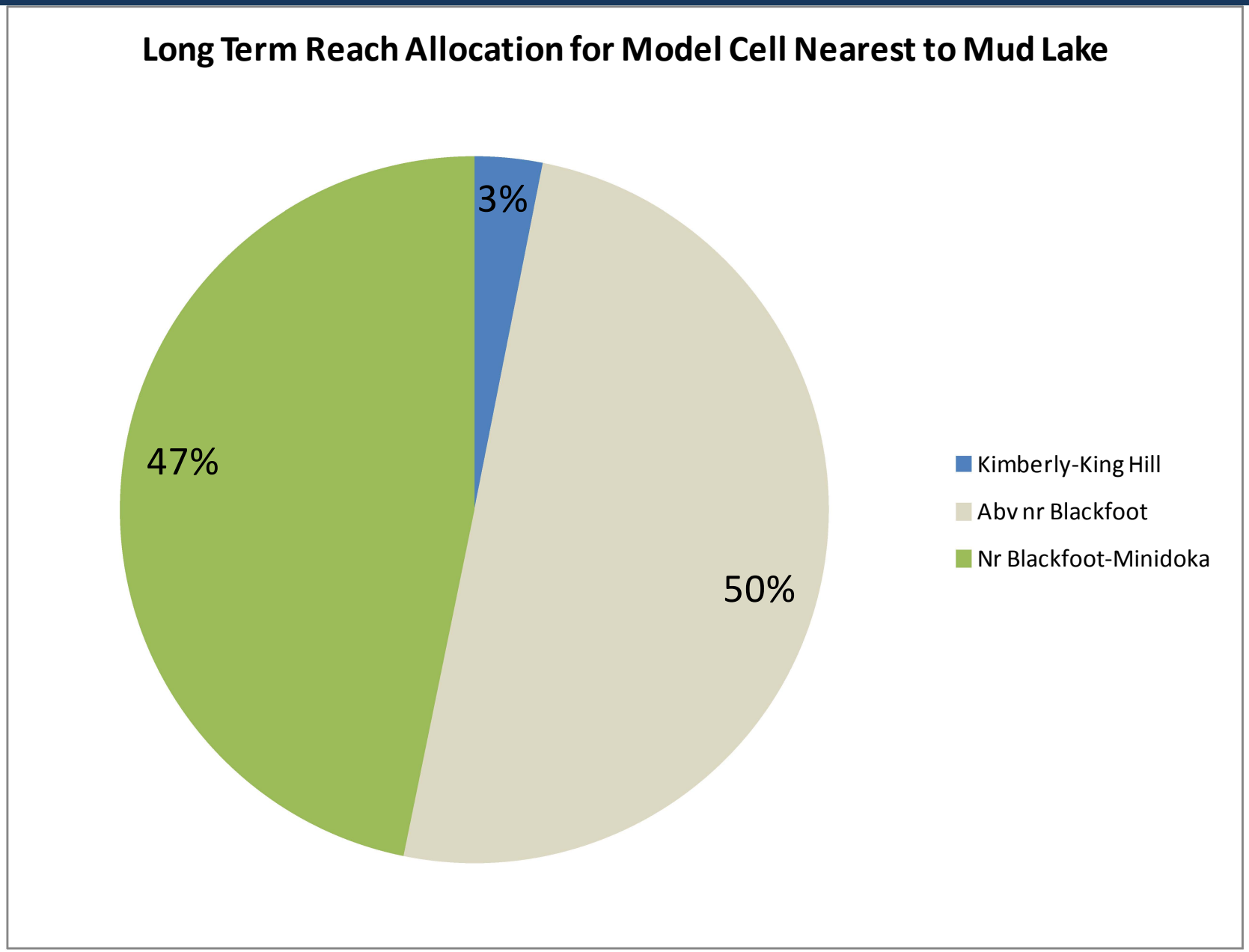

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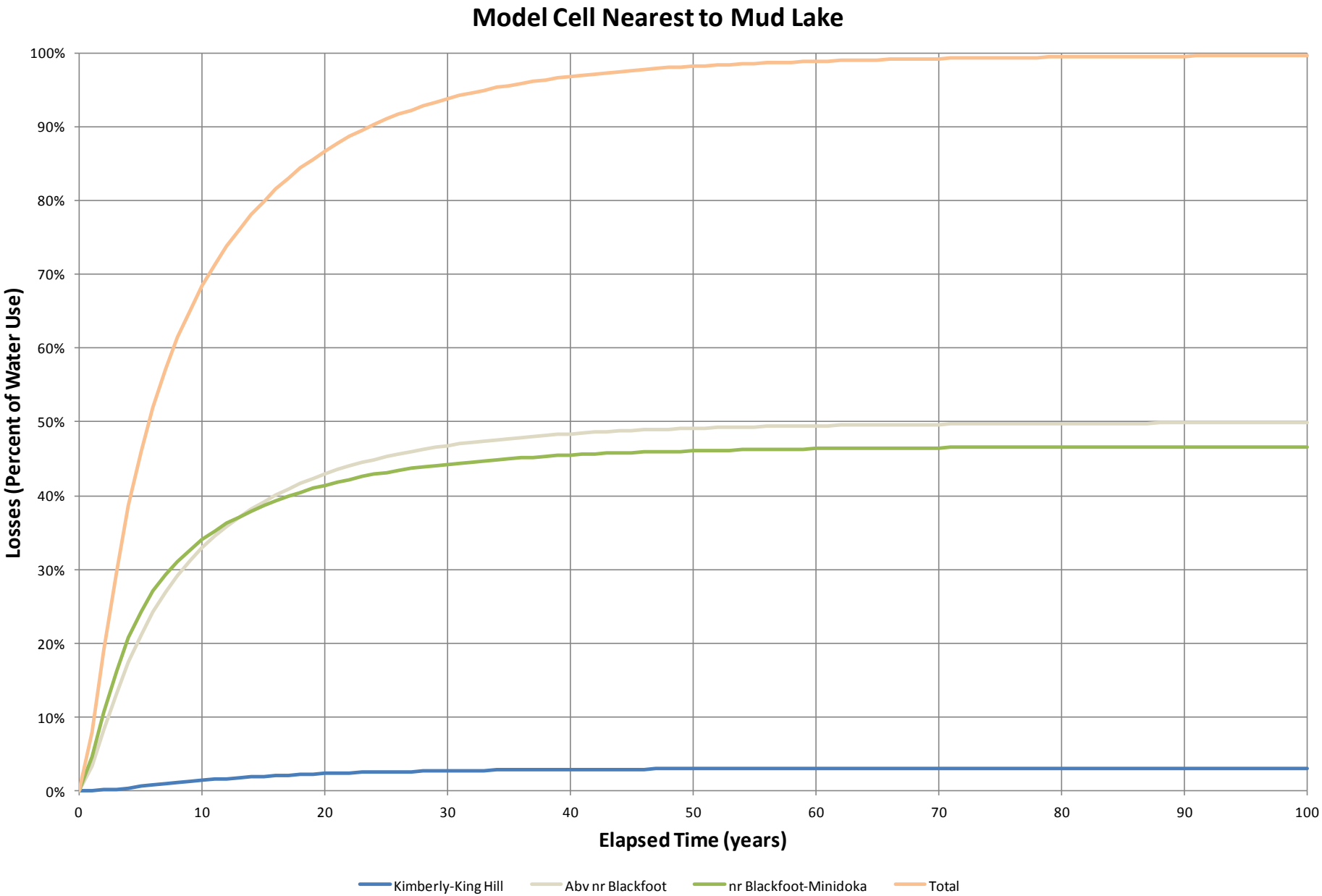

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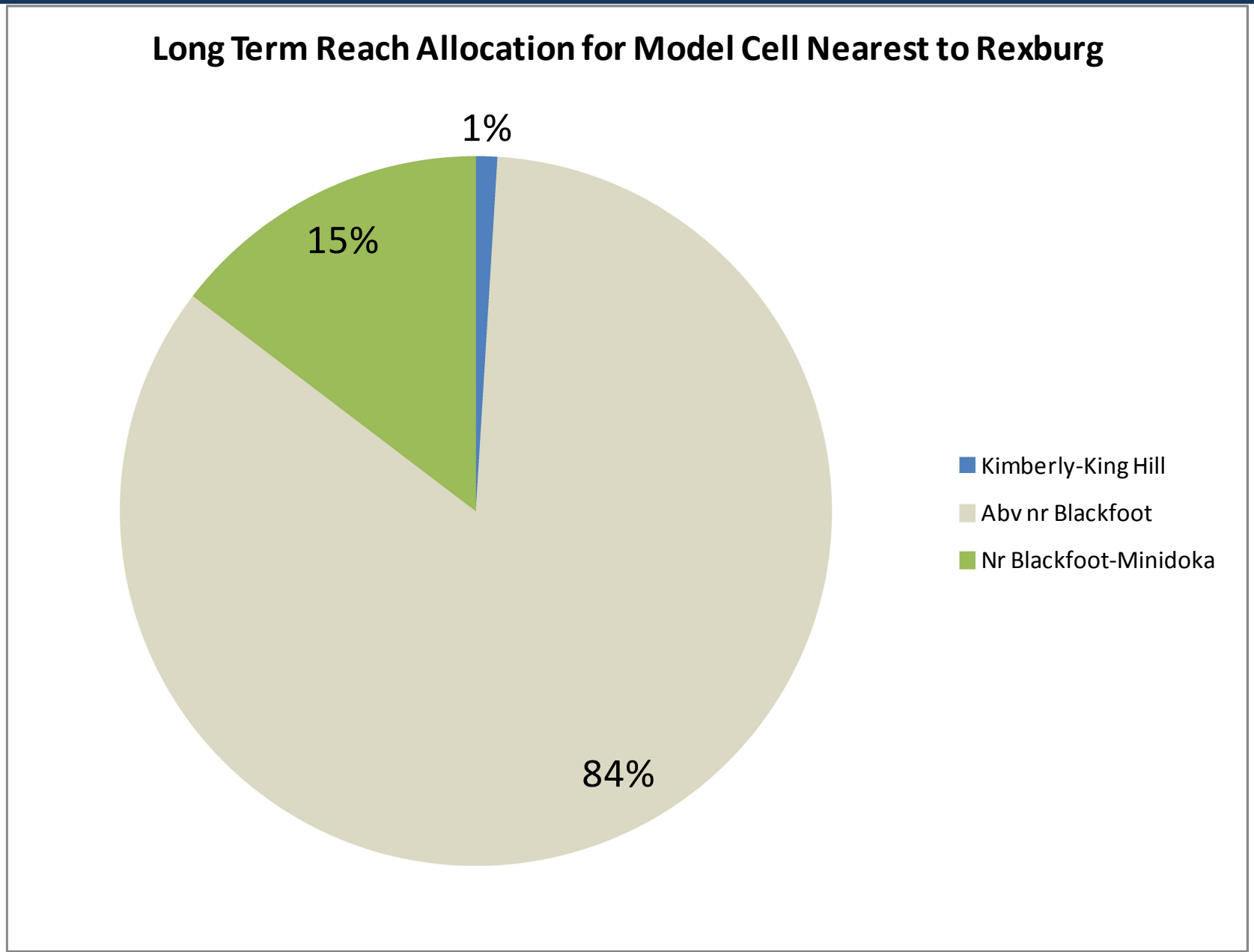

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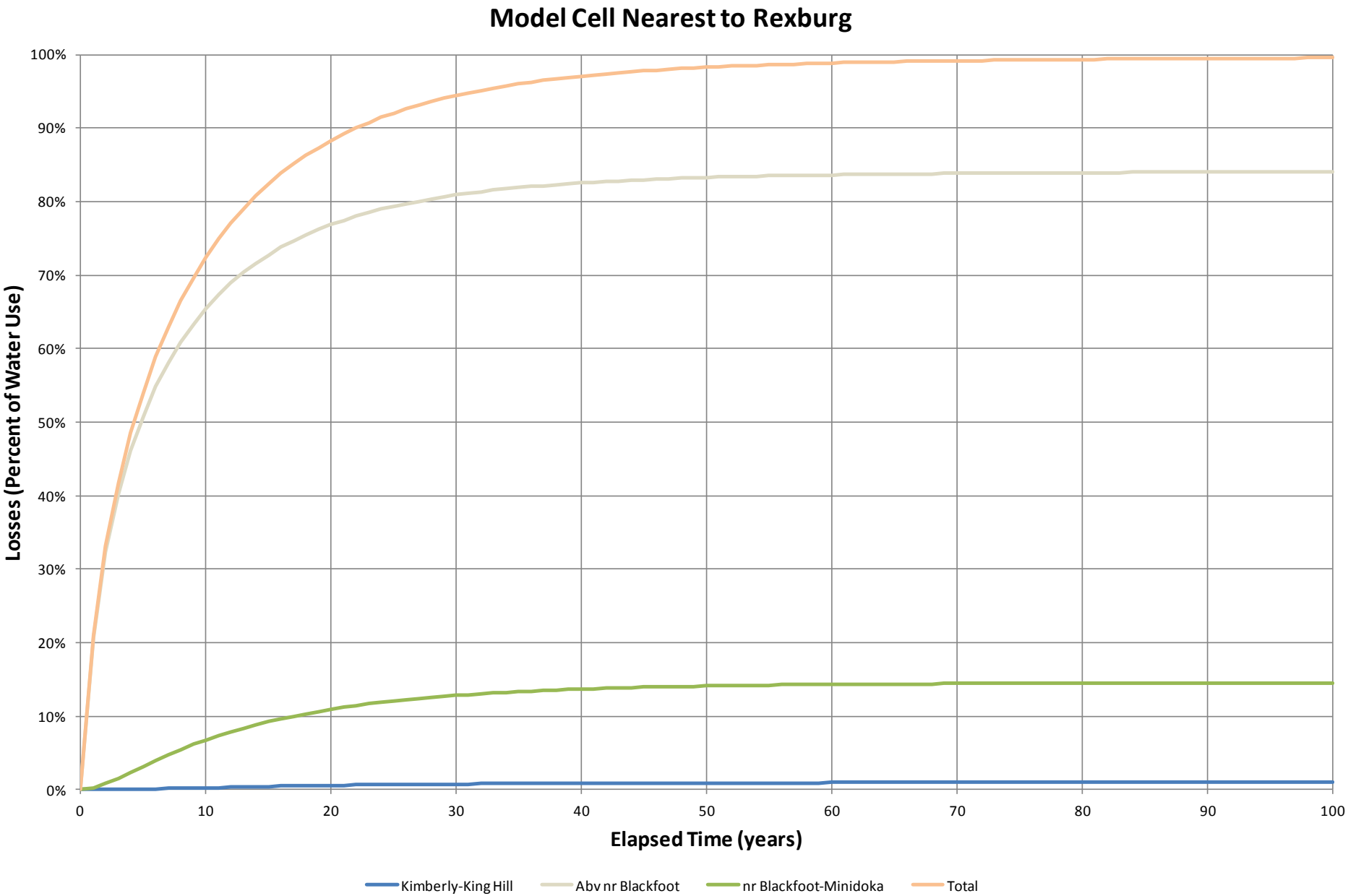

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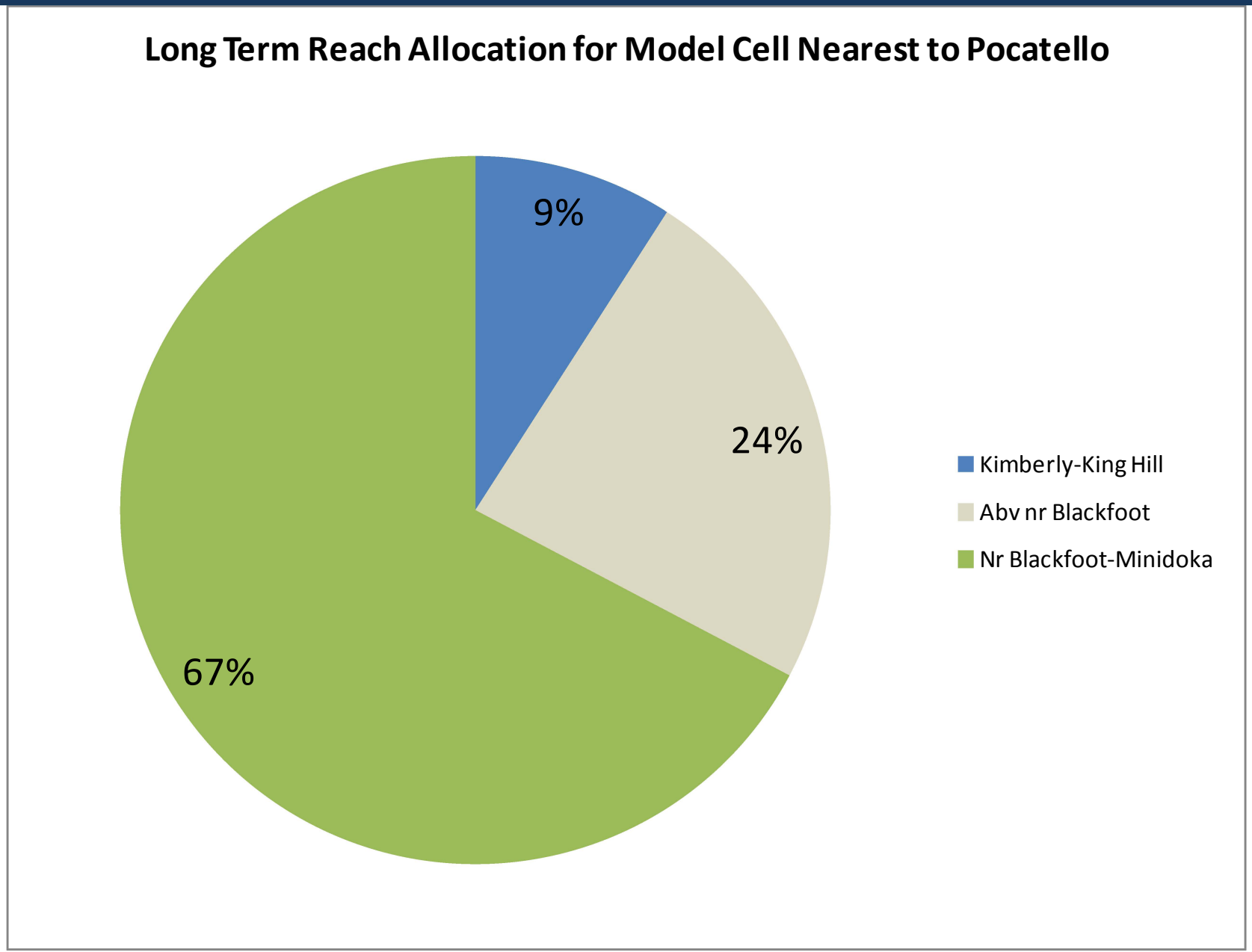

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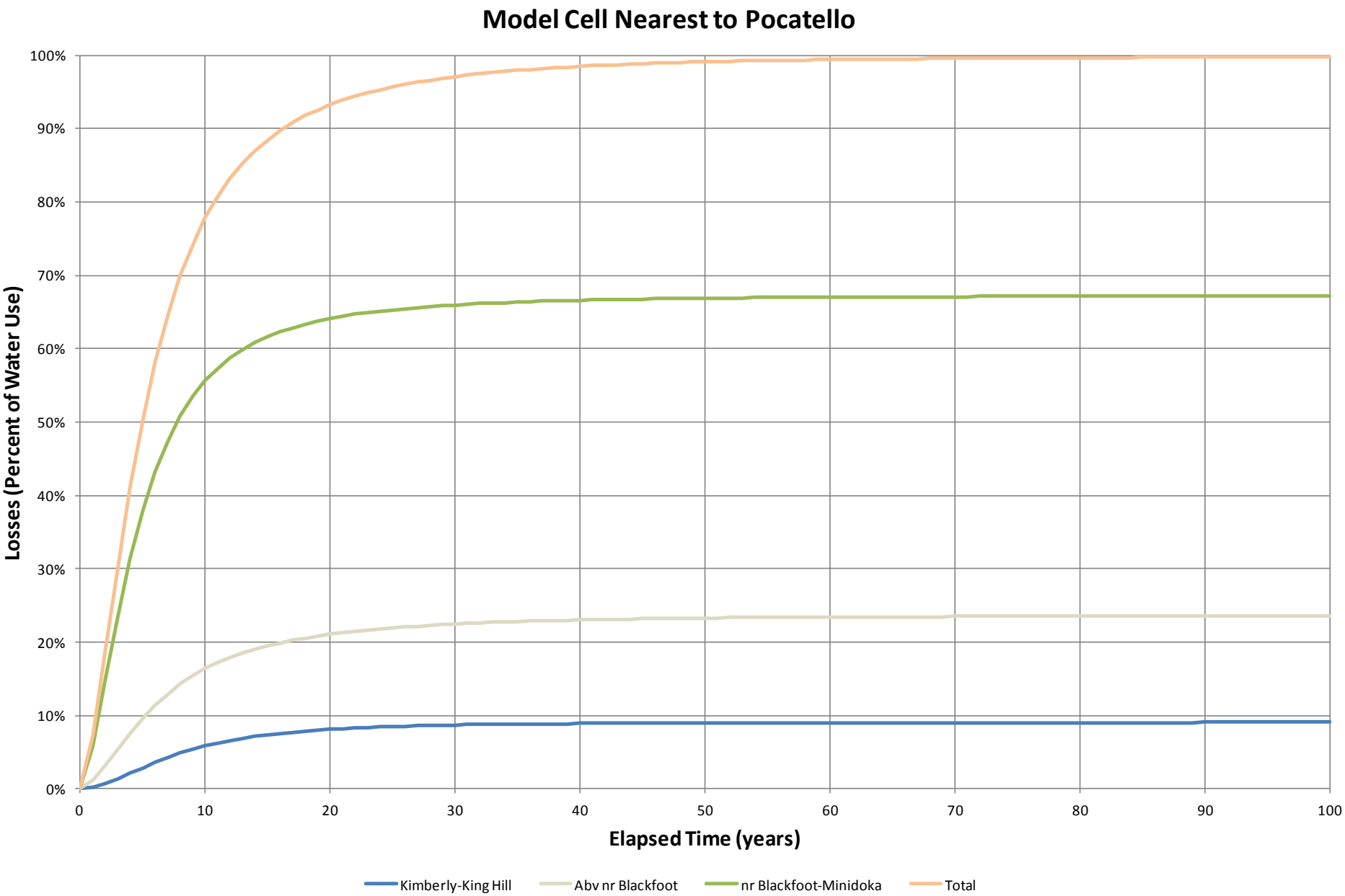

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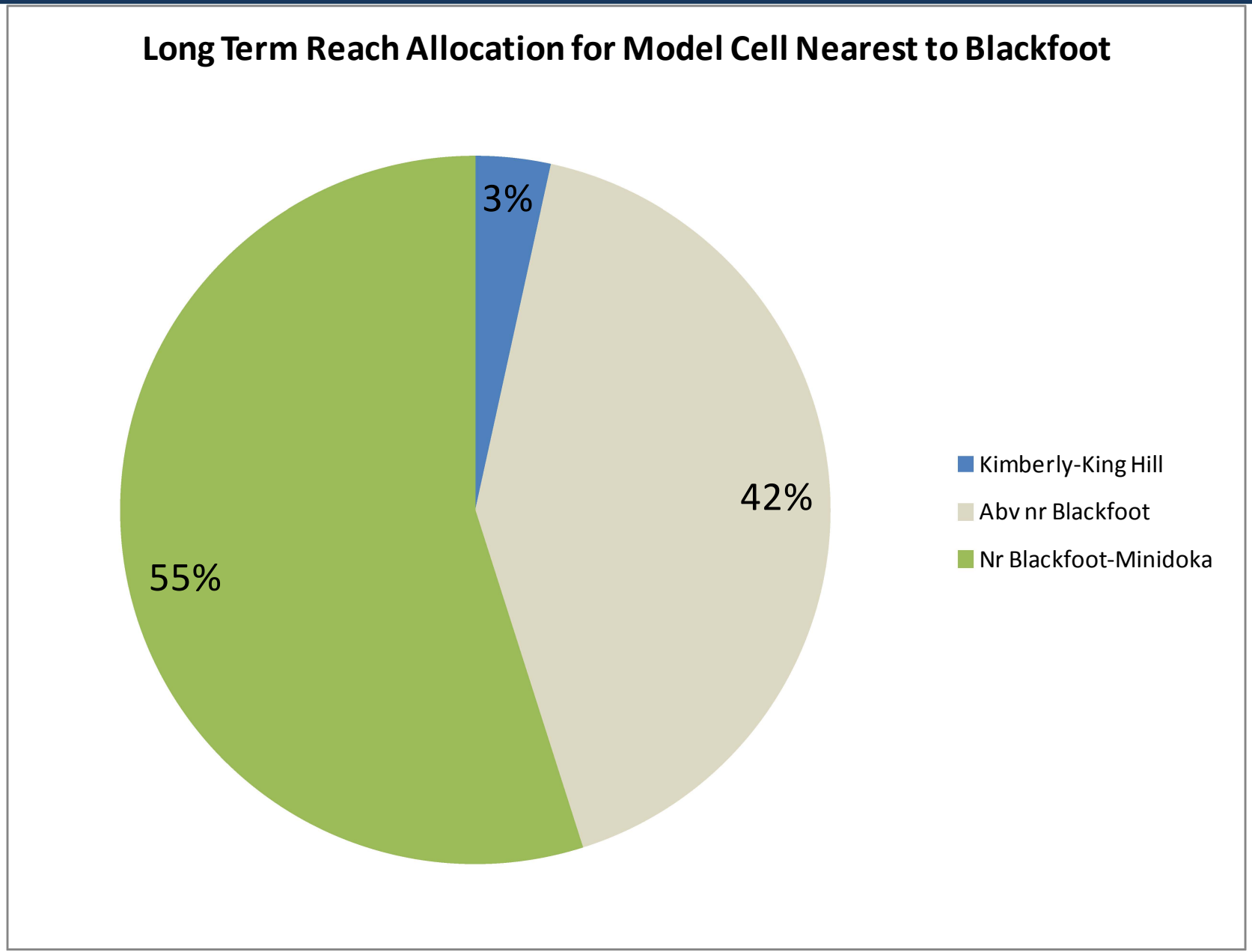

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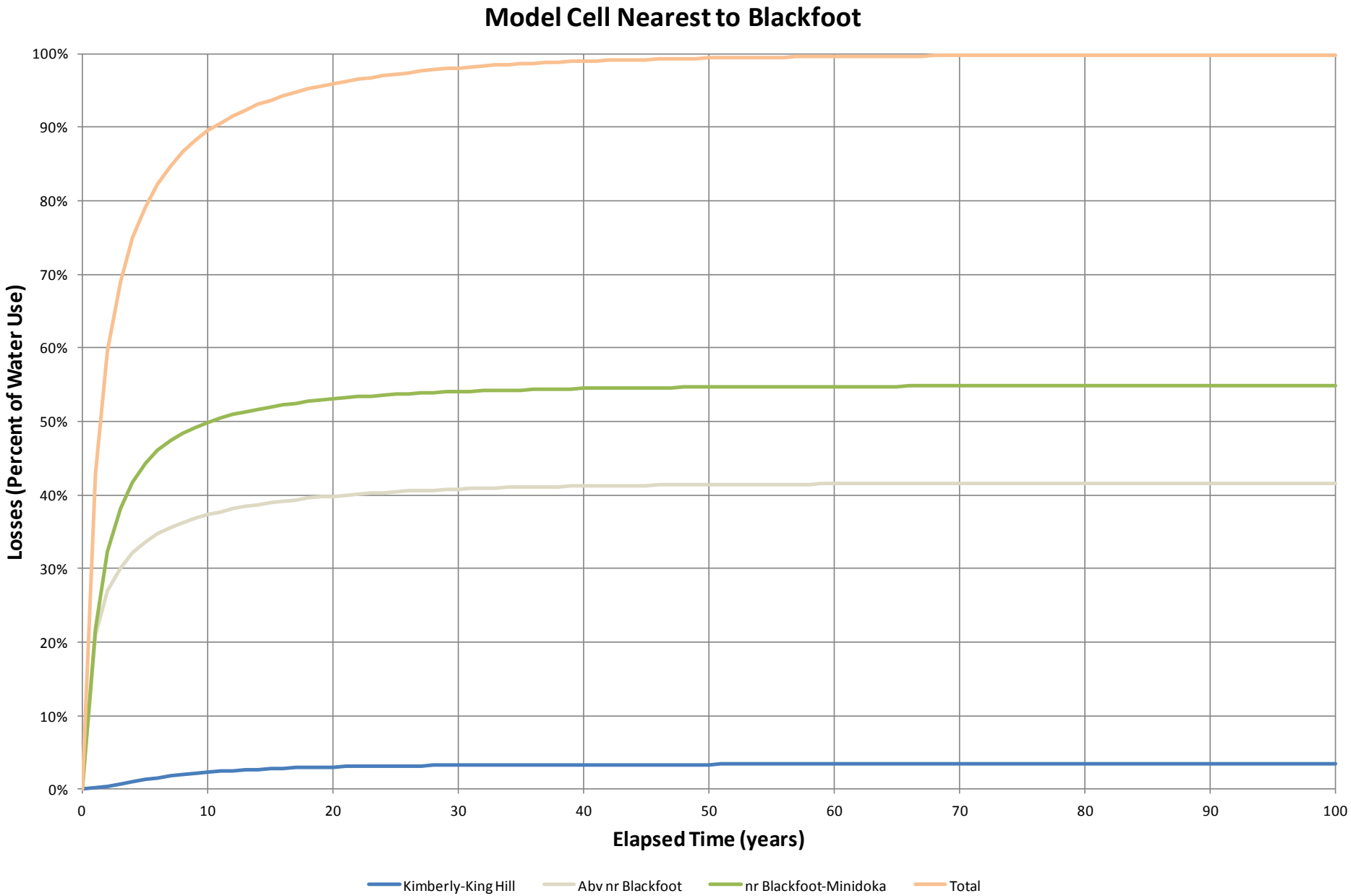

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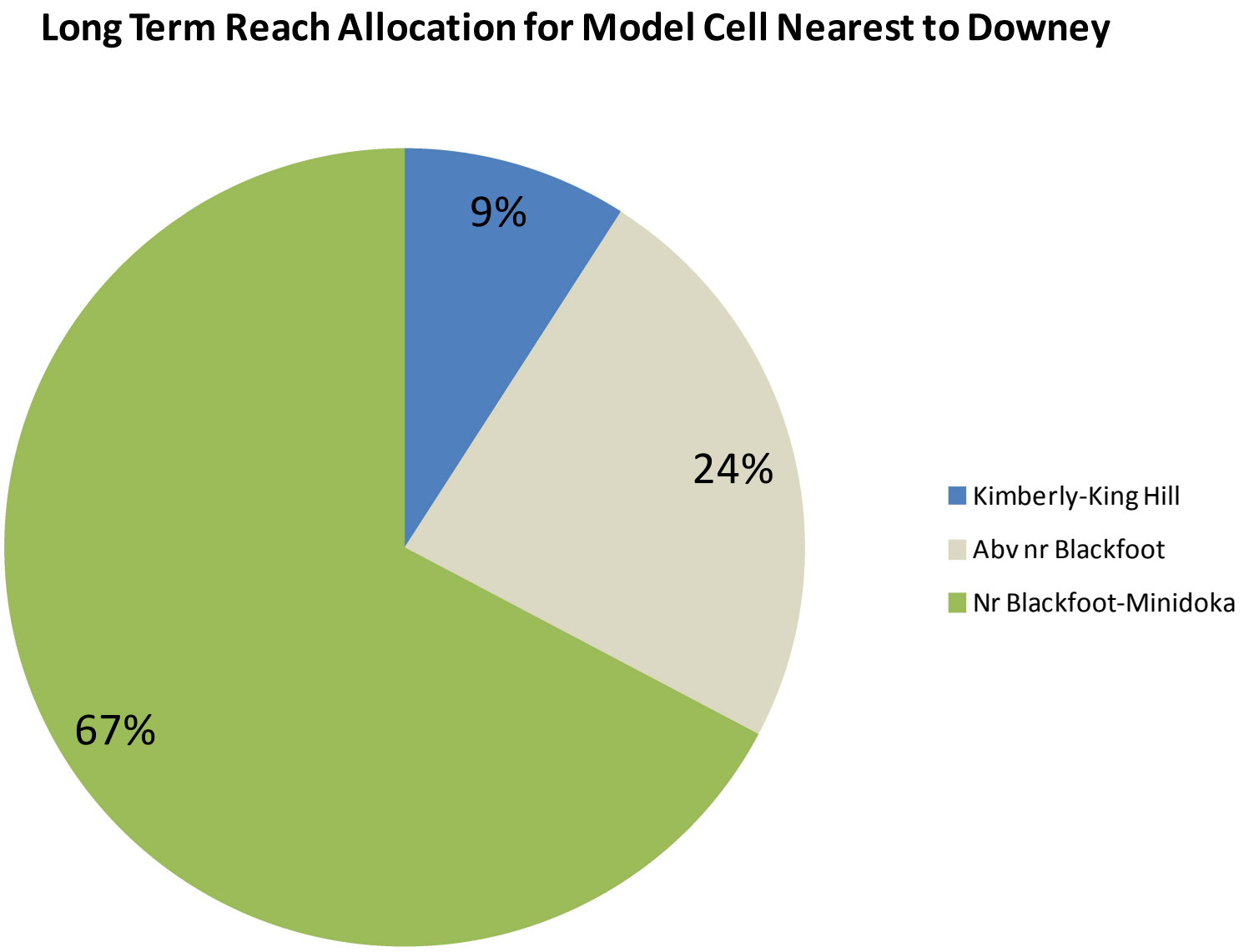

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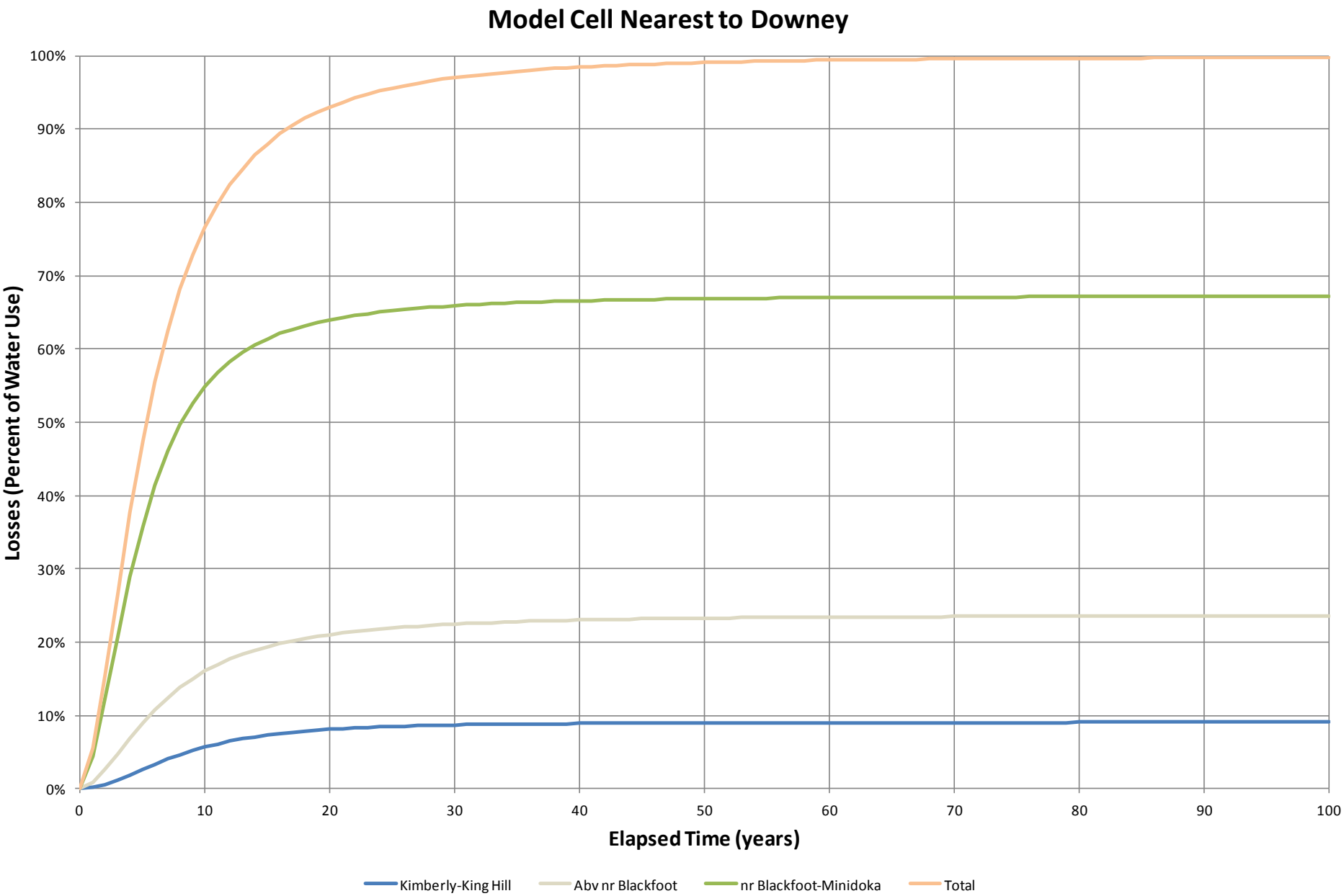

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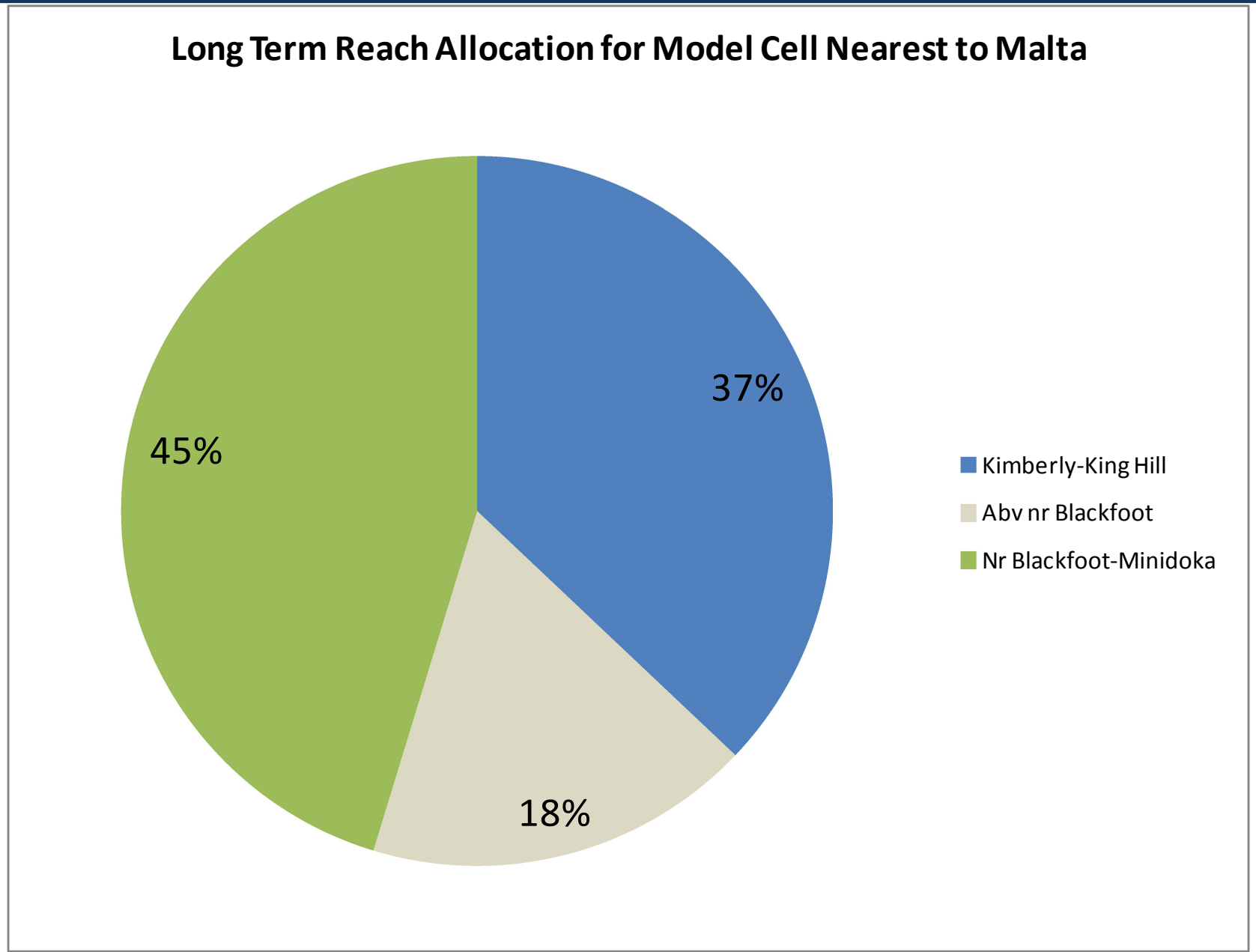

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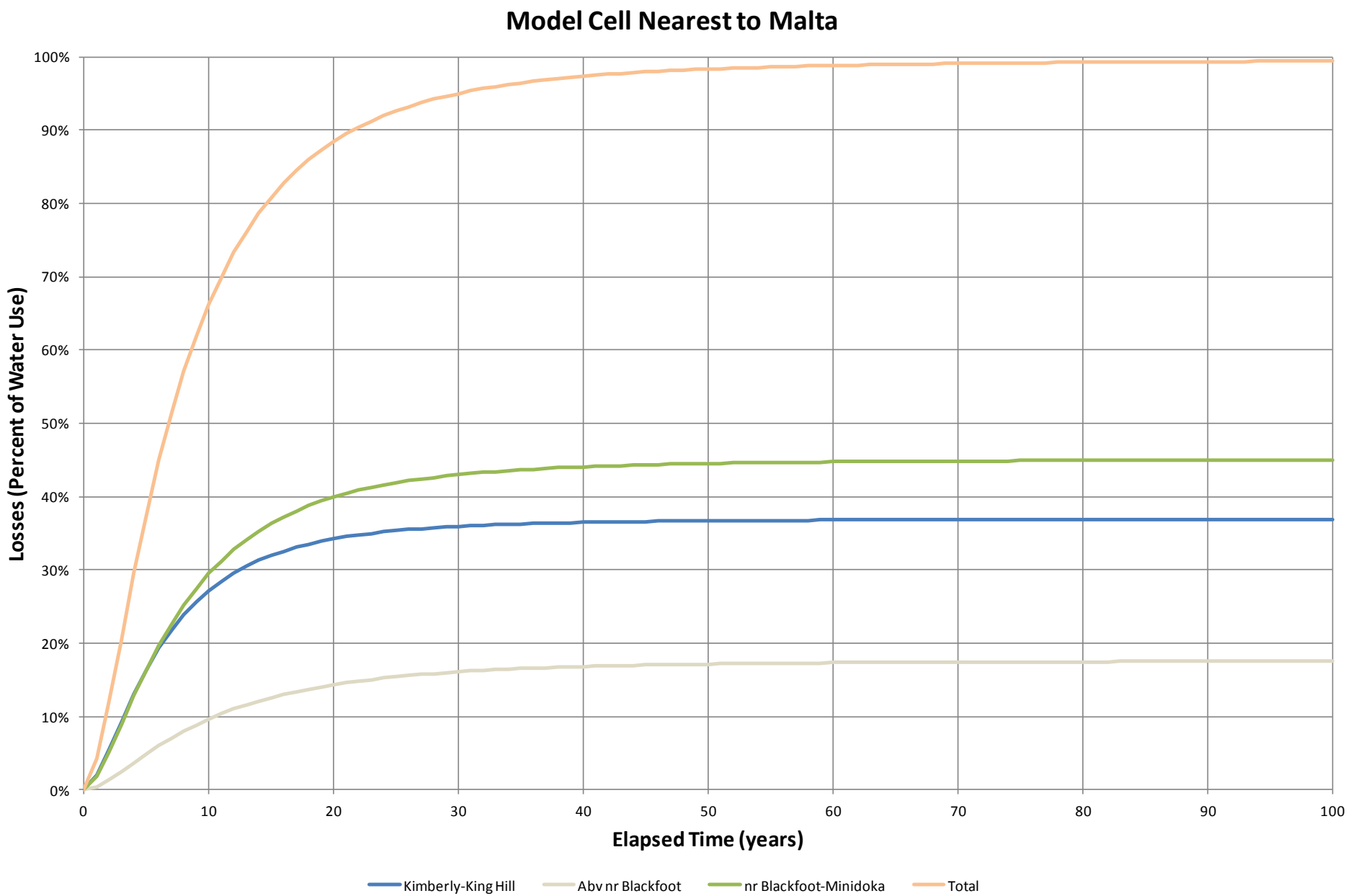

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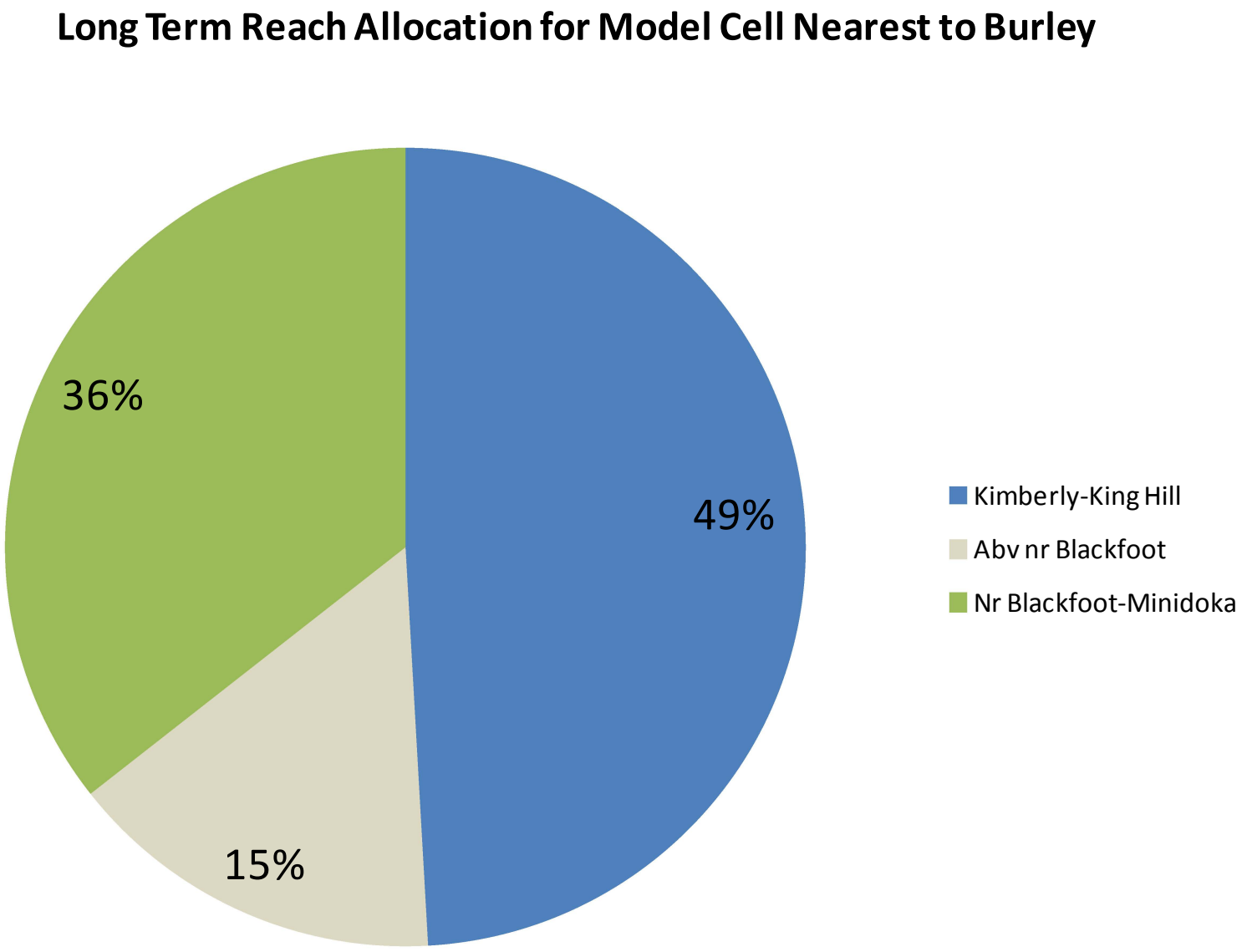

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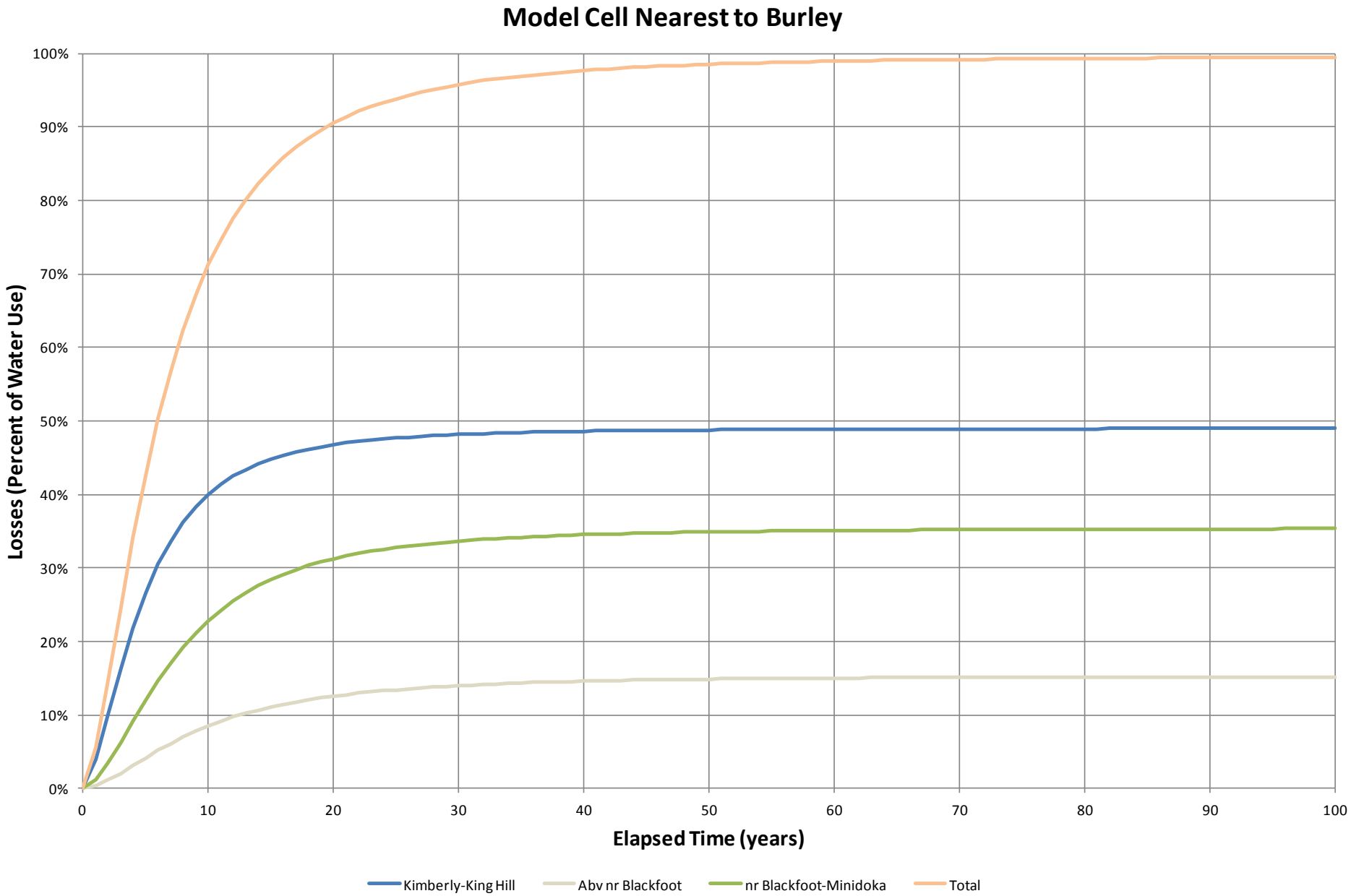

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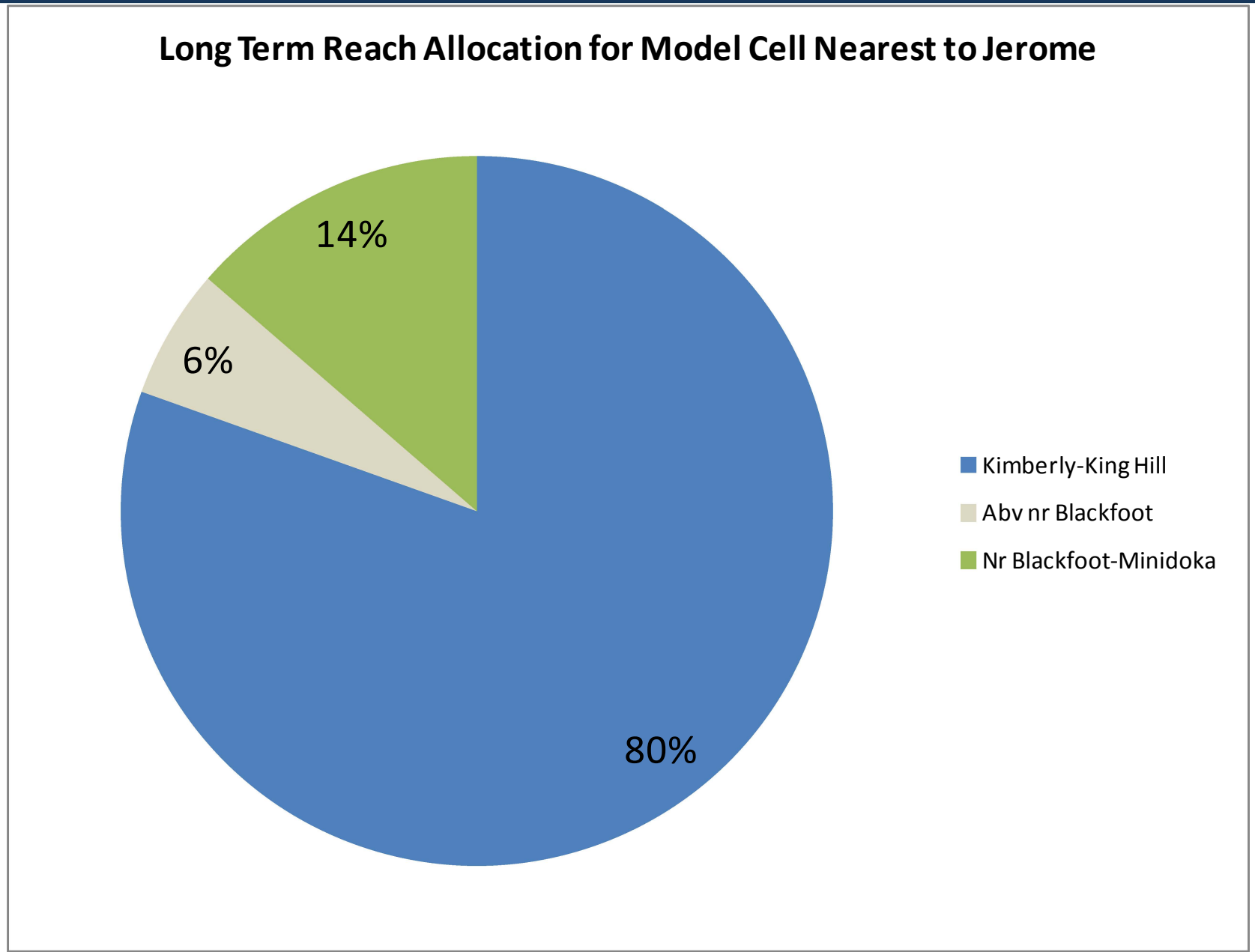

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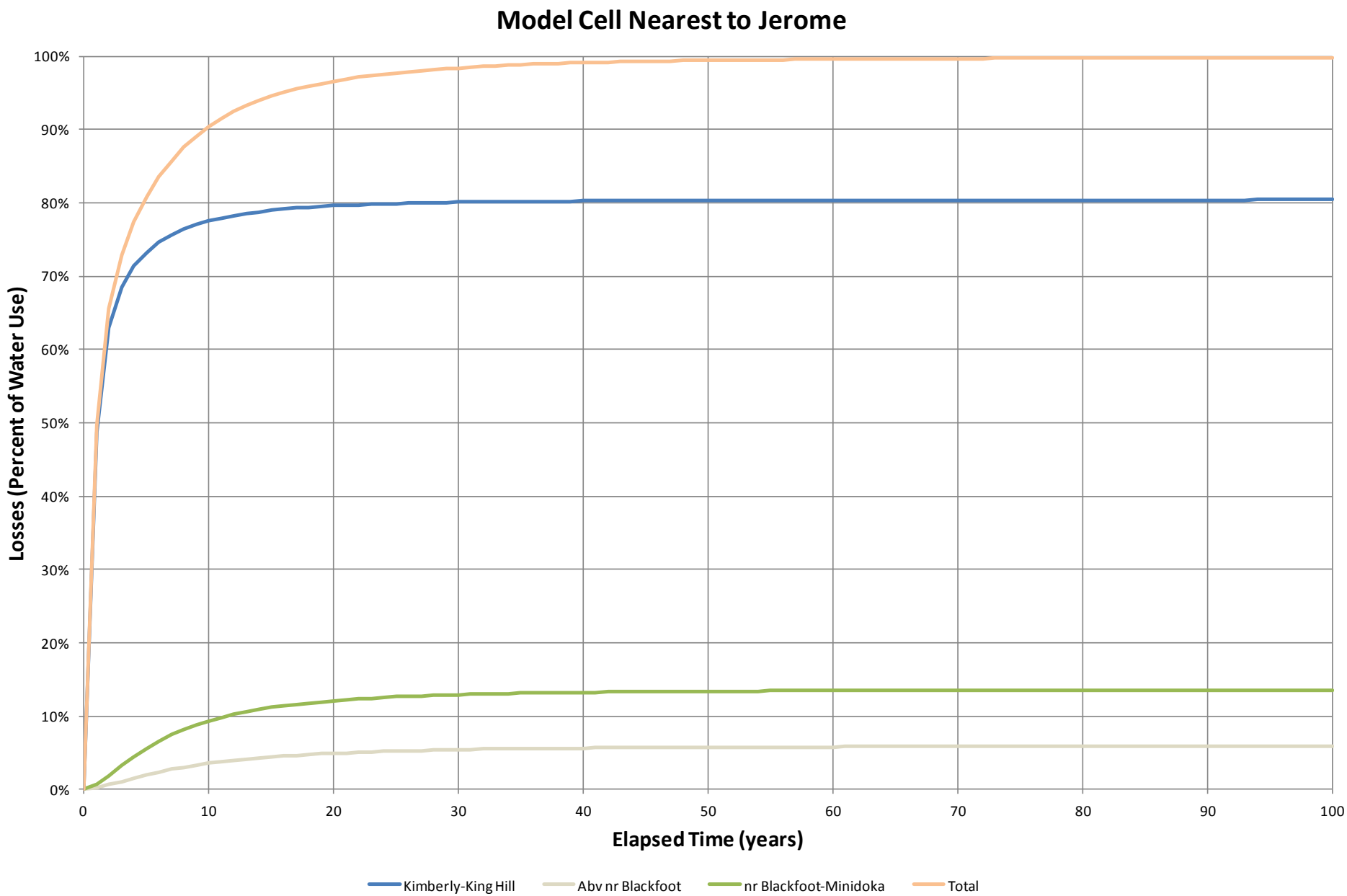

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