

STATE OF COLORADO

Colorado Water Conservation Board

Department of Natural Resources

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MEMORANDUM

To: Colorado Water Conservation Board Members	Bill Owens Governor
From: Randy Seaholm Chief, Water Supply Protection <i>RS</i>	Russell George Executive Director
Date: September 6, 2005	Rod Kuharich CWCB Director
Subject: Agenda Item 15, September 13-14, 2005 Board Meeting -- Colorado River Issues	Rick Brown Acting Deputy Director

The following is an overview of the activities that have occurred over the last couple of months regarding Colorado River issues. Staff would like to review the positions taken and receive any additional guidance the Board would like to offer.

7-State Letter to Reclamation concerning Colorado River Reservoir Operations and the Development of Management Strategies for Lakes Powell and Mead Under Low Reservoir Conditions Pursuant to Interior's Federal Register Notice of June 15, 2005.

The most recent meeting was held in San Diego, California on August 25th. Mark Limbaugh, newly appointed assistant secretary at Interior, along with several folks from Reclamation were in attendance. In total, there were approximately 50 people present with each of the Basin states having 2 or 3 representatives, and the rest representing the major water users in Arizona and California.

7-State Letter

The purpose of this letter is for all parties involved to lay everything, including legal positions that are considered sacred, on the table for discussion. Several versions of the proposed letter had been circulated in advance of the meeting, thus the contents of the letter were fairly well agreed upon prior to the meeting. The letter is to be nothing more than a list of topics for discussion; there are absolutely no agreements on anything implied or otherwise.

However, even with these understandings, California and Nevada were still at odds over language under the "Augmentation of Supply" portion of the letter. Nevada wanted language that was more specific with respect to augmentation for their proposed Virgin River Project, while California wanted language that was more neutral and that did not force project specific issues at this point. New Mexico and Arizona also had some small but substantive changes to the letter, which were incorporated without any significant debate. There was brief discussion

about what might happen absent a united 7-State position. In the end, California and Nevada worked out their differences and all 7-states agreed to sign the letter.

The letter outlined a three pronged approach; conjunctive management of Lakes Powell and Mead under low reservoir conditions done in concert with Lower Basin shortage criteria, system efficiency improvements, and Colorado River Water supply augmentation. The letter was sent to Reclamation by the August 31st deadline. We hope to have a signed copy of the letter available to attach, if not we will provide it at the Board meeting.

7-State Technical Workgroup Model Runs

Early model runs demonstrated that there are several ways to maintain more storage in Lake Powell during low reservoir conditions and reduce the magnitude and frequency of shortages to the Lower Basin. The model runs also show that based on the historic record to date and current operations pursuant to the Coordinated Long-Range Operating Criteria that there is virtually no chance that the Upper Basin will fail to meet the 75 in10 requirement in the compact. Furthermore, there is only about 10% chance that Lake Powell would fall below minimum power pool elevation (3490). The runs show that there are some reasonable ways to reduce the 10% chance of going below minimum power pool elevation at Powell down to 1 or 2%, but no way to totally eliminate it simply because of adverse hydrology, which in combination with some minor Upper Basin development over the next 10-20 years just leaves the system short. Certain options benefiting Lake Powell could be implemented without any significant harm to the Lower Basin, but given the premise that there must be some benefit to both basins, would not be implemented.

The second round of model runs are briefly discussed in the attached PowerPoint presentation. The seven additional model runs compare alternative operations to the existing Coordinated Long-Range Operating Criteria (Lake Powell Normal). These model runs fall into two categories, those that define releases at critical operating elevations in Powell, which sometimes are associated with critical operating elevations in Mead, and runs that seek to simply balance contents between Powell and Mead when critical elevations at either Powell or Mead are reached. The Technical Group agreed that "TieredRel_rev1" and "DD2_rev1" should be pursued further. "TieredRel_rev1" is a targeted approach proposed by the Upper Basin. "DD2_rev1" is a content balancing approach proposed by the Lower Basin. These two model runs have the greatest potential for further refinements that would provide benefits to both basins and do so in a fairly equitable fashion. The Technical Group will meet on September 7th in Phoenix to further refine those two model runs. Once those runs have been further refined, different Lower Basin shortage strategies can be developed and evaluated, including some that incorporate certain levels of Lower Basin conservation before critical elevations that cause implementation of shortage criteria are necessary. The one thing that is becoming increasingly clear is that operations that benefit both basins under low reservoir conditions can be developed. If a particular low reservoir operation is agreed too and hydrologic conditions warrant, such would be tested on an interim basis at least through 2016 and if found to be acceptable, could ultimately result in some changes to the Coordinated Long-Range Operating Criteria.

Next Steps

1. Reclamation will review the states letter and all other public comment received in response to the June 15th Federal Register Notice.
 - a. They plan to move forward with formal public scoping in September.
 - b. Public meetings will be held in October and November; number, locations and times yet to be determined.
 - c. Scoping will be completed by February 1. It was noted that the Secretary was not likely to extend the current schedule given her mandate for completing this effort.
 - d. It was noted that it will not be possible to consider everything outlined in the states letter in one NEPA process and that certain studies or even NEPA compliance actions were already under way with respect to several of the items identified as necessary for system efficiency improvements. There will be several separate processes and each should acknowledge the overall scope of the efforts outlined in the letter.
 - e. There will be follow-up discussion of how to utilize the MSCP to provide or assist with any Biological Opinions for any of the contemplated actions.
2. The states need to break down the items in the letter and divide into smaller groups to work on some of those matters, bringing them back to the group as a whole to work on. It is anticipated that the Technical Workgroup studies will raise broader policy questions for the group to discuss as well. The initial work should perhaps focus in the following areas:
 - a. Work on Nevada's immediate water supply needs (Nevada Plan).
 - b. Conjunctive Reservoir Management Workgroup must continue.
 - i. Part of this effort needs to include work by a legal committee to develop a "no-call" strategy and how to implement such. Need to evaluate how such a strategy affects the Long-Range Operating Criteria, 602(a) storage and equalization.
 - c. Precipitation Augmentation – Upper Basin needs to coordinate efforts and develop a plan. Utah and Colorado will work on a white-paper for weather modification efforts.
 - d. Arizona will take the lead on researching Tamarisk control.
 - e. Nevada will research Desalination issues.
 - f. Arizona will develop a white-paper on re-regulatory storage projects and needs. It was noted that it's very difficult to manage 5.0 maf of water efficiently with just 70,000 af of regulatory storage.
 - i. USBR will assist by providing previous studies and work. Much has already been accomplished with respect to this matter.
 - ii. There are also Salinity Control Program needs for replacement water to offset reject flows from the Yuma Desalter.
 - iii. There are Yuma Valley and Wellton-Mohawk needs that should be factored in this process.
 - iv. USBR needs to continually review operational changes to the Lower Basin water order process that continue to reduce the amount of excess water going to Mexico. They are currently looking into "take or pay" contracts.
3. Arizona asked specifically how conjunctive reservoir management would get factored in to the Colorado River Annual Operating Plan (AOP) process.
 - a. The actions need to be specific enough to allow AOP's to be developed each year without getting involved in the turf battles such the one currently ongoing.

Questions were raised about the potential need to modify the Long-Range Operating Criteria.

b. How interim are the shortage criteria? Need a committee to discuss.

4. The states will need future letters of understanding and formal agreements on how to accomplish the items outlined in the letter similar in nature to those used for the Interim Surplus Guidelines.

Next Meeting

September 27th in Albuquerque (Colorado River Conference is in Santa Fe the next day)

Colorado River Annual Operating Plan (AOP) Meeting 8/23

The entire AOP for 2006 was reviewed in detail by sections with the usual modifications to proposed reservoir operations and the descriptions of last year's operations. We also received a good briefing about operations at the Colorado River Basin River Forecast Center from NOAA and the Nation Weather Service.

The discussions on the 2006 AOP, which took the majority of the time, focused on the following:

1. 602(a) storage and whether or not it was set at elevation 3630 in Powell for the duration of the Interim Surplus Guidelines or whether it was the greater of either elevation 3630 in Powell or the total storage volume in the primary CRSP units computed using the 602(a) storage algorithm. It was eventually concluded that elevation 3630 in Powell would most likely control operations in 2006.
2. Whether or not there should be a mid-year review of the AOP as provided for in the Secretary of Interior's letter dated May 2, 2005. The Lower Basin was adamantly opposed to any mid-year review and indicated that they would challenge any inclusion of a mid-year review through any and all means. There was considerable discussion about allowing a mid-year review under certain conditions, but such review would have to look at conditions basinwide, not just at Lake Powell. The question was raised as to why the Interim Surplus Guidelines allowed for a mid-year review but the same approach couldn't work in this instance. No conclusion was reached during the meeting. Reclamation is currently discussing language that would provide for a mid-year review under certain reservoir conditions, such as those encountered in Lake Powell during September 2004 (the low point in the current drought).

Highlights from the AOP (Entire AOP is available on the USBR website)

- The drought monitor indicates a significant decrease in the intensity of the drought as compared to 1-year ago.
- Powell storage increased from 33% of capacity on April 8th 2005 to 52% of capacity (12.2 maf) on July 14th, an increase of slight more than 50 feet in elevation.
- Unregulated April to July inflow into Lake Powell was 111% of average do mainly to 148% of average inflow from the San Juan. Inflow into Flaming Gorge on the Green River was 93% of average and inflow into Blue Mesa, which was projected to be over 100% at the end of May, was only 82% of average. The most probable inflow into Lake Powell for the 2006 WY is presently forecasted to be 11.5 maf or 95% of average.

Therefore, storage in Lake Powell should increase approximately another 2.0 maf if the forecast holds.

- Special releases from Lake Powell are anticipated, based on recommendations from the AMWG to Interior. The current proposal is that during September and October 2005 there would be alternating 2-week periods between a steady flow of 8,000 cfs and a fluctuating flow between 6,500 cfs and 9,000 cfs. Then beginning on January 1, 2006 and extending through March high fluctuating flows designed to suppress non-native fish (mainly trout) will be made. These will range from 5,000 to 20,000 cfs depending on power needs except on Sundays when the range will be limited to between 5,000 and 8,000 cfs. However, there remains some debate on this experiment and there is a possibility it may change.
- Lake Mead currently sits at 59% of capacity with 15.3 maf of live storage available, which is 90 feet in elevation above minimum power pool and Nevada's upper intake.
- Overall system storage is 60% of capacity and most of the tributary reservoirs are at or near full.
- Total Lower Basin tributary inflow to date this water year is approximately 2.85 maf and that is after the depleted tributary reservoir storage was filled. By comparison, the long-term average is 1.3 maf.
- Excess flows to Mexico for this water year to date are approximately 148,000 af, which isn't too bad given the monsoon season this year. Mexico is scheduled to receive 1.5 maf in both 2005 and 2006.
- EIS operations to meet endangered fish needs below Flaming Gorge, Aspinall and Navajo continue.
- No work on repairs to Senator Wash are in progress, plans to dredge the basin behind Laguna Dam to restore storage capacity are under development, studies to develop additional storage along the All-American Canal near Drop 2 continue, however, a class action lawsuit has been filed in attempts to stop this effort.
- The Yuma Desalter was not operated during 2005 and operation is not anticipated in 2006.

Upper Basin Hydrologic Determination

In order for New Mexico to construct the Gallup-Navajo Project within their compact apportionment, they need to have the hydrologic determination increased enough for them to get an additional 10,000 AF +/- of apportionment. Thus, the determination needs to increase from the current 6.0 maf to approximately 6.1 maf (New Mexico getting 11.5%). Staff is working with Reclamation and other members of the Upper Colorado River Commission Engineering Committee on this effort. An increase of 100,000 af would mean an additional 51,750 af would be available to Colorado. Every factor affecting the determination is being closely reviewed. Factors include among others, available storage, current levels of depletions and the amount of shortage that they experience, reservoir siltation, and incidental losses. Depending on the validity of the available data and certain assumptions selected, it appears that the determination could be as high as 6.5 maf. As further progress is made on this effort, such will be discussed with the Board.

Attachment

RECLAMATION

Managing Water in the West

Concepts from Recent Technical Modeling Effort

Basin States Meeting
San Diego, California
August 25, 2005



U.S. Department of the Interior
Bureau of Reclamation

Explanation of Model Run Scenarios and Selected Results

(Elevation in feet; Volume in million acre-feet)

Powell Elevation	Powell Release Strategy								Powell Elevation
	PowellNormal	R1	R2	Normal_8.5_602a3630	TieredRel_rev1	RevTieredRel_rev1	DD2_rev1	DD2_rev2	
3700	Equalize according to 602a algorithm with additional constraint of 3630 until 2016, or 8.23	Equalize or 7.5	If Mead > 1100, 7.5 <						

Common Assumptions

1. Lower Basin shortage strategy: 80P1050_600 and Absolute Protect 1000 (2006-2011), Absolute Protect 1000 (2012-2025)
2. Initial elevation (content): Powell = 3608.56 (12.60), Mead = 1135.50 (14.92)
3. Surplus in accordance with ISG (2007-2016)
4. 602a storage requirement for equalization is 14.85 (elevation 3630) from 2006-2025, except under PowellNormal and R2 (no equalization in R2)

RECLAMATION

Explanation of Model Run Scenarios and Selected Results
10 Year Period (2006-2015)

		Powell Normal 10yr	R1 10yr	R2 10yr	Normal_8.5_ 602a3630 10yr	TieredRel_ rev1 10yr	RevTiered Rel_rev1 10yr	DD2_rev1 10yr	DD2_rev2 10yr
Effects on Shortage	Probability of Shortage any time in the period	9%	4%	20%	0%	7%	6%	3%	26%
	rank	6	3	7	1	5	4	2	8
	Average cumulative Shortage over the period	0.053	0.027	0.127	0	0.054	0.050	0.027	0.317
	rank	5	2	7	1	6	4	2	8
Effects on Storage	50th percentile Powell elevation at the end of the period	3642	3630	3668	3621	3621	3621	3621	3635
	rank	2	4	1	5	5	5	5	3
	10th percentile Powell elevation at the end of the period	3563	3548	3581	3529	3549	3551	3530	3574
	rank	3	6	1	8	5	4	7	2
	50th percentile Mead elevation at the end of the period	1114	1116	1074	1131	1131	1131	1126	1121
	rank	7	6	8	1	1	1	4	5
	10th percentile Mead elevation at the end of the period	1007	1030	1019	1046	1030	1026	1062	1022
	rank	8	3	7	2	3	5	1	6
Effects on Power Pool	Probability of Powell below power pool any time in the period	4%	3%	3%	13%	1%	3%	3%	0%
	rank	7	3	3	8	2	3	3	1
	Probability of Mead below 1050 any time in the period	22%	16%	41%	11%	13%	14%	4%	37%
	rank	6	5	8	2	3	4	1	7
Effects on Recreation	Probability of Powell below 3570 any time in the period	44%	41%	26%	50%	50%	50%	50%	32%
	rank	4	3	1	5	5	5	5	2
	Probability of Mead below 1120 any time in the period	70%	80%	97%	59%	59%	59%	59%	80%
	rank	5	6	8	1	1	1	1	6
Effects on Surplus	Average probability of Surplus over the period	48%	42%	25%	56%	56%	56%	56%	42%
	rank	5	6	8	1	1	1	1	6

Ranking Legend:

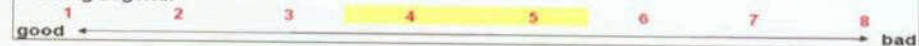
1 2 3 4 5 6 7 8
good ← → bad

RECLAMATION

Explanation of Model Run Scenarios and Selected Results
20 Year Period (2016-2025)

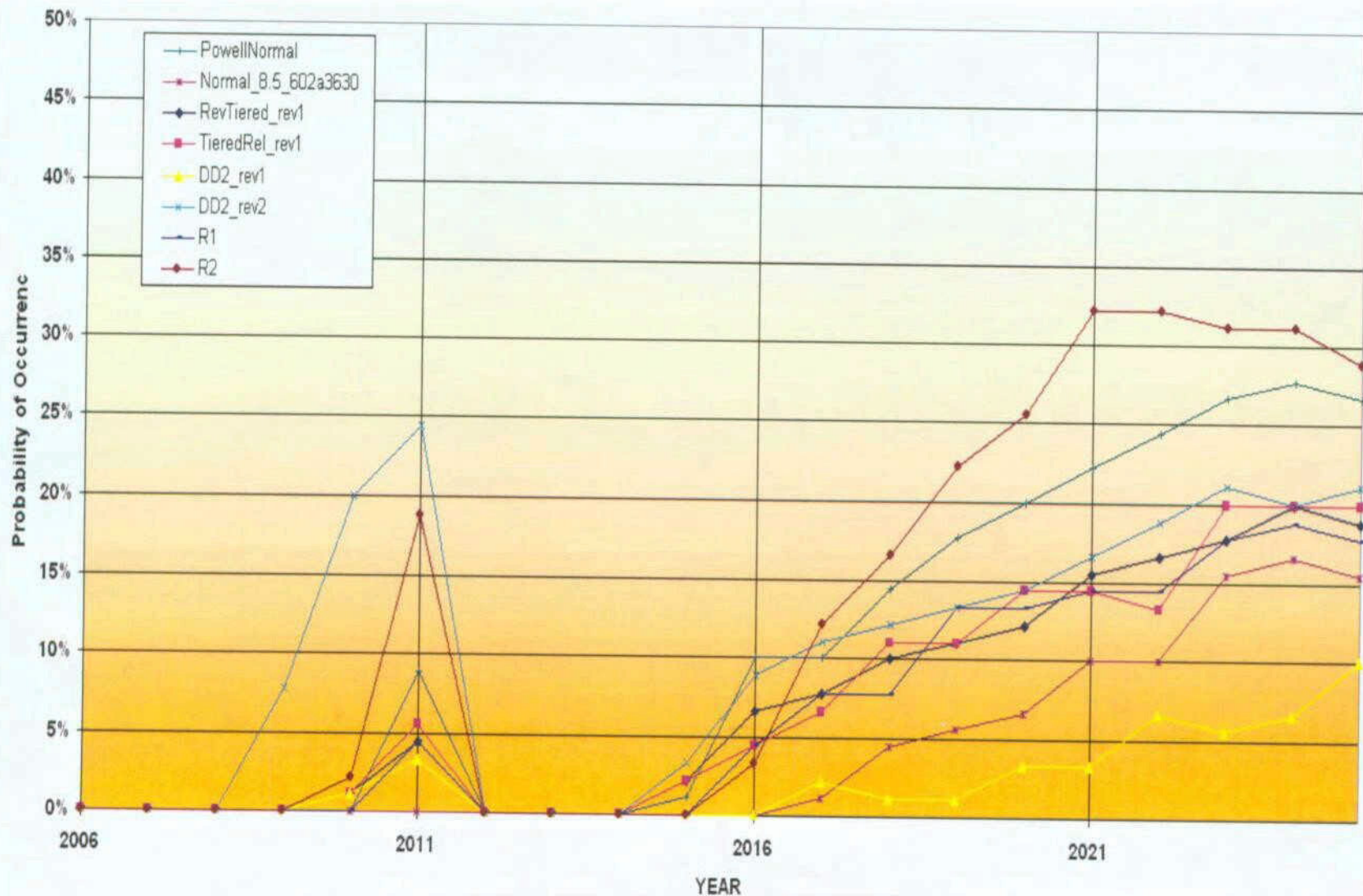
		Powell Normal 20yr	R1 20yr	R2 20yr	Normal_8.5_6 02a3630 20yr	TieredRel_ rev1 20yr	RevTiered Rel_rev1 20yr	DD2_rev1 20yr	DD2_rev2 20yr
Effects on Shortage	Probability of Shortage any time in the period	34%	26%	44%	20%	28%	28%	14%	40%
	rank	6	3	8	2	4	4	1	7
	Average cumulative Shortage over the period	1.819	0.927	1.821	0.587	1.34	1.369	0.272	1.229
	rank	7	3	8	2	5	6	1	4
Effects on Storage	50th percentile Powell elevation at the end of the period	3653	3630	3670	3621	3621	3621	3611	3636
	rank	2	4	1	5	5	5	8	3
	10th percentile Powell elevation at the end of the period	3561	3520	3567	3496	3542	3547	3476	3530
	rank	2	6	1	7	4	3	8	5
	50th percentile Mead elevation at the end of the period	1105	1116	1083	1135	1135	1135	1135	1119
	rank	7	6	8	1	1	1	1	5
	10th percentile Mead elevation at the end of the period	1000	1008	1000	1000	1008	1008	1024	1012
	rank	6	3	6	6	3	3	1	2
Effects on Power Pool	Probability of Powell below power pool any time in the period	10%	16%	6%	27%	2%	16%	20%	9%
	rank	4	5	2	8	1	5	7	3
	Probability of Mead below 1050 any time in the period	44%	34%	54%	32%	33%	33%	29%	59%
	rank	6	5	7	2	3	3	1	8
Effects on Recreation	Probability of Powell below 3570 any time in the period	58%	59%	31%	69%	69%	69%	69%	50%
	rank	3	4	1	5	5	5	5	2
	Probability of Mead below 1120 any time in the period	77%	88%	99%	68%	68%	68%	68%	88%
	rank	5	6	8	1	1	1	1	6
Effects on Surplus	Average probability of Surplus over the period	35%	32%	23%	40%	40%	40%	39%	32%
	rank	5	6	8	1	1	1	4	6

Ranking Legend:



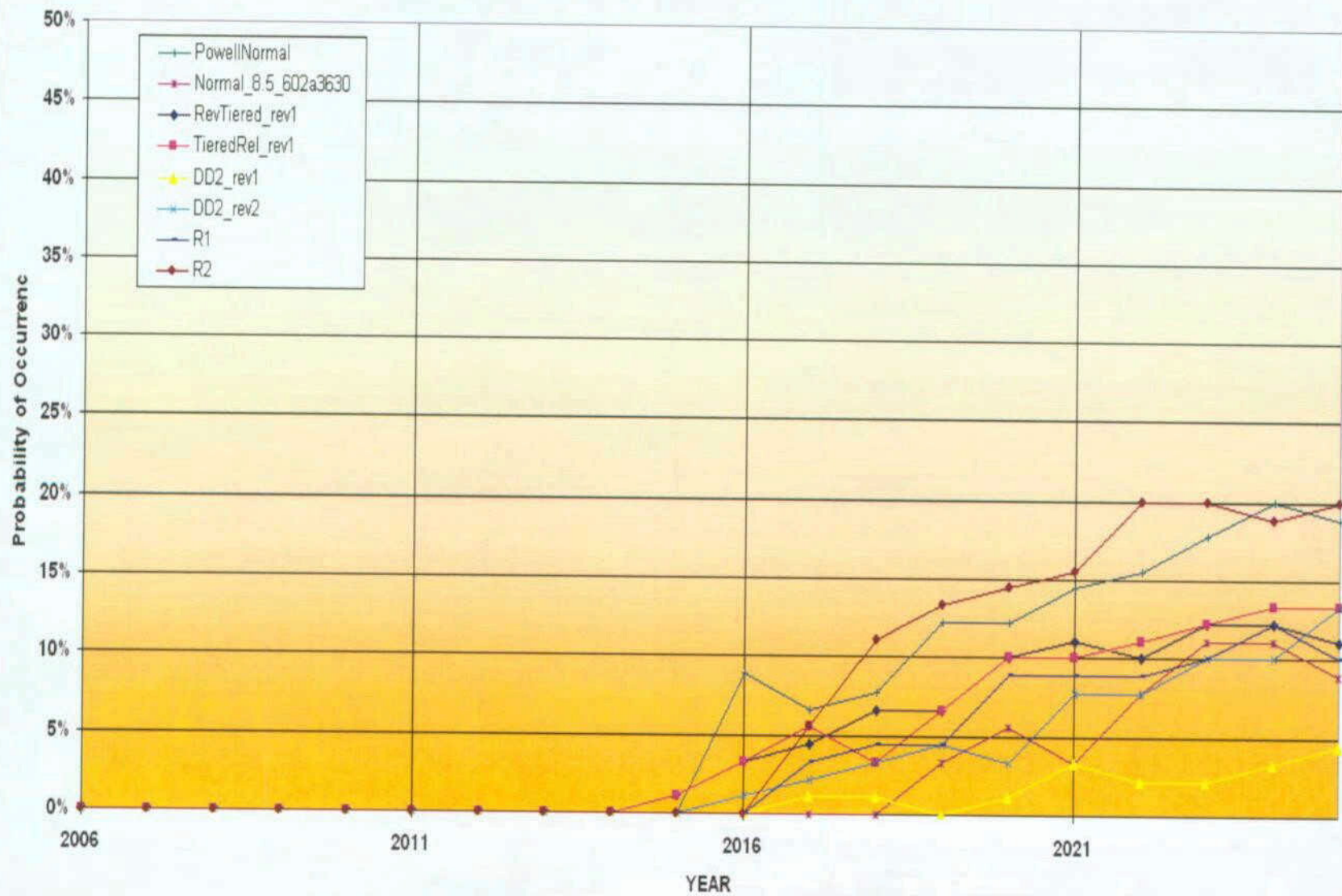
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Probability of Lower Basin & Mexico Shortage



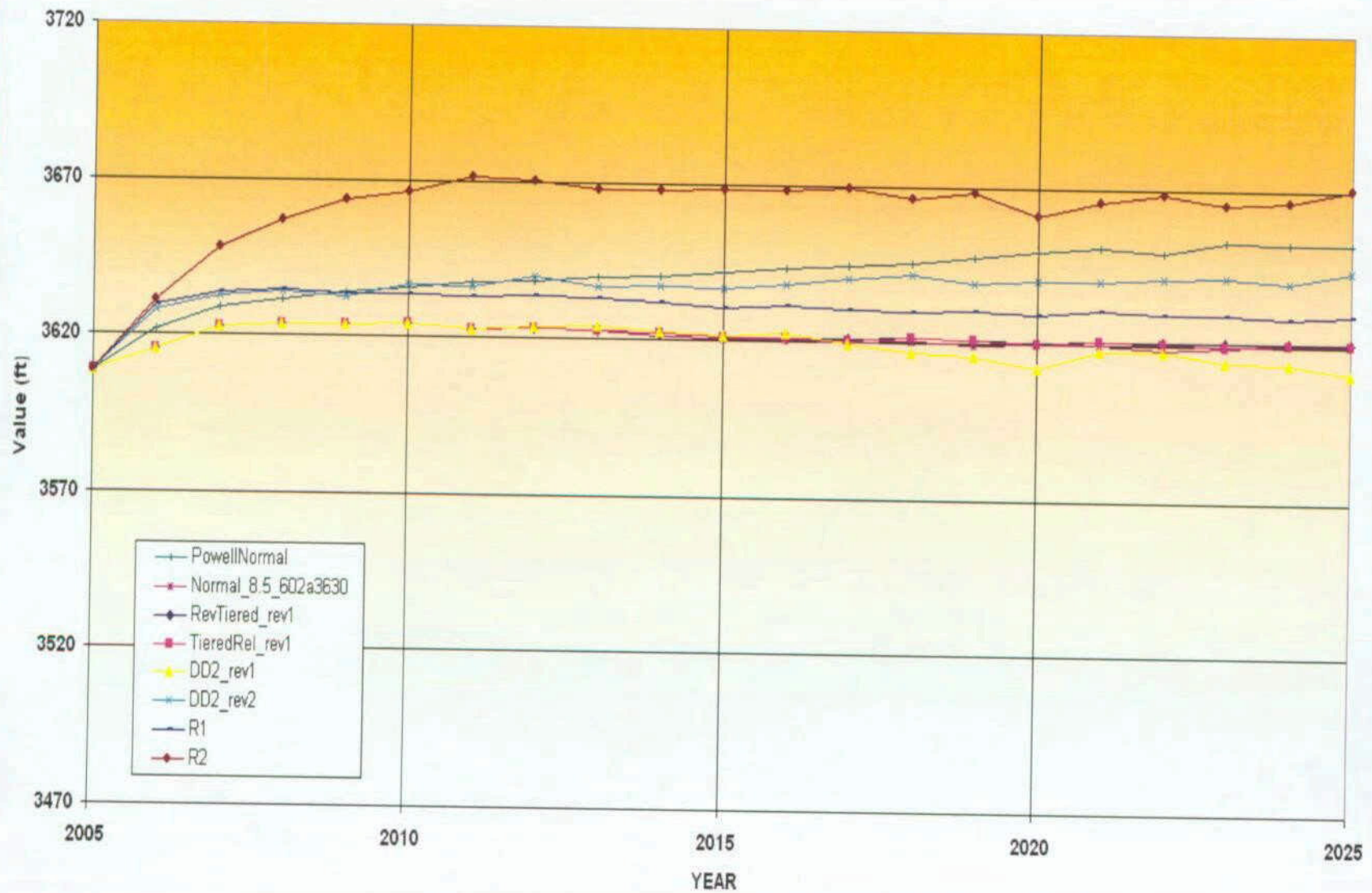
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Probability of Lower Basin & Mexico Shortage Above 600 KAF



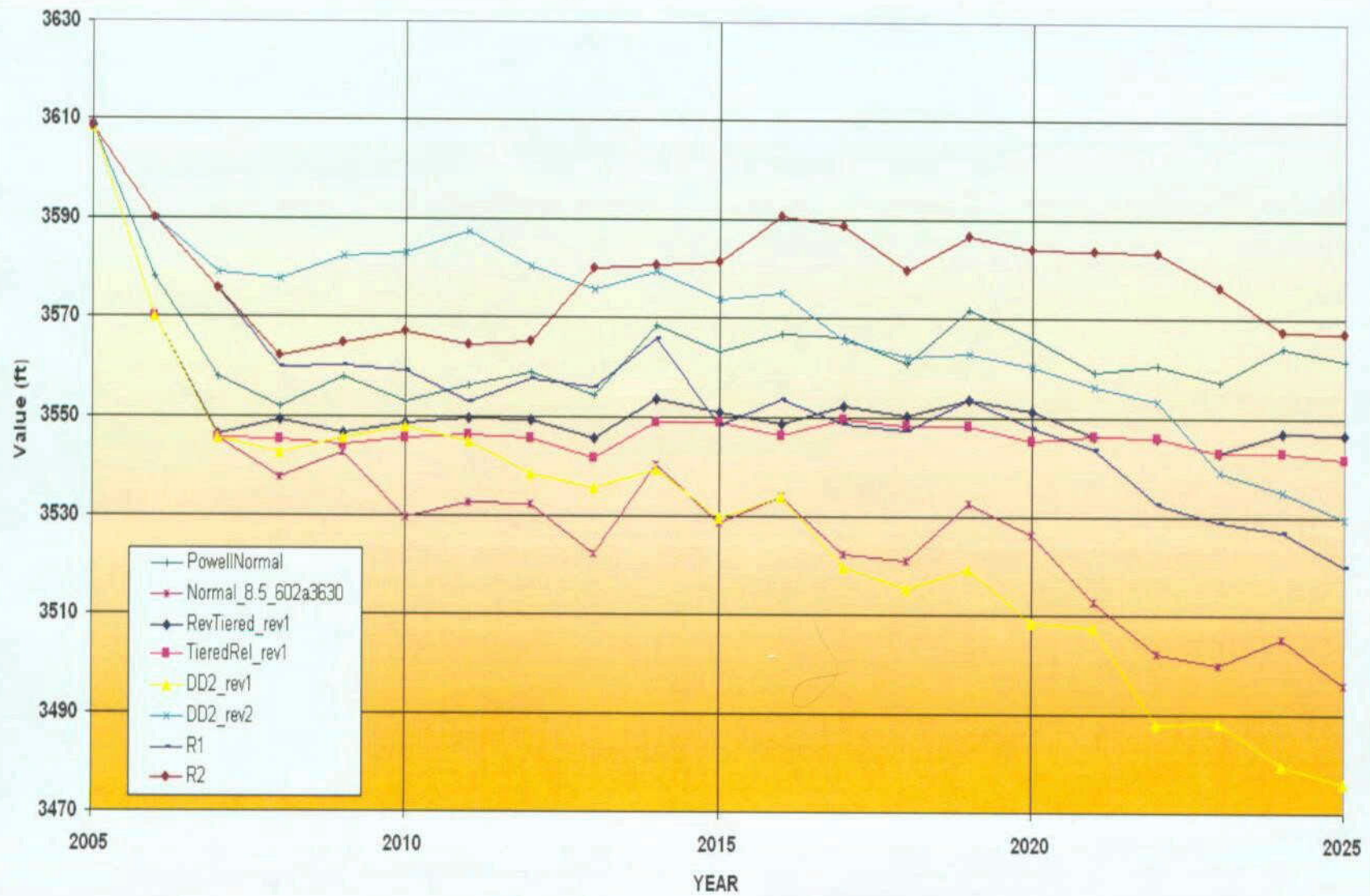
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Powell 50th Percentile Elevations



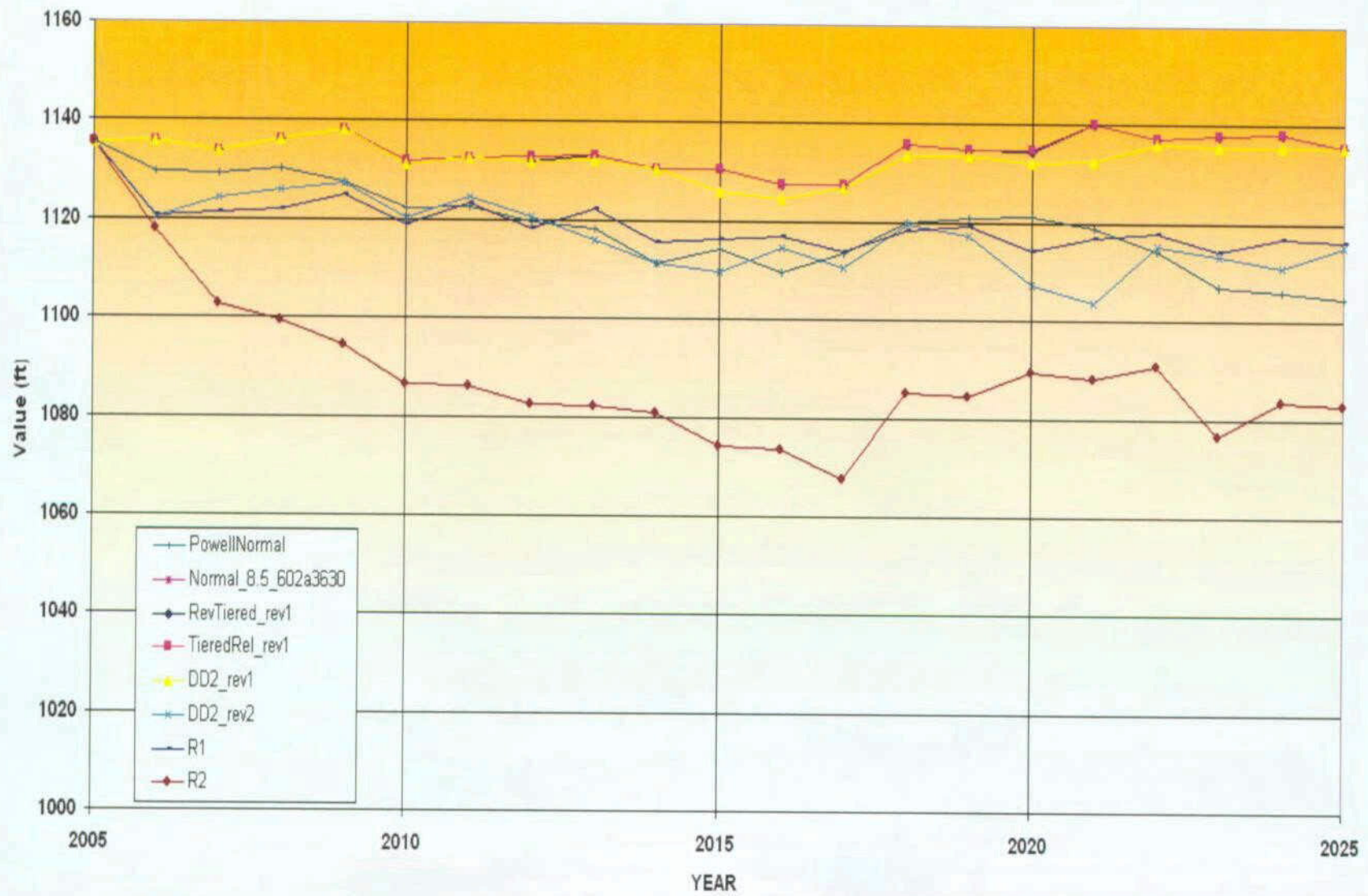
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Powell 10th Percentile Elevations



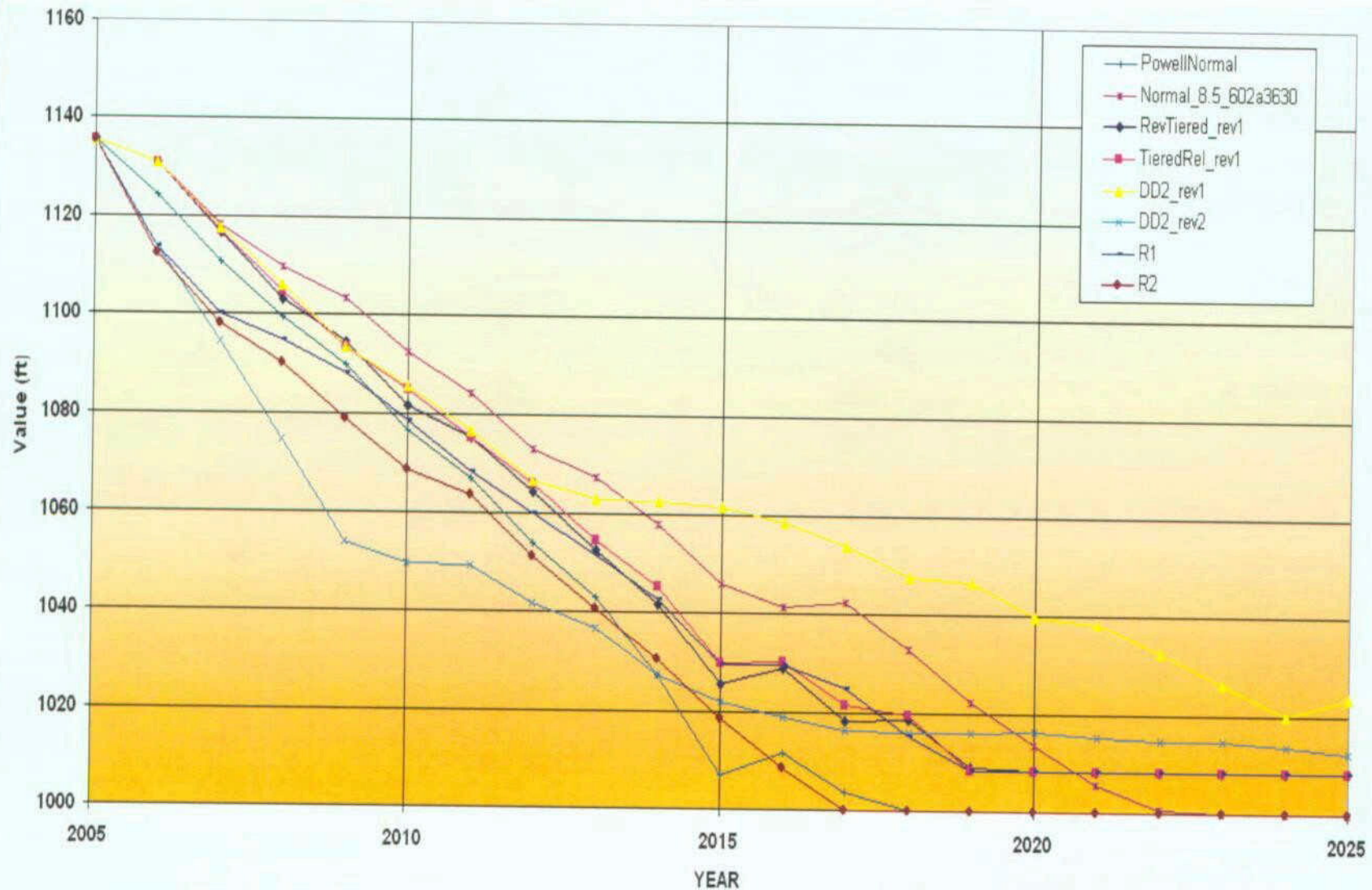
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Mead 50th Percentile Elevations



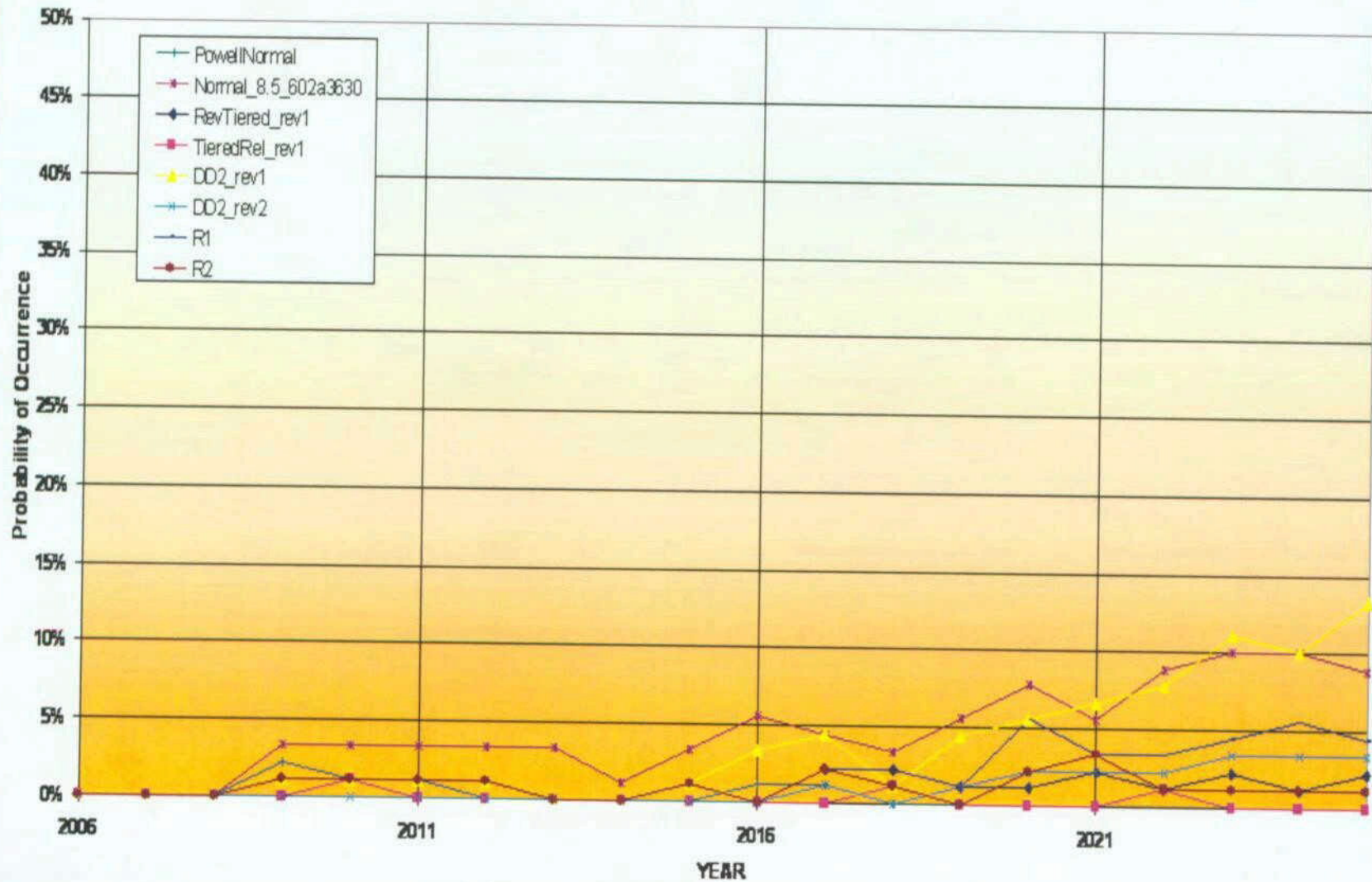
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Mead 10th Percentile Elevations



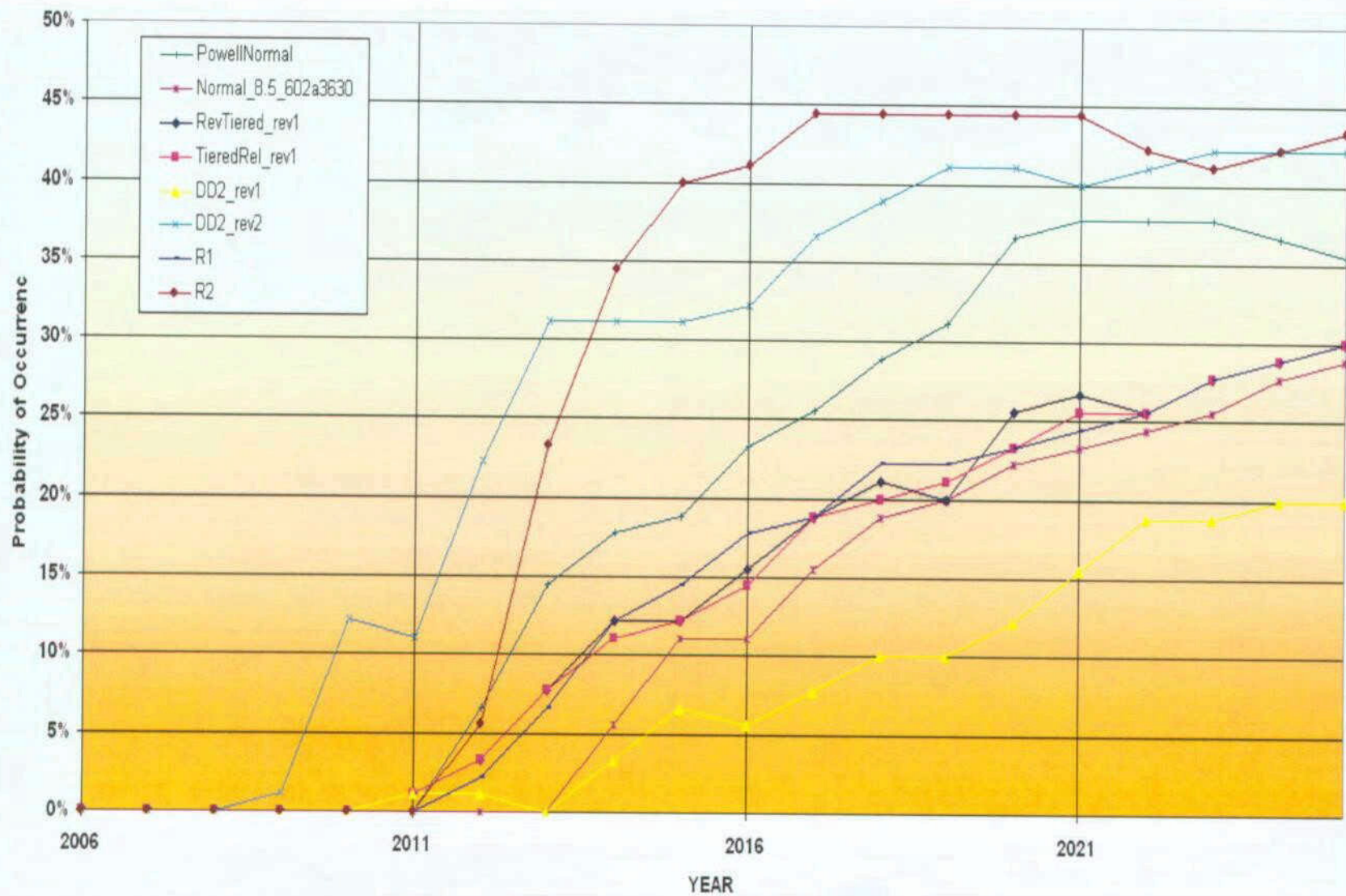
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Probability of Powell Elevation Below 3490 ft



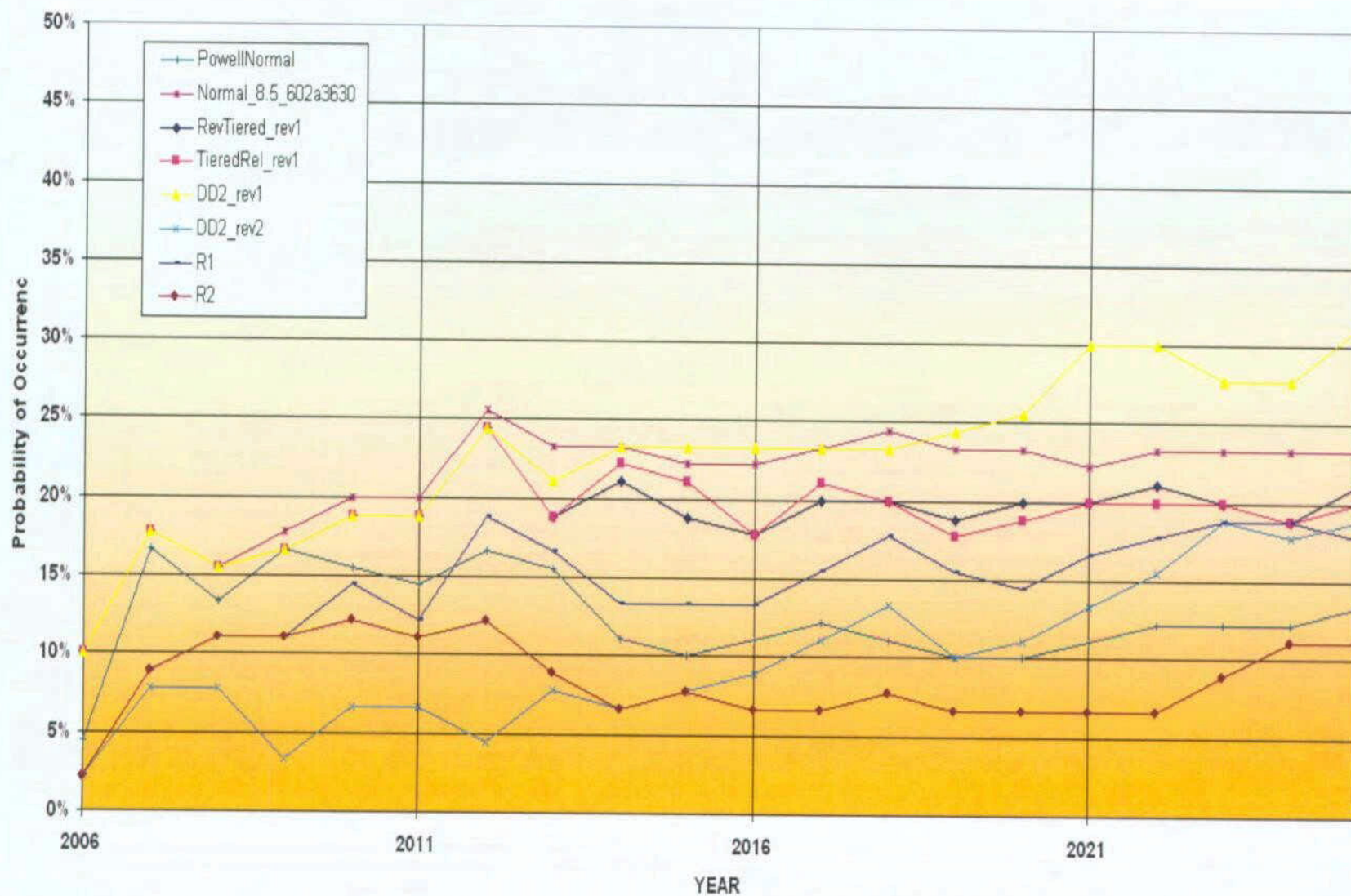
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Probability of Mead Elevation Below 1050 ft



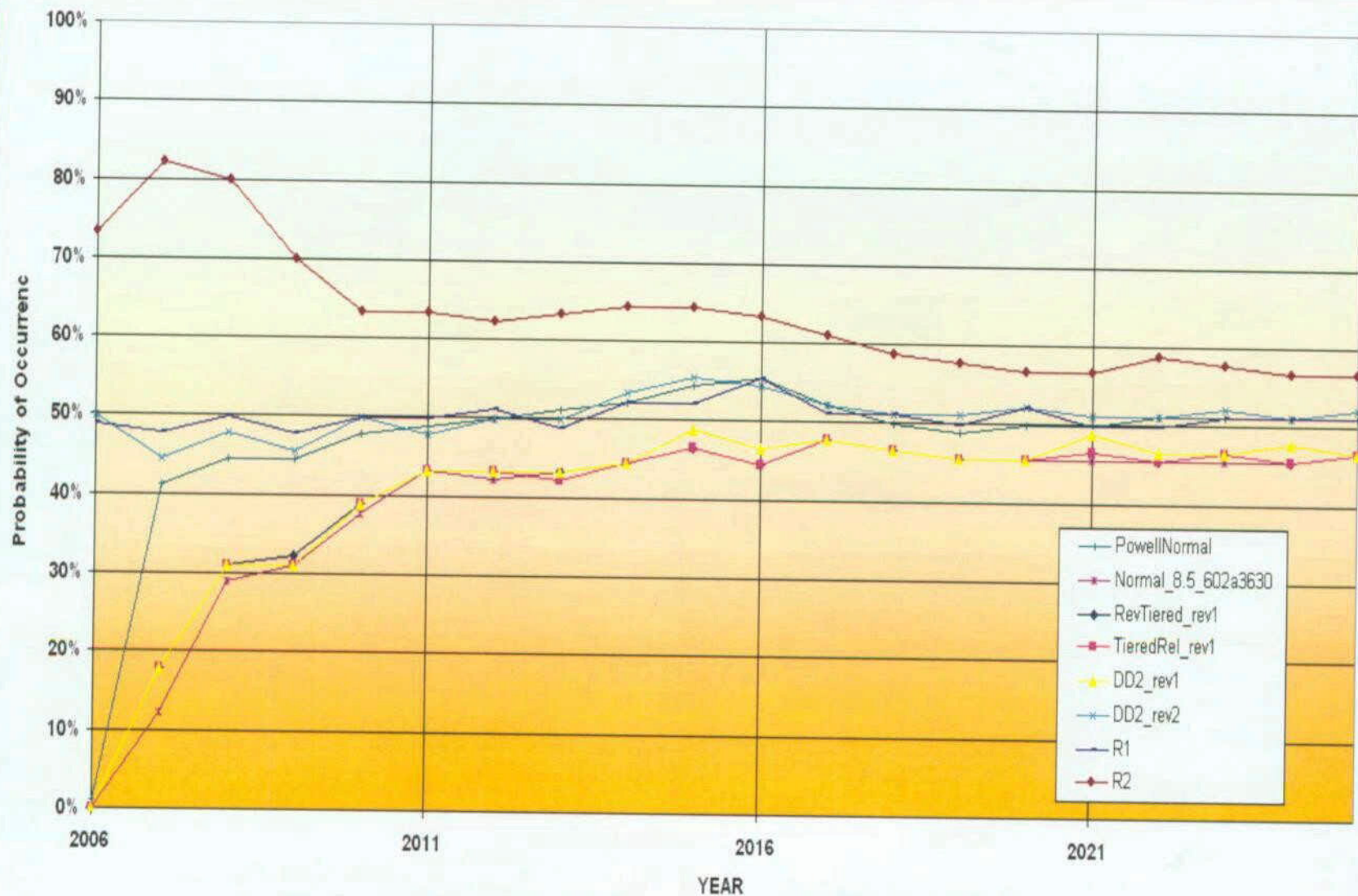
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Probability of Powell Elevation Below 3570 ft



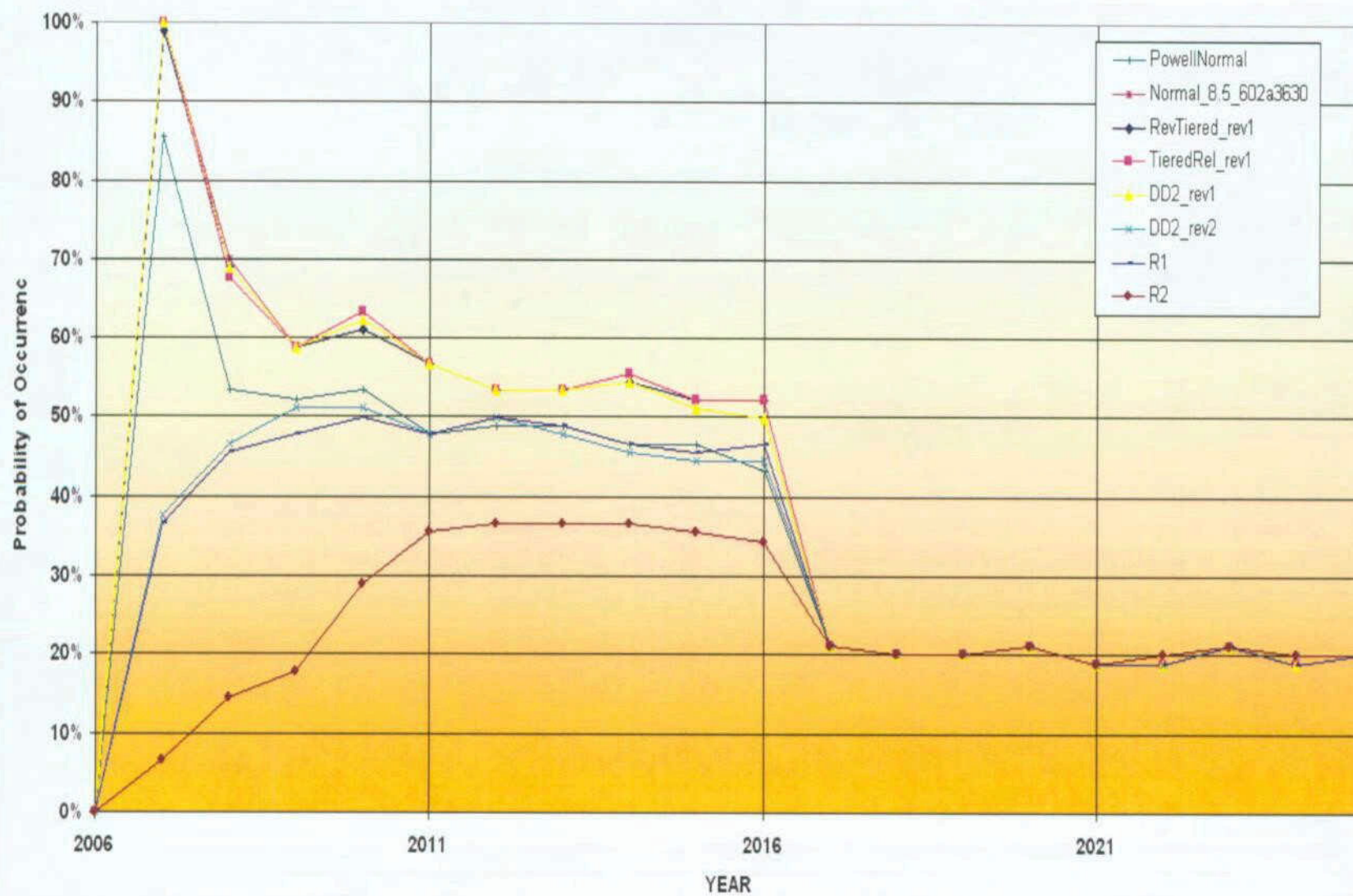
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Probability of Mead Elevation Below 1120 ft



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Probability of Lower Basin Surplus



RECLAMATION

Concepts from Recent Technical Modeling Effort

- Conclusion
- Next steps



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